

THE  
**MUSIC**  
PROJECT

Materials for sUstainable  
Sodium-Ion Capacitors

## Deliverable D9.3 Impact Maximization #1: Mid-term D&C activities

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## Publishable summary

This report, *Deliverable D9.3 - Impact Maximization #1: Mid-term Dissemination and Communication (D&C) Activities*, outlines the dissemination, communication, and exploitation strategies implemented during the first 24 months of the MUSIC project.

The document details the MUSIC project's efforts to engage stakeholders, including researchers, industry professionals, policymakers, and the general public, through targeted communication channels like its website, social media platforms (Twitter, LinkedIn, YouTube), and various publications. These channels were utilized to promote the project's goals, technological innovations, and alignment with United Nations Sustainable Development Goals (SDGs).

Key dissemination activities include presenting research outcomes at scientific conferences, publishing open-access papers, and creating accessible communication materials, such as brochures, videos, and a comic series, to connect with diverse audiences. Additionally, collaboration with other EU-funded initiatives and participation in policymaker workshops emphasized MUSIC's role in addressing critical raw materials challenges and contributing to Europe's green transition.

Early exploitation efforts are outlined, including the development of tools to map market opportunities and prepare for commercialization. The deliverable also highlights the upcoming Supercapacitor Networking Event in 2025, which aims to foster collaboration within the energy storage community and explore market and policy opportunities.

The report underscores MUSIC's commitment to innovation, sustainability, and broad stakeholder engagement, setting the foundation for impactful advancements in energy storage technology.

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# **1 Dissemination, communication and exploitation in MUSIC**

## **1.1 MUSIC dissemination and communication**

The primary strategy for dissemination within the MUSIC project involves utilizing the research results generated during the project to create tangible value within the supercapacitor and broader energy storage communities. This strategy focuses on engaging key stakeholders across the European Union, including the scientific and expert technology communities, industries, policymakers, standardization bodies, and other professionals in related fields. The dissemination efforts aim to not only highlight technological advancements but also foster dialogue and collaboration across diverse sectors that intersect with energy storage technologies.

During the first 24 months of the project, dissemination objectives remained aligned with those set in the initial year. These objectives focus on enhancing the project's visibility at local, national, and international levels while ensuring the relevance of its outcomes to diverse audiences. Particular attention is given to effective management and protection of intellectual property, laying the groundwork for the exploitation of research findings in future initiatives. Dissemination and communication efforts during this period primarily targeted stakeholders with scientific and technological expertise, including those in academia, research institutions, and industry sectors. Simultaneously, efforts were made to engage non-expert audiences, including policymakers and the general public, by linking the MUSIC concept to the United Nations Sustainable Development Goals (SDGs). By emphasizing the sustainability and real-world applications of the project's outputs, the project aimed to bridge the gap between complex scientific advancements and societal impact.

In the last six months, dissemination activities adopted a more focused approach, aiming to showcase the latest developments in the project and highlighting the unique contributions of each partner. This not only increased the visibility of individual partners but also reinforced the collaborative essence of the project. Particular attention was placed on illustrating the added value of the MUSIC project to stakeholders, which included exploring its implications for future energy storage systems. These targeted efforts aimed to maximize stakeholder support and acceptance of the project's results while minimizing risks related to their implementation and exploitation.

Additionally, Work Package 9 played a pivotal role during this period, serving as the foundation for effective public engagement and policy contributions. The dissemination strategy under this work package was designed to build long-term connections with policymakers, standardization entities, and non-technical audiences. This ensured that the outcomes of the MUSIC project were not only scientifically robust but also socially and economically relevant.

### 1.1.1 MUSIC communication results

In the first year of the MUSIC project, its brand and visual identity was successfully established, which included the creation of a distinctive logo, selection of project colors, and development of graphic elements. Main visual features and activities performed are described in detail in deliverable D9.1. "MUSIC online presence and visual identity kit". These elements have been consistently applied across various dissemination materials such as presentation templates, posters, and the initial set of communication materials that featured videos, and short clips.

#### ➤ **Communication channels: Website, blog and social media.**

The MUSIC project's website (<https://musicproject.eu/en>) and social media platforms were launched to extend the reach and impact of the project, fostering a community around the project's aims.

The MUSIC Project website is a meeting place for all the stakeholders, the media and general public. On one hand, it is the entry point for external stakeholders to look for information about the activities the project is developing or to learn about the subject of the project. On the other hand, the website functions as a meeting place for all the individuals and organizations involved in the project. And the social media networks of the project will be the main channels that will conduct the stakeholders to the website.

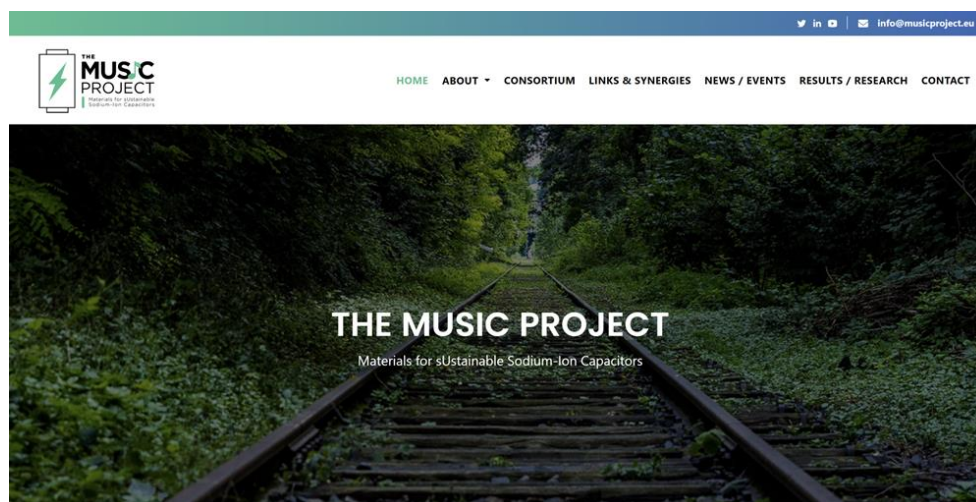


Figure 1. Website of the MUSIC project

The site gathers all the official information about the project: its goals, activities, and results. The general website is in English, but specific sections could be translated into the different languages involved in the project if it is necessary, to facilitate the understanding.

The MUSIC project website has its specific objectives, which respond to the Comm & Diss needs of the project. Among them, the most highlighted are the following:

- **Providing the stakeholders with updates** on the progress and news related to the project: the website includes scientific papers, public deliverables, news pieces and events created by this project.
- **Giving visibility** to the project itself: the content on the website, which is periodically updated, is shared on social media, through which visitors are directed or attracted to the website.
- **Promoting visual identity of the MUSIC project**, which makes a recognizable brand in the eyes of the public.

