EUROPEAN PARTNERSHIP

# CETPartnership Joint Call 2023

## May 2023

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**The Clean Energy Transition Partnership is a transnational joint programming initiative to boost and accelerate the energy transition, building upon regional and national RDI funding programmes. The initiative is receiving funding from the European Union's research and innovation programme "Horizon Europe" under grant agreement No 101069750.**

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[1] RULES OF PROCEDURE FOR THE EUROPEAN FORUM FOR MEMBER STATES (EFMS) ON PUBLIC POLICIES FOR SECURITY AND RESILIENCE IN THE CONTEXT OF CRITICAL INFORMATION INFRASTRUCTURE PROTECTION, Version 3.0 FINAL – May 2011 "Traffic Light system"

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# 1. Clean Energy Transition Partnership (CETPartnership)

## 1.1. Scope

The Clean Energy Transition Partnership (CETPartnership) aims at accelerating the clean energy transition to achieve the goal of climate neutrality by 2050. It is a multilateral and strategic partnership of national and regional research, development and innovation (RDI) funding programmes in EU Member States and Associated Countries, co-funded by the European Commission through Horizon Europe (HE).

The CETPartnership's goals are:

- Building a transnational transformative joint programming platform
- Developing and demonstrating technologies and solutions for the energy system transition
- Building innovation ecosystems that support capacity building at all levels

The CETPartnership supports the implementation of the European Strategic Energy Technology Plan (SET Plan)[2] and builds on existing SET Plan initiatives (ERA-Nets, IWGs, ETIPs, etc.). The partnership intends to contribute to the achievement of the EU decarbonisation targets set in A Clean Planet for all[3] and lastly in the Fit-for-55[4] package and to support the implementation of the EU energy and climate strategy such as the EU strategy for energy system integration[5], the EU strategy on hydrogen[6], the EU strategy on offshore renewable energy[7] and the REPowerEU Plan[8]. On a global level, the CETPartnership Joint Call 2023 (Call) is part of Mission Innovation (MI)[9] call series, i.e. MICall23. As such, some of the call topics are directly prepared in collaboration with MI missions, and all topics of the call is open for applications that directly and/or indirectly contribute to the work of MI missions.

Read more about the CETPartnership on the website[10] and in the CETPartnership Strategic Research and Innovation Agenda (SRIA)[11].

[2] https://energy.ec.europa.eu/topics/research-and-technology/strategic-energy-technology-plan_en

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0773

[4] https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/

[5] COM(2020) 299 final, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2020:299:FIN

[6] COM/2020/301, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0301

[7] COM(2020) 741 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:741:FIN

[8] COM/2022/230 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2022:230:FIN

[9] http://mission-innovation.net/

[10] https://cetpartnership.eu/

[11] https://cetpartnership.eu/sites/default/files/documentation/CETP%20SRIA_v1.0_endorsed_compressed_0.pdf

## 1.2. Transition Initiatives (TRIs)

The CETPartnership includes seven Transition Initiatives (TRIs) addressing a broad range of RDI challenges from discrete technologies to integrated systems for the clean energy transition, as well as several cross-cutting dimensions, as shown in Figure 1.1 and Table 1.1.

| CETPartnership | |
|---|---|
| **System integration** | **Enable technologies** |
| **TRI1 Net-zero emissions energy system** | **TRI2 Power technologies** |
| **TRI5 Regional energy systems** | **TRI3 Storage technologies, renewable fuels and CCU/CCS** |
| **TRI6 Industrial energy systems** | |
| **TRI7 Built environment** | **TRI4 Heating and cooling** |

FIGURE 1.1. CETPARTNERSHIP TRANSITION INITIATIVES (TRIS)

TABLE 1.1. AIMS OF TRANSITION INITIATIVES (TRIS)

| |
|---|
| **TRI1: Net-zero emissions energy system**<br>To develop optimised, integrated net-zero emissions energy systems, with electricity distribution and transmission grids as the "backbone" and with a high level of integration among all energy carrier networks, supported by energy storage and power conversion processes. |
| **TRI2: Power technologies**<br>To develop a pool of zero-emission power technologies and solutions based on renewable energy sources as the backbone of the future energy system, being able to deliver carbon-neutral electricity accessible to all and to contribute to the resilience of the system. |
| **TRI3: Storage technologies, renewable fuels and CCU/CCS**<br>To provide cleaner technological solutions for storage technologies, renewable fuels, CCU (Carbon Capture and Utilisation) and CCS (Carbon Capture and Storage) contributing to significant $CO_2$ reduction by 2030 and the climate neutrality by 2050. |
| **TRI4: Heating and cooling**<br>To provide enhanced and improved heating and cooling technologies and systems for all major parts of Europe by 2030 and to enable 100% climate-neutral heating and cooling by 2050. |
| **TRI5: Regional energy systems**<br>To develop and validate integrated regional and local energy systems that efficiently enable a secure, resilient and $CO_2$-free regional energy supply for a specific regional context (up to and beyond 100% in the dynamic regional or local supply by 2030) and provide tailor-made solutions for individual regional and bring them together at European level. |
| **TRI6: Industrial energy systems**<br>To develop and demonstrate a set of technical solutions for integrated industrial energy systems that enables efficient carbon-neutral industrial production sites as parts of the entire energy system. |
| **TRI7: Built environment**<br>To provide solutions and technologies for existing and new buildings to become an active element in the energy system, with enhanced capability to produce, store and efficiently use energy. |

The CETPartnership supports a paradigm shift with an integrated approach to innovation considering not only technological aspects (Technology), but also business aspects (Market) and social and political aspects (Stakeholders). This implies a cross-sectoral and interdisciplinary approach, including aspects such as system integration of technologies, products, services, tools, business processes, market structures, regulatory regimes, policies as well as security, privacy and resilience. Such an approach to foster innovation is structured and facilitated by the framework of the Three-layer

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Research Model which can be used in project design (mandatory in some part of the Call). Read more about the model on the CETPartnership website[12].

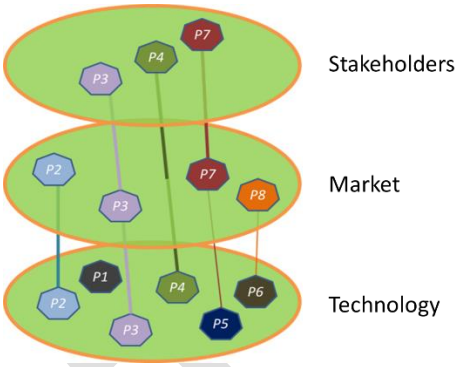


FIGURE 1.2: THREE LAYER RESEARCH MODEL

## 1.3. CETPartnership Knowledge Community

The CETPartnership Knowledge Community is an integral part of the CETPartnership and aims to leverage exchange and co-create knowledge between RDI stakeholders, all CETPartnership funded projects and other national, transnational and international CETPartnership activities. It is intended to act as an information platform, to develop and present state-of-the-art knowledge, to lead discussions and to strengthen multilateral collaboration between research, industry, policy and society in the field of the clean energy transition. Through strategic knowledge management, outcomes of RDI will provide an evidence and fact base for policymaking in support of the clean energy transition in domains of innovation, market entry and diffusion as well as regulation and procurement.

The CETPartnership Knowledge Community will implement innovative monitoring and transfer activities and generate synergies for knowledge co-creation in working groups, in the thematic challenges addressed by TRIs and in the cross-cutting dimensions according to the CETPartnership SRIA[13]. It will be organised by the CETPartnership Knowledge Community Management (KCM) using the CETPartnership Digital Collaboration Platform. The CETPartnership Knowledge Community will also relate to the CETPartnership Impact Network partners that can contribute to dissemination and exploitation of knowledge.

[12] https://cetpartnership.eu/

[13] https://cetpartnership.eu/sites/default/files/documentation/CETP%20SRIA_v1.0_endorsed_compressed_0.pdf

# 2. Definitions

Project participants may belong to legal entities of any organisation type such as:

- Secondary and higher education establishments
- Research organisations (excluding education)
- Private for-profit companies
- Public bodies (excluding research and education)
- Other entities

A project consortium must be built to submit a proposal to the Call and may consist of the following **Project Consortium Partners**:

- A **Coordinator**: A legal entity participating with funding from the Call and responsible for coordinating and managing the project. The Coordinator cannot be changed after the deadline for pre-proposal submission and before the funding decision in the Call process.
- **Beneficiary Partners**: All Project Consortium Partners participating with funding from the Call (including the Coordinator)
- **Self-financed Partner(s)**: Project Consortium Partner(s) participating from any country with their costs declared but without applying for funding in the Call. Each Self-financed Partner must submit a Letter of Commitment in Stage 2 of the Call process (see **Subsection 6.2.1**).

All the Project Consortium Partners must be listed in the proposals and sign a Consortium Agreement at project start (see **Section 7.2**).

Except for the Project Consortium Partners, (an) **Associated Project Partner(s)** may participate from any country, without declaring their costs or applying for funding in the Call.

The call process includes two stages:

- a **pre-proposal** stage (Stage 1)
- a **full proposal** stage (Stage 2)

The term **proposal** refers to both the pre-proposal and the full proposal.

# 3. Call overview

The CETPartnership Joint Call 2023 is the second annual co-funded call under the CETPartnership and is open for participants from all over the world. To cover different topics and RDI approaches, the Call is structured into 12 **Call Modules**, aimed at different energy technologies and/or systems (see **Table 2.1** and **Chapter 8**). The Call Modules address different research-oriented approach (**ROA**) and innovation-oriented approach (**IOA**) (see **Section 4.4**) on different Technology Readiness Levels (TRLs)[14] (see **Section 4.5**) and are thus complementing and completing each other.

**TABLE 2.1. CALL MODULES**

| No. | Title | Contact |
|---|---|---|
| **CM2023-01** | Direct current (DC) technologies for power networks | TRI1@cetpartnership.eu |
| **CM2023-02** | Energy system flexibility: renewables production, storage and system integration | TRI1@cetpartnership.eu<br>TRI2@cetpartnership.eu |
| **CM2023-03A** | Advanced renewable energy technologies for power production | TRI2@cetpartnership.eu |
| **CM2023-03B** | | |
| **CM2023-04** | Carbon capture, utilisation, and storage (CCUS) | TRI3@cetpartnership.eu |
| **CM2023-05** | Hydrogen and renewable fuels | TRI3@cetpartnership.eu |
| **CM2023-06** | Heating and cooling technologies | TRI4@cetpartnership.eu |
| **CM2023-07** | Geothermal energy technologies | TRI4@cetpartnership.eu |
| **CM2023-08** | Integrated regional energy systems | TRI5@cetpartnership.eu |
| **CM2023-09** | Integrated industrial energy systems | TRI6@cetpartnership.eu |
| **CM2023-10A** | Clean energy integration in the built environment | TRI7@cetpartnership.eu |
| **CM2023-10B** | | |

A total of ? national/regional Funding Organisations (as defined in **Table 2.2**) participate with funding for proposals to different Call Modules (see **Annex B** and **Annex C**). The Funding Organisations allocate their budget to fund Beneficiary Partners based in their country/region and decide their budget allocation among different Call Modules at different times in the Call process. The total Call budget is €? million and additional funding from EC (so called top-up). The funding from EU will be used to top-up possibly exhausted budgets of the national/regional Funding Organisations from EU Member States and HE Associated Countries to fund projects.

**TABLE 2.2. FUNDING ORGANISATIONS (TBC= participation to be confirmed)**

| Country | Region | Organisation name | Acronym |
|---|---|---|---|
| **Austria** | | Austrian Research Promotion Agency | FFG |
| **Belgium** | **Wallonia** | Fonds Innoveren en Ondernemen | FIO |
| | **Flanders** | Service public de Wallonie | SPW |
| **Canada** | **Alberta** | Emissions Reduction Alberta | ERA |
| **Cyprus** | | Research and Innovation Foundation | RIF |
| **Czech Republic** | | Technology Agency of the Czech Republic | TA CR |
| **Denmark** | | Energy Technology Development and Demonstration Programme | EUDP |
| | | Innovation Fund Denmark | IFD |

[14] Definition in Horizon Europe Work Programme 2023-2024 13. General Annexes, https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-13-general-annexes_horizon-2023-2024_en.pdf

| | | | |
|---|---|---|---|
| **Estonia** | | Estonian Research Council | ETAG |
| | | Ministry of Economic Affairs and Communications | MKM |
| **Finland** | | Innovaatiorahoituskeskus Business Finland | BF |
| **France** | **(Federal)** | Agence Nationale de la Recherche | ANR |
| | | Agence de la transition écologique | ADEME |
| | **Pays de la Loire** | Pays de la Loire Region Council | RPL |
| **Germany** | **(Federal)** | Forschungszentrum Jülich GmbH (BMWK) | FZJ (BMWK) |
| | **North Rhine-Westphalia** | Forschungszentrum Jülich GmbH (MWIKE) | FZJ (MWIKE) |
| | **Saxony** | Saxon State Ministry for Science, Culture and Tourism | SMWK |
| **Greece** | | General Secretariat for Research and Innovation | GSRI |
| **Hungary** | | National Research, Development and Innovation Office | NKFIH |
| **Iceland** | | The Icelandic Centre for Research | RANNIS |
| **Ireland** | | Geological Survey Ireland TBC | GSI |
| | | Sustainable Energy Authority of Ireland | SEAI |
| **Israel** | | Ministry of Energy TBC | MoE |
| **Italy** | | Ministry of Economic Development | MIMIT |
| | | Ministero dell'Università e della Ricerca | MUR |
| **Latvia** | | Latvian Council of Science TBC | LZP |
| **Lithuania** | | Ministry of Energy of the Republic of Lithuania | ENMIN |
| **Malta** | | Malta Council for Science and Technology | MCST |
| **The Netherlands** | | Dutch Research Council TBC | NWO |
| | | Netherlands Enterprise Agency | RVO |
| **Norway** | | The Research Council of Norway | RCN |
| **Poland** | | National Centre for Research and Development | NCBR |
| **Portugal** | | Fundação para a Ciência e a Tecnologia | FCT |
| **Romania** | | Executive Agency for Higher Education, Research, Development and Innovation Funding TBC | UEFISCDI |
| **Spain** | **(Federal)** | Agencia Estatal de Investigación | AEI |
| | | Centre for the Development of Technology and Innovation. | CDTI |
| | **Asturias** | Fundación para el fomento en Asturias de la Investigacion Cientifica Aplicada y la Tecnologia | FICYT |
| | **Basque** | Departmento de Desarrollo Económico, Sostenibilidad y Medio Ambiente. Eusko Jaurlaritza-Gobierno Vasco | EUSKADI |
| | | Ente Vasco de la Energía | EVE |
| | **Cantabria** | Regional Development Agency of Cantabria TBC | SODERCAN |
| **Sweden** | | Swedish Energy Agency | SWEA |
| **Switzerland** | | Federal Department of the Environment, Transport, Energy and Communications | DETEC |
| | | Swiss National Science Foundation | SNSF |
| **Türkiye** | | The Scientific and Technological Research Council of Türkiye | TUBITAK |
| **United Kingdom** | **Scotland** | Scottish Enterprise | SE |
| **The United States of America** | | Department of Energy | DOE |

The Call is performed in two stages; a pre-proposal stage (Stage 1) and a full proposal stage (Stage 2), see **Table 2.3** and **Chapter 6**. A project consortium chooses one Call Module for their pre-proposal (Stage 1). If the pre-proposal is selected in Stage 1, the project consortium is invited to submit a full proposal (Stage 2). If the proposal is selected in Stage 2, the eligible project costs can be funded by the relevant Funding Organisations.

**TABLE 2.3. CALL TIMELINE**

| | |
|---|---|
| **Opening for pre-proposal submission (Stage 1)** | 20 September 2023 |
| **Deadline for pre-proposal submission** | 22 November 2023, 14.00 CET |
| **Opening for full proposal submission (Stage 2)** | 25 January 2024 |
| **Deadline for full proposal submission** | 27 March 2024, 14.00 CET |
| **Funding decision communicated** | June 2024 |
| **Project start** | September 2024 |

In both Stage 1 and 2, the proposals will be checked according to eligibility criteria and requirements set for the Call in general (see **Chapter 4**), Call Modules (see also **Chapter 8**) and Funding Organisations (see also **Annex B**) and will be evaluated according to evaluation criteria (see **Chapter 5**), ranked per Call Module and selected according to available funding. Proposals that have passed both Stage 1 and 2 can be approved for funding from the Call.

