PANTERA
Pan European Technology Energy Research Approach

Work Package 7

Deliverable D7.3

Report on Appropriate Funding Instruments to ensure Project Sustainability

Grant Agreement No:	**824389**
Funding Instrument:	**Coordination and Support Action (CSA)**
Funded under:	**H2020 LC-SC3-ES-7-2018: Pan-European Forum for R&I on Smart Grids, flexibility and Local Energy Networks**
Starting date of project:	**01.01.2019**
Project Duration:	**54 months**

Contractual delivery date:	**31.12.2022**
Actual delivery date:	**2/02/2023**
Lead beneficiary	**Suite5**
Deliverable Type:	**Report (R)**
Dissemination level:	**Public**
Revision / Status:	**Draft 1**

This project has received funding from the European Union's Horizon 2020 Coordination and Support Action Programme under Grant Agreement No. 824389

Document Information

Document Version: 1
Revision / Status: Draft

All Authors/Partners Giorgos Papadopoulos (Suite5)

Contributors: Anna Mutule (IPE), Rad Stanev (TUS), Venizelos Efthymiou (FOSS), Yaksh Kumar (DERlab), Mattia Cabiatti (RSE), Alireza Nouri (UCD)

Document History

Revision	Content / Changes	Resp. Partner	Date
[1]	Deliverable Structure	Suite5	18.05.2020
[2]	Deliverable First Draft	Suite5	20.01.2023
[3]	Review	UCD	27.01.2023
[4]	Review	FOSS	27.01.2023
[5]	Final Editing	Suite5	30.01.2023
[6]	Final Version	Suite5	30.01.2023

Document Approval

Final Approval	Name	Resp. Partner	Date
Review on WP level	Tasos Tsitsanis	Suite5	20.01.2023
Review Executive Board Level	Venizelos Efthymiou	FOSS	02.02.2023

Disclaimer

Table of Contents

List of Figures

Abbreviations

Acronym	Full name
AI	Artificial Intelligence
API	Application Programming Interface
CCUS	Carbon Capture, Use, and Storage
CETPartnership	Clean Energy Transition Partnership
D	Deliverable
EC	European Commission
EIRIE	European Interconnection for Research Innovation & Entrepreneurship
EU	European Union
H2020	Horizon 2020
IPR	Intellectual Property Rights
JRC	Joint Research Center
KSOs	Key Strategic Orientations
PANTERA	Pan European Technology Energy Research Approach
R&D	Research & Development
R&I	Research & Innovation
SEO	Search Engine Optimization
SET Plan	Strategic Energy Technology Plan
SRIA	Strategic Research and Innovation Agenda
SSL	Secure Sockets Layer
T	Task
TRIs	Transition Initiatives
UI	User Interface
WP	Work Package

Executive Summary

This deliverable “Report on Appropriate Funding Instruments to ensure Project Sustainability” reports on appropriate funding instruments to ensure project sustainability when the PANTERA project is finished. This deliverable was created with the objective of identifying suitable financing sources that would allow all project activities to continue uninterrupted even after the completion of the project.

In section 2 of this deliverable, details are given of the functional strengths of EIRIE that need to be preserved for the long-term support of the R&I family in Europe. As described in detail in D7.1 [2], EIRIE embodies an interactive multi-functional platform that aims at connecting the R&I community of EU to enhance collaboration, strengthen the participation of all Member States in support of the Energy Transition and improve the participation of low-spending countries in R&I activities in the area of Smart Energy Systems.
To this end, it offers a bundle of services and functionalities towards ensuring that EIRIE is established as a central reference point of knowledge, aiming to take on board the existing entities and activities in Europe, expanding on them to capitalize on synergies and bring in the interests of low spending R&I countries.
EIRIE integrates with the most popular platforms in the area of Smart Energy Systems, such as the Smart Electricity Systems and Interoperability Platform of the Joint Research Centre of the European Commission, the Knowledge Sharing Platform of ETIP-SNET, the BRIDGE portal, the EXPERA platform of ERANET Smart Energy Systems, the Mission Innovation Platform, the EU Research Results Platform (CORDIS), the DERlab Research Infrastructures database and the ASSET platform offering training material in the area of smart grids. Others are being planned that includes EPRI knowledge platform that is progressing with confidence from both sides. This connectivity offers a single point of access to the R&I community to offer a wealth of services and functionalities that are presented in Section 2 of this deliverable.

Section 3 gives a valuable overview of Post-Project Cost categories to ensure EIRIE Platform Sustainability and continuation of regional activities. This is meant to be an indication of what is really required to keep the platform up to date, functional and responsive to the needs of the R&I family of Europe. The section covers with adequate details the following:

- EIRIE Platform visibility and stakeholder engagement costs
- Pan-European Workshops hosting and participation.
- Regional Workshops hosting and participation.
- EIRIE Platform Operating costs
    - Platform Hosting
    - Content Population
    - Consortium Travels for event participation
    - News and Newsletter Update
    - Moderation
    - EIRIE Platform Maintenance costs
    - Domain Name

  - SSL Certificate
  - Technical Support
  - Website Design
  - Continuous bug-fixing and fine-tuning of the EIRIE functionality
  - EIRIE Platform Marketing costs
  - Search Engine Optimization
  - Social Media handling
- Event participation for Platform outreach
- EIRIE Platform Expansion costs
- Integration with other platforms
- Collaboration with European Initiatives
- Service Enrichment Costs 28

Thus, the consortium partners performed a thorough analysis of relevant pan-European, regional, and national R&I support instruments, accurately documenting the prerequisites, requirements, and competencies/qualifications necessary to ensure eligibility and apply for securing the minimal required resources necessary to continue project activities at their full scope after the project's official conclusion. In this context, the PANTERA consortium performed an in-depth analysis of relevant EU-wide funding programmes, related to the scope of the project activities, to identify relevant calls and topics in which either the PANTERA consortium as a whole, or individual partners may apply for securing the required funding and resources for the post-project continuation of the PANTERA activities. Moreover, the leaders of the PANTERA Regional Desks specifically went through a series of activities for identifying relevant national and regional R&D programs, their structure, and their pillars, while also providing additional analysis and information about the purpose and scope of the pillars, in accordance with the scope of PANTERA, that include, in their structure, activities in the area of Smart Energy Systems/Smart Grids. The respective partners sought to list calls and topics in regional and national funding instruments, in the specific subsections under each Regional Desk, that could provide potentially the resources required for continuing the activities of the Regional Desks (for instance, the organization of workshops where regional stakeholders can be invited, the continuation of the studies made at national/regional level, etc.).

In Section 4 of this deliverable the identification of potential funding mechanisms to ensure the sustainability of EIRIE Platform are presented. The European Instruments and Financial Mechanisms are presented including Horizon Europe with particular emphasis to Cluster 5 Work Programme. Details are also given for Partnerships with more emphasis on the Clean, Energy Transition Partnership, Missions, widening participation and strengthening the European Research Area. The Section includes relevant Calls and Topics, priority lists and eligibility requirements and preconditions. A similar approach is presented on the important LIFE Programme with details on Relevant Calls and Topics, Priority List and Eligibility Requirements and Preconditions. More on DIGITAL EUROPE with Relevant Upcoming Calls and Topics, priority List and Eligibility Requirements and Preconditions. Specific emphasis is given with similar details on all 6 Regional Instruments and Financing Mechanisms including the relevant Instruments, Financing Mechanisms Identification, and analysis.

The analysis that was performed for this deliverable will be a valuable contribution to the Sustainability Planning activities of the project in T7.4 and to the development of the Sustainability and Business Development Plan under Deliverable D7.4 [1], which will outline the specific business development activities that must be carried out to ensure the long-term viability of the project's activities and the collaboration instruments that were established during the project.

1 Introduction

1.1 Scope of the document

The current deliverable, D7.3, "Report on Appropriate Funding Instruments to Ensure Project Sustainability," is specifically related to Work Package 7 (WP7) "Methodology and Exploitation Management," and as such, it provides information on the post-project cost categories identified, in order to ensure the sustainability of the EIRIE Platform, as well as the continuation of regional activities. In the context of this deliverable, the PANTERA consortium identified and evaluated prospective funding mechanisms (at the European, regional, and national levels) that would ensure the continuation of project-wide activities, even after the PANTERA project is finished.

1.2 Structure of the document

The deliverable consists of five chapters and is structured as follows:

The features and functionalities of the EIRIE Platform, its structure, as well as a synopsis of the requirements that need to be met to ensure the platform's sustainability when the project is complete, are all covered in detail in Chapter 2.

The post-project cost categories that have been identified are examined in detail in Chapter 3 along with a thorough investigation of the pertinent expenses that must be incurred to guarantee the platform's sustainability and the continuation of regional activities, once the PANTERA project is completed.

The PANTERA consortium conducted a thorough analysis in Chapter 4 regarding the identification and evaluation of prospective funding mechanisms (at European, regional, and national levels) that could ensure the sustainability of the EIRIE platform and the corresponding activities for updating the platform content and ensuring engagement at regional level.

The deliverable is concluded in Chapter 5, which summarizes the information covered in the previous chapters.

2 EIRIE Platform at a glance and issues to be addressed to ensure post-project operation

2.1 EIRIE Platform Functionalities overview

As described in detail in D7.1 [2], EIRIE embodies an interactive multi-functional platform that aims at connecting the R&I community of EU to enhance collaboration, strengthen the participation of all Member States in support of the Energy Transition and improve the participation of low-spending countries in R&I activities in the area of Smart Energy Systems.

To this end, it offers a bundle of services and functionalities towards ensuring that EIRIE is established as a central reference point of knowledge, aiming to take on board the existing entities and activities in Europe, expanding on them to capitalise on synergies and bring in the interests of low spending R&I countries.

EIRIE integrates with the most popular platforms in the area of Smart Energy Systems, such as the Smart Electricity Systems and Interoperability Platform of the Joint Research Centre of the European Commission, the Knowledge Sharing Platform of ETIP-SNET, the BRIDGE portal, the EXPERA platform of ERANET Smart Energy Systems, the Mission Innovation Platform, the EU Research Results Platform (CORDIS), the DERlab Research Infrastructures database and the ASSET platform offering training material in the area of smart grids. Others are being planned that includes EPRI knowledge platform that is progressing with confidence from both sides. This connectivity offers a single point of access to the R&I community to offer a wealth of services and functionalities that are presented in the following table and are discuss in extent in the next paragraphs.

Functionality ID	Functionality Description
A1 - B1	Smart Grid Data Collection - Smart Grid Projects Information Creation *Integration with JRC and EXPERA and ETIP SNET*
A1 - B1	Smart Grid Data Collection - Smart Grid Projects Information Creation *Migration of CORDIS database*
C1	Living Documents
A4 - B6 - C2	Data Area Search Functionality - Information Area Search Functionality - Knowledge Area Search Functionality
A2- A3 – B3	Research Datasets from other projects - Standards & Regulation database - Research Infrastructure Database
B2	Simple Data Analytics
D1	Matchmaking functionality
D2	Event Calendar
D3	News/ Newsletter Functionality
A5 - B7 - C3	Linking Functionality
D5	Research and Innovation Marketplace
A1 - B1	Smart Grid Data Collection - Smart Grid Projects Information Creation *Integration with ASSET, Mission Innovation, EPRI*
D4	Training Area
A1 - B1	Smart Grid Data Collection - Smart Grid Projects Information Creation *Integration with any other platform (per platform)*

Table 1 EIRIE Platform Functionalities

A1. Smart Grid Projects' Data Collection

Project related results, like project deliverables, reports, use cases and best practices are collected for EU Research and Innovation projects. The results are uploaded into the EIRIE platform in the form of documents, derived from the projects themselves (partners/ coordinator) or from other platforms (e.g., CORDIS, ASSET). All results are tagged with appropriate metadata

(identical to the ones inherited by the specific project, as described in the information area, or manually introduced by the author of each data item).

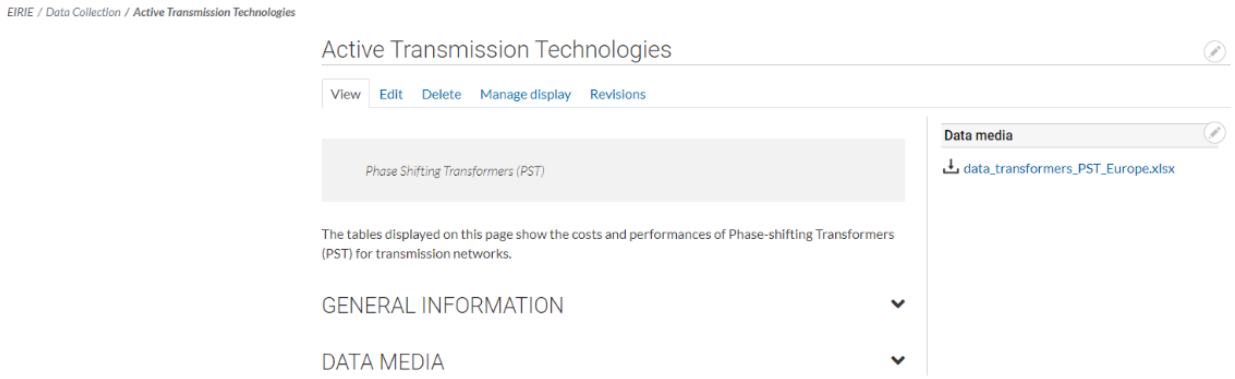


Figure 1: View of an Indicative Data Collection available in EIRIE

A2. Research Datasets from other projects

Datasets (E.g., raw data, time-series data, models, etc.) that are not in the form of a project deliverable, are uploaded by researchers for opening them to the research community. These datasets are either raw or processed data, from ongoing and closed projects. All datasets are tagged with appropriate metadata (identical to the ones inherited by the specific project, as described in the information area, or manually introduced by the author of each data item).

A3. Standards & regulation database

A comprehensive database filled with international standards, grid codes & relevant regulations is created, supporting researchers and industry partners to have an overview of the current connection codes, regulation and standards that are related to the technologies and sub-technologies that constitute the evolving energy system in Europe. Each stored item is accompanied by appropriate metadata.

Figure 2: View of indicative available standards in the EIRIE Regulation and Standards Data Base

A4. Data Area Search Functionality

A strong and versatile search engine (classic filtering and list-based results) is featured. The user has the possibility to filter (based on the available metadata and their categories) and customize the project-related search results, like project deliverables, reports, best practices, use cases and applicable regulatory framework

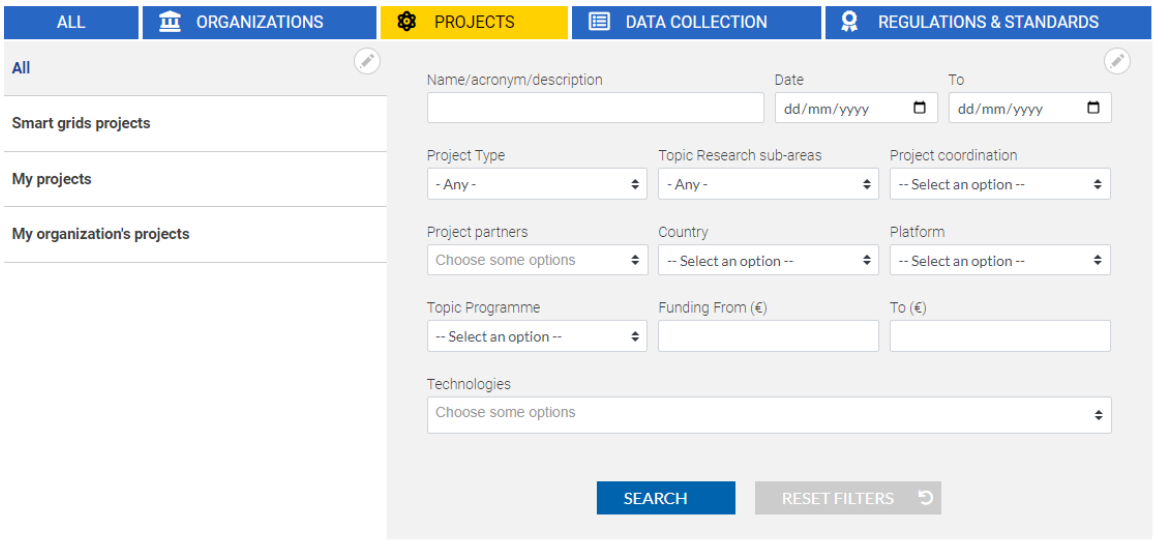


Figure 3: View of the Common Search Area for Information and Data

A5. Data Linking Functionality

Linking functionality between available data items enables the presentation of project-relevant information (project page) together with the corresponding information about:

- Project page link
- Living Documents linked to the specific project

B1. Smart Grid Projects Information Creation

This functionality involves the collection of project-related data and metadata from well-known and established platforms such as SES-JRC, BRIDGE, CORDIS, ETIP-SNET, ASSET, EXPERA, Mission Innovation Platform, EPRI and more that will be identified in the process.

Integration with such platforms is required for keeping the EIRIE platform up to date and as complete as possible in the related reporting area and respond to the planned single point access architecture.

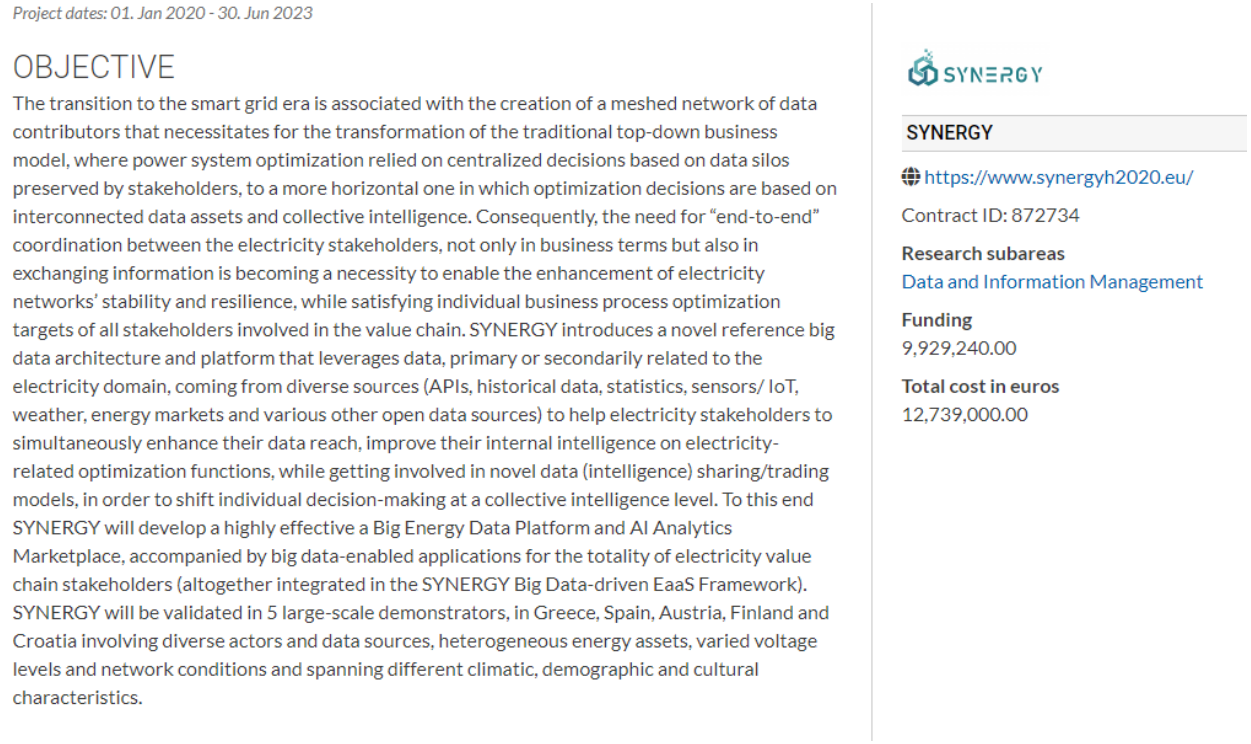


Figure 4: Indicative view of the Projects' Information Area

B2. Simple Data Analytics

It consists in a key functionality offered by the EIRIE Platform enabling the map-based visualization of the distribution of Smart Grid/ Smart Energy Systems projects awarded across the EU through National, Regional and EU programmes.

Apart from the visualization of aggregated project data, the map offers an interactive environment that allows for further drilling in and analysing the project-related information available in EIRIE with the use of a wide variety of filters (e.g., application domain, technology deployed, etc).

Through the map the user is to be also able to further analyse project-related information with the use of dedicated bar diagrams appropriately correlating pairs of data elements such as:

- Number of projects per technology deployed in each country

- Number of projects per stakeholder type in each country
- Funding amount per technology deployed in each country
- Funding amount per stakeholder type in each country

Heatmap visualizations offer an alternative analysis means for visualizing the aforementioned data and demonstrating key figures for each country (number of projects, funding), while allowing for further analysis through the utilization and combination of a variety of filtering criteria.

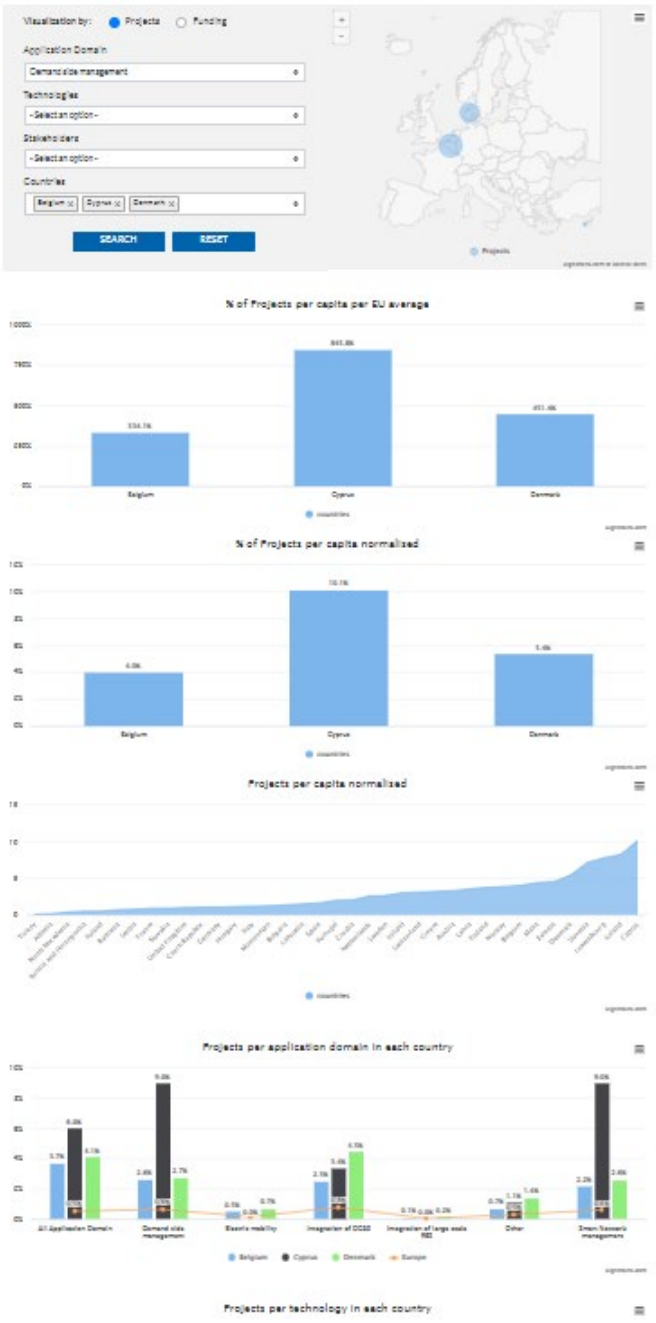


Figure 5: Indicative view of the Simple Data Analytics functionality, offered through map visualizations and associated diagrams

B3. Research Infrastructure database

This database of DER and smart grid research infrastructure contains relevant information on research infrastructure and related assets, testing capabilities and services of research institutes and organization in coordination with JRC, DERlab and the project ERIGRID 2.0. This database gives the chance for research organizations to present their infrastructure. Appropriate metadata are associated to each database item, to facilitate search based on the same criteria applied for projects.

B6. Information Area Search Functionality

Via advanced search functionalities, the search of projects is optimized through a well-designed search engine. The engine is customizable and interactive (applying filters regarding the e.g., location of the project, technologies used etc.), allowing for drilling down in the available data and isolating the subjects of interest. The interactive and customizable nature of the above-mentioned engine provides the opportunity to the users, to perform multiple filtering, i.e., associating the location of interest, the solution type applied in a series of projects, in conjunction to the impact that has been achieved.

B7. Information Linking Functionality

Linking functionality between available data items enables the simultaneous presentation of project-relevant information (project page), together with the enhanced corresponding information about:

- Project results
- Applicable regulatory framework
- Applied and relevant standards
- Living documents linked to the specific projects

C1. Living Documents:

This functionality is a key offering of the EIRIE platform since it is expected to promote wide collaboration between all stakeholders involved in R&I activities in Smart Energy Systems and support the realization of the RICAP process developed and implemented by PANTERA. To facilitate collaboration between involved stakeholders, collaboration spaces (currently addressing collaboration activities in the frame of ETIP-SNET, BRIDGE and Regional Desks) are made available in Confluence which is the solution utilized for the setup of the Knowledge and Collaboration area of the EIRIE platform, accompanied by the corresponding living documents repository as well as discussion forums, moderated by the EIRIE platform administrator.

