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Carbon Neutral European Battery Cell Production with Sustainable, Innovative Processes and 3D Electrode Design to Manufacture

GA101069705

HORIZON-CL5-2021-D2-01 - Environmentally sustainable processing techniques applied to large scale electrode and cell component manufacturing for Li ion batteries

D7.1 – Dissemination and communication plan

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Project Summary

BatWoMan aims to develop sustainable and cost-effective concepts for the production of Li-ion battery cells in the European Union. The project will exploit various technological improvements such as energy-efficient processing of 3D patterned electrodes, an innovative electrolyte filling process, and low-cost and energy-efficient cell conditioning. The implementation of these improvements will be digitally supported and controlled by an AI-driven manufacturing platform. In addition, a battery passport will be created that will contain all key information about the manufacturing process, including materials and their sources, carbon footprint, and efficiency of production steps. The project aims to reduce cell production costs by up to 70% and energy consumption by up to 60%, putting Europe at the forefront of sustainable and cost-effective battery production. The main objectives of the project are to achieve sustainable cell manufacturing with a low carbon footprint and no volatile organic solvents, cost-effectiveness, and verification of environmental improvements throughout the manufacturing process chain. The project will pave the way towards carbon neutral, sustainable Li-ion battery cell production in the European Union, in line with the European Green Deal Action Plan to achieve full carbon neutrality by 2050.

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List of Abbreviations

Acronym / Short Name	Meaning
3D	Three-dimensional
AI	Artificial Intelligence
AIT	Austrian Institute of Technology
BatWoMan	Carbon Neutral European Battery Cell Production with Sustainable, Innovative Processes and 3D Electrode Design to Manufacture
BEPA	Batteries European Partnership Association
CIDETEC	Fundación Cidetec
ERCIM	European Research Consortium for Informatics and Mathematics
EU	European Union
EV	Electric Vehicle
GDPR	General Data Protection Regulation
GWh	Gigawatt-hour
IPR	Intellectual Property Right
KER	Key Exploitable Results
KIT	Karlsruher Institut für Technologie
KPI	Key Performance Indicator
Li	Lithium
LCA	Life Cycle Assessment
MAPE	Mean Absolute Percentage Error
ML	Machine learning
R&D	Research and Development
RISE	Research Institutes of Sweden
RTO	Research and Technology Organisation
SAUERESSIG	Matthews International GmbH
SotA	State-of-the-Art
SOV	Sovema SPA
TRL	Technology Readiness Level
UDE	Universität Duisburg-Essen
WP	Work Package

1. Introduction

1.1. About the BatWoMan Project

Lithium-ion battery cells are an important technology for powering a wide range of devices, from smartphones and laptops to electric vehicles (EVs) and grid-scale energy storage systems. As demand for these batteries continues to grow, the production of lithium-ion battery cells is expected to become a significant contributor to global carbon emissions.

Carbon emissions from the production of lithium-ion battery cells are largely caused by the mining and refining of the raw materials used to make the cells, as well as the energy-intensive processes involved in manufacturing the cells themselves.

To make the production of lithium-ion battery cells carbon neutral, reducing or eliminating these emissions is crucial. This contributes to the reduction of the overall environmental impact of these batteries, making them a more sustainable technology. Implementing sustainable practices in the production process could help to accelerate the transition to a low-carbon economy and support efforts to combat climate change.

In addition, making the production of lithium-ion battery cells carbon neutral would also have economic benefits. It might help to reduce the cost of producing these batteries, making them more competitive with other forms of energy storage. This could enable the wider adoption of lithium-ion battery technology, driving innovation and growth in the clean energy sector.

“Carbon Neutral European **Bat**tery Cell Production **w**ith Sustainable, Innovative Pr**o**cesses and 3D Electrode Design to **Man**ufacture” is a project within the EU HORIZON 2.5.9 (Energy Storage) programme which is being funded under Grant Agreement No. 101069705. It aims to pave the way towards cost-efficient and carbon-neutral lithium-ion battery cell production with the overall goal of cutting the cell production cost and energy consumption by more than half. The focus is on non-volatile organic compounds, processed electrodes with slurries of high dry mass content, and the reduction of dry room requirements through enhanced electrolyte filling. It also aims to make cell conditioning, i.e. wetting, formation, and aging more cost- and energy-efficient, and to make use of AI/ML methods to support technological improvements. [1, 2]

1.2. About the BatWoMan Partners

The project combines the expertise of AIT, KIT, UDE, RISE, CIDETEC, SOVEMA, and SAUERESSIG. Each of these organizations brings unique expertise and resources to the table, making them the perfect partners for this ambitious project.

- AIT brings long-standing experience in the coordination of both national and European research actions. AIT contributes as project coordinator, providing clear organizational structure within the consortium and communicating with the project officer, which ensures its timely execution, and the activities in the WPs. For the project's R&D, AIT provides profound knowledge in slurry optimization, cell assembly, and cell testing. AIT also brings experience in operating horizontally scalable cluster infrastructures for automated environments. AIT capabilities include the battery lab, the research pilot line, and the corresponding expertise will be essential to achieving the defined project goals in expected high quality.
- KIT supports the project with its internationally leading expertise in the field of laser-based 3D (three-dimensional) battery manufacturing. For this purpose, KIT provides pilot facilities for roll-to-roll laser processing of large-area battery materials. In addition, knowledge of the complete cell manufacturing process at laboratory scale and electrochemical analysis as well as post-mortem laser plasma spectroscopy will be contributed to the project.
- Based on many years of project and research experience, the Chair of Energy Technology at the University of Duisburg-Essen (UDE) has profound knowledge of energy technology and, in particular, the field of batteries. A range of simulation software in combination with powerful hardware enables the modelling and simulation of various physical and technical processes. The associated laboratory also provides the possibility to carry out various experimental investigations, which can be used, for instance, to validate newly created simulation models.
- RISE, Research Institutes of Sweden, contributes to the life cycle assessment (LCA). A methodology developed and tested in several EU-projects to support the (eco)design process is used. The methodology includes screening LCA at early design stages, an idea generation workshop to increase the partners' engagement in sustainability and digitalisation, and a full LCA at the end of the design phase. RISE is currently engaged in three battery-related European projects: BatWoMan, NoVoC, and GigaBatt.
- CIDETEC Energy Storage specializes in creating new battery technologies according to specific challenges, and its ultimate transfer to the industry. The institute has the capacity to develop complete products and processes and offers material validation, pilot manufacturing, pack engineering, and battery testing services. CIDETEC Energy Storage is also a regular participant and coordinator in H2020 funded projects dealing with different types of solid electrolytes and advanced battery technologies, involving more than 100 specialized researchers.
- Sovema Group is an expert provider of battery manufacturing equipment suitable for small-scale to large-scale production. Sovema Group is involved in the BatWoMan project as an industrial partner, paving the way to a possible large-scale application of the innovative manufacturing concepts researched in the project.

- Saueressig is supporting the project with its expertise in calendering technology. A calender with a heating unit is being provided for the project. An inline thickness measurement system will also be attached to the calender to ensure consistent quality for the test electrodes.

Together, these partners form a strong and well-rounded team that is capable of achieving the project's goals.

1.3. Definition and Importance of the Tasks

Disseminating the results of a scientific project is an important step in ensuring that the research has a real-world impact. Through strategic science dissemination, the scientific research and knowledge generated within BatWoMan will be made widely available. This includes publishing research findings in scientific journals, presenting results at conferences, and sharing them with relevant stakeholders. The goal of the science dissemination activities within BatWoMan is to ensure that scientific knowledge can be accessed by those who can benefit from it. Further, this will help to bring research findings and enhanced technologies to market applications rapidly, benefitting society as a whole.

Moreover, through science communication activities BatWoMan will engage in the explanation and interpretation of scientific findings and technological innovations for general, non-specialist audiences. This includes discussing the implications of challenges as well as discoveries in sustainable battery research. The activities are aimed at increasing the visibility of BatWoMan as a research project that may contribute to the mitigation of climate change and thus to the well-being of future societies.

The European Commission refers to the term “exploitation” as, “The use of results in further research and innovation activities other than those covered by the action concerned, including, inter alia, commercial exploitation such as developing, creating, manufacturing and marketing a product or process, creating and providing a service, or in standardization activities”.

The exploitation work within the BatWoMan project will ensure that appropriate intellectual property strategies and exploitation plans are undertaken by research and industrial partners, maximizing the impact of the project innovations with the final objective of effectively strengthening their position in the market. Besides, the exploitation of project results is vital for maximizing the real-world impact of the EU funding. Within the BatWoMan project, partners will identify the strongest exploitation potential of the results based on every partner’s particular interest and of the project consortium as a whole.

As this project develops industry-ready processes, and thus many achievements require specific exploitation of Intellectual Property Rights (IPR) in addition to scientific dissemination or communication, the task of IPR management will be dealt with as an extention to the aforementioned task of exploitation. IPRs play a crucial role in the exploitation of the results of research projects and their effective management will contribute to the competitive advantage of the BatWoMan project.

1.4. Function and Scope of this Document

This document outlines the Science Dissemination and Communication Plan, a deliverable of the Horizon Europe project BatWoMan.

In order to provide a comprehensive and effective roadmap for communicating the research findings and results of BatWoMan to various audiences, it will also describe the tools and methodologies which will be applied in the dissemination work package (WP) of the project.