- **Involving the consortium members:** the partners are requested to identify communication opportunities and offer information that enables the creation and publication of articles on the website. Each of the partners is providing complementary materials (such as new pieces, pictures from workshops and events, etc.), which can be later used for communication activities.

Comm & Diss strategies and campaigns developed online and offline will be complementary and will aim to direct visitors to the website, that counts with around 200 unique visitors per month.

Regarding **social networks**, **Twitter** -with a mostly scientific audience-, **LinkedIn** -with a mostly industrial audience- and **YouTube** -as a repository of videos and with a more general audience reach- have been identified as the most appropriate.

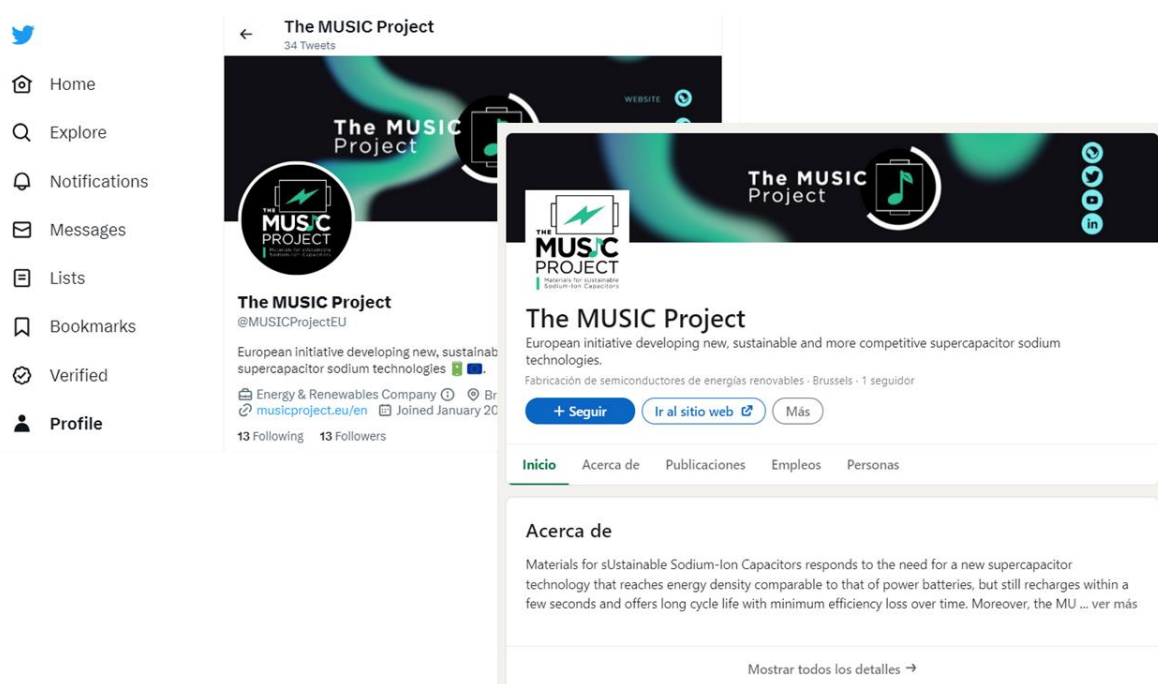


Figure 2. Twitter and LinkedIn channels of the MUSIC project

The Twitter account of the MUSIC project is @MUSICProjectEU. Twitter is a social network with a large active scientific community, which makes it very suitable for disseminating the scientific results of the project. In addition, given the importance of making scientific activities known to society in general, we will combine technical and dissemination publications with more general publications suitable for all audiences. With an average frequency of two publications per week, communications will be made covering all the stages of the value chain involved in the MUSIC project to highlight the value of each stage and the efforts involved in it. For now, up to 42 followers are interested in our content, that we expect to increase when more public related content is published.

LinkedIn, the professional social network per excellence, has mainly a business or industrial audience, so the language we use will be in line with this target. Therefore, the dissemination of scientific results is done by clearly exposing the applicability of these results in the industrial field or in the final application. In addition, thanks to the absence of character limitation, LinkedIn allows for in-depth analysis in accordance with the interests of the industrial/business audience. This channel counts with 869 Followers on LinkedIn, 42 posts were published so far with an average of 16000 post reach.

In this case we will not forget the general public either, so that we will combine technical messages with others of a more universal scope.



The **Twitter** and **LinkedIn** channels are active and updated every week. For the time being, scientific results, general information about the project or news about the sector are being published. Don't forget to follow us!

<https://www.linkedin.com/company/the-music-project-eu/>

<https://twitter.com/MUSICProjectEU>

The **Youtube account** of the MUSIC project can be found in the following URL:

<https://www.youtube.com/channel/UCrxTkzqFLwDySiZp8CWAH7g>

Youtube is the most common video social network and the second most used content search engine after Google. That is why it is of vital importance to have a presence on it by generating videos with interesting content for all audiences: from the general population to the scientific field.

All the content in video format generated during the project, both the dissemination videos of the project and the communication assets that we generate for social networks, are uploaded to this Youtube channel that is used as a repository of the audiovisual material of the project. It is of vital importance to pay special attention to the keywords and description of each of the videos, as these can become the gateway for users to discover the MUSIC project.

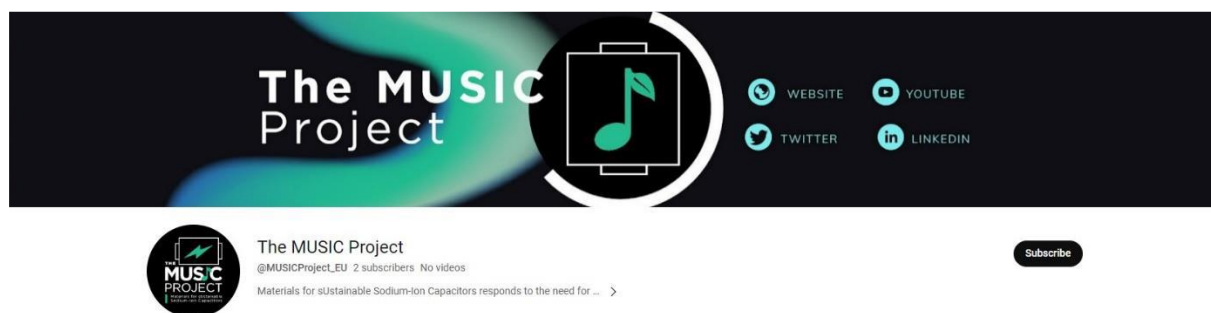


Figure 3. Youtube channel of the project

For now, the youtube account has 11 subscriptions, 6 short videos of SDGs and 1 general video of the MUSIC project is available on this channel, with an average of 463 views each, but it will be updated with more content during the project.

