

CEN/CLC Workshop “Battery2Life - Interoperable BMS principles”

Workshop description form

- PART A – Workshop Summary
- PART B – Project Plan

PART A – Workshop SUMMARY

1	WS details	
1.1.	Organization	☐ CEN ☐ CENELEC ☒ Joint with ☒ CEN lead ☐ CENELEC lead
1.2.	Title	CEN/CLC WS "Battery2Life - Interoperable BMS principles" (select CEN or CLC or leave CEN/CLC in case of joint WS)
1.3.	Scope	This CEN/CENELEC workshop aims to analyse an approach towards interoperable BMS (Battery Management System) and introduces a hybrid cloud/edge BMS architecture serving two different business use cases for the exploitation of 2nd life batteries: a) industrial load levelling application and b) domestic storage application. This WS will not address safety issues.
1.4.	Does this WS stem from an EU Research project?	☒ YES Name of the project: Battery2Life Grant number: 101137615 End date 2026-12-31 ☐ NO
1.5.	Financial support	☐ EU Research project ☒ EC/EFTA Grant reference: 101137615 ☐ Other Specify, if needed: Type here
1.6.	WS Proposer/Proposed Chair	Name: Giorgos Konstantinidis Organization: Institute of Communication & Computer Systems (ICCS) Postal address: Ir. Politechniou 9, Zografou 157 73 Email: episey@central.ntua.gr Phone: +30 21 0772 3847 Webpage: https://www.iccs.gr/ Contact person (name and email): Giorgos Konstantinidis g.konstantinidis@iccs.gr
1.7.	WS Secretariat	Organization: UNE – Spanish association for standardization Postal address: Calle Génova 6, Madrid (Spain), 28004 Email: info@une.org Phone: +34 915 294 900 Webpage: www.une.org WS Secretary name: José Antonio Jiménez Caballero Email: jjimenez@une.org Phone: +34 618 56 63 46
1.8.	CEN and CENELEC Management Centre (CCMC) contact	Organization: CEN and CENELEC Postal address: Rue de la Science 23B - 1040 Brussels, Belgium Webpage: https://www.cencenelec.eu/Pages/default.aspx CCMC Project Manager name: Claire Van Thielen Email: cwa@cencenelec.eu Phone: +3225500831 +32478793545
1.9.	Tentative date and place of the Kick-off Meeting	Date: 2026-11-04 Place: Virtual

1.10.	Does the proposed Workshop fall within the scope of existing CEN and/or CENELEC Technical Bodies? ¹	☒ YES ☐ NO	YES Specify: CLC TC 21X 'Secondary cells and batteries', CLC/SR 120 'Electrical Energy Storage (EES) Systems', CEN/TC 301 'Road vehicles'																								
1.11.	Are there other Technical Bodies or Joint Advisory and Coordination Groups potentially interested in the Workshop? ²	☒ YES ☐ NO	YES Specify: CEN-CLC/COG eMobility																								
1.12.	Are the following aspects affected?	Safety matters Management system aspects Conformity assessment aspects Security matters	<table border="0"> <tr> <td>YES³</td> <td>☐</td> <td>NO</td> <td>☒</td> </tr> <tr> <td>YES⁴</td> <td>☐</td> <td>7</td> <td>☒</td> </tr> <tr> <td>YES⁵</td> <td>☐</td> <td>NO</td> <td>☒</td> </tr> <tr> <td>YES⁶</td> <td>☐</td> <td>NO</td> <td>☒</td> </tr> <tr> <td></td> <td></td> <td>NO</td> <td></td> </tr> <tr> <td></td> <td></td> <td>8</td> <td></td> </tr> </table>	YES ³	☐	NO	☒	YES ⁴	☐	7	☒	YES ⁵	☐	NO	☒	YES ⁶	☐	NO	☒			NO				8	
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		Add information/explanations if Management System aspects and Conformity Assessment aspects are affected: Type here																									
2 WS Deliverables																											
2.1.	CWA #1																										
2.1.1	Title	☐ Same as WS title (1.2) ☒ Other: Interoperable Battery Management Systems – Part 1: Principles																									
2.1.2	Scope		This document aims to analyse an approach towards an interoperable BMS (Battery Management System) by introducing a hybrid cloud/edge BMS architecture serving two different business use cases for the exploitation of 2nd life batteries: a) industrial load levelling application and b) domestic storage application. Furthermore, the state machine diagrams of the different BMS processes for both business use cases are explained. This document aims to inform to any interested party in the latest advancements in interoperable BMS technology. Overall, it seeks to engage a broad audience committed to the development and implementation of second-life battery applications. The BMS is a safety-related component. However, this document does not address safety requirements of the BMS.																								
2.1.3	Does the proposed CWA conflict with a published EN	☐ YES ☒ NO	YES Specify: Type here NO In case the answer is 'yes', the development of the CWA shall be stopped																								

¹ Part A and Part B of this form shall be sent by the WS secretary to the secretary of the Technical Bodies identified in this section to inform them about the creation of the WS and register any possible objection within 30 days (45 during the holiday period).

