EGARA answers consultation lead in batteries

1. The last adaptation report
on exemption 5 concluded with the following statement: "It is also
presumed that in cases where a dual battery system is in use, the use of a LAB [lead-acid battery] as an auxiliary battery would not be avoidable even where starter functionality is not needed. This is based on the understanding that there is a lack of experience with batteries other than LAB for this function, though this could change over the next few years, as Li-Ion batteries [LIB] are understood to provide a suitable candidate for such cases. Three to five years are envisioned to be needed in this case to allow reaching parity of cold cranking performance. As replacement with Li-Ion batteries is not yet implemented in vehicles on the market, it can be followed that more time would be needed to finalise testing and type approval processes, once parity was established."
a. Has parity been reached in terms of cold cranking performance of LIB (lithium iron phosphate-based batteries in particular) and LAB as expected? What is the status of testing and the type approval process? Please describe the progress that has been made since the last revision.
b. What is the typical temperature range for the operation of 12 V LAB and the viable alternatives?
c. For which temperature range do such 12 V batteries need to be tested and validated for the different vehicle classes (ICE, hybrid, fully electric)?
d. What is the cold cranking ability of current 12 V batteries according to common testing standards?

2. Drop-in alternatives for 12 V LAB are available on the market (commonly but not limited to lithium iron phosphate). Several vehicle models from different OEMs have been reported to use 12 V LIB in 2014, in addition to a range of other alternative technologies (e.g. supercapacitors). It was further reported that in 2014 an estimated 900.000 vehicles were in service with a 12 V LIB on board6
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Please provide reasoning as to why such (drop-in) alternatives are commercially available and are already widely in use, but are currently not the default battery system employed in new vehicles.

The alternatives are expensive where lead is way more affordable, lead remains recyclable, lead is in the waste fase easy to store and to transport as in the pre use fase. Lead is cheap to recycle. Lithium and especially li-ion applications need special transport, many storage measures like fire prevention and monitoring, they can be unreliable and catch fire, especially in case of damage. Li-ion requires a BMS, making it expensive technology. Li-ion batteries cannot function in cold temperatures so heating systems are necessary (and costly).

3. Please describe the mission profiles of 12 V batteries in the different vehicle classes. According to information available to the consultant, ICE vehicles require a high power draw for cold cranking, but otherwise only require relatively low power for other functions powered by the 12 V system, leading to overall shallow depth of discharge (DoD) and low cycle frequency requirements. Battery electric vehicles do not require such high power for cold cranking, but draw comparatively more power that ICE both in “on” or “off” mode to supply the board computer, battery management system, and “comfort features”, therefore requiring a battery that can withstand higher DoD and provide a higher cycle life. It has been described in the last adaptation report5 that some hybrid vehicles use the 12 V battery for engine cranking, while others do not.
Please provide specific data for the technical requirements mentioned above regarding the 12 V

battery for each vehicle class and provide reasoning regarding the substitutability of LAB with alternative technologies (including LIB) for each vehicle class.

4. The last adaptation report
cited data from 2014 illustrating the considerable difference in cost
between LAB, NiMH, and LIB for automotive 12 V application. Please provide information regarding the development of the cost per kWh / kW as well as per market-available unit (12 V battery) since then. Please also refer to the expected price development in the next few years.

5. The recycling rate for LAB has been reported to be very high. Please provide any information regarding the current and expected recycling rate for alternative technologies including LIB, for mass percentage of the battery as well as individual elements (e.g. metals such as lead, cobalt, nickel, manganese, lithium, as well as electrolytes and other elements of the batteries). Please also refer to the economic feasibility of recycling now and in the future.

The high recycling rate for lead lies in the fact that lead has a high value, so no lead is lost. Lead is also easy and cheap to recycle and making lead-acid batteries is easy as they do not require complex technology. They are also easy to store (hardly any risks) and to transport.

6. More generally, please explain whether the use of lead in the application(s) addressed under the above exemption is still unavoidable so that Art. 4 (2) (b) (ii) of the ELV Directive would justify the continuation of the exemption.
Please be specific with your answer, for example clarify, if applicable, what types of vehicles your answer refers to, i.e., conventional vehicles and various types of hybrid and electric vehicles, and which functionalities and applications the exemption still needs to cover.

7. Please explain the efforts your organisation has undertaken to find and implement the use of lead-free alternatives for automotive uses. Please refer to alternatives, which at least reduce the amount of lead applied or eliminate its necessity altogether.

8. Please provide a roadmap specifying the necessary steps/achievements in research and development including a time scale for the substitution or elimination of lead in this exemption.

9. What is the amount of lead that would be contained in vehicles
a. placed on the EU market
b. worldwide
in case the exemption is continued? Please provide at least a rough calculation or substantiated estimate clarifying how you arrive at the final result.

10. Overall, please let us know whether you agree with the necessity to continue the exemption and sum up your arguments for or against the continuation.

Reason to continue the exemption is because it's cheap and reliable technology, functioning under a range of conditions without any complex added technologies. Other very important reason is that lead does not affect the environment because it will be collected as a result of it's (high) value.

This characteristic will be lost if lead is fased out. From that moment on lead will end up at undesired places.
In short: continuing or even taking lead out of the substances that need to be fased out would be better for environment, sustainability and circular economy than taking it out of the loop.

11. Is there any other information which you deem important in the context of the review and which you would like to provide?

Lead is a perfect example of circular economy. In batteries it does no harm. The substitutes are way less circular and less stabile. Replacement would be negative for the environment and economics and would mean less reliable technology.