### ➡ **Communication materials:**

Dissemination materials such as presentation templates, posters, and the initial set of communication materials that featured videos, and short clips have been created and published in the communication channels of the project. The main assets of the project that have been published will be briefly described in this section.

#### **Leaflet**

A comprehensive Brochure has been published, encapsulating the essential information about the project, including an overview, the participants involved, and the objectives, designed to provide a quick and clear understanding of MUSIC to any new audience.



Figure 4. Tri-fold brochure of the MUSIC project.

### Roll up

The roll-up of the project has been designed to engage public attention and printed to be shown in the ISEECAP conference, organized by CICE.



Figure 5. Roll up of the project with the MUSIC partners that attended the ISEECAP meeting.

## Comic

The first chapter of the MUSIC Comic has been released, aiming to bring the project closer to a broader audience through a more visual and user-friendly medium. This comic seeks to explain the technology and the project's scope in an engaging and accessible way, appealing to diverse demographic groups including younger audiences.



Figure 6. First episode of the Comic of the MUSIC project

The storyline of the comic has been already defined and the schedule determined to reach the objective of releasing one episode per year, which means that there is continuous work.

## Fact sheets

A set of fact sheets have been defined to be published in the social media, treating different aspects of the supercapacitors and the development of the project. An example of these fact sheets that was published in social media can be seen in the Figure 7.

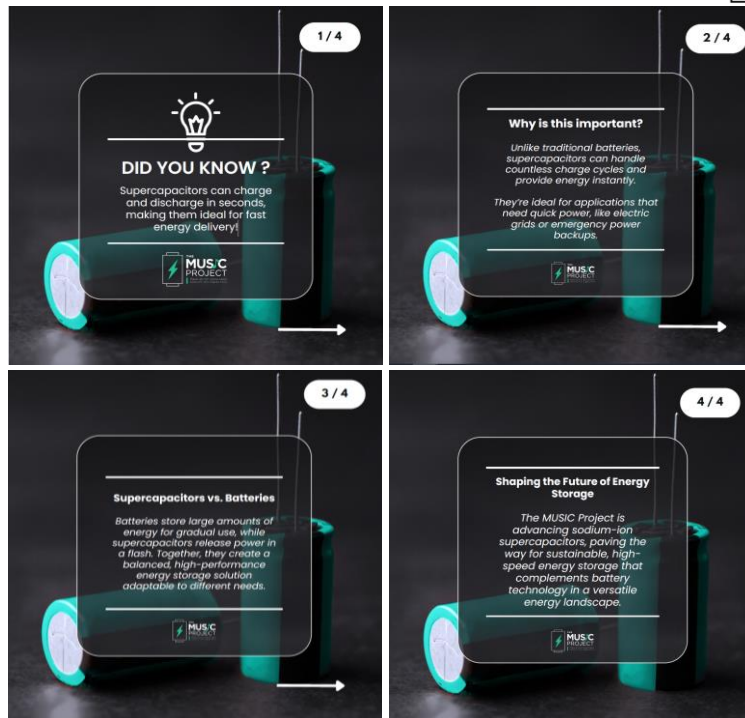


Figure 7. Fact sheet published in social media

## Videos

During this period, the first and introductory video of the project has been released, available in: <https://www.youtube.com/channel/UCrxTkzqFLwDySiZp8CWAH7g>

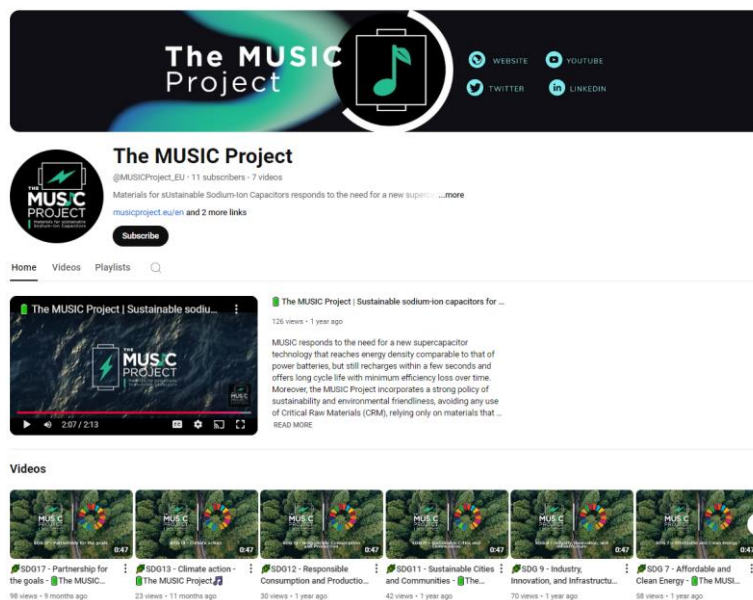


Figure 8. Youtube channel in which all the videos are uploaded.

And 6 short videos explaining how the MUSIC project contributes to the Sustainable Development Goals, in particular:

#### SDG17 - Partnership for the goals

This latest video delves into the heart of SDG 17: Partnerships for the Goals, showcasing the essence and achievements of the MUSIC project in fostering global partnerships for sustainable development.

#### SDG13 - Climate action

The global climate crisis calls for urgent and decisive action, and The MUSIC Project is committed to being at the forefront of this challenge. Our latest video showcases our dedication to contributing to a zero-polluting economy by 2050 and our ongoing efforts to reduce greenhouse gas emissions.

#### SDG12 - Responsible Consumption and Production s

The MUSIC Project is committed to integrating sustainability into our design philosophy. By avoiding critical raw materials and prioritizing sustainable design, we champion responsible production. This approach significantly reduces environmental impact and ensures long-term sustainability of our technologies.

#### SDG11 - Sustainable Cities and Communities

In this video, we explore how our efforts are contributing to creating sustainable cities and communities, and how the MUSIC Project is not just innovating for today but building the sustainable cities of tomorrow.

#### SDG 9 - Industry, Innovation, and Infrastructure

Innovation is the lifeblood of the MUSIC project. By pioneering novel supercapacitor technologies and innovative management systems, MUSIC is setting the stage for new industrial value chains. These advancements are not just incremental; they have the potential to revolutionize energy storage solutions, ranging from consumer goods to the electrification of transport.

#### SDG 7 - Affordable and Clean Energy

At its core, MUSIC is about harnessing sustainable energy. By developing supercapacitors that can be integrated into renewable energy systems, the project directly contributes to SDG 7. These energy storage solutions ensure that power generated from renewable sources can be stored efficiently and used when needed, paving the way for a future where clean energy is not just generated but also utilized optimally.

### **Press releases**

During the project, key achievements and milestones within the MUSIC project will be published in press releases.



