



M-ERA.NET 3
Vision, Mission & Policy for joint programming

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A. *M-ERA.NET 3 motivation, vision & mission*

Motivation

Materials are completely transverse in modern societies. Their usage ranges from home appliances to transportation, infrastructures, electronics, energy production, etc. The challenges for the 21st century are clear, and include:

- energy (production, storage, transmission, usage, ...)
- reduction of greenhouse gas emissions
- increasing materials efficiency (sustainable use of resources)
- eliminating the use of harmful materials and chemicals
- sustainable manufacturing
- robust development and implementation of new technology and innovation

Technological innovation is the foundation of the efforts undertaken to achieve the environmental and growth objectives set in the Sustainable Development Goals by the general assembly of the United Nations. In that respect, there needs to be more research and development in high-tech products that dominate the manufacturing productions to increase efficiency (material use, recyclability, energy efficiency) and more progress needs to be made regarding integrating renewable energy and its storage into end-use applications in buildings, transport and industry. The development and manufacturing of high-performance, reliable, safe and low-cost batteries is a key to a sustainable mobility and energy supply. The numerous fields of application lead to an increased use of batteries and thus to an increased consumption of resources. Measures must be taken to conserve resources and increase the efficiency of their exploitation.

New materials are crucial for finding solutions for light weighting, for enhancing the durability of products, improving process efficiency with reduced energy and materials consumption, substituting hazardous or hardly recyclable materials, and developing products easier to maintain, repair, upgrade, remanufacture or recycle (eco-design).

Very significant efforts are now required to face the current global challenges and to overcome barriers and obstacles through better governance at regional, national, European, and international levels. Interaction between stakeholders is needed to target a better alignment of activities and policies and to achieve synergies between international, national and regional programmes that support cooperation in Science, Technology and Innovation.

Vision

M-ERA.NET 3 is a strong European network of public funding organisations supporting and increasing coordination and convergence of national and regional funding programmes on research and innovation related to materials and battery technologies to support the European Green Deal.

Mission

Continuing the activities started under the predecessor project M-ERA.NET 2, M-ERA.NET 3 will address emerging technologies and application areas related to materials research, supporting the circular economy and Sustainable Development Goals

The mission for M-ERA.NET 3 in this context is to:

- Strengthen the European RTD community and economy in materials research and innovation.
- Enhance scientific research and upgrade the technological capabilities of industrial sectors to target the circular economy and Sustainable Development Goals
- Establish strategic programming of joint activities, addressing societal and technological challenges in an interdisciplinary approach.
- Engage in a continuous dialogue with relevant stakeholders such as relevant thematic networks in order to identify gaps and needs and to ensure support while complementing future initiatives under Horizon Europe
- Mobilise a critical mass of national and regional funding for transnational RTD cooperation in materials research and innovation
- Enable enlarged impact on the efficiency in the coordination and cooperation of funding programmes in EU Member States and Associated States and boosted progress in research, technological development and innovation to support the Green Deal and future battery technologies
- Strengthen the integration of EU-13 countries
- Engage in international cooperation with partners outside Europe
- Facilitate a strong participation of regions, having a strong impact on R&I at regional level and support local actors by facilitating global connections and increased productivity.
- Foster the exploitation of created knowledge along the whole innovation chain

Transnational RTD projects funded by M-ERA.NET 3 will combine materials research with industrial needs by stimulating new products and production processes, and by developing synergies that can be very effective in achieving industrial symbiosis, in particular with the aim of preventing by-products from becoming waste.

M-ERA.NET 3 will be complementary to other initiatives related to a circular economy by explicitly avoiding overlaps and focusing on the design of innovative materials.

M-ERA.NET 3 will contribute to a better efficiency in industrial processes, a reduced use of unsustainable resources along with more efficient sustainable energy harvesting and storing devices. The development of RRI-Guidelines for Materials Research by M-ERA.NET 3, to be considered in the joint calls, will also greatly contribute to the achievements of these goals.

B. M-ERA.NET 3 policy for joint programming

M-ERA.NET 3 will follow a multiannual policy for realising the vision and mission. Joint programming will integrate national and regional needs with European priorities and global challenges and address annual joint calls as well as other joint activities. The methodology for the elaboration of annual work programmes is described in annex A.

The policy is centred on objectives at various levels.