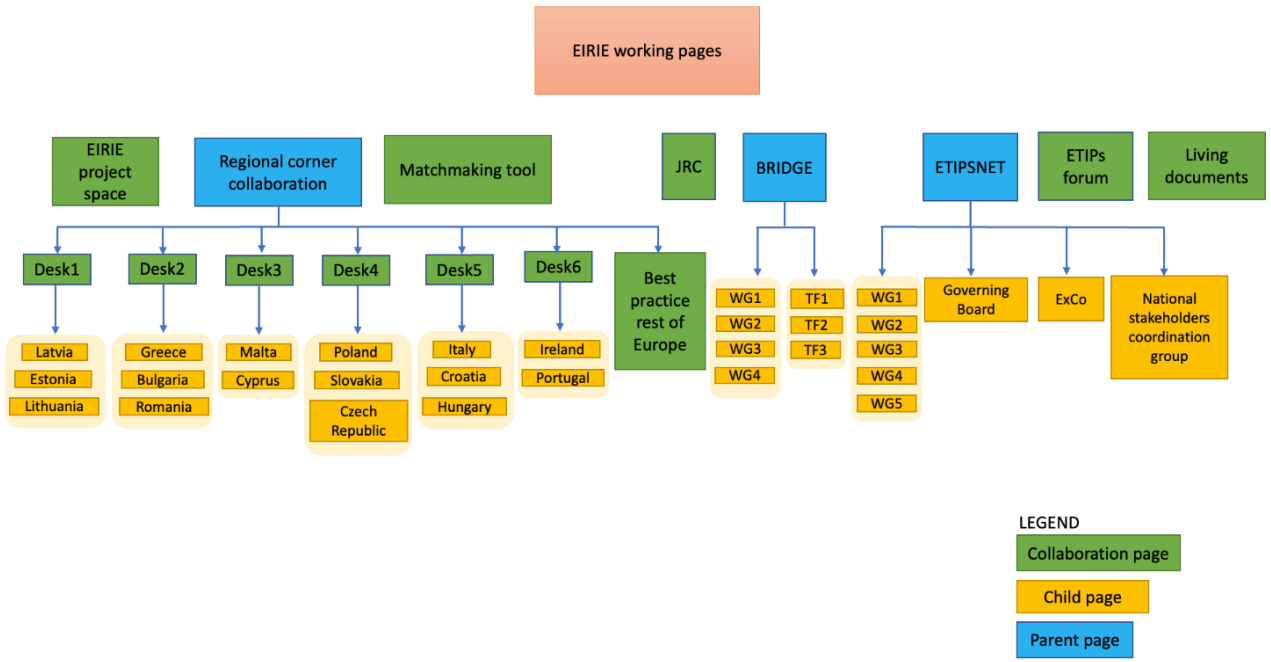


Figure 6: Structure of the EIRIE Collaboration Space in Confluence

C2. Knowledge Area Search Functionality

A strong and versatile search engine (classic filtering and list-based results) is featured. Based on the tagging used on the living documents and forums, the user has the possibility to filter and customize the search results.

C3. Knowledge Area Linking Functionality

Linking functionality between available data items enables the simultaneous presentation of project-relevant information (project page) and best practice information together with the corresponding information about:

- Project(s) page link(s)
- Applicable regulatory framework
- Applied and relevant standards
- Best practices available in the data area.
- Relevant discussion forum topics
- Incentives documentation

D1. Matchmaking Functionality

Each user is able to create an organization cooperation profile, providing information on the organization's Assets (e.g., no of employees, Infrastructure, demo facilities), Network of collaborators (possible additional partners that can be easily engaged), Competencies (expertise) and Research Interests (linked also to specific calls).

In addition, the user is offered with a list of upcoming funding opportunities (e.g., H2020, Horizon Europe, ERA-NET, National) for information purposes and for posting relevant project profiles linked also to the organization profile.

The Matchmaking functionality supports the researchers, companies and institutes involved in international and European projects. This platform offers the opportunity to find and get in touch with potential partners facilitating low spending countries in building partnerships in R&I.

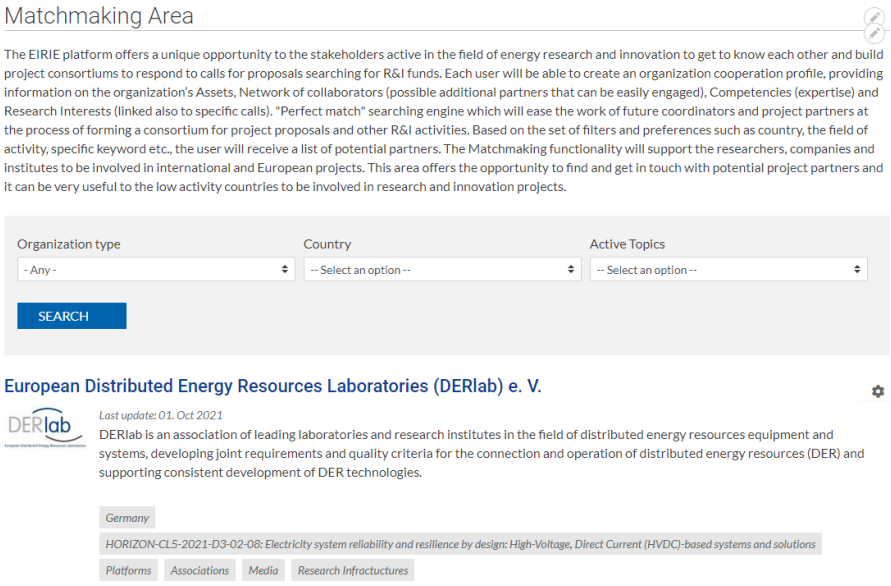


Figure 7: View of the EIRIE Matchmaking Area

D2. Event Calendar

This functionality offers an events calendar that is adequately dynamic to be always up to date and informative, provided of course that it is adequately supported and updated. External stakeholders are offered the possibility to add project events in the calendar, upon previous approval by the platform administrator.

This calendar informs the EIRIE community about interesting events related to the energy field (e.g., EUSEW, interesting workshops…etc.). This calendar is publicly accessible, and anyone can synchronize his/her outlook calendar with EIRIE's calendar.

Figure 8: View of the EIRIE Calendar Functionality

D3. News/ Newsletter Functionality

This is a horizontal functionality offering an environment for Interaction with R&I organizations, collection of news for publication (as can already be done through the website) and newsletter features that allow stakeholders, by filling in a registration form, to subscribe to the EIRIE newsletter, in order to receive news and information on EIRIE and PANTERA activities or on other interesting events (i.e., workshops) and issues.

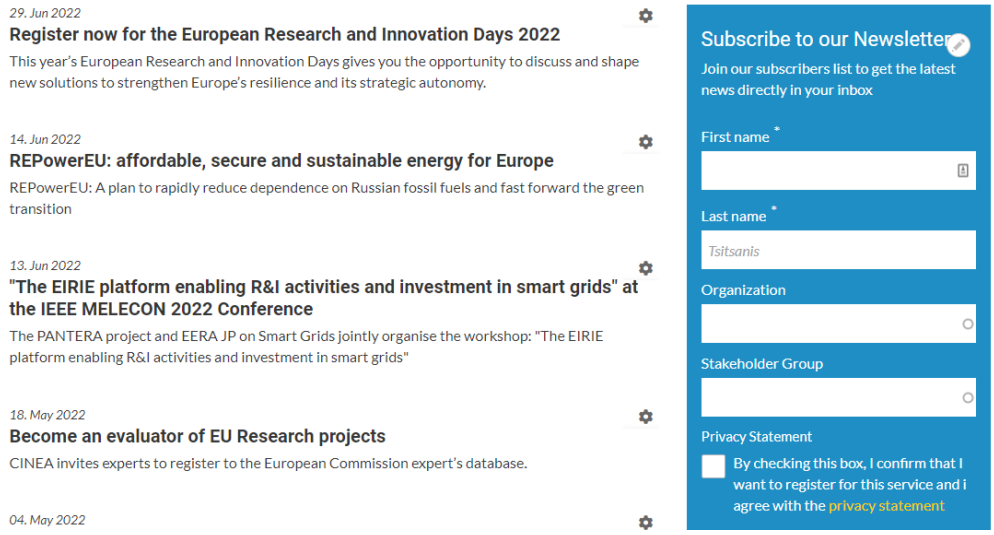


Figure 9: The EIRIE News Area with newsletter subscription feature

D4. Training Area

It consists in a comprehensive area and database of educational material that allows stakeholders to access appropriately selected, high quality training material on Smart Grids R&I relevant issues, and receive tertiary (reports, best practices) education services or learn about available training programmes offered by well-known and distinguished academic institutions based on relevant material retrieved through the integration with the ASSET project and other that will follow.

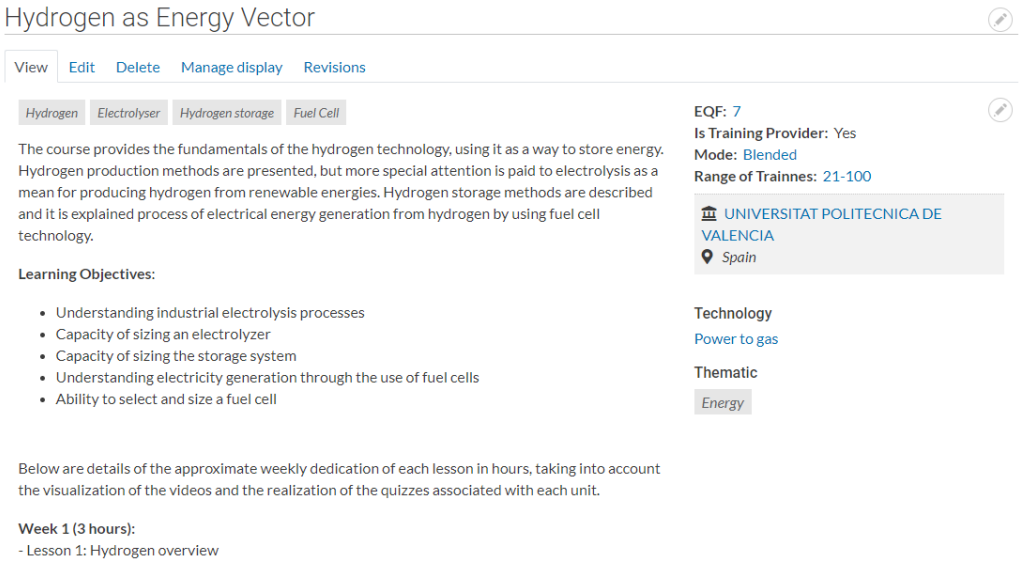


Figure 10: View of an indicative educational programme accessible through the Training Area of EIRIE

D5. Research and Innovation Marketplace

This section allows R&I organizations to either publish or find innovative results from previous R&I projects, or commercialized solutions, utilizing information provided by a variety of projects or industrial stakeholders, as well as from WG5 of ETIP-SNET that performs the Innovation Assessment of relevant R&I projects on the basis of an extended version of the EU Innovation Radar Methodology.

2.2 Operational needs that have to be covered so to ensure the sustainability of EIRIE Platform

As can be seen from the paragraphs above, the sustainable future of EIRIE, to continue serving the R&I community, is highly dependent on continuous care and support from experts in the field. More in detail, with regards to the operational sustainability of the EIRIE platform special attention must be given to planning and carrying out specific tasks to guarantee that the necessary resources are available during the post-project period for ensuring intense stakeholder engagement (especially at regional level), enhanced collaboration, continuous content update, and high quality in order. The platform content must be regularly updated and improved in order to achieve this. Moreover, it is of key importance that the platform is effectively and continuously maintained and enhanced with new functionalities and collaborations with a variety of data sources around the EU and globally. Nevertheless, fundamental and fixed costs addressing platform hosting, moderation, support to users, management of collaboration spaces, as well as, Search Engine Optimization and marketing/ communication costs, need to be also guaranteed to safeguard the successful and impactful operation of the platform for the years to come after PANTERA finalization.

To this end, the consortium has worked for the following outcomes that act as a promise that the future of EIRIE is in good hands:

- EIRIE to be hosted on the servers of JRC within EUROPA with JRC taking responsibility for offering the required services, including back up possibilities of all generated data and knowledge.
- The service contract of DG Energy SPRING has already taken responsibility for continuing the expert support to the PANTERA consortium by taking over from the nominated contractor of the project BILBOMATICA. The intention here, is for SPRING to continue supporting EIRIE until the end of the PANTERA project, but more importantly take full responsibility after from the PANTERA consortium.
- The required expert support for enriching the functionalities of EIRIE is coming from corresponding Working Teams that are currently operating in harmony with WG5 of ETIP SNET. The intention through this visionary action, is to mature this need to the stakeholders of ETIP SNET, to formalize the process and have this team work to be pursued by the respective teamwork beyond the operation of the PANTERA project. The consortium members of the PANTERA project are already active members in the established Teams of WG5 of ETIP SNET, driving the required work with their active participation.
- Any shortcomings or identified developments that are beyond the scope of the service contract offered by DG Energy, will require further support from DG Energy but this is far fetching, and it is left on the shoulders of DG Energy to take appropriate decision as and when these needs arise.

In addition, sustainable operation of EIRIE directly relies on the realization of a series of soft and horizontal activities, yet necessary for retaining and further extending stakeholder engagement (with further focus given on regional desks and the engagement of regional stakeholders in low spending countries, towards enhancing their involvement in R&I activities). This requires securing additional funding (either to the consortium as a whole or individually to partners leading the regional desks), to ensure engagement increases in the long run, the stakeholder network around EIRIE is continuously expanded and new services are born based on the stakeholder needs for data, information, knowledge and collaboration.

3 Overview of Post-Project Cost categories to ensure EIRIE Platform Sustainability and continuation of regional activities

3.1 EIRIE Platform visibility and stakeholder engagement costs

3.1.1 *Pan-European Workshops hosting and participation*

The PANTERA Project consortium should pursue the hosting and participation in Pan-European workshops organized as side events to well-known European events and conferences, with the objective of identifying, discussing, and contributing to Smart Grids, storage, and local energy system related priorities (e.g., identifying, raising awareness, and trying to fill Smart Grids related standardization gaps) in order to support the deployment of Smart Grids and emerging technologies.

By taking an active role in these sessions, the PANTERA consortium can use the strength of the workshops to share results/knowledge, build participation interest, analyze the current status, and set detailed future plans related to the deployment of Smart Grids, Storage, and Local Energy Systems, so that the outcomes of the workshops would then feed relevant reports and the EIRIE Platform, to enhance collaboration activities for the advancement of the R&I status quo in the area of smart grids and flexibility in energy systems.

3.1.2 *Regional Workshops hosting and participation*

Regional Workshops are considered to be a significant instrument for effectively engaging R&I stakeholders around the EIRIE platform, particularly at the regional level. In this context, PANTERA must continue to invest in the organization of such workshops in the various Member States covered by its regional desks. PANTERA partners need to arrange regional and national workshops (even after the project is completed) to enable and expand stakeholder engagement and collaborative activities for the advancement of the R&I status quo in the field of smart grids.

The PANTERA Project consortium should pursue the hosting and participation in regional workshops with the objective of exploring means of direct support to the EU's low-spending countries and generating useful impact among local stakeholders through these regional workshops. Regional Workshops are considered as a solid steppingstone for expanding pan-European mobilization for stirring R&I activities in all corners in Europe. The needs of stakeholders will be further instantiated through these sessions, and it should be easier to define the ways to address them through R&I activities and collaboration with more advanced stakeholders at the EU level, by increasing their visibility and widely disseminating the added value they can offer to the outer EU R&I community.

By actively participating in these workshops, the PANTERA consortium can focus on analyzing the current situation and developing detailed future plans for low R&I spending countries, as well as properly processing the outcomes of local workshops and collaboration activities, in order to strengthen local stakeholders' involvement in EU R&I activities. The outcomes of the workshops would then feed relevant reports and the EIRIE Platform, to enhance collaboration activities for the advancement of the R&I status quo in the area of smart grids and flexibility in energy systems.

Such EIRIE visibility and stakeholder engagement activities will be quantified in the final stages of the project and reported in D7.4 along with their associated costs.

3.2 EIRIE Platform Operating costs

3.2.1 *Platform Hosting*

By ensuring that adequate funding is in place towards the platform operation, the project can continue over the long term, increase its stakeholder network, add new services, and collaborate on integration-based projects with other platforms to advance R&I for the energy transition and enhance the integration of the R&I value chain.

Such financial resources will ensure the platform's smooth operation (by enabling the satisfaction of fixed costs associated with hosting and maintenance), while also enabling the extension of the services offered, the content population of the EIRIE platform through integration with new platforms and information sources throughout the EU and beyond, together with the realization of stakeholder engagement activities for maintaining and further expanding the user base of the platform.

In this context a sufficient budget must be set out for covering fixed costs related to web hosting (servers, CPUs, storage) and ensure continuous platform uptime, satisfaction of high security standards and effective scaling in case required, considering the continuous increase of platform users, stored content and requirements introduced by new and more sophisticated services that may require increased processing power.

3.2.2 *Content Population*

In terms of how the EIRIE platform works, content population is a different process that necessitates planning, organizing, refining, and reviewing. For this reason, sufficient people and resources are required to define the procedure and the mechanisms, which involve integrating the platform with other platforms and sources across the EU, in order for EIRIE to be continuously updated.

Additionally, maintaining and organizing content well or incorporating it into EIRIE is a component of content population. Services like converting pre-existing pages or user-supplied text, uploading files and images, editing page layouts with a text editor, setting up menus and links, and formatting typography are all included in this.

3.2.3 *Consortium Travels for event participation*

The PANTERA Project consortium must attend events (ENLIT, EUSEW, MEDPOWER, EERA, etc.) and relevant sessions in order to raise project awareness, present the project results and to liaise and effectively engage with experts, R&I practitioners, policymakers, and market stakeholders across the EU, involving them in a collaborative process for knowledge creation and

facilitating their participation in cohesive R&I activities by bringing forward relevant opportunities, increasing their visibility towards EU-wide consortia.

By actively participating in these types of events, the PANTERA Partners will have the opportunity to explain the purpose of EIRIE and the benefits offered to its users, demonstrate the capabilities and functionalities of the platform, increase its visibility, engage new R&I stakeholders from their respective regions and Member States, and nurture successful collaborations that strengthen R&I activities across the EU.

3.2.4 *News and Newsletter Update*

A dedicated budget is required for the platform's news page updates and the creation of the EIRIE newsletter in order to guarantee that stakeholders who have registered for the EIRIE Platform receive news and information on EIRIE and PANTERA activities as well as other pertinent events.

3.2.5 Moderation

Protecting the trust, content quality, and user experience of the EIRIE platform needs a sophisticated and continuously changing procedure known as content moderation that calls for a precisely matched combination of technological and human knowledge. This process requires time, energy, and skill to create, or in other words, the requirement for sufficient funding and resources.

Secure and adequate funding are meant to cover the annual expenditures of maintaining the moderating personnel as well as the necessary software and equipment purchases, while also ensuring that the moderating personnel is also well-trained and suitably skilled.

3.2.6 EIRIE Platform Maintenance costs

EIRIE platform introduces a reference one-stop shop for data, information and knowledge around Smart Energy Systems. It is comprised in a first-of-a-kind platform that effectively and seamlessly integrates data and information from various dispersed platforms, under common semantics and formalized taxonomies addressing the specificities of the Smart Energy Systems domain. It offers a wealth of services, spanning versatile search engines, access to wide categories of information and unique analytics tools for assessing the performance and progress of EU member states in terms of R&I performance assessment metrics. Maintenance is crucial to ensuring that the EIRIE platform is serving its mission. Monitoring online traffic, updating content, and ensuring secure navigation are all part of the platform maintenance.

3.2.7 Domain Name

The most significant recurring platform cost encountered is the cost of the domain name. The domain name is the "address" of the EIRIE platform on the Internet and it is not actually a one-time purchase. Most domain name registrars charge an annual fee, and controlling this annual cost is crucial to maintaining current domain ownership.

3.2.8 SSL Certificate

Information flowing through the EIRIE platform is encrypted by SSL certificates, protecting visitor data effectively. Of course, adding this additional security layer can increase platform maintenance costs. However, security is one of the most essential costs the EIRIE platform will incur, considering its importance in terms of engagement. If users don't see the platform as a reliable portal, the much-expected visitor engagement will be negatively impacted.

3.2.9 *Tech Support*

Tech support is essential for the EIRIE platform maintenance, since it includes the preservation of the server, the upkeeping of the codebase of the platform updated, fix broken contact forms or eventually help platform users familiarize with the platform, significantly impacting on the engagement levels.

3.2.10 *Website Design*

Dedicated budget allocation is needed for website re-design and adaptation to new user experience practices and to maintain compatibility with modern web browsers, their updates and security fixes; however, this does not mean that a complete overhaul of the platform design is required. Instead, website design comprises optimization of pages presentation, adaptation of more attractive themes and CSSs, along with design work like creating featured images for news and events updating, infographics, headers, etc.

3.2.11 *Continuous bug-fixing and fine-tuning of the EIRIE functionality*

Additional resources need to be invested towards the extensive testing of the platform functionalities to validate their expected and error-free functionality at all times. Several issues that will be identified will need to be reported and addressed by the technical support team of EIRIE, as part of their maintenance obligations, indicatively referring to the search engine operation, the map visualizations, the correction of information ingested from external platforms, etc.

**Such EIRIE maintenance activities will be quantified in the final stages of the project and reported in D7.4 along with their associated costs.*

3.3 EIRIE Platform Marketing costs

3.3.1 *Search Engine Optimization (SEO)*

Search engine optimization is the process of enhancing the EIRIE platform to boost its visibility when users search for energy-related services throughout Europe in various search engines. The more prominent the EIRIE platform appears in search results, the more likely it is to generate interest, boost participation, and draw in potential stakeholders.

3.3.2 *Social Media handling*

Social media management is a useful tool for improving the platform's social media strategy, increasing engagement, and expanding the reach of EIRIE. The growth of social media users offers a chance to introduce the EIRIE platform to thousands of individuals and stakeholders. However, in order to be seen and heard, social media marketing calls for developing an online presence. To make the most of this online presence, it is essential to specify a precise funding allocation when it comes to the platform marketing costs.

3.3.3 *Event participation for Platform outreach*

The PANTERA Consortium can increase the visibility of the platform, engage new R&I stakeholders from their respective regions and Member States, and foster fruitful collaborations that strengthen R&I activities across the EU by taking part in major events (ENLIT, EUSEW, MEDPOWER, EERA, etc.). These opportunities include explaining the objectives of EIRIE and the advantages offered to its users, showcasing the platform's capabilities and functionalities, and increasing its outreach.

Such EIRIE marketing activities will be quantified in the final stages of the project and reported in D7.4 along with their associated costs.

3.4 EIRIE Platform Expansion costs

3.4.1 *Integration with other platforms*

By establishing reliable funding sources, EIRIE aims towards providing users with access to a variety of data and information as well as building of transparent, interactive mechanisms for ongoing cooperation and motivation for knowledge and content creation. In order to maintain integration at the data level and grow the community active around the EIRIE platform and services, special emphasis will be placed on the bi-directional data flows with key partners and external platforms. It needs to be mentioned that there has been already an ongoing coordination with EPRI for the bi-directional data exchange with the EIRIE platform, which will materialize until the end of the project, together with the ongoing integration with the EXPERA platform and the BRIDGE Use Case Repository. Further integration activities are expected to flourish in the next years, addressing the vision of EIRIE to become a reference one-stop-shop for R&I collaboration and data sharing in the area of Smart Energy Systems.

3.4.2 *Collaboration with European Initiatives*

Further to the established collaborations of the EIRIE platform with BRIDGE and ETIP-SNET, new collaborations are expected to flourish in the upcoming years, especially addressing the need for promoting R&I under the Clean Energy Transition Partnership [6] and initiatives promoting the digitalization of the energy system such as the Intnet project [7] funded under Horizon Europe. Such collaborations with experts, working groups and task forces that will be established under the umbrella of these initiatives are expected to enhance engagement in the EIRIE Platform and further extend the collaboration space established in the platform with the use of the Confluence tool.

The achievement of such collaborations, though, will require significant human resources (and respective financing) for undertaking intense negotiation and coordination activities with such initiatives' coordinators, while creating additional cost elements for the expansion and adaptation of the EIRIE Collaboration Space to satisfy the requirements they may introduce.