² Part A and Part B of this form should be sent by the WS secretary to the Bodies identified in this section to inform them about the creation of the WS.

³ Work on the proposed CEN and/or CENELEC Workshop shall not be initiated.

⁴ The CEN and/or CENELEC Workshop proposal shall be submitted to the CEN/CENELEC BT(s) for decision.

⁵ CEN-CENELEC Internal Regulations - Part 3, Clause 33 applies.

⁶ For projects dealing with security matters the security risk analysis provided in Annex I shall be carried out.

⁷ See Note 2 in CEN-CENELEC Guide 29, Clause 3.

⁸ See Note 2 in CEN-CENELEC Guide 29, Clause 3.

2.2.	CWA #2		
2.1.1	Title	☐ ☒	Same as WS title (1.2) Other: Interoperable Battery Management Systems – Part 2: Use cases
2.1.2	Scope		This document presents two use cases for the interoperable BMS principles specified in CWA #1.
2.1.3	Does the proposed CWA conflict with a published EN	☐ ☒	YES Specify: Type here NO In case the answer is 'yes', the development of the CWA shall be stopped

PART B – Project Plan

1 Status of the project plan

Draft project plan for public commenting (Version 1.0).

This draft project plan is intended to inform the public of a new Workshop. Any interested party can take part in this Workshop and/or comment on this draft project plan by sending an email to the WS secretary jjimenez@une.org.

All those who have applied for participation or have commented on the project plan by the deadline will be invited to the kick-off meeting of the Workshop on 2026-11-04.

2 Workshop proposer and potential Workshop participants

2.1 Workshop proposer

The Workshop proposer is Giorgos Konstantinidis from Institute of Communication & Computer Systems (ICCS) on behalf of the [Battery2Life](#) project. Battery2Life aims to facilitate the smooth transition of batteries to 2nd life use, boost the innovation of the European Battery Industry by providing enablers to implement adaptable smart Battery Management Systems (BMS) and improved system designs, as well as proposing methods for the efficient and reliable reconfiguration of used batteries. The project's objectives are:

- Enable the safe and efficient reconfiguration of the BS for 2nd life use
- Design and develop an cloud-based BMS, adaptable to battery technologies & communication protocols for 1st or 2nd life storage applications
- Embed smart monitoring and control functionalities in the BMS to ensure safety and reliability in 2nd life operation
- Develop AI based tools for the reliable and efficient assessment, sorting and recombination of modules according to their suitability for 2nd life applications
- Demonstrate and assess the efficiency and the impact of the developed solutions in domestic and utility-scale storage applications towards
- Propose sustainable business plans to boost the competitiveness of the European battery industry

Battery2Life has received funding from the Horizon Europe programme under grant agreement No 101137615. This project has received funding from the Swiss State Secretariat for Education, Research and Innovation (SERI).

Giorgos Konstantinidis (Institute of Communication & Computer Systems -ICCS)

Founded in 1989, ICCS is an independent, non-profit research organization dedicated to advancing the values, mission, and strategic goals of the National Technical University of Athens (NTUA). Scientific research at ICCS is structured around various interdisciplinary thematic areas, including AI and Smart Systems, Hardware and Software, Computer Networks, Mobile Communications, Control and Automation, Power Production, Transport and Distribution, Energy, Climate, Biomedical and Biomechanics, Information Systems, Management and Decision Support, and Photonics. The focus is on advancing scientific discovery and driving engineering innovation through cutting-edge, interdisciplinary computing research.

2.2 Potential participants

This CWA will be developed in a Workshop (temporary body) that is open to any interested party. The participation of the following persons/organizations would be helpful and is desired. It is recommended that:

- manufacturers of batteries and battery-powered systems;
- test institutes for batteries and battery-powered systems;
- research institutes for batteries and battery-powered systems;
- system providers;
- etc.

take part in the development of this CWA.

