M-ERA.NET Call 2024

Guide for Proposers

Main document

Version 1.0

5 March 2024

Content:

1. Introduction to M-ERA.NET

What is M-ERA.NET ?

M-ERA.NET 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[1].

M-ERA.NET Mission

Technological innovation is the driving force behind M-ERA.NET's contribution to achieve the environmental and growth objectives necessary for the green transition, supporting the circular economy and the Sustainable Development Goals (SDGs) set in the 2030 Agenda for Sustainable Development[2] by the general assembly of the United Nations.

M-ERA.NET aims to strengthen the European Research Area (ERA) on advanced materials[3]. With annual joint calls M-ERA.NET funds ground-breaking research, facilitates knowledge exchange, promotes sustainable solutions in the field of materials science, and fosters transnational collaboration among researchers, academia, industry and other stakeholders. In addition, efforts are directed towards consolidating strategic programming, reducing fragmentation of funding, engaging in international cooperation and facilitating the exploitation of knowledge along the entire innovation chain.

M-ERA.NET plays a pivotal role in aligning national and regional priorities with industry needs, European policy priorities and global challenges. The initiative emphasises a holistic approach to product development, addressing challenges at the design, materials and manufacturing levels. This includes improving durability, reducing energy and material consumption, substituting hazardous materials and developing products that are lighter, easier to maintain, repair, upgrade, remanufacture or recycle. The collaboration also extends to bio-degradable plastics and sustainable polymer design, aiming to mitigate health risks and reduce plastic waste. Furthermore, M-ERA.NET promotes digitalisation and materials modelling to tailor material properties, optimise production processes, and establish uniform data structures for seamless collaboration. Addressing climate challenges, the initiative supports research on efficient energy harvesting, storage devices, and high-

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[1] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

[2] https://sdgs.un.org/2030agenda

[3] https://www.m-era.net/news/updated-vision-and-policy-document-published

performance, environmentally friendly batteries. Overall, M-ERA.NET catalyses progress in materials research, driving advancements in functional materials, composites, surfaces, coatings and interfaces to shape sustainability and competitiveness in key industrial sectors.

M-ERA.NET Consortium

M-ERA.NET started in 2012 under FP7 with 37 partners from 25 European countries. It continued as M-ERA.NET 2 from 2016 to 2022 with 43 partners from 29 countries and is now running in its third phase as M-ERA.NET 3 until 2026 under the Horizon 2020 ERA-NET COFUND scheme with currently 49 public funding organisations from 35 countries. The diverse and experienced network comprises national and regional funding programmes from 25 EU member states and 5 associated countries and includes 5 non-European organisations.
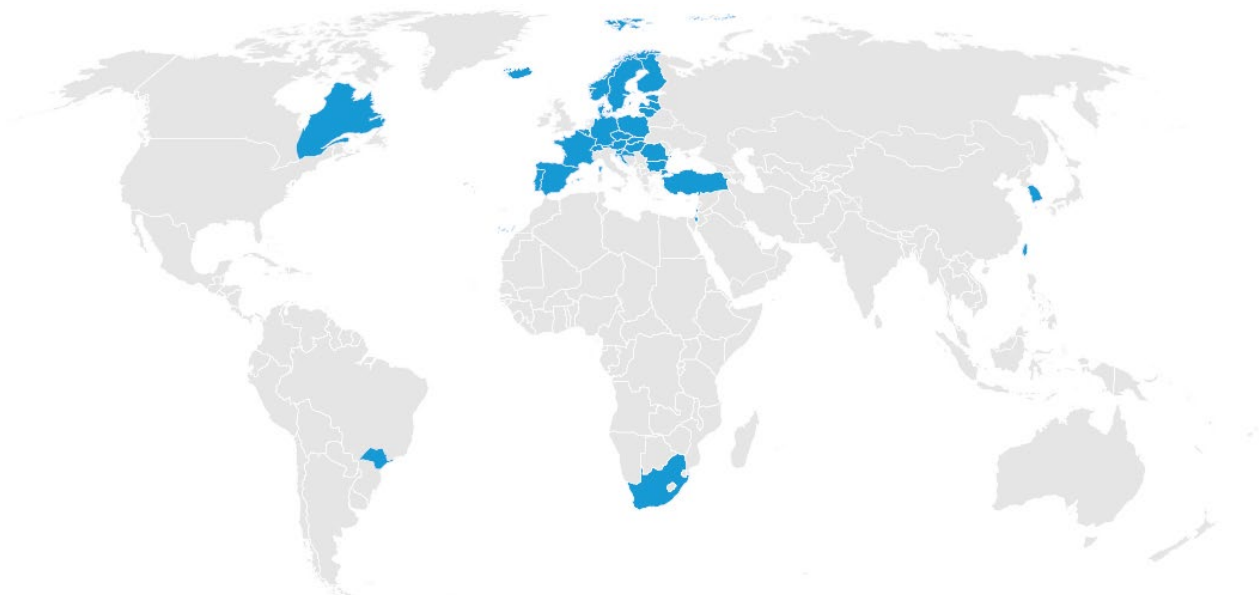
Figure 1: Participating countries and regions of the M-ERA.NET 3 consortium, see also
https://www.m-era.net/about/m-consortium

2. Structure of the M-ERA.NET Call 2024

The objective of the M-ERA.NET Call 2024 is to enable transnational R&D projects between partners receiving funding from regional/national programmes.

Fig. 2 shows the schematic workflow of the Call 2024. Benefits are combined in one approach: On the one hand the regional/national funding organisations apply their own well-established funding rules and procedures known to their applicants, and on the other hand M-ERA.NET provides transnational coordination expertise:

- The call is organised as a 2-step application (Pre- and Full-Proposal). The eligibility of applicants applying for funding will be checked by national/regional funding organisations according to the rules defined by their respective funding programmes.
- The centralised evaluation of Pre-Proposals and Full-Proposals will be carried out by independent international evaluators resulting in a ranking list for each stage.
- In stage 1 the M-ERA.NET call consortium will agree on a list of Pre-Proposals invited to submit a Full-Proposal. The decision is based on the ranking list of evaluated Pre-Proposals and available national/regional budgets.
- In stage 2 the M-ERA.NET call consortium will agree on a joint selection list based on the ranking list of evaluated Full-Proposals and available national/regional budgets.
- The final funding decisions will be made by the national/regional funding organisations.

Figure 2: Workflow of the Call 2024

3. Call Announcement

3.1. Objectives and Topics

The aim is to fund ambitious transnational RTD projects addressing materials research and innovation including materials for batteries and low carbon energy technologies.
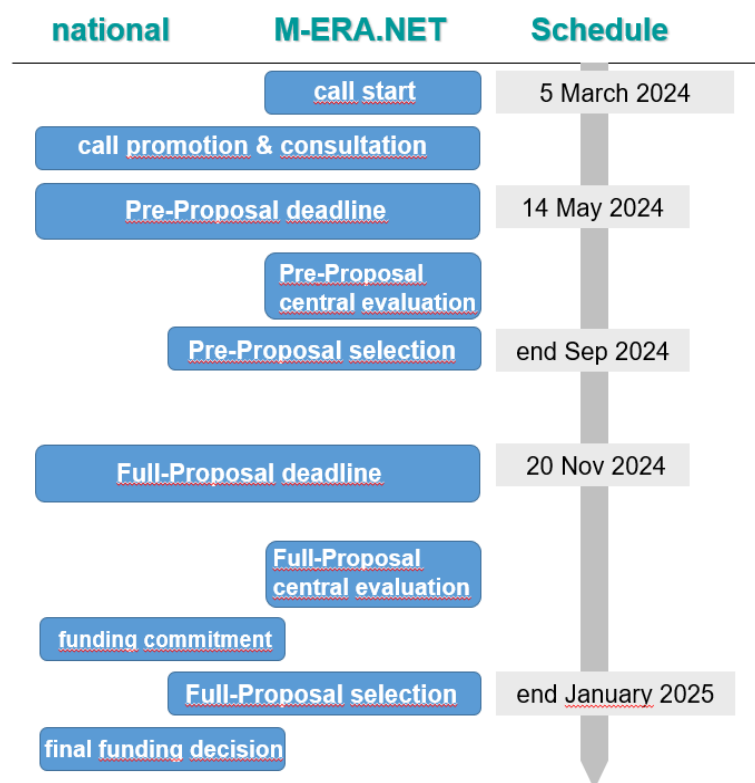
Horizontal objectives for the Call 2024

Supporting the European Green Deal by increasing attention to clean energy technologies and future batteries:

M-ERA.NET aims to strengthen the contribution of materials RTD for clean energy-related applications, energy generation and harvesting, energy storage (battery technologies), electrolysers and fuel cells. M-ERA.NET will support the transition towards a circular economy by addressing aspects like eco-design, design for recycling, durability of products and process efficiency through reduced energy and materials consumption, resulting e.g. in light-weight products.

Supporting the achievement of the United Nations' Sustainable Development Goals (SDG):

M-ERA.NET will contribute to a wider public debate on the impact of materials research and its potential to achieve the SDGs. In particular, M-ERA.NET will support in particular SDG 6 ("Clean water and sanitation") through the development of materials and processes for water treatment, SDG 7 ("Affordable and clean energy") through fostering research on sustainable energy storage technology, SDG 9 ("Industrial innovation and infrastructure") by upgrading the technological capabilities of industrial sectors and SDG 12 ("Ensure sustainable consumption and production patterns") through an environmentally sound management of natural resources and reduced waste generation.

Creating socio-ecological benefits in the context of Responsible Research and Innovation (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. Please refer to the topic descriptions and the M-ERA.NET RRI guidelines included in the call documents.

Supporting the innovation chain:

Making the best use of the interdisciplinary network, the calls in M-ERA.NET will facilitate the generation of knowledge along the innovation chain, from excellent science and research to innovative industrial applications.

Strengthening interdisciplinarity:

M-ERA.NET as a platform uses an integrative approach across disciplines and across application fields, making the initiative an attractive and efficient tool for transnational joint projects that were unlikely to be realised before.

Thematic priorities

The following six topics are defined for the Call 2024

> **1: Sustainable advanced materials for energy**
>
> **2: Innovative surfaces, coatings and interfaces**
>
> **3: High performance composites**
>
> **4: Functional materials**
>
> **5: Materials addressing environmental challenges**
>
> **6: Next generation materials for advanced electronics**

M-ERA.NET will support the research and innovation chain described through Technology Readiness Levels (TRL). **A more detailed description of the topics is available in Annex 1. A description of the TRLs can be found in Annex 2.** In addition, individual national/regional thematic programme focus and funding rules (see chapter 3.2.) must be taken into account.

General considerations

- In general, a special focus on materials science, processing, and engineering that contributes to the implementation of the SDGs (particularly 7 and 9, although other SDGs can also be addressed) and the Green Deal is strongly recommended. Sustainability aspects of the targeted solutions and/or materials must be addressed in the proposal. Proposals should avoid as far as possible the use of hazardous compounds and demonstrate that the materials and processes involved in the research will be safe and will have a minimum impact on the environment.

- Unless expressly justified, proposals should comply with the open data science directive[4] from the EC. It is expected that proposals include intellectual property rights management and proper knowledge transfer and exploitation strategy. It is expected that part of the deliverables of the project include open-source codes, data management and curation methodology, and/or demonstrative examples of the technologies proposed.

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[4] https://digital-strategy.ec.europa.eu/en/policies/legislation-open-data

- Issues of societal concerns should be addressed in a systematic way, and following the M-ERA.NET RRI guidelines[5].

- Measures to ensure gender balance in the project consortia should also be considered.

3.2. Funding rules

Each of the project partners that requests funding has to apply individually for regional/national funding, and is subjected to the rules of the respective regional/national programme. **This means that - depending on the respective national/regional funding rules - some project partners may have to submit additional proposals or information on national/regional level.**

To obtain detailed information on the specific funding rules and programme priorities we strongly recommend contacting the respective national/regional funding organisations (Contact details see Annex 3; first overview on the national / regional funding rules see Annex A to Guide for Proposers for details).