3.4.3 *Service Enrichment Costs*

From the beginning of its conceptualization and development, the EIRIE platform aspired to transform into a "living platform" that will be continuously extended and enhanced with new features and functionalities, to effectively address the needs of the European R&I community. The realization of this vision, though, requires the investment of significant resources for the enrichment of the already provided services, with new, more sophisticated ones that will allow EIRIE to remain the reference point for data, information and analytics in the area of Smart Energy Systems. In this context, it is essential that adequate funding is ensured in the next years so that a minimum set of new features and functionalities are offered through EIRIE, including:

- Advanced data analytics and visualizations appropriately correlating multiple parameters and metadata and providing insights about trends and success stories in the R&I arena in the domain of smart grids. The user, through interactive dashboards, will be able to visualize and analyze:
    - The R&I interest and focus on different technologies at an application domain over time. Data analytics (utilizing time-series analytics) will facilitate the user to examine on (for example) how the number of projects that utilize each storage

solution (lithium, chemical, P2H, etc.) changes over time and reveal trends extracted from real information coming from the projects included in the PANTERA database.
    - The Impact achieved by different types of technologies (in a given application domain) through the use of bar diagrams.
    - The maturity level reached for different types of technologies (in a given application domain), through the use of bar diagrams
    - The funding received by different types of stakeholders (over time) through the use of time-series diagrams, revealing the evolution of their interest to further promote innovation in Smart Grids.
- Scenario building functionality, enabling, in an easy and user-friendly manner, the semi-automatic estimation (emulation) of anticipated impact based on best practices and collected project data, for specific high-level policy scenarios to be applied by policy makers.
- Jobs functionality, giving the opportunity for companies and research institutes to present their job offers and the applicants interested in the energy field to be able to find interesting jobs, especially in organizations coming from low-spending Member States.

Moreover, the platform shall facilitate data integration from other platforms, by automating data ingestion and collection through appropriately configured APIs that will need to be build to satisfy this need.

**Such EIRIE expansion activities will be quantified in the final stages of the project and reported in D7.4 along with their associated costs*

3.5 Actual Post-Project Cost Categories for the sustainable continuation of project activities

For ensuring the sustainability of the EIRIE platform and the post-project continuation of the project activities, the PANTERA consortium identified and analysed a series of alternative options and stakeholders that could potentially undertake the hosting, operation and maintenance of the platform after the PANTERA project end and safeguard the effective and long-term operation of the EIRIE platform, under reliable and continuously available and scalable infrastructures. Such alternatives were presented and analyzed in detail in Deliverable D7.1 [2] and included:

- Hosting of EIRIE Platform in DERlab's Infrastructures
- Transfer of Responsibility for the hosting of EIRIE Platform to the Governance Board of ETIP- SNET
- Hosting of the EIRIE Platform in the SES Infrastructure under the auspices of the Joint Research Centre of the European Commission and DG ENER

The third and most difficult exploitation option considered by the PANTERA consortium for the future exploitation of the EIRIE Platform was to try to reach an agreement with the European Commission's Joint Research Centre (JRC) (operating under the auspices of DG ENER) for the EIRIE platform to be hosted on JRC's servers and the relevant functionality to be provided as part of a one-stop-shop service through the domain of europa.eu.

Such an approach offered numerous and significant benefits, including JRC's credibility with the EU research community, the availability of specialized staff in both energy and ICT areas for content population/enrichment of the platform, as well as platform maintenance and availability, but most importantly, it would ensure the platform's financial sustainability because relevant operating costs could be covered under the budget of DG ENER/ JRC (e.g., costs for extending the user base through communication activities) Also, costs related to hosting the EIRIE platform are eliminated since JRC offers already the required infrastructures for such a function.

This approach, on the other hand, would face a significant challenge, namely persuading JRC and DG ENER that the EIRIE platform adds value to their existing services and complies with the requirements they have for all applications and platforms operating under the europa.eu domain (adhering to security, interoperability, and visualization/ user interface requirements).

The consortium initiated a series of contacts with the European Commission (DG ENER and JRC) and the owners of the platforms that would need to integrate with the EIRIE platform (ETIP-SNET, BRIDGE, EXPERA in the initial specifications) in order to promote the concept of the EIRIE platform and attempt to get them on board for ensuring the EIRIE platform's takeover by JRC, with regards to its hosting and operation not only during the project life cycle but also during the post-project phase (JRC/DG ENER), and for agreeing on integration principles with other platforms under EIRIE platform. Such contacts were intensified, laying the groundwork for all parties concerned to agree on the PANTERA consortium's major exploitation plan, the hosting on JRC servers and the operation of the EIRIE platform under the auspices of JRC and the europa.eu domain. **This agreement ensures the EIRIE platform's financial sustainability because the most significant fixed and operating costs (e.g., costs for expanding the user base through communication activities) will be effectively covered through a suitably tailored service contract under the governance of DG ENER. Also, costs associated with hosting the EIRIE platform would be eliminated because JRC already has the necessary infrastructure in place.**

It is worthwhile mentioning that following this agreement, DG ENER put forward a new action in support of the operation of ETIP-SNET and BRIDGE (among others), namely the SPRING project, which is fully aligned with the scope and features offered by the EIRIE platform. Following a series of meetings and discussions between representatives of DG ENER, SPRING and the PANTERA project, it was agreed that the overall maintenance, extension and content population of the EIRIE platform, will be transferred, as a responsibility, to the SPRING project, with the respective reallocation and transfer of IPR from the PANTERA consortium, to ensure the long-term update and enhancement of EIRIE through the utilization of resources available on the side of SPRING.

In this context, the following table presents in brief, the Post-Project Costs that will be effectively covered by SPRING, DG ENER and JRC, as part of the agreement achieved, while highlighting the cost categories for which the PANTERA Consortium partners will perform a series of business development activities within the last months of the project in order to secure the required funding for their effective and sustainable continuation.

Cost Category	JRC	DG ENER	SPRING	PANTERA Consortium
Pan-European Workshops Hosting/ Participation		√	√	
Regional Workshops Hosting/ Participation			√	√
Platform Hosting	√			
Content Population			√	√
News/ Newsletter Update			√	
Moderation			√	
Domain Name	√			
SSL Certificate	√			
Tech Support	√		√	
Website Design			√	
Bug fixing and Fine-tuning			√	
SEO			√	
Social Media Handling			√	
Event Participation/ Platform Marketing	√		√	√
Integration with other Platforms			√	
Collaboration with EU Initiatives		√	√	√
Service Enrichment		√	√	

Table 2: Post-Project Costs that will be effectively covered by SPRING, DG ENER and JRC

4 Identification of potential funding mechanisms to ensure the sustainability of EIRIE Platform

4.1 European Instruments and Financing Mechanisms

4.1.1 *Horizon Europe*

Horizon Europe [3] is the EU's research and innovation support programme, part of a network of European and national financing programmes with common policy objectives. Special emphasis is placed on ensuring cooperation between universities, scientific communities, and industry, including small and medium-sized businesses, as well as citizens and their representatives. The effective cooperation of all involved parties will facilitate the bridging of gaps between regions, generations, and regional cultures, with a particular focus on the needs of the young in shaping Europe's future. Calls might be EU Synergies calls, which means that projects that are granted a grant under the call may also be eligible for financing from other EU programmes, including applicable shared management funds. In this work programme, a pilot is applied to Innovation Actions incorporating coprogrammed European Partnerships, with a financing rate of 60% (except for nonprofit legal organizations), with the objective of increasing industry contributions. Participating themes (i.e., with a funding rate of 60%) were picked randomly in the 2023 and 2024 calls, to allow for analysis of the consequences of the reduced funding rate. Horizon Europe's approach to international cooperation is multilateralism and meaningful openness, mixed with focused initiatives with significant third-country partners.

4.1.1.1 Cluster 5 Work Programme

The actions focus on harmonizing national, European, and global efforts and investments in research and innovation sectors that contribute to the achievement of major European Commission goals. In terms of Cluster 5, the Commission promotes renewable energy innovation through the Mission Innovation Initiative. International collaboration between EU Member States and Associated Countries is encouraged in the context of Mission Innovation on pertinent themes in this work programme. Furthermore, this work programme addresses cooperation on sustainable decarbonization with major emitting countries around the world, in accordance with the spirit of the Paris Agreement, which emphasizes the importance of global cooperation on technology development and transfer.

The activities of this work program will contribute to all of the Strategic Plan's Key Strategic Orientations (KSOs) (KSO C is the one with the most direct contribution):

A. Promote open strategic autonomy by leading the development of key emerging and digital technologies, industries and value chains to accelerate and accelerate digital and green transformation through human-centered technologies and innovations;
B. Restore Europe's ecosystems and biodiversity, while sustainably managing natural resources to ensure food security and a clean and healthy environment;
C. Make Europe the first circular, climate-neutral and sustainable digital economy through the transformation of mobility, energy, buildings and manufacturing systems;
D. Creating a more democratic, inclusive and resilient European society that prepares for and responds to threats and disasters.

Cluster 5 will deliver on six particular projected impacts in order to contribute to these program-level KSOs. Each predicted impact has been turned into a distinct Destination in this work programme. This deliverable's Destination of interest will be Destination - Sustainable, secure,

and competitive energy supply. The analysis of the specific Destination will be conducted in section 4.1.1.1.

The work programme's activities assist in the achievement of both the Sustainable Development Goals and the Paris Agreement. The main driving force behind Cluster 5 is to expedite the twin green and digital revolutions and the ensuing transformation of our economy, industry, and society in order to achieve climate neutrality in Europe by 2050. This includes advancing the energy and transportation sectors' competitiveness, resilience, and value for people and society while achieving greenhouse gas neutrality in those sectors by 2050 at the latest (as well as in other sectors not included in this cluster). Europe has been at the forefront of climate science and is dedicated to keeping the information flowing so that effective paths and just transitions to climate neutrality are made possible. In order to implement, demonstrate, and de-risk solutions, as well as involve citizens in social innovation, it is of crucial importance that research and Innovation facilitate and manage the necessary transitions. The success rate of European research and innovation initiatives in creating, scaling up, implementing, and commercializing creative solutions will determine how competitive the EU's current and upcoming sectors will be in the European and international markets in the future. Cluster 5 supports the strategic goals of the EU through the actions outlined in this work programmes and the assistance of Institutional European Partnerships, which are carried out through specific organizations.

4.1.1.1.1 Relevant Upcoming Calls and Topics

In this section, as mentioned previously, the emphasis will be put on the Destination - Sustainable, safe and competitive energy supply. This Destination comprises efforts aimed at ensuring a sustainable, secure, and competitive energy supply. In accordance with the scope of Cluster 5, this incorporates activities in the areas of renewable energy, energy systems, grids, and storage, as well as carbon capture, use, and storage (CCUS). The energy system transition will rely on lowering total energy demand and making the energy supply side carbon neutral in current and future climatic circumstances. R&I initiatives will assist to make the energy supply side greener, more secure, and competitive by improving the cost performance and dependability of a diverse portfolio of renewable energy solutions in accordance with societal demands and preferences. Furthermore, R&I activities will support energy system integration by supporting the modernization of energy networks, including the progressive electrification of demand side sectors (buildings, mobility, and industry) and the integration of other climate neutral, renewable energy carriers, such as clean hydrogen.

This Destination helps the Strategic Energy Technology Plan (SET Plan) and its implementation working groups and contributes to the following Key Strategic Orientations (KSO) of the Strategic Plan:

C: Making Europe the first digitally enabled circular, climate-neutral, and sustainable economy by transforming its mobility, energy, construction, and manufacturing systems;

A: Promoting open strategic autonomy by leading the development of key digital, enabling, and emerging technologies, sectors, and value chains to accelerate and steer the digital and green transitions through human-centered technologies and innovations;

This Destination focuses on the following areas of impact:

- industrial leadership in critical and emerging technologies that benefit people;
- affordable and clean energy.

The expected impact, in line with the Strategic Plan, is to contribute to a “More efficient, clean, sustainable, secure and competitive energy supply through new solutions for smart grids and energy systems based on more performant renewable energy solutions”, notably through

i. Fostering European global leadership in affordable, secure and sustainable renewable energy technologies and services by improving their competitiveness in global value chains and their position in growth markets, notably through the diversification of the renewable services and technology portfolio
ii. ii. Ensuring cost-effective uninterrupted and affordable supply of energy to households and industries in a scenario of high penetration of variable renewables and other new low carbon energy supply. This includes more efficient approaches to managing smart and cyber-secure energy grids and optimising the interaction between producers, consumers, networks, infrastructures and vectors.
iii. iii. Accelerating the development of Carbon Capture, Use and Storage (CCUS) as a CO2 emission mitigation option in electricity generation and industry applications (including also conversion of CO2 to products).

Renewable energy technologies include renewable power, renewable heating and cooling, and renewable fuel technologies. Renewable energy technologies provide the foundation for a climate-neutral European and global future. A strong worldwide European leadership in renewable energy technology will pave the road for increased energy security and dependability. It is critical to improve the affordability, security, sustainability, and efficiency of more established renewable energy technologies (such as wind energy, photovoltaics, solar thermal, bioenergy, or hydropower), as well as diversify the technological portfolio. Furthermore, advanced renewable fuels, such as synthetic fuels and sustainable advanced biofuels, are required to provide long-term carbon-neutral solutions for the transportation, energy-consuming, and energy-intensive industrial sectors, particularly in applications where direct electrification is not a technically or economically viable option.

In accordance with the "do not significantly harm" principle for the environment, all renewable energy research and innovation actions aim to improve the environmental sustainability of the technologies, delivering products with lower greenhouse gas emissions and improved environmental performance in terms of water use, circularity, pollution, and ecosystems. Improving environmental sustainability in biofuels and bioenergy is related with the biomass conversion element of the value chain and the product quality, although air pollution associated with engine combustion comes within the scope of other destinations in Cluster 5.

The following topics are inviting proposals, under calls HORIZON-CL5-2023-D3-01 and HORIZON-CL5-2023-D3-02:

HORIZON-CL5-2023-D3-01-01: Renewable Energy Valleys to increase energy security while accelerating the green transition in Europe

Renewable energy valleys are decentralized renewable energy systems that provide a practical and efficient answer to the aforementioned difficulties. Local production and consumption, for example, reduced transmission and distribution losses due to reliance on local networks for energy needs, greater operational flexibility, and less reliance on expensive fuel imports all contribute to greater energy autonomy, a more secure supply, and lower, more stable overall energy costs, including for individual citizens.

HORIZON-CL5-2023-D3-01-02: PV integration in buildings and in infrastructure

PV integration in buildings and infrastructure unleashes a massive amount of renewable energy generation potential. Individual solutions are required for integrated PV to meet multi-functional and aesthetic requirements. These solutions include yield-friendly coloration or modular transparency, antifouling property, structural flexibility, module lightness and flexibility, suited voltage levels, the use of/ the combination with (building) materials other than glass, and an overall high aesthetical value that meets the needs of architects and designers.

HORIZON-CL5-2023-D3-01-10: Supporting the development of a digital twin to improve management, operations and resilience of the EU Electricity System in support to REPowerEU

A digital twin of the electricity grid is a vital digital solution to enable network operators and market actors in performing well-informed decision-making to deal with the expanding complexity of the Energy System(s) and the impact of the fast-changing energy market environment on the Energy System. To achieve the goals of REPowerEU, the energy sector must undergo a digital transition and in order to make the energy system more effective, robust, and capable of integrating increasing percentages of renewable energies, it is essential to speed the innovation cycle and minimize the inertia of the energy industry.

HORIZON-CL5-2023-D3-01-11: Demonstration of DC powered data centres, buildings, industries and ports

Results of the project are anticipated to add to the efficiency and advantages of DC power distribution systems over AC (no need for AC/DC conversion, less copper, less space occupancy, etc.) as well as to the improved grid dependability and resilience offered by DC power distribution networks.

HORIZON-CL5-2023-D3-01-12: Development of MVDC, HVDC and High-Power Transmission systems and components for a resilient grid

The project's outcomes are anticipated to support exploration and development of new converter systems with higher efficiencies. They are also expect to promote the investigation and development of additional sustainable energy storage options that interoperate with MVDC, HVDC, and/or High-Power Transmission systems to support the AC system and the exploration and development of DC breaker integrated in Multi-terminal DC (MTDC) systems, including DC breaker for integration with Superconducting cables.

HORIZON-CL5-2023-D3-01-13: Development of novel long-term electricity storage technologies

The main objective under this topic, is the creation of innovative storage technologies that advance current practice, offer best-fit features for CAPEX, OPEX, efficiency, and sustainability, and are tailored to the unique requirements of the energy system. Examples of such specialized demands include the ability to adapt to the need for energy system flexibility, the quantity of storage required, or particular needs resulting from off-grid circumstances. As opposed to lithium-ion technology, which now drives new storage projects, the focus is on longer-duration solutions. Novel mechanical, chemical, and thermal storage technology solutions are included in the scope, with the exclusion of hydrogen or batteries. Innovative storage solutions should demonstrate significant innovation compared to the state of the art, such as via the use of new advanced

materials or novel design solutions, always keeping in mind the goal of sustainability and the circular economy, reducing the environmental impact.

HORIZON-CL5-2023-D3-01-14: Demonstration of innovative, large-scale, seasonal heat and/or cooling storage technologies for decarbonisation and security of supply

The demonstration of cutting-edge heat and/or cooling storage systems that go beyond the state-of-the-art and address long-term energy storage up to cross-seasonal storage falls under the purview of this topic. Large-scale solutions are anticipated to be integrated into a) District-level heating and/or cooling storage and/or b) integrate the demand for heat for industrial operations with the supply of heat (waste heat from the industry).

HORIZON-CL5-2023-D3-01-15: Supporting the green and digital transformation of the energy ecosystem and enhancing its resilience through the development and piloting of AI-IoT Edge-cloud and platform solutions

By creating and piloting at scale open source, environmentally friendly, easily upgradeable, and energy-efficient cloud-edge solutions, the main objective under this topic is to develop solutions that increase the integration of renewable energy sources, as well as the local generation and consumption of energy, and the processing of data. Smart houses and buildings, as well as bidirectional EV charging, should be included in the application space. It is intended that solutions would be built using widely accepted open standards. Additionally, validation should be carried out at least three pilot sites in three Member States or Associated Countries, and it may include an open call for additional services using up to 10% of the total budget under "financial support to third parties" to draw in more customers and suppliers, particularly SMEs. The project will use operational end-to-end architectures, digital platforms, and other data exchange infrastructure for the energy system being developed as part of ongoing EU programs and other relevant initiatives to ensure interoperability between the solutions and with other European IoT research and innovation efforts in the energy and other sectors, as well as grid integration.

HORIZON-CL5-2023-D3-01-16: Support action to the SET Plan IWG on HVDC & DC Technologies

The Implementation Working Group (IWG) on HVDC was established to explicitly address the demands for grid development resulting from an energy system based mostly on renewable resources, as outlined in the Green Deal. The Offshore Renewable Energy Strategy served as the impetus for the formation of the WG, with a goal of installing 60 GW of offshore wind and at least 1 GW of ocean energy by 2030 (300 GW and 40 GW by 2050). In order to assure the SET Plan nations' active participation, the IWG's actions span from supporting the development of DC Technologies and Systems to encouraging collaboration and coordination among them. The aim of the support action is to make the IWG's simpler by supporting the HVDC Implementation Plan.

HORIZON-CL5-2023-D3-02-02: Novel thermal energy storage for CSP

Novel thermal energy storage solutions for CSP facilities will be supported. The proposed thermal energy storage solutions are required to be more efficient, cost effective, and dependable than present commercial alternatives, while also achieving comparable performance in terms of cycles.

HORIZON-CL5-2023-D3-02-04: Innovative components and configurations for heat pumps

Development of novel heat pumps and/or heat pump components. Innovative heat pumps and/or heat pump components should be more efficient and dependable than current commercial systems. They should be both safe and inexpensive.

HORIZON-CL5-2023-D3-02-06: Smart use of geothermal electricity and heating and cooling in the energy system

The development of transmission and distribution infrastructure, as well as the interaction with other flexibility alternatives (such as demand-side management and storage), as well as dispatchability testing, will lead to AI-based smart thermal grids that balance generation and demand. Flexible generation should be capable of providing additional grid services such as inertial services/peak power and a role in electricity balancing/reserve market.

HORIZON-CL5-2023-D3-02-14: Digital twin for forecasting of power production to wind energy demand

Experience from the existing wind farms demonstrates the significance of appropriate micrositing and effective connectivity of the wind turbines inside the farm. Additionally, clustering wind farms in order to create a wind power plant idea might cause long-distance negative interactions between the farms, lowering their anticipated efficiency. This might occur both onshore and offshore. Due to the large quantity of wind power that is already connected and the anticipated growth over the next several years, this technology must be ready to play a more significant part in the dependability and security of the energy system. The objective of this topic is to create new digital twins to maximize the use of individual wind farms (onshore, offshore, bottom-fixed, and floating) as well as wind farm clusters, with the intention of converting them into virtual power plants that would supply a more dependable and secure electricity system.

HORIZON-CL5-2023-D3-03-03: System approach for grid planning and upgrade in support of a dominant electric mobility (vehicles and vessels) using AI tools

The activities are anticipated to include the definition and development of new AI-based tools to predict the estimation and planning of the deployment, and associated challenges for utilities (from an EV recharging ecosystem viewpoint - CPO, DSO, and TSO) on how to handle the increasing upcoming demand in numerous new locations, particularly during peak periods. Additionally, one of the activities involves developing a coherent energy system planning for electric mobility, taking into account both the needs and impacts for the recharging of EVs and onshore power supply of vessels in maritime ports and inland waterways, as well as understanding how to efficiently deploy the required grid connection (and power) in less densely populated areas, exploring the impact from the installation of batteries to expand the grid in combination with renewables.

HORIZON-CL5-2023-D3-03-04: Digital tools for enhancing the uptake of digital services in the energy market

Digitalization advances more quickly than society can adapt to it. The use of digital technology is encouraging individuals to participate actively in the just energy transition. In order to reduce the anticipated friction of end-consumer on-boarding, measures should focus on the advantages of new digital services and users' experiences, while also providing cutting-edge tools for engagement and literacy. Tools for social innovation, multidisciplinary methods, and the involvement of policymakers at all levels - in the commercial sector, civic society, and the general public - are necessary.

HORIZON-CL5-2023-D3-03-05: Creation of a standardised and open-source peer-to-peer energy sharing platform architecture for the energy sector

In order to ensure the best exploitation and integration of DER (such as solar panels, batteries, and electric vehicles, but also demand-response and flexible heat pumps and heaters considered as a resource) within the electricity network, taking into account network constraints, the activities include defining the fundamental tasks that a flexibility and peer-to-peer trading platform ought to carry out. Furthermore, part of these tasks is the development of AI-based software that incorporates regional grid constraints with core operations (including when directed through price signals) in order to adapt to variations and changes in grid conditions, as well as the testing and simulation of blockchain-based trading operations using an agile methodology in order to create a fully functional trading tool.

HORIZON-CL5-2023-D3-03-06: Components and interfacing for AC & DC side protection system – AC & DC grid: components and systems for grid optimisation

The outcomes of the project are anticipated to have an impact on the functional design of the AC and DC side protection strategies, the development of a methodology to evaluate the admissible temporary loss of transmitted power in the event of a DC fault, and the design of multi-vendor interoperable MVDC/HVDC grid protection strategies.

Regarding grid congestions in either AC or DC, project outcomes are anticipated to contribute to innovative power electronics-based technologies that are properly positioned in the grid for congestion caused by the introduction of decentralized energy in a centralised-based electricity system, to the optimization of the power flows by shifting power transfer from loaded to less loaded lines, as well as to grid reinforcement avoidance.

4.1.1.1.2 Priority List

Calls	Topics	Type of Action	Deadline(s)	Priority
HORIZON-CL5-2023-D3-01	HORIZON-CL5-2023-D3-01-01: Renewable Energy Valleys to increase energy security while accelerating the green transition in Europe	IA	30 Mar 2023	Medium
	HORIZON-CL5-2023-D3-01-02: PV integration in buildings and in infrastructure	IA	30 Mar 2023	Medium
	HORIZON-CL5-2023-D3-01-10: Supporting the development of a digital twin to improve management, operations and resilience of the EU	IA	30 Mar 2023	High

	Electricity System in support to REPowerEU			
	HORIZON-CL5-2023-D3-01-11: Demonstration of DC powered data centres, buildings, industries and ports	IA	30 Mar 2023	Medium
	HORIZON-CL5-2023-D3-01-12: Development of MVDC, HVDC and High-Power Transmission systems and components for a resilient grid	IA	30 Mar 2023	Low
	HORIZON-CL5-2023-D3-01-13: Development of novel long-term electricity storage technologies	RIA	30 Mar 2023	Low
	HORIZON-CL5-2023-D3-01-14: Demonstration of innovative, large-scale, seasonal heat and/or cooling storage technologies for decarbonisation and security of supply	IA	30 Mar 2023	Low
	HORIZON-CL5-2023-D3-01-15: Supporting the green and digital transformation of the energy ecosystem and enhancing its resilience through the development and piloting of AI-IoT Edge-cloud and platform solutions	IA	30 Mar 2023	High
	HORIZON-CL5-2023-D3-01-16: Support action to the SET Plan IWG on HVDC & DC Technologies	CSA	30 Mar 2023	High
HORIZON-CL5-2023-D3-02	HORIZON-CL5-2023-D3-02-02: Novel thermal energy storage for CSP	RIA	05 Sep 2023	Low
	HORIZON-CL5-2023-D3-02-04: Innovative components and configurations for heat pumps	RIA	05 Sep 2023	Low
	HORIZON-CL5-2023-D3-02-06: Smart use of geothermal electricity and heating and cooling in the energy system	IA	05 Sep 2023	Medium

	HORIZON-CL5-2023-D3-02-14: Digital twin for forecasting of power production to wind energy demand	RIA	05 Sep 2023	High
HORIZON-CL5-2023-D3-02	HORIZON-CL5-2023-D3-03-03: System approach for grid planning and upgrade in support of a dominant electric mobility (vehicles and vessels) using AI tools	IA	10 Oct 2023	High
	HORIZON-CL5-2023-D3-03-04: Digital tools for enhancing the uptake of digital services in the energy market	IA	10 Oct 2023	High
	HORIZON-CL5-2023-D3-03-05: Creation of a standardised and open-source peer-to-peer energy sharing platform architecture for the energy sector	IA	10 Oct 2023	Low
	HORIZON-CL5-2023-D3-03-06: Components and interfacing for AC & DC side protection system – AC & DC grid: components and systems for grid optimisation	IA	10 Oct 2023	Medium

Table 3 Cluster 5 topics priority list

4.1.1.1.3 Eligibility Requirements and Pre-conditions

In terms of Eligibility [5], participation in Horizon Europe calls is allowed to legal entities forming a consortium provided that the consortium includes at least one independent legal entity established in a Member State; and at least two other independent legal entities, each established in different Member States or Associated Countries, as they are defined in General Annex B of Horizon Europe

4.1.1.2 Missions

The primary objectives of EU Missions are to tackle some of the most pressing issues affecting our society. The Horizon Europe Regulation has five mission areas (Adaptation to Climate Change, including Societal Transformation - Cancer - Healthy Ocean, Seas, Coastal and Inland Waters - Climate-Neutral and Smart Cities - Soil Health and Food). Missions had a preliminary planning phase in 2021, during which execution plans were created. These comprised specific actions, explicit goals, an investment plan, and performance measures for each mission. The

implementation plans were evaluated in summer 2021 based on objective criteria, and all five planned EU Missions have already begun full implementation.