1.5. Target Audiences and Strategy

With respect to the BatWoMan project, the most relevant target audience for dissemination activities are researchers working in the field of sustainable battery (and) manufacturing research. Important stakeholders and target groups for communication activities include:

- private industrial companies involved in the production and use of batteries
- environmental groups, advocating for a rapid development of sustainable energy technologies
- the general public, which has an increasing interest in climate change issues and thus sustainable energy technologies
- funding organizations, such as government agencies and private foundations

For dissemination and communication activities we will use the following strategy:

1. **Identify** specific **key target audiences** for the aforementioned stakeholder groups.
2. Tailor communication and dissemination materials to specific audiences: develop **different materials** and methods of communication for each target group, such as scientific papers and conference contributions for the scientific community, and news articles, blogposts, podcasts, and animations for the general public.
3. Use **multiple channels** of communication: utilize a variety of channels to reach target audiences, such as the BatWoMan website, social media, press releases via the partner institutions, conferences, and other events.
4. Build partnerships: work with **key stakeholders**, such as private industrial companies, to co-create communication and dissemination materials and to **promote the project to their networks.**
5. Measure impact: use **metrics** such as website traffic, social media engagement, and media coverage to **evaluate the effectiveness** of the communication and dissemination strategy and **adjust as needed**.
6. **Continuously** engage with target audiences: keep stakeholders informed about project progress and results and gather their feedback to inform future research directions.

2. Scientific Dissemination

The purpose of the scientific dissemination in this project is to promote the concept of green manufacturing and to share project results with the scientific and technical community. The following chapter outlines the tasks, required by the grant agreement, or devised by the team of WP 7, that have been planned and partially implemented. Section 2.1 defines the **targeted audience**, while the following section 2.2 is focused on the selected solution for the **dissemination schedule**. Essential for the scientific dissemination in a European research project are the:

- possible **events** that are pointed out and shared within the consortium (Section 2.3)
- and the resulting **publications** for conferences or in journals (Section 2.4).

In section 2.5 we focus on the **evaluation** of the scientific dissemination task and the chapter concludes with the **milestones** in section 2.6. [2]

2.1. Target Audience

The targeted group for the scientific dissemination in a European research project refers to the individuals or organizations that the project aims to inform and educate about its findings and results. The focus is on the scientific and technical community, with a special emphasis on specialist stakeholders in the field of energy storage. This distinguishes it from communications, which is aimed at a broader, less specialized audience. [2]

2.2. Dissemination Schedule Application

In order to effectively manage and disseminate the progress and results of the BatWoMan project, it is useful to have a dedicated dissemination schedule application. This application will allow the project team to organize and keep track of all dissemination activities, including events and publications. In addition, it offers the option to easily see which topics and which materials are to be published when and where in order to either confirm this plan, or to communicate change requests. As another result, overlapping presentations or disproportionate representation at a few conferences can be avoided, which also optimizes the efficiency of public appearances.

An application like this, integrated into a *Teams* list app as shown in Figure 1, is especially helpful for the BatWoMan project as it not only allows all dissemination and communication tasks to be centralized in one place, but they are also brought together in one location, which also serves as a standard internal communication channel and data repository, making it easily accessible and manageable for all project partners. This will improve the efficiency and effectiveness of the dissemination process and ensure that the results of the BatWoMan project reach the intended audience and have the desired impact.

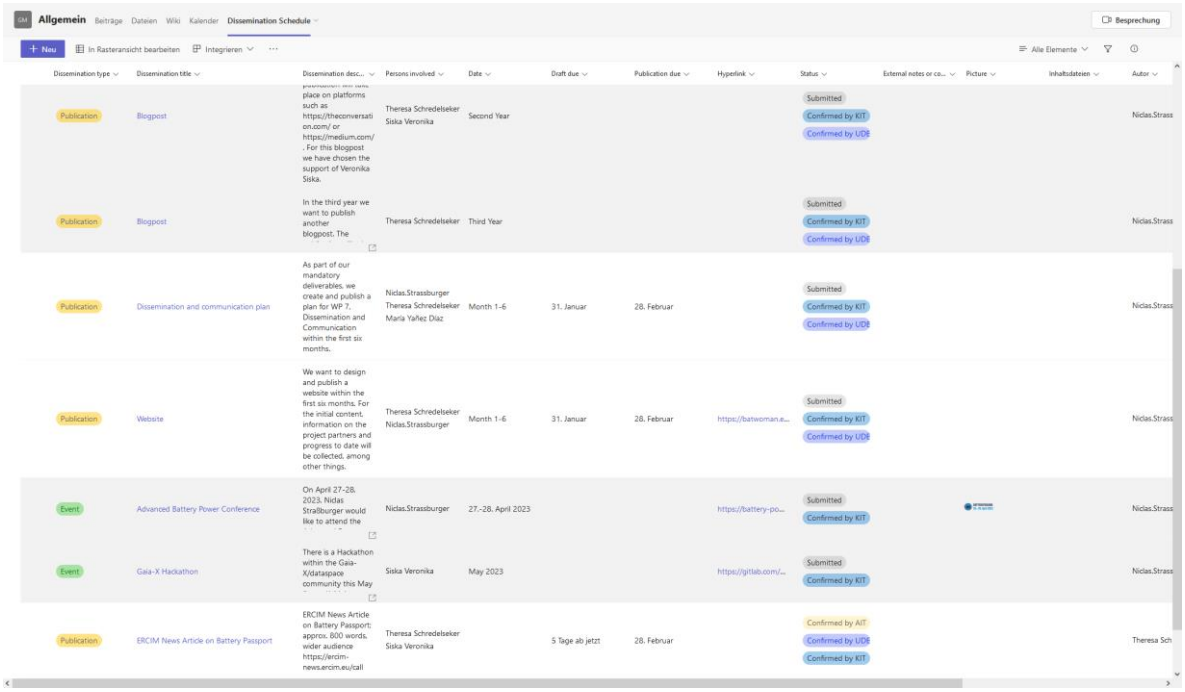
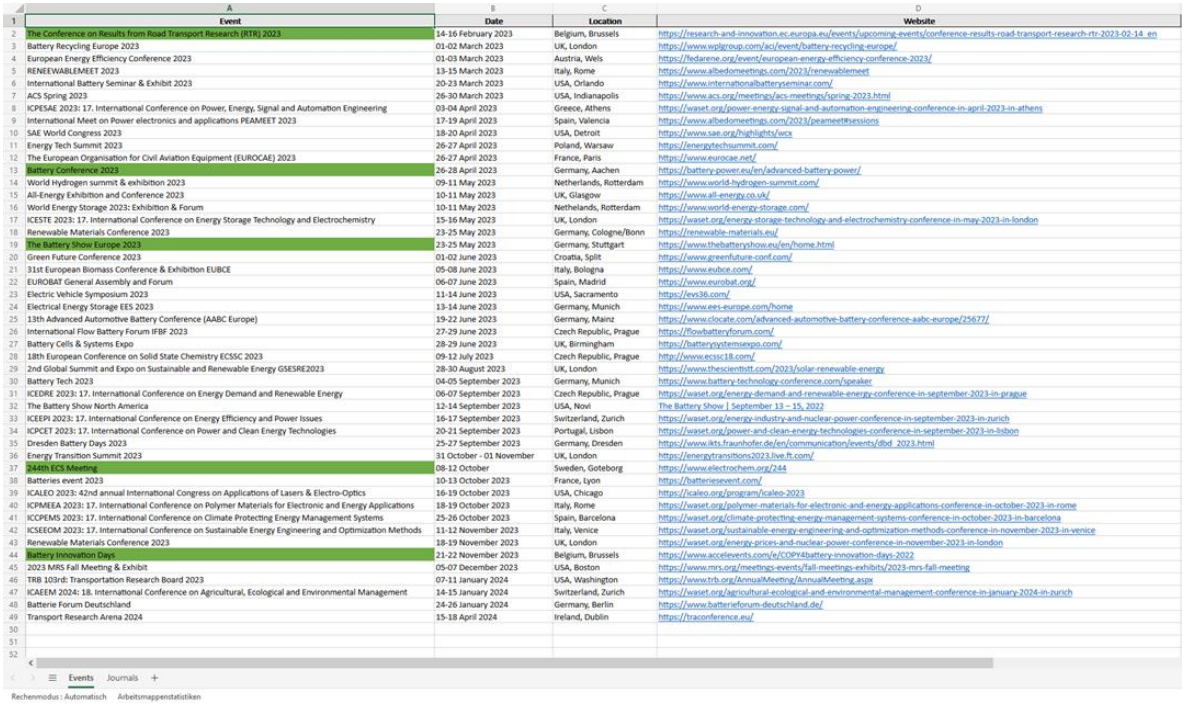


Figure 1: Dissemination schedule application as a Teams lists app.

2.3. Events

As part of the dissemination of BatWoMan, a continuously updated list for battery-related events for the next 12 months will be made available to project partners, helping them choose which ones would provide a convenient platform for promoting the project. This list can be seen in Figure 2 and is stored in the shared *Teams* folder. It provides the name of the event, the date, the location, and the website of the respective events; it can also be expanded on by the project partners. This list is based on a list published by Batteries European Partnership Association (BEPA) for European events with a similar focus and has been successively updated, corrected, and expanded.