For a proposal to be approved for funding, the Coordinator and at least two Beneficiary Partners must have been deemed eligible by relevant Funding Organisations from at least three different countries participating in the Call, according to their national/regional requirements. Of these three entities, at least two must be from EU Member States or HE Associated Countries (see **Section 4.2**). Project Consortium Partners in EU/EEA countries can be funded according to the EU/EEA State aid rules. Project Consortium Partners outside EU Member States and HE Associated Countries may be eligible for funding from the CETPartnership Associated Partners[15] or Non-associated Partners[16].

All Project Consortium Partners are encouraged to check carefully all eligibility criteria and requirements. Different Call Modules and Funding Organisations may support different organisation and RDI types, TRLs etc. Some Funding Organisations require submission of additional information from applicable Project Consortium Partners. In this case, the Funding Organisations have own submission procedure such as deadlines, portals and templates (see **Annex B**).

**GENERAL QUESTIONS ABOUT THE CALL** should be addressed to the CETPartnership Call Management (**Call Management**) (callmanagement@cetpartnership.eu).

**QUESTIONS ABOUT THE CALL MODULES** should be addressed to respective Call Module contacts, see **Table 2.1**.

**QUESTIONS ABOUT THE NATIONAL/REGIONAL REQUIREMENTS** should be addressed to respective Funding Organisations, see **Annex B**.

[15] The CETPartnership Associated Partners are Funding Organisations that participate in the CETPartnership Consortium from non-EU Member States/HE Associated Countries.

[16] The CETPartnership Non-Associated Partners are Funding Organisations that do not particpate in the CETPartnership Consortium but have signed a funding commitment to the Call.

# 4. Eligibility criteria and guidelines

The Call includes the following eligibility criteria and requirements:

- Transnational eligibility criteria, applicable for all project consortia applying to the Call
- Call Module requirements, applicable for project consortia applying to Call Modules with specific requirements, see also Chapter 8
- National/regional requirements, applicable for Project Consortium Partners applying for funding from Funding Organisations in the Call, see also Annex B

**TABLE 4.1. SUMMARY OF TRANSNATIONAL ELIGIBILITY CRITERIA**

| | |
|---|---|
| **1** | The proposal must be written in English and submitted on the CETPartnership Submission Platform before the deadlines, following mandatory proposal templates. |
| **2** | A project consortium must be built of at least three independent legal entities applying and deemed eligible for funding by relevant national/regional Funding Organisations from at least three different countries participating in the Call. Of these three entities, at least two must be from EU Member States or HE Associated Countries |
| **3** | The total effort of one Project Consortium Partner in the project consortium can be maximum 60% of the total project efforts (measured in person months). |
| **4** | The total effort of Project Consortium Partners from one country/region in the project consortium can be maximum 75% of the total project efforts (measured in person months). |
| **5** | The following individuals are ineligible for proposal submission: CETPartnership Governing Board members, CETPartnership General Assembly members or researchers from the Funding Organisations in the Call. |
| **6** | The project must start before 15 December 2024. |
| **7** | The project must finish in 36 months. |
| **8** | The proposals must include a work package called Reporting and Knowledge Community in their work plan. |

Below, eligibility criteria and requirements are described in lists ( ➢ ) and guidelines and recommendations in texts.

## 4.1. Proposal submission

- A proposal must be written in English and submitted on the CETPartnership Submission Platform[17] before the deadlines, following mandatory proposal templates with instructions regarding the total page number, the page margins, and the font type and size. The mandatory proposal templates are available for download on the start page of the Submission Platform. To be considered, submission of a pre-proposal is mandatory for each project consortium, and submission of a full proposal is mandatory for each invited project consortium. Resubmission or revision of the proposal will be denied after the submission deadline unless it is requested by the Call Management. (**TRANSNATIONAL ELIGIBILITY CRITERION 1**)
- Some national/regional Funding Organisations require submission on national/regional level, see respective national/regional requirements in **Annex B**.

[17] https://cetp-submission.mur.gov.it/

## 4.2. Project consortia

- A project consortium must be built of at least three independent legal entities (i.e. at least one Coordinator and two Beneficiary Partners) applying and deemed eligible for funding by relevant national/regional Funding Organisations (see requirements in **Annex B**) from at least three different countries participating in the Call. Of these three entities, at least two must be from EU Member States or HE Associated Countries[18]. (**TRANSNATIONAL ELIGIBILITY CRITERION 2**)
- The total effort of one Project Consortium Partner in the project consortium can be maximum 60% of the total project efforts (measured in person months). (**TRANSNATIONAL ELIGIBILITY CRITERION 3**)
- The total effort of Project Consortium Partners from one country/region in the project consortium can be maximum 75% of the total project efforts (measured in person months). (**TRANSNATIONAL ELIGIBILITY CRITERION 4**)
- The following individuals are ineligible for proposal submission: CETPartnership Governing Board members, CETPartnership General Assembly members or researchers from the Funding Organisations in the Call[19]. (**TRANSNATIONAL ELIGIBILITY CRITERION 5**)
- Call Module requirements may apply regarding the project consortia, see **Project consortia** in respective Call Modules in **Chapter 8**.
- National/regional requirements may apply regarding the project consortia, see respective national/regional requirements in **Annex B**.

Any Self-financed Partner can participate in a project consortium fulfilling **TRANSNATIONAL ELIGIBILITY CRITERION 2**. Each Self-funded Partner is expected to enclose a Letter of Commitment with the full proposal (see **Subsection 6.2.1**).

No individual involved in a proposal can act as an evaluator in the Call.

## 4.3. Project duration and budget

- The project must start before 15 December 2024. (**TRANSNATIONAL ELIGIBILITY CRITERION 6**)
- The project must finish in 36 months. (**TRANSNATIONAL ELIGIBILITY CRITERION 7**)
- Call Module requirements may apply regarding the project duration and/or budget, see **Project duration/budget** in respective Call Modules in **Chapter 8**.
- National/regional requirements may apply regarding the project duration and/or budget, see respective national/regional requirements in **Annex B**.

## 4.4. Research, development and innovation (RDI) approaches

- Call Module requirements may apply regarding the RDI approaches, see **Target RDI**

[18] List of Participating Countries in Horizon Europe, https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-euratom_en.pdf

[19] Legal entities who are able to provide written proof that their organisational structure is completely separated from those of the Funding Organisation participating in the Call may under these exceptional circumstances submit their proposal to the Call.

**approaches** in respective Call Modules in **Chapter 8**.

- National/regional requirements may apply regarding RDI approaches; see respective national/regional requirements in **Annex B**.

The following RDI approaches may apply:

- **Research-oriented approach (ROA)** aims at creating knowledge or exploring the feasibility of a new or improved technology, product, process, service or solution and includes applied research, technology development and integration, testing, demonstration and validation of a small-scale prototype in a laboratory or simulated environment.
- **Innovation-oriented approach (IOA)** aims at developing plans and arrangements or designs for new or improved products, processes or services and includes prototyping, testing, demonstrating, piloting, large-scale product validation in an operational environment, and market replication.

## 4.5. Technology Readiness Levels (TRLs)[20]

- Call Module requirements may apply regarding the TRLs, see **Target TRLs** in respective Call Modules in **Chapter 8**.
- National/regional requirements may apply regarding the TRLs, see respective national/regional requirements in **Annex B**.

Since the CETPartnership aims at accelerating the clean energy transition to achieve the goal of climate neutrality by 2050, the Call generally aims at funding projects to reach medium to high TRLs (4–8), combining technologies with societal, environmental, financial, regulatory and other critical aspects. In some cases, projects may include activities at lower or higher TRLs based on specific needs to reach project goals or fulfil national/regional requirements.

## 4.6. Cross-cutting dimensions

- Call Module requirements may apply regarding the cross-cutting dimensions, see **Objectives**, **Scope**, **Target topics**, **Expected impact**, **Target TRLs** and **Project consortia** in respective Call Modules in **Chapter 8**.

The cross-cutting dimensions are an integral part of the CETPartnership and may need to be addressed in proposals. They can be transition pathways, circularity, digitalisation as well as policy and social aspects and include different societal stakeholders and innovation ecosystems. Such a cross-sectoral and interdisciplinary approach can be structured in project design with the help of the Three-layer Research Model (see **Section 1.2**).

Followings are aspects that can be considered to enable and accelerate the transition towards a net zero society in the CETPartnership:

- Identifying robust transition pathways toward a net zero society
- Encouraging transition based on resource efficiency and circularity principles
- Encouraging digitalisation of transition processes

[20] Definition in Horizon Europe Work Programme 2023-2024 13. General Annexes, https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-13-general-annexes_horizon-2023-2024_en.pdf

- Accelerating transition through innovation ecosystems
- Developing policies and actions to ensure a fair, just and democratic transition
- Understanding effects of regulation and market design on transition in short and long term

Read more about the cross-cutting dimensions in the CETPartnership SRIA[21].
A proposal that extends approach/result from ongoing projects can be considered in this Call if it is explicitly distinguished from the proposal.

## 4.7. Reporting and Knowledge Community work package

- The proposals must include a work package called Reporting and Knowledge Community in their work plan (see **Annex A**), since projects funded by the Call are expected to actively participate in the CETPartnership Knowledge Community and exchange knowledge, read more in **Section 1.3**. (TRANSNATIONAL ELIGIBILITY CRITERION 8)

When developing the proposals, it is important to consider the concept and content of the CETPartnership Knowledge Community as well as uses and synergies which will be created there.

## 4.8. Open science

The proposals will be evaluated regarding open science under the criterion Excellence (see **Chapter 5**). Please consider carefully the EU's open science policy[22].

## 4.9. Gender dimension

The proposals will be evaluated regarding the gender dimension of the research and innovation, project outcome and stakeholder engagement under the criterion Excellence (see **Chapter 5**)**.** Gender balance in personnel named in the proposals will be one of the criteria to decide in case of ex aequo proposals.

In the CETPartnership, the gender dimension will be considered to eliminate gender inequality and intersecting socioeconomic inequalities throughout research and innovation systems, including by addressing unconscious bias and systemic structural barriers. CETPartnership promotes gender balance among personnel in a project consortium.

At project implementation, the Coordinator and Beneficiary Partners must follow Horizon Europe Guidance on Gender Equality Plans (GEPs), see **Section 7.3**.

[21] https://cetpartnership.eu/sites/default/files/documentation/CETP%20SRIA_v1.0_endorsed_compressed_0.pdf
[22] https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open-science_en

# 5. Evaluation criteria

In both Stage 1 and 2, the proposals will be evaluated according to the following main evaluation criteria:

- **Excellence**
- **Impact**
- **Quality and efficiency of the implementation**

For proposal evaluation, scores will be awarded for each of the three main criteria. Each criterion will be scored out of 5 (half scores are not allowed) and equally weighted.

The **cut-off** for being invited to Stage 2 or considered for funding in Stage 2 is a score at or above 10 and none of the criteria scoring below 3. It means that the scores must pass the individual threshold AND the overall threshold if a proposal is to proceed to Stage 2. The same rule applies for proposals to be considered for funding in Stage 2.

The following **sub-criteria** will be used in all the Call Modules to determine the scores for the three main criteria. Call Module sub-criteria may apply in addition, see **Chapter 8**.

**Excellence**

- Clarity and pertinence of the project's objectives, and the extent to which the proposed work is ambitious, and goes beyond the state-of-the-art.
- Soundness of the proposed methodology, including the underlying concepts, models, assumptions, inter-disciplinary approaches, appropriate consideration of the gender dimension in research and innovation content, and the quality of open science practices, including sharing and management of research and innovation outputs and engagement of citizens, civil society and end users where appropriate.

**Impact**

- Likely scale and significance of the expected outcomes and impacts including the added value of the transnational collaboration, and credibility of the pathways to achieve the expected outcomes and impacts specified in the work programme.
- Suitability and quality of the measures to maximise expected outcomes and impacts, as set out in the dissemination and exploitation plan, including communication activities.
- Extent to which the project is relevant for the energy transition through appropriate involvement of end-users, need-owners and/or the private sector.

**Quality and efficiency of the implementation**

- Quality and effectiveness of the work plan, assessment of risks, and appropriateness of the effort assigned to work packages and the resources overall.
- Capacity and role of each participant, and extent to which the consortium as a whole brings together the necessary expertise.

# 6. Call process

The Call process includes two stages: the pre-proposal stage (Stage 1) and the full proposal stage (Stage 2). **To be considered, your pre-proposal must be submitted on time, complete and concise.**

## 6.1. Pre-proposal stage – Stage 1

### 6.1.1 Submission of pre-proposals

A pre-proposal must be submitted by a Coordinator (see **Section 4.2** for the eligibility criteria and guidelines on project consortia) to a Call Module by **22 November 2023, 14:00 CET** on the CETPartnership Submission Platform, where the Coordinator must invite Beneficiary Partners and, if applicable, Self-financed Partners. To submit the pre-proposal, every Project Consortium Partner invited by the Coordinator must accept the invitation and enter its information and budget on the Submission Platform, while possible irrelevant partners must have been removed.

The pre-proposal can be edited and re-submitted until the deadline. Every submitted version will replace the previous one, and the last version submitted by the deadline will be assessed and evaluated.

The pre-proposal must include a project description (max 10 pages using the mandatory pre-proposal templates available for download on the start page of the Submission Platform) and any supporting documents, where required. Text and page limits are set on the Submission Platform. See **Section 4.1** for the eligibility criteria and guidelines on submission. See **Section 4.2–4.9** for the eligibility criteria and guidelines on how to formulate the pre-proposal.

Please consider that some Funding Organisations require submission of additional information from applicable Project Consortium Partners. In this case, the Funding Organisations have own submission procedure such as deadlines, portals and templates. See respective national/regional requirements in **Annex B**.

### 6.1.2 Eligibility check of pre-proposals

The submitted pre-proposals will be assessed according to:

- Transnational eligibility criteria (see **Chapter 4**) by the Call Management.
- Call Module requirements (see **Chapter 9**) by TRIs.
- National/regional requirements (see **Annex B**) by the Funding Organisations. However, the final eligibility check may need to wait until Stage 2.

Pre-proposals fulfilling all the transnational eligibility criteria and Call Module requirements will proceed to the next step.

Pre-proposal with a Project Consortium Partner falling into any of the following situations may also proceed to the next step on equal terms despite the risk of failing to fulfil **TRANSNATIONAL ELIGIBILITY CRITERION 2**:

- Deemed conditionally eligible, when the possible Funding Organisations request more information for the national/regional requirements.

- Deemed ineligible by the Funding Organisations, when the Coordinator has been deemed eligible and when the ineligible Project Consortium Partner covers less than 25% of the total project efforts (measured in person months).

### 6.1.3. Evaluation of pre-proposals

In each Call Module, the evaluation of pre-proposals passing the former steps will be done according to the evaluation criteria described in **Chapter 5** and result in a ranking list. Each pre-proposal will be evaluated by at least three independent evaluators. In case of strong disagreement between individual evaluations, a panel meeting will be arranged to reach a consensus.

### 6.1.4. Selection of pre-proposals

Based on the ranking lists developed in the former step, the Funding Organisations will agree on a list of pre-proposals to be invited to Stage 2, while ensuring that the total funding requested by the invited pre-proposals is balanced (max four times) in relation to the available budget for each Funding Organisation. Proposals scoring below the cut-off as described in **Chapter 5** will be excluded from the selection.

In case of budgetary constraints, pre-proposals scoring higher in the ranking lists will be prioritised, considering the following **core principles**:

- Maximisation of the total output in terms of funded projects.
- Maximisation of the number of countries/regions involved in the funded projects.
- Aiming for a similar success rate between the Call Modules.
- Reaching a good balance between the Call Modules regarding the output in terms of funded projects.
- Maximisation of the financial contribution by the EC obtained through the Joint Call 2023.

The outcome of Stage 1 will be notified by the Call Management to each Coordinator with reports on the eligibility check and, if applicable, the evaluation of the pre-proposals.