3.3. Eligible project structure and application

- Project consortia must consist of at least 3 partners (all requesting funding from a funding organisation listed in Annex 3) from at least 3 different countries (at least 2 EU member state or associated country[6]) participating in the M-ERA.NET Call 2024. In addition to the minimum consortium, the participation of further partners is possible, including applicants not asking for funding (self-funded).
- Coordinator is eligible and requests funding from a funding organisation listed in Annex 3.
- Proposers (SMEs, large companies, academic research groups, universities, public research organisations or other research organisations) must be eligible for funding according to their national/regional regulations (to be checked with funding organisations listed in Annex 3). If one or more partner(s) responsible for more than 15% of the total project efforts (measured in persons month) are deemed ineligible, the project will not be invited for Pre- or Full- Proposal evaluation.
- The total effort of one single applicant cannot exceed 60% of the total project efforts (measured in person months) in the proposal.

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[5] https://www.m-era.net/other-joint-activities/responsible-research-and-innovation

[6] https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-euratom_en.pdf

- The total effort of applicants from one country cannot exceed 70% of the total project efforts (measured in person months) in the proposal.
- Proposers must be involved in activities within the eligible TRL range of their respective funding agencies to the relevant Topic. Proposal should overall address appropriate TRLs for selected M-ERA.NET Call 2024 topics.
- Mandatory proposal forms must be used (provided for download at https://www.m-era.net/joint-call-2024). Any restructuring and change of formatting conditions of proposal forms result in formal rejection of the proposal (this includes changing the font and its size, interline interval, spacing, margins, document size, individual sections of the template)
- Proposal must be written in English.
- Projects must select only one of the M-ERA.NET Call 2024 Topics.
- Maximum project duration is 36 months.
- Only Proposals recommended to stage 2 by M-ERA.NET after Pre-Proposal stage will be allowed to submit a Full-Proposal.
- Proposers must provide their respective PIC[7]-numbers in the proposal; proposers without a validated PIC will be able to use a temporary PIC for submission.
- Conflict of Interest: the following individuals are not eligible for proposal submission: M-ERA.NET Steering Board members, researchers affiliated to Russian entities and/or exercising in Russia and researchers from participating Funding Organisations. In addition, proposers cannot act as evaluators of the M-ERA.NET Call 2024.

Typically, small to medium sized consortia (3-5 partners on average per proposal) are expected. However, there is no upper limit and consortia may involve as many partners as necessary for a convincing proposal, ensuring that all participants have a valid role. Each partner within the consortium should clearly add value to the objectives of the proposed project. Depending on the nature of the project, each partner in the consortium must demonstrate how he / she will exploit the expected results.

National/regional funding rules apply. Therefore, in some cases only certain topics, TRLs or types of organisations are eligible (e.g., some national/regional programmes fund only industrial but no

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[7] Participant Identification Code: If you want to participate in a project proposal your organisation needs to be registered and have a 9-digit Participant Identification Code (PIC). Please find details here: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/participant-register

academic partners, low/high TRLs). It is highly recommended to contact the respective national/regional funding organisation before proposal submission (see Annex 3 for details).

A consortium agreement between the project partners is recommended for funded projects based on national/regional funding rules. However, the principles of the agreement should already be clear when submitting the proposal. The purpose of the consortium agreement is to clarify:

- the responsibilities of the partners;
- decision processes inside the project;
- management of any change of partners;
- how to exploit and/or commercialise the results (for each partner);
- IPR issues.

A template for the consortium agreement can be found at: https://www.desca-agreement.eu/desca-model-consortium-agreement/.

3.4. Project budget

No overall limits have been defined on M-ERA.NET level but national/regional limits regarding the available funding may apply. Budget shares in project consortia have to be in line with eligibility criteria (chapter 5.1.1. and 5.2.1.).

3.5. Project duration

The maximum project duration must not exceed 36 months. National/regional limits regarding the duration of projects will apply.

3.6. Dates and deadlines

Date	Step	Place
5 March 2024	Launch of the Call 2024	

14 May 2024
 	
12:00 noon Brussels time
	Deadline for submission of:
	
	  a) Pre-Proposals and
	  b) National/regional Funding
	    Applications, if necessary*
		a) Online (via IT tool)
		b) National/Regional
		  funding organisations

Early October 2024	Feedback to applicants	

20 November 2024
 	
12:00 noon Brussels time
	Deadline for submission of:
	
	  a) Full-Proposals and
	  b) National/regional Funding
	    Applications, if necessary*
		a) Online (via IT tool)
		b) National/Regional
		  funding organisation

Early February 2025	Feedback to applicants	
February 2025	Contract negotiations for selected proposals on national/regional level	National/Regional funding organisations
February – May 2025	Start of funded projects	

Please contact your national/regional funding organisation

4. Application process

The M-ERA.NET application process is implemented as a 2-step procedure: Pre-Proposal and Full-Proposal.

1. Before submitting a proposal, all project partners must contact their respective national/regional programme funding organisations in order to discuss the project line-up and the funding conditions.

2. **In stage 1, a Pre-Proposal is mandatory**. It has to be submitted by the coordinator through the M-ERA.NET submission tool until 14 May 2024, 12:00 noon Brussels time. The mandatory Pre-Proposal form available at https://www.m-era.net/joint-call-2024 has to be used. At the same time national/regional funding applications must be submitted to each of the involved funding organisation according to their specific rules (if applicable).

3. National/regional funding organisations will carry out eligibility checks of the Pre-Proposals. Eligible Pre-Proposals are sent to central evaluation, organised by the M-ERA.NET call secretariat. The online central evaluation is performed by independent international evaluators, resulting in the M-ERA.NET ranking list of proposals. The Pre-Proposal stage will be used to ensure that only high-quality proposals which are in line with national requirements are invited to the Full-Proposal stage. Applicants will be provided with feedback emails (only with comments, no scores will be communicated to proposers) after the M-ERA.NET Pre-Proposal selection meeting, including a recommendation to submit (or not) a Full-Proposal.

4. A proposal has to be recommended for Full-Proposal submission by M-ERA.NET to be eligible for stage 2.

5. **In stage 2, a Full-Proposal and an Annex 1 to the Full-Proposal are mandatory**. They must be submitted by the project coordinator through the M-ERA.NET submission tool until 20 November 2024, 12:00 noon Brussels time. The mandatory Full-Proposal form and the mandatory Annex 1 to Full-Proposal form available at https://www.m-era.net/joint-call-2024 have to be used. According to the specific rules of the involved funding organisations, a submission of a national / regional application may be required. Please check with your funding organisation.

6. M-ERA.NET as well as national/regional funding organisations will carry out eligibility checks of the Pre-Proposals. Only eligible Full-Proposals are sent to central evaluation, organised by the M-ERA.NET call secretariat. The online central evaluation is performed by independent international evaluators, resulting in the M-ERA.NET ranking list of proposals.

7. At the M-ERA.NET Full-Proposal selection meeting proposals will be selected for funding based on the M-ERA.NET ranking list and available national/regional funding.

8. M-ERA.NET recommends selected projects for funding to the involved funding organisations. The regional/national funding organisations take the final funding decision.

4.1. Stage 1: M-ERA.NET Pre-Proposal

A Pre-Proposal submission is mandatory using the M-ERA.NET proposal template. The mandatory Pre-Proposal must be submitted by the project coordinator through the M-ERA.NET submission tool until deadline 14 May 2024, 12:00 noon Brussels time. M-ERA.NET Pre-Proposal templates of the Call 2024 must be used.

At the same time national/regional funding applications must be submitted to each of the involved funding organisation according to their specific rules (if applicable). Applicants are requested to contact the involved funding organisations before Pre-Proposal submission. To receive funding, the national/regional parts of the project must fulfil their national/regional criteria. This may create different submission and financing situations for partners from different countries.

4.2. Stage 2: M-ERA.NET Full-Proposal

Only Pre-Proposals invited to Full-Proposal submission are allowed to participate in stage 2. A mandatory Full-Proposal and a mandatory Annex1 to the Full-Proposal must be submitted by the project coordinator through the M-ERA.NET submission tool until deadline 20 November 2024, 12:00 noon Brussels time. M-ERA.NET proposal templates of the Call 2024 must be used.

At the same time national/regional funding applications must be submitted to each of the involved funding organisation according to their specific rules (if applicable).

> ***Changes from Pre- to Full-Proposal***
>
> ► *Project objectives stated in the Pre-Proposal cannot be changed.*
>
> ► *Changes in the consortium should be avoided. Modifications of the consortium are restricted to applicants from countries already part of the Pre-Proposal consortium. It is not accepted to introduce new countries into the existing consortium.*
>
> ► *In general, changes from Pre- to Full-Proposal should be avoided. In any case changes from Pre- to Full-Proposal stage have to be coordinated by the consortium leader with all involved funding organisations.*
>
> *This means that major changes regarding content, project duration, costs, funding or consortium have to be communicated and approved by all involved funding organisations <u>at least 2 weeks before Full-Proposal deadline</u>. The consortium leader is responsible to coordinate and ensure the acceptance of these changes by all involved project partners, funding organisations and the call secretariat.*

4.3. Confidentiality

Proposals and any information relating to them (including the names of the evaluators) will be kept confidential and only be accessible to the funding organisations participating in the M-ERA.NET Call 2024. Proposals will not be used for any purpose other than the evaluation of the applications, making funding decisions and monitoring of the project. International experts are required to sign a confidentiality agreement prior to evaluating proposals.

5. Evaluation

The M-ERA.NET selection process will be a 2-step procedure: Pre-Proposal and Full-Proposal. M-ERA.NET aims at providing a transparent, fast and straight forward assessment of the submitted proposals.

5.1. Pre-Proposal

5.1.1 Eligibility check

At M-ERA.NET level:

- requested M-ERA.NET Pre-Proposal form in English is uploaded to the M-ERA.NET submission tool until submission deadline 14 May 2024, 12:00 noon Brussels time. The

structure of the Pre-Proposal form must not be changed. Any restructuring and change of the formatting conditions of the proposal forms result in the formal rejection of the proposal.

- maximum project duration is 36 months
- minimum of 3 applicants (all requesting funding from a funding organisation listed in the Guide for Proposers) from at least 3 different countries (at least 2 EU member states or associated countries[8]) participating in the Call 2024; applicants not asking for funding can participate in addition to the minimum consortium of 3 applicants from 3 different countries
- project coordinator is eligible and requests funding (from a funding organisation listed in the Annex 3)
- total effort of one single applicant cannot exceed 60% of the total project efforts (measured in person months) in the proposal
- total effort of applicants from one country cannot exceed 70% of the total project efforts (measured in person months) in the proposal
- Pre-Proposal is recommended for Full-Proposal submission by a minimum of 3 funding organisations from 3 different countries of the M-ERA.NET call consortium
- In case one or more project partners are considered ineligible the entire Pre-Proposal will not be invited to the Pre-Proposal evaluation if the not eligible partner(s) account for ≥15% of the total project effort (measured in person months).

At national/regional level:

- presence of requested national/regional Pre-Proposal forms (if applicable)
- minimum number of eligible, independent applicants (if applicable, criteria of involved funding programmes apply)
- relevance to funding programme (if applicable, criteria of involved funding programmes apply)
- national/regional thematic priorities going beyond, or more in details than, the M-ERA.NET Call 2024 topics and associated TRL
- financial status of applicants, especially industrial applicants

5.1.2. Central evaluation of Pre-Proposals

Only eligible Pre-Proposals are sent to central evaluation carried out by independent international evaluators according to the EC rules for ERA-NET Cofund (see Figure 3):

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[8] http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf

- Individual written assessments: 3 individual and independent written assessments for each Pre-Proposal provided by selected and agreed experts. There is no scoring for the individual assessment reports.

