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HORIZON EUROPE PROGRAMME – TOPIC HORIZON-CL5-2022-D2-01-06

*Embedding smart functionalities into battery cells (embedding sensing and self-healing functionalities to monitor and self-repair battery cells)
(Batteries Partnership)*



PHOENIX

Building more reliable and performant batteries by embedding sensors and self-healing functionalities to detect degradation and repair damage via advanced Battery Management System

Grant Agreement No. 101103702

Starting date: 1st May 2023 – Duration: 48 months

Deliverable D8.3 Website and digital identity

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ABSTRACT

This document represents a comprehensive description of the project's website structure, content, and digital identity elements. It will outline the architecture and layout of the web pages, detailing its various sections and functionalities and delve into the digital identity of the project.



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LIST OF PARTNERS

N.	Logo	Name	Short Name	Country
1		VRIJE UNIVERSITEIT BRUSSEL	VUB	Belgium
2		FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV	FhG	Germany
3		DEUTSCHES ZENTRUM FÜR LUFT-UND RAUMFAHRT	DLR	Germany
4		ENWAIR ENERJI TEKNOLOJILERI ANONIMSIRKETI	ENW	Turkey
5		DEEP BLUE SRL	DBL	Italy
6		FUNDACION CIDETEC	CID	Spain
7		LECLANCHÉ GMBH	LEC	Germany
8		ACCUREC-RECYCLING GMBH	ACC	Germany
9		CSEM CENTRE SUISSE D'ÉLECTRONIQUE ET DE MICROTECHNIQUE SA - RECHERCHE ET DEVELOPPEMENT	CSEM	Switzerland



ABBREVIATIONS

ACRONYM	DESCRIPTION
AB	Advisory Board
BMS	Battery Management System
EC	European Commission
EU	European Union
GDPR	General Data Protection Regulation
KPI	Key Performance Indicator
LCA	Life Cycle Assessment
OBJ	Objective
SoH	State of Health
W3C	World wide web consortium
WCAG	Web Content Accessibility Guidelines
WP	Work Package



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EXECUTIVE SUMMARY

This document represents a comprehensive description of the project's website structure, content, and digital identity elements. The website provides all the useful information about PHOENIX' objectives and planned activities. It gives an overview of the entire project, introduces the consortium partners, presents the main results, offers references to related and sister projects, and represents an easy access for citizens and stakeholders to interface and receive all information related to the project. The website will be regularly updated, and it will represent the main communication and dissemination channel: news, milestones, events, planned workshops and any other announcement will be published through its news section. The project partners will support its function by sharing updates on research advancements, scientific publications, reports, public deliverables, conferences, or project results. Not only interested visitors but also the general audience will be able to read through the content, download resources, engage through the newsletter form and social media links.

The deliverable will serve as a comprehensive guide to develop an engaging and visually cohesive website, presenting the project's key information, while maintaining a consistent and compelling digital identity. Deep Blue, as Dissemination Leader, is responsible for the design, realisation, implementation, maintenance and update of the website and the social media pages, over the course of the project and for four years after its conclusion.



1. PHOENIX WEBSITE: GENERAL INFORMATION

The website will guide the user through the project’s content, thanks to its designed layout and its simple and user-friendly architecture, graphically displayed in the Figure 1 below. It offers a comprehensible overview of the context, methodology and objectives while still providing in-depth details about the technologies and the scientific innovation of the project.

Firstly, extracts have been extrapolated from the project’s proposal and, in some instances, rewritten for greater clarity, easy understanding and to fit the dissemination and communication objectives. Then, a framework structure and a graphical layout have been proposed to the project partners to better satisfy the information needs of the project’s target audience.

Texts have been drafted and peer reviewed by the consortium and approved by the project coordinator VUB. Type fonts, styles and identity, including the logo, have been chosen following the consortium preferences collected during the kick-off meeting (Brussels, May 12th, 2023).

The website’s official address is www.phoenix-smartbatteries.eu – chosen by the entire consortium to make the site more indexable and recognisable on the Internet – and it is hosted on DBL servers, operated through the WordPress content management system. The website is compliant with the most recent General Data Protection Regulation (GDPR) – (EU) 2016/679 and the Web Content Accessibility Guidelines (WCAG) (version 2.0) issued by the World Wide Web Consortium (W3C) provisions.