Event	Date	Location	Website
The Conference on Results from Road Transport Research (RTR) 2023	14-16 February 2023	Belgium, Brussels	https://research-and-innovation.ec.europa.eu/events/upcoming-events/conference-results-road-transport-research-rtr-2023-02-14_en
Battery Recycling Europe 2023	01-02 March 2023	UK, London	https://www.wplgroup.com/aci/event/battery-recycling-europe/
European Energy Efficiency Conference 2023	01-03 March 2023	Austria, Wels	https://fedarene.org/event/european-energy-efficiency-conference-2023/
RENEEWABLEMEET 2023	13-15 March 2023	Italy, Rome	https://www.albedomeetings.com/2023/renewablemeet
International Battery Seminar & Exhibit 2023	20-23 March 2023	USA, Orlando	https://www.internationalbatteryseminar.com/
ACS Spring 2023	26-30 March 2023	USA, Indianapolis	https://www.acs.org/meetings/acs-meetings/spring-2023.html
ICPESAE 2023: 17. International Conference on Power, Energy, Signal and Automation Engineering	03-04 April 2023	Greece, Athens	https://waset.org/power-energy-signal-and-automation-engineering-conference-in-april-2023-in-athens
International Meet on Power electronics and applications PEAMEET 2023	17-19 April 2023	Spain, Valencia	https://www.albedomeetings.com/2023/peameet#sessions
SAE World Congress 2023	18-20 April 2023	USA, Detroit	https://www.sae.org/highlights/wcx
Energy Tech Summit 2023	26-27 April 2023	Poland, Warsaw	https://energytechsummit.com/
The European Organisation for Civil Aviation Equipment (EUROCAE) 2023	26-27 April 2023	France, Paris	https://www.eurocae.net/
Battery Conference 2023	26-28 April 2023	Germany, Aachen	https://battery-power.eu/en/advanced-battery-power/
World Hydrogen summit & exhibition 2023	09-11 May 2023	Netherlands, Rotterdam	https://www.world-hydrogen-summit.com/
All-Energy Exhibition and Conference 2023	10-11 May 2023	UK, Glasgow	https://www.all-energy.co.uk/
World Energy Storage 2023: Exhibition & Forum	10-11 May 2023	Netherlands, Rotterdam	https://www.world-energy-storage.com/
ICESTE 2023: 17. International Conference on Energy Storage Technology and Electrochemistry	15-16 May 2023	UK, London	https://waset.org/energy-storage-technology-and-electrochemistry-conference-in-may-2023-in-london
Renewable Materials Conference 2023	23-25 May 2023	Germany, Cologne/Bonn	https://renewable-materials.eu/
The Battery Show Europe 2023	23-25 May 2023	Germany, Stuttgart	https://www.thebatteryshow.eu/en/home.html
Green Future Conference 2023	01-02 June 2023	Croatia, Split	https://www.greenfuture-conf.com/
31st European Biomass Conference & Exhibition EUBCE	05-08 June 2023	Italy, Bologna	https://www.eubce.com/
EUROBAT General Assembly and Forum	06-07 June 2023	Spain, Madrid	https://www.eurobat.org/
Electric Vehicle Symposium 2023	11-14 June 2023	USA, Sacramento	https://evs36.com/
Electrical Energy Storage EES 2023	13-14 June 2023	Germany, Munich	https://www.ees-europe.com/home
13th Advanced Automotive Battery Conference (AABC Europe)	19-22 June 2023	Germany, Mainz	https://www.clocate.com/advanced-automotive-battery-conference-aabc-europe/25677/
International Flow Battery Forum IFBF 2023	27-29 June 2023	Czech Republic, Prague	https://flowbatteryforum.com/
Battery Cells & Systems Expo	28-29 June 2023	UK, Birmingham	https://batterysystemsexpo.com/
18th European Conference on Solid State Chemistry ECSSC 2023	09-12 July 2023	Czech Republic, Prague	http://www.ecssc18.com/
2nd Global Summit and Expo on Sustainable and Renewable Energy GSESRE2023	28-30 August 2023	UK, London	https://www.thescientistt.com/2023/solar-renewable-energy
Battery Tech 2023	04-05 September 2023	Germany, Munich	https://www.battery-technology-conference.com/speaker
ICEDRE 2023: 17. International Conference on Energy Demand and Renewable Energy	06-07 September 2023	Czech Republic, Prague	https://waset.org/energy-demand-and-renewable-energy-conference-in-september-2023-in-prague
The Battery Show North America	12-14 September 2023	USA, Novi	The Battery Show | September 13 – 15, 2022
ICEEPI 2023: 17. International Conference on Energy Efficiency and Power Issues	16-17 September 2023	Switzerland, Zurich	https://waset.org/energy-industry-and-nuclear-power-conference-in-september-2023-in-zurich
ICPCET 2023: 17. International Conference on Power and Clean Energy Technologies	20-21 September 2023	Portugal, Lisbon	https://waset.org/power-and-clean-energy-technologies-conference-in-september-2023-in-lisbon
Dresden Battery Days 2023	25-27 September 2023	Germany, Dresden	https://www.ikts.fraunhofer.de/en/communication/events/dbd_2023.html
Energy Transition Summit 2023	31 October - 01 November	UK, London	https://energytransitions2023.live.ft.com/
244th ECS Meeting	08-12 October	Sweden, Goteborg	https://www.electrochem.org/244
Batteries event 2023	10-13 October 2023	France, Lyon	https://batteriesevent.com/
ICALEO 2023: 42nd annual International Congress on Applications of Lasers & Electro-Optics	16-19 October 2023	USA, Chicago	https://icaleo.org/program/icaleo-2023
ICPMEEA 2023: 17. International Conference on Polymer Materials for Electronic and Energy Applications	18-19 October 2023	Italy, Rome	https://waset.org/polymer-materials-for-electronic-and-energy-applications-conference-in-october-2023-in-rome
ICCPEMS 2023: 17. International Conference on Climate Protecting Energy Management Systems	25-26 October 2023	Spain, Barcelona	https://waset.org/climate-protecting-energy-management-systems-conference-in-october-2023-in-barcelona
ICSEEOM 2023: 17. International Conference on Sustainable Energy Engineering and Optimization Methods	11-12 November 2023	Italy, Venice	https://waset.org/sustainable-energy-engineering-and-optimization-methods-conference-in-november-2023-in-venice
Renewable Materials Conference 2023	18-19 November 2023	UK, London	https://waset.org/energy-prices-and-nuclear-power-conference-in-november-2023-in-london
Battery Innovation Days	21-22 November 2023	Belgium, Brussels	https://www.accelevents.com/e/COPY4battery-innovation-days-2022
2023 MRS Fall Meeting & Exhibit	05-07 December 2023	USA, Boston	https://www.mrs.org/meetings-events/fall-meetings-exhibits/2023-mrs-fall-meeting
TRB 103rd: Transportation Research Board 2023	07-11 January 2024	USA, Washington	https://www.trb.org/AnnualMeeting/AnnualMeeting.aspx
ICAEEM 2024: 18. International Conference on Agricultural, Ecological and Environmental Management	14-15 January 2024	Switzerland, Zurich	https://waset.org/agricultural-ecological-and-environmental-management-conference-in-january-2024-in-zurich
Batterie Forum Deutschland	24-26 January 2024	Germany, Berlin	https://www.batterieforum-deutschland.de/
Transport Research Arena 2024	15-18 April 2024	Ireland, Dublin	https://traconference.eu/

Figure 2: List of battery-related events.

2.4. Scientific publications

Scientific publications play a crucial role in disseminating the results of the project to the wider scientific community and advancing knowledge in the field. Additionally, the publication of project results increases the visibility and impact of the project and its outcomes, documenting its progress, and ideally enhancing the reputation of the project partners, their researchers, and the project involved. In the course of the project, at least six associated publications for conference participations and at least four peer-reviewed scientific publications are expected to be written and submitted by consortium members, as further described in section 2.5. Similar to the aforementioned list of events, a continuously updated list for battery-related journals will be made available to the project partners, as seen in Figure 3.

	A	B
1	Journal	Website
2	ACS nano	https://pubs.acs.org/journal/ancac3
3	Applied Energy	https://www.sciencedirect.com/journal/applied-energy
4	Electrochimica Acta	https://www.sciencedirect.com/journal/electrochimica-acta
5	Energy	https://www.sciencedirect.com/journal/energy
6	Journal of Energy Storage	https://www.sciencedirect.com/journal/journal-of-energy-storage
7	Journal of Power Sources	https://www.sciencedirect.com/journal/journal-of-power-sources
8	Journal of the Electrochemical Society	https://www.electrochem.org/publications/jes
9	Nanomaterials	https://www.mdpi.com/journal/nanomaterials
10	Open Research Europe Engineering and Technology Journal	https://www.ej-eng.org/index.php/ejeng
11	Sustainable Energy & Fuels	https://www.rsc.org/journals-books-databases/about-journals/sustainable-energy-fuels
12		

Figure 3: List of battery-related journals.

2.5. Evaluations

To measure the success of scientific dissemination in this research project we use two Key Performance Indicators (KPIs) that represent the objectives for this task described in the grant agreement:

- International conference participation and associated proceedings publications are important for the project's visibility and impact in the scientific community. Conferences provide an opportunity for researchers to present their work to a broader scientific audience and to receive feedback from experts in the field. The publications associated with these conferences provide a permanent record of the presented work and make it accessible to a wider audience. The number of conference participations and associated publications will be used as a KPI and must reach a minimum of six to achieve the objective as stated in the Grant Agreement.
- Peer-reviewed scientific publications are also essential for a research project's impact. Peer-review is a critical aspect of the scientific process, providing a way to ensure the quality and validity of scientific results. The number of peer-reviewed scientific publications will be used as another KPI and needs to reach a minimum count of four to fulfil the objective.

These KPIs not only allow for evaluating how well the project was disseminated overall, but by differentiating between the contributors, the KPIs also provide a way to assess the engagement of the individual project partners.

In addition to these KPIs, it can also be helpful to track the reach of the dissemination activities, such as the number of downloads, views, or citations of the publications, and the

number of attendees of the events. These metrics can provide additional insight into the project's success in disseminating its results and its impact on the scientific community.

2.6. Milestones

In Figure 4 you can find the milestones of the scientific dissemination task.