- 1 peer review report (PRR): 3 individual assessments are compiled by one of the 3 experts (= rapporteur). The compilation consists of peer review report and a scoring.

- Pre-Proposal evaluation criteria, scoring and thresholds (described in Annex 4.1).

- Quality check of the peer review report by the M-ERA.NET call secretariat

- Ranking list of recommended projects is based on the scoring

- Involved funding organisations meet for a Pre-Proposal selection meeting to assemble and commit themselves to the list of Pre-Proposals to be invited to submit a Full-Proposal. The selection is based on the M-ERA.NET ranking list, national/regional priorities (if applicable) and available national/regional budgets.

- In case one or more project partners cannot be recommended, the entire Pre-Proposal will not be invited to the Full-Proposal phase if the not the recommended partner(s) account for ≥15% of the total project effort (measured in person months).
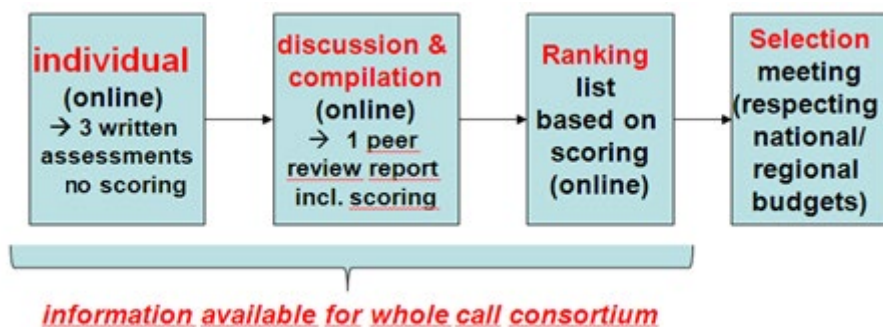
Figure 3:

Procedure of the centra evaluation applied for the Pre-Proposal and Full-Proposal stage

5.1.3. Result of Pre-Proposal phase

After the Pre-Proposal selection meeting of the involved funding organisations, the selection of Pre-Proposal results in one of the recommendations, to be communicated to the applicants:

- *Recommended for submitting the Full-Proposal*

- *Not recommended*

The results of the Pre-Proposals stage including a compiled peer review report (anonymised result of central international peer review process excluding the scoring) will be provided by the call secretariat via feedback emails to the project coordinators. All applicants will receive feedback provided by the involved funding organisations.

5.2. Full-Proposal

Full-Proposals will be selected by the following steps:

5.2.1 Eligibility check

Eligibility checks of Full-Proposals are performed before the central evaluation.

At M-ERA.NET level:

- requested M-ERA.NET Full-Proposal form and Annex1 to the Full-Proposal form in English is uploaded to the M ERA.NET submission tool until submission deadline 21 November 2024, 12:00 noon Brussels time. The structure of the Full-Proposal form must not be changed. Any restructuring and change of the formatting conditions of the proposal forms result in the formal rejection of the proposal.
- Pre-Proposal is recommended for Full-Proposal submission by M-ERA.NET
- project coordinator is eligible and requests funding (from a funding organisation listed in Annex 3)
- presence of requested M-ERA.NET Full-Proposal form and Annex1 in English until deadline
- maximum project duration of 36 months
- minimum of 3 applicants (all requesting funding from a funding organisation listed in the Guide for Proposers) from at least 3 different countries (at least 2 EU member states or associated countries[9]) participating in the Call 2024; applicants not asking for funding can participate in addition to the minimum consortium of 3 applicants from 3 different countries
- total effort of one single applicant cannot exceed 60% of the total project efforts (measured in person months) in the proposal
- total effort of applicants from one country cannot exceed 70% of the total project efforts (measured in person months) in the proposal;
- In case one or more project partners are considered ineligible the entire Full-Proposal will not be invited to the Full-Proposal evaluation if the not eligible partner(s) account for ≥15% of the total project effort (measured in person months).

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[9] https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf

At National/regional level:

- programme regulations observed if applicable (e.g. presence of requested nat/reg proposal forms, financial standing of industrial applicants, etc.)

5.2.2. Central evaluation of Full-Proposal

Only eligible Full-Proposals are sent to central evaluation carried out by independent international evaluators according to the EC rules for ERA-NET Cofund (see Figure 3).

The M-ERA.NET Call 2024 Evaluation Procedure:

- Individual written assessments: 3 individual and independent written assessments for each Full-Proposal provided by selected and agreed experts. There is no scoring for the individual assessment reports.
- 1 peer review report (PRR): 3 individual assessments are compiled by one of the 3 experts (= rapporteur). The compilation consists of peer review report and a scoring.
- Full-Proposal evaluation criteria, scoring and thresholds (described in Annex 4.2).
- Quality check of the peer review report by the M-ERA.NET call secretariat
- Ranking list of recommended projects is based on the scoring
- Involved funding organisations meet for a selection meeting to assemble and commit themselves to the final list of selected proposals (= selection list). The selection is based on the M-ERA.NET ranking list and available national/regional budgets.

5.2.3. Result of Full-Proposal phase

As a result of the M-ERA.NET central evaluation Full-Proposals will either be:
- Recommended for funding *or*
- Not recommended for funding

The results of the Full-Proposals stage including a compiled peer review report (anonymised result of central international peer review process excluding the scoring) will be provided by the call secretariat via feedback emails to the project coordinators and all applicants.

6. Decision and funding procedure

6.1. Decision process

The M-ERA.NET Full-Proposal selection meeting results in the M-ERA.NET recommendation for funding decisions at national/regional level. The recommended selection list will be forwarded to the involved programme owners who will be in charge of the final funding decisions.

In case one or more project partners are not recommended for funding, the entire Full-Proposal cannot be recommended for funding if the not the recommended partner(s) account for ≥15% of the total project effort (measured in person months).

Applicants may submit a complaint to the M-ERA.NET coordinator (office@m-era.net) until one week after the communication of the Full-Proposals assessment if any procedural error may be perceived to exist.

6.2. Funding

6.2.1. Contract

Funding contracts are signed directly between the project partners and their national/regional funding organisations.

6.2.2. Start of projects

Depending on the national/regional regulations, a pre-condition might be the existence of a consortium agreement that also includes IPR related issues.

It is highly recommended that the project start and end dates are synchronised for all project parties.

7. Monitoring

7.1. National/regional project review

The progress of each individual funding contract will be monitored by the respective national/regional funding organisation through individual project review processes and monitoring procedures.

7.2. Reporting to M-ERA.NET

Apart from the national/regional project review, the transnational cooperation aspects will be monitored at M-ERA.NET level, e.g. by using online questionnaires. This will also facilitate the identification of potential success stories.

At the end of the project lifetime, a final project report must be submitted to M-ERA.NET by the project coordinator using the M-ERA.NET reporting templates[10]. The reporting templates will be available on the Call 2024 web page.

7.3. Change in active projects

Any substantial change in an on-going project must be reported immediately to the involved funding organisations and the monitoring task force (email: monitoring@m-era.net)[11]. The project partners should be aware that changes may affect their funding.

8. Communication and dissemination

Funded projects will be displayed on the M-ERA.NET website, in the online project catalogue "Materipedia". The project consortium is invited to enhance their project communication activities using this tool.

A reference to M-ERA.NET is requested in publications, exhibitions, lectures, success stories and press information concerning results of the projects.

9. Support

Frequently Asked Questions (FAQ) are listed in the call website https://www.m-era.net/joint-call-2024. In addition, all funding organisations participating in the call will provide assistance to project proposers in the case of any questions.

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[10] More details are provided in the „Tutorial for project coordinators on how to submit the final report", available on the call website

[11] A change request form will be available on the call website.

Annex 1: Thematic priorities for the M-ERA.NET Call 2024

Topic 1:   **Sustainable advanced materials for energy**

Topic 2:   **Innovative surfaces, coatings and interfaces**

Topic 3:   **High performance composites**

Topic 4:   **Functional materials**

Topic 5:   **Materials addressing environmental challenges**

Topic 6:   **Next generation materials for advanced electronics**

Topic 1: Sustainable advanced materials for energy

Technical Content and Scope

The EU commitment to mitigate climate change is rooted in the way we use energy and the decarbonisation strategies we take. It is a main objective of M-ERA.NET to support SDG 7 "Affordable and clean energy". The development of advanced materials can play a key role in resolving these issues, enabling new and cleaner energy production, storage, conversion, efficiency and utilisation. To be effective, sustainable advanced materials development with scientific, societal and economic impact should engage with aspects such as circularity, end of life treatment, recyclability, Life Cycle Assessment (LCA), Techno-Economic Analysis (TEA) and Responsible Research and Innovation (RRI). Furthermore, methodologies supported by digitalisation (computational modelling, artificial intelligence, design of experiments, etc.) are needed for accelerated materials design and optimisation for energy applications. These methodologies, together with experimental high throughput screening of materials, are expected to save time and cost in the materials discovery and design process versus traditional trial and error approaches.

Objectives and Transversal aspects

The objective of this topic is to develop materials to enable new and cleaner energy production, storage, conversion and utilisation. The proposals shall address at least one of the following items:
- Multiscale modelling and artificial intelligence for accelerated energy materials development and optimisation based on understanding material behaviour.
- Safe by design materials in energy storage and conversion devices, i.e. batteries, fuel cells electrolysers, and molecular H_2 distribution.
- Novel materials for H_2 production, storage and distribution, combustion, conversion and power to X including synthetic fuels.
- Development of sustainable and advanced catalysts to improve fuel cell and electrolyser efficiency based on computation and experiments.
- Improved active materials and electrolytes for Generation 4 and 5 batteries for mobility (i.e. solid state Li-ion batteries and beyond Li-ion batteries) and for stationary applications (for instance vanadium free flow batteries).
- New photovoltaic materials and architectures for efficient and stable energy production in a broad range of applications.
- Materials for short, medium and long-term thermal storage over a wide temperature range.
- Materials for long duration electrochemical battery storage.
- New material concepts for efficient energy harvesting, including thermoelectric, triboelectric, piezoelectric and hybrid technologies.

- Advanced materials for wind turbines low in critical elements, low degradation and increased recyclability of the blades.

In addition to the topics above, the project proposal may also include materials processing with reduced ecological footprint, in-operando experimental approaches, improving energy optimization through lightweight materials, and/or flexible design for repurposing and recycling. Such integration could be further enhanced by fostering collaboration between academia, civil society, industry, and relevant stakeholders to strengthen the whole innovation chain.

Expected impact

The proposal shall address how it will contribute to the expected impact of the topic, defined as follows:
- The proposed research should lead to energy conversion and storage systems with higher efficiency, improved overall performance and lower cost through increases in, amongst others and not limited to, energy and power characteristics, safety, cyclability, volumetric and gravimetric energy density, capacity, power conversion efficiency and stability. These improvements shall be substantiated with key performance indicators.
- Improved comparison between project results, cooperation between related research groups and possibly contribution to standardization efforts by providing open access to accrued raw data and metadata.
- Improvement of reusability and interoperability in developed software.

All proposals should clearly state the TRL at the project start and at the project end (see 1.5.). The proposals should include a plan for the transition to higher TRLs at a later stage (i.e. beyond the project end date). Establishing an industrial and societal advisory board or the participation of one or more companies in the project consortium is encouraged. In proposals targeting TRL 5, industrial partners and at least one project partner specialised on customer or end-user demands should be involved in the project consortium.

Sustainability and RRI requirements

All proposals should provide a preliminary assessment regarding (but not limited to):
- Resources: the use of resources overall, the environmental properties of the materials, the use of critical raw materials, energy, water, etc.
- The production process: use of solvents, toxic elements, etc.
- Use phase: the sustainability of the conditions under which the material can be used (continuous energy use, releases to the environment, life span, etc.)