3 Workshop objectives and scope

3.1 Workshop background

The transition to a carbon neutral transportation sector, particularly in road transport, which is a major pollutant sub-sector, has been underway for over a decade. During this period, the market share of Electric Vehicles (EVs) has significantly increased. As EV batteries age and their capacity diminishes, repurposing them for 2nd life applications offers substantial environmental and economic benefits. This approach reduces waste, conserves resources, and provides affordable Energy Storage Solutions (ESS). Aging is part of the operation of a battery, even during normal usage. Usually, there is a significant decrease of the nominal capacity during the first years of its operational life, which levels off afterwards. The average EV battery capacity loss is estimated to around 2.3% per year. To ensure the optimal operational quality and driving range adequacy for the electric vehicle, most automotive industries offer a battery warranty of 7-10 years or driving range of 120,000- 160,000 kms. Thus, at the end of the warranty, the expected EV battery nominal capacity varies between 70-80%. This is also the First-Life End-Of-Life (FL-EOL) threshold adopted by most automotive industries.

Even though such a battery does not fulfil the automotive requirements, its storage capacity can still be exploited for other applications. It is expected that over 5 million metric tons of EV batteries will be inappropriate for mobility purposes by 2030. This number is huge and reflects a great number of materials and storage capacity which will be useless to serve the mobility energy needs of the automotive industry. The cumulative capacity due to EV batteries after the end of their 1st life use is expected to increase to 185.5 GWh/year by 2025 and to 1000 GWh by 2030, offering a significant storage capacity for 2nd life applications. Apart from passenger EVs, other types of vehicles and industrial motive machinery are getting electric in the transformation to green mobility and economy. The electric truck market is estimated to reach 1,067,985 units by 2030, while in 2022 it was 101,499 units. The electric construction equipment market is estimated to grow to USD 24.8 billion by 2027 from USD 9.2 billion in 2022. The demand for industrial motive batteries will reach ~50GWh by 2025[7]. These batteries, being much bigger than EV batteries, will offer significant capacity for exploitation at the end of their 1st life. In fact, there is a number of applications, where 2nd life batteries can be used, unlocking new revenue streams to different business stakeholders. Fourteen indicative 2nd life battery services for the electricity grid have been identified for the entire value chain of the energy system (i.e., end-user, utility, grid operator and off-grid).

The environmental benefits due to re-using before recycling batteries are significant. The re-use of the battery materials extends their lifecycle and reduce the need for new raw materials (ex. lithium, nickel, etc.) reducing, thus, the dependency of Europe from external resources. Furthermore, the energy consumption and carbon footprint of the construction process of a new battery is typically higher than the refurbishment of batteries.

The transition from the 1st life battery application to the 2nd life one is a challenging task since the BMS design between the 1st to 2nd life use implies different system, functional and safety requirements. Existing BMSes are customised to serve the functional and safety constraints of a specific technology and a specific application, and this is a hindering factor for the wider promotion of the 2nd life applications of batteries. For example, BMSes for automotive use are designed to serve the vehicle's mobility requirements and vehicle's auxiliary energy needs. For an efficient use in the 2nd life, the BMS must be adaptable to the requirements of the 2nd life operational application and ensure the safe and optimal performance of the new battery composed of its 2nd life modules. Furthermore, the power and energy requirements of 2nd life applications might require the combination of diverse battery technologies with different operational and technical specifications. This diversity may intensify as new technologies emerge in the future. There is a need for transitioning from a technology-driven rigid BMS to a data-driven, technology and application agnostic BMS.

This WS is intended to provide a set of principles for the development of interoperable BMSes that serve as a guide for the development of these systems and two use cases for specific applications. It is important to note

that BMSes are safety-related components and that applicable industry standards and harmonized European standards must be used in their development. These safety aspects will not be addressed in the CWAs developed in this WS, but references will be made to these standards.

This WS is related to Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC.

The following CEN and CENELEC TCs have been identified as interested in this WS:

- CLC/TC 21X Secondary cells and batteries
- CEN/TC 301 Road vehicles
- CLC/SR 120 Electrical Energy Storage (EES) Systems

4 Workshop programme

4.1 General

The kick-off meeting is planned to take place on 2026-11-04 as virtual meeting. A draft for public commenting will be published.

A total of 3 Workshop meetings (kick-off meeting and Workshop meetings) and web conferences will be held, during which the content of the CWA(s) will be presented, discussed and approved.

The working language (language of meetings, minutes, etc.) of the WS will be English. The CWA will be written in English.