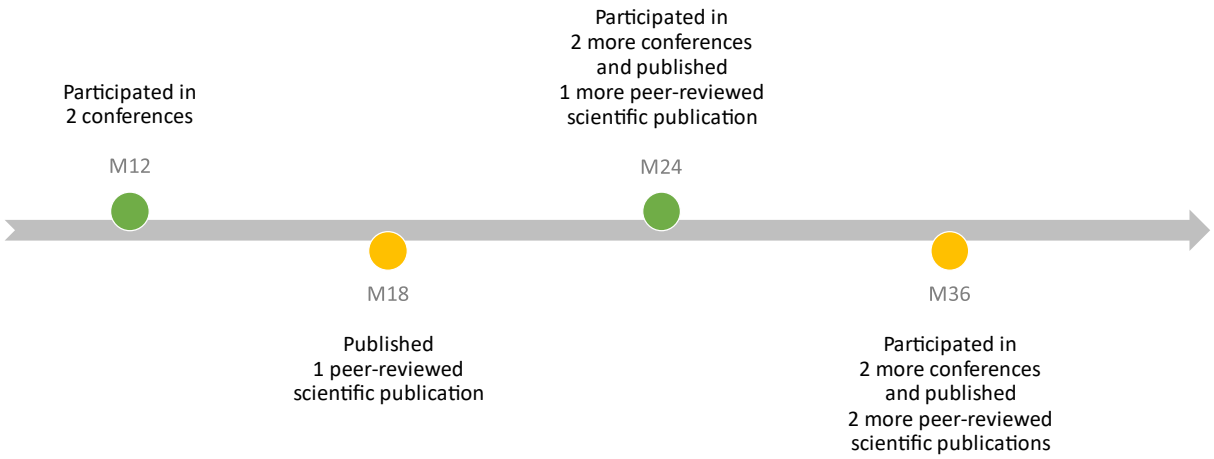


Figure 4: Milestones of the BatWoMan scientific dissemination.

3. Communication

The objective of the communication is to share project information and results with the wider public. This chapter summarizes the tasks, required by the Grant Agreement, or devised by the team of WP 7, that have been planned and partially implemented. In section 3.1 the **targeted audience** is described, while the following 4 sections are focusing on materials developed for the communication as:

- the BatWoMan **logo** (Section 3.2)
- poster and presentation **templates** (Section 3.3)
- **print products** such as flyers and/or leaflets (Section 3.4)
- **animations** of the LIBs cell manufacturing (Section 3.5).

Central for the collection of science communication content aimed at non-specialist stakeholders will be the BatWoMan **website** (Section 3.6) and the BatWoMan **social media channels** (Section 3.7). BatWoMan scientists from all career levels will be encouraged and assisted to:

- write **blogposts** (Section 3.8)
- participate in interviews which will be released as **podcasts** (Section 3.9)
- realize **local activities** (Section 3.10).

Section 3.11 is focused on the **evaluation** of the communication task and the chapter completes with the **milestones** in section 3.12. [2]

3.1. Target Audience

Due to their critical role in supporting and advancing scientific research it is important to address the general public in scientific communication. Publicly funded research is an investment in the future, and taxpayers have a right to know what they are getting in return for their investment. By making the public aware of the research being conducted in their name, they are able to make informed decisions about the issues and challenges that affect their daily lives. Therefore, scientists have a responsibility to make their research widely accessible and transparent and to engage the general public in their research process.

The BatWoMan consortium recognizes and integrates the public audience as a valuable stakeholder in the pursuit of scientific knowledge and progress. Through the generation of multimedia content which will be shared on the BatWoMan website and social media channels, scientists within BatWoMan engage the public in dialogue and collaboration and might learn about public knowledge and concerns. This can help to create a more inclusive and equitable science ecosystem and can lead to better outcomes and solutions for current social and environmental challenges.

Engaging with the general public can help to educate people about the importance of scientific research and its potential to improve our lives and the world around us. This contributes to fostering a culture of curiosity and inquiry and can inspire the next generation of scientists and innovators. Overall, addressing a general public audience in science communication is essential for ensuring that scientific research is valued and supported, and for driving progress in the field. [2]

3.2. Logo

The BatWoMan logo shown in Figure 5 with a gradient from blue to green represents a shift from the current state (represented in the neutral colour blue) to a more energy-efficient and sustainable (represented in green) battery cell production process.

Figure 5: BatWoMan logo.

The blue colour represents the current state of battery cell production, which is often energy-intensive and environmentally damaging. The green colour, on the other hand, represents a more sustainable future state of battery cell production, to which BatWoMan aims to contribute.

The gradient from blue to green represents the transition from the current state to the desired future state and symbolizes the progress and momentum that is being made towards a more sustainable and energy-efficient future.

The BatWoMan logo was created by Theresa Schredelseker and presented at the BatWoMan kick-off meeting in Vienna on September 29 – 30, 2022. It was approved by all attendees during the meeting.

3.3. Poster and Presentation Templates

Design templates were generated to assist the generation of visually consistent and cohesive materials, such as posters and talk presentations. They strengthen the project's visual identity. The use of a consistent colour palette and graphic elements such as logos and icons ensure that all materials have a professional and cohesive appearance. The current design of the poster is shown in Figure 6 and the following figure, Figure 7, shows the presentation template.

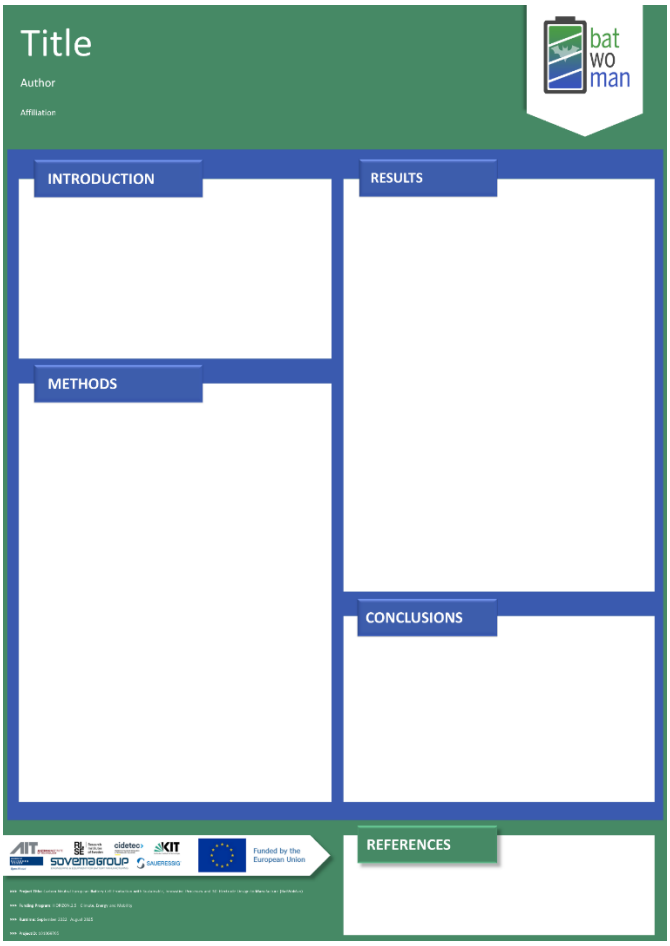


Figure 6: Poster template for BatWoMan.

Blue and green are used as the main colours in the design template. Blue is often associated with trustworthiness, reliability, and intelligence. Green is often associated with environmentalism and sustainability. These colours are intended to represent BatWoMan as a professional research project focusing on sustainability and environmental responsibility.

Figure 7: Title slide of the BatWoMan presentation template.

3.4. Print Products

Flyers and/or leaflets displaying condensed information about BatWoMan will be designed and printed. Figure 8 shows the first page of a design draft for a leaflet to be printed and distributed.

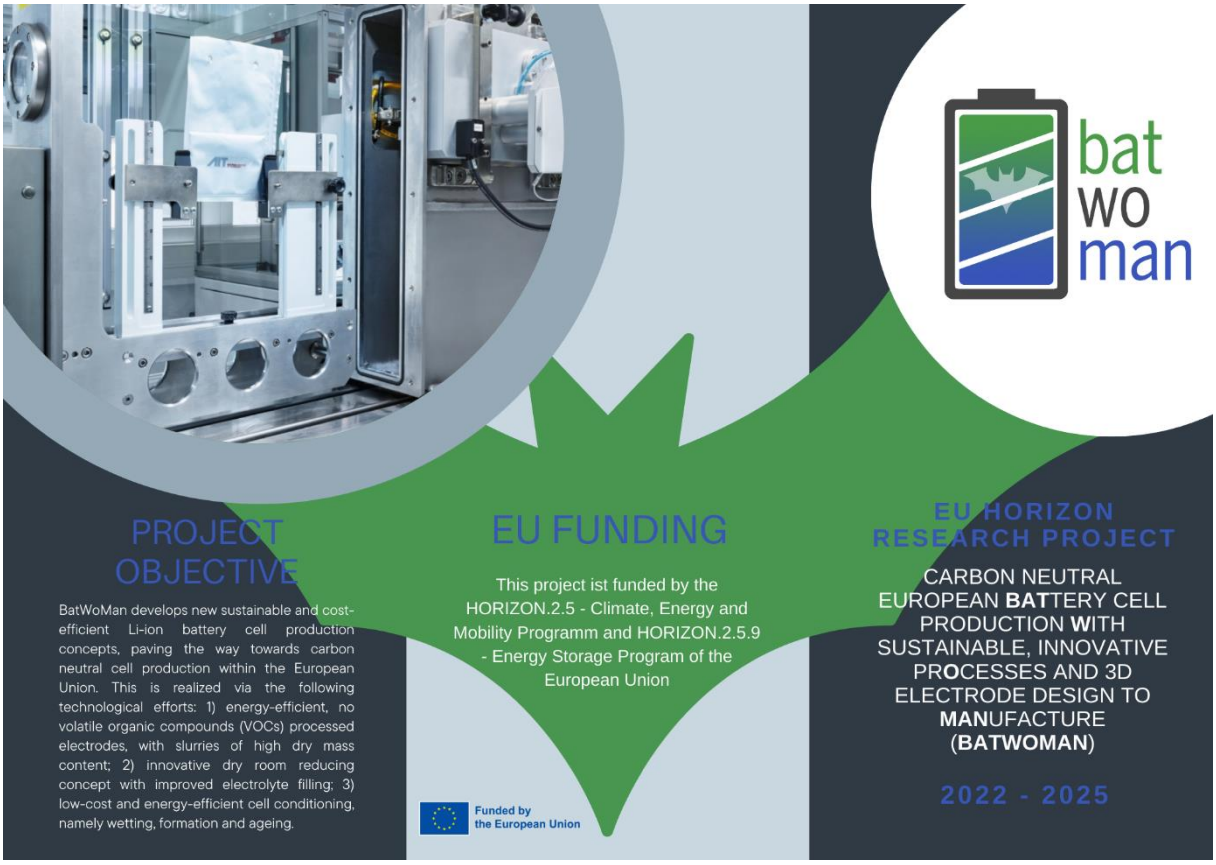


Figure 8: Example of the first page of the BatWoMan leaflet design.