Media Center - [Home](#) - [About](#) - [Contact](#) - [CIC energIGUNE leads the European MUSIC project for the development of sustainable sodium-ion capacitors with fast recharge and maximum efficiency](#)

**CIC ENERGIGUNE LEADS THE EUROPEAN MUSIC PROJECT FOR THE DEVELOPMENT OF SUSTAINABLE SODIUM-ION CAPACITORS WITH FAST RECHARGE AND MAXIMUM EFFICIENCY**

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The headquarters of the Basque center at the Alava Technology Park hosted the kick-off meeting of this project, in which 12 partners and one affiliated entity are participating with the aim of promoting a new sodium-ion cell technology that will allow them to achieve an energy density comparable to that of power batteries but with greater performance in terms of potency and cyclability. CIC energIGUNE, in addition of assuming the coordination tasks of MUSIC, will provide knowledge in the development of materials and prototyping, so that the project opens the door to the manufacture of sustainable sodium-ion cells.

CIC energIGUNE, the Basque research center of reference in [battery systems](#), [electrochemical energy storage](#), [renewable and hydrogen technologies](#), and member of the Basque Research & Technology Alliance [BRTA](#), has hosted at its headquarters in the Alava Technology Park the kick-off meeting of the European project MUSIC, which aims to manufacture high-performance electrochemical storage systems based on sodium-ion technology. The meeting, which started yesterday and has finished today, brought together in Vitoria-Gasteiz representatives of the 12 partners, including the Karlsruhe Institut für Technologie (KIT), the Centre National de la Recherche Scientifique (CNRS) or ICIQ, among others.

"This project aims to respond to a specific need in the field of electrochemical energy storage", has said Jon Ajuria, Principal Investigator at CIC energIGUNE for the MUSIC project. "We are going to open the door to a new technology in the field of sodium-ion that is capable of bringing the energy density of these devices to that of power batteries, but with very short recharge times – just a few seconds, and with a very limited loss of efficiency," he has assured.

The MUSIC project also incorporates highly demanding criteria in terms of sustainability and respect for the environment. In this sense, for the development of the sodium-ion technology, any use of potentially harmful substances will be avoided, and only new advanced electrodes based on new carbonaceous and binders of a biopolymer nature in combination with green electrolytes that are sustainable by design will be produced.

Figure 9. First press release of the project after the KoM that took place in CIC enerGIGUNE.

## 1.1.2 MUSIC dissemination by specific stakeholder groups

### ➔ Dissemination to the scientific community – conferences and publications

#### Publications

MUSIC partners have published their work and results via Open Access using 'Gold' access and deposited in digital repositories linked to OpenAire (institutional or Zenodo). In particular, in ZENODO, a community has been created in which the publications are made available and also the relevant data and metadata that has not IP protection issues.

Status	Journal	Authors	Title
<b>Submitted, under review</b>	ChemElectroChem	<b>María Canal-Rodríguez, María Arnaiz, Silvia Martin, Bruno Correa, Devaraj Shanmukaraj, Jon Ajuria</b>	Sodium mesoxalate as pre-sodiation agent for sodium-ion capacitors
<b>Submitted, under review</b>	Renewable and Sustainable Energy Reviews	<b>Fatemeh Bahmei, Amaia Saenz de Buruaga, Sebastián P. Bautista, Javier Olarte, Jon Ajuria, Alberto Varzi, Marcel Weil</b>	Life Cycle Analysis and Life Cycle Cost of Supercapacitors: A Review
<b>Published</b> <a href="https://doi.org/10.1016/j.powersour.2024.100158">https://doi.org/10.1016/j.powersour.2024.100158</a>	Journal of Power Sources Advances	<b>Andrea Hainthaler, Akshaya Sidharth Sidharthan, Andrea Balducci</b>	Enhancing the Stability of Sodium-ion Capacitors by Introducing Glyoxilic-acetal Based Electrolyte

Status	Journal	Authors	Title
<b>Published</b> <a href="https://doi.org/10.1002/batt.202400405">https://doi.org/10.1002/batt.202400405</a>	Batteries & Supercaps	<b>Paulo Luís</b> , Silvia Martin, María Arnaiz, Jon Ajuria	On the selection of the current collector for water processed activated carbon electrodes for their application in electrochemical capacitors
<b>Submitted, under review</b>	Batteries & Supercaps	<b>Paulo Luís</b> , Silvia Martin, María Arnaiz, Jon Ajuria	Slurry Process Optimization through Rheological Investigation for Electrochemical Capacitors
<b>Submitted, under review</b>	Advanced Energy Materials	Roman Mysyk, Daniel Carriazo, Damien Saurel, Maria Arnaiz, Olivier Crosnier, Thierry Brousse, Kangkang Ge, Pierre-Louis Taberna, Patrice Simon, Sander Ratso , Einar Karu, Alberto Varzi, Juan Pablo Badillo, Andrea Hainthaler, Andrea Balducci, Obinna Egwu Eleri, Amaia Saenz de Buruaga, Javier Olarte, Juan Dayron Lopez Cardona, Fatemeh Bahmei, Sebastian P. Bautista, Marcel Weil, Jon Ajuria	The Value Chain of Sustainable Dual Carbon Sodium Ion Capacitors

Table 1. List of publications in the framework of MUSIC project

### Conferences, symposia and other events with science and technology focus

During the first two years of the project MUSIC partners have attended the following conferences:

Contributing partner	Event	Topic (Oral Presentation, abstract, poster)
<b>CICE</b>	Materials Research Society Spring Meeting. April 10-14, 2023, San Francisco, USA	Roll-to-roll electrode processing towards the development of a 100 F lithium-ion capacitor (Maria Arnaiz, Oral Presentation)
<b>KIT</b>	17th Society and Materials Conference: May 9-10, 2023, in Karlsruhe, Germany	Sustainable Design of Sodium based Supercapacitors for Mobile and Stationary Applications (poster)