- End of life: the entry of the material into the circular economy, including re-use, re-manufacturing or recycling considerations.Describe any potential trade-offs between sustainability burdens and benefits.
- Involvement of relevant societal stakeholders as appropriate

Proposals should describe any potential trade-offs between sustainability burdens and benefits. The proposal should include an activity where such aspects (relevant to the proposal) are further investigated, potentially with corresponding impacts on the design of the material(s).

Target groups

This topic is targeted at all groups in the innovation chain: disruptive, applied research, industrial research and development. Collaboration between research entities and industrial partners is encouraged also at low (<4) TRL levels.

Keywords

Projects submitted to this Topic should choose at least **3** keywords from the following list:

Modelling; artificial intelligence; life cycle assessment; energy efficiency; energy storage; energy harvesting; materials safety; lightweight; thermochemical materials; photovoltaic materials; battery materials; thermoelectric materials; piezoelectric materials; triboelectric materials; solar cells; wind turbines; advanced catalysts; Power to X; fuel cells; electrolysers; hydrogen; hydrogen distribution; liquid state batteries; solid state batteries.

Additional keywords can also be chosen in the submission platform. The ensemble of the keywords should allow for an overview of the scope of the project (consider describing different aspects of the project such as: main scientific area / domain, system / property / material of interest, applications / objectives and pertinent procedures / techniques)**.**

Indicative TRL range: 1-6

Topic 2: Innovative surfaces, coatings and interfaces

Technical Content and Scope

Surface and coating technology is a key enabler for new solutions in numerous industrial sectors worldwide. This call will stimulate application driven development of innovative surfaces, thin films, coatings, interfaces and related process technologies, including a broad spectrum of applications in various fields as specified in objectives and transversal aspects. The proposals should consider the energy efficient development, processing or production aspects including modelling and circular economy. Sustainable use of materials in an environmentally friendly manner with special attention to Critical Raw Materials (CRM) should be considered.

Objectives and Transversal aspects

The proposals shall address at least one of the following items:
- Development of innovative surfaces, thin films, coatings and/or interfaces.
- Development of smart or multifunctional coatings, thin films or interfaces.
- Development or improvement of process technologies considering circular economy and energy efficiency to enable deposition of new coatings and/or surface modification.
- Development of optimised interfaces and interphases.
- Development of new materials and processing for long-time stable antipathogen coatings.
- Development of environmentally friendly interfaces in battery cells or innovative battery-or electrolyser- or fuel cell components, including post Li-ion battery.
- Development of thin films and coatings for sensing applications, including biosensing.
- Multiscale modelling and/or new characterisation techniques of innovative surfaces, thin films, coatings and/or interfaces.
- Engineered functional interfaces between electronics and biological systems.

To address transversal aspects, that are specifically related to the topic, project proposals should:
- Consider aspects such as fundamental understanding of the mechanisms, experimental assessment, and where applicable prototyping, up-scaling, manufacturing and validation demonstrating prototype in an operational environment with a view to final customer applications.

- Address complementary characterisation techniques and/or, where relevant, modelling techniques and/or how to rationalise data for future use in modelling processes (data base).
- Address how coatings and/or thin films will impact the recyclability of core material.
- Ensure relevance for different partners in the value chain by stating clear concepts for application(s) in targeted industrial sector(s).

Expected impact

The proposal shall address how it will contribute to the expected impact of the topic, defined as follows:

- Innovative energy efficient process technologies related to interface optimisation, coating development and application as well as surface modification.
- Availability of high-end components, products with tailored properties or functionalities by innovative surfaces, coatings and interfaces. All addressed technologies and/or products should ensure having a minimal negative impact on health and safety.
- Achieving a positive ecological and energy impact by developing processes, coating materials, and thin film technologies following a circular economy and CRM strategies in accordance with SDG 7 (affordable and clean energy).
- Innovative products or technologies with tailored properties or functionalities by innovative surfaces, coatings and interfaces enabling positive societal impacts, on e.g. safety, economics, employment, life quality and avoid the release of toxic substances.
- Increasing synergy between industry and academia during and after the end of the project.

All proposals should address environmental aspects, including reuse, remanufacturing or recycling considerations, and broader social or ethical impacts, when relevant.

All proposals should clearly state the TRL at the project start and at the project end. The proposals should include a plan for the transition to higher TRLs at a later stage (i.e. after the project end date). Establishing an industrial and societal advisory board or the participation of one or more companies in the project consortium is encouraged. For proposals aiming at TRL 4 or higher, industrial partners and at least one project partner specialised on customer demands should be involved in the project consortium.

Sustainability and RRI requirements

M-ERA.NET requires that all proposers explain how their projects demonstrate a commitment to RRI by investigating and addressing the environmental, social, ethical, political, or cultural dimensions of the proposed research:

Proposals should provide a preliminary assessment regarding (but not limited to):
- Resources: the use of resources overall, the environmental properties of the materials, the use of critical raw materials, energy, water, etc.
- Production process: use of solvents, toxic elements, substances of concern, etc.
- Use phase: the sustainability of the conditions under which the material can be used (releases to the environment, life span, etc.).
- End-of-life: the entry of the material into the circular economy, including reuse, remanufacturing or recycling considerations.
- Involvement of relevant societal stakeholders as appropriate.

Describe any potential trade-offs between sustainability burdens and benefits.
The proposal should include an activity where relevant aspects are further investigated, potentially with corresponding impacts on the design of the material(s).

Target groups

This topic is targeted at all groups in the innovation chain: basic research, applied research, industrial research, as well as at the end-user industry. The topic is particularly suitable for the establishment of a strong collaboration between research entities and industry, including Small and Medium Enterprises (SMEs). Participation of large enterprises may be considered due to their powerful research units or as potential end users of the technology or of the product proposed. Interdisciplinary/transdisciplinary projects along the value chain are encouraged and should enable a broader cross-sectorial use.

Keywords

Projects submitted to this Topic should choose at least **2** keywords from the following list:

Innovative surfaces, multifunctional coatings, sensing surfaces, nano-engineered coatings, antipathogen coatings, bio-interfaces, thin films, interfaces, interphases, advanced coatings, functionalisation, surface technologies, modelling, surface characterisation techniques, structured surfaces, textured surfaces.

Additional keywords can also be chosen in the submission platform. The ensemble of the keywords should allow for an overview of the scope of the project (consider describing different aspects of the project such as: main scientific area / domain, system / property / material of interest, applications / objectives and pertinent procedures / techniques).

Indicative TRL range: 2 – 7

Topic 3: High performance composites

Technical Content and Scope

Within the scope of this call, composites are defined as engineered materials (incl. hybrids) composed of ≥2 constituents (ex. a polymer, metallic or ceramic matrix reinforced by a textile, fibre, particle, container or filler) that meet requirements which cannot be fulfilled by a single material. The constituents can be metallic, ceramic, mineral, synthetic, natural or bio-based, and may possess one or more nanoscale dimensions.

Objectives and Transversal aspects

This call topic is aimed at experimental and/or computational activities focused on high performance composites having functional properties for engineering applications. Projects focused on energy or electronics applications can also be considered but should not be the sole focus; in such cases please refer to Topics 1 or 6.

Regarding materials properties, composites should combine at least two of the following:

- High strength and stiffness to weight-ratio.
- Durability (e.g. vs. creep, fatigue, working / environmental conditions, etc.).
- Tailored thermal, electrical and/or mechanical properties.
- Self-healing functionalities or self-monitoring properties.
- Thermal management properties (e.g. phase change materials).
- Electronic and/or ionic conductivity.
- Electrochemical energy storage properties.
- Biocompatible or anti-microbial properties.
- Biodegradable and/or compostable properties.
- Bioactive or biologically functional
- Fire retardant properties with environmentally friendly substances.
- Long-term stability and safety.

Proposals should also incorporate at least one of the following aspects:

- Molecular design, functionalization and characterisation for improved reinforcement/matrix interaction.
- Elimination of substances of concern.
- Reduction in greenhouse gas emissions.
- Dependence on critical raw materials and vulnerable supply chains.
- New bio-based (renewable) constituents.
- Considerations of cost and scalability.
- Resource optimisation, incl. use of recycled/waste materials and lifetime extension.
- Methods and tools for design optimisation (e.g. for additive manufacturing).
- Determination of long-term properties (e.g. creep, fatigue, ageing, etc.).

- Understanding of failure and prediction of failure
- Joining, assembly and interface optimization between dissimilar materials.
- Sustainability-by-design.
- Disassembly / constituent separation / reuse / remanufacture / repurpose / repair / recycling strategies (incl. design-for-X, mechanical and chemical recycling).
- New scalable, high throughput and rapid manufacturing techniques, e.g. fast curing, low viscosity resins, extrusion, thermoforming, and roll-to-roll processing.
- Automation, robotisation, cost-efficient and/or sustainable manufacturing.
- Novel composite architectures and constituent designs (e.g. thin tapes), and novel means of generating them (e.g. additive manufacturing).

It is strongly recommended that the proposal covers materials, processing, applications, and recycling. Such integration may be further enhanced by collaborations between universities, institutes and industry, and by a consortium covering the whole value chain, as well as by providing an objective and meaningful assessment of sustainability. Life-Cycle Analysis (LCA) is encouraged but not required; regardless, proposals should evaluate manufacturing and end-of-life issues.

Expected impact

The proposal shall address how it will contribute to the expected impact of the topic, defined as follows:

- High performance composites with responsible resource consumption using advanced design and manufacturing concepts (esp. avoiding substances of concern), in line with SDG 12 "responsible consumption and production".
- More competitive industrial products and processes.
- Socioeconomic, ecological and/or ethical benefits of composites with enhanced functionality and/or reduced impact on human health / the environment.
- Improved knowledge sharing and the reinforcing of scientific and technological platforms within the international composites community.

All proposals should clearly state the TRL range covered during the project (see 1.3.) and include a plan for the transition to higher TRLs beyond the project end date. Establishing an industrial and societal advisory board or implicating one or more companies in the consortium is encouraged. When aiming above TRL 4, the consortium should involve industrial partners.

Sustainability and RRI requirements

M-ERA.NET requires that all proposers explain how their projects demonstrate a commitment to RRI by investigating and addressing the environmental, social, ethical, political, or cultural dimensions of the proposed research:

Proposals should provide a preliminary assessment regarding (but not limited to):

- Resources: the use of resources overall, the environmental properties of the materials, the use of critical raw materials, energy, water, etc.
- Production process: use of solvents, toxic elements, substances of concern, etc.
- Use phase: the sustainability of the conditions under which the material can be used (releases to the environment, life span, etc.)
- End-of-life: the entry of the material into the circular economy, including re-use, re-manufacturing or recycling considerations
- Ethical and privacy concerns related to the enabling of studies involving animal or human subjects (where applicable)
- Involvement of relevant societal stakeholders as appropriate

Describe any potential trade-offs between sustainability burdens and benefits.
The proposal should include an activity where relevant aspects are further investigated, potentially with corresponding impacts on the design of the material(s).

Target groups
This topic is targeted at all groups in the innovation chain: disruptive, applied research, industrial research and development. Collaboration between research entities and industrial partners is encouraged also at low (<4) TRL levels.

Keywords

Projects submitted to this Topic should choose at least **3** keywords from the following list:

Mechanical, Thermal, Dielectric, Durability, Sensing, Biological, Biocompatible, Compostable, Self-healing, Lightweight, Magnetic, Optical, Recyclable, Combustion, Fire Safety, Porosity, Insulation, Acoustic, Piezo, Polymer Matrix Composite, Ceramic Matrix Composite, Metal Matrix Composite, Bio-based Material, Natural Material, Thermoplastic, Thermoset, Elastomer, Mineral, Geopolymer, Fiber, Textile, Nanomaterial, Filler, Gel, Porous, Meta-material, Concrete, Alloy, Additive Manufacturing, Liquid / Resin Molding, Thermoplastic Processing, Casting, Thin Layer Processing, Plasma Processing, Laser Processing, Printing, Sintering, Solution Processing, Solvent-free Processing, Powder Metallurgy, Joining, Automation

Additional keywords can also be chosen in the submission platform. The ensemble of the keywords should allow for an overview of the scope of the project (consider describing different aspects of the project such as: main scientific area / domain, system / property / material of interest, applications / objectives and pertinent procedures / techniques)*.*

Indicative TRL range: 2-5

Topic 4: Functional materials

Technical Content and Scope

Functional materials are a key enabler for almost all technologies and an important economic and employment generator in Europe. New functional materials are expected to improve the performance of end-user products. They should also reduce our dependence on non-renewable resources and critical raw materials, while favouring recycling and sustainable solutions, notably by avoiding toxic substances.