European policy objectives

M-ERA.NET 3 activities will be in line with priorities defined at European level and support key enabling technologies that are essential for Europe's industrial future as stated in strategic documents; in particular the network will be guided by:

- the **Circular Economy Action Plan**: R&I on advanced materials is essential for developing a circular design of products as recommended by the “Report on the implementation of the Circular Economy Action Plan (SDW (2019)90)”¹ supporting the transition towards a “Circular economy and a zero waste programme for Europe (COM(2014)398)”². Moreover, the European Strategy for Plastics in a Circular Economy (SDW(2018)16)³ specifies the need for plastics design and production fully respecting reuse, repair and recycling requirements.
- the **2030 Agenda for Sustainable Development**⁴ and its **17 Sustainable Development Goals**: Technological innovation is the foundation of the efforts undertaken to achieve the environmental and growth objectives (SDG7, SDG9 and SDG12) set by the general assembly of the United Nations. In that respect, there needs to be more research and development in high-tech products that dominate the manufacturing productions to increase efficiency (material use, recyclability, energy efficiency) and more progress needs to be made regarding integrating renewable energy and its storage into end-use applications in buildings, transport and industry.
- the **EC communication “A clean planet for all”**⁵: A defined set of seven main strategic priorities considering new and improved materials for buildings, reduction of materials through re-use and recycling, substitution of carbon intensive materials, biogenic materials as well as more efficient and sustainable batteries.
- **“European Green Deal”**⁶: A set of deeply transformative policies are designed, which include new forms of collaboration with industry and investments in strategic value chains aiming to mobilise industry towards a clean and circular economy. The Commission will also continue to implement the Strategic Action Plan on Batteries and support the European Battery Alliance.
- **Commission's plan for a new ERA based on excellence**: The EC communication “A new ERA for Research and Innovation”⁷ defines several strategic objectives which will be relevant for M-ERA.NET 3:
 1. prioritise investments and reforms in research and innovation, to support the digital and green transition and Europe's recovery

¹ https://ec.europa.eu/commission/publications/report-implementation-circular-economy-action-plan-1_de

² <https://ec.europa.eu/environment/circular-economy/pdf/circular-economy-communication.pdf>

³ <https://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy.pdf>

⁴ https://ec.europa.eu/environment/sustainable-development/SDGs/index_en.htm

⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0773>

⁶ https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf

⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0628&from=EN>

2. improve access to excellent research and innovation for researchers across the EU
3. translate results into the economy to ensure market uptake of research output and Europe's competitive leadership in technology
4. make progress on the free circulation of knowledge, researchers and technology through stronger cooperation with EU countries

To make the European Research Area stronger, national research and innovation policies need to be strengthened too.

Materials research objectives

Innovation is needed at the scale of the whole product (interfaces, surfaces, assembling) or in its very constitutive materials (e.g. via self-healing properties). Transnational research supported by M-ERA.NET 3 will combine materials science with industrial needs by stimulating new products and better efficiency in industrial production processes, and by developing synergies that can be very effective in achieving industrial symbiosis.

- A systemic approach is needed and innovative materials have to be developed and designed taking into account the whole life-cycle, enhancing the durability of products, improving process efficiency with reduced energy and materials consumption, substituting hazardous or hardly recyclable materials, and developing products easier to maintain, repair, upgrade, remanufacture or recycle in particular with the aim of preventing by-products from becoming waste. M-ERA.NET 3 will therefore address also bio-degradable and compostable plastics, improved polymer design and innovative compositions, aimed at reducing potential health impacts, and preventing plastic waste and micro-plastics pollution, by replacing chemicals of concern to achieve higher recycling rates.
- Digitalisation and materials modelling will contribute to the identification of new materials, tailoring the material properties and performance at the design phase, optimising production processes or operation strategies for devices and systems.
- Meeting the challenges of climate neutrality requires a reduced use of unsustainable resources along with more efficient sustainable energy harvesting and storing devices. The development and manufacturing of high-performance, reliable, safe and low-cost batteries is a key issue. Research on the design of future batteries or disruptive technologies with advanced chemistry will be encouraged, including aspects like high energy density, high power density, long cycle lifetime, recyclability and low environmental footprint.
- New approaches in health applications, advanced materials and coatings are key components of diagnostics, clinical or surgical treatments and therapeutics.