Contributing partner	Event	Topic (Oral Presentation, abstract, poster)
<b>FSU</b>	2nd German-French Summer Workshop on high power devices: June 18-20, 2023, in Nantes, France	Electrolytes in high power devices: active or inactive component (Andrea Balducci, oral presentation); Sodium-ion Capacitors: Introduction of a novel electrolyte and optimization of full-cell parameters (Andrea Hainthaler, oral presentation)
<b>CICe</b>	ISE Annual meeting, 4-8 September 2023, Lyon, France	Towards the fabrication of metal-ion capacitor prototypes. (Maria Arnaiz, Oral presentation)
<b>KIT</b>	Transforming towards a sustainable society - challenges and solutions conference: October 11-13, Karlsruhe, Germany	Sodium-Ion Capacitors: A Pathway towards Environmentally Sustainable Energy Storage Technologies (poster)
<b>CICe</b>	244th ECS Meeting Conference: October 8-12, 2023, in Gothenburg, Sweden	In situ Crosslinked Gel Polymer Electrolytes for Li-ion Capacitors (Simon Lindberg, Oral Presentation)
<b>CICe</b>	244th ECS Meeting Conference: October 8-12, 2023, in Gothenburg, Sweden	Sodium Mesoxalate as PRE-Sodiation Agent in Sodium-ION Capacitors (Maria Canal, Oral Presentation)
<b>FSU</b>	StoRIES project seminar: November 28, 2023	StoRIES project seminar
<b>KIT</b>	POLIS-Post Lithium Storage Cluster of Excellence, 20 and 21 June 2024.	Sustainability Considerations of Supercapacitors: A review of LCA and LCC studies (Sebastian P. Bautista, poster)
<b>CICe</b>	ISE topical meeting: 9-12 June 2024, in Stresa, Italy	Towards sustainable and high-performance electrode fabrication for EDLC and sodium ion capacitors. (Maria Arnaiz, Oral Presentation)
<b>IMN-CNRS</b>	Journées d'électrochimie, 1-5 July 2024, Saint Malo, France	Une seconde vie pour les fibres de carbone recyclées dans le domaine des supercondensateurs Sodium-ion? (Camille Douard, poster)
<b>IMN-CNRS</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	What if carbon nanofibers had a second life for Sodium-ion capacitors? (Camille Douard, poster)
<b>IMN-CNRS</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	From aqueous asymmetric/hybrid devices to metal-ion capacitors: domino cascade problems (Thierry Brousse, Tutorial)



Contributing partner	Event	Topic (Oral Presentation, abstract, poster)
<b>IRT</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	Sodium-ions capacitor: a path for recycled carbon fibres (Hugo Mazoyer, poster)
<b>ELY</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	Electrolytes - The key enabler for innovative cell technologies (Mirco Rutttert, oral presentation)
<b>IMN-CNRS</b>	75th ISE Annual Meeting - 18-23 August 2024, Montreal, Canada	Recycled carbon fibers as negative electrode for sodium-ion capacitors (Thierry Brousse, oral presentation)
<b>FSU</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	Towards Sustainable Sodium-Ion Capacitors: Investigating Low-Fluorine Electrolytes for Enhanced Performance and Environmental Safety (Akshaya Sidharth Sidharthan, poster)
<b>KIT-HIU</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	Sustainable Electrode Manufacturing via Aqueous Processable Binders: Opportunities and Challenges in EDLC and Metal-ion Capacitor Applications (Alberto Varzi, invited talk)
<b>KIT-HIU</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	Water-processable Polymers as Sustainable Binders for Sodium Ion Capacitors (Mahdi Karimi Jafari, poster)
<b>CICe</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	Current Collector Selection for Water-processed Sodium-ion Capacitor Electrodes (Paulo Luis, poster)
<b>CICe</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	Investigation of the solid electrolyte interphase formation on hard carbon electrode for sodium ion capacitors when using sacrificial salts (Manuel Pinzon, poster)
<b>BCARE</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	Lithium-ion capacitor use-case analysis in railway application (Amaia Sáenz de Buruaga, oral presentation)
<b>FSU</b>	ISEECAP 2024 meeting - 8-12 July 2024 Vitoria-Gasteiz, Spain	Glyoxylic-Acetal Based Electrolyte Stabilizing the Performance of Sodium-ion Capacitors (Andrea Hainthaler, oral presentation)
<b>FSU</b>	5th International Sodium Battery Symposium, SBS-5. September 23 – 25, 2024 in Berlin, Germany	Development of sustainable electrolytes for sodium-ion batteries and sodium-ion capacitors (Andrea Balducci, Oral presentation)

Contributing partner	Event	Topic (Oral Presentation, abstract, poster)
<b>CICe</b>	ICNaB 2024 conference, 11-14 November, Richland, EEUU	Sodium-ion capacitors: may the power be with you (Jon Ajuria, Oral presentation)

Table 2. List of conferences in the framework of MUSIC project

## ➤ Knowledge exploitation and exchange with the supercapacitor, energy storage and materials community

The four projects granted by HaDEA under the HORIZON-CL4-2022-RESILIENCE-01-24 call are collaborating in the organization of the first **Supercapacitor Networking Event** that will be held in Jena, on the 27&28 February 2025:

- MUSIC <https://musicproject.eu/en>
- GREENCAP <https://greencap-project.eu/>
- EMPHASIS <https://www.emphasis-supercaps.eu/>
- HEDAsupercaps <https://www.hedasupercap.eu/>

The goals and actions we pursue with the event

- ✓ Build a critical mass of supercapacitor experts, including researchers, innovators, and industry players, to exchange expertise and increase the visibility of supercapacitors within the field of energy storage.
- ✓ Increase the awareness of potential end users and areas of application towards supercapacitors, either as alternative to batteries or as complementary technology.
- ✓ Discuss industry needs, current challenges, market opportunities and possible barriers and risks. Discussing with the industry, suppliers and future end users allows the incorporation of needs and limitations at the early stages of innovation and product development, resulting in mutual benefits.
- ✓ Identify and discuss current challenges in R&D and opportunities and limitations of the supercapacitor technology from the research perspective
- ✓ Explore and discuss possible future cooperation and joint activities to get the most promising research results to the demonstration and market stages, addressing remaining challenges on the way to market maturity, providing evidence-based input to future EU policies and strategies, including shaping funding opportunities in European funding programs.

This event will count with science and expert sessions, panel discussions, and economic and environmental sessions in applications or markets. This event will be the starting point of further collaboration, by means of other clusters events, or even topical meetings in the near future in the supercapacitors field. The agenda of the event can be found in Appendix B.

## ➤ Providing a knowledge base for policy makers and regulators

The MUSIC project participated in the 2024 Raw Materials Information System (RMIS) Workshop, co-organised by the JRC and the European Health and Digital Executive Agency (HaDEA), took place on 9-10 October at HaDEA's premises in Brussels. In this event, MUSIC presentation highlighted the objectives of the project, the (delivered or expected) outputs and, most importantly, how these can contribute to specific RMIS pages and RMIS development priorities.

The event brought together policymakers, EU agencies, research institutions, and representatives from academia to discuss the role of pan-EU raw materials knowledge developments in the community in supporting Europe's green and digital transitions with a focus on the RMIS.

The workshop was opened by Salla SAASTAMOINEN, Deputy Director-General (DDG) of the JRC, who emphasized the importance of knowledge on securing critical raw materials (CRMs) to ensure Europe's sustainability and competitiveness.

Salla was followed by Marina ZANCHI, Director of HaDEA, who highlighted the importance of collaboration between the European Commission, HaDEA, and EU-funded projects.