Successful product innovation requires consistent advances in design, production, processing and integration of materials, supported by modelling, characterisation, high-throughput approaches, digital technologies and innovative manufacturing technologies that will enable tailoring the materials properties.

Functional materials specifically targeting only one application among energy, electronics or environmental applications should be submitted to the corresponding call topic.

Objectives and Transversal aspects

Proposals within the scope of this topic should target sustainable functional materials in at least one of the following areas:
- Beyond state-of-the-art functional materials, e.g. self-healing materials, 2D materials enabling novel functions, bio-based materials, catalyst materials, photonic materials, etc.
- Functional structures, e.g. metamaterials, topological structures, heterolayers and others.
- Materials with special functions for sensing and actuation
- Materials for smart wearables, implants and other health applications
- Materials for emerging technologies, e.g. quantum technologies, neuromorphic computing, etc.
- Materials for smart and zero-energy buildings, e.g. thermal insulation systems and efficient heat radiation or cooling solutions
- Materials for energy-efficient separation, liquid/gas purification and process intensification.
- New strategies to replace toxic or critical raw materials in commercial products
- Materials for greenhouse gas capture/conversion.

Proposals could address other aspects of the advanced materials value chain than materials design, discovery, development and/or production (provided they are directly related to materials), such as:

- Resource optimisation, incl. use of recycled/waste materials and lifetime extension.
- Methods and tools for design optimisation (e.g. for additive manufacturing).
- Disassembly / constituent separation / reuse / remanufacture / repurpose / repair / recycling strategies (incl. design-for-X, mechanical and chemical recycling).
- New scalable, high throughput and rapid manufacturing techniques.
- Automation, robotisation, cost-efficient and/or sustainable products manufacturing.
- Characterisation techniques for material behaviour during the product use phase
- Materials traceability along the materials life cycle

To establish a whole innovation chain, it is strongly recommended that the project proposal covers several stages of material development (design, production, processing, integration into products, and recycling). This may be further enhanced by collaborations between academia (universities and/or RTOs) and industry, and by a consortium covering the whole value chain, as well as by providing an objective and meaningful assessment of sustainability. Life-Cycle Analysis (LCA) is encouraged but not required; regardless, proposals should evaluate manufacturing and end-of-life issues.

Expected impact

The proposal shall address how it will contribute to the expected impact of the topic, defined as follows:
- Support European industry through technological development based on novel functional materials and optimised production processes, with particular focus on sustainability and circular economy.
- Improved competitiveness and strengthened industrial leadership by improving performance, reducing costs, optimising production processes, or offering new applications of end user products based on functional materials.
- Strengthened innovation excellence of the European academia and research institutes in functional materials to address new societal and industrial challenges.
- Improved citizens' well-being by providing sustainable advanced functional materials enabling more powerful technological solutions

All proposals should clearly state the TRL at the project start and at the project end. The proposals based on original and innovative approaches may start with TRL 1. The proposals should include a plan for the transition to higher TRLs at a later stage (i.e., beyond the project end date). Establishing an advisory board involving industrial and societal stakeholders is encouraged, as well as the participation of one or more companies in the project consortium, especially for proposals aiming at TRL 4 or higher at the project end. Those projects might include an LCA elaborated with the industrial partners.

Sustainability and RRI requirements

M-ERA.NET requires that all proposers explain how their projects demonstrate a commitment to RRI by investigating and addressing the environmental, social, ethical, political, or cultural dimensions of the proposed research:

Proposals should provide a preliminary assessment regarding (but not limited to):

- Resources: the use of resources overall, the environmental properties of the materials, the use of critical raw materials, energy, water, etc.
- Production process: use of solvents, toxic elements, substances of concern, etc.
- Use phase: the sustainability of the conditions under which the material can be used (releases to the environment, life span, etc.)
- End-of-life: the entry of the material into the circular economy, including re-use, re-manufacturing or recycling considerations
- Involvement of relevant societal stakeholders as appropriate

Describe any potential trade-offs between sustainability burdens and benefits.
The proposal should include an activity where relevant aspects are further investigated, potentially with corresponding impacts on the design of the material(s).

The [Commission initiative for Safe and Sustainable by Design](link) will set a framework for assessing safety and sustainability of chemicals and materials and which should be considered as a reference in the proposal.

Target groups

This topic is targeted at all groups: disruptive research, applied research, industrial research and development.

Keywords

Projects submitted to this Topic should choose at least **3** keywords from the following list:

nanomaterials, bio-based materials, topological structures, 2D materials, heterostructures, electro/photochromic materials, porous materials, metamaterials, self-healing materials, polymers, metal-organic frameworks, processing technologies, additive manufacturing, energy-efficient processes, eco-design, recyclability, upcycling, SSbD, thermal properties, thermoelectric properties, triboelectric properties, tribological properties, magnetic properties, optical properties, photonic properties, piezoelectricity, plasmonics, healthcare, construction, catalysis, quantum technologies, wearables, sensors, membranes.

Additional keywords can also be chosen in the submission platform. The ensemble of the keywords should allow for an overview of the scope of the project (consider describing different aspects of the project such as: main scientific area / domain, system / property / material of interest, applications / objectives and pertinent procedures / techniques).

Indicative TRL range: 1-6

Topic 5: Materials addressing environmental challenges

Technical Content and Scope

It is a main objective of M-ERA.NET to address the environmental challenges of today and to support the Green Deal and the sustainable development goals (SDGs) and this topic covers specifically number 6, 7, 9, 12, and 13.

The topic will support the transition towards a circular economy by addressing design, synthesis, shaping, and application of advanced materials with emphasis on the emerging environmental applications, such as sensing of hazardous substances, eco-benign technologies for water / air /soil treatment, remediation of (post)industrial sites, substitution of hazardous substances or critical materials, reduction of fossil-based materials, waste reduction and recycling technologies.

The reduction of waste and recycling of materials in accordance with a sustainable development is becoming a necessity related to decarbonization and circular economy, as for example those based on technologies dedicated to energy transition.

Objectives and Transversal aspects

The goal is to develop and integrate new materials and advanced processing concepts that enable more efficient and safer technologies tackling environmental challenges and for recycling end-of-life (EoL) products. The use of novel materials in environmental applications should be developed, targeting to provide sustainable solutions that aim at least one of the following areas:

- Biobased materials to reduce the use of fossil raw materials.
- Biodegradable polymers / new chemistries that reduce sources of microplastic in agriculture, food, cosmetic, and textile applications for better compostability and degradation in soil.
- Improve durability of materials (self-healing, vitrimers, reparability).
- Develop sustainable and circular packaging materials which are not harmful for the environment.

- Novel materials for CO_2 capture, sequestration, and valorisation.
- Materials for treatment/purification of contaminated waters, air and soil.

- Use of European secondary material sources to reduce the dependency on imported materials and to limit supply risks.
- Advanced pre-processing methods to separate the materials to mitigate potential effects of impurities.

- Various waste materials recycling via environmentally benign technologies (e.g. textiles, fibres-based materials, plastics, composites, strategic metals).
- Recycling of materials used for energy transition (production, conversion, recovery and storage).
- Recycling of materials from waste of electric and electronic equipment (WEEE).
- Efficient technologies aimed at improved recovery yield and impurity removal. Increased quality and purity level of the recycled/recovered materials.
- Reduce hazardous side-streams from recycling (e.g. use of alternative solvents).

To strengthen the whole innovation chain, it is strongly recommended that the project proposal covers materials, processing, application, and recycling. Such integration could be further enhanced by fostering collaboration between academia and industry, and by a consortium covering the whole circular value chain and life-cycle. All the proposed technologies must be assessed by their economical, ecological, societal and safety impact (such as with LCA).

Expected impact

The proposal shall address how it will contribute to the expected impact of the topic, defined as follows:
- sustainable and cost-efficient processing methods (remediation, recycling) for high quality materials and components.
- Less pollution of water / air / soil
- a contribution to zero waste by improving the valorisation of waste where CRM are present.
- Increased use of recycled materials.
- Increased substitution of fossil-based materials with biobased materials
- Increased material circularity.

The aim is to increase the European competitiveness by offering sustainable, safe, energy efficient and low carbon, water and biodiversity footprint materials production technologies and recycling technologies that are able to create new business opportunities and models for the EU industry.

All proposals should clearly state the TRL at the project start and at the project end (see 1.5.). The proposals should include a plan for the transition to higher TRLs at a later stage (i.e., beyond the project end date). Establishing an industrial and societal advisory board or the participation of one or more companies in the project consortium is encouraged. Also consider the inclusion of a societal stakeholder. For proposals aiming above TRL 4, industrial partners should be involved in the project consortium.

Sustainability and RRI requirements

M-ERA.NET requires that all proposers explain how their projects demonstrate a commitment to RRI by investigating and addressing the environmental, social, ethical, political, or cultural dimensions of the proposed research:

All proposals should provide a preliminary assessment regarding (but not limited to):

- Resources: the use of resources overall, the environmental properties of the materials, the use of critical raw materials, energy, water, etc.
- The production process: use of solvents, toxic elements, etc.
- Use phase: the sustainability of the conditions under which the material can be used (continuous energy use, releases to the environment, life span, etc.)
- End of life: the entry of the material into the circular economy, including re-use, re-manufacturing or recycling considerations.
- Inclusion of relevant societal stakeholders as appropriate

Describe any potential trade-offs between sustainability burdens and benefits.
The proposal should include an activity where such aspects (relevant to the proposal) are further investigated, potentially with corresponding impacts on the design of the material(s).

Target groups

This topic is targeted at all groups in the innovation chain: disruptive, applied research, industrial research and development. Collaboration between research entities and industrial partners is encouraged also at low (<4) TRL levels.

Keywords

Projects submitted to this Topic should choose at least **2** keywords from the following list:

Waste recycling, Recyclable materials, Sustainable processing, Degradable materials, Biodegradation, Durability, Bio-based materials, Hazardous substances, Remediation, Water treatment, Soil treatment, Air treatment, CO_2 valorisation, Waste reduction, Life-cycle assesment, Green chemistry

Additional keywords can also be chosen in the submission platform. The ensemble of the keywords should allow for an overview of the scope of the project (consider describing different aspects of the project such as: main scientific area / domain, system / property / material of interest, applications / objectives and pertinent procedures / techniques)*.*

Indicative TRL range: 2 - 6

Topic 6: Next generation materials for advanced electronics

Technical Content and Scope

Disruptive evolution of electronics always came hand-in-hand with the development and integration of advanced materials, illustrating the transformative potential of materials in our daily life. The European Union is becoming more and more aware of the need of creating a diverse and dynamic microelectronics ecosystem and, at the same time, is concerned about the environmental challenges related to deploying electronics applications like Internet of Things (IoT) or Industry 4.0 that will require a huge production of electronic components. This challenge also opens a window of opportunity to research in developing the next generation of materials for responsible electronics[12] to reduce the electronic waste issue, enhancing the recyclability of the electronic components and transiting towards greener production processes. This aligns with the ongoing Green and Digital transition in Europe that seeks to harmonize environmental sustainability and technological progress, leading the way in reducing the carbon footprint and promoting a circular economy.

The topic supports proposals on materials research and its application, with special focus on physical properties of electronic, optoelectronic and magnetic materials and with emphasis on materials with low environmental impact, high power efficiency and more sustainable processing.