Missions [4] will employ the reuse and reproducibility of research outcomes, such as FAIR research data and open access to scientific papers, to carry out their objectives and foster social change. Along with demonstrating the value the EU adds, the missions will closely include citizens in their implementation and monitoring throughout their duration. This deliverable's emphasis will be on *100 Climate-Neutral and Smart Cities by 2030*, as well as particular calls and topics related to this mission, which are discussed in the next section.

4.1.1.2.1 Relevant Upcoming Calls and Topics

In accordance with the guidelines in the Implementation Plan of the Cities Mission, the Work Programme 2023 of the Climate-Neutral and Smart Cities Mission promotes the implementation of the Mission through actions that will keep providing a strong and direct support to cities that will commit to climate neutrality and enable them to implement their climate action plans and achieve climate neutrality by 2030, in synergy with significant progress towards zero pollution. In order for other cities to become climate-neutral by 2050, the cities that benefit from these efforts will serve as hubs for innovation and experimentation. Cities that are climate neutral experience significant co-benefits and urban characteristics, such as lower air and noise pollution, better health and wellbeing, smaller environmental footprints, more urban greening, reduced soil sealing and improved water management.

The topics covered by the 2023 calls will keep working to develop and scale up R&I activities and solutions while creating synergies and cooperative actions with Horizon Europe Partnerships and other EU Missions. The proposed actions are intended to:

Accelerating the transition of European cities to climate neutrality by utilizing the potential of shared, automated, and connected people mobility as well as freight transport through a joint action with the Horizon Europe Partnerships dedicated to Zero-emission Road Transport (2Zero) and Connected, Cooperative and Automated Mobility (CCAM);

Engaging cities in forceful climate mitigation and adaptation efforts to reduce emissions, through a collaborative venture with the Adaptation to Climate Change Mission, focusing on creative use of urban greening and nature-based solutions;

Create and test a digital twin of a PED (Positive Clean Energy District) that includes modeling, management, citizen involvement, self-optimization, and scenario analysis.

The following topics are inviting proposals, under call HORIZON-MISS-2023-CIT-01 - Research and Innovation actions to support the implementation of the Climate neutral and Smart Cities Mission:

HORIZON-MISS-2023-CIT-01-01: Co-designed smart systems and services for user centered shared zero-emission mobility of people and freight in urban areas (2Zero, CCAM and Cities' Mission)

Urban mobility is a significant aspect that cities must focus on if they are to hasten their transition to climate neutrality. In their planning and implementation, citizens, logistics and delivery stakeholders, urban planners, transport operators, and technology providers should work together to fully utilize the potential of electric, automated, and connected vehicles as well as integrated and shared people and freight transport. This calls for the coordination of the technological

opportunities provided by the relationships between CCAM and 2Zero and the needs indicated by users and localities working to achieve the Mission's goal of carbon neutrality. Innovative passenger mobility and freight transport ideas should be co-designed with end users, residents, and other stakeholders to maximize performance, uptake potential and usability after being agreed upon by technology providers and cities.

HORIZON-MISS-2023-CIT-01-02: Positive clean energy district (PED) digital twins – from modelling to creating climate neutral Cities

Delivering climate-neutral and intelligent cities is an extremely challenging endeavor that requires consistent support for the Cities Mission. This activity needs to be tackled from the smallest representative size, which is the district level, in order to be feasible. To obtain the sharpest image of the current situation and the size of the issue, it is essential to measure, analyze, and model the characteristics and conduct of a prospective Positive Clean Energy District (PED). Making a digital twin can help with system administration in real time for adaptation and optimization over time and place, as well as identification of the most efficient collection of integrated solutions.

4.1.1.2.2 Priority List

The call **HORIZON-MISS-2023-CIT-01 - Research and Innovation actions to support the implementation of the Climate neutral and Smart Cities Mission** is anticipated to launch on January 10, 2023, and the deadline for submitting proposals for the topics discussed above is set for April 27, 2023, at 17.00 CET.

Calls	Topics	Type of Action	Deadline(s)	Priority
HORIZON-MISS-2023-CIT-01	HORIZON-MISS-2023-CIT-01-01: Co-designed smart systems and services for user centered shared zero-emission mobility of people and freight in urban areas (2Zero, CCAM and Cities' Mission)	IA	27 Apr 2023	Medium
	HORIZON-MISS-2023-CIT-01-02: Positive clean energy district (PED) digital twins – from modelling to creating climate neutral Cities	IA	27 Apr 2023	High

Table 4 Missions topics priority list

4.1.1.2.3 Eligibility Requirements and Pre-conditions

In terms of Eligibility, participation in Missions calls is allowed to legal entities forming a consortium provided that the consortium includes at least one independent legal entity established in a Member State; and at least two other independent legal entities, each established in different

Member States or Associated Countries, as they are defined in General Annex B of Horizon Europe

4.1.1.3 Widening participation and strengthening the European Research Area

This part [7] of the Horizon Europe Work Programme 2023–2024 addresses the key areas Widening participation and Strengthening the European Research Area (ERA) and includes two main components:

- Widening participation and spreading excellence, and;
- Strengthening the ERA by reforming and enhancing the European Research and Innovation system.

Since Research and Innovation (R&I) policy can only ensure excellence at the European level if every country and region progresses, the dedicated widening component aims to bridge the innovation gap and create a more integrated and cohesive European research and innovation ecosystem in the European Union. The European Union's R&I system must foster a more inclusive approach in which everyone can participate and benefit. Existing gaps between leading and underperforming countries in R&I should be addressed by fundamental policy reforms. Closer links between research and innovation, as well as institutional collaboration to develop high-quality knowledge, are critical to bridging these gaps. Less R&I advanced countries will be able to upgrade their R&I systems by establishing connections to larger networks of excellence.

According to the Horizon Europe regulation in this program component, the less developed countries eligible for hosting the co-ordinator of widening actions are Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, and all Associated Countries with comparable characteristics in terms of R&I performance (Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, Georgia, Kosovo, Moldova, Montenegro, North Macedonia, Serbia, Tunisia, Turkey, Ukraine, and once associated Morocco), as well as the Outermost Regions (Guadeloupe, French Guiana, Martinique, Mayotte, Réunion and Saint Martin (France), the Canary Islands (Spain) and the Azores and Madeira (Portugal)) .

With regards to the second component, The European Commission adopted a communication on a new European Research Area for Research and Innovation to improve the European research and innovation landscape, accelerate the European Union's transition to climate neutrality and digital leadership, aid the European Union's recovery from the coronavirus crisis, and strengthen its resilience in the face of future crises. In close collaboration with Member States, it establishes strategic objectives to prioritize R&I investments and reforms, improve access to excellence for researchers across the EU, enable research results to reach the market and the real economy, and strengthen researcher mobility and the free flow of knowledge. In this framework, the ERA envisions a unified, borderless market for research, innovation, and technology across the EU, based on great, competitive, open, and talent-driven research and researchers. It enables Member States to work more effectively together by tightly coordinating their research policies and programs. The free movement of researchers and knowledge allows for improved cross-border cooperation, the formation of critical mass and continental competition.

This constituent of the Horizon Europe Work Programme will help to achieve the expected impacts of Horizon Europe along the four key strategic orientations outlined in the strategic plan,

as well as support the implementation of key policy objectives of the European Commission, including the European Green Deal and the European Union's digital strategy. The topics of the work programme reflect the four strands of the ERA communication: expanding access to excellence, attracting and mobilizing top talent, reforming and upgrading the European Union R&I system, and translating research discoveries into economic value.

- Strand 1 recognizes the necessity of prioritizing investments and reforms to expedite the green and digital transformation, boost competitiveness, and accelerate and deepen the recovery.
- Strand 2 tackles the need to improve access to excellence and the performance of R&I systems, building on targeted Horizon Europe initiatives as well as complementarities with Cohesion Policy smart specialisation strategies.
- Strand 3 emphasizes the significance of translating R&I results into the economy.
- Strand 4 addresses the challenge of expanding the ERA by bringing together Open Science, Higher Education and Researchers, Citizen Science, Science Education, Gender and Ethics. It aspires to underlie a new ERA that benefits from knowledge development, dissemination, and implementation.

In this programme, special attention is given to ensuring cooperation between universities, scientific communities, and industry, including small and medium enterprises, as well as citizens and their representatives, in order to bridge gaps between territories, generations, and regional cultures, with a particular focus on the needs of the young in shaping Europe's future. Synergies with national, regional, and other European programs, particularly those covered by the cohesion policy, will boost the impact of actions carried out under this work programme.

This deliverable's Destination of interest will be Destination - Reforming and enhancing the EU research and innovation system. The analysis of the specific Destination will be conducted in section 4.1.3.1.

4.1.1.3.1 Relevant Upcoming Calls and Topics

Horizon Europe has a clear objective: to maximize the influence of the European Union's research and innovation funding on European science, the economy, and society as a whole. It represents a paradigm shift in the design of European R&I framework programs (FP) from activity-driven to impact-driven. This objective is linked to the relaunch of the European Research Area (ERA), as defined in the Commission Communication "A new ERA for Research and Innovation" (COM/2020/628 final of September 30, 2020). The new ERA calls for expanding existing objectives and creating new initiatives to promote access to excellence, boost market uptake, and prioritize investment and reform through improving researcher mobility and the free movement of knowledge and technology.

Working together has been the ERA's approach from its inception; nevertheless, the green and digital transitions, as well as the COVID recovery, require deeper and closer cooperation between the Commission, Member States, and stakeholders. They necessitate the establishment of new priorities, the launch of ambitious collaborative initiatives, and the development of unified policy approaches. To meet these requirements, this Horizon Europe work project destination will assist initiatives to reform and improve the European R&I system. This destination is organized around four strands that relate to the four ERA Communication objectives:

- Prioritizing research and innovation investments and reforms;
- Improving access to excellence, progressing toward excellence across the EU, and working for better research and innovation systems;
- Translating R&I results into the economy in order to meet the digital and green transition objectives and boost the resilience and competitiveness of our economies and societies;
- Deepening the ERA in order to advance knowledge free circulation and ensure an upgraded, efficient, and effective R&I system.

The following topics are inviting proposals, under calls HORIZON-WIDERA-2023-ERA-01 and HORIZON-WIDERA-2024-ERA-01:

HORIZON-WIDERA-2023-ERA-01-01: Programme level collaboration between national R&I policy-makers

Since the establishment of the European Research Area (ERA) in 2000 and beginning with Framework Programme 6 and the implementation of the ERA-NET scheme, program level collaboration among Member States and Associated Countries and their research and innovation funding programmes has been a cornerstone of the ERA. Over time, more than 250 networks of research funders have emerged, each fulfilling a different research need but always coordinating public research investments across borders and allowing academics to submit for proposals for transnational research projects sponsored by the participating governments. Horizon Europe takes a novel method to incentivize program-level collaboration by identifying candidate European co-funded, co-programmed, and institutionalized partnerships in the Strategic Plan. The initiatives financed under this topic will coordinate national and regional R&I funding programmes by pooling national resources and contributing to national R&I policy alignment.

HORIZON-WIDERA-2023-ERA-01-02: A strong European R&I Foresight Community to better inform R&I policy decisions in the European Research Area about potential futures

The primary objective of this action is to accelerate the development of a European R&I foresight community that can contribute not only to the design of national reforms and policies, but also to the evidence underpinning, and governance of a vibrant European Research Area that delivers on common priorities and objectives.

HORIZON-WIDERA-2023-ERA-01-03: Experimentation and exchange of good practices for value creation

Europe must translate available scientific information and research results into new market, societal, and regulatory solutions, including technological, non-technological, and social innovations. More experimentation, peer learning, and testing of new models, as well as trying out good practices in other situations, are required to bring existing good practices in knowledge valorization to assist value creation across Europe.

HORIZON-WIDERA-2023-ERA-01-05: Exploitation and valorisation of results relevant for the ERA Policy Agenda

The action will put in place a facility to disseminate results widely, make them easier to use, tailor them to the needs of different communities, and create a community of practitioners who will support mutual learning and the exchange of good practices in institutional change in the spirit of the New ERA.

HORIZON-WIDERA-2023-ERA-01-07: Support to reforms of research assessment in the European Research Area

This action intends to help to the reforming of the evaluation of research projects, researchers, research units, and research institutions. The formation of a coalition of committed organizations is intended to hasten improvements toward research assessment systems that emphasize qualitative judgment through unbiased peer review, backed up by more responsible use of quantitative data. The reformed research assessment systems should value a more diverse set of research cultures and outputs, such as publications, other research outputs such as data sets, software, models, workflows, methods, and so on, as well as proper conduct such as integrity, gender equality, equal opportunities, and inclusiveness. The revamped processes are expected to incentivize early knowledge and data sharing as well as open collaboration.

4.1.1.3.2 Priority List

The call **HORIZON-WIDERA-2023-ERA-01 - Enhancing the European R&I system** launched on December 6, 2022, and the deadline for submitting proposals for the topics discussed above is set for March 9, 2023, at 17.00 CET**.** The call **HORIZON-WIDERA-2024-ERA-01 - Enhancing the European R&I system,** is anticipated to be launched on December 6, 2023, and the deadline for the submission of proposals for the respective topics that were discussed above, is foreseen for March 12, 2024, at 17.00 CET**.**

Calls	Topics	Type of Action	Deadline(s)	Priority
HORIZON-WIDERA-2023-ERA-01	HORIZON-WIDERA-2023-ERA-01-01: Programme level collaboration between national R&I policy-makers	CSA	9 Mar 2023	Low
	HORIZON-WIDERA-2023-ERA-01-02: A strong European R&I Foresight Community to better inform R&I policy decisions in the European Research Area about potential futures	CSA	9 Mar 2023	High
	HORIZON-WIDERA-2023-ERA-01-03: Experimentation and exchange of good practices for value creation	CSA	9 Mar 2023	High
	HORIZON-WIDERA-2023-ERA-01-05: Exploitation and valorisation of results relevant for the ERA Policy Agenda	CSA	9 Mar 2023	Medium

	HORIZON-WIDERA-2023-ERA-01-07: Support to reforms of research assessment in the European Research Area	CSA	9 Mar 2023	Low

Table 5 WIDERA topics priority list

4.1.1.3.3 Eligibility Requirements and Pre-conditions

In terms of Eligibility, participation in WIDERA calls is allowed to legal entities forming a consortium provided that the consortium includes at least one independent legal entity established in a Member State; and at least two other independent legal entities, each established in different Member States or Associated Countries, as they are defined in General Annex B of Horizon Europe

4.1.2 *Clean Energy Transition Partnership (CETP)*

The Clean Energy Transition Partnership (CETPartnership) [11] is a multilateral and strategic partnership of national and regional research, development and innovation (RDI) programmes in EU/EEA Member States and non-EU/EEA Partner Countries with the aim to substantially support the implementation of the European Strategic Energy Technology Plan (SET Plan). It will contribute to higher level European policy goals towards Stepping up EU 2030 Climate Ambitions and the New European Research Area with the ultimate objective to achieve a climate-neutral society by 2050. The CETPartnership will also address the strategies outlined in the latest EC communications e.g. A Clean Planet for all and the European Green Deal.

The CETPartnership builds on previous SET Plan activities (ERA-Nets, IWGs, ETIPs, and so on) and seeks to develop synergies with the National Energy and Climate Plans as well as the Recovery and Resilience Facility (RRF). Furthermore, the CETPartnership will help to achieve the goals of saving energy, creating clean energy, diversifying Europe's energy suppliers, strengthening and making Europe's clean energy value chains more sustainable. The Strategic Research and Innovation Agenda (SRIA) of the CETPartnership is the underpinning for the implementation of the Partnership. For the next ten years, the SRIA will act as a guide and "compass" for international collaboration in Europe and beyond. The national and regional RDI programme owners and managers constituting the partnership share a common vision and objectives, which frame the CETPartnership's transformative research, development and innovation programme. The SRIA reflects their coordinated and harmonised view as well as their high expectations as to the impact of the RDI. To deliver highly transformative outcomes, it follows a challenge-driven and transdisciplinary approach.

CETPartnership aims to empower the energy transition and contribute to the EU's goal of becoming the first climate-neutral continent by 2050. It pools national and regional RDI funding for the broad variety of technologies and system solutions required to make this transition. CETPartnership envisions a transition driven by industry, public institutions, academia and citizens groups that will make Europe the front-runner in clean energy innovation and implementation. The CETPartnership call welcomes funding organisations from outside Europe, which then expands the impact of climate neutrality to the global arena.

The CETPartnership has seven Transition Initiatives (TRIs) focusing on RDI Challenges that address various technologies and system aspects connected to the clean energy transition, as well as several cross-cutting dimensions.

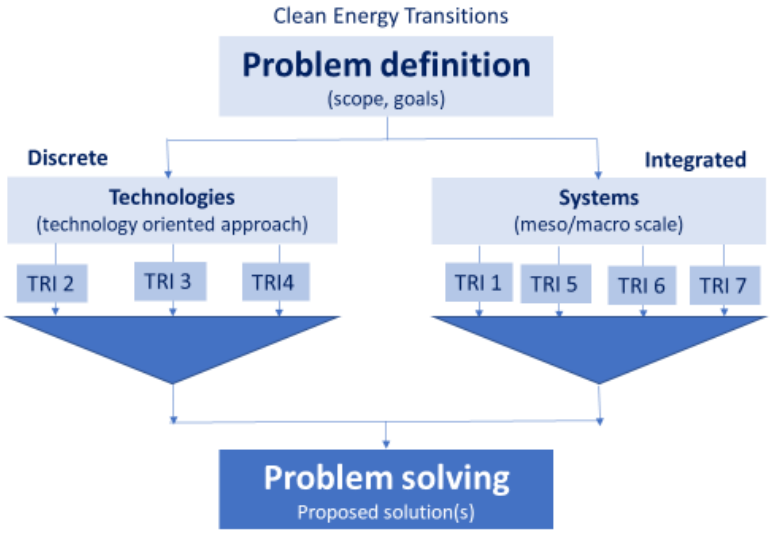


Figure 11: Structure for the selection of the appropriate TRI

The TRIs tackle a wide variety of issues, from discrete technologies to integrated systems. There is an emphasis on technology for energy conversion and storage as well as for supplying carbon treatment and sinks, which are viewed as the enabling zero emission solutions for the energy system. Other issues are related to storage technologies, technologies that will enable more variable demand, and power-to-x technologies that will contribute to electrification and a cleaner industry. The TRIs are summarized as follows:

- TRI1: Optimised integrated European net-zero emissions energy system
- TRI2: Enhanced zero emission power technologies
- TRI3: Enabling climate neutrality with storage technologies, hydrogen and renewable fuels, and CCU/CCS
- TRI4: Efficient zero emission Heating and Cooling Solutions
- TRI5: Integrated regional energy systems
- TRI6: Integrated industrial energy systems
- TRI7: Integration in the built environment

The CETPartnership Joint Call 2022 is the CETPartnership's first annual co-funded call. The joint call text and eleven Call modules provided by the TRIs structure the CETPartnership Joint Call 2022. The focus of this deliverable will be on TRI1, TRI5, and TRI7, as well as specific Call Modules of these TRIs, analyzed in the next section.

The call procedure for the CETPartnership is organised as a 2-step-procedure: submission of a pre-proposal followed by an invite to submit a full-proposal. Stage 1, referring to a pre-proposal and any supporting documents had to be submitted by the project Coordinator through the CETPartnership Application portal. The deadline for submission of pre-proposals is the 23rd of November 2022, 14:00 CET.

Towards Stage 2, the CETPartnership Funding Partners will agree on a list of pre-proposals to be invited for submission of a full proposal. The choice will be based on the ranked list and the outcome of the national/regional eligibility check, with the total budget of invited pre-proposals being balanced in relation to the available budget for each Funding Partner.

4.1.2.1 Relevant Calls and Topics

Call - TRI 1 Integrated Net-zero-emissions Energy System

Transition Initiative 1 (TRI1) - Integrated net-zero energy systems implement the CETPartnership Strategic Research Innovation Agenda (SRIA) Challenge 1, focusing on developing the "Optimised, integrated European net-zero emission energy system," in which energy networks (electricity, gas, hydrogen, water, heating and cooling, mobility, and their integrated and coordinated functioning, etc.) play an important role.

Call Module/ Topic 1.1 PowerPlanningTools

Projects are expected to contribute to the creation, demonstration, and/or implementation of the toolbox elements required to plan and run future integrated energy systems that improve inclusivity, sustainability, and resilience. Projects funded through this Call module will make available proven methods for future energy system planning, operation, performance assessment, resilience, and sustainability evaluation.

The projects are expected to contribute to the following impacts:

- Higher confidence about robustness of energy transition scenarios enabled by the use of transparent and open source tools;
- Possibility to handle stochastic boundary conditions (variability of energy sources, variability of loads, volatility of energy costs, environmental threats etc.) to represent the evolution of the energy systems and their threats in view of a higher level of resilience;
- Better technical understanding of cross sectoral and trans-national energy system planning;
- Assessment and optimisation of technical performances and of the economical and societal benefits linked with the evolution of the integrated energy systems as developed using the exploitable results of the projects.

Call Module/ Topic 1.2 RESDemoPowerflex

Projects are expected to develop, design, test, and demonstrate advanced inclusive, sustainable, and resilient technologies, systems, control mechanisms, and solutions that allow for the efficient provision, hosting, and utilization of high shares of renewables, up to and beyond 100% in the European system at distribution and transmission levels by 2030, while dealing with network constraints and providing flexibility services and ensuring coordination across energy sectors.

Solutions developed should be targeted to one or more of the following outcomes:

- Increase RES hosting capacity of distribution systems, through advanced network solutions, development and standardization of new components and devices (to ensure full interoperability), based on power electronics, improved grid controllability and digitalization and improved forecasting tools (e.g. digital twin).

- Increase generators capability to meet network balancing needs, through faster switch in/out and ramping up/down of all types of generators, including variable RES (e.g. wind, PV, wave), leveraging hydropower (including pumped hydro), cogeneration (CHP), biofuels, geothermal etc.
- Enable the exploitation of energy storage through the adequate coordination with system operators to enhance flexibility: demonstrate the role of large-scale and distributed energy storage (electricity, thermal, synthetic liquids, hydrogen, etc.) in supporting cost effective decarbonization.
- Develop and test solutions to unlock the flexibility potential (demand response and storage) of industrial processes and industrial/commercial/residential building; platforms to accelerate the adoption of new energy services and technologies.
- Quantify and optimize the impact (opportunities and constraints) of EV interaction with the grid (smart control of different charging (slow and fast) infrastructures in providing various flexibility services to local district and national infrastructure: smart Charging and Vehicle-to-Grid).
- Demonstrate the ability of providing management of flexibility by cross-energy vector coupling including various P2X, X2P, through innovative control and operation tools for multi-energy systems.

Call - TRI 5 Integrated regional energy systems

The objective of this Call is to create and validate integrated regional and local energy systems that are resilient and secure while also efficiently providing, hosting, and utilizing high proportions of renewables, up to and beyond 100% in dynamic local or regional supply by 2030. Such systems must give reproducible model solutions that may suit particular regional and local requirements and demand while also demonstrating national and global scalability and replicability. A fundamental cornerstone for this call module is a mission-driven approach in which relevant local and regional stakeholders have a prominent role in problem conceptualization and project implementation. The predicted innovation is required along the three integration dimensions listed below:

- Smart energy system integration
- Cross-sectoral integration
- Innovation ecosystems and Integration with local & regional development

Call - TRI 7 Integration in the built environment

TRI7 mission is 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 in the residential and non-residential sector, comprising public and commercial buildings, service and mobility infrastructure buildings.