While continuity in support is crucial for long-term goals, M-ERA.NET 3 will also recognise and react to future emerging trends by continuously interacting with the relevant players in materials research including industry. When planning the M-ERA.NET 3 activities respective roadmaps will be analysed, such as:

- **ETIP Batteries Europe: Strategic Research Agenda for batteries 2020⁸**
- **BATTERY 2030+ long-term roadmap for forward-looking battery research in Europe⁹**

⁸ https://ec.europa.eu/energy/sites/ener/files/documents/batteries_europe_strategic_research_agenda_december_2020_1.pdf

⁹ <https://battery2030.eu/research/roadmap/>

- EMIRI Technology Roadmap¹⁰
- EMMC RoadMap 2018 for Materials Modelling and Informatics¹¹
- SusChem Strategic Innovation and Research Agenda
- Strategic Energy Technology Plan (SET Plan)¹²
- Nanomedicine SRIA¹³

M-ERA.NET 3 objectives

In line with the objectives listed above, M-ERA.NET 3 will contribute to green transition and digital transformation of the EU industry with investments in transnational research and innovation projects that will develop green and sustainable materials for the benefit of society and the environment, improving resource-efficient and resilient industry and developing emerging technologies for competitiveness and fit for green deal. The flexible network will contribute to harmonising European funding programmes that support research and innovation and secure durable, long-term cooperation between key actors from national and regional funding systems.

The main objectives are:

- Support the achievement of Sustainable Development Goals:

M-ERA.NET will support materials research and innovation that can contribute to achieve the Sustainable Development Goals. In particular, M-ERA.NET will support SDG 7 (“Affordable and clean energy”) through fostering research on sustainable energy storage technology and SDG 9 (“Industrial innovation and infrastructure”) by upgrading the technological capabilities of industrial sectors.

- Contribute to the European Green Deal by supporting a circular economy and future batteries:

M-ERA.NET aims to contribute to clean energy-related applications as well as battery technologies, to an improved efficiency of production processes, to reduced use of materials & energy resources, and to improved materials properties to maintain the value of materials and products for as long as possible.

- Synergies with topics of the EU framework programme and with related European Partnership initiatives:

The thematic scope of the M-ERA.NET calls and activities will be defined in cooperation with the RTD community. M-ERA.NET will analyse respective roadmaps and interact with thematically relevant networks and initiatives and will closely follow the evolution of the upcoming European Partnerships to identify options and opportunities.

- Contribution to meeting Global Challenges through Better Governance:

M-ERA.NET will contribute to a better alignment of activities and policies at international, national and regional levels and to achieve synergies between programmes that support cooperation in science, technology and innovation. Guided by a set of appropriate key indicators the interaction between stakeholders will result in M-ERA.NET impact on national and transnational programmes as well as a leverage effect on European research and competitiveness. Targeting a global approach, M-ERA.NET 3 will help establish new opportunities for European high-tech industries through participation in global value chains and access to new and emerging markets by focusing on relevant

¹⁰ [https://emiri.eu/uploads/content_files/65/value_file/EMIRI%20Technology%20Roadmap%20-%20September%202019%20\(cond\).pdf](https://emiri.eu/uploads/content_files/65/value_file/EMIRI%20Technology%20Roadmap%20-%20September%202019%20(cond).pdf)

¹¹ <https://emmc.info/main/roadmaps/>

¹² https://ec.europa.eu/energy/topics/technology-and-innovation/strategic-energy-technology-plan_en

¹³ <https://etp-nanomedicine.eu/about-nanomedicine/strategic-research-and-innovation-agenda>

countries outside the EU with robust programme cooperation. Funded projects will exhibit clear added value from international collaboration by bringing together the best talent, knowledge, and resources.

- Leverage of national, regional and European funding

M-ERA.NET will mobilise substantial funding at the regional, national and European levels; the network will launch annual calls with an estimated total funding of around 120 million € during 5 years, making M-ERA.NET a major tool for funding trans-national projects in materials research and innovation.

- Socio-ecological benefits in the context of RRI:

M-ERA.NET calls will address EU areas of socio-ecological relevance, illustrating the leveraging effects materials research and innovation have on areas that reflect meaningful societal needs. M-ERA.NET will develop responsible research and innovation processes to systematically address socio-ecological, ethical and political dimensions of material research, development and use.

M-ERA.NET will contribute to a wider public debate on the impact of materials research by elaborating RRI guidelines for materials research. These guidelines will be circulated among various groups aiming to raise awareness in the scientific community and among its stakeholders.