Objectives and Transversal aspects
Proposals shall address at least one of the following items:
- Advanced materials for responsible electronics and optoelectronics: components with low electronic waste footprint.
- Materials for ultralow-power electronics.
- Materials for high-power-control electronics.
- Materials for smart physical-, chemical- and bio- sensors
- Advanced materials for thermal management in electronics.
- Wearable, flexible, stretchable and/or conformable materials for responsible electronics.
- Hybrid integration: combination of established electronic materials with advanced materials
- High throughput manufacturing approaches for electronic components: printing technologies, additive manufacturing techniques, patterned coatings, laser-induced processes, etc.

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[12] *EIC Challenge - Responsible electronics (europa.eu)*

- Sustainability of semiconductor processing: greener chemistry, lower power consumption, improved use of water, etc.
- Materials for More-than-Moore electronics: 2D electronics, spintronics, photonics, valleytronics, etc.
- Coatings for enabling advanced functionalities: protection from aggressive environments, electromagnetic compatibility (EMC), self-cleaning, self-healing, etc.

Proposals including and considering materials by design, using modelling and/or artificial intelligence approaches, targeting health applications or focusing on energy management are welcome.

Expected impact

The proposal shall address how it will contribute to the expected impact of the topic, defined as follows:
- Development of new materials for wearables and/or flexible electronics: electronics for improving quality of life.
- Substitution of toxic and hazardous materials with greener technology materials. Reduction of the carbon footprint of developed technologies.
- Integration of novel materials into existing electronic platforms.
- New electronic materials and emerging technologies that can help the EU to solve societal challenges and enable sustainable growth.
- Training the next generation of researchers for the growing European responsible electronics industry.

All proposals should clearly state the TRL at the project start and at the project end. The proposals based on original and innovative approaches may start with TRL 1. The proposals should include a plan for the transition to higher TRLs at a later stage (i.e., beyond the project end date). Establishing an industrial and societal stakeholder advisory board or the participation of one or more companies in the project consortium is encouraged. For proposals aiming at TRL 5 or higher, industrial partners should be involved in the project consortium.

Sustainability and RRI requirements

M-ERA.NET requires that all proposers explain how their projects demonstrate a commitment to RRI by investigating and addressing the environmental, social, ethical, political, or cultural dimensions of the proposed research:

All proposals should provide a preliminary assessment regarding (but not limited to):
- Resources: the use of resources overall, the environmental properties of the materials, the use of critical raw materials, energy, water, etc.

- The production process: use of solvents, toxic elements, etc.
- Use phase: the sustainability of the conditions under which the material can be used (continuous energy use, releases to the environment, life span, etc.)
- (When relevant) end of life: the entry of the material into the circular economy, including re-use, re-manufacturing or recycling considerations.
- Inclusion of relevant societal stakeholders as appropriate

Describe any potential trade-offs between sustainability burdens and benefits.

Target groups

This topic is targeted at academic research groups, SMEs, or large enterprises.

Keywords

Projects submitted to this Topic should choose at least **2** keywords from the following list:

Responsible electronics, Ultralow-power electronics, High-power-control electronics, Sensors, Thermal management, Flexible electronics, Heterogeneous integration, Manufacturing methods, Sustainable semiconductor processing, Unconventional-electronics, Advanced coatings

Additional keywords can also be chosen in the submission platform. The ensemble of the keywords should allow for an overview of the scope of the project (consider describing different aspects of the project such as: main scientific area / domain, system / property / material of interest, applications / objectives and pertinent procedures / techniques)**.**

Indicative TRL range: 1-5

Annex 2: Technology Readiness Level

All proposals should clearly state and motivate at what level on the Technology Readiness Level (TRL) scale the project is situated at the beginning and after the project is finished. In order to increase the potential for new business opportunities and commercial exploitation of the results:

• Proposals aiming at TRL below 4 should include a plan for the transition to higher TRL's at a later stage (i.e. beyond the project end date) and demonstrate industrial involvement. This can be realised by establishing an industrial or end user advisory board (or alternatively by the participation of one or more companies in the project consortium when feasible).

• For proposals aiming at TRL above 4, industrial partners should be involved in the project consortium.

Where the topic description refers to the concept of **"Technology Readiness Level"** (TRL), the following definition in accordance with H2020[13] applies:

TRL 1 – basic principles observed
TRL 2 – technology concept formulated
TRL 3 – experimental proof of concept
TRL 4 – technology validated in lab
TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 7 – system prototype demonstration in operational environment
TRL 8 – system complete and qualified
TRL 9 – actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

Project proposals should clearly indicate the TRL position at the beginning of the project and after the project is finished and consider to the indicative TRL range indicated in each topic as summarised in the table below.

Topic	TRL 1	TRL 2	TRL 3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9
Topic 1: Sustainable advanced materials for energy	X	X	X	X	X	X	X		
Topic 2: Innovative surfaces, coatings and interfaces	X	X	X	X	X	X	X	X	
Topic 3: High performance composites	X	X	X	X	X	X			
Topic 4: Functional materials	X	X	X	X	X	X	X		
Topic 5: Materials addressing environmental challenges	X	X	X	X	X	X	X		
Topic 6: Next Generation Materials for Advanced Electronics	X	X	X	X	X	X			

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[13] https://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-g-trl_en.pdf

Annex 3: Funding organisations participating in the M-ERA.NET Call 2024

Country	National / regional coverage	Funding organisation	Contact person:
Austria	national	Austrian Research Promotion Agency (FFG)	Name: Fabienne Nikowitz Phone:+43 57755 5081 e-mail: fabienne.nikowitz@ffg.at
			Name: Johannes Fritzer Phone: --- E-mail: Johannes.fritzer@ffg.at
Belgium	regional: Flanders	Flanders Innovation & Entrepreneurship (VLAIO)	Name: Maarten Rockele Phone: +32 2 432 43 27 e-mail: maarten.rockele@vlaio.be
			Name: Elsie De Clercq Phone: +32 2 432 42 78 e-mail: elsie.declercq@vlaio.be
	regional: French-Speaking Community	Fund for Scientific Research – FNRS (F.R.S.-FNRS)	Name: Florence Quist Phone: +32 2 504 93 51 e-mail: international@frs-fnrs.be
			Name: Joël Groeneveld Phone: +32 2 504 92 70 e-mail: international@frs-fnrs.be
	regional: Wallonia	Service public de Wallonie (SPW)	Name: Pierre Demoitié Phone: +32 81 33 45 40 e-mail: pierre.demoitie@spw.wallonie.be
Brazil	regional: Sao Paulo	São Paulo Research Foundation (FAPESP)	Name: Virginia Sanches Subinas Phone: + 55 11 3838 4000 e-mail: chamada_meranet@fapesp.br

Country	National / regional coverage	Funding organisation	Contact person:
Bulgaria	national	Bulgarian National Science Fund (BNSF)	Name: Milena Aleksandrova Phone: +359 884 171 363 e-mail: aleksandrova@mon.bg
Canada	regional: Québec	PRIMA Québec	Name: Michel Lefèvre Phone: +1-514-284-0211 #227 e-mail: michel.lefevre@prima.ca
Croatia	national	Ministry of Science and Education (MSE)	Name: Mateo Ante Bosnić Phone: +385 01 4594 166 e-mail: mateoante.basnic@mzo.hr
Czech Republic	national	Technology Agency of the Czech Republic (TA CR)	Name: Kateřina Volfová Phone: +420 778 463 138 e-mail: katerina.volfova@tacr.cz
Denmark	national	Innovation Fund Denmark (IFD)	Name: Daniel G. Marques Phone: +45 6190 5006 e-mail: daniel.g.marques@innofond.dk internationale@innofond.dk
Estonia	national	Estonian Research Council (ETAG)	Name: Margit Suuroja Phone: +372 731 7360 e-mail: margit.suuroja@etag.ee
Finland	national	Academy of Finland (AKA)	Name: Saila Seppo Phone: +358 295 33 5109 e-mail: saila.seppo@aka.fi
	national	Business Finland	Name: Satu Penttinen Phone: +358505983319 e-mail: satu.penttinen@businessfinland.fi

Country	National / regional coverage	Funding organisation	Contact person:
			Name: Matti Saynätjoki Phone: +358505577899 e-mail: matti.saynatjoki@businessfinland.fi
France	national	Agence Nationale de la Recherche (ANR)	Name: Larissa Chaperman Phone: --- e-mail: larissa.chaperman@agencerecherche.fr
			Name: Aymen Ben Amor Phone: --- e-mail: aymen.benamor@agencerecherche.fr
Germany	regional: Freestate of Saxony	Saxon State Ministry for Science, Culture and Tourism (SMWK)	Name: Gabriele Süptitz Phone +49 351 564 64210 e-mail: Gabriele.Sueptitz@smwk.sachsen.de EuProNet@smwk.sachsen.de
Hungary	national	National Research, Development, and Innovation Office (NKFIH)	Name: Elod Nemerkenyi Phone: +36-1-896-3987 e-mail: elod.nemerkenyi@nkfih.gov.hu
Italy	regional: Calabria	Regione Calabria	Name: Pietro Domenico Alfarano Menotti Lucchetta e-mail: Pietro.alfarano@regione.calabria.it universitaricerca@pec.regione.calabria.it
Israel	national	The National Technological Innovation Authority (Innovation Authority – IIA)	Name: Rachel Loutaty Phone: +972 (3) 5118152 e-mail: Rachel.l@iserd.org.il
	national	Ministry of Innovation, Science and Technology (MOST)	Name: Avi Raveh Phone: +972 (2) 5411136; +972 (55) 8864207 e-mail: AviR@most.gov.il

Country	National / regional coverage	Funding organisation	Contact person:
Latvia	national	Latvijas Zinātnes padome / Latvian Council of Science (LZP)	Name: Maija Bundule Phone: +371 26514481 e-mail: maija.bundule@lzp.gov.lv
Lithuania	national	Research Council of Lithuania (LMT)	Name: Saulius Marcinkonis Phone: +370 676 17256 e-mail: saulius.marcinkonis@lmt.lt
Luxembourg	national	Luxembourg National Research Fund / Fonds National de la Recherche (FNR)	Name: Christiane Kaell Phone: +352 691 362 817 e-mail: christiane.kaell@fnr.lu
Poland	national	National Centre for Research and Development (NCBR)	Name: Krzysztof Jabłoński Phone: +48 22 25 66 702 e-mail: krzysztof.jablonski@ncbr.gov.pl
	national	National Science Centre (NCN)	Name: Anna Kotarba Phone:--- e-mail: anna.kotarba@ncn.gov.pl
			Name: Magdalena Nowak Phone: +48 538 185 453 e-mail: magdalena.nowak@ncn.gov.pl
Romania	national	Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI)	Name: Domnica Coteț e-mail: domnica.cotet@uefiscdi.ro
			Name: Cristina Coteț e-mail: cristina.cotet@uefiscdi.ro
Slovak Republic	national	Slovak Academy of Sciences (SAS)	Name: Martin Novák Phone: +421 2 5751 0 119 e-mail: mnovak@up.upsav.sk

Country	National / regional coverage	Funding organisation	Contact person:
			Name: Zuzana Panisova Phone: +421 2 5751 0 245 e-mail: panisova@up.upsav.sk
Slovenia	national	Ministrstvo za visoko solstvo, znanost in inovacije (MVZI)	Name: Doroteja Zlobec Phone: +386 (0)1 478 46 24 e-mail: Doroteja.zlobec@gov.si
South Africa	national	Department of Science and Innovation (DSI)	Name: Anita Mnisi Phone: +27 26 63 6328 e-mail: Anita.Mnisi@dst.gov.za
			Name: Ntombi Mchuba Phone: +27 60 974 6773 e-mail: Ntombi.mchuba@dst.gov.za
South Korea	national	Korea Institute for Advancement of Technology (KIAT)	Name: Youngji TAK Phone: + 32 493-37-95-11 e-mail: yjtak@kiat.or.kr
			Name: Heeweon LEE Phone: +82 (0) 2-6009-3768 e-mail: leejen@kiat.or.kr
Spain	national	Agencia Estatal de Investigación (AEI)	Name: Severino Falcón Morales Phone: + 34 91 603 8384 e-mail: severino.falcon@aei.gob.es
			Name: Jorge Sotelo Santos e-mail: era-mat@aei.gob.es
	regional: Asturias	Asturian Agency for Science, Business Competitiveness and Innovation (SEKUENS Agency)	Name: Ana E. Fernández Monzón Phone: +34 985 98 00 20 e-mail: anae@sekuens.es