Both underscored how crucial it is to channel knowledge outputs from European projects into the RMIS to enhance the platform's role in supporting EU policy goals.

Importantly, the Critical Raw Materials Act (CRMA) identifies critical, strategic, and advanced materials as being essential for Europe's future, particularly in meeting the demands of the twin green and digital transitions.

The workshop aimed to strengthen engagement between EU-funded projects and the RMIS.

This year's event featured an expanded dialogue between policy representatives from various DGs, such as DG GROW, DG RTD, and DG ENV, as well as representatives from the European Environment Agency (EEA) and key research institutions like TU Delft, KU Leuven, and ENEA.

The main objectives of the 2024 RMIS Workshop were to:

1. **Increase Awareness of EU Projects:** how the outputs from EU-funded projects on critical, strategic, and advanced materials can help fulfill policy and knowledge needs.
2. **Integrate Project Findings into the RMIS:** how to better incorporate findings from these projects into the RMIS to support policy development and improve the platform's role as a hub for raw materials knowledge.
3. **Foster the Use of Advanced Materials:** exploit the potential of advanced materials to substitute critical raw materials in key sectors such as energy, mobility, construction, and electronics, supporting the development of a research agenda in these areas.

Addressing the knowledge needs around raw materials is key for several policies - the Critical Raw Materials Act, the Circular Economy Action Plan, and the forthcoming Clean Industrial Deal. The focus on securing sustainable supply chains and promoting circularity is critical for achieving the European Union's ambitious targets in decarbonisation, digitalisation and industrial growth.

The JRC, through its RMIS platform and in-house research, plays a fundamental role in supporting these policy frameworks by providing foresight analyses on supply, demand and circularity of raw materials in the contexts of security of supply and sustainability.

The exchange of ideas and best practices between research institutions, industry, and policymakers is essential to support Europe's raw materials strategy and ensure the sustainable management of these resources.

Participants at the workshop underscored the need for continued collaboration between EU projects and the RMIS to ensure that the vast knowledge generated by these initiatives is efficiently integrated into policymaking processes.

Among the themes of discussions, participants highlighted:

- How specific projects can play a key role in developing essential knowledge on metals and minerals.
- How knowledge from specific Horizon projects can provide models for key sectors such as batteries on issues like circularity; enhancing models on batteries, electric vehicles, and other key sectors/technologies already included in the RMIS.

- How analyses linked to specific raw materials can enhance and verify related knowledge in the RMIS raw materials and country profiles.
- How other projects covering a broad range of raw materials and sectors, including information systems, could play a key role, with long-term business plans ensuring continuity.
- The vital role of education, giving recommendations for where the RMIS and its team could become more and more engaged in initiatives at the EU and Member State levels.

After this participation, MUSIC project has been kindly invited to fill in a template to be included in the RMIS website ([RMIS - EU funded projects](#)) to give more visibility to the project, and facilitate further interactions.

### **1.1.3 First results from the exploitation of MUSIC**

While knowledge exploitation for scientific communities and wider stakeholder groups have been described in the sections above, this chapter focuses on the first steps taken to identify market opportunities for MUSIC results and to develop initial exploitation plans and business cases for the MUSIC partners.

Although MUSIC SICs represent a new technology with TRLs that are still several steps from commercial maturity levels the project envisages at least initial exploitation plans and business cases for each participant.

Task 9.5 which addresses the development of exploitation routes will start in M24 of the project. But even though the exploitation activities have not formally started at the time of this deliverable report, the screening of results for potential commercial exploitation has started at the beginning of MUSIC.

Since the first two project years have been mostly dedicated to research, the results that have been achieved so far still require further testing, verification and optimisation to prove their commercial and market potential. Furthermore, data and results from the techno- and socio-economic as well as the environmental sustainability are needed to verify the exploitation and market potential of MUSIC results alongside the exact market segments and key applications that should be targeted in the future, as this will be highly influenced by technical, cost and environmental performances of the MUSIC supercapacitors.

To build a basis for the timely development of sound exploitation pathways for the different MUSIC results and to collect the most important details and data for Task 9.5 and future exploitation plans, advanced spreadsheets have been developed. The spreadsheets will be used to collect envisaged innovations per project partner or joint innovations from several partners, the TRL and innovation levels, prospected exploitation routes, expected timelines and sources for financing, key target groups and/or market segments and competitors in the target markets. To be able to go deeper into the details of innovations, the general spreadsheet is complemented by a sheet that gathers details for the technology and market watch.

Both sheets are included in this deliverable report as Appendix B.

The details given by the partners in those exploitation sheets will be evaluated and discussed in bilateral or multilateral exploitation meetings, depending on how many partners are involved in the respective innovation.

A first exploitation workshop is planned for January 2025.

## 2 Acknowledgement

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

### Project partners

#	PARTICIPANT SHORT NAME	PARTNER ORGANISATION NAME	COUNTRY
1	CICE	CENTRO DE INVESTIGACION COOPERATIVA DE ENERGIAS ALTERNATIVAS FUNDACION, CIC ENERGIGUNE FUNDAZIOA	Spain
2	EUR	CLANCY HAUSSLER RITA (EURIDA)	AT
3	KIT	KARLSRUHER INSTITUT FUER TECHNOLOGIE	Germany
4	CNRS	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS	France
4.1	IMN	NANTES UNIVERSITE (Affiliated)	France
5	UPS	UNIVERSITE PAUL SABATIER TOULOUSE III	France
6	FSU	FRIEDRICH-SCHILLER-UNIVERSITAT JENA	Germany
7	IRT-JV	INSTITUT DE RECHERCHE TECHNOLOGIQUE JULES VERNE	France
8	ELY	E-LYTE INNOVATIONS GMBH	Germany
9	BYD	BEYONDER AS	Norway
10	BCARE	BATTERYCARE S. L.	Spain
12	TALGO	PATENTES TALGO SL	Spain
13	UPC	UP CATALYST OU	Estonia

Table 2: Project Partners



### 3 Appendix A – Quality Assurance

The following questions should be answered by all reviewers (WP Leader, peer reviewer 1, peer reviewer 2 and the technical coordinator) as part of the Quality Assurance Procedure. Questions answered with NO should be motivated. The author will then make an updated version of the Deliverable. When all reviewers have answered all questions with YES, only then the Deliverable can be submitted to the EC.

NOTE: For public documents this Quality Assurance part will be removed before publication.