## 6.2. Full proposal stage – Stage 2

### 6.2.1. Submission of full proposal

A full proposal must be submitted by the Coordinator of each invited project consortium (see **Section 4.2** for the eligibility criteria and guidelines on project consortia) to the same Call Module by **27 March 2024, 14:00 CET** on the Submission Platform, in a similar manner to the pre-proposal, in collaboration with Beneficiary Partners and, if applicable, Self-financed Partners. The difference from submission of pre-proposal (**Subsection 6.1.1**) is:

- The full proposal must include a project description (max 30 pages instead of max 10 pages).
- Each Self-financed Partners must submit a Letter of Commitment.

Between the pre-proposal and the full proposal, no fundamental changes initiated by the project consortium alone will be accepted, except for minor ones in the project consortium, duration, budget or applied funding (see more information below), which must be communicated to and approved by all the Project Consortium Partners and the relevant Funding Organisation(s) before submission of the full proposal. A written proof (e.g. e-mail) from the Funding Organisation(s) must be forwarded to the

Call Management (callmanagement@cetpartnership.eu).

Following changes in the project consortium can be allowed:

- To add (a) Self-financed Partner(s).
- To change (a) Beneficiary Partner(s) deemed ineligible in Stage 1 to (a) Self-financed Partner(s).
- To change (a) Beneficiary Partner(s) to (a) new Beneficiary partner(s) applying for funding from the same Funding Organisation.

If any Funding Organisation turns out to be undersubscribed in Stage 1[23], following changes will also be allowed in the project consortium to widen the involvement of Funding Organisations:

- To change (an) ineligible Beneficiary Partner(s) for (another/other) Beneficiary Partner(s) applying for funding from any of the undersubscribed Funding Organisations.
- To add (a) new Beneficiary Partner(s) applying for funding from any of the undersubscribed Funding Organisations.

Changes in the project consortium can only be allowed if all the following conditions are met:

- The Coordinator stays the same.
- Addition/change of (a) Project Consortium Partner(s) is well motivated in relation to the overall project ambition and scope.
- Addition/change of (a) Project Consortium Partner(s) changes max 25% of the total project budget.

Please again consider that some Funding Organisations require submission of additional information from applicable Project Consortium Partners. In this case, the Funding Organisations have own submission procedure such as deadlines, portals and templates. See respective national/regional requirements in **Annex B**.

Please consider that some Funding Organisations require submission of additional information from applicable Project Consortium Partners. In this case, the Funding Organisations have own submission procedure such as deadlines, portals and templates. See respective national/regional requirements in **Annex B**

### 6.2.2. Eligibility check of full proposals

The submitted full proposals will be assessed for their eligibility in a similar manner to the pre-proposal. Full proposals fulfilling all the transnational eligibility criteria and Call Module requirements will proceed to the next step.

### 6.2.3. Evaluation of full proposals

In each Call Module, the evaluation of full proposals passing the former steps will be done according to the evaluation criteria described in **Chapter 5** and result in a ranking list. Each full proposal will be evaluated by at least three independent evaluators, who will then meet at a panel meeting to reach a consensus and write a report. The whole evaluation process will be overseen by an independent observer.

[23] Potential Funding Organisations will be found on the Submission Platform after Stage 1.

### 6.2.4. Selection of full proposals

The Funding Organisations will agree on a list of full proposals to be funded based on the ranking lists in the former step, the available budgets and the same core principles as in **Subsection 6.1.4**. Proposals scoring below the cut-off as described in **Chapter 5** will be excluded from the selection.

The outcome of Stage 2 will be notified by the Call Management to each Coordinator with reports on the eligibility check and, if applicable, the evaluation of the full proposals.

# 7. Project implementation

## 7.1. Funding arrangements and period

Funding arrangement will be made directly between Project Consortium Partners and their national/regional Funding Organisations. It is highly recommended that all Partners in a project consortium synchronise their project start and end dates, even though their national/regional funding arrangements can be desynchronised.

According to **Section 4.3**, projects funded by the Call must start before 15 December 2024 (**TRANSNATIONAL ELIGIBILITY CRITERION 7**) and finish in 36 months (**TRANSNATIONAL ELIGIBILITY CRITERION 8**). National/regional requirements may apply regarding the project duration (see **Annex B**).

## 7.2. Consortium Agreement (CA)

Each project consortium must have a signed Consortium Agreement (CA) between all the Project Consortium Partners, including intellectual property rights (IPR) issues. It is recommended to have it already at the project start or by 6 months after the project start using the Development of a Simplified Consortium Agreement (DESCA)[24] template. However, a project consortium with Project Consortium Partners outside Europe may need an adapted CA.

## 7.3. Gender Equality Plans

The Coordinator and Beneficiary Partners must follow Horizon Europe Guidance on Gender Equality Plans (GEPs)[25]. It means that public bodies as well as public and private higher education establishments and research organisations established in EU Member States and Associated Countries must have a GEP.

## 7.4. Changes in projects

Any substantial changes in an ongoing project must be reported to and approved by relevant Funding Organisations and the Call Management. Such changes may affect the funding from the CETPartnership.

## 7.5. Reporting and dissemination

The Coordinator must submit annual reports and a final report to the CETPartnership. In addition, each project is expected to have a webpage and to actively participate in the CETPartnership Knowledge Community (see **Section 1.3** and **Annex A**) for increased knowledge sharing and dissemination of results.

National/regional requirements may apply regarding the reporting and dissemination.

[24] https://www.desca-agreement.eu/desca-model-consortium-agreement/

[25] https://op.europa.eu/en/publication-detail/-/publication/ffcb06c3-200a-11ec-bd8e-01aa75ed71a1/language-en/format-PDF/source-232129669

# 8. Call Modules

| No. | Title | Contact |
|---|---|---|
| **CM2023-01** | Direct current (DC) technologies for power networks | TRI1@cetpartnership.eu |
| **CM2023-02** | Energy system flexibility: renewables production, storage and system integration | TRI1@cetpartnership.eu<br>TRI2@cetpartnership.eu |
| **CM2023-03A** | Advanced renewable energy technologies for power production | TRI2@cetpartnership.eu |
| **CM2023-03B** | | |
| **CM2023-04** | Carbon capture, utilisation, and storage (CCUS) | TRI3@cetpartnership.eu |
| **CM2023-05** | Hydrogen and renewable fuels | TRI3@cetpartnership.eu |
| **CM2023-06** | Heating and cooling technologies | TRI4@cetpartnership.eu |
| **CM2023-07** | Geothermal energy technologies | TRI4@cetpartnership.eu |
| **CM2023-08** | Integrated regional energy systems | TRI5@cetpartnership.eu |
| **CM2023-09** | Integrated industrial energy systems | TRI6@cetpartnership.eu |
| **CM2023-10A** | Clean energy integration in the built environment | TRI7@cetpartnership.eu |
| **CM2023-10B** | | |



Co-funded by the European Union

# CM2023-01 Direct current (DC) technologies for power networks

## Objectives

TRI1[26] implements the CETPartnership SRIA[27] Challenge 1, that is focused on developing the "Optimised, integrated European net-zero emission energy system", where the energy networks (i.e. electricity, gas, hydrogen, water, heating and cooling, mobility and their integrated and coordinated functioning etc.) play a significant role.

In order to meet the European Union (EU) and Member States' climate targets for 2030 and 2050, it is not only necessary to accelerate the expansion of renewable energy sources (RES), but also to integrate RES more efficiently into the energy system.

RES integration into the energy system will require a fundamental change in infrastructure, implying significant investments in grids and use different and new technologies in the grids. Direct current (DC) technologies can have a leading role in this transformation thanks to their flexibility, efficiency and sustainability. High voltage DC (HVDC) is essential for offshore generation and for the integration of energy islands (both onshore and offshore), while medium voltage DC (MVDC) and hybrid networks (alternating current (AC) and DC) can foster direct RES integration and sector coupling.

While both transmission and distribution grids are currently predominantly AC, DC grids are becoming increasingly important. Especially for long transmission distances the use of HVDC is often advantageous, as there are lower losses over long distances and compensation techniques are not required.

HVDC is therefore also important for connecting offshore wind farms to continental electricity grids and for the integration of "energy islands", a system concept currently being promoted by several Member States. In particular, the offshore wind expansion plans of the countries bordering the North Sea and the new energy island concept are challenging to integrate into the existing grids with current solutions, so that in addition to the necessary investments, there is also a high demand for research.

Moreover, there is a clear trend towards employing MVDC networks and MVDC grids/microgrids are attracting even more interest thanks to the advancements in the power electronics area. For example, large RES can be easily connected to the MVDC networks, and DC loads such as energy storage or electric vehicles are increasingly appearing. In addition, existing AC grids can be effectively coupled using DC. MVDC networks and micro grids, which have different characteristics and applications from HVDC networks, are still in their infancy in terms of research.

This Call Module addresses the main challenges of DC technologies at medium and high voltage level for effective integration of energy islands or high shares of RES into the energy infrastructure. The dynamic response of power systems is more dependent on complex fast-responding power electronic devices, which affects the dynamic behaviour of the power system. Furthermore, meshed DC grids are expected to proliferate at all voltage levels as well as hybrid transmission and hybrid

[26] https://cetpartnership.eu/tri/1

[27] https://cetpartnership.eu/sites/default/files/documentation/CETP%20SRIA_v1.0_endorsed_compressed_0.pdf

distribution AC/DC networks. In this context, the grids evolve towards multi-terminal, multi-vendor and meshed DC grids. Therefore, new and advanced control and operation principles are required for secure and stable grid operation supported by a higher level of observability, covering all voltage levels and new types of dynamics (e.g. faster dynamics).

In addition, the DC grids must be integrated into the existing grid infrastructures, whereby cost-efficient solutions are essential. Especially the integration of energy islands into the onshore grids requires not only transnational planning but also the consideration of market aspects, e.g. connection to shore, technology used, design of pricing zones. Furthermore, the costs of the different technologies on all voltage levels must be taken into consideration in order to enable effective hybrid AC/DC grid planning. Not only should optimal solutions be determined in terms of a cost-benefit analysis, but the solutions should also be designed for the long term and the public should be involved.

TRI1, in continuity with previous year, keeps its work direction in the field of integrated energy system according to SET Plan Action 4, to the targets set by EU policies in the last years and to technology R&I roadmaps. Particularly, this Call Module fits into ETIP SNET, R&I Implementation Plan 2022–2025[28] (High Level Use Cases 4, 6 and 7).

Coordination with other TRIs is fundamental as well. Care has been taken to ensure that there is a clear separation between the Call Modules of the different TRIs. While TRI1 focuses on technologies for networks, necessary for effective integration of energy islands and high shares of RES into the energy infrastructure, TRI2[29] focuses on power production technologies designed keeping into consideration system integration, efficiency and circularity.

## Scope

This Call Module is meant to foster projects to develop, test and demonstrate enabling and supporting tools in the fields of:

- HVDC and MVDC development and deployment
- meshed multi-terminal AC/DC grids
- energy island integration

The scope can be divided into three main areas the projects can focus on:

1. Planning and markets
   - Planning of meshed energy islands and their integration in onshore grids, e.g. location, capacity of onshore grids, size, technologies, impact of onshore grid/market
   - Analysis of sustainability and environmental impact of DC grids and energy islands
   - Coordinated planning of hybrid AC/DC grids including DC microgrids
   - Simulation of energy island integration and market related aspects, e.g. design of offshore bidding zones
2. Operation, control and protection
   - Grid operation and control principles for multi-terminal HVDC and MVDC networks, for hybrid transmission and hybrid distribution AC/DC grids
   - Analysis and development of new energy management, voltage and power level management solutions including provision of flexibility

[28] https://op.europa.eu/en/publication-detail/-/publication/53e747cd-9f57-11ec-83e1-01aa75ed71a1

[29] https://cetpartnership.eu/tri/2

- Investigations and simulations of the dynamics of multi-terminal DC networks connected to AC grids
- Develop, test and validate protection concepts for DC and hybrid grids
- New generation of grid-connected inverters and parallel operation of converters (different vendor, different topologies, considering energy storage applications)
- Operation and control of DC connected distribution grids
- Components, operation and control of MVDC microgrids
- Development of reliable communication and integration of DC grids in SCADA systems

3. Verification, test and maintenance
   - Testing and verification methods and concepts for scaling
   - Standardised validation tests for de-risking interoperability issues
   - New HiL testing concepts
   - Standardised test procedures for DC grid protection equipment
   - Analysis of possible trade-offs in performance, ambient condition impact, maintenance, reliability, dimensioning, testing procedures, etc.
   - Improved tools for remote monitoring and maintenance of equipment
   - Digital twins for condition monitoring and improved maintenance

Projects must provide results in at least one of these three areas of the Call Module scope.

By fostering projects focusing on these areas, this Call Module aims to respond to the main R&I gaps and challenges underlined by IWG HVDC[30], IWG 4[31], ENTSO-e[32], ETIP SNET[33] and ETIPWind[34] in the framework of SET Plan:

- HVDC and MVDC technology development
- interoperability
- new solutions for DC breakers
- energy management solutions
- voltage and power level management
- distribution digital DC/hybrid converter/transformer
- optimal design and operation concepts of hybrid grids (HVDC & HVAC; MVDC & MVAC)
- clear understanding and simulations of the dynamics of a power grid with high penetration of power electronics
- new generation of grid-connected inverters able to provide grid services in a flexible way and to commute
- grid operation and control principles for multi-terminal HVDC and MVDC networks and for hybrid AC/DC networks
- intelligent hybrid distribution substation

Exclusive analysis of materials, semiconductors and their design are not within the scope of this Call Module, but can be considered to an appropriate extent within a larger project.

[30] https://setis.ec.europa.eu/implementing-actions/high-voltage-direct-current-hvdc-direct-current-dc-technologies_en

[31] https://setis.ec.europa.eu/implementing-actions/energy-systems_en

[32] https://www.entsoe.eu/

[33] https://smart-networks-energy-transition.ec.europa.eu/

[34] https://etipwind.eu/

## Expected impact

Supported projects are expected to deliver results that have a significant impact on promoting the deployment of new and cost-efficient technologies. This Call Module looks at results helping to reduce the time to market for technologies much needed for the development of multi-terminal and multi-vendor hybrid networks, integrating HVDC, MVDC and energy islands, with a significant contribution to the integration in the overall energy system.

Expected impacts:

- availability of validated solutions for control, operation and protection of DC and hybrid grids: shortening market uptake and cost reduction
- fostering European leadership in solutions and technologies linked with operation and control of DC networks
- acceleration of production of standards to ensure interoperability for multi-vendor applications enhancing technological market efficiency and cost reduction
- fostering European leadership in testing and validation of DC solutions and their related control and operation
- reduction of costs for maintenance and operation linked with the development of advanced monitoring and diagnostic techniques for DC applications
- enabling the concept of energy islands both onshore and offshore to optimise the integration of RES in a multi-vector energy system
- reducing the environmental impact of transmission and distribution grids and their components – e.g. HVDC for offshore wind integration or DC microgrids
- enabling cross-border markets, e.g. bidding zones design for North Sea or Baltic Sea, and reduced grid fees due to efficient transmission and distribution

## Target TRLs

In terms of TRL, projects are expected to increase the TRL moderately, i.e. to show a TRL jump of 1–2 in terms of start and end.

## Project consortia

The concrete later use represents an important aspect of this Call Module, so that the consortia should have significant industry participation. The need-owners should be involved as Project Consortium Partners in the project (e.g. wind park operator).

This Call Module expects at least two of the following stakeholders to be Beneficiary Partners of the projects:

- operators of offshore wind farms / energy islands
- infrastructure or grid operators, e.g. TSO, DSO
- universities and research institutes
- industry and SMEs in the fields of components, systems and devices for energy systems as well as software (services)

Further partners (Associated Partners) are welcome, e.g. (European) standardisation organisations, national & local authorities, etc.

Attention should be paid to a balanced allocation of work between users and developers.

The opportunity for projects to work on existing infrastructures would be considered positively. If possible, project consortia should include partners that can provide access to infrastructures to develop and test solutions that can be directly applied (e.g. supporting activities and tools for verification, validation, testing and study of technologies and their integration; working with test facilities and hardware in the loop; support, control and measurement tools; etc.).

## Project duration/budget

A budget of €10 million for the Call Module is envisaged. 2–3 projects shall be funded with €2–4 million each. Projects addressing planning and markets are expected in the range of €1–2 million.