Country	National / regional coverage	Funding organisation	Contact person:
	regional: Basque Country	EJ-GV (EUSKO JAURLARITZA – GOBIERNO VASCO)	Name: Catalina Chamorro Silgado Phone: +34 945 018 210 e-mail: cat-chamorro@euskadi.eus
			Name: Judith de Prado Olivenza Phone: +34 944 209 488 e-mail: jdeprado@innobasque.eus
Switzerland	national	Swiss Federal Office of Energy (SFOE)	Name: Stefan Oberholzer (Topic 1) Phone: +41 58 465 89 20 e-mail: Stefan.oberholzer@bfe.admin.ch
			Name: Roland Brüniger (Topic 6) Phone: +41 44 760 00 66 e-mail: roland.brueniger@brueniger.swiss
Taiwan	national	National Science and Technology Council (NSTC), Taiwan	Name: Dr. Ching-Mei Tang e-mail: cmtom@nstc.gov.tw
			Name: Ian Liau e-mail: ianliau@nycu.edu.tw
			Name: Randy Chang e-mail: mcchang76@gate.sinica.edu.tw
Turkey	national	The Scientific and Technological Research Council of Turkey (TÜBİTAK)	Name: Burcu Koç Haskılıç Phone: +90 312 298 94 67 e-mail: burcu.haskilic@tubitak.gov.tr
			Name: Tayyip Kösoğlu Phone: +90 312 298 18 06 e-mail: tayyip.kosoglu@tubitak.gov.tr

Commitment per funding organisation:

	Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Indicative call budget (Mio €)
	Sustainable advanced materials for energy	Innovative surfaces, coatings and interfaces	High performance composites	Functional materials	Materials addressing environmental challenges	Next generation materials for advanced electronics	
Austria: FFG (KLWPT)		X		X		X	2.80
Austria: FFG (Mobility)	X	X	X	X			1.00
Belgium (Flanders): HERMESFUND / VLAIO	X	X	X	X	X	X	1.00
Belgium (French Speaking Community): F.R.S.- FNRS	X	X	X	X	X	X	0.20
Belgium (Wallonia): SPW	X	X	X	X	X	X	1.00
Brazil (Sao Paulo): FAPESP	X	X	X	X	X	X	0.40
Bulgaria: BNSF	X	X	X	X	X	X	0.46
Canada (Québec): PRIMA	X	X	X	X	X	X	0.70
Croatia: MSE	X	X	X	X	X	X	0.15
Czech Republic: TA CR	X	X	X	X	X	X	1.45

	Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Indicative call budget (Mio €)
Denmark: IFD	X	X	X	X	X	X	1.00
Estonia: ETAG	X	X	X	X	X	X	0.30
Finland: AKA	X	X	X	X	X	X	1.25
Finland: Business Finland	X	X	X	X	X	X	1.00
France: ANR	X			X		X	1.00
Germany (Saxony): SMWK	X	X	X	X	X	X	3.00
Hungary: NKFIH	X	X	X	X	X	X	0.30
Italy (Calabria): Regione Calabria	X	X	X	X	X		0.50
Israel: IIA	X	X	X	X	X	X	0.50
Israel: MOST	X	X	X	X	X	X	0.30
Latvia: LZP	X	X	X	X	X	X	1.20
Lithuania: LMT	X	X	X	X	X	X	0.30
Luxembourg: FNR	X	X	X	X	X	X	0.50

	Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Indicative call budget (Mio €)
Poland: NCBR	X	X	X	X	X	X	2.00
Poland: NCN	X	X	X	X	X	X	1.50
Romania: UEFISCDI	X	X	X	X	X	X	1.00
Slovak Republic SAS	X	X	X	X	X	X	0.36
Slovenia MVZI	X	X	X	X	X	X	2.40
South Africa: DSI	X	X	X	X	X	X	0.40
South Korea KIAT	X	X	X	X	X	X	3.00
Spain AEI / FECYT	X	X	X	X	X	X	1.00
Spain (Asturias): SEKUENS	X	X	X	X	X	X	0.25
Spain (Basque Country): EJ-GV	X	X	X	X	X	X	0.50
Switzerland: SFOE	X					X	1,0
Taiwan: NSTC	X	X	X	X	X	X	0.75
Turkey: TÜBITAK	X	X	X	X	X	X	1.00

Annex 4.1: Pre-Proposal evaluation criteria, scoring, thresholds

Evaluation criteria:

Criteria for Pre-Proposal evaluation are predefined by the EC for ERA-NET Cofund:
- (a) Excellence
- (b) Impact
- (c) Implementation

Sub-criteria, scoring and thresholds are defined by the call consortium.

Pre-Proposal evaluation criteria

Main Criteria	*Sub Criteria*	*Score (points)*
Excellence	Clarity and pertinence of research objectives and hypotheses	*max. 1.5*
	Novelty, originality, position of concepts and approaches in relation to the state of the art (ambition, innovation potential, ground-breaking objectives)	*max. 2.0*
	Appropriateness of the methodology, credibility of the proposed approach and soundness of the concept, including TRL and the approach to RRI	*max. 1.5*
Impact	Ability of the project to address the research issues covered by the chosen research theme: relevance to the topic addressed by the call	*max. 2.0*
	Contribution at the European or international level to the expected impacts listed in the Guide for Proposers under the relevant topic	*max. 2.0*
	Engagement of the proposed research with circularity, environmental as well as ethical, political, social and/or cultural dimensions	*max. 1.0*
Implementation	Competences, experience and complementarity of each of the consortium members and the consortium as a whole (including complementarity, balance, inter- or transdisciplinarity)	*max. 2.0*
	Quality of the collaboration (added value of the transnational cooperation)	
	Quality and effectiveness of the work plan (work packages and tasks distribution among partners)	*max. 2.0*
	Organisation and overall management of the project	
	Overall appropriateness of the proposal budget and other resources to be committed by individual partners (overall person month balance)	*max. 1.0*

Ethical issues: Pre-Proposal includes Horizon Europe "Ethical Issues Table". In case ethical issues apply (applicants mark respective issues in the table) M-ERA.NET recommends that the

national/regional organisations observe these issues (e.g. post-evaluation review) for their respective funded projects.

Scoring and Thresholds

Individual assessment report (IAR): Each criterion will be composed by sub-criteria. The individual evaluators have to provide an evaluation consisting of written statements for each of the sub-criterion. Scores are not provided for the IAR.

Peer review report (PRR): The rapporteur will compile a peer review report, to be accepted by all 3 evaluators. PRR will include scoring of each sub-criterion to be provided by the rapporteur and agreed by all evaluators. Each criterion will be scored between 0.0 and 5.0 in multiples of 0.5 points.

Threshold: The threshold for individual criteria will be 3.0; the overall threshold, applying to the sum of the individual scores will be 10.0.

Ranking: In case of equal overall scores, proposals can be sorted by:
- comparing individual main criteria (compare scores of "Excellence" criterion, if still equal compare scores of "Impact" criterion, if still equal compare scores of "Implementation" criterion)
- available national/regional budgets

Annex 4.2: Full-Proposal evaluation criteria, scoring, thresholds

Evaluation criteria:

Criteria for Full-Proposal evaluation are predefined by the EC for ERA-NET Cofund:
- (a) Excellence
- (b) Impact
- (c) Implementation

Sub-criteria, scoring and thresholds are defined by the call consortium.

Full-Proposal evaluation criteria

Main Criteria	Sub Criteria	Score (points)
Excellence	Clarity and pertinence of research objectives and hypotheses	*max. 1.5*
	Extent that proposed work is ambitious, has innovation potential, and is beyond the state of the art (e.g. ground-breaking objectives, novel concepts and approaches)	*max. 1.5*
	Credibility of the proposed approach and soundness of the concept. including approach to RRI	*max. 2.0*
Impact	Contribution at the European or international level to the expected impacts listed in the Guide for Proposers under the relevant topic	*max. 1.5*

	Enhancing innovation capacity and integration of new knowledge	
	Strengthening the competitiveness and growth of companies by developing innovations meeting the needs and values of European and global markets; and, where relevant, by delivering such innovations to the markets	*max. 1.0*
	Engagement of the proposed research with circularity, environmental as well as ethical, political, social and/or cultural dimensions	*max. 1.0*
	Effectiveness of the proposed measures to exploit and disseminate the project results (including management of IPR), to communicate the project, engage with stakeholders and user groups, and to manage research data where relevant	*max. 1.5*
Implementation	Quality and effectiveness of the work plan, assessment of risks, and appropriateness of the effort assigned to work packages, and the resources overall.	*max. 1.0*
	Appropriateness of the management structures and procedures	*max. 1.0*
	Quality and relevant experience of the individual participants	*max. 1.0*
	Quality of the consortium as a whole including complementarity, balance, inter- or transdiciplinarity	*max. 1.0*
	Appropriate of the allocation of tasks, ensuring that all participants have a valid role and allocation and justification of the resources to fulfil that role (including overall person month balance)	*max. 1.0*

Ethical issues: Full-proposal includes Horizon Europe "Ethical Issues Table". In case ethical issues apply (applicants mark respective issues in the table) M-ERA.NET recommends that the national/regional organisations observe these issues (e.g. post-evaluation review) for their respective funded projects.

Scoring and Thresholds

Individual assessment report (IAR): Each criterion will be composed by sub-criteria. The individual evaluators have to provide an evaluation consisting of written statements for each of the sub-criterion. Scores are not provided for the IAR.

Peer review report (PRR): The rapporteur will compile a peer review report, to be accepted by all 3 evaluators. PRR will include scoring of each sub-criterion to be provided by the rapporteur and agreed by all evaluators. Each criterion will be scored between 0.0 and 5.0 in multiples of 0.5 points.

Threshold: The threshold for individual criteria will be 3.0; the overall threshold, applying to the sum of the individual scores will be 10.0.

Ranking: In case of equal overall scores, proposals can be sorted by:
- comparing individual main criteria (compare scores of "Excellence" criterion, if still equal compare scores of "Impact" criterion, if still equal compare scores of "Implementation" criterion)
- available national/regional budgets

Annex 5: RRI Guidelines (v1.1)

M-ERA.NET guidelines for Responsible Research and Innovation (RRI) in the context of materials science

Update 1.1 placed more emphasis on sustainability dimensions as an integral part of responsible research and innovation, based on recommendations of the 2022 Strategic Expert Group.

1. What is RRI and why do we need it?

We need innovations that leave the world in a better place than they have done previously. This means we need researchers able to balance tensions between economic growth, public benefit and environmental sustainability. This is hard because harms and benefits are slow to accrue, occur unexpectedly and will be distributed unevenly. Inventions are created gradually by teams and networks of investors, scientists and policy makers, meaning that ultimate responsibility is collective and distributed over time. It is also often hard to correct the downsides of innovations once their use has become widespread.

Acknowledging that science is separate neither from society nor the environment but part of them confers a social responsibility on science. It is important, therefore, that funders, researchers and other key groups involved in the development of science, technology and innovation think about: (i) the potential directions of research being taken; (ii) who might benefit and who might not from new inventions; and (iii) how consideration of the potential social, environmental and ethical issues can be considered *throughout* the science and innovation process. Responsible research and innovation (RRI) is not about adjudicating what is 'good 'or 'bad', 'positive 'or 'negative', or 'responsible 'or 'irresponsible'. Instead, RRI offers techniques, tools and frameworks to think about questions of social responsibility and ensure scientists, funders and technologies do not lose sight of the context in which they do science, technology and innovation.