The exact design and content are subject to change as the draft still needs to be circulated within the consortium to collect feedback and make adaptations accordingly. A final version of the leaflet is planned to be circulated within the BatWoMan consortium by April 2023.

3.5. Animations

Animations are a useful tool to inform a non-specialist audience as they can provide clear visuals to explain the complex steps involved in the Li-ion battery (LIB) manufacturing process. This can help to make the information more accessible and easier to understand for people who may not have a technical background in this area.

For the animations, we place particular emphasis on representing the entire scope of the BatWoMan project. To accomplish this, we use Figure 9 as a basis and create animations that set the project apart from current state-of-the-art processes.

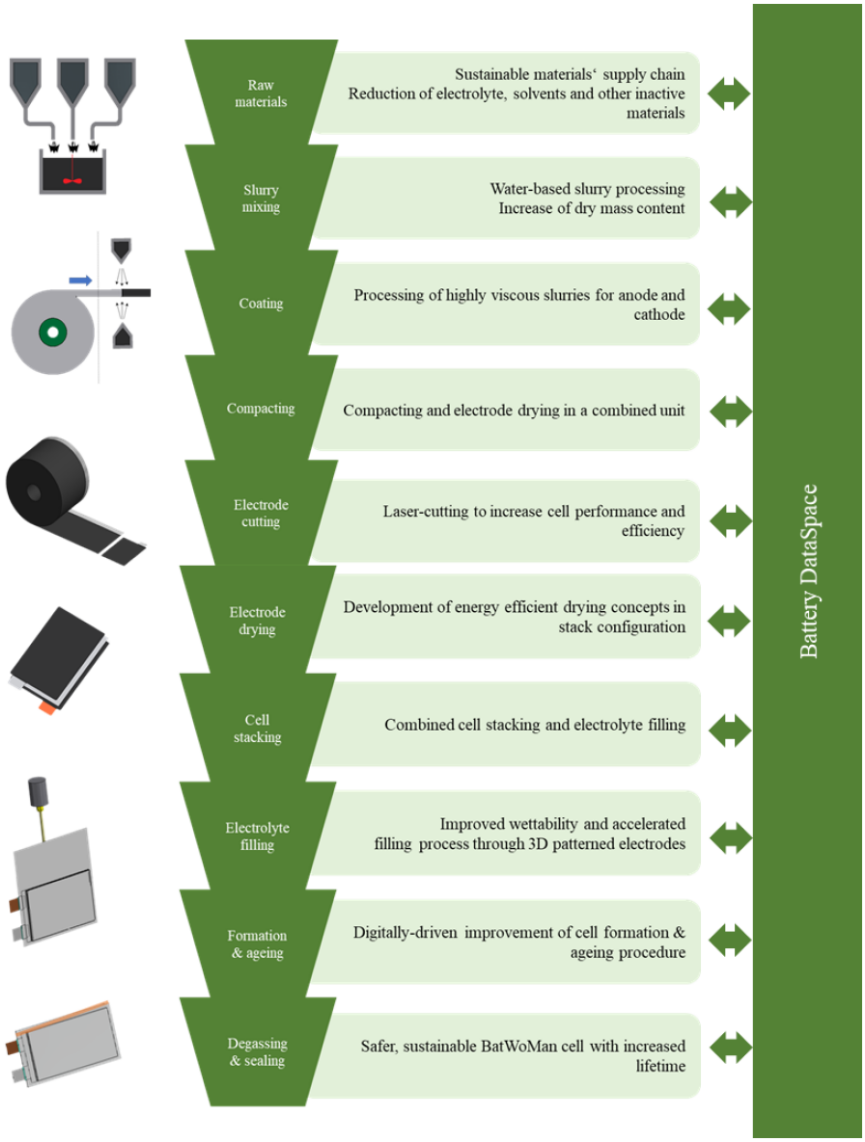


Figure 9: BatWoMan's concept of sustainable European Li-ion battery cell manufacturing.

The approach we consider to be the most promising and which is currently being implemented is to capture the complete project scope in short animations, which can be accessed by hovering or clicking on an exemplary image of battery production steps. In addition, a complete video with a consistent combination of all animations is planned. Figure 10 provides a conceptual illustration of the previously mentioned exemplary image of battery production steps.

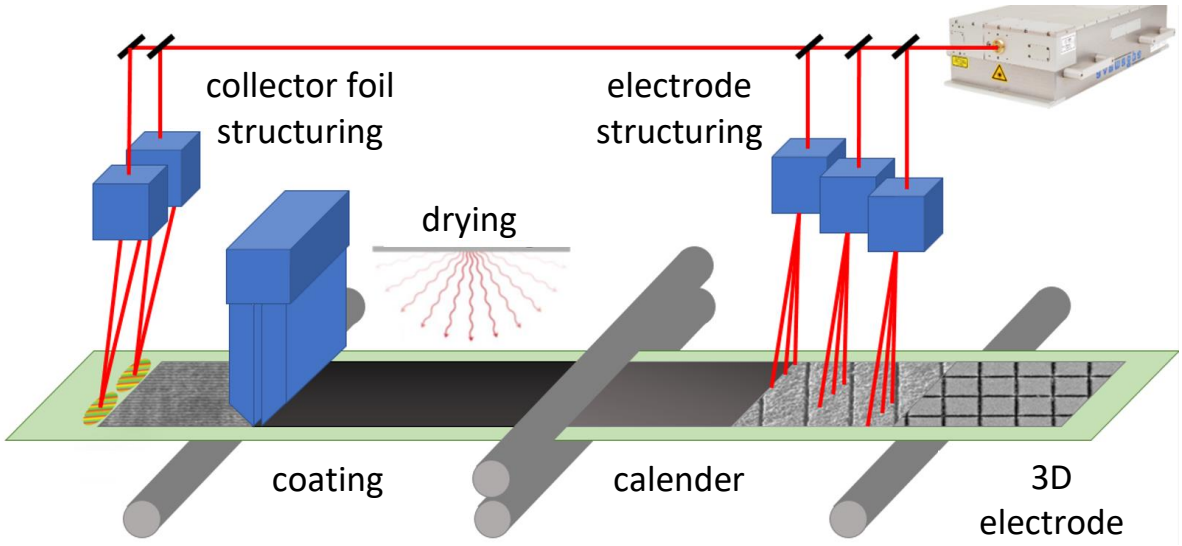


Figure 10: Exemplary image of battery production steps (Source: KIT).

The animations will be generated between the 12th and 30th month of the project and be made publicly available on the BatWoMan website (https://www.batwoman.eu/) and on YouTube (https://www.youtube.com/).

3.6. Website

The BatWoMan website will be the centralized and accessible source of information about the research project, its findings, and its significance. It aims to ensure that the information is readily available to a broad range of target groups, including other scientists, funding agencies, policy makers, industry leaders, and the general public. Through the website, a range of resources and materials about BatWoMan will be available, including press releases, project descriptions, contact details of the project partners, and multimedia content.

The BatWoMan website is created and administered with the content management system WordPress (https://www.wordpress.org/), due to its user friendliness and the vast range of available tools provided by the large user community. The URL **batwoman.eu** was registered by the Chair of Energy Technology at the University of Duisburg-Essen (UDE) through STRATO (https://www.strato.de/). The WordPress website at https://www.batwoman.eu/ will be hosted on UDE webservers. However, it is currently (Jan 20, 2023) hosted at a third-party provider (https://www.strato.de/), since the UDE web servers are still offline after the Cyberattack on UDE on November 27, 2022. As soon as the web servers of UDE are back online, the website will be transferred to UDE servers and will be hosted there for at least three years after the end of the BatWoMan project, i.e., until 2028.

The original outline and design of the BatWoMan website will be set up by the BatWoMan team members at UDE. The website will officially be launched at the latest on February 28, 2023, i.e., six months after project start.

The open-source web analytics tool Matomo (https://www.matomo.org) will be used to track user data on the BatWoMan website. To make it GDPR-compliant, the consent of the visitor to collect and process their personal data will be obtained. This can be done by displaying a clear and prominent notice on the website, explaining what data is being collected and why. The visitor must then explicitly opt in to have their data collected. This may lead to a misrepresented visitor number which is lower than the actual visitor number.

3.7. Social Media

Social Media platforms are used to increase the visibility and outreach of the BatWoMan project and help engage with these audiences and foster dialogue and collaboration. They will be used to inform audiences about project developments and distribute media content.

The BatWoMan project has profiles/channels on three social media platforms which are important to engage with certain target audiences:

3.7.1. ResearchGate

ResearchGate is primarily used by scientists and researchers, so it is an effective tool to reach this specific audience with information about the BatWoMan project. This audience is likely to be particularly interested in the technical details and scientific implications of the project, and ResearchGate provides an in-depth and specialized platform for sharing this information.