# CM2023-02 Energy system flexibility: renewables production, storage and system integration

## Objectives

Through this joint Call Module, the CETPartnership TRI1[35] and TRI2[36] and the Mission Innovation (MI) Green Powered Future Mission (GPFM) are establishing an effective collaboration towards the green transition of the energy system.

The MI GPFM[37] aims to demonstrate that by 2030, power systems in different geographies and climates can effectively integrate up to 100% variable renewable energies, like wind and solar, in their generation mix, and maintain a cost-efficient, secure and resilient system.

This joint Call Module is intended to increase opportunities for international cooperation and represents the implementation of the GPFM Flagship Project 2 (FP2) "Multilateral Research Programme" to take forward a selection of the identified Innovation Priorities (IPs) for the power system decarbonisation and transformation. FP2 was launched by the GPFM at the Global Clean Energy Action Forum held in Pittsburgh (September 2022) as part of the GPFM Action Plan 2022–2024[38].

## Scope

This joint Call Module aims to address key aspects of the clean energy transition ranging from the integration of renewable energy sources into the power grids, considering storage as a possible solution to deal with their intermittent nature, to broad technological and market aspects as well as approaches towards system integration. Moreover, digitalisation and standardisation, being key enablers for the deployment of innovative system flexibility solutions, need to be duly considered by the submitted proposed projects.

The R&I Themes and IPs addressed by this Call Module are reported here below and have been selected with the help of a task force set up within the GPFM and by joint discussions between the GPFM and the CETPartnership. The challenges addressed by the Call Module are well aligned with the CETPartnership SRIA[39]: funded projects are therefore expected to contribute to reach the targets of both initiatives.

Funded projects shall address one or more of the following main **R&I Themes**:

1. Large-scale renewable generation and system flexibility and reliability
2. Energy storage technologies and systems for flexibility services
3. System integration and flexible operations
4. Innovative flexibility sources and flexibility markets

[35] https://cetpartnership.eu/tri/1

[36] https://cetpartnership.eu/tri/2

[37] https://explore.mission-innovation.net/mission/green-powered-future/

[38] http://mission-innovation.net/wp-content/uploads/2022/09/Green-Powered-Future-Mission-Action-Plan-2022-2024.pdf

[39] https://cetpartnership.eu/sites/default/files/documentation/CETP%20SRIA_v1.0_endorsed_compressed_0.pdf

5. Energy data management and security

More in detail, funded projects shall address one or more of the following identified IPs[40]:

1. Large-scale renewable energy generation for improving system reliability & stability (GPFM IP 1.3.2)
2. Variable renewable energy flexibility provision & contribution to generation capacity (GPFM IP 2.1.1)
3. Innovation in energy storage technologies (GPFM IP 1.5.3)
4. Utility scale storage systems for innovative flexibility services (GPFM IP 2.4.3)
5. System stability assessment considering high VRE penetration (GPFM IP 2.3.1)
6. Enhanced TSO-DSO coordination platform for flexibility markets optimisation (GPFM IP 2.3.2)
7. Flexibility markets for innovative ancillary services by VRE and storage (GPFM IP 2.7.1)
8. Unlocking commercial and residential buildings flexibility potential (GPFM IP 2.5.2)
9. Connected data platforms for enhanced forecasting and flexible operation (GPFM IP 3.3.2)
10. Standardisation of devices and control platforms (GPFM IP 3.1.2)
11. Identify priority dataset for system security (GPFM IP 3.2.2)

## Expected impact

This joint Call Module is intended to concentrate efforts and financial resources to accelerate the deployment of key innovation thus enabling the uptake of clean energy solutions in the near future.

The Call Module mainly focuses on **research and development**, while demonstration and implementation are considered as subordinate. Nevertheless, it is expected to possibly involve **industry**, bringing in expertise, knowledge, and know-how for the implementation of innovative and breakthrough solutions.

The Call Module mainly focuses on **transnationality**, as it expects to engage with GPFM country member organisations, among which are included extra-European countries (countries outside the EU and not associated to Horizon Europe). Projects with partners outside Europe are expected to foster the CETPartnership approach worldwide, also contributing to link the GPFM Internet-based platform to the CETPartnership knowledge community.

## Target TRLs

R&I activities are expected to start from TRL ≥3 and to achieve TRL 5–6 by the end of the project.

## Project consortia

This joint Call Module deviates from the standard requirements regarding the consortium composition since it is devoted also to extra-European countries participation (countries outside the EU and not associated to Horizon Europe).

The proper involvement in the consortia of Research Performing Organisations (RPO) and private

[40] See the GPFM Action Plan 2022–2024, https://explore.mission-innovation.net/wp-content/uploads/2022/09/Green-Powered-Future-Mission-Action-Plan-2022-2024-1.pdf

sector actors such as system operators, SMEs, spin-off companies, will be key to submit sound project proposals and to properly address some of the selected IP. Moreover, projects should be highly innovative and should preferably be designed building on top of existing initiatives or assets and propose replicable and scalable solutions.



Co-funded by the European Union

# CM2023-03A/03B Advanced renewable energy (RE) technologies for power production

## Objectives

The Call Modules **CM2023-03A/03B Advanced renewable energy (RE) technologies for power production** build on the CETPartnership SRIA, the Input Papers and the SET Plan Implementation Plans for the Actions 1 & 2 'Global Leadership in Renewables', to deliver performing RE technologies integrated in the energy system with increased circularity and a more sustainable life cycle.

The objective of the Call Modules is to support the development, scale up and market uptake of enhanced RE technologies contributing to zero-emission power production, in line with the Green Deal and the EU's energy policy and decarbonisation targets. In particular, the Call Modules **support projects aiming at increasing the overall energy conversion efficiency and lowering RE technologies' cost**. The EU SET Plan performance and cost targets for the renewable energy technologies in the scope of TRI2[41] are a reference for these Call Modules.

The Call Modules contribute to the relevant SET Plan Implementation Plans objectives (and namely the IPs on CSP/STE; Ocean Energy; PV; Wind) [42], complementing Horizon Europe calls in order to have a balanced portfolio of RE technologies for power production at different stages of TRL.

**CM2023-03A** calls for ROA (Research-Oriented Approach) projects, and **CM2023-03B** calls for IOA (Innovation-Oriented Approach) projects (see **Section 4.4** for definition of ROA and IOA). Projects can apply for either ROA or IOA, according to the target TRL.

## Scope

Zero-emission power technologies are a cornerstone of the global and European sustainable energy system. Solar (photovoltaic-PV based, thermal and Concentrating Solar Power-STE/CSP), onshore and offshore wind, ocean energy, bioenergy with negative $CO_2$ emissions and their integration are key for transitioning the energy system. The electrification of end-use sectors, the integration of RE sources into the energy system, further reduction of cost, enhanced flexibility and diversification are needed. A massive renewable energy technologies rollout shall be accompanied by a sustainable integration into living and natural environment, sustainability and circularity in all parts of the European and global value chains.

The Call Modules are open to all the broad portfolio of RE zero-emission power technologies in TRI2's scope, but specific focus is on technologies contributing to power production such as onshore and offshore wind, ocean energy and other offshore renewables, solar energy (PV based technology, including PVT, PVH and STE-CSP), bioenergy for power generation (with negative carbon emissions). Please note that bioenergy applications dedicated to fuel production are not in TRI2's in scope but are considered in TRI3's Call Module (**CM2023-05**).

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[41] https://cetpartnership.eu/tri/2

[42] CSP/STE: Initiative for Global Leadership in Concentrated Solar Thermal Technologies (Updated Implementation Plan February 2023); Ocean Energy: Ocean Energy - Implementation Plan (2021); Solar photovoltaics: PV Implementation Plan (2017 - under revision); Wind Energy: 2nd SET Plan Implementation Plan for offshore wind (March 2022). See: https://setis.ec.europa.eu/implementing-actions/set-plan-documents_en#implementation-plans

## Target topics

Following consultation with stakeholders, the following RDI areas have been identified as priority. The list is not prescriptive and other topics might be considered, as long as they demonstrate contribution to the objectives of the Call Modules and the development of the relevant RE sector.

### Bioenergy for power generation

- High efficiency biomass (co)generation of power with improved performance and higher share of power production ratio, using residues and wastes as feedstocks, and with negative carbon emission
- Integrated CHP systems enhancing annual total efficiency and power capacity factor and negative carbon emission

### Concentrated solar power (CSP) / solar thermal energy (STE)

- Line-focus solar power plants technology: Component development, process innovation and cost optimisation for molten salts systems; Solar collector fields with silicone oil as heat transfer fluid (HTF)
- Central Receiver power plants technology (concepts, materials and components): optimisation of central receiver molten-salt technology; Solar tower with particle receiver technology
- Turbo-machinery developed for specific conditions of solar thermal power plants: expansion turbine technologies for advanced CSP power blocks or supercritical CO2 cycles
- **Cross-cutting issues**: Digitalisation of CSP plants; Innovative coatings for CSP mirrors

### Ocean energy

- Dry-testing of power take-off for wave energy devices to debug, improve, stabilise, fine-tune and optimise wave energy devices before offshore operations
- Tidal blades: Improving the survivability and efficiency of tidal blades to enhance performance and reliability of the device
- Connection systems: Reduce the cost of connection and cabling systems, as well as maintenance requirements and costs

### Offshore renewables (marine renewables, floating wind/PV, etc.)

- New materials or novel applications of existing materials for moorings, foundations and components: Materials with improved fatigue, damping, stiffness, bio-fouling management or other cost-reducing characteristics
- Mooring and connections: Improved moorings, foundations, connections and cabling systems; Dynamic cable repair solutions
- O&M: innovative solutions to reduce costs of operations and maintenance
- Site-specific marine observation, modelling and forecasting: marine / meteorological data to improve performance, reliability, availability of offshore renewables through better design and efficient operations

### Solar photovoltaics

- Performance Enhancement and Cost Reduction through Advanced PV Technologies: Perovskite / Silicon Tandem-Solar cells and modules / Thin film cells
- Lifetime, Reliability and Sustainability advanced PV technologies, manufacturing and applications: Low environmental impact materials, processes, products
- Digitalisation for O&M: advanced data analytics, digital twin of assets and components, predictive maintenance
- New Applications through Integration of PV: Agrovoltaic and landscape integration; Floating PV; IIPV-Infrastructure Integrated PV; Low power PV

### Wind energy (offshore and onshore)

- Next generation of wind turbine technology: cost-efficient, energy-efficient, low environmental impact, scalable wind energy converters and turbines
- Atmospheric modelling: Improved understanding of atmospheric and wind power plant flow physics; Predicting environmental parameters
- Digital twins for turbine and for optimised wind energy applications
- O&M: solutions/digital solutions for wind energy operation, maintenance & installation
- Landscape integration of wind energy in the natural and social environment

### Hybrid-RES solutions

- Site integration optimisation: PV+CSP; PV+Wind, CSP-Wind, Ocean-Wind, etc.
- Integration with storage: Optimise RE power production, site and technology integration with energy storage
- Hybrid systems: Combined electricity generation with heat or other energy carriers in hybrid systems (PVT, PV-Hydrogen, CSP-ST)

## Expected impact

Projects shall address one or more of the following outcomes:

- Increase the **energy conversion efficiency**, contributing to zero-emission power production
- Increase **technology performance** (with reference to SET Plan Implementation Plans[43]) and/or lifetime
- Develop **innovative technologies and components**, ensuring higher efficiency in the energy and power production
- Decrease **investment cost and LCOE** and/or improve the overall economics of the technology
- Demonstrate the **feasibility of scaling up**
- Demonstrate the **technology in different geophysical conditions** or in different weather conditions
- Reduce **environmental impact** (e. g. land use, effects on biodiversity and animal life) or

[43] https://setis.ec.europa.eu/implementing-actions/set-plan-documents_en#implementation-plans

significantly improve multiple use of occupied land surface / or maritime space

- Minimise the use of **critical raw materials** (CRM) and apply circularity-by-design approaches

## Target RDI approaches/TRLs

The Call Modules call for both ROA (Research-Oriented Approach) and IOA (Innovation-Oriented Approach) projects, resulting in two separate ranking lists:

- **CM2023-03A** (ROA) covers the TRL range 3–5.
- **CM2023-03B** (IOA) covers the TRL range 5–7/8.

Projects can apply either as ROA (**CM2023-03A**) or IOA (**CM2023-03B**) on the basis of the target TRLs:

- Research-oriented projects (ROA) are expected to increase the efficiency of the technology targeting TRL 4 or above.
- Innovation-oriented projects (IOA) are expected to make relevant progress towards the demonstration of technology to TRL 6 or above.

Both ROA and IOA are equally relevant to these Call Modules. Project proposals are ranked on the basis of two separate ranking lists for **CM2023-03A** (ROA) and **CM2023-03B** (IOA).

## Project consortia

The Call Modules target consortia comprising complementary Research Performing Organisations (Universities, Research and Technology Organisations) and/or industry (SME, spin-offs; large companies, technology providers etc.).

The participation of industry associations and other relevant stakeholders, as well as regional/local governments, NGOs and/or Consumer Associations in Advisory Boards or as Project Consortium Partners is an asset.

Projects applying as IOA (**CM2023-03B**) shall include at least an industrial partner (private company: SME; large company etc.) as an off-taker.

Projects applying as IOA (**CM2023-03B**) shall comprise industry partners (SMEs, Spin-offs, large companies and in general any industrial up-taker) in the project consortium.

# CM2023-04 Carbon capture, utilisation, and storage (CCUS)

## Objectives

The Call Module on CCU/CCS is based on the previous ERA-Net ACT initiative[44] with the aim to facilitate the emergence of $CO_2$ Capture, Utilisation and Storage (CCUS) technologies via funding of transnational projects. It aims at facilitating the emergence of CCU and CCS by accelerating and maturing these CCU/CCS technologies through targeted financing of innovation and research activities.

The term CCUS refers to all areas of the CCU and CCS chains. It encompasses a wide spectrum of technologies to capture $CO_2$ from point sources or directly from the air and either store it in porous geological formations that are typically located several kilometres under the earth's surface, onshore or offshore (CCS), or use the $CO_2$ to produce valuable products like fuels or energy, chemicals, and other materials (CCU). Under this Call, CCU does not include the use of $CO_2$ as a non-reactive working fluid, unless it is combined with other renewable systems (such as geothermal) to constitute a CCUS system.

The CCU/CCS Call Module intends to fund projects that aim to accelerate CCUS technologies in support of global efforts to reduce $CO_2$ emissions by more than 50 percent by 2030 compared to 1990 and further efforts for climate neutrality.

The CCU/CCS Call Module is seeking innovative projects that range from smaller research projects to new or major expansions/upgrades of existing pilot and demonstration facility sites or projects.

## Scope

Selected projects will support the emergence of CCU/CCS primarily in the industrial sectors and the energy sector.

The ambition of the Call Module is to select projects that have the potential to accelerate the time to market for CCU/CCS technologies. This will require cost-shared participation from industries in research and innovation activities, especially in energy intensive and heavy industry sectors, which may benefit strongly from implementing CCU/CCS technologies.

Projects must address one or several of the research and innovation activities described by the SET Plan IWG 9[45] and the Mission Innovation[46], with special emphasis on the following topics:

- $CO_2$ capture from energy intensive or heavy industry (waste to energy, cement, steel, other metals, etc), power, maritime transport, hydrogen produced from natural gas, and storage-based $CO_2$ removal (CDR).
- Advancing lower cost $CO_2$ capture technologies that can effectively remove 95–100% of $CO_2$ from flue gases with dilute $CO_2$ concentrations.
- $CO_2$-storage sites, including elements that are needed for characterisation and management

[44] ACT- Accelerating CCS technologies, http://www.act-ccs.eu/

[45] CCUS Roadmap to 2030, https://www.ccus-setplan.eu/wp-content/uploads/2021/11/CCUS-SET-Plan_CCUS-Roadmap-2030.pdf

[46] https://www.energy.gov/fecm/articles/accelerating-breakthrough-innovation-carbon-capture-utilization-and-storage

of large-scale permanent storage of $CO_2$, e.g., reservoir integrity, monitoring, capacity estimation, modelling.