Call Module/ Topic 7.1 R&I in clean energy integration in the built environment

The Call module "R&I in clean energy integration in the built environment" is a Research and Innovation Action (RIA). The content of the Call module is specified by the Strategic Research and Innovation Agenda (SRIA), elaborated by the CET Partnership principles, and addresses the objectives of Transition Initiative 7 (TRI7): Integration in the Built Environment. The Call module is designed to establish the first portfolio of innovative solutions covering a critical component of the SRIA for RDI integration in the built environment. Proposals should focus on integrating

energy technologies and digitalization. The Call module should produce outcomes that can be used as building blocks and elements in the building supply chain, such as energy conversion, storage, or harvesting. Integration schemas should be included in solutions. Interfaces of non-homogeneous components and interoperability among them are critical design considerations. Digitalisation and tool solutions, on the other hand, help with design, implementation, performance measurement, and validation.

Call Module/ Topic 7.2 Solutions to energy transition in the built environment

The Call Module "Solutions to Energy Transition in the Built Environment" is an Innovation and Demonstration Action (IDA). The content of the Call module is specified by the Strategic Research and Innovation Agenda (SRIA), elaborated by the CET Partnership principles, and addresses the objectives of Transition Initiative 7 (TRI7): Integration in the Built Environment.

The SRIA proposes a broad picture of field improvements. The scope is arranged around developments in renewable energy integration and conversion in the built environment, as well as digitalization across the building life cycle.

The Call module aims to build the first portfolio of new solutions covering a fundamental portion of the SRIA in terms of innovation and demonstration in built-environment integration. The projects will handle the problems for large integration of sustainable energy technologies in buildings mentioned in the SRIA. Proposals should demonstrate energy technology integration and digitalisation capabilities. The Call module should provide integrated energy solutions that address the complexities of the energy system, which are critical to the construction industry. The portfolio should include pilot projects that include demonstration and validation of implementable solutions. Multipliers (architects, building owners, civil engineers, craftsmen, engineering offices, manufacturers, municipalities, the public sector, etc.) should become part of the projects to lead new technologies towards commercial readiness.

4.1.2.2 Priority List

At the time of the drafting of this deliverable, and because the deadline for submitting pre-proposals has expired, less priority is placed on CETPartnership, in relation to the other funding instruments that are currently ongoing. However, we anticipate the launch of the next Joint Call, TRIs, and Call Modules.

4.1.2.3 Eligibility Requirements and Preconditions

Participation in CETP Projects is not subject to any strict eligibility requirements. In fact, the main eligibility requirement dictates that each project proposal must include at least three independent legal entities from at least three different countries participating in the CETPartnership Joint Call 2022 (all PANTERA countries are represented, except for Bulgaria), out of which at least two must be EU Member States or Horizon Europe Associated Countries

4.1.3 *LIFE Programme*

The LIFE Programme [12] is the EU Programme for Environment and Climate Action. As such, it is one of the key contributors to the European Green Deal which aims to:

- transform the EU into a fair and prosperous society, with a modern, resource efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use and;
- protect, conserve and enhance the EU's natural capital, and protect the health and well-being of citizens from environment and climate related risks and impacts.

The LIFE Programme contributes to these priorities through its four sub-programmes in particular by:

- boosting and integrating the implementation of the EU's policy objectives for halting and reversing loss of wildlife habitats and species across all sectors
- supporting the transition to a circular economy and protecting and improving the quality of EU's natural resources, including air, soil and water among others
- supporting implementation of the 2030 energy and climate policy framework, the EU's climate neutrality objective by 2050, and the new EU strategy on adaptation to climate change and;
- building capacity, stimulating investments and supporting implementation of policies focused on energy efficiency and small-scale renewables.

The LIFE Programme is structured in two fields and four sub-programmes

Environment:

- sub-programme Nature and Biodiversity
- sub-programme Circular Economy and Quality of Life

Climate Action:

- sub-programme Climate Change Mitigation and Adaptation
- sub-programme Clean Energy Transition.

In the context of this deliverable, we will emphasize on the sub-programme Clean Energy Transition of the Climate Action field.

4.1.3.1 Relevant Calls and Topics

The specific objectives of the sub-programme "Clean Energy Transition" are the following:

- to develop, demonstrate and promote innovative techniques, methods and approaches for reaching the objectives of Union legislation and policy on the transition to sustainable renewable energy and increased energy efficiency, and to contribute to the knowledge base and to the application of best practice;
- to support the development, implementation, monitoring and enforcement of relevant Union legislation and policy on the transition to sustainable renewable energy or increased energy efficiency, including by improving governance at all levels, in particular through enhancing capacities of public and private actors and the involvement of civil society;
- to catalyse the large-scale deployment of successful technical and policy-related solutions for implementing relevant Union legislation on the transition to renewable energy or increased energy efficiency by replicating results, integrating related objectives into other policies and into public and private sector practices, mobilising investment and improving access to finance.

The sub-programme will fund coordination and support initiatives across Europe in order to facilitate the transition to an energy-efficient, renewable energy-based, climate-neutral, and resilient economy. These initiatives attempt to break down market obstacles that impede the socioeconomic transition to sustainable energy, often including a wide range of small and medium-sized businesses, actors such as local and regional governmental authorities and non-profit organizations, and consumers.

A significant part of the budget allocated to this sub-programme will be used to finance Coordination and Support Actions (CSA) under OAs grants for the four-year (2021-2024) period, whereas the possibility to finance SAPs (Standard Action Projects) is only foreseen as from 2023.

The sub-programme's **Call: LIFE-2022-CET — LIFE Clean Energy Transition**, the themes and the respective topics under each theme are presented as follows:

Building a national, regional and local policy framework supporting the clean energy transition:

Promoting multi-stakeholder interaction and strengthening public authorities' ability to carry out their responsibilities under national energy and climate plans and/or other plans and strategies to increase the coherence of energy transition governance at all levels.

LIFE-2022-CET-LOCAL: Technical support to clean energy transition plans and strategies in municipalities and regions

The aim of the topic is to give local and regional authorities the ability to deliver and carry out plans and strategies for the transition to renewable energy. Transition plans and strategies must be institutionalized, cross-sectoral, and adapted to the degree of innovation, ambition, and particular geographic location of the relevant authorities if they are to successfully assist the accomplishment of European energy and climate targets.

LIFE-2022-CET-POLICY: Towards an effective implementation of key legislation in the field of sustainable energy

The topic intends to facilitate the implementation of the fundamental pieces of legislation in the field of sustainable energy, including the Energy Efficiency Directive, the Renewable Energy Directive, and the Energy Performance of Buildings Directive.

LIFE-2022-CET-COMPLIANCE: New ecodesign and energy labelling compliance support facility for suppliers and retailers

Suppliers, retailers, customers, and citizens generally support ecodesign and energy labeling for items connected to energy, but non-compliance with the criteria is a serious and rising problem (for example, over 70% of products fail to fulfill the disclosure requirements). One of the more likely major causes, rather than intent, is economic operators' lack of awareness, expertise, or in-depth grasp of the legislative provisions. Through greater communication and proactive participation by key stakeholders, the objective of this topic is to improve awareness among operators of (existing) resources available to assist them in complying.

LIFE-2022-CET-EE1st: Making the "Energy efficiency first" principle more operational

Energy efficiency first (EE1st) has long been described as the cornerstone of European energy and climate strategies. It entails giving the highest weight possible to cost-effective energy efficiency measures while establishing energy policy and selecting appropriate investment

opportunities. The Governance Regulation defines the principle, which requires from EU nations to take it into account in their National Energy and Climate Plans (NECPs). However, it is frequently disregarded in current planning and investment strategies. Robust methodologies are required to support and monitor the operational application of EE1st in energy and non-energy policy, planning, and investment decisions as well as to accurately measure the impacts on energy consumption and energy efficiency following the publication of the Commission's Recommendation and Guidelines on EE1st.

Accelerating technology roll-out, digitalisation, new services and business models and enhancement of the related professional skills on the market for the clean energy transition:

Provision of support towards market adoption of cutting-edge technologies, such as digitalization and circular design in line with the climate neutrality aim, would help the construction, industrial, and tertiary sectors become carbon-neutral.

LIFE-2022-CET-DEEPRENO: Towards a zero-emission building stock: strengthening the enabling framework for deep renovation

The aim of this topic is to improve the amount of "deep renovations" and the quality of energy performance attained following building renovations. This necessitates tackling the many levels of barriers to deep renovation.

LIFE-2022-CET-BUILDPERFORM: Energy performance and Smart Readiness of buildings – making the instruments work

This topic aims at actions that i) support efficient policy design and implementation of Energy Performance Certificates and the Smart Readiness Indicator and improve synergies across assessment and disclosure instruments for buildings; and ii) foster market uptake of these instruments through suitable methodologies, tools, and processes involving key stakeholders.

LIFE-2022-CET-BUSINESS: Supporting the clean energy transition of the business sector

The overarching objective of this topic is to increase the market adoption of cost-effective energy efficiency measures, and where appropriate, renewables and heat pumps, among EU companies by having them either implement the recommended actions from energy audits OR engage in sustainable value chain business models.

LIFE-2022-CET-BUILDSKILLS: BUILD UP Skills – Strategies and training interventions enabling a decarbonised building stock

The first objective is to assist in revitalizing the National Platforms established in the BUILD UP Skills initiative's first phase (2011–2012, "Pillar I") by bringing together all significant national stakeholders. The second objective is to expand the number of qualified building professionals along the value chain for building design, operation, and maintenance.

LIFE-2022-CET-DH: Integration of low-grade renewable energy or waste heat in high temperature district heating

The purpose of this topic is to assist operators and owners of high-temperature district heating systems and give them the necessary technical assistance for the creation of investment plans that meet the proposed criteria for "efficient district heating and cooling," as defined in the proposal for the revised energy efficiency directive.

LIFE-2022-CET-HEATPUMPS: Accelerating deployment and affordability of heat pumps through collective purchase actions and procurement

Buildings are anticipated to be heavily electrified, particularly with the introduction of heat pumps for space heating, cooling, and domestic hot water production. The percentage of electricity in heating demand in the residential sector should increase to 40% by 2030 and to 50-70% by 2050. One of the major technologies to address this need and help the EU achieve its 2030 and 2050 energy and climate goals is the heat pump. Although these technologies and the caliber of installations have been increasing, the scaling up of current supply chains and the creation of new ones are not occurring quickly enough to avoid bottlenecks and guarantee that prices are competitive across the supply chain. By generating considerable demand for well-defined (ranges of) heat pump goods, the topic aims to set up and/or assist collective buy and procurement activities with the objective of reducing product and/or installation prices by a significant margin.

Attracting private finance for sustainable energy:

Addressing both the supply and demand of finance and by properly leveraging public money, alternative capital flows must be made available in order to scale up investments in sustainable energy.

LIFE-2022-CET-MAINSTREAM: Mainstreaming sustainable energy investments in the financial sector

The objective of the topic is to increase private investors' interest in making investments in small-scale renewable energy sources and energy efficiency. To accomplish the ambition set forth by the European Green Deal and the goal of reducing the EU's reliance on imported fossil fuels, significant investments must be mobilized.

LIFE-2022-CET-FINROUND: National Finance Roundtables for sustainable energy investments

The primary objective of the topic is to create national roundtables to enhance communication, cooperation, and awareness between significant public and private stakeholders and to build capacity to develop large-scale investment programmes that mobilize private finance for investments in integrated renewables and energy efficiency.

LIFE-2022-CET-INNOFIN: Innovative financing schemes for sustainable energy investments

The aim of the topic is to establish creative financing plans for investments in small-scale renewable energy sources and energy efficiency.

Supporting the development of local and regional investment projects:

Increase the capabilities of local government departments and private investors, particularly community collective investors. Facilitate communication with the financial sector to deliver investments in sustainable energy, including specialized initiatives supporting a just transition to a more sustainable energy system in EU areas most dependent on fossil fuels or carbon-intensive activities.

LIFE-2022-CET-HOMERENO: Integrated Home Renovation Services

By establishing an EU community of practice, this topic seeks to: a) directly assist the development or replication of creative local or regional "integrated home remodeling services"; and b) directly support the trained professionals actively engaged in their implementation.

LIFE-2022-CET-RENOPUB: Setting up facilitation structures to accelerate the renovation wave in the public sector

Creating and maintaining long-term technical and financial capability among public bodies to develop projects is now a significant barrier to greater renovation rates in the public sector. Particularly small and medium-sized communities sometimes lack the funding necessary to assign people to creating a project pipeline. The objective of scaling up ambitious energy upgrades of public buildings to show the public authorities' model role in decarbonizing their assets and paving the path for the transition to sustainable energy in Europe remains a challenge. In order to develop and implement ambitious rehabilitation projects in the public sector at scale and capitalize on existing solutions, facilitation mechanisms (such as one-stop-shops or similar) are required at the regional and national levels.

LIFE-2022-CET-PDA: Project Development Assistance for sustainable energy investments

The objective of the topic is to assist project developers across Europe in creating replicable solutions that mobilize private capital, combine public and private financing, establish long-term and scalable financial instruments, and simultaneously overcome legal and structural barriers while delivering a highly ambitious pipeline of sustainable energy projects.

Involving and empowering citizens in the clean energy transition:

Encourage participation from citizens in the sustainable energy transition by providing targeted assistance for group initiatives, community- and citizen-led projects, and the creation of new energy services and social innovations.

LIFE-2022-CET-ENERPOV: Addressing building related interventions in vulnerable districts

With low wages and high energy costs as two additional major risk factors contributing to energy poverty, the topic seeks to reduce the poor energy efficiency of dwellings. Buildings continue to account for 40% of Europe's overall energy consumption, and a large number of Europeans struggle to pay the energy bills for their inefficiently insulated homes with environmentally harmful heating and cooling systems.

LIFE-2022-CET-ENERCOM: Developing support mechanisms for energy communities

In order to enable the formation and expansion of community energy projects, this topic seeks to support initiatives that promote cooperation between local and regional authorities and the energy sector.

4.1.3.2 Priority List

Since the deadline for submitting proposals has passed (16 November 2022 – 17.00 CET) at the time this deliverable was being written, we give the LIFE program and the Clean Energy Transition call less priority than the other funding instruments that are currently ongoing. However, we expect the launch of the following calls, themes, and topics under LIFE Programme in the future.

4.1.3.3 Eligibility Requirements and Preconditions

Participation in LIFE Projects is not subject to any strict eligibility requirements. In fact, the main eligibility requirement refers to the need of registration in an EU country or an associated to LIFE programme. This excludes the participation of Norwegian organization, since Norway does not participate in the LIFE Programme [6].

4.1.4 *DIGITAL EUROPE*

Digital technologies are significantly altering how we live, work, and conduct business. It is stressed how essential digital infrastructures and technology are to our daily lives as well as how much our society and economy rely on them. Consequently, the EU needed to significantly expand its digital capabilities. The adoption of digital technology, the expansion of the digital skills required for the entire EU workforce, the creation of essential digital infrastructure, the innovation and strengthening of the industrial base, and the enhancement of its adaptability to changing supply networks and technology were all identified. No Member State could achieve this on their own; this would require major public and private investment along with collaborative efforts. Due to this, the European Data Strategy has launched a High Impact initiative on European Data Spaces, which consists of governance and data sharing architectures as well as the European Federation of Trustworthy and Energy-Efficient Cloud-to-Edge Infrastructures and related services.

The Digital Europe Programme [13] helps achieve the objectives outlined in the Commission's proposal for a Regulation on a Single Market for Digital Services (the Digital Services Act - DSA) and a Regulation on Contestable and Fair Markets in the Digital Sector (the Digital Markets Act - DMA) by taking steps to create a safer digital space where the fundamental rights of all users of digital services are protected, as well as through actions that aim to establish a level playing field to foster innovation, growth, and competitiveness. The Economic Recovery and Digital Transformation of Europe will be accelerated through the Digital Europe Programme, which plays a vital role in assisting the EU industrial ecosystems' digital transition. Both EU member states and foreign nations participating in the Digital Europe Programme will have access to the funding. The Digital Europe Programme also aims to upskill people so that they can work with these cutting-edge digital technologies. With a strengthened network of European Digital Innovation Hubs, it assists business, small and medium-sized companies (SMEs), and public administration in undergoing a digital transformation (EDIH).

Actions in this Work Programme will support technologies that are strategically important for Europe’s future. In particular:

- Unleash the potential of data with European common data spaces built on innovative secure and energy efficient cloud to edge technology. It will promote the testing and adoption of trustful AI technologies with world-class testing and experimentation facilities boosting the development of artificial intelligence and its use to respond to key societal challenges including climate change and sustainable healthcare. Europe is facing global competition and needs to invest in key European digital capacities so that it can become a world leader in digital transformation and contribute to solving societal and global challenges. Digital Europe Programme actions are to support the Union’s digital open strategic autonomy. The actions proposed for building essential capacities will be

achieved by co-investing with Member States in new high-end infrastructures, and by upgrading and consolidating available capacities at EU and national levels.

- Ensure the deployment of a secure quantum communication infrastructure for the EU (EuroQCI). This infrastructure will become the backbone of a future “quantum internet”, connecting quantum computers, simulators and sensors to radically enhance their performance and enable a new technological revolution.
- Implement specialised Master’s programmes in advanced digital technologies, deploying cutting edge technologies to address the shortage of digital experts and the gender gap among professionals and researchers in this area, particularly in key technological areas.
- Address key societal challenges such as protecting the environment and fighting climate change through high-impact deployments. It will accelerate the uptake of blockchain in Europe, enable interoperable digital public services centered on the needs of users, facilitating the sharing of data across borders in areas like justice and security and promote an inclusive and trustworthy digital space.

Multiannual Work Programmes are used to carry out the Digital Europe Programme. This Work Programme encompasses Data, AI, Cloud, Quantum Communication Infrastructure, Advanced Digital Skills, and Deployment activities for the best use of these technologies.

4.1.4.1 Relevant Upcoming Calls and Topics

The EU data strategy emphasized the significance of establishing a strong ecosystem of private actors to produce economic and societal value from data while upholding high privacy, security, safety, and ethical standards. The Commission invested in a High Impact Project, which would finance the infrastructure, data-sharing platforms, architectural designs, and administrative frameworks needed to support healthy ecosystems for AI and data sharing.

To reach these objectives, three main interlinked work strands are foreseen in the first two years of implementation of the Digital Europe Programme [14]:

- The deployment of cloud-to-edge infrastructure and services compliant with EU rules, notably on security, data protection and privacy and environmental aspects. Open-source by default, they will ensure fluid data flows.
- The deployment of a Data for EU strand with a focus on building common data spaces, based on the above federated cloud-to-edge infrastructure and services that are accessible to businesses and the public sector across the EU. The objective is the creation of data infrastructure with tailored governance mechanisms that will enable secure and cross-border access to key datasets in the targeted thematic areas.
- The deployment of AI reference testing and experimentation facilities with a focus on four prioritized application sectors (i.e. health, smart communities, manufacturing, and agriculture). These facilities will provide common, highly specialized resources to be shared at European level.

Since the deadline for submitting proposals has passed for Calls 1 and 2 under the intervention area “Cloud, data and Artificial Intelligence”, the emphasis of this deliverable will be put on Call 3, **Cloud Data and TEF DIGITAL-2022-CLOUD-AI-03** and the identified topics, related to the PANTERA activities.

DIGITAL-2022-CLOUD-AI-03-AI-ON-DEMAND Deployment of the AI-on-demand platform

The creation and implementation of the AI-on-demand platform will take into account the suggested criteria and functioning of the platform's effect optimization mechanisms. The platform would compile all the AI resources (algorithms and tools) and make them accessible to potential users, enterprises, and the public administration, together with the services required to support their integration.

DIGITAL-2021-CLOUD-AI-03-PILOTS-CLOUD-SERVICES Large-scale pilots for cloud-to-edge based service solutions

Initiation of large-scale pilot projects with the objective of deploying at scale cutting-edge, sustainable, safe, and cross-border cloud-to-edge based services deployed in a number of carefully chosen application areas These deployments will serve two purposes: first, they will be the first actual, concrete implementations and deployments of the middleware platform and its various open source middleware solutions, each of which will be tailored to meet the needs of a particular application sector and use case and second, the experience gained should feedback into this separate process.

4.1.4.2 Priority List

The call DIGITAL-2022-CLOUD-AI-03 is inviting proposals (start date September 19, 2022), and the deadline for submitting proposals for the topics discussed above is set for January 24, 2023, at 17.00 CET.

Calls	Topics	Type of Action	Deadline(s)	Priority
Call 3 - Cloud Data and TEF DIGITAL-2022-CLOUD-AI-03	DIGITAL-2022-CLOUD-AI-03-AI-ON-DEMAND Deployment of the AI-on-demand platform	CSA	24 Jan 2023	Low
	DIGITAL-2021-CLOUD-AI-03-PILOTS-CLOUD-SERVICES Large-scale pilots for cloud-to-edge based service solutions	CSA	24 Jan 2023	Low

Table 6 DIGITAL EUROPE topics priority list

4.1.4.3 Eligibility Requirements and Preconditions

Participation in Digital Europe Projects is not subject to any strict eligibility requirements. In fact, the main eligibility requirement refers to the need of registration in an EU country or an associated to Digital Europe programme [10]. This does not exclude any of the PANTERA partners.

4.2 Regional Instruments and Financing Mechanisms

4.2.1 *Regional Desk 1: Instruments, Financing Mechanisms Identification and analysis*

4.2.1.1 Regional Calls

EEA and Norway Grants

The EEA and Norway Grants are funded by Iceland, Liechtenstein and Norway (Donor States).

The Grants have two main goals:

1. To contribute to a more equal Europe, both socially and economically;
2. To strengthen the relations between Iceland, Liechtenstein and Norway, and the 15 beneficiary countries in Europe – Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia.

The Grants are composed of two funding schemes – the EEA Grants and the Norway Grants. The main difference between the two lies in where the funding comes from and which countries receive the funding. In the 2014-2021 period, the funding amounted €2.8 billion and covered areas ranging from climate change and energy to cultural cooperation and the promotion of human rights.

Baltic Research Programme financed under EEA and Norway grants targets three Baltic countries. It focuses on strengthening multilateral relations between research institutions in the Baltic States and donor sates. The focus of this programme is on promoting sustainable cooperation in research, complementarity and capacity building as well as creating grounds for future cooperation in research projects at European Union and European Economic Area and regional level. The projects under Baltic Research Programme shall be implemented by 30 April 2024 in three beneficiary countries - Latvia, Lithuania and Estonia - together with donor countries - Norway, Iceland and Liechtenstein. As a result of three open calls, 27 applicants for research projects in the Baltic States received funding for the implementation of projects: Latvia – 9, Estonia – 7 and Lithuania – 11.

Currently available funding:

- LT-ACTIVECITIZENS call targets national governmental authorities (NGOs), short initiatives (1-6 months) with small budget (grant size up to 4 000EUR).
- LV-ACTIVECITIZENS call targets civil society organizations, the maximum duration of project is 12 months, and one project can receive a grant up to 10 000 EUR.

Negotiations are ongoing about the future funding period. No more details are available yet.

Interreg

Interreg V-A Estonia-Latvia [10]

The Estonia-Latvia programme is one of the 60 cross-border cooperation programmes operating along EU internal borders. The programme is funded under the goal of the European Territorial Cooperation, better known as Interreg, and aims at strengthening cooperation among regions across the borders of Estonia and Latvia. The Interreg VI-A Estonia-Latvia programme 2021-2027 was adopted by the European Commission on 30 November 2022.The first call for project

proposals is open from 7 November 2022 until 15 February 2023. In total 24 million euros support (ERDF) is available.

Project proposals can be submitted under four priorities:

- Priority 1: BETTER GOVERNANCE - More cooperating cross border regions and development of joint services
- Priority 2: SMARTER EUROPE - Jointly and smartly growing businesses
- Priority 3: GREENER EUROPE - Sustainable and resilient programme area
- Priority 4: MORE SOCIAL EUROPE - More accessible and sustainable cross-border tourism experience

Interreg VI-A Latvia–Lithuania [15]

The objective of the Interreg VI-A Latvia–Lithuania Programme 2021–2027 is to contribute to the sustainable and cohesive socioeconomic development of the Programme regions by helping to make them more competitive and attractive for living, studying, working and visiting. The Programme has 4 priorities:

- Priority 1: Capacity building and people-to-people cooperation
- Priority 2: Green, resilient and sustainable development
- Priority 3: Fair and inclusive society
- Priority 4: Economic potential of tourism and heritage

National, regional and local public authorities as well as public equivalent bodies and NGOs can apply for the Programme in cross border partnerships. The eligible programme territories are Klaipėda, Telšiai, Šiauliai, Penevėžys and Utena counties in Lithuania and Kurzeme, Zemgale, Latgale regions in Latvia. The total Programme co-financing from the European Regional Development Fund amounts to EUR 29,175 million euros and will be allocated to projects contributing to the Programme objectives.

The First Call for Proposals of Interreg VI-A Latvia–Lithuania Programme 2021–2027 is open from 28 November 2022 and closes 29 March 2023.

Interreg the Central Baltic Programme [16]

The Central Baltic Programme 2021-2027 is a EU cross-border cooperation programme. Its scope is to finance high quality projects with European Regional Development Funds in Finland (including Åland), Estonia, Latvia and Sweden, that aim at solving common challenges together and across borders. The programme budget for 2021-2027 is EUR 118 million from the European Regional Development Fund (ERDF), which can be applied for in the calls.