Question	WP Leader	Peer reviewer 1	Peer reviewer 2	Technical Coordinator
	Elena Dosal (CICE)	Rita Clancy (EURIDA)	All partners	Jon Ajuria (CICE)
<b>1. Do you accept this deliverable as it is?</b>	Yes	Yes	Yes	Yes
<b>2. Is the deliverable completely ready (or are any changes required)?</b>	Yes	Yes	Yes	Yes
<b>3. Does this deliverable correspond to the DoW?</b>	Yes	Yes	Yes	Yes
<b>4. Is the Deliverable in line with the MUSIC objectives?</b>	Yes	Yes	Yes	Yes
<b>a. WP Objectives?</b>	Yes	Yes	Yes	Yes
<b>b. Task Objectives?</b>	Yes	Yes	Yes	Yes
<b>5. Is the technical quality sufficient?</b>	Yes	Yes	Yes	Yes



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This document reflects the views of the author and does not reflect the views of the European Commission. While every effort has been made to ensure the accuracy and completeness of this document, the European Commission cannot be held responsible for errors or omissions, whatever their cause.

## 4 Appendix B – Supercapacitors Networking Event agenda



### INNOVATION AND NETWORKING DAYS IN SUPERCAPACITORS

*Workshop/Networking Event  
or  
Workshop in high power devices Jena 2025*

#### The goals and actions we pursue with the event

- Build a critical mass of supercapacitor experts, including researchers, innovators, and industry players, to exchange expertise and increase the visibility of supercapacitors within the field of energy storage.
- Increase the awareness of potential end users and areas of application towards supercapacitors, either as alternative to batteries or as complementary technology.
- Discuss industry needs, current challenges, market opportunities and possible barriers and risks. Discussing with the industry, suppliers and future end users allows the incorporation of needs and limitations at the early stages of innovation and product development, resulting in mutual benefits.
- Identify and discuss current challenges in R&D and opportunities and limitations of the supercapacitor technology from the research perspective
- Explore and discuss possible future cooperation and joint activities to get the most promising research results to the demonstration and market stages, addressing remaining challenges on the way to market maturity, providing evidence-based input to future EU policies and strategies, including shaping funding opportunities in European funding programs.

#### Partners invited to the event

##### 1. EU funded projects, HADEA:

MUSIC <https://musicproject.eu/en>  
GREENCAP <https://greencap-project.eu/>  
EMPHASIS <https://www.emphasis-supercaps.eu/>  
HEDAsupercaps <https://www.hedasupercap.eu/>  
STORIES <https://www.storiesproject.eu/>  
DESTINY <https://www.destiny-phd.eu/>  
ENERCAP <https://enercap.put.poznan.pl/>  
HYFLOW <https://hyflow-h2020.eu/>  
POSEIDON <https://poseidon-europeanproject.eu/> [...]

##### 2. Research:

KIT (MUSIC)  
CNRS (MUSIC)  
UNIVERSITY OF NANTES (MUSIC)



*Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or Horizon Europe. Neither the European Union nor the granting authority can be held responsible for them. No 101092080*

UNIVERSITY OF TOLOUSE (MUSIC)  
UNIVERSITY OF JENA (MUSIC-GREENCAP)  
CIC energiGUNE (MUSIC)  
INSTITUTE JULES VERNE (MUSIC)  
KIT (MUSIC)  
ISM-CNR (GREENCAP)  
UNIVERSITY OF CAMBRIDGE (GREENCAP)  
TRINITY COLLEGE DUBLIN (GREENCAP)  
UNIVERSITY OF STRASBOURG (GREENCAP)  
TECHNICAL UNIVERSITY DRESDEN (GREENCAP)  
CANOE (EMPHASIS)  
UNIVERSITY OF WURZBURG (EMPHASIS)  
FRAUNHOFER (EMPHASIS)  
CRF (EMPHASIS, HEDASUPERCAP)  
INRIM (EMPHASIS)  
UNIVERSITY OF TORINO (EMPHASIS)  
INL (HEDASUPERCAP)  
WEST POMERIAN UNIVERSITY OF TECHNOLOGY (HEDASUPERCAP)  
UNIVERSITY OF LULEA (HEDASUPERCAP)

**3. Industry, suppliers and end users:**

E-LYTE (MUSIC) BCARE (MUSIC)  
UPCATALYST (MUSIC)  
BEYONDER (MUSIC)  
TALGO (MUSIC, End-user)  
BEDIMENSIONAL (GREENCAP)  
SKELETON (GREENCAP)  
SOLVIONIC (GREENCAP)  
CARBON-UKRAINE (GREENCAP)  
KEYSIGHT TECHNOLOGIES (EMPHASIS, end-user)  
WOOD K PLUS (EMPHASIS)  
BORN GmbH (EMPHASIS, end-user)  
PLEIONE ENERGY (EMPHASIS)  
YUNASKO (HEDASUPERCAP)  
RINA (HEDASUPERCAP)  
GEMATE TECHNOLOGIES (HEDASUPERCAP)  
VITO (HEDASUPERCAPS)



#### 4. Policy:

HADEA

CINEA

European platform on LCA <https://eplca.jrc.ec.europa.eu/>

[...]

**Date:** 27-28 February 2025

**Duration:** 2 Days

**Number of attendees:** 80-100

Day 1 (27 February 2025)	
9:00 - 9:30	Doors open. Registration
9:30 - 9:45	Welcome Andrea Balducci, FSU Jena
9:45 – 10:00	<b>KEYNOTE1:</b> Policy session: HADEA TBD with PO
10:00 - 12:30	<b>SCIENCE SESSION 1 - INTRODUCTION TO HORIZON-CL4-2022-RESILIENCE-01-24 funded projects</b> <b>Chair: Prof. Andrea Balducci (Friedrich Schiller University Jena)</b> <ul style="list-style-type: none"> <li>▪ 10:00-10:30 MUSIC</li> <li>▪ 10:30-11:00 GREENCAP</li> </ul> <i>Coffee-break</i> <ul style="list-style-type: none"> <li>▪ 11:30-12:00 EMPHASIS</li> <li>▪ 12:00-12:30 HEDASUPERCAPS</li> </ul>
12:30 - 14:00	<i>LUNCH &amp; NETWORKING</i>
14:00 - 15:30	<b>SCIENCE SESSION 2 - OTHER EU INITIATIVES IN SUPERCAPS - Moderated (science, soft skills)</b> <b>Chair: TBD</b> <ul style="list-style-type: none"> <li>▪ 14:00-14:15 StoRIES (Dr. Miriam Elisa Gil Bardaji)</li> <li>▪ 14:15-14:30 Hyflow, (Prof. Dr. Karl-Heinz Pettinger)</li> <li>▪ 14:30-14:45 Enercap (Dr. Krzysztof Fic)</li> <li>▪ 14:45-15:00 MetSupercap (tba)</li> <li>▪ 15:00-15:30 Panel discussion + Q&amp;A</li> </ul>
15:30 – 16:00	<i>COFFEE-BREAK</i>