ResearchGate also provides opportunities for researchers to connect with each other and form collaborations, which can be valuable for BatWoMan scientists to disseminate their research and engage with other experts in the field. BatWoMan scientists will be encouraged to upload and share materials like protocols, posters, and articles about the project.

3.7.2. Twitter

Twitter has a large and diverse user base, which can be useful for reaching a broad and varied audience with information about the BatWoMan project. Twitter is known for its fast-paced, real-time nature, which can be useful for sharing updates and news about BatWoMan immediately. This can help keep stakeholders and followers engaged and informed about the latest developments.

Twitter allows users to use hashtags to categorize and discover tweets on specific topics. This can be useful for the project team to use relevant hashtags to reach users who are interested in BatWoMan-related topics. Impactful hashtags that could be used in BatWoMan Twitter posts include: #sustainability, #sustainable, #battery, #batteries, #batteryresearch, #batterymaterials, #lithiumion, #lithiumionbatteries, #evbatteries, #sustainablebatteries, #cleantech, #energy, #renewableenergy, #greenenergy, #energystorage, #energytransition, #energytwitter, #greenmanufacturing, #climatechange, #globalwarming, #euhorizon, #research, #science.

Twitter is known for its high levels of user engagement, and it can be an effective way to interact with followers and stakeholders, as well as encourage two-way communication and dialogue. Twitter also allows the inclusion of photos and videos, which can be useful for visually communicating information about BatWoMan.

3.7.3. LinkedIn

LinkedIn is primarily used by professionals, including researchers and scientists. This audience is likely to be interested in the professional and career-related aspects of the BatWoMan project, and LinkedIn provides a specialized platform for sharing this information. LinkedIn posts are often longer than posts on other social media platforms and can thus transport more specialized content. LinkedIn also provides opportunities for professionals to connect with each other and form collaborations, which might help to engage with other experts in the field.

Also on LinkedIn, hashtags are an important tool to curate content. A company page on LinkedIn can highlight three Hashtags in their profile. For the BatWoMan page, the following three hashtags were chosen (in brackets, the number of followers as of Jan 9, 2023, is given for each hashtag):

#batteries (133.785 followers)

#energy (4.010.220 followers)

#greentech (12.315.061 followers)

While according to the BatWoMan grant proposal it was intended to also create a BatWoMan page on **Facebook**, the consortium decided that the platform became less feasible for science communication and thus will not be considered. While Facebook still has a vast user base, the algorithms which curate content recently have been heavily criticized to foster the spread of misinformation, which creates challenges for scientific communication efforts. [3]

As of January 19th, 2023, the numbers of reads or followers of the BatWoMan social media pages were as displayed in Table 1.

Table 1: Target and current numbers of reads or followers on the Social Media platforms on which BatWoMan is represented.

Platform	Reads (ResearchGate), Followers (LinkedIn, Twitter)	Aim to be reached according to the grant agreement
ResearchGate	123	150
LinkedIn	354	350
Twitter	86	350

3.8. Blogposts

Social media platforms are great places to share news and brief posts about research projects. For more in-depth coverage of specific aspects, blogposts are still a very useful tool for science communication. [4]

Writing blogposts is a valuable way for researchers to disseminate their research to a wider audience and to contribute to public engagement. Blogposts allow people to share insights and perspectives on a research field and to discuss broader implications. We picked postdoctoral BatWoMan researchers as authors because of their high level of expertise and knowledge in their field of research they are also mostly still involved in the day-to-day aspects of a research project. They usually can integrate and communicate a thorough understanding of the progress, results, and challenges of the project.

We plan to publish the blogposts on “The Conversation” (https://www.theconversation.com/) or “Medium” (https://www.medium.com/) since they have a large audience and reach a diverse range of readers, including both experts and non-experts in their field. Additionally, these platforms are known for their focus on high-quality, accurate, and accessible content. They also reach a broad audience and offer a good opportunity to share the results of their research and expertise in a more approachable way, and to engage with the public in the comments section.

Furthermore, “The Conversation” and “Medium” are free to use and easily accessible, which makes it easy for researchers to share their work and engage with readers. Thereby, they also provide the opportunity for researchers to gain visibility in the scientific community and beyond.

Two blogposts are scheduled to be published by the end of 2024. The first one will be an ERCIM (European Research Consortium for Informatics and Mathematics) news article written by Dr. Veronika Siska and edited by Dr. Theresa Schredelseker, and will be submitted by February 28, 2023 (News No. 133). ERCIM News articles are descriptive reports about contributions to the European Community in Information Technology and have a length of about 800 words. The April 2023 issue will focus on Data Infrastructures and Management. Our contribution is planned to cover the concept of a battery passport, with focus on the European frameworks and the specific BatWoMan activities in this field. The second blogpost is expected to be written by Dr. Theresa Schredelseker in 2024. However, a different author might be chosen instead, depending on results which are obtained during the BatWoMan project.

3.9. Podcasts

Podcasts as a format for science communication have grown in popularity in the last decade. [5]

Podcasts offer a convenient way for people to access information about research in energy storage, a topic which is assumed to have risen in public interest within the last few years.

Between the 18th and 36th month of the BatWoMan project, four interviews with WP leaders will be recorded and released on the BatWoMan website (https://batwoman.eu/) and on Spotify (https://www.spotify.com/).

For the fall of 2023, the annual consortium meeting is scheduled to take place in Sweden. At this meeting, an interview with Dr. Katja Fröhlich about the general motivation and objectives of the BatWoMan project is planned to be recorded. This recording will be the first in the series of four podcast episodes. At the 2023 meeting, RISE will organize a workshop on LCA topics. The plan is to record some audio from the workshop and conduct an interview with Dr. Mats Zackrisson, and to combine these recordings into a second podcast episode.

A third and fourth episode will be based on interviews recorded at the 2024 annual consortium meeting, which is scheduled to take place in Spain. Potential interview partners include Dr. Wilhelm Pfleging, Prof. Dr. Harry Hoster and/or Dr. Iratxe de Meatza, although interviewees are subject to change as the project progresses.

3.10. Local Activities

BatWoMan consortium members will engage in local activities and events organized in the cities and regions of host institutions. As an example, the laboratories at KIT in which BatWoMan research is conducted will open their doors to the public on April 27, 2023, for "Girls' Day". Girls' Day is a day of action held once a year to motivate girls and women to take up technical and scientific professions. Here, KIT will not only illustrate all production steps from making a slurry to testing the final batteries, and to what extent BatWoMan will optimize the processes shown, but also give everyone the opportunity to build their own coin cells in a glovebox. Similar events taking place at any other of the institution's sites may be used to present BatWoMan activities to the public.

3.11. Evaluation

KPIs for the communication efforts in BatWoMan include website visitors, social media followers and comments, research item reads and downloads, podcast downloads, blogpost reads, and animation/video views.

- **Website Visitors:** Tracking website visitors can provide valuable insights into the reach and engagement of the BatWoMan project's communication efforts. We will track the number of unique visitors and the number of page views per visitor to gauge engagement. Our goal is to reach more than 13,000 visitors over the project duration. However, it is important to note that GDPR compliance and visitor opt-outs can make it difficult to obtain accurate visitor data. We will ensure that all tracking is done in compliance with GDPR regulations and provide visitors with the choice to opt out of being tracked.
- **Social Media Followers and Comments:** BatWoMan is represented on Twitter and LinkedIn. To learn about the reach and engagement with a public audience, we will track the number of followers and the number of comments on our social media accounts as a way of assessing the reach and engagement of our social media communication efforts. The number of followers that we aim to reach, as well as the current status, is shown in Table 1.
- **Research Item Reads and Downloads:** By tracking the number of reads and downloads of research items shared on ResearchGate we can assess the reach and engagement of our research communication efforts target towards a professional audience. The number of reads that we aim to reach as well as the current status is shown in Table 1.
- **Podcast Downloads:** Podcast downloads can be accessed on Spotify and through the Podlove plugin (https://de.wordpress.org/plugins/podlove-podcasting-plugin-for-wordpress/) used on the BatWoMan WordPress page. This will give us an idea of the reach and engagement of our podcast communication efforts. We aim for more than 100 downloads for each of the four podcast episodes that we plan to produce until the end of the BatWoMan project.
- **Blogpost Reads:** We will be publishing our blogposts either on "The Conversation" or "Medium". These websites track the number of reads which will allow us to assess the reach and engagement of our blogpost communication efforts. We aim for more than 500 reads of the first blogpost (to be published within 2023) and more than 300 reads for the second blogpost (to be published in 2024) until the end of the BatWoMan project.
- **Animation/Video Views:** We plan to generate animations and upload them to the BatWoMan website as well as on YouTube. The number of views can be tracked as a way of assessing the reach and engagement of our animation communication efforts. We aim for more than 200 views on YouTube for the animations until the end of the BatWoMan project.

3.12. Milestones

Figure 11 displays the communication task's significant achievements.

Figure 11: Milestones of the BatWoMan communication.

4. Exploitation

The intention of the exploitation activities within the project are directly connected to the dissemination and communication tasks. Relevant EU battery stakeholders will be informed on the project results in order to increase the economic opportunities. This chapter describes the tasks, stipulated in the grant agreement, or devised by the team of WP 7, that have been planned and partially implemented. Section 4.1 defines the **target audience**, while the following section 4.2 is focused on the **key exploitable results**. Important for the exploitation in this project are:

- the upcoming **workshops** (Section 4.3),
- the **implementation strategy** of the project exploitation (Section 4.4), and
- the resulting **deliverables** (Section 4.5).

In section 4.6 we describe the **evaluation** of the exploitation task; the chapter concludes with the **milestones** in section 4.7. [2]

4.1. Target Audience

As a counterpart to the previously mentioned scientific dissemination and communication, this task focuses on the commercial utilisation of the achieved results. For this purpose, the task is directed at the battery industry, policymakers, and research institutions. These audiences are crucial to the real-world success of BatWoMan, as they play an important role in ensuring the project's impact through exploitation, the sustainability of its results, and also in possible business opportunities for the partners.