The Programme has 4 priorities:

- Priority 1: Innovative business development
- Priority 2: Improved environmental and resource use
- Priority 3: improved employment opportunities
- Priority 4: Improves public services

The second call for project proposals is open from 20 February 2023 and 10 March 2023. The third call will be dedicated to small projects and will be open from 25 September 2023 to 16 October 2023.

Interreg Baltic Sea Region [17]

The area of the Interreg Baltic Sea Region Programme covers nine countries: Denmark, Estonia, Finland, Germany (the States (Länder) of Berlin, Brandenburg, Bremen, Hamburg, Mecklenburg-Vorpommern, Schleswig-Holstein and Niedersachsen (only NUTS II area Lüneburg region)), Latvia, Lithuania, Poland, Sweden and Norway (the Regions of Trøndelag, Møre og Romsdal, Vestland, Rogaland, Agder, Vestfold og Telemark, Viken, Innlandet, Oslo). The Programme is structured along with four priorities:

- Priority 1: Innovative societies
- Priority 2: Water-smart societies
- Priority 3: Climate-neutral societies
- Priority 4: Cooperation governance

At firs applicants must submit a project idea form. Application for submitting a project idea form for small projects is open until 5 January 2023, for core projects – until 14 February 2023. Core project aim at developing a solution to a challenge, and bring it to the people in Baltic Sea Region. Small projects are a testing ground to learn Interreg, working across borders with partners from different countries.

4.2.1.2 National Calls

National level funding description is provided by the funding agencies.

National funding (Latvia)

The Latvian Council of Science [18]

The Latvian Council of Science since July 1st, 2020 is an institution of direct administration under the supervision of the Minister for Education and Science. The aim of the Latvian Council of Science is to implement the state science and technology development policy, ensure expertise, implementation and supervision of research programs and projects financed from the state budget, as well as from the European Union structural funds and other foreign financial instruments delegated in regulatory enactments.

National Programmes coordinated by the Latvian Council of Science are:

- Fundamental and Applied Research programme;
- National Research Programme;
- Postdoctoral research grants.

Fundamental and Applied Research is a programme financed from the state budget which aims to create new knowledge and technological know-how in all Fields of Science. Programme is organized as annual open calls. Fundamental and Applied Research programme's budget is around10 million EUR per year.

National Research Programmes (NRP) are research programmes funded from the state budget and initiated by the sectoral ministries. These programmes aim to create new knowledge, expertise and innovations, develop new solutions to contribute to the development of the specific

field and strategic national development goals. Sectoral ministries define the goals and objectives of the National Research Programme of their interest and ensure the necessary funding from the state budget.

Postdoctoral research grants provide an opportunity for young researchers to develop their research capacity and career while contributing to the goals of Latvia's Smart Specialization strategy. Funding for the programme is provided from European Regional Development fund.

Investment and Development Agency of Latvia [19]

Investment and Development Agency of Latvia works to increase export and competitiveness of Latvian companies, facilitate foreign investment and implement tourism development and innovation policies. It is responsible for coordination and observation of national business-oriented instruments: innovation motivation programmes, business incubators, support programmes to newly established innovative SMEs, support programmes to commercialize research results, innovation vouchers, etc.

Central Finance and Contracting agency of Latvia [20]

The Central Finance and Contracting agency of Latvia organizes calls of applied research programme. Applied research programme is a programme to develop industry-oriented research projects in the areas of Latvia's Smart specialization strategy. Funding for the programme is provided from European Regional Development fund. Programme is open for the project proposals from research institutions and companies registered in Latvia.

4.2.1.3 Calls to target – Related to PANTERA activities

The current political and energy status in the Baltic States affects the situation in the field, including implementation and of R&D. For example, after the 14th Saeima elections, when forming the new government, the potential partners of the ruling coalition agreed on the plan to form a new Ministry of Climate and Energy in Latvia. The plan is to build the ministry from three existing departments in the Ministries of Economy and Environmental Protection and Regional Development. The total number of employees of the new ministry could reach about half a hundred. Preparations for the creation of the ministry are currently underway, for example, its regulations have been developed. This is expected to cause a delay in the announcement of national calls in Latvia.

4.2.1.4 Priority List (Topics)

In the case of Latvia, the priority topics can be considered State research programmes, which at the moment are frozen.

4.2.1.5 Eligibility Requirements and Pre-conditions

The major requirement introduced in the prioritized State research programmes, mainly refers to the exclusive participation of Latvian Organizations and selective participation of organizations from other Baltic countries.

4.2.2 Regional Desk 2: Instruments, Financing Mechanisms Identification and analysis

4.2.2.1 Regional Calls

INTERREG

Co-funded by the European Union Interreg Europe is a cooperation programme which aims at reducing disparities in the levels of development across Europe's regions stimulating regional cooperations.

After the 2014-2020 programming period several Research and Innovation topics in the field of Smart Grids, Storage and Local energy systems are possible for the 2021-2027 programming period.

Specifically, under the topic "Smarter Europe" the programme gives opportunities for development and extension of Research & innovation capacities, Digitisation and Digital connectivity.

Under the "Greener Europe" research related activities and projects in the field of Energy efficiency, Renewable energy, Smart energy systems, Climate change and Zero-carbon urban mobility can be considered.

The Interreg programme is represented in Bulgaria from the Ministry of Regional Development and Public Works. Due to the unstable political situation and the frequent change of the government during the recent months and years the participation in this programme might pose some challenges in front of the R&I stakeholders.

Bulgarian National Science Fund

The Bulgarian National Science Fund of the ministry of Education and Science offer some initiatives which focus on regional level and stimulate R&I collaboration with the neighboring countries. Some of the topics allow consideration of Smart grids, Energy storage and local energy systems.

4.2.2.2 National Calls

National Recovery and Resilience Plan

The Bulgaria's National Recovery and Resilience Plan is expected to provide funding for some research and innovation activities allowing innovative SMEs, Research organizations and higher-education institutions to tackle smart grid and energy sector related problems and reforms in coal phase-out, renewable energy sources and storage, e-mobility, promoting of zero-emission vehicles, increasing public charging points and introducing low-emission zones in polluted district cities which are considered to be a key for the green transition.

Bulgarian National Science Fund

The Bulgarian National Science Fund of the ministry of Education and Science provide some options research and innovation project funding. Presently the most promising Smart grid and storage related activities appear to be actions within the Network of Research Universities and the National Recovery and Resilience Plan.

4.2.2.3 Calls to target – Related to PANTERA activities

A study on the calls and topics available in regional and national funding instruments that could potentially offer resources needed for continuing the Regional Desks activities is performed. These will be shortly listed below

4.2.2.3.1 Network of Research Universities

Funding source: National Recovery and Resilience Plan/ Bulgarian National Science Fund [21]

Call: Generation of Network of Research Universities under Component "Innovative Bulgaria", Program for acceleration of the Economic Development and transformation using Science and Innovations

Objective: To pilot a new model for development of Research Universities using financing and creation of strategic scientific research and innovation programs for development.

Duration: 42 Months

Budget: Single Stage 1,12 M BGN

Type of Action: National funding

Topics under interest (smart grid domain):

- Concepts for operation of smart grid ready microgrids, minigrids and nanogrids
- Local and global stability of AC, DC and combined AC+DC micro, mini and nanogrids and systems
- Dynamic pricing schemes and markets for smart grids
- Flexibility and storage- solutions and implementations
- Real life pilots and demonstrators for AC, DC and Hybrid AC+ DC micro, mini and nanogrids

4.2.2.3.2 Scientific and technological collaboration in the Danube region 2022

Funding source: Bulgarian National Science Fund [22]

Call: Multi country call for scientific and technological collaboration in the Danube region 2022

Objective: To support actions connected with the international scientific technical collaboration for realization of direct contacts between scientists and scientific teams from universities and scientific institutions from Bulgaria and the countries from the Danube region.

Duration: 2 years

Budget: Single Stage 40 000 BGN

Type of Action: National funding

Topics under interest:

- Organization of local and regional workshops on Smart grid topics
- Analysis and updates of the national and European strategies, roadmaps and research priorities
- Power system smart grid education
- Energy Transition cross sector coupling
- Electricity networks with renewable energy sources
- Analysis and planning tools for Powers System infrastructure for electric mobility charging

4.2.2.3.3 DUT (Driving Urban Trasitions)

Funding: Bulgarian National Science Fund

Call: DUT (Driving Urban Trasitions) [23]

Objective: To tackle urban challenges through research and innovation and capacity building and to enable local authorities and municipalities, service and infrastructure providers [24], and citizens to translate global strategies into local action.

Duration: 3 years

Budget: Single Stage 250 000 BGN

Type of Action: National /EU funding

Topics:

- Energy communities – energy transition driven by civil society
- Energy flexibility strategies – technological, legal, societal challenges
- Energy efficiency in existing urban structures
- Positive Energy Districts
- 15-minute City
- Circular Urban Economies

Figure 12 DUT Partnership

4.2.2.4 Priority List (Topics)

The main priority lists and topics related to the PANTERA activities are presented in the paragraphs above.

Calls	Objective	Funding	Priority

Generation of Network of Research Universities under Component "Innovative Bulgaria", Program for acceleration of the Economic Development and transformation using Science and Innovations	New model for development of Research Universities using financing and creation of strategic scientific research and innovation programs for development	National funding	High
Multi country call for scientific and technological collaboration in the Danube region 2022	To support actions connected with the international scientific technical collaboration for realization of direct contacts between scientists and scientific teams from universities and scientific institutions from Bulgaria and the countries from the Danube region	National funding	High
DUT (Driving Urban Trasitions)	Tackle urban challenges through research and innovation and capacity building and to enable local authorities and municipalities, service and infrastructure providers, and citizens to translate global strategies into local action	National /EU funding	Low

Table 7 Regional Desk 2 calls priority list

4.2.2.5 Eligibility Requirements and Pre-conditions

The major requirement introduced in the prioritized research programmes, mainly refers to the exclusive participation of Bulgarian Organizations, except for the case of the Danube region call, which allows a more extended list of organizations orginating in other countries in the Danube region to collaborate in the frame of synergetic projects.

4.2.3 Regional Desk 3: Instruments, Financing Mechanisms Identification and analysis

4.2.3.1 Regional Calls

Countries in the Mediterranean Region are funded by a mixture of the following financial instruments giving evidence of two regional and one national.

INTERREG MED

The Interreg Euro-MED Programme supports **cooperation across Mediterranean** borders. We provide funds for projects developed and managed by public administrations, universities, private and civil society organisations.

The Programme brings together **partners from 69 regions of 14 countries from the Northern shore of the Mediterranean with a common objective: a climate neutral and resilient society for the benefit of its citizens.**

For the next seven year**,** together with our partners we will work to make the **region smarter, greener and improve the governance** between its stakeholders.

The total programme **budget amounts to about 294M€ for the 2021-2027** period.

Accordingly, Interreg MED Programme establishes the following key cooperation principles aiming at consolidating the character of future projects and their related activities.

These fundamental principles represent the DNA of the Interreg MED Programme and are coherent with the promotion of development, of good governance and supported by the European Union Cohesion Policy.

ENI CBC: We make cooperation happen in the Mediterranean!

i. The Mediterranean faces a multitude of common challenges, including climate change, pollution, youth unemployment and social inequality. Acting together to address these challenges and improve the lives of men and women across the region is the impetus for the 2014-2020 ENI CBC “Mediterranean Sea Basin Programme”, the largest Cross-Border Cooperation (CBC) initiative implemented by the EU under the European Neighbourhood Instrument (ENI).
ii. The Programme brings together the coastal territories of 14 countries in view of fostering fair, equitable development on both sides of the Mediterranean. Through calls for proposals, ENI CBC Med finances cooperation projects for a more competitive, innovative, inclusive and sustainable Mediterranean area.
iii. The strategic framework of the Programme is based on 4 Thematic Objectives and 11 Priorities as a contribution to the main socio-economic and environmental challenges of the Mediterranean region.

Two of the 11 thematic objectives are highly relevant to the targeted stakeholders of PANTERA.

4.2.3.2 National Calls

Research and Innovation foundation of Cyprus

RIF to become the driving force to further develop the Research and Innovation ecosystem in Cyprus and contribute towards the productivity growth and prosperity of the country. The Research and Innovation Foundation (RIF) is the national authority in charge of supporting and promoting research, technological development and innovation in Cyprus.

The RIF was established in 1996, following an initiative by the Government of the Republic of Cyprus, with the initial name of Research Promotion Foundation (RPF). The RIF is a private legal entity structured as a non-profit organization, and is registered as an Institution, under the Societies and Institutions Laws. The significant role of scientific research in modern socio-economic development, as well as the vital need to enhance research activities and infrastructures in Cyprus, were determining factors for the founding of the RIF.

Since its establishment, the Foundation has developed widespread activities at the National, European and International levels, with a strong focus on the development of national research programs, as well as the representation of Cyprus in European and International programs and organizations. Following a relevant decision by the Council of Ministers in 2007, the Foundation expanded its range of activities to also support and advance Innovation in Cyprus.

After a further decision by the Council of Ministers in October 2018, for the overall restructuring of the Research, Technological Development and Innovation System in Cyprus, the Foundation was renamed to Research and Innovation Foundation (RIF) and took over the role of the executive arm of this System.

4.2.3.3 Calls to target – Related to PANTERA activities

PRIORITIES & SPECIFIC OBJECTIVES OF INTERREG MED

From the numerous funding priorities and specific objectives proposed by the European Commission for 2021-2027, Interreg Euro-MED selected 3 priorities and 5 specific objectives:

Priority 1 – A Smarter Mediterranean

Specific objective 1.1: Developing and enhancing research and innovation capacities and the uptake of advanced technologies

Priority 2 – A Greener Mediterranean

Specific objective 2.4: Promoting climate change adaptation and disaster risk prevention, resilience, taking into account eco-system-based approaches

Specific objective 2.6: Promoting the transition to a circular and resource efficient economy

Specific objective 2.7: Enhancing protection and conservation of nature, biodiversity and green infrastructure including in urban areas and reducing all forms of pollution

Priority 3 – Mediterranean Governance

Specific objective 6.6: Actions to support better cooperation governance

Out of the above priorities and specific objectives interesting options arise for the PANTERA stakeholders. Specific emphasis will be given to joining effort in capacity building between countries and R&I of the region to raise collaboration efforts for stronger presence in the energy transition endeavours. Both Cyprus and Malta can gain tremendously in pursuing related calls through this financial instrument.

ENI CBC MED coming calls

With activities centred around the Mediterranean calls are coming that can help to build the right collaboration on issues that are of interest to the energy transition. Such a possibility is the following:

NEX-LABS: supporting business creation, technology transfer and innovation in the Water, Energy, Food NEXUS sector

Description and objectives:

NEXUS testing vouchers: Supporting the access of NEXUS stakeholders to existing R&D&I NEXUS innovation vouchers: Facilitate transfer of knowledge together with commercialization of research results.

NEXUS incubation vouchers Effective implementation of innovative technologies that require certain nurture, maturing and mentorship through incubation vouchers for working space Acceleration grants: to support attendance to different workshops/conferences/pitch events where to present the business idea to large live audiences and allow building communities around them.

NEXUS innovation prize: Support selected business ideas through technical, financial and business tutorship.

NEXUS R2B2R missions: Exchange best practices, detect cooperation opportunities, presentation of advance, outputs, future perspectives, competitive advantages, round table discussions concerning NEXUS challenges.

Calls offered by the Research and Innovation Foundation (RIF) of Cyprus which is the national authority in charge of supporting and promoting research, technological development and innovation in Cyprus.

NEW CALL FOR PROPOSALS OF THE «HORIZON EUROPE – 2ND OPPORTUNITY – MSCA » PROGRAMME (OPPORTUNITY – MSCA/1122)

The Research and Innovation Foundation (RIF) announces the new call for proposals for the «Horizon Europe – 2nd Opportunity – MSCA » Programme (OPPORTUNITY – MSCA/1122).

The call budget is €2.000,000, and the maximum funding per project is €170.000.

Proposals have to be submitted through the IRIS portal [25] and the deadline for submitting proposals is 27 April 2023, time 13:00.

The "Horizon Europe – 2nd Opportunity "Programme's objective is to provide a second opportunity to entities and natural persons (researchers) who attempted to receive a grant under Horizon Europe Programme, and whose proposals despite of being of high quality did not manage to secure funding due to budget exhaustion.

Other smaller calls are currently open such as "Innovation Vouchers" addressed to young researchers.

«Innovation Vouchers» Programme, is a simple and effective instrument that will enable Small and Medium Enterprises (SMEs) to realize the importance and benefits that could emerge from their involvement in research and innovation activities and, through the relevant cooperation, to exploit technical know-how from research and other knowledge intensive organisations that can support them to develop innovative solutions to address problems they face, while strengthening their capacity for research and innovation.

For the establishment of the partnership, the RIF offers to interested SMEs, «Innovation Vouchers» which are redeemed by organisations that will provide them with specific innovation, technical or scientific services and know-how. Each «Innovation Vouchers» has a value of **5.000 Euros** and the Call budget is **350.000 Euros**.

Funding may cover research and technical consulting services, measurements, tests and analyses, access to research/laboratory infrastructures, and design and development of product and/or service prototype. Organisations that may provide services and know-how include research and academic organisations, laboratories, as well as innovative and research-intensive enterprises.

New €34 million programs to further strengthen the research and business community (announced December 2022)

Figure 13 IdEK funding programme structure

Recognizing the enormous potential of the research and business world of Cyprus and fully adopting the national strategy, the Research and Innovation Foundation (R&I) is paving the way for further development. By announcing four new financial programs amounting to €34 million,

IdEK implements targeted actions and investments, supporting the economy in practice and with speed.

The new Programs and the pillars of the new investment of the IdEK concern:

1. in the creation of new or upgrading of existing critical and technologically advanced infrastructures with a budget of €17.5 million,
2. in the Disrupt program, amounting to €10 million,
3. to support Business Research with €6 million,
4. in the PhD program in Industry with €1 million..

The new programs cover a wide range of Research and Innovation (R&D) activities and respond to the need for new specialized infrastructures in strategic priority areas, which will be accessible to all stakeholders. In this way, on the one hand, further impetus is given to the great progress that is already recorded, and on the other hand, the competitiveness of Cyprus at the international level is strengthened. The programs also aim to strengthen the cooperation between businesses and research organizations, in order to utilize the high-level research activity produced in our country, for the benefit of the economy and society. The new generation of Cyprus is also high on the priorities, with the "PhD in Industry" program equipping young scientists with R&D skills and abilities,

At the same time, recognizing Cyprus' perennial inability to access high-risk capital, the flagship "Disrupt" Program aims to leverage high-risk capital funds (Venture Capital funds) to invest in Cypriot innovative businesses. Through Disrupt, the interconnection of businesses with VCs is supported, while their exponential growth and expansion in international markets is enhanced. In addition, with the aim of increasing investment in Research and Development (R&D), IdEK presents the "Research in Enterprises" program, through which it supports domestic enterprises to invest in R&D in order to differentiate themselves and become more competitive.

In addition to the four new programs, the Central Office of Knowledge Transfer (KCMG), which started its operation in October 2022, provides a solution to the weakness that Cyprus presents in the transfer of technology and its commercial exploitation. Objective, the development of knowledge transfer skills and abilities in research organizations and companies and the maximization of the impact of the investment in R&D.

The aim of the new programs is to strengthen the competitiveness of Cyprus, to create new jobs in cutting-edge fields for young scientists, to increase the export of high-tech products and services and to increase the successes of the Framework Program of the EU, "Horizon Europe". Cyprus is implementing the country's national strategy, building on what has been achieved. With clear objectives, new programs and a new philosophy, with consistency and coherence, to continue the great work that has already been achieved.

The Programs are financed by the Resilience and Recovery Plan "Cyprus - Tomorrow", the Political Cohesion Program "THALEIA" and National Resources.

4.2.3.4 Priority List (Topics)

All details are included in the above paragraphs giving evidence that there is scope for specific activities in line with the PANTERA objectives.

Calls	Objective	Funding	Deadline(s)	Priority
«HORIZON EUROPE – 2ND OPPORTUNITY – MSCA » PROGRAMME (OPPORTUNITY – MSCA/1122)	Provide a second opportunity to entities and natural persons (researchers) who attempted to receive a grant under Horizon Europe Programme, and whose proposals despite of being of high quality did not manage to secure funding due to budget exhaustion	National funding	27 April 2023, time 13:00	Medium
FUSION R&I: Research Excellence Programme.	Financial support for the early-stage development of innovative projects, through a bottom-up approach.	National funding	23:59pm CET on Monday 27th of February, 2023	High

Table 8 Regional Desk 3 calls priority list

4.2.3.5 Eligibility Requirements and Pre-conditions

The major requirement introduced in the prioritized research programmes, mainly refers to the exclusive participation of Cyprus Organizations and selective participation of organizations from other countries under well justified conditions.

4.2.4 Regional Desk 4: Instruments, Financing Mechanisms Identification and analysis

4.2.4.1 Regional Calls

Cross-Border Renewable Energy (CB RES) Projects: Launched by EU in September 2022 [26], cross-border renewable energy projects aim to enable the cost-effective deployment of renewable energy. As per EU, CB RES projects should contribute to generation of renewable energy from, for example, on- and offshore wind, solar energy, sustainable biomass, ocean energy, geothermal energy or combinations thereof, their connection to the grid and additional elements such as storage or conversion facilities. CB RES projects are not limited to the electricity sector and can cover other energy carriers and potential sector coupling with, for example, heating and cooling, power-to-gas, storage and transport.

The first CB RES list announced by the European Commission includes three projects concerning 7 European countries, among three project there is a district heating network project between Germany and Poland. There will be immense opportunities to develop Germany-Poland and

Germany-Czech Republic cooperation to attain funding to support PANTERA activities under CB RES projects scheme.

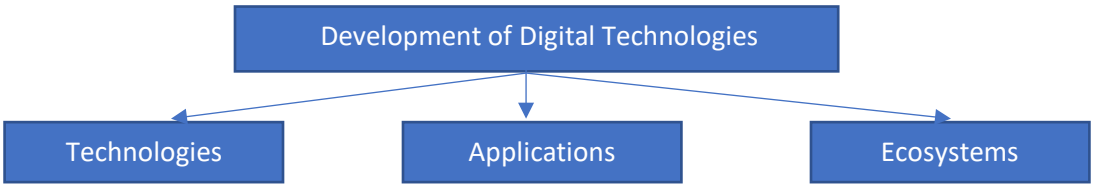
Scope for PANTERA activities: The above-mentioned call is not a R&D program. It is an engineering/construction project fostering the cross-border deployment of renewable energy generation projects. PANTERA activities are R&D activities which are unlikely to be supported by this call.

4.2.4.2 National Calls

The Federal Ministry for Economic Affairs and Climate Action, abbreviated BMWK, is a cabinet-level ministry of the Federal Republic of Germany, which is responsible for the national and international cooperation and funding in the field of energy and climate change. BMWK has been successfully initiating various funding opportunities in the field of green energy transition, decarbonization, and smart grids. The current call is given below:

"Development of Digital Technologies" 2022 to 2026

With the funding program "Development of Digital Technologies" (2022 to 2026) [27], the Federal Ministry of Economic Affairs and Climate Action (BMWK) aims to address current thematic priorities and challenges quickly and flexibly through timely funding calls. These should be aligned with current technological trends and requirements in the market, digital policy priorities, available budgets and the best possible time corridors for market-oriented implementation. The “Development of Digital Technologies” funding program is based on the three priority areas of “Technologies”, “Applications” and “Ecosystems”. These build on each other and in their combination form the technical framework for the desired projects. The starting point of the projects should be findings from basic research, i.e., technologies that have already been scientifically examined. Within the framework of the projects eligible for funding, the aim is to determine the economic potential of such new, digital technologies and to open up ways for economic exploitation, especially in Germany, Switzerland or the European Economic Area (EEA).