<p><b>16:00 – 17:30</b></p>	<p><b>PANEL DISCUSSION (moderated): SUPERCAPS – PRESENT AND FUTURE</b></p> <p>Key topics for discussion:</p> <ul style="list-style-type: none"> <li>- Chances and limitations of the technology</li> <li>- Markets, key applications and end user needs</li> <li>- Expectations towards a future workforce &amp; education needs</li> </ul> <p><i>Panelists from science, industry, policy, educational projects (e.g. ITNs)</i></p> <p><b>Chair: Sebastian Pohlmann</b> (CTO UP Catalyst)</p> <p><b>Panelists:</b></p> <ul style="list-style-type: none"> <li>-Dr. Linus Fröbose (Skeleton)</li> <li>-Dr. Yurii Maletin (Yunasko)</li> <li>-Prof. Thierry Brousse (INM-CNRS)</li> <li>-Dr. Michael Schneider (Born GmbH)</li> <li>-TBD (JRC)</li> <li>-Dr. Daniele Pullini (Centro Ricerche Fiat)</li> </ul>
<p><b>Day 2 (28 February 2025)</b></p>	
<p><b>9:00 - 10:30</b></p>	<p><b>EXPERT SESSION – (ADVANCED?) MATERIALS FOR SUPERCAPACITORS:</b></p> <p>Topic: Materials’ and components’ state-of-the-art, needs for the future and market perspectives</p> <p><i>Short presentations, round table discussion</i></p> <p><b>Chair: Guinevere Giffin</b> (Scientific Head of Fraunhofer R&amp;D Center Electromobility (FZEB) at the Fraunhofer Institute for Silicate Research ISC, Würzburg, Germany.)</p> <ul style="list-style-type: none"> <li>- Dr. Francesco Bonaccorso (Bedimensional)</li> <li>-Dr. XX (E-lyte)</li> <li>-Prof. Valeria Nicolosi (Trinity College Dublin)</li> <li>-Forth</li> <li>-Prof. Faiz Ullah Shah (Lulea Tekniska Univesitet)</li> </ul>
<p><b>10:30 - 11:00</b></p>	<p><b>COFFEE-BREAK</b></p>

<p><b>11:00 – 12:30</b></p>	<p><b>SUSTAINABILITY SESSION – ECONOMIC AND ENVIRONMENTAL SUSTAINABILITY CRITERIA FOR FUTURE APPLICATIONS/ MARKETS</b></p> <ul style="list-style-type: none"> <li>- Socio-Economic criteria: Cost, ROI, market and public acceptance</li> <li>- Environmental criteria: [energy, CO2, water, EU CRMs etc; LCA]</li> <li>- EU regulations, environmental and technology standards, trends and future needs</li> </ul> <p><i>Short presentations, Round table and discussion</i></p> <p><b>Chair:</b> TBD</p> <p>-Dr. Fatemeh Bahmei (Karlsruhe Institute of Technology) -Dr. Pohlmann (Up Catalyst)</p> <ul style="list-style-type: none"> <li>- Prof. David Peck (Delft University)</li> <li>- Gemmate Technologies (tba)</li> <li>- Wood-K plus (tba)</li> <li>- Solvionic</li> </ul>
<p><b>12:30 - 13:00</b></p>	<p><b>CONCLUSION AND FUTURE ACTIONS</b></p> <p>Chair: Rita Clancy (EURIDA) &amp; Jon Ajuria (CICenergiGUNE)</p> <ul style="list-style-type: none"> <li>- Positioning paper</li> <li>- Discussion about possible future clusters and topical meetings</li> </ul>
<p><b>13:00 – 14:00</b></p>	<p><i>LUNCH BOX &amp; NETWORKING</i></p>
<p><b>14:00</b></p>	<p><b>END OF EVENT</b></p>

## 5 Appendix C – MUSIC exploitation Sheets



**WP9 T9.5 - MUSIC TECHNOLOGY AND MARKET WATCH TEMPLATE**

KER1 - XXXXXXXX (KER name)

KER LEADER: XXX

Last update: XX/XX/XXXX

KER description	
KER description	XXX
Company involved	
Company contact	

MUSIC Technology Description:	
State of the art technology	research / development / demonstration / deployment / mature
Detailed Technology description	XXX

Technologies in competition			
	Technology 1	Technology 2	Technology 3
State-of-the-art	deployment / mature	deployment / mature	deployment / mature
Technology description	XXX	XXX	XXX
Maturity (TRL scale)	TRLX	TRLX	TRLX
Technical lifetime (years)	X years	X years	X years
Prevalent technologies in the short to medium term? (Y/N)	Y/N	Y/N	Y/N

Market description			
	Technology 1	Technology 2	Technology 3
State-of-the-art	XXX	XXX	XXX
Market description	XXX	XXX	XXX
Geographical scope	XXX	XXX	XXX
Segmentation of the market	XXX	XXX	XXX
Global evaluation of the market	XXX	XXX	XXX

Economic aspects			
	Technology 1	Technology 2	Technology 3
State-of-the-art	XXX	XXX	XXX
Capital Expenditures or CAPEX	XXX	XXX	XXX
Operating Expenses or OPEX	XXX	XXX	XXX
Levelized Cost of Electricity (LCOE)	XXX	XXX	XXX
Levelized Cost of Storage (LCOS)	XXX	XXX	XXX

Technology developed in MUSIC project	
State of the art technology	research / development / demonstration / deployment / mature
Output (mark with X)	Significantly improved product
	Significantly improved service (except consulting services)
	Significantly improved process
	Significantly improved marketing method
	Significantly improved organisational method
	Consulting services
	New product (X)
	New service (except consulting services)
	New process
	New marketing method
New organisational method	
Other (please specify):	
Technology description	XXX
Level of Innovation:	XXX
maturity after A&C (TRL scale)	TRLX
Technical lifetime (years)	X years
Prevalent technologies in the short to medium term? (Y/N)	Y/N

Potential Market description	
Market description	XXX
Geographical scope	XXX
Global evaluation of the potential market	XXX
Market maturity (not yet existing/market creating/energising/mature)	XXX
How will the innovation be exploited?	XXX
Existing Installations of the technology	XXX
Realistic readiness timeline of the KER after project closing for a large scale deployment (years)	XXX

Other market aspects	

Picture / scheme
Add representative picture / scheme of the selected technology.

Comments

Comments

Comments

Comments
Some distinct, probably minor, improvements over existing products. Innovative but could be difficult to convert customers. Obviously innovative and easily appreciated advantages to customer. Very innovative.

Comments
The market is not yet existing and it is not yet clear that the innovation has potential to create a new market. Market creating: The market is not yet existing but the innovation has clear potential to create a new market. Emerging: There is a growing demand and few offerings are available. Mature: The market is already supplied with many products of the type proposed.
Introduced as new to the market (commercial exploitation). Only deployed as new to the organisation/company (new internal processes) Please describe existing sites where the technology has been installed. This can be installation as part of lab test or other R&D sites.