- Enabling CCUS technologies that industry views as high priority.
- Transport and injection of $CO_2$ (pipelines, ships, other non-pipeline transport and inter-modal options, monitoring and metering within $CO_2$ networks, temporary storage, well integrity and well technology).
- Reuse of existing energy assets for CCUS (e.g. pipeline repurposing).
- Negative emission technologies (NETs), Carbon Dioxide Removal (CDR) technologies such as Direct Air Capture technologies (DAC) with storage or use of $CO_2$, Bioenergy with CCS (BECCS), and Biomass Carbon Removal and Storage (BiCRS).

Projects focusing on developing new pilot and demonstration facilities are required to illustrate the potential for upscaling to industrial size either in a demo phase or early commercial phase.

Proposals must address at least one of the following:

- Improve the cost-efficiency and energy-efficiency along the value chain (scale up, storage at basin scale, efficiency, digital tools, effective collaboration among the stakeholders).
- Faster scale up of CCU/CCS technologies and at lower risk (design, demonstrations, development of legal framework, measures that strengthen the innovation system, knowledge sharing from full scale operations, Integration into the energy-system etc.).
- Develop lower cost solutions for efficient capture of $CO_2$ from hydrogen produced from natural gas, and new technologies for processing, shipping, transport, and storage of hydrogen.
- Design and manufacturing of new materials that can make CCU/CCS more affordable.
- CCU/CCS market and business case development.
- Minimising or avoiding adverse impacts on human health and the environment throughout the CCU/CCS life cycle, including the development of circular economy strategies.
- Strengthen public perception of CCU/CCS through education, information sharing, and community engagement.
- Develop robust life-cycle assessment (LCA) and techno-economic analysis (TEA) for full CCU/CCS-value chains and life cycles. Alternatively, a more complex sustainability assessment can be developed addressing social science and humanities (SSH) disciplines (e.g., sociology, social psychology, economics).
- Develop net negative $CO_2$ emission solutions, such as direct air carbon capture and storage (DACCS) or Biomass Carbon Removal and Storage (BiCRS).

In addition to proposing technological solutions, proposals must also address the environmental, social, and economic implications that might impact industry adoption of the proposed technology. Proposals for only environmental, social, and economic implications of existing and commercial-ready technologies are not eligible for funding.

## Expected impact

Funded projects will have a significant contribution to the green transition by accelerating development and deployment of CCUS technologies.

All projects must advance the state-of-the art for CCUS technologies and contribute new knowledge and new competence that brings CCUS closer to commercialisation.

The selected projects will address at least one of the following:

- lead to $CO_2$ capture at industrial-scale by early 2030s and $CO_2$ storage at mega ton scale also by early 2030s
- pave way for deployment of large-scale infrastructure for $CO_2$ capture from multiple sources, cross-border $CO_2$ transport, and $CO_2$ storage of tens of million tons $CO_2$ annually by mid 2030s
- be a bridge to implementation of $CO_2$ utilisation projects at industrial scale by early 2030s that have a sustainable and significant effect on reducing $CO_2$ emissions
- pave way for net zero or negative $CO_2$ emission technologies being deployed at industrial scale by mid 2030s

## Target TRLs

The aim is to support projects that move CCU/CCS technology to a higher TRL. Only projects ending at TRL 5 or higher will be eligible for funding. However, activities at lower TRLs may be included if they contribute to the higher TRL goal of the overall project.

The acceleration of CCU/CCS technology deployment also depends on costs, markets and supporting frameworks. The Australian Renewable Energy Agency (ARENA) has developed and applied the concept of a Commercial Readiness Index (CRI) as shown in the figure below. The CRI casts technologies in terms of their commercial value proposition and ability to obtain financing for deployment.

Proposals must illustrate how their projects will help accelerate the time to market of affordable, cost-effective, low environmental impact and resource efficient CCU/CCS technologies. References to CRI and TRL should be included in proposals.

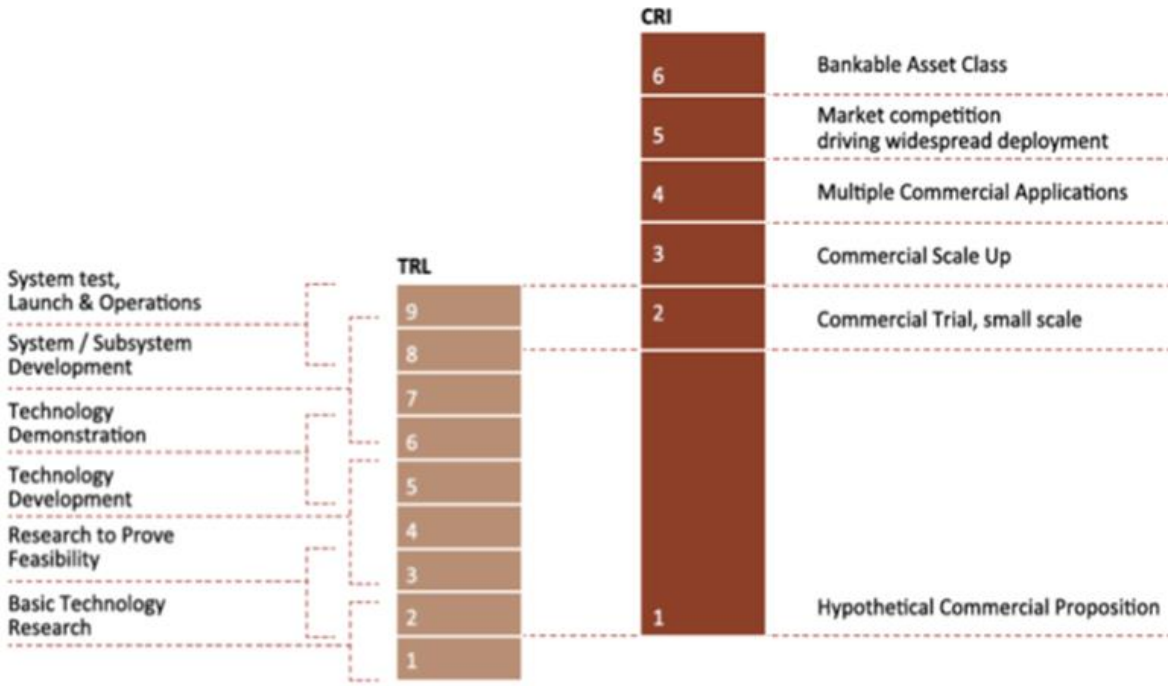


FIGURE 8.1. TECHNOLOGY READINESS LEVEL (TRL) AND THE COMMERCIAL READINESS INDEX (CRI)

## Project consortia

Project consortia may consist of partners from universities, companies, industry organisations, local/regional governments, research organisations and NGOs. Consortia must demonstrate the interest of industry partner(s) by actively involving them in the project as Project Consortium Partners.

Access to top class research infrastructure is key for reaching the objectives of this Call Module. Proposals should, if relevant, seek to maximise synergies with existing infrastructures, for example ECCSEL[47], members of the International Test Center Network[48], the Hontomin Technology Development Plant (TDP)[49] in Spain, and the Alberta Carbon Conversion Technology Centre (ACCTC)[50].

## Project duration/budget

Proposals must have a project duration between one and three years.

Proposals are expected to request a grant in the range of €1–5 million.



[47] European Research Infrastructure for CO2 Capture, Utilisation, Transport and Storage (CCUS), https://www.eccsel.org/

[48] https://itcn-global.org/

[49] http://www.enos-project.eu/sites/operational-storage-field-site/hontomin/

[50] https://innotechalberta.ca/facilities/alberta-carbon-conversion-technology-centre/

# CM2023-05 Hydrogen and renewable fuels

## Objectives

The objective of the Call Module is to facilitate the development and adoption of technologies for effective production, transport, storage and end-use of hydrogen and renewable fuels, including security aspects.

The ambition of the Call Module is to accelerate the time to market for hydrogen and renewable fuel technologies. This will require industrial involvement in research and innovation activities.

The Call Module seeks to finance innovative projects which can contribute, support, and provide results to future or already existing pilot and demonstration installations.

It is noted that at national level there might be specific goals within the global scope and objectives world call infrastructures that need to be checked by candidates when formulating the proposal, for eligibility.

## Scope

The Call Module on hydrogen and renewable fuels is launched within the scope of CETPartnership TRI3[51]. In the case of storage technologies there are various programmes covering R&D related to batteries, which justifies focussing on alternative solutions for storage, namely by using energy carriers. Hence, this Call Module aims to support projects on hydrogen[52] and renewable fuels technologies, from the production of the fuel to its end-use. The production of **hydrogen** plays a key role in any industrial society, since hydrogen can be used to store energy and for many essential chemical processes, as fuel to power electric motors via fuel cells, or as an input to produce e-fuels[53], biofuels and other hydrogen carriers like ammonia, or to power gas turbines. Further development of hydrogen technologies is necessary to reduce cost and improve process integration and business models.

Hydrogen can be produced from fossil fuels with CCS (so-called blue hydrogen), or from biomass or low-carbon power (so-called green hydrogen). Though water electrolysis has the advantage of producing extremely pure hydrogen (>99.9%), it is still possible to produce high purity hydrogen by natural gas reforming or gasification of biomass and other solid feedstocks (coal, waste plastics and municipal solid waste) through further hydrogen separation or purification.

Integration of hydrogen production and CCS offers significant opportunities for cost reduction. Commercial technologies for this type of hydrogen production are available but not implemented in large scale. **Biomass** can be used to produce different kinds of fuels. Production of hydrogen from biomass through anaerobic digestion, fermentation, gasification, or pyrolysis (all with bioenergy produced with CCS, i.e. BECCS) are at earlier stages of commercialisation. Hydrogen production with

[51] https://cetpartnership.eu/tri/3

[52] This includes hydrogen produced with maximum emission of 3 kg CO2eq/kg H2 (EU taxonomy).

[53] Electrofuels or e-fuels (synthetic fuels) are an emerging class of drop-in replacement fuels that are made by storing energy from renewable sources in the chemical bonds of liquid or gas fuels, aiming to be a carbon-neutral fuel. They are an alternative to aviation biofuel. The primary targets are butanol, biodiesel, and hydrogen, but include other alcohols and carbon-containing gases such as methane and butane.

BECCS is attractive as it would deliver negative emissions, although it would compete with other sources of demand for biomass.

Considering the production of hydrogen to store energy in situations of surplus of intermittent power production, further research efforts and developments are also needed, as it is the case of electrolysis using non-clean water sources.

The international focus on **renewable fuels** is growing steadily to achieve a carbon neutral society. Renewable fuels are environmentally friendly energy carriers and important flexibility options are required to achieve a sustainable energy system. Important for a net-zero energy system is the cost-effective provision of thermo-, photo- and electrochemical solar fuels, as well as the supply of advanced biofuels from sustainable biomass. Renewable fuel production, particularly when coupled with power-to-X (e.g. biogas or biosyngas upgrading and solar fuels) and CCUS, offers major opportunities for greenhouse gas mitigation and negative emissions. The provision of such renewable fuels is crucial for industry, as well as for the residential and transport sectors. Low-cost production of such fuels to meet the needs of specific market segments (heavy-duty road transport, shipping, aviation, heat and power generation) requires a clear entry strategy.

The use of **renewable ammonia** (made from sun, air, and water) is expected to increase for both fertiliser and e-fuels. The advantage of renewable ammonia is that its production does not require a $CO_2$ source, it is easy to transport, and it is an established commodity. Thus, ammonia can be produced at remote locations with access to cheap renewable electricity. Ammonia is not yet approved or tested as a fuel for transport applications (e.g. in marine engines), but there are ongoing projects to test the feasibility, also considering hazardous aspects regarding handling of ammonia.

**Electrofuels** (e-fuels/synthetic fuels made by storing energy from renewable sources) are expected to impact aviation and shipping in all countries, most likely as sustainable jet-fuel for aviation and as either ammonia or methanol for marine. For short distance ferries, batteries or hydrogen will be an option. The technology for producing e-fuels requires further development before reaching technical and commercial maturity.

In order to enable the most rapid introduction of new fuels, selected end-user application technologies are also supported within this Call Module.

The hydrogen and renewable fuels Call Module strives to be complementary to calls for proposals issued by the EC under the Horizon Europe Work Programme, in particular the calls from the Clean Hydrogen Partnership[54], the Circular Bio-based Europe Joint Undertaking[55], the Clean Aviation Joint Undertaking[56], the Towards zero emission road transport (2Zero)[57] and the Zero-emission Waterborne Transport[58], or other available instruments, including the national research programmes planned by the countries involved in this collaboration.

Projects must focus on the technology but are also required to address **cross-cutting dimensions** such as the environmental, social, and economic challenges required to accelerate the implementation of these renewable or low carbon, low-footprint fuels. However, projects dedicated

[54] https://www.clean-hydrogen.europa.eu/

[55] https://www.cbe.europa.eu/

[56] https://www.clean-aviation.eu/

[57] https://www.2zeroemission.eu/

[58] https://www.waterborne.eu/partnership/partnership/

to **cross-cutting dimensions** alone are not eligible for funding.

The Call Module seeks to finance innovative projects which can contribute, support, and provide results to future or already existing pilot and demonstration installations. Projects focusing on developing new pilot and demonstration facilities are required to illustrate the potential for upscaling to industrial size either in a demo phase or early commercial phase.

## Target topics

This Call Module will focus on the development and demonstration of innovative and cost-, energy- and carbon-/resource-efficient technologies for hydrogen and renewable fuels along the whole value chain.

### Hydrogen technologies

Considering that the Clean Hydrogen Partnership call for proposals covers well a large part of this R&D domain, and more specifically water electrolysis, hydrogen storage (in solid materials, high pressure and liquid form), transport and distribution and fuel cells development, the topics are limited to:

- New or improved processes for hydrogen production, as:
  - from water through new electrolysis concepts (alternative to AEMEC, Alkaline electrolysis, PEMEC and SOEC) or processes alternative to electrolysis, including high temperature or solar processes (solar hydrogen), or
  - e.g., blue hydrogen or hydrogen obtained from biomass or other resources (waste…), potentially coupled with CCS, including their integration with other processes like electrolysis
- Storage of hydrogen through ammonia or other hydrogen liquid carriers (like LOHC): for the production of ammonia, research into alternative, economically viable, less energy-intensive processes to the commercial Haber-Bosch process is encouraged
- Infrastructure and distribution aspects, including pipeline reuse and cost competitive materials for pipelines

### Renewable fuels

This topic is dedicated to new or improved processes and technologies for production of renewable fuels with low or zero carbon footprint, including biofuels and other synthetic fuels (such as e-fuels or solar fuels). Biomass and other feedstocks for the production of biofuels may be considered (taking into consideration the question of availability, cost, and competition with other uses). Different processes (thermo-, photo- and electrochemical, biological…) and their possible combination can be considered.

### Uses of hydrogen and renewable fuels

This topic aims to support projects on end-use technologies using hydrogen or renewable fuels, targeting in particular the following priority uses: heavy duty long-distance transport vehicles and machinery (road, off-road, rail, ship), power production, stationary residential use and industrial use.

Aviation would undoubtedly be a relevant field of application for sustainable fuels, however, there are numerous 2023 calls for proposals in HE (Cluster 5 Destination 5) respectively the Clean

Hydrogen and the Clean Aviation Partnership programme. This topic on uses of hydrogen and renewable fuels covers technologies for mobility, industry and residential use, such as:

- FCEV heavy duty, long-distance road transport vehicles
- FCEV locomotives
- FC off-road vehicles and mobile machinery (e.g. mining)
- Waterborne applications of hydrogen and renewable fuels
- New and innovative combustion concepts to substitute fossil fuels use in industry
- Combined heat and power systems with less than 30% output coming from electricity
- Stationary residential use

The projects should focus on system solutions at vehicle level based on component developments and include fuel station technologies for hydrogen and renewable fuels. In terms of fuel transformation technologies, fuel cells or combustion engines can be considered, depending on the targeted application.

**Cross-cutting issues** related to the uses of hydrogen and renewable fuels, such as the suitability of the fuel (hydrogen, ammonia, methanol, methane…) and the technology using it to the specifications of the targeted uses, pollutant emissions (e.g. NOx for combustion processes), safety of use, stability and ageing of the fuels, etc. will be considered.