2. M-ERA.NET's approach to RRI

M-ERA.NET's approach to RRI builds on previous frameworks published by the UK's EPSRC, the Research Council of Norway, the European Commission and funding programmes such as ERA CoBioTech and ERA EuroNanoMed III. It recognises that the materials resulting from the programme need to be designed for a *sustainable* society in the near to medium future rather than the one we have today. It highlights the need to address the social, environmental, political, cultural or ethical dimensions of the proposed research and offers four dimensions that researchers, funders and technologists should engage with to maintain focus on the social context of their work:

- *Anticipation* suggests that actors should map the plausible intended and unintended effects of their work. Anticipation is not about exhaustively predicting all outcomes but about building a sense of preparedness so that potential downsides can be addressed as they are foreseen and arise.
- *Inclusion* encourages researchers, funders and developers to engage with future users, interest groups or potentially concerned groups to gain insights about the application contexts

and what desirable trajectories would be. Engagement here should move beyond dissemination or outreach to pursue a two-way exchange of information, with the understanding that knowledge that is not' scientific 'in the traditional sense of the word might still be valuable.

- ***Reflexivity*** asks researchers, funders and developers to create specific opportunities to consider the underlying assumptions and values driving their funding programmes and projects.
- ***Responsiveness*** reminds us that science and innovation are processes of exploration and learning. It urges scientists, funders and developers to change course if any of the above dimensions (anticipation, inclusion or reflexivity) generate new knowledge, identify public concerns, or reveal potential harms.

As the involvement of societal groups is essential in RRI it is often connected to co-creation, co-design and co-production – methodologies in which R&I projects are structured to include stakeholders from the beginning (e.g. users or interest groups) – and is related to the general Open Science agenda, prominent in Horizon Europe. Additionally, M-ERA.NET has fundamental commitments to sustainability in line with frameworks such as the UN Sustainable Development Goals, and the European Green Deal. This means that methods analysing the current or future ecological impacts of materials and their supply chains are appropriate. In sum RRI provides a framework to ask *how* research and innovation should be carried out in order to ensure that we achieve the sustainability goals in an open and inclusive way.

Sustainability and RRI in the M-ERA.NET calls

The specific requirements for each topic in the current call are detailed in a section labelled 'sustainability and RRI requirements'.

However, RRI is not a one-size-fits-all approach but must be adapted to the actual social, environmental and ethical issues raised by the R&I activities funded in the programme. Foundational, exploratory research will require a different approach to applied, high-TRL research. Disruptive, pathbreaking research may require a more substantive approach to RRI than tentative, incremental research. And the specific issues raised by the biological sciences differ to those raised by the physical sciences. This means that *the commitment* to RRI is clear and fixed in the programme, but there is an openness about the issues addressed and the specific ways to practice responsibility – these must be adapted to each project.

3. How can you include RRI in your proposal?

Recalling the above explanation, the diversity of material science and the range of local contexts engaged within M-ERA.NET means that there cannot be a one size fits all approach. The text below therefore provides overall ideas and advice but cannot give a recipe that all potential applicants may use. In general, your approach to RRI should be proportionate to your proposal – disruptive, ground-breaking or high-TRL work is likely to require a more substantive engagement with RRI. If the research is exploratory then RRI components can also be exploratory – teasing out the potential visions, goals and end uses of a project. Overall, the goal is to demonstrate that you have engaged and seriously considered the tensions associated with materials science.

While RRI may focus on broadly recognised issues, the approach taken should be specific to the project. Nevertheless, these three points provide general principles from which to develop your approach to RRI:

1. M-ERA.NET's philosophy is to have **RRI as an integrated part of the project** involving all project participants.

2. Developing a **shared understanding of the project's RRI aspects** as early as possible is important. With 'RRI aspects 'we mean implications or characteristics of your research that touch upon environmental, societal and ethical values. This implies having conversations about their importance and potential actions to address RRI aspects. Such understanding will evolve in a learning process that should be encouraged throughout the project.

3. Considering RRI-related issues and acting upon them, must be done as a cross-cutting part of the project or a separate work package. RRI in the project needs to be **coordinated** and should have a **lead**.

> **Web resources for including RRI in your project:**
>
> https://rri-tools.eu/ provide numerous resources for practical RRI.
>
> https://thinkingtool.eu/ The Societal Readiness Thinking Tool guides you through the steps of including RRI in a project.
>
> The Digital Life Centre has also compiled a range of resources that may help develop your approach.
>
> Further examples specific to material science will in the future be provided on the RRI webpage

The following list provides examples of different RRI perspectives applicable for materials science research projects. Please be aware that these guidelines and reflections neither represent the only RRI approach nor a complete list of examples of measures when implementing RRI in materials proposals. You should identify the points relevant for your project.

1. Address **environmental impacts and sustainable solutions**, in line with the **Do No Significant Harm principle[14],** by including, for example:
   a. lifecycle analysis (LCA)
   b. ecotoxicology studies
   c. recyclable by design methodologies
2. Involve **relevant stakeholders in the project at the earliest stage as possible**, and provide opportunities for them to contribute to your work.
   a. Co-design methodologies are important to generate trust and **allow stakeholders to contribute knowledge** of the social, environmental or commercial problem you are trying to address in your project.
   b. Think also about the appropriate **timing** of different stakeholders 'inclusion: certain kinds of knowledge may be more useful than others at different points of your project.
   c. It will likely be valuable (but not obligatory) to include **expertise beyond the natural and physical sciences** – such as lawyers, social scientists or philosophers – to provide anticipatory and reflective methodologies or to address key challenges.

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[14] For more information on this principle see Horizon Europe's Programme Guide, page 37: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/programme-guide_horizon_en.pdf

d. Think about **how** the involvement of such researchers and their knowledge can be formalised within your project. Are they best placed as scientific collaborators, as members of an advisory board, or as consultants to deliver only specific tasks? Please check if your approach is in line with the national/regional funding rules before designing your proposal.

3. **Create good deliberative spaces** for a range of partners, stakeholders and participants to anticipate, discuss and reflect on the social, political, ethical or environmental context of your research. RRI experts may be able to help you with this in project design and implementation. A number of different approaches are possible, e.g.:
   a. Focusing on your day-to-day research work ("philosopher in the lab approach")
   b. At bi-annual/annual consortium meetings
   c. By using stage-gate approaches where explicit decisions about technological choices are taken.

4. Consider **who will benefit** and who may experience new risks from your project.
   a. Does your project address a specific societal or environmental problem or need?
   b. Does your framing of the problem fit with other people's understanding of it? Can you gain access to these alternative framings?
   c. In addition to societal benefits, also consider benefits to the research community through the generation of knowledge, access to infrastructure, the creation of networks and funding.
   d. Reflect on the most the appropriate form of intellectual property (IP) to suit your project goals. Do classical IP strategies deliver the broadest benefit? Can new strategies (e.g. Open Material Transfer Agreements) be adopted at certain points of the research process?
   e. Could commercial or non-commercial organisations benefit from your research? How?
   f. Consider also the risks and ways that these can be ameliorated. For instance, what are the risks of potential risks of data being released? How can you take care to ensure these data are interpreted appropriately?

5. Reflect on/consider adapting **your choice of research methods** regarding, for example:
   a. ethical issues,
   b. in vivo/in vitro experiments,
   c. use of new approaches such as "Safe(r) by Design".
   d. Are there ways that your project can advance common practices on these issues?

6. Engage with important aspects of **your research environment** such as:
   a. gender, ethnicity and intersectional equality, diversity and inclusivity
   b. Open Science and other publication practices
   c. career progression and precarity
   d. equity between partners in your research consortium

7. Show how the project (and product) satisfy requirements for **production safety** and efficiency.

4. How does M-ERA.NET support and evaluate RRI?

RRI requires a multi-level approach that pays attention to the different sites of research and innovation (e.g. universities, companies, policy arenas), different stages of research (i.e. across the

TRL spectrum) and different research cultures. Responsibility must be shared, and RRI is therefore a cross-cutting issue for M-ERA.NET. It is considered in development of the annual work programme and the resulting funding calls. The programme will also facilitate a dialogue among stakeholders in materials research about the sustainable development goals, circular economy perspectives, and RRI.

At the level of research projects, ***M-ERA.NET requires that all proposers explain how their projects demonstrate a commitment to investigating and addressing the social, environmental, ethical, political or cultural dimensions of the proposed research***. Integration of RRI should lead to an improved awareness of the possible benefits, risks, and uncertainties of material science across a broad cross-section of society. This may include (but is not limited to) any of the approaches described in the above section.

RRI should not be thought of as 'distinct from the science', but central to it. ***RRI components will therefore be evaluated by experts as integral components within the scope of all evaluation criteria (Excellence, Impact, and Implementation)***. RRI does not detract from the overall scoring but contributes to it: Proposals that explicitly aim to advance processes of anticipation, reflection, inclusion and responsiveness by developing new analyses or methodologies will be rewarded in the review process and the scores will be adjusted accordingly. The kinds of questions the reviewers will ask regarding RRI are:

- Is the approach proportionate to the content of the scientific proposal?
- Is there appropriate RRI expertise in the project?
- Is RRI work adequately resourced? Is it clear *how* the objectives will be achieved?
- Does RRI extend across the lifespan of the project? (e.g. as a sub-project, an advisory board or to be considered in annual meetings)
- Is it clear how the work is organised? (e.g. as a WP, a cross-cutting issue, outsourced etc.)
- Is it clear who is doing the work?
- Are there clear opportunities for the RRI work to shape scientific trajectories?
- Does the work advance RRI scholarship or generate new knowledge of the social, political, ethical or environmental dimensions of material science?

Annex 6: Checklist for Proposers

The proposal conforms to the call guidelines.	☐
Every project partner has been in direct contact with his/her national/regional funding agency and has checked that their collaboration and their project contributions are eligible for funding.	☐
All project partners have checked the national/regional programme procedures and regulations. All project partners are aware of documents requested by the national/regional funding organisations. ***IMPORTANT REMINDER: All consortium partners must check if applications (at Pre-Proposal and/or Full-Proposal stage) have to be submitted also to their national/regional funding organisations.***	☐
All partners who are not eligible for 100% funding are able to provide financial resources for their own contribution.	☐
A PIC[15] is available for all project partners.	☐
The consortium is aware that a duly signed and stamped consortium agreement (CA) between the project partners is recommended for funded projects based on national/regional funding rules, including agreements on intellectual property rights (IPR) and agreements on scientific publications. At the time of proposal submission it is recommended to provide the principles ruling the CA but not the CA itself.	☐

Please go https://www.m-era.net/joint-call-2024 to submit the:
1. **Pre-Proposal form online.**
   Deadline for submission: 14 May 2024, 12:00 noon Brussels time
2. **Full-Proposal form + Annex 1 to the Full-Proposal form online.**
   Deadline for submission: 20 November 2024, 12:00 noon Brussels time

For further information on M-ERA.NET please go to: http://www.m-era.net

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[15] Participant Identification Code: If you want to participate in a project proposal your organisation needs to be registered and have a 9-digit Participant Identification Code (PIC). Please find details here: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/participant-register

Abbreviations and Clarifications:

CRM - Critical Raw Materials

IoT - Internet of Things

LCA - Life Cycle Assessment

PIC – Participant Identification Code

RTD - Research and Technological Development;

RRI - Responsible Research and Innovation

SDGs - Sustainable Development Goals;

SMEs - Small and Medium Enterprises

TEA - Techno-Economic Analysis

TRL - Technology Readiness Level

"*Disruptive research"* also encompasses "*basic and fundamental research*"

> **Important notice:**
>
> The national / regional regulations are provided in the **Annex A** as a separate document on the [Call 2024 webpage](#).