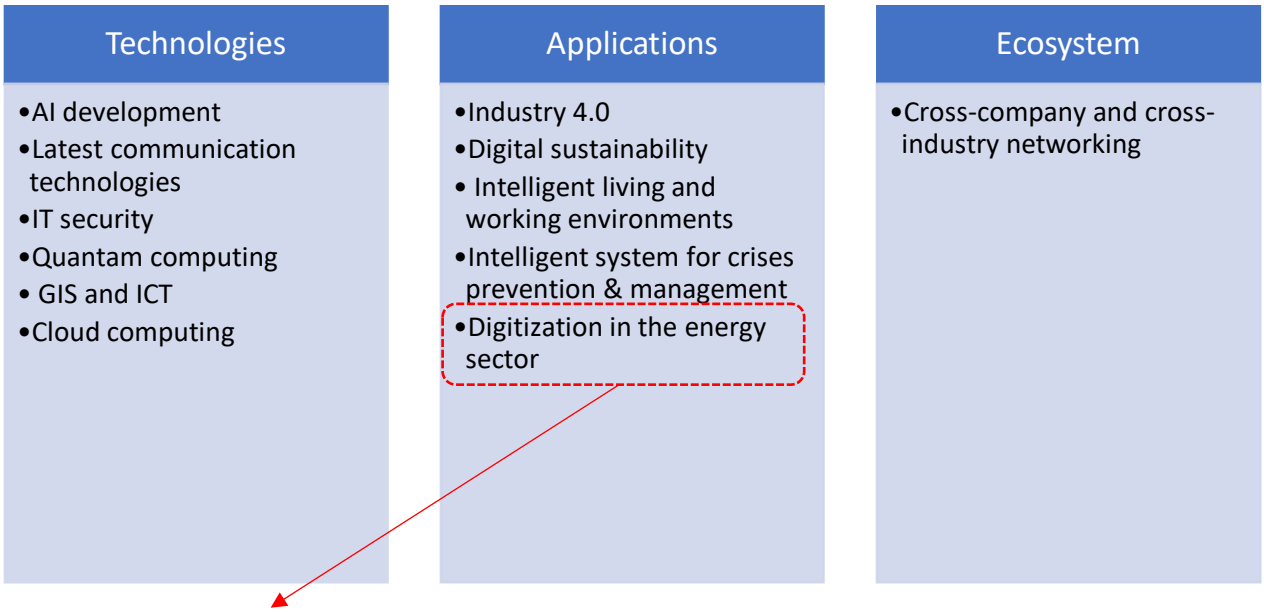
The application domains consist of such as digital production and logistics, trade, smart living, mobility, agriculture, energy industry, health care, construction and housing industry, civil protection, environment and climate protection, forestry and forestry up to the maritime economy. As energy industry is a vital application area under this call, there will be open doors for the financial support for PANTERA activities.

4.2.4.3 Calls to target – Related to PANTERA activities

Detailed explanation of the call: - "Development of Digital Technologies" 2022 to 2026

The call is announced on July 1, 2022. The digitization of the economy and society has already resulted in the boundaries between sectors becoming more dependent and, in some cases, inter-connected. The current demand is to create new ecosystems - for example for the development, provision, utilization and distribution of digital identities, AI, 5G/6G communication technologies, for quantum computing (QC), for climate-neutral ICT, for geoinformation and environmental data or for edge computing. Such ecosystems can in turn include application domains such as digital production and logistics, trade, smart living, mobility, agriculture, **energy industry**, health care, construction and housing industry, civil protection, environment and climate protection, forestry and forestry up to the maritime economy. Economic success is achieved by forming strong cooperation between various stakeholders/entities and to establish cross-industry, internationally binding standards. The focus area “Ecosystems” of the funding program is aimed at this scenario.

Area of focus:



Scope for PANTERA activities: The objective of the PANTERA project is to create a European forum composed of Research & Innovation stakeholders active in the fields of smart grids, storage and local energy systems, including policy makers, standardisation bodies and experts in both research and academia representing the EU energy system. Digitization is an essential part to make the current grids smart and all the targeted areas on the PANTERA are essential to foster the digitization in the energy sector. Under the scope area of “Application” within the funding instrument of “International cooperation projects”, explained in the section below, there is a possibility to utilize this financial instrument to exploit the PANTERA activities under the regional desk 4. A detailed understanding of the call under the purview of the German law must be needed.

Funding call and Instrument: Calls for funding are announced on the Internet at the programs list of the Federal Ministry for Economic Affairs and Climate Action. Funding calls are made on the basis of funding policy priorities and objectives as well as available budget funds and are therefore irregular. The amount of funding available and the desired implementation period are specified in the respective call for funding.

Depending on the topic, the following funding instruments are used in the respective funding calls. They differ in term, network structure and funding volume. In addition to the classic application and technology projects, the calls for funding can also address proposals for ecosystems, for innovation concepts and international cooperation projects.

1. **Application and technology projects:** Joint projects from business and science are funded with a funding budget of 1 to 10 million euros (unless specified in the respective funding call) and a term of up to 36 months. The consortium consists of at least three to usually seven funded partners from business and science and, if necessary, other non-funded associated partners (e.g., multipliers).
2. **Ecosystems:** Cooperation groups are funded by high-performance, thematically focused partners in large-volume funding projects and a funding budget of 10 to 15 million euros (unless specified in more detail in the respective funding call). Eligible to apply are groups of at least eight and a maximum of 15 funded partners (unless specified in the respective funding call) as well as other associated partners in the addressed area of application, supplemented by network management. The project duration is 36 months, which may be broken down into several phases with demolition milestones.
3. **Innovation concepts:** Small-volume joint projects (funding volume usually less than 1 million euros) are funded by groups of two to a maximum of three partners and a project duration of six to a maximum of twelve months. This is usually conceptual work that serves to prepare the above-mentioned ecosystems or to create important foundations for strategic cooperation in application and technology projects or in international cooperation projects.
4. **International cooperation projects:** Projects are funded that promise strategic added value through cooperation with European or international partners. In principle, such projects should be related to ongoing technology programs or projects under this funding program. The projects should on the one hand transfer technological developments to foreign application areas and markets and on the other hand use specific competencies of research institutions and companies from the respective partner country for joint activities. In particular, international cooperation projects should make contributions that open up the perspectives of current, national funding priorities, e.g., strengthen international standardization or prepare joint European activities through cross-border cooperation. A prerequisite for the funding of international cooperation projects is usually a secured co-funding of the international partners by their sponsors. As a rule, these are research and development projects with a term of no more than 36 months and three to five funded partners on the German side. The details are regulated by the respective call for funding. Companies, research institutions and universities can be funded in accordance with the general funding conditions of the BMWK. The participation of SMEs is expressly desired. Furthermore, applicants can also consider possibilities of multinational research cooperation within the framework of the European research initiative EUREKA [28].

Type of sponsorship and funding rates:

1. **Sponsorship:** The grants are granted by way of project funding in the form of a non-repayable grant. There is no entitlement to the award of the grant. Rather, the BMWK decides on the basis of its due discretion within the framework of the available budget. Work on the project must not have started before the start of the term. The work must

always be carried out in the Federal Republic of Germany. Before submitting the formal application for funding, the applicants will be informed separately of the facts relevant to the subsidy.

2. **Funding Rates:** Commercial companies are expected to participate appropriately. For commercial companies, the funding can amount to 25 to 50% of the total costs eligible for funding, depending on the market proximity of the solutions to be developed. Priority List (Topics). Research institutions can receive up to 100% funding as part of their non-commercial activity. A reasonable personal contribution is desired. For institutions that are funded on a cost basis, this must be at least 10% of the eligible project costs.

Procedures: Application documents, other documents and use of the electronic application system Forms for funding applications, guidelines, leaflets, notes and ancillary provisions can be found on the federal funding portal [29] retrieved or requested directly from the project sponsor specified in the call for funding. Further information is contained in the respective calls for funding.

Selection Criteria: The project proposals must be based on the funding purpose described above. The projects are selected with the support of the project management agency commissioned by the BMWK and, if necessary, other appointed experts or appraisers based on the following five criteria; idea, partibility, consortium, market potential, and sustainability. The weighting of which is determined in the calls for funding. The aspects listed in the respective table serves as an orientation for the necessary specification, although they do not have to be relevant for all project proposals. Other aspects that are considered relevant for the specification can be added to the respective funding calls. The detailed explanation of selection criteria explained in the reference document published by BMWK.

Selection Process: In principle, the following procedures are possible:

I. One-stage procedure (direct submission of full applications)
II. Two-stage procedure (first submission of outlines, then call for submission of full proposals)

The selection process with the valid documents and information can be found in the respective funding call. Project proposals are to be submitted online. The information required for participation in the selection process can be found at the web address given in the calls for funding. The electronic form for applying and submitting project proposals can also be found there. As a rule, the calls for funding also include specifications regarding content, format, scope and structure. The project proposals are password-protected on the project sponsor's server and can be edited until the end of the call for proposals. The data transmission is encrypted. The processing is carried out while maintaining confidentiality

Review Process: The selection and assessment of the project proposals submitted by the BMWK takes place with the involvement of the project management agency commissioned by the BMWK and, if necessary, additionally appointed, independent experts with specialist knowledge of the subject areas addressed in the respective call for funding. The assessment documents are examined by at least two independent experts on the basis of the selection criteria mentioned above. Experts who are interested in the subject areas named in this funding program can apply to the commissioned project management agency for an expert opinion. The composition of the assessment committee will be determined by the BMWK after publication of the respective call for funding based on the expertise required in each case. With knowledge of the call for funding,

the selected reviewers declare that whether your own interests are affected or whether there are conflicts of interest that preclude participation. If commissioned, the experts appointed undertake to be neutral and confidential. This obligation applies equally to the BMWK and the project sponsor. Based on the assessment of the written form, the consortia with the most promising project proposals are asked to present and defend their project idea to the expert panel (BMWK, project management agency, external experts). Submitting consortia must ensure that they can competently present their outline ideas at the expert meeting. On the basis of this final assessment, the BMWK makes the final selection decision subject to a positive assessment.

4.2.4.4 Priority List (Topics)

All details are included in the above paragraphs giving evidence that there is scope for specific activities in line with the PANTERA objectives.

Calls	Objective	Funding	Deadline(s)	Priority
Development of Digital Technologies	Create and establish a universal, AI-based ecosystem that puts the development of intelligent and sustainability-oriented Smart Living services and applications on a new footing, simplifies it, accelerates it and makes it cost-effective	National funding	6 March 2023 at 12:00	Medium
Eurostars: joint transnational call	Support innovative SMEs and project partners (large companies, universities, research organisations and other types of organisations) by funding international collaborative R&D and innovation projects.	National, co-funded by European Union through Horizon Europe	Launch: 10 February 2023 Submission Deadline: 13 April 2023 at 14:00 CEST	High

Open call for Network projects	Eases collaboration between organisations in Eureka countries	National funding	31 December 2025	High

Table 9 Regional Desk 4 calls priority list

4.2.4.5 Eligibility Requirements and Pre-conditions

The major requirement introduced in the prioritized national research programmes, mainly refers to the exclusive participation of German Organizations.

As for the Eurostars/ Eureka topics, participation is limited to the countries participating in the Eureka Network, main requirements refer to the need that the project consortium is led by an innovative SME from a Eureka network country, the project consortium is composed of at least two entities that are independent from one another and the project consortium is composed of entities from at least two participating countries with a minimum of one organization from an EU or Horizon Europe Associated Country. Such requirements do not pose any burden to the PANTERA partners to jointly get involved in these topics.

4.2.5 Regional Desk 5: Instruments, Financing Mechanisms Identification and analysis

4.2.5.1 Regional Calls

All the three desk 5 countries (Hungary, Croatia and Italy) participate in the ERA-Net Smart Energy system financing mechanism [30]. More in detail, Hungary is participating to ERA-Net through the National Research, Development and Innovation Office (NRDI Office), Croatia through the Environmental protection and energy efficiency Fund while for Italy is the Ministry for university and research that participate. Currently the ERA-Net programme has been succeeded by the Co-funded European Partnerships. Considering the energy system, the most relevant field for the PANTERA activities, the successor is the CETPartnership where all desk 5 countries (Hungary, Croatia and Italy) are participating. Organized in 7 Transition Initiatives (TRIs) the CETPartnership covers a wide spectrum of the energy system innovation. Recently the Joint Call 2022 has been issued and the call for project recently closed. PANTERA partners will carefully be monitoring the future call modules since the topics covered by the CETPartnership are well covering the smart grids field.

Other relevant calls come from Interreg [31] that is one of the key instruments of the European Union in support of the cooperation across borders through project funding. Interreg cover a huge variety of topics such as health, environment, research, education, transport, sustainable energy and it aims to tackle common challenges and find shared solutions. Interreg is organized in several programmes, in the following images are reported the ones relevant for the desk 5 countries.

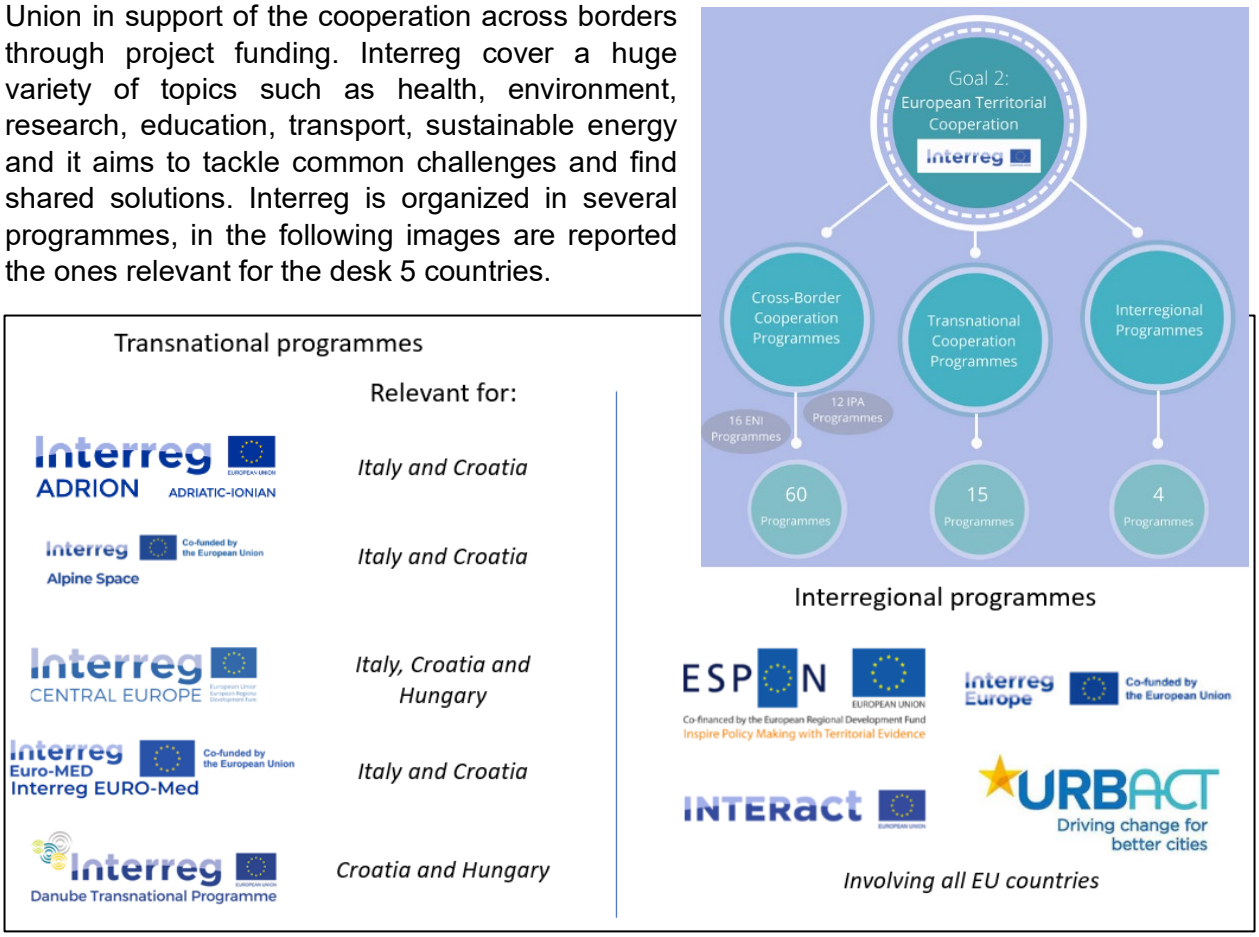


Figure 14: Interreg transnational programmes relevant for desk 5 countries and interregional programme covering the whole Europe

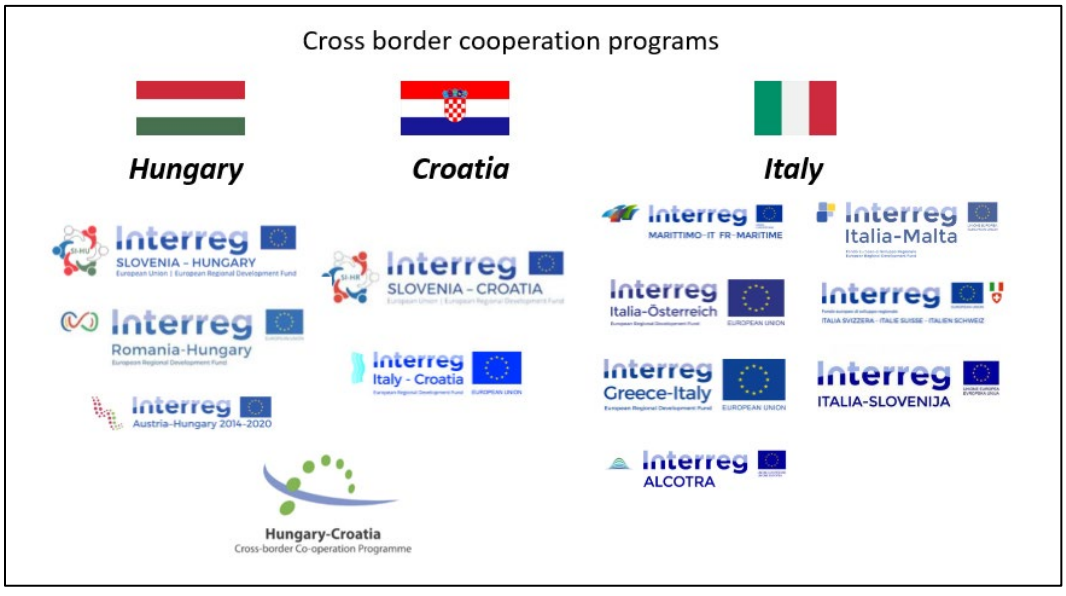


Figure 15: Interreg cross borders cooperation programs relevant for desk 5 countries.

Of interest could be the Interreg ESPON 2020 which is a cooperation programme aimed to produces pan-European research by providing scientific information to public authorities and actors at all levels through territorial research and analysis. More in details ESPON's 2020 overarching objective is to support the development of regions in line with the EU Cohesion Policy as well as national development policies making sure the cities and regions across Europe are well informed.

Among interregional programmes that covers the whole Europe, the Interreg Europe and ITERact programmes could be relevant for continuing in addressing PANTERA targets. More in details the first is supporting regional and local governments across Europe to develop and deliver better policies while the second supports learning events bringing together expertise across Europe. It creates and manages a wide range of online tools and produces publications and studies to meet current needs. However, the ITERact programme is mainly devoted to organizations involved in the policy making. Presently no calls from these programmes are open.

The priority axis 1 innovative and smart region of the Interreg ADRION programme supports topics very much in line with the topics covered by the PANTERA projects. Also in this case, no calls are presently open, however the programme will be constantly monitored.

Italy and Croatian organisations could also participate in the Alpine Space programme (an Interreg European transnational cooperation programme for the Alpine region). It provides a framework to facilitate the cooperation between economic, social and environmental key players in seven Alpine countries, as well as between various institutional levels such as: academia, administration, business and innovation sector, and policy making. While Hungary as well as Italy and Croatia can join forces in response to Interreg Central Europe calls to improves capacities for regional development in innovation, carbon dioxide reduction, the protection of natural and cultural resources as well as transport and mobility. This last funding program recently closed calls for application and presently no further calls have been still issued. Also, for the Alpine Space program presently no calls are open. Worth to be monitored are also the calls that will be issued under the Interreg Euromed and Interreg Danube transnational programmes that can support smart grids and energy system related activities depending on the calls that will be opened.
Finally, it is worth to mention that Interreg programmes have a strong regional connotation and in many cases the participation is limited to specific part of the territory of a country. For example, in the Interreg Alpine space, regarding Italy, only organisation coming from the northern part of the country can participate.

4.2.5.2 National Calls

An investigation of the Italian national and regional calls related to the topics covered by the PANTERA project has been conducted, here are presented the main relevant funding programs and open calls (if any) that can be exploited to support the continuation of the PANTERA activity at national level.

Regional program European Regional Development Fund – ERDF

These are regional tender supporting the development sustained by European cohesion funds. Each Italian region has its own tenders, we summarise here in the following the ones available from the Emilia Romagna and Lombardia regions that are the ones where RSE (PANTERA partner) has offices and laboratories.

For the Emilia Romagna region, in total there are nine calls currently open that tackle the following priorities:

- Research, innovation and competitiveness
  - innovative and intelligent transformation of the regional territory, in close relationship with the new S3 Strategy, which indicates the guidelines for regional research and innovation policies;
  - promotion of digital transformation to strengthen opportunities for economic development and social innovation, with the aim of encouraging a cultural change in society by making digital a new territorial typicality;
  - relaunching the competitiveness of the production system by placing work, the value of the company and the entrepreneurial and widespread pluralism of SMEs at the centre.
- Sustainability, decarbonisation, biodiversity and resilience
  - Increasing the security and resilience of the territory and urban areas, improving the ability to adapt to climate change, promoting an economy that is increasingly circular and suited to today's challenges, are some of the key elements of this priority
- Sustainable mobility and air quality

  The Program will focus on promoting the use of soft and cycle-pedestrian mobility, also through the creation of equipped and interconnected cycle paths, the dissemination of intelligent mobility systems and the installation of electric recharging points.

- Attractiveness, cohesion and territorial development

  The Program intends to combat territorial inequalities and promote the attractiveness and sustainability of territories, helping to bridge the gaps that weaken cohesion and fair and sustainable development. Based on a multilevel governance approach, the Regional Program aims to activate new development processes to:

  - relaunch/strengthen the attractiveness of the territories for citizens, the training system, the production system and tourism;
  - actively contribute to the fight against climate change;
  - to counter territorial imbalances (demographic, social and economic), focusing above all on development and attractiveness policies and on the quality and proximity of essential services;
  - strengthen the offer and proximity of the services necessary to guarantee equal rights and equal opportunities for all citizens.

Italian Recovery and Resilience Plan

Eventually it worth to mention that the Italian Recovery and Resilience Plan established at EU level to support the EU economy to recover from the COVID-19 pandemic and to increase the EU competitiveness could provide a relevant source for smart grid and energy system related activities. In fact, the Italian National Recovery Fund covers a broad spectrum of fields, as highlighted in the following figure, and especially under mission 1 and 2 calls for projects in line with the main PANTERA topics can be issued.

Figure 16: Missions of the Italian recovery and residence plan

In particular under the Italian Recovery and Resilience Plan the following funding instruments are financing investments in the energy system domain.

Development contracts. Operational indications on renewables and batteries

Related to the investment 5.1 "Renewables and batteries" defined in the Italian recovery fund and aimed at promoting the development in Italy of production sectors connected to technologies for the generation of energy from renewable sources, with particular reference to innovative photovoltaic modules (PV - PhotoVoltaics) and new generation and medium-large size, and for electrochemical storage.

4.2.5.3 Calls to target – Related to PANTERA activities

Regional program European Regional Development Fund – ERDF

The new tenders published foresee important investments in various sectors such as energy requalification, female entrepreneurship, research and experimental development, innovative start-ups and much more, in line with a strategy capable of combining quality of work, increased productivity and added value, technological innovation, environmental and social, international attractiveness and openness.

List of currently open tenders:

- **Energy requalification and seismic upgrading of public buildings – 2022** (deadline: 04/27/2023)
- **Industrial research projects aimed at the priority areas of the Smart Specialization Strategy** 2023-2024 (deadline: 31/03/2023)
- **Support for productive investments aimed at business innovation** (deadline: 01/03/2023)
- **Research and experimental development projects** (deadline: 02/28/2023)
- **Support for energy interventions and seismic prevention of companies** (deadline: 02/22/2023)
- **Support for the development of innovative start-ups** (deadline: 17/02/2023)
- **Funding for the development of the smart specialization strategy of Emilia-Romagna - year 2023/2024** (deadline: 01/31/2023)
- **Contributions for the management and development activities of the Technopoles 2023-2025** (deadline: 20/01/2023)

The most relevant call for the continuation of some of the PANTERA activities is the second mentioned in the above list: Industrial research projects aimed at the priority areas of the Smart Specialization Strategy 2023-2024" That it's clearly mentioning the EU S3 Smart Specialization Strategy.

Regarding instead the Lombardia region, only two calls for project are currently open, we list them her even if are not so relevant for the topics covered by the PANTERA project:

- Call for grants for the participation of SMEs in international trade fairs in Lombardy
- Public call for candidates to the database of technical-scientific experts of the Lombardy Region

Italian Recovery and Resilience Plan

Agreements for innovation - First counter

This program will support projects concerning industrial research and experimental development activities aimed at the creation of new products, processes or services or at the significant improvement of existing products, processes or services, through the development of key enabling technologies in the following areas of intervention attributable to the second Pillar of the "Horizon Europe" research and innovation framework program:

- Manufacturing technologies
- Fundamental digital technologies, including quantum technologies
- Emerging enabling technologies
- Advanced materials
- Artificial intelligence and robotics
- Circular industries
- Low carbon clean industry
- Rare and non-communicable diseases
- Industrial plants in the energy transition
- Industrial competitiveness in the transport sector
- Clean, safe and accessible mobility and transport
- Smart mobility
- Energy storage
- Food systems
- Bioinnovation systems in the EU bioeconomy
- Circular systems

Agreements for innovation - Second counter

These are “development contracts” to support development of renewables and batteries. Projects concerning industrial research and experimental development aimed at creating new products, processes or services or at significantly improving existing products, processes or services, through the development of key enabling technologies of the following areas of intervention attributable to the second Pillar of the "Horizon Europe" research and innovation framework program:

- Manufacturing technologies
- Fundamental digital technologies, including quantum technologies
- Emerging enabling technologies
- Advanced materials
- Artificial intelligence and robotics
- Circular industries
- Low carbon clean industry
- Rare and non-communicable diseases

- Industrial plants in the energy transition
- Industrial competitiveness in the transport sector
- Clean, safe and accessible mobility and transport
- Smart mobility
- Energy storage
- Food systems
- Bio-innovation systems in the EU bioeconomy
- Circular systems

As can be seen, even if from a more technological and industrial oriented point of view, the topics covered by the PANTERA project are addressed by the Italian Recovery and Resilience Plan and discussions are ongoing on how to exploit at best the open opportunities.