### Cross-cutting issues

Projects are required to consider **cross-cutting issues**, such as:

- Consumer attitudes, risk perception and the levers which could influence consumer behaviour
- Life cycle, techno-economic and environmental impact analyses, including water, land and energy consumptions aspects
- Barriers, opportunities, and solutions to scaling up
- System analysis and integration of processes in the energy system, continuity/intermittence
- Digitalisation as part of the project

## Expected impact

Projects funded under this Call Module are expected to have a significant bearing on accelerating the development and use of hydrogen and renewable fuel technologies and provide results showing significant $CO_2$ reduction by 2030.

Supported projects are expected to deliver results that have a significant impact on promoting the deployment of new and cost-efficient technologies with a significant contribution to the green transition.

## Target TRLs

This Call Module aims at supporting projects to reach TRL 5 or above by the end of the project. Activities with lower TRLs may be included if they contribute to the higher TRL goal of the project.

## Project consortia

Consortia may consist of partners from universities, companies, industry organisations, local/regional governments, research organisations and NGOs.

Consortia may consist of partners **across several positions and disciplines** within research and development systems (i.e., fundamental targeted research, applied research, innovation, business etc.) in a way that the project aims at reaching TRL 5 or above by the end of the project. The consortia are required to demonstrate the interest of industry partner(s) by actively involving them in the project.

Consortia must demonstrate the interest of industry partner(s) by actively involving them in the project as Project Consortium Partners.

## Project duration

Proposals within this Call Module must have a project duration between one and three years.

# CM2023-06 Heating and cooling technologies

## Objectives

The CETPartnership Transition Initiative Heating and cooling (TRI4[59]) will contribute to Challenge 4, "Efficient zero emission Heating and Cooling Solutions", formulated in the CETPartnership SRIA[60].

This initiative's overarching goals are to provide enhanced and improved heating and cooling technologies and systems for all major parts or climate zones of Europe by 2030 and to enable 100% climate-neutral heating and cooling by 2050. The energy crisis caused by the war in Ukraine has clearly shown that Europe needs to repower and rethink its heating and cooling policy (ref. REPowerEU[61]). Better, cheaper, easier applicable and climate-neutral heating and cooling technologies are needed to provide thermal comfort while phasing out fossil fuel-fired dependence.

The **objective** of successful projects, developing technologies, methods, knowledge or innovations should be the following:

- For pilots and demos (aiming towards TRL 7, 8 or 9 after project completion), the innovation must enable cost reduction and/or an increase in competitive market opportunities and/or environmental protection compared to state-of-the-art today. Innovations impacting societal acceptability, safety, and/or circularity are also within scope. Pilots and demos are realised in the operational environment, in 'real life'.
- For applied research and development (aiming towards TRL 5 or 6 after project completion), the project's output must enable significant cost reduction and/or a significant increase in competitive market opportunities and/or environmental protection and/or better tools and methodologies compared to state-of-the-art today. Innovations significantly impacting societal acceptability, knowledge development, experience sharing, safety, and/or circularity are also within scope. Such projects have a valid proof-of-concept before starting and typically develop the innovation in detail in a laboratory or similar environment.

This Call Module (**CM2023-06**) complements various Call Modules in the CETPartnership Joint Call:

- PV/T is covered in **CM2023-03** (TRI2).
- Concentrated solar power is covered in **CM2023-03** (TRI2), while concentrated solar for thermal applications in the industry is covered by this Call Module (**CM2023-06**).
- Geothermal energy technologies are covered in **CM2023-07**.
- Thermal storage *technologies* to be integrated into the built environment or industrial applications are covered in this Call Module, whereas thermal storage technologies with a focus on subsurface utilisation are referred to in **CM2023-07**.
- Projects focusing on integrating heating and cooling in regional or industrial energy systems or the built environment are referred to **CM2023-08**, **-09**, and **-10A/10B**, respectively.
- In case of doubt where to best propose your project, consult with your funding organisation.

## Scope

[59] https://cetpartnership.eu/tri/4

[60] https://cetpartnership.eu/sites/default/files/documentation/CETP%20SRIA_v1.0_endorsed_compressed_0.pdf

[61] https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131

This Call Module targets innovation in all relevant areas for developing a secure, sustainable, competitive and affordable climate-neutral heating and cooling supply (Figure 8.2). Projects should address one or more of the following areas:

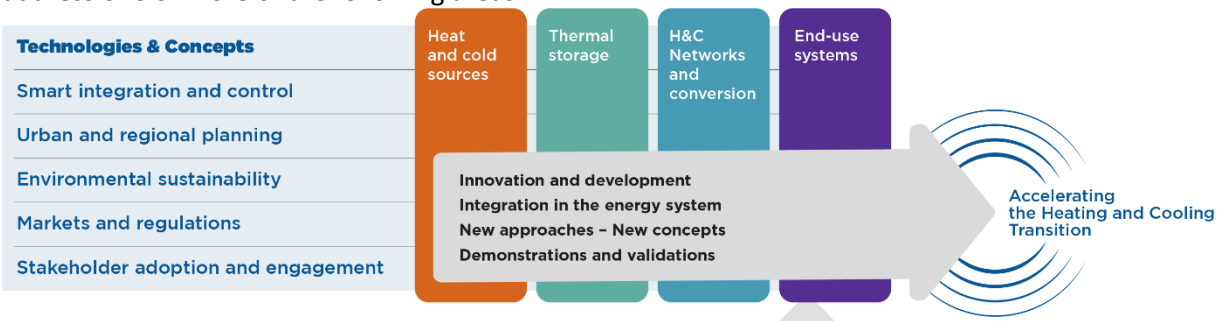


FIGURE 8.2. SCOPE MODULE 6 HEATING AND COOLING TECHNOLOGIES.

- **Heat and cold sources**, Innovative approaches for solar thermal, local and regional excess resources, renewable cooling technologies, concentrated solar for (industrial) thermal energy purposes, ambient heat and cold from the air, surface water, sewers etc., biomass and organic waste and excess heat from industry.
- **Thermal storage,** new storage technologies and storage-related innovations aiming at, e.g. small-scale hour-to-day thermal storage in industry and the built environment, smart systems balancing supply and demand, excess power to thermal energy, seasonal thermal storage integrated into a building or DHC (District heating and cooling) system.
- **Heating and cooling networks, conversion**, and integration, including but not limited to innovations for more cost-efficient heating and/or cooling networks and their operation, retrofit of heating and/or cooling networks, conversion technologies such as heat pumping technologies, in the built environment and industry.
- **End-use systems:** innovative distribution systems within the end-user system (typically a building or a home) are relevant to the heating and/or cooling system because the temperature level matters.

Across these themes, the horizontal bars indicate essential 'areas of interest to adopt innovations in society'– including applications in buildings and meeting the industry's demand. The vertical bars indicate the technological scope. The arrow in the figure symbolises the forward and future-oriented approach that builds on these various aspects.

The projects resulting from this Call are expected to encompass projects both relating to the built environment or industrial end-users. For the built environment, the projects may focus on district heating and/or cooling systems and other collective systems, but also on individual solutions.

Proposals are expected to explain their contribution to the objectives of the Call Module and quantify this contribution to the extent that this is possible. Successful projects in the Call Module should contribute to one or more relevant **cross-cutting**, non-technological themes whenever appropriate. A close interconnection between sources and their temperature level, conversion and distribution technologies, flexibility for the energy system and end-user requirements should be sought for heating and thermal storage operations. Projects should demonstrate their market relevance and potential impact.

**Project Consortium Partners must ensure that their proposed work agrees with the funding instrument of their relevant funding organisation – consult Annex B to this Call Module.**

## Expected impact

Projects funded by this Call should improve business cases and/or increase the competitive market opportunities and environmental protection, compared to state-of-the-art today, through research and innovation. The projects' results must emphasise market-driven innovation activities, aimed to be ready for large-scale implementation by 2030. However, projects may include lower TRLs depending on national funding rules.

Project outcomes are expected to help accelerate the time to market of secure, sustainable, competitive, affordable and climate-neutral heating and/or cooling solutions. Projects can also focus on bringing upcoming technologies to a level of validation in a relevant environment or integrating their activities into already viable and ongoing demonstration or piloting projects.

This Call Module envisages technical projects that develop innovations or new solutions that may address **cross-cutting topics** such as economic modelling, social aspects, environmental concerns, etc. The projects are encouraged to consider **cross-cutting topics** in their work explicitly. However, Project Consortium Partners must ensure that their proposed work meets national funding instruments. Proposals that exclusively consider research on sustainability or social acceptance cannot be funded.

## Target TRLs

Projects are expected to demonstrate real progress and target to bring the TRL of their innovation to TRL 5, 6, 7, 8 or 9 after project completion.

Projects need to assess the TRL (i) before their work and (ii) indicate by how many levels the technology readiness advances in case of a successful outcome of their project. Projects need to aim at advancing towards TRLs 5, 6, 7, 8 or 9. There will be an emphasis on market-driven projects aimed to be ready for large-scale implementation by 2030. However, projects may include lower TRLs depending on national funding rules.

The overall TRL of the project will not be defined (different from most definitions) by the subproject/work package with the lowest TRL.

## Project consortia

This Call Module encourages innovative entrepreneurs in small, middle-sized, and large companies, and researchers at research organisations, and academia to propose. In many partner countries, local and regional governments are also eligible for funding and could be part of consortia.

Active involvement of the private sector and/or organisations that will own new demonstrators/installations developed as part of the project is highly recommended. Likewise, project leadership from such organisations is encouraged, in particular to maximise the impact of technological development in the private sector.

The Call Module encourages consortia with a broad geographic spectrum. Each project consortium must demonstrate the alignment with the respective funding bodies' national interest (see national/regional Annexes) and demonstrate the Project Consortium Partners' competence to implement the project.

# CM2023-07 Geothermal energy technologies

## Objectives

The CETPartnership TRI4[62] Heating and cooling and TRI2[63] Power technologies aim to contribute to their respective Challenges in the CETPartnership SRIA[64], by launching this Call Module for geothermal energy in the Call.

The Call Module will address a broad range of geothermal energy-related innovation, development and research projects, for heating and cooling, power generation, underground thermal energy storage (UTES), and the co-production of geothermal minerals.

The **objective** of successful projects, developing technologies, methods, knowledge or innovations, should be the following:

- For pilots and demos (aiming towards TRL 7, 8 or 9 after project completion), the innovation must enable cost reduction and/or an increase in competitive market opportunities and/or environmental protection compared to state-of-the-art today. Innovations significantly impacting societal acceptability, safety, and/or circularity are also within scope. Pilots and demos are realised in the operational environment, in 'real life'.
- For applied research and development (aiming towards TRL 5 or 6 after project completion), the project's output must enable significant cost reduction and/or a significant increase in competitive market opportunities and/or environmental protection and/or better tools and methodologies compared to state-of-the-art today. Project output significantly impacting societal acceptability, knowledge development, experience sharing, safety, and/or circularity are also within scope. Such projects have a valid proof-of-concept before starting and typically develop the innovation in detail in a laboratory or similar environment.

This Call Module complements various Call Modules in the CETPartnership joint Call. In case of doubt where to best propose your project, consult with your funding organisation.

- Thermal storage with a focus on geological storage is covered in this Call Module (**CM2023-07**), while **CM2023-06** focuses more broadly on thermal storage technologies.
- Projects focusing on the *integration* of geothermal energy and thermal storage in regional or industrial energy systems or the built environment are referred to as **CM2023-08**, **-09**, and **-10A/10B**, respectively.

## Scope

1This Call Module targets innovation, research and development in how geothermal energy is supplied and integrated into Europe's future energy system. The scope includes:

- Geothermal energy for heating and cooling
- Geothermal energy for power generation
- Underground thermal energy storage (UTES)
- Geothermal energy with the co-production of minerals

[62] https://cetpartnership.eu/tri/4

[63] https://cetpartnership.eu/tri/2

[64] https://cetpartnership.eu/sites/default/files/documentation/CETP%20SRIA_v1.0_endorsed_compressed_0.pdf

Successful projects may address one or more of the three themes shown in Figure 8.3, which cover all stages in the development cycle of a secure, sustainable, competitive, and affordable geothermal installation.

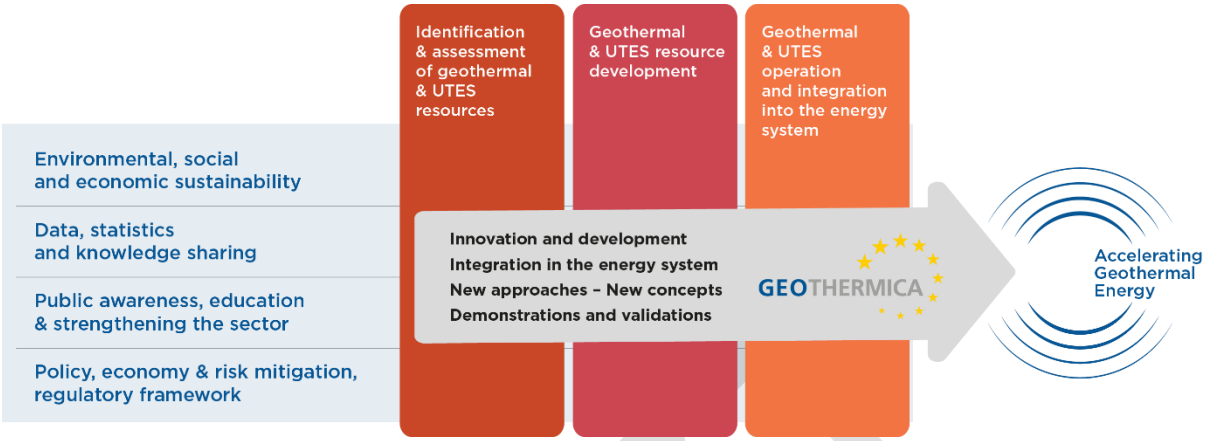


FIGURE 8.3. SCOPE CALL MODULE 7 GEOTHERMAL ENERGY TECHNOLOGIES

- **Identifying and assessing geothermal and underground thermal energy storage (UTES) resources, reserves and reservoirs:** Innovative and improved prospecting and exploration techniques and modelling methods to identify and assess geothermal resources at all depth levels.
- **Geothermal & underground thermal energy storage (UTES) resource development:** New drilling and well completion technologies, reservoir optimisation, stimulation and innovative systems to manage induced seismicity.
- **Geothermal operation and integration into the energy system:** Innovative concepts with geothermal energy as part of the energy system; geothermal reservoirs for heating, cooling and storage; innovative power cycles; novel revenue streams from additional side benefits from geothermal utilisation (such as mineral extraction); innovative applications in the built environment and industry. For operation, novel approaches to improve well injectivity and reliability and availability of injection operations; novel equipment, materials and methods for lowering and optimising operating expenses; disruptive smart reservoir management technologies; and innovative approaches to managing induced seismicity during production.

Across these themes, four **cross-cutting**, non-technological thematic aspects are relevant for 'Geothermal Energy Technologies'; sustainability and safety, knowledge sharing, enhancing public awareness and the sector's strength, and activities related to policies and regulations (Figure 8.3). Proposals are expected to explain their contribution to the objectives of this Call Module and quantify this contribution to the extent that this is possible. Successful projects in this Call Module should contribute to one or more relevant **cross-cutting**, non-technological themes. A close interconnection between sources and their temperature level, conversion and distribution technologies, flexibility for the energy system and end-user requirements should be sought for heating and thermal storage operations. Projects should demonstrate their market relevance and potential impact. The Call Module considers all geological depth levels.

**Project Consortium Partners must ensure that their proposed work agrees with the funding instrument of their relevant funding organisation – consult the national Annexes to this Call Module.**

## Expected impact

Projects funded by this Call should improve business cases and/or increase the competitive market opportunities and/or improve tools and methodologies and/or environmental protection, social acceptability, strategic knowledge, safety and/or circularity for geothermal energy. The projects' results must emphasise market-driven innovation activities, aimed to be ready for large-scale implementation by 2030. However, projects may include lower TRLs depending on national funding rules.

Project outcomes are expected to help accelerate and implement geothermal energy solutions. Projects can also focus on bringing upcoming technologies to a level of validation in a relevant environment or integrating their activities into already viable and ongoing demonstration or piloting projects.

This Call Module envisages technical projects that develop innovations or new solutions that may address **cross-cutting topics** such as economic modelling, social aspects, environmental concerns, etc. The projects are encouraged to consider **cross-cutting topics** in their work explicitly. However, Project Consortium Partners must ensure that their proposed work meets national funding rules. Proposals that exclusively consider research on sustainability or social acceptance cannot be funded.