4.2 Workshop schedule

Table 1: Workshop schedule (preliminary)

CEN/CENELEC Workshop	M01	M02	M03	M04	M05	M06	M07	M08	M09	M10	M11	M12	...
Initiation													
1. Workshop description form submission and TC response													
2. Open commenting period on draft project plan (mandatory)													
Operation													
3. Kick-off meeting													
4. CWA(s) development													
5. Open commenting period on draft CWA(s) (optional)													
6. CWA(s) finalized and approved by Workshop participants													
Publication													
7. CWA(s) publication													
Dissemination (see 6)													
Milestones								K	V	V	V	P	D

Legend



- K Kick-off
- M Workshop meeting
- V Virtual Workshop meeting
- A Adoption of CWA
- P Publication of CWA
- D Online distribution of CWA

5 Resource planning

All costs related to the participation of interested parties in the Workshop's activities have to be borne by themselves.

The management costs of the Workshop will be covered by resources from the BATTERY2LIFE project, an EU project funded by the Horizon Europe programme (grant agreement No 101137615).

6 Workshop structure and rules of cooperation

6.1 Participation in the Workshop

The Workshop will be constituted during the kick-off meeting. By approving this project plan, the interested parties declare their willingness to participate in the Workshop and will be formally named as Workshop participants, with the associated rights and duties. Participants at the kick-off meeting who do not approve the project plan are not given the status of a Workshop participant and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the Workshop.

As a rule, the request to participate in the Workshop is closed once it is constituted. The current Workshop participants shall decide whether any additional members will be accepted or not.

Any new participant in the Workshop at a later date is decided on by the participants making up the Workshop at that time. It is particularly important to consider these aspects:

- a. expansion would be conducive to shortening the duration of the Workshop or to avoiding or averting an impending delay in the planned duration of the Workshop;
- b. the expansion would not result in the Workshop taking longer to complete;
- c. the new Workshop participant would not address any new or complementary issues beyond the scope defined and approved in the project plan;
- d. the new Workshop participant would bring complementary expertise into the Workshop in order to incorporate the latest scientific findings and state-of-the-art knowledge;
- e. the new Workshop participant would actively participate in the drafting of the manuscript by submitting concrete, not abstract, proposals and contributions;
- f. the new Workshop participant would ensure wider application of the CWA.

All Workshop participants who approved the publication of the CWA or its draft will be named as authors in the European Foreword, including the organizations which they represent. All Workshop participants who did not approve the publication of the CWA will not be named in the European Foreword.

6.2 Workshop responsibilities

The Workshop Chair is responsible for content management and consensus building. The Workshop Chair is supported by the Workshop Vice-Chair (if any) and the responsible Workshop secretariat, whereby the Workshop secretariat will always remain neutral regarding the content of the CWA(s). Furthermore, the Workshop secretariat shall ensure that CEN-CENELEC's rules of procedure, rules of presentation, and the principles governing the publication of CWA(s) have been observed. Should a Workshop Chair no longer be able to carry out her/his duties, the Workshop secretariat shall initiate the election of a new Workshop Chair. The list below covers the main tasks of the Workshop Chair. It is not intended to be exhaustive.

- Content related contact point for the Workshop
- Presides at Workshop meetings
- Ensures that the development of the CWA respects the principles and content of the adopted project plan
- Manages the consensus building process, assesses when the Workshop participants have reached agreement on the final CWA, on the basis of the comments received
- Ensures due information exchange with the Workshop secretariat
- Represents the Workshop and its results to exterior

The Workshop secretariat, provided by a CEN and/or CENELEC Member, is responsible for organizing and leading the kick-off meeting, in consultation with the Workshop proposer. Further Workshop meetings and/or web conferences shall be organized by the Workshop secretariat in consultation with the Workshop Chair. The list below covers the main tasks of the Workshop secretariat. It is not intended to be exhaustive.