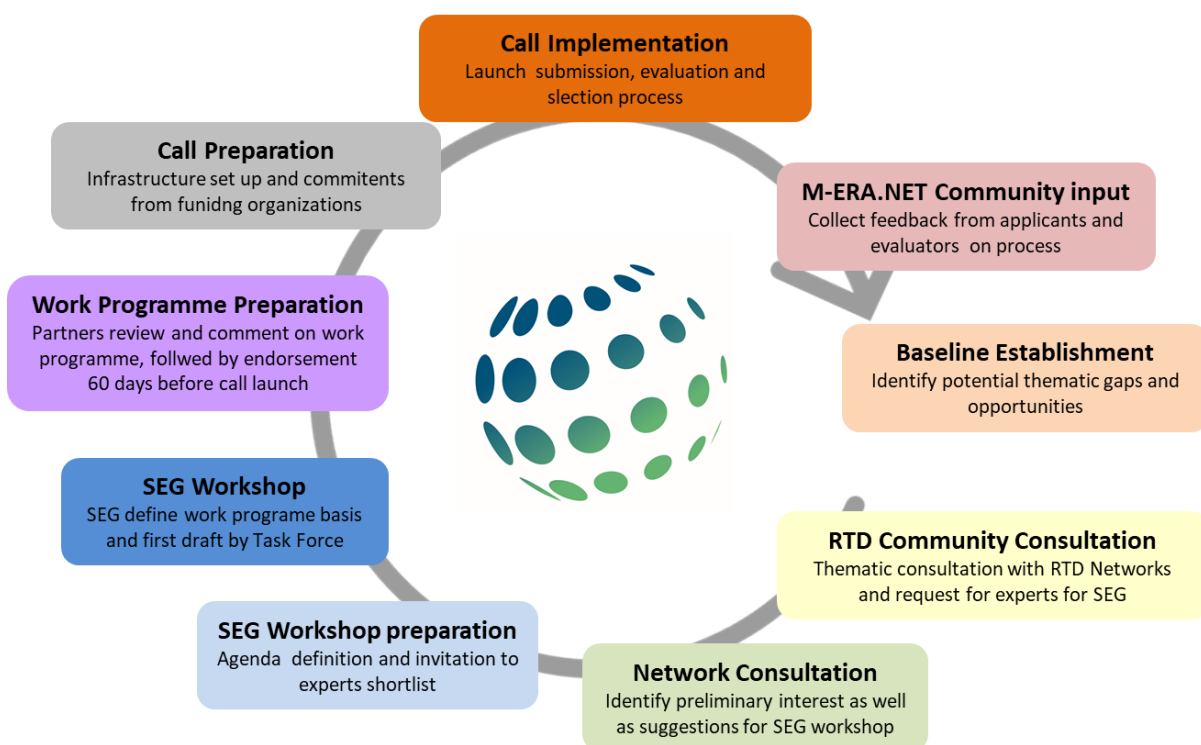
- Support for the innovation chain:

M-ERA.NET will support interdisciplinary material research across application fields to strengthen the competitiveness of the European economy. M-ERA.NET will facilitate the generation of knowledge along the innovation chain, from excellent science and research to innovative industrial applications. Research projects funded by M-ERA.NET should clearly state the Technology Readiness Level (TRL) and should include a plan for the transition to higher TRLs at a later stage; research consortia aiming at TRL 4 or higher are encouraged to involve industrial partners.

Annex A. Methodology for the development of annual work programmes

M-ERA.NET 3 will develop annual work programmes following a model of continuous improvement based on the learnings from past programmes. Building on the vision and policy this approach takes into account input from the M-ERA.NET stakeholders in a way which results in annual work programmes, reflecting the needs of society and the RTD community. A schematic illustration of the yearly cycle is presented below.

The thematic scope of annual calls is drafted on the basis of consultations among **M-ERA.NET members** and the **RTD community**. A **Strategic Expert Group (SEG)** further defines the topics in detail during a 2-days workshop. The resulting annual work programme which also includes the call schedule and procedures is finally endorsed by the **Steering Board**.



Strategic Expert Group (SEG)

The role of the Strategic Expert Group (SEG) is at the cornerstone of the whole process. Its goal is to identify gaps and opportunities for transregional, transnational and international cooperation and to support the selection and definition of the work programmes for joint calls and joint activities.

Candidates are representatives of the RTD community including relevant initiatives, industry networks and scientific committees such as EuMaT, EMMC, EMIRI, Batteries 2030+, etc. SEG members provide a comprehensive overview on needs, possibilities and trends at European and international levels in order to help M-ERA.NET identify gaps and opportunities. As background information SEG experts will be informed during the workshop on the portfolio of the funded projects and accepted pre-proposals of previous and ongoing M-ERA.NET calls.

SEG members are selected by M-ERA.NET partners according to defined criteria:

- expertise in relevant areas of materials research and good track record;
- Overall balance of industry and academic background to cover the entire value chain;
- Overall balance of geographical coverage
- Overall balance of experts who served on previous SEG Workshop(s) and new experts;
- Gender balance