## Target TRLs

Projects are expected to demonstrate real progress and target to bring the TRL of their innovation to TRL 5, 6, 7, 8 or 9 after project completion.

Projects need to assess the TRL (i) before their work and (ii) indicate by how many levels the technology readiness advances in case of a successful outcome of their project. Projects need to aim at advancing towards TRLs 5, 6, 7, 8 or 9. There will be an emphasis on market-driven projects ready for large-scale implementation around 2030. However, projects may include lower TRLs depending on national funding rules.

The overall TRL of the project will not be defined (different from most definitions) by the subproject/work package with the lowest TRL.

## Project consortia

This Call Module encourages innovative entrepreneurs in small, middle-sized, and large companies, and researchers at research organisations and academia to propose. In many partner countries, local and regional governments are also eligible for funding and could be part of consortia.

Active involvement of the private sector and/or organisations that will own new demonstrators/installations developed as part of the project is highly recommended. Likewise, project leadership from such organisations is encouraged, in particular to maximise the impact of technological development in the private sector.

This Call Module encourages consortia with a broad geographic spectrum. Each project consortium must demonstrate the alignment with the respective funding bodies' national interest (see national/regional Annexes) and demonstrate the Project Consortium Partners' competence to implement the project.

# CM2023-08 Integrated regional energy systems

## Objectives

The objective of this Call Module is to build Energy Transition Ecosystems all over Europe. The focus is on local and regional energy systems with the need owners[65] of specific regions[66] in the centre with projects that bring them together on a European level. The intention is to fund a portfolio of projects dealing with solutions for different regional characteristics. The characteristic can be described freely by the consortium, according to their perception what is of relevance in their specific geographical context for example an industrial or agricultural setting, wind or solar dominated system, and may or may not include specific infrastructure like heating grid, geographical terrain (plains or mountains), etc.

**An Energy Transition Ecosystem can have specific characteristics such as:**

- Located in a geographical context and has specific characteristics (urban, rural, agricultural, industrial, islands, etc)
- Enabling a secure, resilient and $CO_2$-free regional energy supply for a specific regional context
- Use of flexibility of locally and regionally available energy sources, often with a focus on increasing security and resilience
- Meeting the individual local and regional requirements in terms of generation, demand, and goals
- Sustainable use and optimisation of local and regional infrastructures and local and global resources
- Use of synergies for user and consumer structures from different sectors (including, for example, municipalities, industrial plants or the transport system) and associated consumption patterns

The aim is to initiate projects driven by consortium of need owners in a regional / geographical context with the intent to develop model system solutions. These solutions should provide opportunities and synergies for active participation in the energy system and have a high potential for implementation. Scaling up in this context means that there is a high potential for replicability of the solution in similar environments across Europe.

The target for this Call Module is to demonstrate how local stakeholders, regulation and markets enable various technologies on different levels to work together in an integrated system. The development of regional and local energy systems should be orchestrated within framework which reaches and impacts the maximum number of relevant stakeholders. Important local community and regional stakeholders include but are not limited to: municipalities, innovation clusters, ecosystems and programmes, small and medium-sized enterprises (SMEs), infrastructure providers and operators, etc. Interregional and transnational innovation ecosystems such as cluster networks, start-ups networks, etc. are also relevant.

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65 “Need-owner” refers to the role of an entity (e.g. public agency, local/regional authority, energy grid manager/owner, company, building owner etc.), that seek a solution to a specified need (problem) within its area of operation. The “need-owner” has practical insights into what the actual need is and an interest to be involved in the development of a solution. This ensures the development of an optimal solution and facilitates the “need-owner(s)” acceptance and implementation of the solution. There can be more than one “need-owner” to the same need.

66 By “region” we mean the cluster represented by assets and actors of local economy and community that can contribute to the energy exchanges and flows.

This Call Module does not focus on the technological development of individual solutions, but on appropriate system solutions in the specific regional context. Characteristics of potential initiatives may include:

- Encourage consortia to further develop already existing regional initiatives by adding either new aspects/objectives or new partners
- Connect to ongoing or recently finished demonstration projects and thereby utilise pre-existing test infrastructure, knowledge, cooperation of key demos, transfer of results, opening-up, etc.
- Design the structure around integrated approaches, involving **cross-sectoral and interdisciplinary research and innovation**
- Refer to existing local/regional climate, energy and implementation plans or roadmaps

Therefore, projects should focus on regionally anchored ecosystems with the need owners of the region and bring them together at European level.

**Expectations for the transnational collaboration:**
Energy Transition Ecosystems can be found in a broad range of settings for example: large urban systems, the integration of municipalities or smart energy communities, and often include the integration of multiple sectors like industry, agricultural, public or tourism.

The transnational cooperation of these ecosystems will help foster a deeper understanding of the different infrastructural and socio-economic contexts. The transfer of knowledge and the transfer of solutions to other regions with similar conditions will attract larger market players, more efficient use of resources and accelerate co-transition of regional energy systems. The benefit of addressing **cross-cutting issues** in a transnational approach ensures that learnings can be shared and create robust transition pathways across Europe.

## Scope

The scope of this Call Module is the creation of resilient and secure energy transition regions, which efficiently provide, host, and utilise high shares of renewables in the dynamic local or regional supply by 2030. A crucial corner stone for this Call Module is the mission driven focus where relevant local and regional stakeholders (need-owners) have a central role in the problem definitions and in the implementation of the project.

These integrated local and regional energy systems must be validated by transnational cooperation on the European level. Such systems shall provide replicable solution models that both meet the individual local and regional requirements and demand, as well as provide scalability and replicability on a national and transnational level.

## Target topics

Challenges that the projects may address:

### Regional aspects

- Develop integrated regional and local energy systems that enable a secure, resilient and fossil free regional energy supply, up to and beyond 100% in the dynamic local or regional

supply

- Increase renewable energy supply (RES), electric vehicles (EV) and storage hosting capacity of distribution systems to reduce energy dependence
- Leverage synergies and utilise flexibilities in locally and regionally available energy sources (including aspects of heating, cooling, electricity and local fuels) and involve **cross-sectoral integration** of multiple (economic) sectors like transport, industry, trade, and so on
- Include regional infrastructures as well as user and consumer structures driven by local municipalities, communities, industry and stakeholders from different sectors

### Contribution to a secure and resilient European energy system

- Participation in inter-regional exchange of energy (e.g. city, rural areas)
- Demonstrate the ability of providing management of flexibility by cross-energy vector coupling and by efficiently integrating different energy carriers
- Contribute to interoperability in developing harmonised business processes for solutions
- Coordinate and link research activities with e.g. living labs to facilitate the development and field-testing of prototypes
- Develop regional climate strategies and Key Performance Indicators (KPI's) for climate neutral energy systems can guide policy makers and actors when adopting market design on European level

### Market aspects

- Enable citizens, need-owners, and other stakeholders to take part in the related value chains
- Develop appropriate market and business models
- Focus on large scale markets for solutions and technologies
- Define target groups for the solutions

### Partnership aspects

- Make a clear and locally relevant problem definition at the core of a process of interaction and iteration
- Define the target groups to answer the problem definition and achieve the goals
- Build partnerships for achieving strong relationships within the right target groups

### Policy aspects

- Insights on how to overcome challenges and barriers related to governance, decision-making and the legal framework
- Guide regulatory frameworks for adaption in order to accelerate the energy transition

## Expected impact

Projects funded under this Call Module are expected to contribute both to specific local and regional energy- and climate objectives and, at the same time, have a larger energy system relevance. The

Projects, that are related to system integration, should use the Three-Layer Research Model [67]as a framework for their expected impact.

**Expected impact of the projects in the framework of the Three-Layer Research Model:**

- **Transition (Stakeholder Adoption)**
  - Active engagement of diversified stakeholders in the local and regional energy context including spatial planning and business development
  - Educated citizens respecting the importance of regional energy infrastructure as a key enabler for the energy transition
  - Solutions to overcome energy poverty with a goal of presenting the feasibility and usefulness of local energy supply

- **Marketplace**
  - Practical business and market models to unleash flexibility potentials on regional level including sector coupling
  - Adopted models to assess critical needs of multiple stakeholders as a contribution that will harmonise European framework conditions
  - Guidance on how to create local and regional value with sustainable energies

- **Technology**
  - Replicable and scalable model solutions as well as tools and guidelines for replicable innovation processes, where innovation is on a system level
  - Demonstrated integration or coupling of different energy sectors
  - Modernise and improve infrastructure (especially smart grids) as a key factor
  - Evolve and adopted models for interoperability in harmonised business processes and data exchange

## Target TRLs

Technical research and innovation in projects should target at solutions within TRL 5–9. Activities with lower TRLs (3–5) may be included if they contribute to the higher project goal.

Furthermore, given that projects in this Call Module are required to structure around integrated approaches, involving **cross-sectoral and interdisciplinary research and innovation**, the Readiness Level should be considered along more holistic approaches. In the absence of an equally established and commonly used readiness concept, this can be described, for example, by the Societal Readiness Level (SRL) defined according to Innovation Fund Denmark[68].

The expectation is that projects in this Call Module will target solutions with a SRL in the interval SRL 5–8. If other Readiness Indicators such as System Readiness Level, Market Readiness Levels or alike are already in use nationally or seem more appropriate they can also be used.

Please refer to national funding agency requirement for more specific TRL and SRL requirements.

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[67] The Three-layer Research Model is a framework that facilitates a structured approach to fostering innovation in project design. The model has a proven track record in Smart Grid development throughout Europe where it has contributed to compatibility, intermobility, scalability, and replicability. The different layers are transition, marketplace and technology. See also **Section 1.2**.

[68] https://innovationsfonden.dk/sites/default/files/2019-03/societal_readiness_levels_-_srl.pdf

## Project consortia

This Call Module aims to create a culture which is conducive to innovation, allowing both companies and regional ecosystems to evolve over time. It is desirable to have projects driven by local and regional stakeholders (as defined above) working in close liaison with relevant research organisations and solution providers from the public and private sectors.

**Target groups include the following entities:**

- Local and regional authorities, stakeholder groups, aggregators
- Private and public need-owners, institutions and citizens, especially involving diversified stakeholders intent on implementing innovative and **cross-sectoral integrated solutions**
- Solution providers: technology product and system developers, service providers, etc.
- R&D institutes, local and regional innovation clusters, programmes and ecosystems, technology transfer agencies, triple helix organisations, and so forth

Projects should reflect the needs of a region of interest and cover as many local target groups as possible. Furthermore, the consortium should be able to implement the outlined exploitation plan successfully and independently after the end of the project.

For proposals that intend to work with former ERA-Net Projects, Demonstration, Real-Lab or Living-Lab approach, it is recommended to consider the JPP SES Living Labs and Testbeds Network[69] when looking for partners. For Matchmaking opportunities please register at the CETPartnership platform[70].

For proposals that intend to work with data service solutions, it is recommended to consider the JPP SES network of Digital Platform Providers[71] when looking for partners.

[69] https://www.eranet-smartenergysystems.eu/Partners/Living_Labs

[70] https://clean-energy-transition-partnership-2023.cetp.b2match.io/home

[71] https://www.eranet-smartenergysystems.eu/Partners/Digital_Platform_Providers

# CM2023-09 Integrated industrial energy systems

## Objectives

The Call Module for Integrated Industrial Energy Systems (TRI6[72]) **aims at developing and demonstrating a set of technical solutions for integrated industrial energy systems that enables efficient carbon-neutral industrial production sites and takes industrial energy systems into development as part of the entire energy system**. TRI6 focuses specifically on **integrated solutions across industries, across energy sectors and across public and private sectors** according to the CETPartnership SRIA[73].

Special emphasis in the Call Module is placed on solutions for system- and process-level integrations for efficient industrial power, heating, and cooling. The main industries that are considered include iron & steel, cement, pulp & paper, chemical, and food and beverage industries.

The Call Module will contribute to an innovation-based growth of the European economy and the European energy transition by supporting projects that accelerate the development of clean technologies by capitalising on synergies between programmes, both nationally and internationally, as well as by addressing **key cross-cutting issues**, lead to faster market uptake, upscaling, and increased EU´s technological independence and global competitiveness[74]. Projects are expected to increase their TRL up to 7 throughout the project duration so that they move closer to commercial readiness.

The Call Module will address topics such as sustainability, circularity, environmental impact, integration with local and regional energy systems, energy storage, CCUS and digitalisation and Artificial Intelligence. There are synergies with TRI3 and TRI5.

## Scope

In the future, electricity will play a significant role as a “primary” energy source for the industries and new innovations are needed to accomplish the transformation of industrial electrification. Further, a large share of the industrial energy supply shall be based on renewable sources. Where carbon emissions cannot be avoided, $CO_2$ shall be captured, utilised for production of preferably long-lifetime products, or permanently stored. To produce negative emissions, capture, utilisation in long-lifetime products and storage of biogenic $CO_2$ from the exhaust gases, i.e., bio-CCUS, is an option.

While the energy transition of industries advances, industrial energy systems shall integrate with local, regional, and national heat and power networks and systems. Moreover, the energy and industrial systems shall together integrate as renewable power will also be used to produce hydrogen which can be utilised as energy carrier or raw materials in industrial processes or with $CO_2$ utilisation (CCU) to synthesise e-products for the replacement of fossil-based fuels and chemicals.

The integration of industrial energy systems with local, regional, or trans-regional energy systems supports national and European goals for carbon neutrality. As research, development, and

[72] https://cetpartnership.eu/tri/6

[73] https://cetpartnership.eu/sites/default/files/documentation/CETP%20SRIA_v1.0_endorsed_compressed_0.pdf

[74] https://setis.ec.europa.eu/set-plan-progress-report-2022_en

innovation activities (RDI) for industrial carbon-neutrality are already funded at a national level in many countries, a broader experience and knowledge sharing at an international level will be an advantage. Transnational co-operation will boost efficient technology transfer and leverage complementarities for building competitive European value chains.

## Target topics

This Call Module is in line with the REPowerEU Plan[75] and focuses on the need for reducing energy consumption, substituting fossil fuels, and accelerating Europe's clean energy transition to bring down emissions and dependencies[76]. Therefore, this Call Module welcomes proposals for research, development and innovation projects that contribute to one or more of the following challenges:

### Challenge 1 – Reducing emissions from the industrial energy system

Funding in this area is directed to projects that contribute to reducing the industry's process-related greenhouse gas emissions and other emissions such as certain combustion emissions and diffuse emissions linked to process-related emissions. The objective is to finance technological leaps and to support industry's ambitions to change to more sustainable production.

Process-related emissions refer to emissions directly from industrial processes according to environmental reporting as well as to emissions that occur during the combustion of residual products from fossil raw materials in production processes, such as flaring of industrial residual gases. Emissions with an indirect connection to industrial processes are, for example, combustion emissions from on-site power and heat production.

Projects that focus on reduction of indirect emissions from industry can only be supported in cases where a reduction in direct emissions from processes is also included in the project or when they involve a technological leap for the industry. Therefore, projects that only involve conventional fuel changes will not be funded.

### Challenge 2 – Integrating energy and resource efficient industrial energy systems

Funding in this area is directed to projects that increase knowledge and develop new and innovative processes and system integrations that improve sector coupling in an energy and resource efficient way between industrial energy systems and the energy system in general. **System-level integrations across sectoral boundaries** will provide support for a more flexible and robust European energy system based on a high degree of intermittent energy sources.

The projects in this area can include the role of industry in a larger perspective, i.e., integration between different industries or integration between an industrial site and the surrounding local or regional energy system, to create an energy- and resource-efficient system from a holistic perspective. The area thus comprises industrial and **cross-sectoral symbiosis**, including new industrial and system-integrated structures, i.e., projects that study physical exchanges of energy, material or residual streams in the form of, for example, excess heat or cool, operational and

[75] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2022:230:FIN

[76] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en

municipal wastes, residual materials and residual flows. This area can thus help to create circular economy solutions for the industry and local communities and regions.