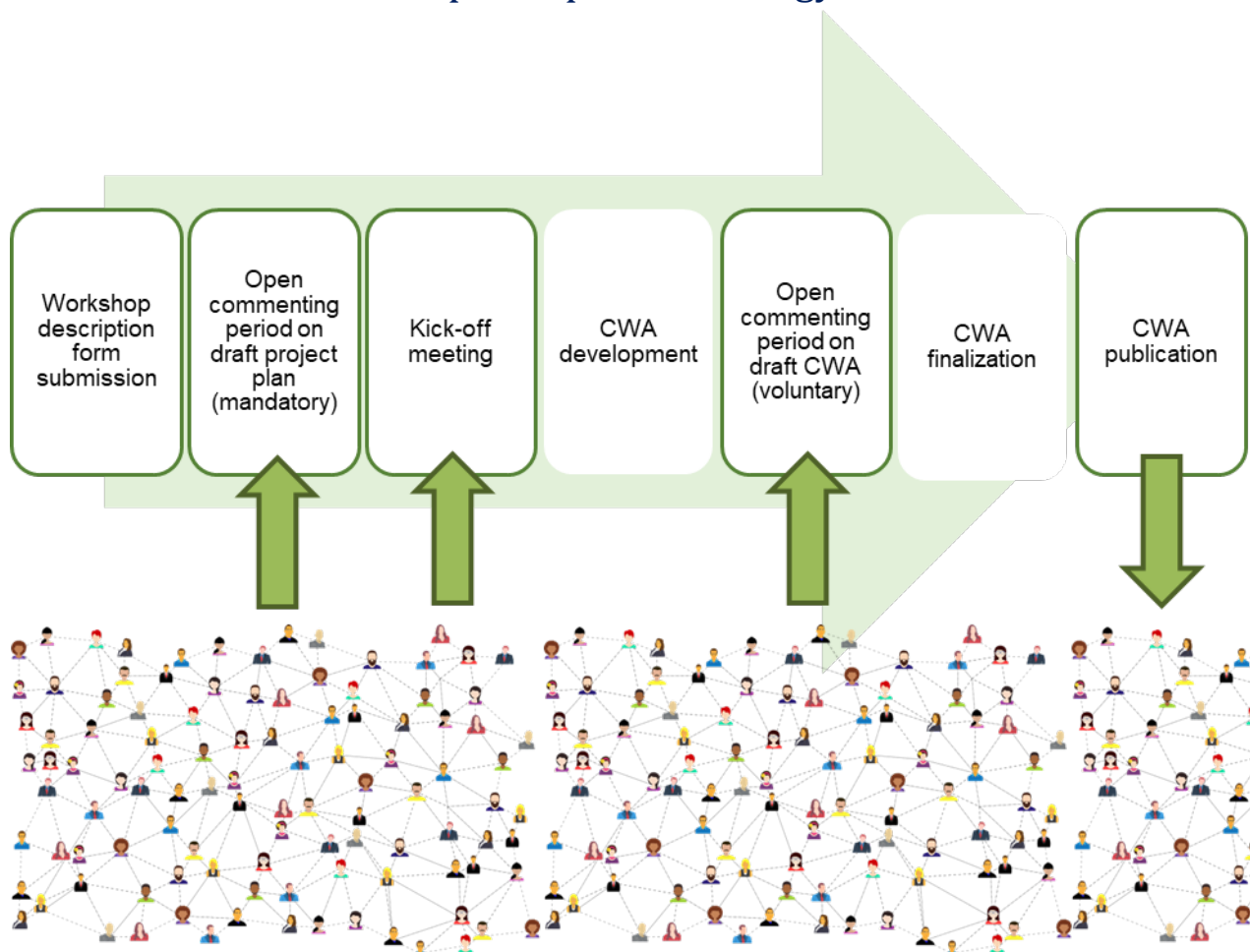
- Administrative and organizational contact point for the Workshop
- Ensures that the development of the CWA respects the principles and content of the adopted project plan and of the requirements of the CEN-CENELEC Guide 29
- Formally registers Workshop participants and maintains record of participating organizations and individuals
- Offers infrastructure and manages documents and their distribution through an electronic platform
- Prepares agenda and distributes information on meetings and meeting minutes as well as follow-up actions of the Workshop
- Initiates and manages CWA approval process upon decision by the Workshop Chair
- Interfaces with CEN-CENELEC Management Centre (CCMC) and Workshop Chair regarding strategic directions, problems arising, and external relationships
- Advises on CEN-CENELEC rules and brings any major problems encountered (if any) in the development of the CWA to the attention of CEN-CENELEC Management Centre (CCMC)
- Administrates the connection with relevant CEN or CENELEC/TCs

6.3 Decision making process

The CEN and/or CENELEC Workshop Chair is responsible for ensuring that the development of the CWA follows the principles and content of the project plan described in this document and the requirements of CEN-CENELEC Guide 29. The CEN and/or CENELEC Workshop Chair may take decisions on the conduct of the CEN and/or CENELEC Workshop on the basis of the comments expressed by the participants and of CEN-CENELEC Guide 29.

Decisions shall be taken based on consensus of the WS participants.

7 Dissemination and participation strategy



Potential participants identified in section 2.2 and potential interested stakeholders identified in Part A should be informed of the open commenting phase, if any, and of the publication of the CWA.

In addition to the CCMC website, the final CWA might be advertised on:

- sector specific newsletter
- social media, such as
 - Facebook
 - Instagram
 - LinkedIn
 - X
- Research Gate
- EC Newsroom
- Others