4.2. Key exploitable results

Firstly, all Key Exploitable Results (KERs) will be identified, updated, and upgraded through Exploitation Workshops as a part of the General Assembly meetings to maximize their value. The initial information on the KERs was obtained at the proposal stage. A better insight on the technologies developed in the BatWoMan project is needed to gauge the potential of these KERs. At the present day identified KERs are listed below:

For the five research institutes (AIT, CID, KIT, RISE, UDE):

- Expertise on sustainable manufacturing methods for gen 3b batteries
- Solvent-reduced electrode manufacturing methods
- Cell prototyping with advanced 3D structured components
- New standards in LCA for green manufacturing methods
- New models related to the manufacturing process chain
- Enhanced academic track record through journal and conference papers
- Engagement with public through communication activities
- Engagement with stakeholders through networking activities

For the two industrial players in cell production machinery (SAU, SOV):

- Develop and standardize green Lithium (Li)-ion manufacturing capabilities using sustainable materials and processes
- Develop manufacturing concepts for implementation in equipment design
- Position companies in EU green manufacturing value chain
- Enable design for advanced manufacturing machinery

4.3. Workshops

Scheduled for M18 and M30, two Exploitation Workshops will be held as part of WP7 with all partners to develop the exploitation plans and exchange information obtained through technical and commercial surveys done by each partner. In these Exploitation Workshops, the project´s researchers and industry partners will contribute to the KERs list to achieve a target-oriented exploitation of the project outcomes. The outcomes of these workshops will be fed into the Exploitation Plan, delivering a preliminary exploitation strategy (D7.2) at M24 and a final exploitation strategy for the technology after the project (D7.4) at M36.

4.4. Implementation Strategy

The preliminary roadmap to the market-uptake of the BatWoMan technology, with the main focus on the sustainability of the production technology for the growing EV market's requirements, is depicted in Figure 12. It is expected that the main BatWoMan developments will achieve Technology Readiness Level (TRL) 6 within the lifetime of the project, which is due to end in 2025. It can be assumed that for market uptake it will take up to 3 years before cell manufacturers standardize and validate the expected developments in the project, albeit with minimal further capital expenditure. Once taken on board by cell manufacturers, it is assumed that the technology will be brought to TRL 9 by 2028, ready for commercialization within the EV market. Since the technology roadmap of generation 4 solid electrolyte battery materials will be significantly shaped by Horizon-CL5-D2-01-05 and other initiatives, it is predicted that several of the solvent-reduced manufacturing techniques, as well as laser structuring of the cell components, will be directly or indirectly transferable to generation 4 technology. This would further enhance the market uptake of the BatWoMan fabrication methods, highlighting the importance of direct communication links with these initiatives. The industrial partners (SOVEMA, SAUERESSIG) will reinforce their direct positioning within the EU battery manufacturing value chain by exploiting the project's outcomes.

Their design inputs into GWh scale equipment can be realized using the demonstrated technology in BatWoMan and can be directly used by key stakeholders, such as cell manufacturers in the EU. Lastly, the interaction of BatWoMan with Cluster 5 projects from Horizon 2020, such as 3beLiEVe, COBRA, and Sense, allow a direct transfer of knowledge to other generation (3b and higher) batteries and therefore enhance their market penetration by 2028.

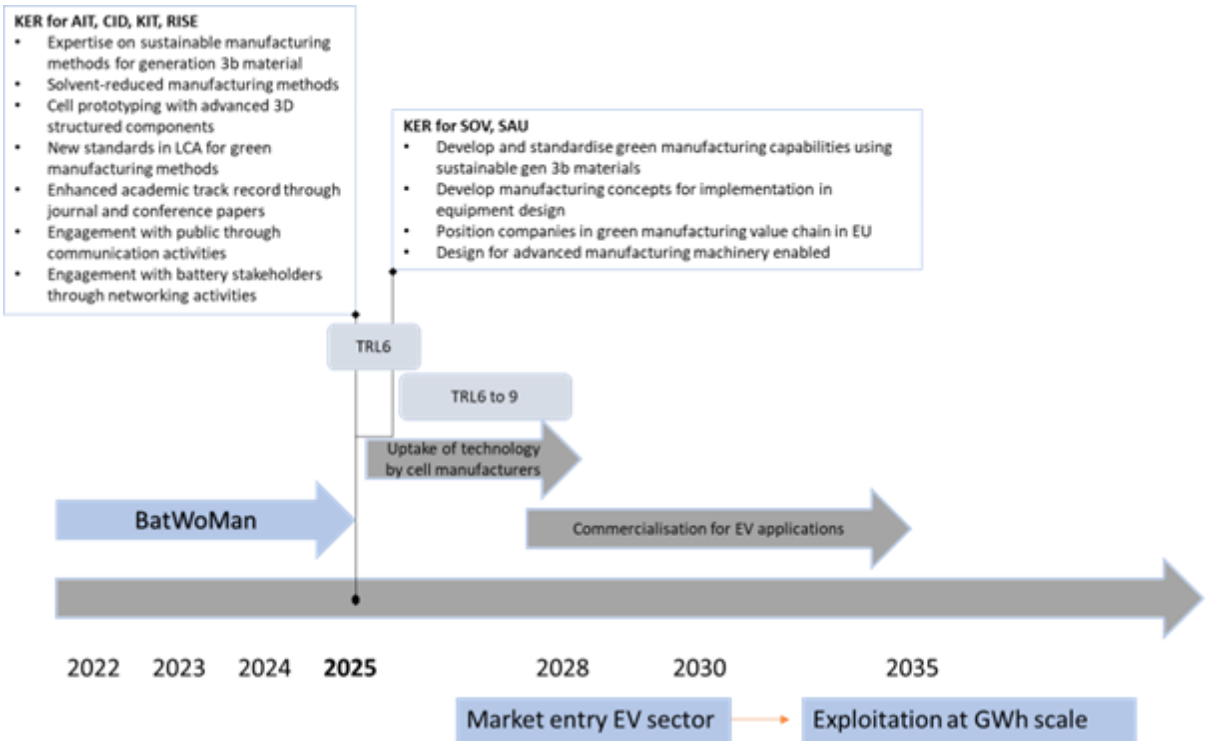


Figure 12: Exploitation plan of BatWoMan (Infographics).

The strategic approaches in the BatWoMan project are expected to be used by the industrial partners (SAUERESSIG, SOVEMA) for customer acquisition as well as for presentation at relevant exhibitions, trade fairs, and symposia. It is expected that the results will set European machinery developers apart technically from the Asian market and thus strengthen their position in the market. After successful project implementation, it will be feasible to implement the equipment concepts on a laboratory and pilot scale. This will expand the portfolio of R&D equipment and is expected to increase sales within the EU. For the RTO partners (AIT, CIDETEC, KIT, RISE), the project will enable increased visibility and expertise on sustainable manufacturing methods, which they can incorporate into their wide network of EU battery stakeholders. They will set new standards for environmentally friendly processed cells. In addition, KIT will strengthen its know-how in upscaling ultrashort pulse laser technology for battery production, gathering data for the optimization/control of electrode structuring and for the classification of degradation processes in batteries.

4.5. Deliverables

During the BatWoMan project, a detailed exploitation strategy will be continuously developed through task 7.3, describing the framework that will maximize taking advantage of the results attained after the end of the project and ensure that partners follow the right exploitation path. This preliminary and later final exploitation strategy will hinge on:

- valorisation of the common elements across the business strategies of the involved partners,
- IPR management (formulated in task 7.4). [2]

4.6. Evaluation

In the regular reporting, WP leaders will closely monitor the quality of project results versus quantified KPIs. To this purpose, Table 2 reports an overview of the key features that the BatWoMan consortium has identified in the proposal phase, indicating the state of the art (SotA) in 2021 and the target results to be achieved at the end of the project (2025), and, where applicable, measurable progress beyond the SotA 2021, i.e. Δ, in Table 2.

Table 2: Quantification of the progress beyond the SotA 2021.

	BatWoMan key features (SotA 2021)	Δ	Target results at the end of BatWoMan
Electrode manufacturing	Solvent-reduced electrode processing	50% energy and 50% cost reduction of electrode drying process	Reduction of solvent in electrode processing to 30% for anode and 20% for cathode manufacturing.
	Water-based electrode manufacturing	4.6% cost and 46.84% energy reduction	Water-based NMC622 cathode processing established and verified.
	3D patterned electrode design to manufacture	>30% higher current capability	Increased C-rate in comparison to cells with unstructured electrodes while maintaining 80% of initial capacity.
	Ultrafast laser cutting of electrodes	<50% of clearance width	In comparison to conventional ns-laser cutting; reduce of clearance width (cutting kerf) for comparable cutting speeds (>1m/s).
	Laser structuring of separators	>20% lifetime	Lifetime test using lab-pouch cells with structured and unstructured separators
	One-step compacting/drying of the electrodes	4% cost and 2% reduction of energy	Integration of the electrode drying process in the calendaring process.
	Virtual replica of the electrode manufacturing process	MAPE < 10%	Accurate data-driven models to virtually represent the BatWoMan electrode manufacturing chain
Cell assembly	Dry room needs reduction	11% cost and 17.5% reduction of energy	Concept of new stack drying approach combined with electrolyte filler and sealing.
	Electrolyte development Filling process	>50% less filling time and >10% less amount of electrolyte	3D patterned separator and electrodes reduce filling time and electrolyte amount through increased wettability.
Formation & ageing	Dry room needs	11% cost and 17.5% reduction of energy	New cell stack drying combined with electrolyte filling unit reduces dry air volume.
	Formation and ageing procedure	9% cost and 1.5% energy reduction	New energy, cost and time efficient formation and ageing procedure established based on Machine Learning algorithms

The background and foreground IP for the KERs will be described within the exploitation process at the level of each partner and of the project consortium as a whole, as indicated above. To track the exploitation plan, a form will be uploaded on the online sharing platform. This will also assess, among other things, the number of patents, acquired equipment and infrastructure, new process concept service/product developed, potential clients, open/private licenses all along the project lifetime. The table will contain the number of KERs identified by title and lead and involved partners and fully characterized by nature, form, risk, and description of exploitation pathway.