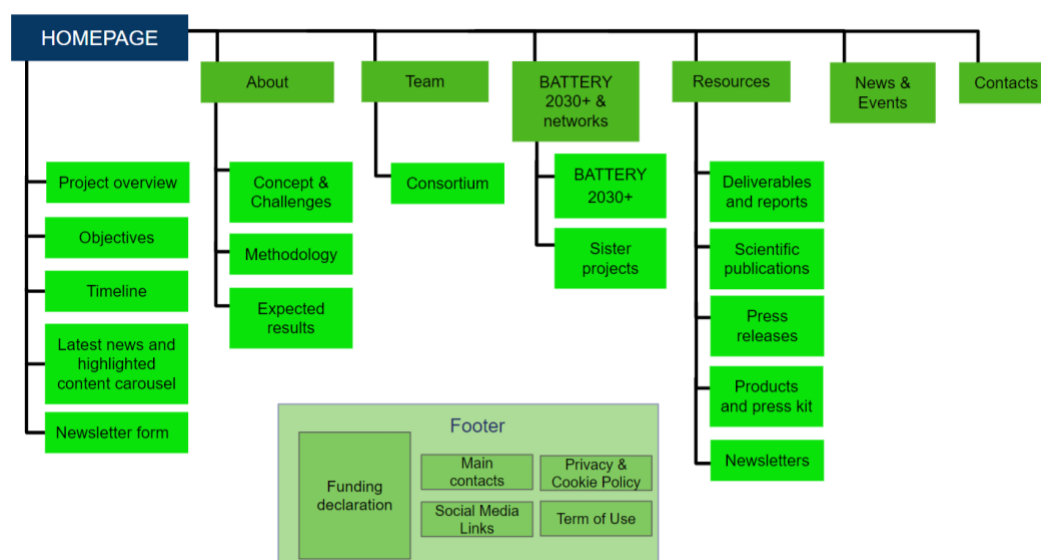


Figure 1 - Website architecture



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2. WEBSITE PAGES CONTENT

2.1 Homepage

2.1.1 Project overview

PHOENIX: Building more reliable and performing batteries by embedding sensors and self-healing functionalities to detect degradation and repair damage via advanced Battery Management Systems

PHOENIX is an innovative project supporting the development of smart, technologically advanced and sustainable batteries.

The next generation batteries will prioritise safety, durability, and environmental sustainability. Therefore, the PHOENIX project seeks to explore a range of smart functionalities in terms of self-healing, sensing, and triggering. Thanks to the integration of an advanced Battery Management System (BMS) to these functionalities, detecting any degradation in performance and evaluate the battery's overall quality will be possible: batteries lifetime will improve up to 100% (from 250 to 500 charging cycles).

[READ MORE button linking to About page]

2.1.2 Objectives

[The eight (8) main objectives of the project will be shortly presented. Every objective will be identified with a dedicated pictogram.]

#1 Obj: Develop materials providing self-healing capabilities

These materials can support the detection of problems in the battery cell components and then use the triggering external stimulus to repair or prevent those issues from causing failures.

#2 Obj: Create and develop various types of sensors

Sensors that have a small form factor, consume low energy, and can detect different types of healable degradation systems, allowing the measurement of their State of Health.

#3 Obj: Develop triggering devices that can activate the self-healing process

They should consume less than 50% of the energy stored within the cell and not interfere with the battery chemistry.



#4 Obj: Creating a self-contained solution

Demonstrate how the sensors and self-healing technologies can be effectively combined with the Battery Management System (BMS)

#5 Obj: Detect and address critical battery degradation

Critical degradation processes occur during the electrochemical or chemical aging of battery cells. Once detected, the self-healing functionality will be activated to repair the damage that occurs.

#6 Obj: Assess the sustainability of the developed battery technology

To ensure that the new technologies are environmentally sustainable and demonstrate a competitive advantage over alternative approaches such as replacement, recycling, or second use.

#7 Obj: Implement an adaptable approach to mass production processes of battery cells

To ensure efficient production without hindering the recycling process, scalability and adaptability of production steps must not negatively affect the performance, sustainability and recycling process of the battery.

#8 Obj: Contribute to the growth of a sustainable battery manufacturing industry in EU

Thanks to the collaboration with the BATTERY 2030+ large-scale initiative, which aims to shape the future of battery technology.

2.1.3 Timeline

[A graphical timeline will show the significant milestones and key processes for a collective view of the 4 years of PHOENIX]

2.1.4 Latest news and highlighted content carousel

[A selection of the latest/top news will appear here]

2.1.5 Newsletter form

[Form to submit/subscribe to the Newsletter]



2.2 About

2.2.1 Concept and challenges

The demand for batteries in electric mobility, grid energy storage, and consumer electronics is projected to increase tenfold in the next decade. However, for sustainable and European batteries to be developed and utilised, improvements are necessary.

The PHOENIX project aims to explore various possibilities for integrating self-healing, sensing, and triggering functionalities into batteries, to develop less expensive and more sustainable cells capable of living longer, detecting and preventing any kind of degradation.