### Challenge 3 – Removing carbon emissions from the carbon cycle in industrial energy systems

Funding in this area is directed to projects that can contribute to removing industrial greenhouse gas emissions from the carbon cycle through emission separation combined with long-lifetime utilisation or long-term storage of carbon. Funding is also directed to projects that address the possibility for industries to implement CCU to produce energy products/synthetic fuels from their $CO_2$ emissions. Such chemical energy carriers could serve as energy storages and support balancing of the renewable-based future energy system. CCU production pathways might involve bioprocesses, e.g. with algae, or synthesis processes with clean hydrogen. Implementation of CCU, hence, might open new business opportunities beyond today's industrial production.

Special emphasis is put on greenhouse gas emissions of biogenic origin and on $CO_2$ taken out of the atmosphere so that effective long-term removal of carbon emissions from the carbon cycle can be achieved.

## Expected impact

The expected impact from projects that are funded in the Call are that they contribute to making European industry a part of a climate-neutral economy. Funded projects will strive to:

- increase European industry's competitiveness
- support the development and pre-commercialisation of future disruptive technologies
- support a wider use of renewables and alternative energy sources as well as emission control technologies for reducing industrial emissions
- integrate renewable energy into the industrial energy system to aid increased industrial electrification
- increase resource -and energy efficiency of industrial energy systems through novel process and system integrations
- increase circularity through, for example CCU or the reuse of waste heat
- Increase the use of Bio-CCUS in industrial processes
- develop sustainable bioenergy and biofuels
- develop and integrate hydrogen-based technologies into the industrial energy system and infrastructures

Projects that are funded are expected to provide solutions to the challenges in the Call Module through new knowledge, skills, and technologies. The funded projects will also be expected to use need-owners, industrial advisory boards and/or a challenge driven approach to improve fit with industrial needs, to foster industrial acceptance and to boost exploitation of research results. Projects shall participate in CETP's working groups and workshops to share information, knowledge, ideas, and results to strengthen national and regional research, development and innovation policies.

## Target TRLs

This Call Module supports projects with TRL 3 to 7. Projects are encouraged to advance solution development towards TRL 7 by the end of the project so that the consortium members are ready to

apply for follow-up funding for piloting or demonstration projects from other funding programmes like EU´s Innovation Fund[77]. This to drive clean energy solutions faster towards commercial readiness and contribute to a more competitive European industry and a sustainable and de-carbonised European energy system based on renewable energy sources.

## Project consortia

A project consortium is expected to include the following types of actors:

- Companies such as industrial companies, suppliers of technology and services
- Research institutes
- Universities and colleges' social science, humanities, technology, economic and science disciplines
- Municipal companies and other public sector organisations

Projects must involve industrial need-owners in the projects to provide for faster market diffusion, upscaling, and replication of solutions. If universities or research institutes are project leaders, they must have at least one need-owner attached to the project. If the project leaders are companies, their customers can be seen as need-owners so there is no need to attach a specific organisation to the project.



[77] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/programmes/innovfund

# CM2023-10A/10B Clean energy integration in the built environment

## Objectives

The Call Modules **CM2023-10A/10B Clean energy integration in the built environment** cover both ROA (Research-Oriented Approach) and IOA (Innovation-Oriented Approach) projects.

The Call Modules' content is defined according to the CETPartnership SRIA[78], elaborated according to the CETPartnership principles, seeking coordination with the SET Plan IWG5 (Implementation Working Group on Energy Efficiency in Buildings), IWG3 (Implementation Working Group on Positive Energy Districts(PED) as well as different ETIPs and covers the objectives of CETPartnership TRI7: Integration in the built environment[79].

The CETPartnership SRIA proposes a wide picture of improvements in the field. The scope is organised around **new developments in integration and conversion of renewable energy in the built environment and digitalisation in the whole building life cycle**. In these Call Modules, particular emphasis is put on the interface with and the integration in the built infrastructure.

The Call Modules are intended to establish a portfolio of new solutions covering a fundamental part of the CETPartnership SRIA regarding RDI for integration in the built environment.

The Call Modules aim to enable transnational projects which develop and provide new solutions for the built environment from a pure energy consumer towards becoming a prosumer (producer-consumers) of renewable energy and from a passive to an active role in the future energy landscape.

This should be achieved by focusing on the physical, technical and (where applicable) aesthetical integration of clean energy conversion technologies for power, heat and cold into buildings and more generally into the built infrastructure which thereby become integrated and active parts in energy networks (power, heat and cold).

The integration of electricity and heat storage as well as the integration of mobility concepts is also in the focus of these Call Modules.

RDI proposals should include the integration aspects in order to identify the expected role played in the built environment, reflecting the New European Bauhaus (NEB) integrated approach. The proposals should demonstrate their contribution to technology improvements through new solutions and capabilities, proof of concepts or optimisations including formalised test and validations.

Projects can apply either as ROA (**CM2023-10A**) or IOA (**CM2023-10B**) based on the target TRLs.

## Scope

The scope of these Call Modules is to transform the built environment from a passive towards an active role in the future energy landscape. Two challenges are defined, namely:

[78] https://cetpartnership.eu/sites/default/files/documentation/CETP%20SRIA_v1.0_endorsed_compressed_0.pdf

[79] https://cetpartnership.eu/tri/7

- Challenge 1: Integrate renewable energy conversion technologies for power, heat and cold in buildings. Connect the buildings in networks. Integrate energy storage, zero emission fuel, and activate building parts as energy storage. (Measures contribution to $CO_2$ reduction and increased building renovation rates).
- Challenge 2: Digitalisation for planning, construction phase, commissioning, and operation as well as decommissioning and disposal. Methods of building performance assessment. (Measure carbon-neutral building stock, life cycle analysis (LCA)).

Proposals should identify the foreseen application(s) of the developments in different building contexts:

- Existing and new buildings
- Residential (urban, rural, isolated) and non-residential buildings (large public and private buildings, commercial malls, service and mobility infrastructures, logistics platforms such as ports, airports, railway terminals, roads, large parking areas)
- Old, historical and special buildings (cultural and built heritage)
- Different climate and geographical areas

Proposed projects should include a perspective for technology transfer including plans for verification and validation, data management and exploitation.

Proposals shall cover solutions for one or several points in the two proposed challenges. The challenges are non-exclusive. Solutions addressing parts of one challenge or parts of both challenges are welcome.

| Challenge 1. Integrate renewable energy conversion technologies for power, heat and cold in buildings. Connect the buildings in networks. Integrate energy storage, zero emission fuel, and activate building parts as energy storage. (Measures contribution to $CO_2$ reduction and increased building renovation rates). |
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| Climate-neutral buildings or building environment blocks that generate integrated electric and thermal energy, with increased use of local renewables, as well as generate local support (citizens and professional stakeholders) to reach sustainability in the long term. |
| Seamless integration of renewable energy technologies in the urban environment, building integrated photovoltaics (PV), several types of storage solutions, combined heat and power (CHP) technologies on fossil-free gaseous fuels (hydrogen or synthetic gases, biogenic gas, thermochemical solar fuels, electrochemical solar fuels) for historic integration districts or hard-to-retrofit buildings in the energy systems. |
| Building-to-Building energy and active buildings concepts. Aggregation of energy services and energy traceability. |
| Active facades: solar thermal, building integrated PV (BIPV), hybrid PV, PV-thermal, switchable windows, switchable thermal insulation and their system integration. |
| PV integration in buildings (including semi-fabricates): module installation, structural, thermal and functional integration, aesthetics solutions, power management, safety, operations and management, maintenance, decommissioning, recycling and disposal. |
| Integration of solar thermal energy in buildings and nearly zero energy buildings (nZEB) / passive-house concepts, combination with other solutions in hybrid products and the use of enablers of sector coupling including improvements at component level. |
| Integration of electricity and heat storage; integration of mobility concepts. |
| Decentralised storage tanks in buildings and built infrastructure for thermal flexibility. |
| Technologies for non-residential air-conditioning and ventilation. |
| Large building (malls, terminals, parking areas, building services) energy production and storage |

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| systems integration for efficient energy production and uses. |

| Challenge 2. Digitalisation for planning, construction phase, commissioning and operation as well as decommissioning and disposal. Methods of building performance assessment. (Measure carbon-neutral building stock, life cycle analysis (LCA)). |
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| Digitalisation of in-building energy management by considering internal energy production and storage as well energy traceability for building-to-building energy flows and active buildings by smart contracts (span across energy vectors, increase flexibility and reduce peak loads). |
| Development of solar cadastres to assess the generation potential of solar energy from the scale of single buildings to energy districts and metropolitan/regional areas. The cadastre might also be linked to a database of suitable technologies to be ranked according to the specifications of the installation site. |
| Digitalisation in district heating and cooling networks: large scale collection data located throughout the district heating and cooling (DHC) production, transport, distribution and user chain, machine learning for optimal control of the network and support the analytics intended to maximise use of RES and residual heat to reduce the operational costs. |
| Built infrastructure as part of a local/regional decentralised energy system with consumer, prosumer and energy communities. |
| Contribution to open platforms for sharing data and models (digital twins) in support of the energy transition for research-based knowledge. Standardisation of the solutions. |
| Building Information Modelling (BIM) from the cradle to the grave including life cycle analysis. Offer circular-oriented services at different levels of the Construction and Demolition Waste (CDW) supply/value chain. Against the background of rising ecological pressure and threatening scarcity of primary raw materials, demolition has a fundamental role to play in the circular economy (CE) and global decarbonisation of the Construction sector, as a source of valuable CDW-originated materials and components that can be effectively recycled or reused into new built structures. |
| Smart tools for Smart Homes + smart buildings with the aim that buildings become active elements in the power supply system (and maybe also in a heat network – if present). |

**All the proposals shall analyse the cross-cutting dimensions** (cf. **Section 4.6**). Identify which are applicable and elaborate the inclusion of those in the proposal.

| Cross-cutting dimensions |
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| Integrated approach considering technical, societal, economical, architectural, aesthetical, urban planning and transport sector issues, implementing the European New Bauhaus (NEB) values. |
| Synergies with widespread of energy communities, neutral and positive energy districts and climate neutral cities policies. |
| Needs of users have to be taken account for: issues of acceptance, participatory approaches to support the complex transformation processes, new ways of living and working, demography, urban-suburban relationships and sustainable mobility etc. Furthermore, the impact on rent pricing, affordable construction prices, comfort or also user data privacy have to be considered. |
| Need of adaptation to meet urban planning regulations and specifically preserve cultural heritage landscape (e.g., building, complex of buildings). |
| Increase the smartness of various building systems (energy management and control in broad view, heating, ventilation, electrical, information,…) and evaluate it through objective indexes (Smart Readiness Indicator (SRI),..). |
| Indoor Environmental Quality (IEQ)— indoor air quality (temperature, humidity, $CO_2$, Radon,…), lighting, noise, ergonomics—and their effects on occupants or residents comfort must be taken into account. Strategies for addressing IEQ include those that protect human health, improve quality of life, and reduce stress and potential injuries. |

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| Solutions have to consider different economies of scale and climate context. |
| Standardisation of solutions, components and modules taking into account EU regulations. |
| Knowledge diffusion (specifically for historical and special buildings where the EU market is crucial). |
| Safety and security (cybersecurity, privacy, data protection, data rights) by design intended to generate trust in society and must be included in the proposals. |

## Expected impact

At scientific and technological level, the portfolio of projects will provide validated solutions ready to be included in new research and innovation processes intended to improvements and/or base for new developments. Valuable infrastructures in this environment should be visible and accessible to the RDI community.

At industrial stakeholders' level, participation of need-owners from the energy, building and installer industry is expected. Their participation should provide requirements in the projects intended to reinforce local industry and drive developments to affordable solutions.

It is expected to yield improved access and higher use of research results, innovation and knowledge. Presented solutions should drive new technologies towards commercial readiness by reinforcing connection with multipliers (architects, civil engineers, craftsmen, engineering offices, manufacturers), public bodies (regulators, standardisation institutions), as well as potential users of the developed solutions (i.e. municipalities, public and private property owners), creating high-quality new knowledge and skills in the complete built environment.

Proof methods of building energy performance assessment will support transition to carbon-neutral housing stock.

The prospect of standardised solutions, components and modules will benefit from larger markets and contribute to the efficient use of the funding. The increase of utilisation and sharing of research infrastructures is foreseen to mobilise innovation community.

A wide EU and international market supported by the diffusion of knowledge is the base of efficient responses in the integration of zero emission energy in existing, historical and special buildings as well as in mobility infrastructure.

In addition to the dissemination and experience sharing within the CETPartnership Knowledge Community, the projects are invited to participate in the activities and events organised by other partnership programmes like Built4People.

## Target RDI approaches/TRLs

Projects can apply either as ROA (**CM2023-10A**) or IOA (**CM2023-10B**) based on the target TRLs:

- ROA covers the TRL range 3–5
- IOA covers the TRL range 6–9

The projects shall include a perspective for technological transfer including:

- Verification and Validation Plan
- Data management plan

- Results management and exploitation plan

At the pre-proposal stage, a clear mention of the corresponding planning should appear in the three evaluation criteria: Excellence, supporting project goals; Impact, as part of the expected outcome and impact; and Implementation, identifying deliverables in the work plan.

At the full proposal stage, an outline of the plans and references to the content should be included. Specifically, the versions/deliverables over the project implementation shall be included in the Implementation section.

## Project consortia

TRI7 intends to establish, mobilise and attract project consortia from the energy, building and construction research (public and private research organisations, higher education institutions etc.) and industry (private SMEs, private large companies, etc.) to work together on holistic solutions for the future built environment.

## Project budget

The Call Modules aims to support projects with an expected requested grant (but not limited to) in the range of €0.5–5 million.

# Annex A. Reporting and Knowledge Community work package

Since all projects funded by the Call are expected to actively participate in the CETPartnership Knowledge Community, proposals must include the following tasks in the mandatory Reporting and Knowledge Community Work Package of your Work Plan and necessary resources in the project budget.

Even though the necessary resources depend on the project consortium composition, length, size and focus, the total estimated resources in the Work Package are as follows per project:

- 35–55 days/year
- €7 000–10 000 for travel, accommodation and related costs
- Minimum total costs €35 000

Estimated resources (days/year/project) per task are mentioned in the task description below.

The final organisation and implementation of the undermentioned tasks in each project will be determined in an iterative process with the CETPartnership Knowledge Community Management (KCM) using the CETPartnership Digital Collaboration Platform.

Knowledge Community events will mostly take place online. In case of onsite events, CETPartnership encourages Project Consortium Partners to consider traveling by train if feasible and compensating for the emission in case of traveling by air.

## Task 1. Reporting

Resource estimation: 10 days/year/project.

The following deliverables must be reported to the Call.

| Subtask | Description |
|---|---|
| **1.1** | **Annual reporting** |
| **1.2** | **Final reporting by 2028 depending on the project end date** |
| **1.3** | **Public abstract of the main results at the project's end** |

## Task 2. Contribution to formative evaluation

Resource estimation: 10–20 days/year/project.

Feedback based on the annual reporting in Subtask 1.1 will be given and implemented as follows:

| Subtask | Description |
|---|---|
| **2.1** | **Giving feedback**<br>Project Consortium Partners are expected to give feedback to other projects in a similar field. |
| **2.2** | **Feedback implementation** |

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| | The following feedback will be given to your project once a year and must be considered for implementation during the rest of the project duration:<br>● Feedback from the CETPartnership monitoring team<br>● In person feedback from Coordinators of other funded project at peer-to-peer online meetings where project results are presented and discussed |

## Task 3. Contribution to other Knowledge Community activities

Resource estimation: 15–25 days/year/project.

Each project will belong to one thematic working group organised by TRI(s) relevant to the Call Module and up to five cross-cutting working groups.

| Subtask | Description |
|---|---|
| **3.1** | **Living documents**<br>For each working group, each project must contribute to continuous development of spotlights and policy briefs related to the working group's topics by clarifying conclusions, giving feedback and examples etc. from own and other project results. |
| **3.2** | **Meetings (working group)**<br>For each working group, at least one representative from each project must contribute to about one onsite meeting per project duration and two online meetings per year. This includes preparation for, participation in and follow-up of the meetings. |
| **3.3** | **Communication and dissemination**<br>Each project must contribute to the following activities to detect synergies between funded projects and to develop joint communication and dissemination.<br>● Online meetings and workshops<br>● CETPartnership annual project events (hybrid) |

# Annex B. National/regional requirements



Co-funded by the European Union