4.7. Milestones

Figure 13 gives the milestones of the exploitation task.

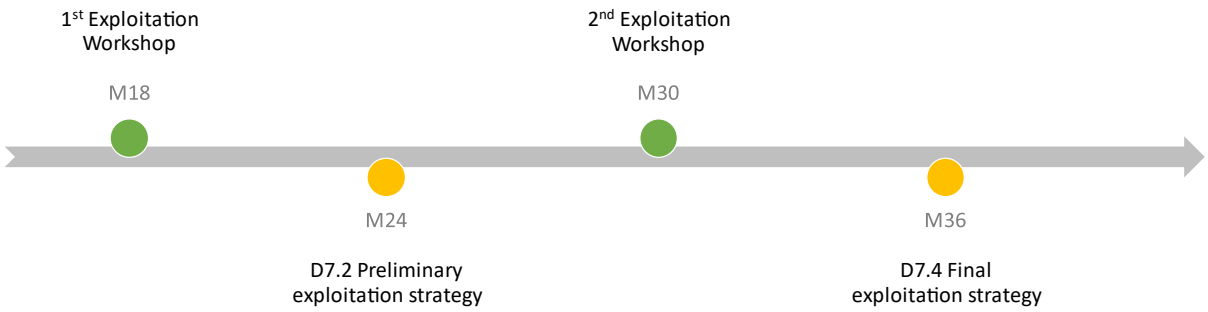


Figure 13: Milestones of the BatWoMan exploitation.

Two exploitation workshops will be held in WP7 at M18 and M30 with all partners to develop the exploitation plans and gather information obtained through technical and commercial surveys done by each partner. In these exploitation workshops, the project´s researchers and industry partners will contribute to the KER list to achieve a target-oriented exploitation of the project outcomes. The outcomes of these workshops will be fed into the exploitation plan, delivering a preliminary exploitation strategy (D7.2) at M24 and a final exploitation strategy for after the project (D7.4) at M36.

The exploitation strategy will describe the targeted market(s), the estimated market size in Europe and overseas, the user and customer needs, and will demonstrate how the developed Green Technology will match these in a cost-effective manner, enhancing the competitive advantage of the future EU industry of batteries for the automotive sector. All industrial partners will carry out exploitation either separately or jointly, based on the Consortium Agreement and project exploitation strategy (D7.2, D7.4).

5. IPR Management

As already described in chapter 4, commercial exploitation is an important aspect of the BatWoMan project, as for any Horizon Europe project. For this purpose, there is typically the exploitation task, which, in this case, was extended by task 7.4, the IPR management. Here, the knowledge gained within the project, which may also be of commercial interest, in the form of intellectual property rights such as patents or determining which results are to be kept as industry secrets, is managed. This is an important factor for a complete exploitation as well as the competitiveness of the project.

Exploitation includes the use of the results in further research and innovation activities, including commercial exploitation such as the development, creation, production, and marketing of a product or process, the creation and provision of a service, or in standardization activities.

In the case of developments, the innovation management department of the corresponding consortium partner is both leading and primarily responsible for the IPR management. A dedicated IPR manager of this department will assist the consortium partners involved in protecting intellectual property and in managing the knowledge generated by the project in the form of intellectual property rights and patents. In case the consortium partner in question does not have an innovation management department, administrative support (e.g. patent search) will be provided within the consortium. And when it comes to an invention, if necessary, an external patent attorney may be consulted.

More information on the IPR management strategy follows in the preliminary and final explotation strategy documents. [2]

6. Acknowledgement

The authors would like to thank the partners in the project for their valuable comments on previous drafts and for performing the review.

7. Project Partners

#	PARTICIPANT SHORT NAME	PARTNER ORGANISATION NAME	COUNTRY
1	AIT	AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH	AT
2	CIDETEC	FUNDACION CIDETEC	ES
3	KIT	KARLSRUHE INSTITUTE OF TECHNOLOGY	DE
4	UDE	UNIVERSITAET DUISBURG-ESSEN	DE
5	SOV	SOVEMA SPA	IT
6	SAUERESSIG	MATTHEWS INTERNATIONAL GMBH	DE
7	RISE AB	RISE RESEARCH INSTITUTES OF SWEDEN AB	SE

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Appendix

Table 3: Examples for events with intersecting focus in the next 12 months.

Event	Date	Location
The Conference on Results from Road Transport Research (RTR) 2023	14-16 February 2023	Belgium, Brussels
Battery Recycling Europe 2023	01-02 March 2023	UK, London
European Energy Efficiency Conference 2023	01-03 March 2023	Austria, Wels
RENEEWABLEMEET 2023	13-15 March 2023	Italy, Rome
International Battery Seminar & Exhibit 2023	20-23 March 2023	USA, Orlando
ACS Spring 2023	26-30 March 2023	USA, Indianapolis
ICPESAE 2023: 17. International Conference on Power, Energy, Signal and Automation Engineering	03-04 April 2023	Greece, Athens
International Meet on Power electronics and applications PEAMEET 2023	17-19 April 2023	Spain, Valencia
SAE World Congress 2023	18-20 April 2023	USA, Detroit
Energy Tech Summit 2023	26-27 April 2023	Poland, Warsaw
The European Organisation for Civil Aviation Equipment (EUROCAE) 2023	26-27 April 2023	France, Paris
Battery Conference 2023	26-28 April 2023	Germany, Aachen
World Hydrogen summit & exhibition 2023	09-11 May 2023	Netherlands, Rotterdam
All-Energy Exhibition and Conference 2023	10-11 May 2023	UK, Glasgow
World Energy Storage 2023: Exhibition & Forum	10-11 May 2023	Netherlands, Rotterdam
ICESTE 2023: 17. International Conference on Energy Storage Technology and Electrochemistry	15-16 May 2023	UK, London
Renewable Materials Conference 2023	23-25 May 2023	Germany, Cologne/Bonn
The Battery Show Europe 2023	23-25 May 2023	Germany, Stuttgart
Green Future Conference 2023	01-02 June 2023	Croatia, Split
31st European Biomass Conference & Exhibition EUBCE	05-08 June 2023	Italy, Bologna
EUROBAT General Assembly and Forum	06-07 June 2023	Spain, Madrid
Electric Vehicle Symposium 2023	11-14 June 2023	USA, Sacramento
Electrical Energy Storage EES 2023	13-14 June 2023	Germany, Munich
13th Advanced Automotive Battery Conference (AABC Europe)	19-22 June 2023	Germany, Mainz
International Flow Battery Forum IFBF 2023	27-29 June 2023	Czech Republic, Prague

Battery Cells & Systems Expo	28-29 June 2023	UK, Birmingham
18th European Conference on Solid State Chemistry ECSSC 2023	09-12 July 2023	Czech Republic, Prague
2nd Global Summit and Expo on Sustainable and Renewable Energy GSESRE2023	28-30 August 2023	UK, London
Battery Tech 2023	04-05 September 2023	Germany, Munich
ICEDRE 2023: 17. International Conference on Energy Demand and Renewable Energy	06-07 September 2023	Czech Republic, Prague
The Battery Show North America	12-14 September 2023	USA, Novi
ICEEPI 2023: 17. International Conference on Energy Efficiency and Power Issues	16-17 September 2023	Switzerland, Zurich
ICPCET 2023: 17. International Conference on Power and Clean Energy Technologies	20-21 September 2023	Portugal, Lisbon
Dresden Battery Days 2023	25-27 September 2023	Germany, Dresden
Energy Transition Summit 2023	31 October - 01 November 2023	UK, London
244th ECS Meeting	08-12 October	Sweden, Goteborg
Batteries event 2023	10-13 October 2023	France, Lyon
ICALEO 2023: 42nd International Congress on Applications of Lasers & Electro-Optics	16-19 October 2023	USA, Chicago
ICPMEEA 2023: 17. International Conference on Polymer Materials for Electronic and Energy Applications	18-19 October 2023	Italy, Rome
ICCPEMS 2023: 17. International Conference on Climate Protecting Energy Management Systems	25-26 October 2023	Spain, Barcelona
ICSEEOM 2023: 17. International Conference on Sustainable Energy Engineering and Optimization Methods	11-12 November 2023	Italy, Venice
Renewable Materials Conference 2023	18-19 November 2023	UK, London
Battery Innovation Days	21-22 November 2023	Belgium, Brussels
2023 MRS Fall Meeting & Exhibit	05-07 December 2023	USA, Boston

Table 4: Examples for journals with intersecting focus.

Journal	Website
ACS nano	https://pubs.acs.org/journal/ancac3
Applied Energy	https://www.sciencedirect.com/journal/applied-energy
Electrochimica Acta	https://www.sciencedirect.com/journal/electrochimica-acta
Energy	https://www.sciencedirect.com/journal/energy
Journal of Energy Storage	https://www.sciencedirect.com/journal/journal-of-energy-storage
Journal of Power Sources	https://www.sciencedirect.com/journal/journal-of-power-sources
Journal of the Electrochemical Society	https://www.electrochem.org/publications/jes
Nanomaterials	https://www.mdpi.com/journal/nanomaterials
Open Research Europe Engineering and Technology Journal	https://www.ej-eng.org/index.php/ejeng
Sustainable Energy & Fuels	https://www.rsc.org/journals-books-databases/about-journals/sustainable-energy-fuels

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