

# Consultation Questionnaire Exemption 5(b) of ELV Annex II

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*Lead in batteries for battery applications not included in entry 5(a) <sup>1</sup>*

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## 1. Acronyms and Definitions

DoD	Depth of discharge
ELV	End-of-life vehicles
LAB	Lead-acid battery
LIB	Lithium-ion battery
NiMH	Nickel metal hydride battery
OEM	Original equipment manufacturer

## 2. Background

Bio Innovation Service, UNITAR and Fraunhofer IZM have been appointed<sup>2</sup> to assist the European Commission in the evaluation for the review of three exemptions currently listed in Annex II of the ELV Directive 2000/53/EC.

The above-mentioned exemption has become due for review. It was reviewed<sup>3</sup> last time in 2015/2016 under the ELV Directive<sup>4</sup>, and the consultants concluded that the use of lead was still unavoidable. The Commission therefore granted the exemption in line with the requirements of ELV Art. 4(2)(b)(ii). The exemption is due for review in 2021 in order to adapt it to the state of scientific and technological progress.

This questionnaire has been prepared for the stakeholder consultation held as part of the evaluation. The objective of this consultation and the review process is to collect and to evaluate information and evidence according to the criteria listed in Art. (4)(2)(b)(ii) of Directive 2000/53/EC (ELV Directive), which you can download from here:

<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32000L0053>

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<sup>1</sup> Exemption 5(a): Lead in batteries in high-voltage systems (> 75 V DC) that are used only for propulsion in M1 and N1 vehicles; the exemption expired in January 2019

<sup>2</sup> It is implemented through the specific contract 070201/2020/832829/ENV.B.3 under the Framework contract ENV.B.3/FRA/2019/0017

<sup>3</sup> Gensch et al. (2016 a): 8th Adaptation to scientific and technical progress of exemptions 2(c), 3 and 5 of Annex II to Directive 2000/53/EC (ELV). Final Report for the European Commission DG Environment under Framework Contract No ENV.C.2/FRA/2011/0020. ELV III.5.

[https://elv.exemptions.oeko.info/fileadmin/user\\_upload/Consultation\\_2014\\_1/20160216\\_ELV\\_Final\\_Gen\\_Ex\\_2c\\_Ex\\_3\\_Ex\\_5.pdf](https://elv.exemptions.oeko.info/fileadmin/user_upload/Consultation_2014_1/20160216_ELV_Final_Gen_Ex_2c_Ex_3_Ex_5.pdf).

<sup>4</sup> Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles, ELV Directive, European Union (21 October 2000), accessed December 5, 2013

Additional background information can be found on the exemption review page accessible through the following link: [www.elv.biois.eu](http://www.elv.biois.eu)

If you would like to contribute to the stakeholder consultation, please answer the following questions:

### 3. Questions

1. The last adaptation report<sup>5</sup> 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 board<sup>6</sup>.

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.

<sup>5</sup> <https://op.europa.eu/de/publication-detail/-/publication/e41f365a-f74e-11e7-b8f5-01aa75ed71a1>

<sup>6</sup>

[https://elv.exemptions.oeko.info/fileadmin/user\\_upload/Consultation\\_2014\\_1/Ex\\_5/20141217\\_A123\\_et.al.2015\\_ELV\\_exemption\\_5\\_review\\_-\\_Li-ion\\_stakeholders.pdf](https://elv.exemptions.oeko.info/fileadmin/user_upload/Consultation_2014_1/Ex_5/20141217_A123_et.al.2015_ELV_exemption_5_review_-_Li-ion_stakeholders.pdf)

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 than 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 report<sup>5</sup> 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<sup>5</sup> 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.
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.
  
11. Is there any other information which you deem important in the context of the review and which you would like to provide?

**Please note that answers to these questions can be published in the stakeholder consultation, which is part of the evaluation of this request. If your answers contain confidential information, please provide a version that can be made public along with a confidential version, in which proprietary information is clearly marked.**

**Please do not forget to provide your contact details (Name, Organisation, e-mail and phone number) so that the project team can contact you in case there are questions concerning your contribution.**