These functionalities, along with the control and management of the Battery Management System, will be prototyped and demonstrated in Generation 3b and 4a Li-ion batteries. These battery technologies have the potential for high voltage and fast charging, making them suitable for electric mobility and stationary applications.

The Battery Management System will enhance safety and enable longer battery lifetimes, aiming for a 100% increase in cycle life (from 250 to 500 charging cycles) through in-line communication. The project will demonstrate the self-healing behaviour of the batteries using sensors in single-layer and multi-layer cells, with the prototyping of 200 cells.

Additionally, the project will address manufacturing concerns such as cost and mass production, recycling feasibility, and sustainability assessment. The aim is to reduce specific battery costs by 10% and enable the recycling of self-healing materials without significant changes to the current recycling processes.

[A concept image will be developed to effectively communicate the project's goals and impact]

2.2.2 Methodology

PHOENIX will be deployed in three phases to achieve its goals.

DEVELOP

In the first phase, the focus is on developing self-healing battery materials and sensing devices. The challenge lies in implementing these materials and devices in a way that effectively increases the State of Health (SoH) of the battery. Various sensing technologies, such as thermal, ultrasonic, gas, and deformation sensors, are used to measure the battery's health. The triggering can be done thermally, magnetically, or by applying



pressure. Different cell types will be prototyped, with specific self-healing properties and triggering effects tailored to the degradation occurring in each technology.

VALIDATE

In the second phase, the validation of the triggering mechanisms and degradation detection is carried out. Single-layer pouch cells are developed to implement the self-healing triggering mechanisms, followed by the fabrication of multilayer cells integrating both sensors and self-healing functionality. The validation involves electrochemical testing to identify irreversible reactions and activate the repair process, as well as the triggering of the self-healing functionality monitored by sensor devices.

ASSESS

The third phase focuses on the development of the Battery Management System and addresses manufacturing, recycling, and sustainability assessment. The BMS interfaces with the developed sensors and self-healing triggering mechanisms, hosting degradation detection and self-healing triggering algorithms. An assessment of the competitive advantage of smart batteries is conducted, considering environmental sustainability and comparing it to alternative approaches such as replacement or recycling. The environmental impacts of the materials are evaluated through an early screening and full Life Cycle Assessment (LCA).

2.2.3 Expected results

[The eight (8) expected results of the project will be shortly presented. Every result would be accompanied and identified with a dedicated symbol, which in some cases will correspond to that of the objectives.]

- #1: Develop and implement magnetic, thermal and pressure triggering.
- #2: Design and implement the Mechanical, Electrical, Thermal and Gas sensors.
- #3: Demonstrate Gen 3b and 4a batteries with increased anode capacity and excellent capacity retention after numerous cycles.
- #4: Show significant capacity retention of the demonstrator pouch cell after multiple cycles at a moderate charging rate.
- #5: Develop a fully integrated BMS.
- #6: Lower the specific costs of the self-healing battery compared to the reference battery.
- #7: Achieve a high recycling efficiency that demonstrates the recyclability of self-healing components.
- #8: Prospective Life Cycle Assessment of future batteries



2.3 Team

[Partners logos and access to their company websites, including their role in the project]

2.4 Battery2030+ & Networks

2.4.1 Battery 2030+

BATTERY 2030+ is a large scale, long-term European research initiative with the vision of inventing sustainable batteries of the future.

It is working towards providing European industry with disruptive technologies and a competitive advantage across the entire battery value chain. This will support Europe in achieving its climate-neutral society goals outlined in the European Green Deal. The BATTERY 2030+ large-scale research initiative, supported by the European Commission with a funding of EUR 272 million, is driving transformative advancements in battery development and design in Europe, by creating a generic toolbox for transforming the way we develop and design batteries in Europe.

The BATTERY 2030+ initiative has a chemistry-neutral approach to facilitate the invention of the batteries of the future. The research directions presented in its roadmap outline a generic toolbox for transforming the way batteries are developed and designed.

Click here to discover BATTERY 2030+ [[Link to Battery 2030+ website](#)]

[Three buttons "Objectives", "Impacts", "Challenges" with direct links to the dedicated pages on the BATTERY 2030+ website will be inserted below]

2.4.2 Sister projects

[Sister projects logos with link to their websites and short abstract]

2.5 Resources

[Contents will be made available for download and uploaded when available. The different resources will be presented with drop-down menus]

2.5.1 Deliverables and reports

[List of the published deliverables]



2.5.2 Scientific publications

[Links to the site/journal/magazine where the scientific articles have been published]

2.5.3 Press releases

[List of the published press releases]

2.5.4 Products and press kit

[Downloadable graphic materials]

2.5.5 Newsletters

[Repository of newsletter issues]

2.6 News & Events

[Latest news in grid visualisation]

2.7 Contact us

[Form to submit inquiries and contact the project team, plus additional relevant contacts]

2.8 Standard pages

[Set of standard pages and features normally accessed through the header or footer bar]

- Funding declaration
- Privacy policy and Cookie Settings
- Terms of use
- Social media links
- Search bar



3. NEXT STEPS

The project website is a continuously growing content manager, therefore updates to the abovementioned contents and changes in its initial structure are still possible and will be done according to communication and dissemination needs over time.



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4. VISUAL IDENTITY

A digital identity is the unique and distinct online representation of a project. It encompasses various elements such as logos, colours, typography, visual style, and other design elements that collectively create a consistent and recognizable visual representation across digital platforms, including websites and social media.

A strong and consistent digital identity is essential to establish a lasting and positive online presence. Below, the project style guide is provided, as a reference for partners to ensure a homogeneous style in all communication and dissemination products and activities. It contains:

- PHOENIX logo (Figure 2)
- Different versions of the PHOENIX logo (Figure 3)
- BATTERY 2030+ and PHOENIX colour palette (Figure 4)
- PHOENIX font styles (Figure 5)



Figure 2 - PHOENIX logo



Figure 3 - Different versions of the PHOENIX logo



COLOR PALETTE

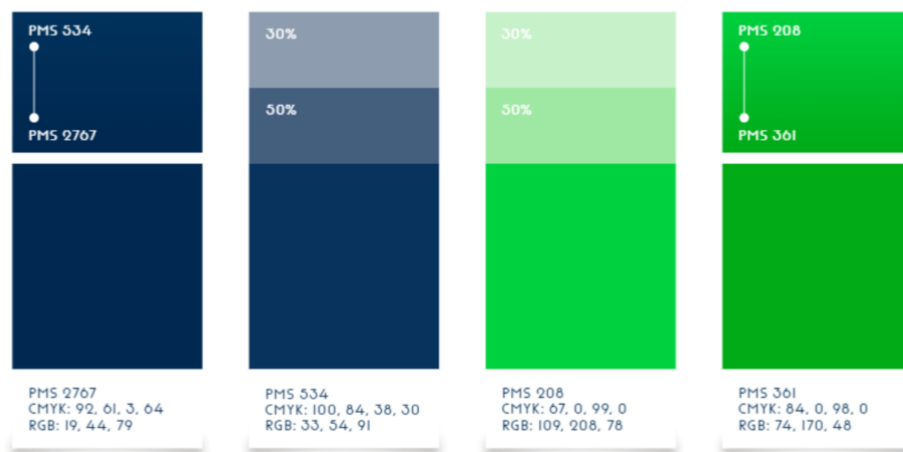


Figure 4 - BATTERY 2030+ and PHOENIX colour palette

BILO

Aa Bb Cc Dd Ee Hh Ii
 Jj Kk Ll Mm Nn Oo Pp Qq Rr
 Ss Tt Uu Vv Ww Xx Yy Zz
 1234567890
 !?=%&@#°ç

TEXTS + LOGO

CASCADIA MONO

Aa Bb Cc Dd Ee Hh Ii
 Jj Kk Ll Mm Nn Oo Pp Qq Rr
 Ss Tt Uu Vv Ww Xx Yy Zz
 1234567890
 !?=%&@#°ç

TITLES + SUBTITLES + NOTES

Figure 5 - PHOENIX font styles

4.1 Visual identity applications

The digital identity applications can vary over time and depending on the needs, since they play a major role in various aspects of online presence, communication and dissemination. Having a strong digital identity, applied to all the official products and channels of the project – both digitally (e.g., website, social media, project videos, newsletters, social cards, presentations) and printed (e.g., posters, flyers, roll-ups, white papers, reports) – ensures consistency, brand recognition, and trust among the target audiences.



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Below, Figure 6 and Figure 7 show the use of visual identity to build recognisable project's LinkedIn and Twitter pages.



Figure 6 - PHOENIX visual identity application on social media: LinkedIn



Figure 7 - PHOENIX visual identity application on social media: Twitter

4.2 Final recommendations

As specified in the detailed D8.1 – Communication and dissemination plan, all partners are involved in communication activities and are responsible for the adoption of the agreed visual identity whenever publishing contents related to the PHOENIX research. Additionally, the website texts and contents can be used as official reference whenever advancements and results are shared publicly. Both the D8.3 – Website and digital identity and D8.1 – Communication and dissemination plan are intended as main guidance to ensure the efficacy of the planned measures to maximise the research impact. All partners are invited to share remarks, feedback and suggestions to better align with stakeholder groups' needs.



REFERENCES

PHOENIX D8.1 – Communication and dissemination plan



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