4.2.5.4 Priority List (Topics)

All details are included in the above paragraphs giving evidence that there is scope for specific activities in line with the PANTERA objectives.

Calls	Objective	Funding	Deadline(s)	Priority
Industrial research projects aimed at the priority areas of the Smart Specialization Strategy 2023-2024	N/A	ERDF	31/03/2023	High
Energy requalification and seismic upgrading of public buildings – 2022	N/A	ERDF	27/04/2023	Low
Support for productive investments aimed at business innovation	N/A	ERDF	01/03/2023	Low
Research and experimental development projects	N/A	ERDF	28/02/2023	Medium

Support for energy interventions and seismic prevention of companies	N/A	ERDF	22/02/2023	Low
Support for the development of innovative start-ups	N/A	ERDF	17/02/2023	Low
Funding for the development of the smart specialization strategy of Emilia-Romagna - year 2023/2024	N/A	ERDF	31/03/2023	Medium
Contributions for the management and development activities of the Technopoles 2023-2025	N/A	ERDF	20/01/2023	Low

Table 10 Regional Desk 5 calls priority list

4.2.5.5 Eligibility Requirements and Pre-conditions

No major requirement is imposed by the ERDF-funded projects that are prioritized under Desk 5, apart from the exclusive involvement of organizations based in Italy, with an additional requirement for strong participation of organizations located in the region publishing the tender.

4.2.6 Regional Desk 6: Instruments, Financing Mechanisms Identification and analysis

4.2.6.1 Regional Calls

There are a few funding opportunities for the countries in this regional corner to support related research and innovation projects [32]. One of these funding opportunities is INTERREG Atlantic Area supports transnational cooperation projects [33] which covers 37 Atlantic regions in five countries: Ireland, Portugal, France, Spain and the United Kingdom, contributing to the achievement of economic, social and territorial cohesion. The Programme aims at implementing solutions to answer to regional challenges in the fields of innovation, resource efficiency, environment, and cultural assets, supporting regional development and sustainable growth.

From 2016, there have been three calls for funding under this programme:

- Call 1 - 2016 - Stage 1
- Call 1 - 2016 - Stage 2
- Call 1 - 2016 - Contractualisation
- Call 2 – 2018
- Call 3 - 2021 - Extension to calls 1 and 2

Only, under the first call of the Atlantic Area Programme, a total of 45 projects were approved accounting for 66% of the overall budget. The total approved ERDF grant aid to the 90 Irish partners was €12.226m and Irish partners were involved in 42 of the 45 approved projects.

Call for project 2022: With a total budget of €45.4M, mostly received from European Regional Development Fund (ERDF), the 2022 call is still open and accepts proposals until the 17th of February 2023, 6pm (Lisbon time). The budget may be adjusted by the Monitoring Committee in line with the Programme needs. Results are to be communicated to the applicants within 6-8 months after this deadline. The Monitoring Committee approval decisions are foreseen for the end of June 2023.

Eligibility to apply: a wide range of organisations, under public or private law, are potential beneficiaries of the European Regional Development Fund and may therefore join a project partnership. Lead Partner organisations can be public bodies, universities, education and research organisations, private institutions (not-for-profit) and international organisations acting under national law. The Lead Partner must be in the Programme INTERREG Atlantic eligible area. Applicants need to submit the application form through the SIGI platform [34].

4.2.6.1.1 Priorities in 2022 INTERREG Atlantic calls

The Atlantic Area programme consists of four Priority Axes, each with associated objectives. The projects must fall under these categories if they are to be eligible for consideration.

- Stimulating innovation and competitiveness (EUR 62.8 million)

  Objectives:

  1- Enhancing innovation capacity through cooperation to foster competitiveness
  2- Strengthening the transfer of innovation results to facilitate the emergence of new products, services and processes.

- Fostering resource efficiency (EUR 39.6 million)

  Objectives:

  2-1- Fostering renewable energies and energy efficiency
  2-2- Fostering green growth, eco-innovation and environmental efficiency

- Strengthening the territory’s resilience to risks of natural, climate and human origin (EUR 20.3 million)
  - Strengthening risk management systems
  - Enhancing biodiversity and the natural and cultural assets (EUR 52.6 million)

- Improving the protection of biodiversity and ecosystems' services
- Enhancing natural and cultural assets to stimulate economic development.

4.2.6.2 National Calls

There are two important national research and innovation funding calls in Ireland related to smart grids and energy transition, i.e., SEAI National Energy RD&D calls, and SFI Research Frontiers. There are also some mechanisms in place in order to commercialise and/or exploit the outputs of research activities. As an example, Enterprise Ireland helps the researchers with commercialization. There are also some minor research funding opportunities, e.g., Enterprise Ireland's Grant Offers.

4.2.6.2.1 SEAI National Energy RD&D calls

SEAI is Ireland's national sustainable energy authority. From home energy efficiency upgrades to ocean energy research, SEAI has supported a wide range of activities since 2011. SEAI has invested €400M in sustainable energy projects to achieve €1bn+ cumulative energy savings and help 250 energy community projects.

The Research Development and Demonstration (RD&D) Funding Programme of SEAI supports innovative energy RD&D projects that contribute to Ireland's transition to a clean and secure energy future [35].

A co-funding partnership is formed between SEAI and the following organizations for the National Energy Research and Development Calls 2022: the Department of Agriculture, Food and the Marine, Department of Housing, Local Government and Heritage, National Parks and Wildlife Service, Department of Transport, ESB Networks, and Geological Survey Ireland.

This programme greatly supports innovation and targeted actions that support in nature the delivery of the following objectives:

- Climate Action Plan 2021
- Programme for Government
- 2030 Climate and Energy Framework
- Ireland's National Energy and Climate Plan
- The Strategic Energy Technology Plan
- Climate Action and Low Carbon Development Bill (2021)

The main overarching objectives of this call are listed below.

- Develop and deploy competitive energy-related products, processes, and systems on the Irish market.
- Assist in overcoming technical and other barriers to energy market uptake.
- Develop Ireland's capacity for accessing, developing and applying energy RD&D of an international standard.
- Results, outcomes, and lessons learned from supported projects may be used to provide guidance and support to policymakers and public bodies.

Priorities in SEAI National Energy RD&D calls [36]:

1- A wide range of stakeholders and actors will be required to accelerate transformative research to deliver Ireland's clean energy and climate ambitions.
2- Multidisciplinary, transdisciplinary, and interdisciplinary approaches will be required, as well as engaged research methods. SEAI's National Energy Research and Development Funding Programme welcomes proposals from all research disciplines. Multiple organizations may participate in collaborative projects provided they are aligned with the overall goals of the program listed above.

Previous SEAI National Energy RD&D Funding Call:

A total of €19 million was awarded to 50 research projects as part of the 2021 programme, which attracted significant interest. In 2021, 56% more applications were received than in the most recent call in 2019, making it an extremely competitive call. These calls brought together leading academic institutions, industry partners, and not-for-profits to help the transition to a low-carbon society.

Levels of Available research Funding in 2022 calls:

The SEAI National Energy RD&D Funding Programme provides funding under the following five categories. Details of the typical duration and typical maximum SEAI funding associated with each scale/type are provided in the table below:

Scale and type	Duration (months)	Max. available funding (€1,000)
Small scale projects	Up to 12	Up to 200
Medium scale projects	12 to 36	Up to 650
Large scale projects	36 to 48	Up to 1,000
Academic Fellowships	12 to 36	Up to 300
SEAI-based Fellowships	12 to 24	Up to 200

Table 11 Scale, duration, and available funding in SEAI National Energy RD&D Funding Programme [44]

4.2.6.2.2 SFI Research Frontiers for the future Programme

The Science Foundation Ireland (SFI) Frontiers for the Future Programme provides opportunities for independent investigators to conduct highly innovative, collaborative research with the potential to deliver impact, whilst also providing opportunities for high-risk, high-reward research projects [37].

This programme has been designed by SFI to build research capacity and reputation, fund highly innovative Awards with strong potential for economic and societal impact, facilitate researchers based in Ireland to lead consortia and to win further support, develop an integrated research ecosystem through partnerships with other agencies, and support the growth and development of research capacity for the Technological University and Institute of Technology sector.

The programme comprises two streams [38]:

- Projects: This stream provides funding for high-risk, high-reward research that facilitates highly innovative and novel approaches to research.

- Awards: This stream provides larger-scale funding for innovative, collaborative, and excellent research programmes that have the potential to deliver economic and societal impact.

Researchers who seek funding for individual-led research and access to short-term project funding provide feedback to the programme design (SFI strategy workshops and SFI Researcher Survey). Emerging Investigators who may be returning to research after a period of absence can benefit from this programme, which addresses gender imbalance.

Open/Deadlines Dates and funding:

- 2022 Projects Call deadline is set for 14th April 2023 at 13:00 Dublin Local Time. The amount of funding support available for projects stream is between 200,000 and 600,000 Euros (direct cost) and the duration of the research is set to 24, 36, or 48 months.
- After the deadline of the projects, the 2022 Awards Call will open for applications from 14th April 2023 at 13:00 Dublin Local Time. The amount of funding support available for projects stream is between 610,000 and 1,500,000 Euros (direct cost) and the duration of the research is set to 48 or 60 months.

Subsection 4.2.6.2.2 presents the SFI research priorities and topics for this programme. Among these priority themes introduced in this sub-section, Energy, Climate Actions, and Sustainability is of interest from the perspective of the PANTERA consortium.

4.2.6.3 Calls to target – Related to PANTERA activities

4.2.6.3.1 Calls to target in SEAI National Energy RD&D programme

Analysing the targets of SEAI National Energy RD&D calls 2022, we found out in Regional Desk 6 of the PANTERA project that the following activities of the PANTERA consortium highly relate to the calls open strand:

- Overcoming the barriers to an effective and competitive energy market structure
- Overcoming barriers to the energy transition
- Guidance to policy makers on the national energy and climate action plan

Analysing the topics in topic strand of the SEAI National Energy RD&D Funding Programme 2022, the PANTERA consortium found out that the following topics are highly related to the activities of the consortium:

- Topic 17: Investigation of residential electricity use and the opportunities to optimise solar PV renewable electricity for self-consumption.
- Topic 22: Investigating ecological conservation management while maximising Ireland's clean energy transition
- Topic 23: Investigating innovation to impact frameworks to achieve Ireland's clean energy transition.
- Topic 24: Developing a research impact framework to support Ireland's energy research sector

4.2.6.3.2 Calls to target in SFI Research Frontiers for the Future programme

Subsection 4.2.6.4 presents the SFI research priorities. Among these priority themes introduced in this sub-section, Energy, Climate Actions, and Sustainability is of interest from the perspective of the PANTERA consortium.

Before 2015, these priority areas focused on Smart Grids, Smart Cities, and Marine Renewable Energy. Following the increased urgency to address climate change and sustainability challenges, alongside the increased opportunities for the industry within this wider context, the respective Research Priority theme has been amended to better reflect these drivers. Therefore, the theme Smart Grids, Smart Cities, and Marine Renewable Energy has been renamed Energy, Climate Action and Sustainability, and the two priority areas have been updated: 1- Decarbonising the Energy System and 2- Sustainable Living.

The SFI Frontiers for the Future Programme 2022 call under the Energy, Climate Action, and Sustainability includes co-funding partnerships between SFI and the Sustainable Energy Authority of Ireland.

4.2.6.4 Priority List (Topics)

4.2.6.4.1 Priority List of topics in SEAI National Energy RD&D programme

This research funding programme makes it viable for applicants to submit proposals to:

1- An Open Strand
2- A topic Strand.

Research proposals that fall within SEAI's remit and meet the programme objectives can be submitted through the Open Strand.

A total of 25 topic areas have been identified as priority areas for research in the Topic Strand. The 2022 call also includes five SEAI-based fellowship topics. These topics are summarised below. Subsection 4.2.6.2.1 discussed the topics (among the topic strand of this programme) that are most related to the activities of PANTERA consortium.

1- Demonstration of grid forming inverters.
2- Identifying knowledge gaps in bird conservation in relation to offshore wind farm development and setting out how to address them (Co-funded by NPWS).
3- Economic evaluation of geothermal energy in Ireland (Co-funded by GSI).
4- Investigation of geothermal energy for Industrial applications in Ireland (Co-funded by GSI).
5- Utilising spatial analysis and AI to determine future EV charging requirements.
6- Assessing the role of equality, diversity and inclusion in the energy sector.
7- Airborne wind energy.
8- Demonstration of smart controllers in conjunction with ESB Networks' NNLC Programme (Co-funded by ESB Networks).
9- Compact urban growth in Ireland.
10- Utilising CO2 from biomass combustion for greenhouse CO2 enhancement (Co-funded by DAFM).
11- District heating deployment in Ireland.

12- Floating offshore wind development.
13- Green hydrogen in the Irish energy sector.
14- Developing a pathway to a carbon-neutral shipping and maritime industry (Co-funded by the Department of Transport).
15- Bioeconomy renewable energy (Co-funded by DAFM).
16- Demonstration to address dispatch down of renewable generation (Co-funded by ESB Networks).
17- Investigation of residential electricity use and the opportunities to optimise solar PV renewable electricity for self-consumption.
18- Measuring the impact of behaviour change interventions on changing energy and transport related behaviours in Ireland.
19- Adaptive or risk-based management of wind farm interactions with hen harriers.
20- High temperature heat pumps for industrial use (Small, medium or large scale).
21- Investigating gender aspects of Ireland's clean energy transition.
22- Investigating ecological preservation while maximising Ireland's clean energy transition.
23- Investigating innovation to impact frameworks to achieve Ireland's clean energy transition.
24- Developing a research impact framework to support Irelands energy research sector.
25- Identifying optimal investments for citizens wishing to reduce energy-related emissions in an Irish context.

Calls	Objective	Funding	Priority
SEAI National Energy RD&D calls	Demonstration of grid forming inverters	SEAI National Energy RD&D programme	Low
	Identifying knowledge gaps in bird conservation in relation to offshore wind farm development and setting out how to address them	SEAI National Energy RD&D programme (Co-funded by NPWS).	Low
	Economic evaluation of geothermal energy in Ireland	SEAI National Energy RD&D programme (Co-funded by GSI).	Medium

	Investigation of geothermal energy for Industrial applications in Ireland	SEAI National Energy RD&D programme (Co-funded by GSI).	Medium
	Utilising spatial analysis and AI to determine future EV charging requirements	SEAI National Energy RD&D programme	High
	Assessing the role of equality, diversity and inclusion in the energy sector	SEAI National Energy RD&D programme	Medium
	Airborne wind energy	SEAI National Energy RD&D programme	Low
	Demonstration of smart controllers in conjunction with ESB Networks' NNLC Programme	SEAI National Energy RD&D programme (Co-funded by ESB Networks).	Low
	Compact urban growth in Ireland	SEAI National Energy RD&D programme	Medium

	Utilising CO2 from biomass combustion for greenhouse CO2 enhancement	SEAI National Energy RD&D programme (Co-funded by DAFM)	Low
	District heating deployment in Ireland	SEAI National Energy RD&D programme	Low
	Floating offshore wind development	SEAI National Energy RD&D programme	Low
	Green hydrogen in the Irish energy sector	SEAI National Energy RD&D programme	High
	Developing a pathway to a carbon-neutral shipping and maritime industry	SEAI National Energy RD&D programme (Co-funded by the Department of Transport)	Medium
	Bioeconomy renewable energy	SEAI National Energy RD&D programme (Co-funded by DAFM).	High

	Demonstration to address dispatch down of renewable generation	SEAI National Energy RD&D programme (Co-funded by ESB Networks)	High
	Investigation of residential electricity use and the opportunities to optimise solar PV renewable electricity for self-consumption	SEAI National Energy RD&D programme	High
	Measuring the impact of behaviour change interventions on changing energy and transport related behaviours in Ireland	SEAI National Energy RD&D programme	Medium
	Adaptive or risk-based management of wind farm interactions with hen harriers	SEAI National Energy RD&D programme	Low
	High temperature heat pumps for industrial use (Small, medium or large scale).	SEAI National Energy RD&D programme	Medium
	Investigating gender aspects of Ireland's clean energy transition	SEAI National Energy RD&D programme	Medium

	Investigating ecological preservation while maximising Ireland's clean energy transition	SEAI National Energy RD&D programme	High
	Investigating innovation to impact frameworks to achieve Ireland's clean energy transition	SEAI National Energy RD&D programme	High
	Developing a research impact framework to support Irelands energy research sector	SEAI National Energy RD&D programme	High
	Identifying optimal investments for citizens wishing to reduce energy-related emissions in an Irish context	SEAI National Energy RD&D programme	Low

Table 12 SEAI Research themes and priorities

4.2.6.4.2 Eligibility Requirements and Pre-conditions

The major requirement introduced in the prioritized topics, mainly refers to the participation of organizations registered in Ireland, while participation from organizations from other countries is accepted upon well justified grounds.

4.2.6.4.3 Priority List of topics in SFI Research Frontiers for the Future programme

The Audit of Progress in the objectives of research and innovation in Ireland was undertaken internally by the Department of Business, Enterprise and Innovation (DBEI) with the support of the research funding agencies to determine the Research Prioritisation. This report captures the investment and performance based on data provided by the funding agencies under each of the priority areas. The audit also identifies research strengths outside of those areas. The findings from these reports along with views provoked from stakeholders representing academia, industry as well as the public sector at a Consultation Forum in November 2017, have informed the refreshed priority areas. SFI uses the finding of this audit to prioritize the research funding opportunities. The following Table presents the SFI research priorities [39].

Theme	**Priority Area**

ICT	Future Networks, Communications and Internet of Things
	Data Analytics, Management, Security, Privacy, Robotics and Artificial Intelligence (including Machine Learning)
	Digital Platforms, Content and Applications, and Augmented Reality and Virtual Reality
Health and Wellbeing	Connected Health and Independent Living
	Medical Devices
	Diagnostics
	Therapeutics
Food	Food for Health
	Smart and Sustainable Food Production and Processing
Energy, Climate Action, and Sustainability	Decarbonising the Energy System
	Sustainable Living
Manufacturing and Materials	Advanced and Smart Manufacturing
	Manufacturing and Novel Materials
Services and Business Processes	Innovation in Services and Business Processes

Table 13 Research themes and priorities in SFI Research Frontiers for the future Programme

4.3 Overview of target topics and prioritization

The following table lists the topics with the highest importance in relation to the PANTERA operations, together with the relevant funding programme, after the analysis carried out in the previous sections of this chapter.

Table 14 HIgh priority topics per funding programme

Funding Programme	Topics
HORIZON Europe - Cluster 5	HORIZON-CL5-2023-D3-01-10: Supporting the development of a digital twin to improve management, operations and resilience of the EU Electricity System in support to REPowerEU
	HORIZON-CL5-2023-D3-01-15: Supporting the green and digital transformation of the energy ecosystem and enhancing its resilience through the development and piloting of AI-IoT Edge-cloud and platform solutions
	HORIZON-CL5-2023-D3-01-16: Support action to the SET Plan IWG on HVDC & DC Technologies

	HORIZON-CL5-2023-D3-02-14: Digital twin for forecasting of power production to wind energy demand
	HORIZON-CL5-2023-D3-03-03: System approach for grid planning and upgrade in support of a dominant electric mobility (vehicles and vessels) using AI tools
	HORIZON-CL5-2023-D3-03-04: Digital tools for enhancing the uptake of digital services in the energy market
HORIZON Europe - Missions	HORIZON-MISS-2023-CIT-01-02: Positive clean energy district (PED) digital twins – from modelling to creating climate neutral Cities
HORIZON Europe - WIDERA	HORIZON-WIDERA-2023-ERA-01-02: A strong European R&I Foresight Community to better inform R&I policy decisions in the European Research Area about potential futures
	HORIZON-WIDERA-2023-ERA-01-03: Experimentation and exchange of good practices for value creation
National Recovery and Resilience Plan/ Bulgarian National Science Fund	Generation of Network of Research Universities under Component “Innovative Bulgaria”, Program for acceleration of the Economic Development and transformation using Science and Innovations
Bulgarian National Science Fund	Multi country call for scientific and technological collaboration in the Danube region 2022

FUSION R&I: Research Excellence Programme	Financial support for the early-stage development of innovative projects, through a bottom-up approach.
Eurostars: joint transnational call	Support innovative SMEs and project partners (large companies, universities, research organisations and other types of organisations) by funding international collaborative R&D and innovation projects.
Open call for Network projects	Eases collaboration between organisations in Eureka countries
ERDF	Industrial research projects aimed at the priority areas of the Smart Specialization Strategy 2023-2024
SEAI National Energy RD&D programme	Utilising spatial analysis and AI to determine future EV charging requirements
SEAI National Energy RD&D programme	Green hydrogen in the Irish energy sector
SEAI National Energy RD&D programme	Bioeconomy renewable energy
SEAI National Energy RD&D programme	Demonstration to address dispatch down of renewable generation

SEAI National Energy RD&D programme	Investigation of residential electricity use and the opportunities to optimise solar PV renewable electricity for self-consumption
SEAI National Energy RD&D programme	Investigating ecological preservation while maximising Ireland's clean energy transition
SEAI National Energy RD&D programme	Investigating innovation to impact frameworks to achieve Ireland's clean energy transition
SEAI National Energy RD&D programme	Developing a research impact framework to support Irelands energy research sector

6 Conclusions

The focus of Deliverable D7.3 was on the activities carried out by the entire PANTERA consortium to identify, not only at the pan-European level but also at the regional and national levels, and assess potential funding sources in order to ensure the sustainability of the EIRIE Platform and which could also provide the resources for continuing parts of the work that has already been done (under the regional desks) in PANTERA project.

A high-level analysis of the post-project costs has also been completed as part of the deliverable, together with an explanation of the significance of these financial requirements, to ensure the sustainability of the EIRIE Platform.

The abovementioned analysis performed for Deliverable D7.3, will make a significant contribution to the Sustainability Planning activities of the project in T7.4 and to the creation of the Sustainability and Business Development Plan under Deliverable D7.4 (M51), which will outline the specific business development activities that must be accomplished to ensure the long-term viability of both the project's activities and the collaboration instruments that were established during the project.

References

1 PANTERA Consortium. (2019). PANTERA D7.4 “Sustainability and Business Development Plan”

2 PANTERA Consortium. (2019). PANTERA D7.1 “Exploitation Strategy and Plan”

3 https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021 2027/horizon/wp-call/2023-2024/wp-8-climate-energy-and-mobility_horizon-2023-2024_en.pdf

4 https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-12-missions_horizon-2023-2024_en.pdf

5 https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-13-general-annexes_horizon-2021-2022_en.pdf

6 https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/life/guidance/list-3rd-country-participation_life_en.pdf

7 https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2021-2022/wp-11-widening-participation-and-strengthening-the-european-research-area_horizon-2021-2022_en.pdf

8 https://cetpartnership.eu/

9 https://intnet-project.eu/

10 https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/digital/wp-call/2022/call-fiche_digital-2022-cloud-ai-02_en.pdf

11 https://cetpartnership.eu/sites/default/files/documentation/CETPartnership%20Joint%20Call%202022%20Info%20Day%201%20Report%20and%20Q%26A_221011.pdf

12 https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/life/wp-call/2021-2024/call-fiche_life-2022-cet_en.pdf

13 https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-search;callCode=null;freeTextSearchKeyword=;matchWholeText=true;typeCodes=1,0;statusCodes=31094501,31094502;programmePeriod=2021%20-%202027;programCcm2Id=43152860;programDivisionCode=null;focusAreaCode=null;destinationGroup=null;missionGroup=null;geographicalZonesCode=null;programmeDivisionProspect=null;startDateLte=null;startDateGte=null;crossCuttingPriorityCode=null;cpvC

ode=null;performanceOfDelivery=null;sortQuery=sortStatus;orderBy=asc;onlyTenders=false;topicListKey=topicSearchTablePageState

14 https://ec.europa.eu/newsroom/repository/document/2021-45/C_2021_7911_1_EN_annexe_acte_autonome_cp_part1_v2_d4ygL3fB7OJrEhLGIXBaC5w0X0_80907.pdf

15 https://latlit.eu/

16 https://centralbaltic.eu/

17 https://interreg-baltic.eu/

18 https://lzp.gov.lv/en/

19 https://www.liaa.gov.lv/en

20 https://www.cfla.gov.lv/en

21 https://eumis2020.government.bg/bg/s/800c457d-e8be-4421-8ed9%209e78d0a75c39/Procedure/Active

22 https://enims.egov.bg/

23 https://dutpartnership.eu/dut_call_2022/

24 https://www.fni.bg/?q=node/1484

25 https://iris.research.org.cy/#!/

26 https://cinea.ec.europa.eu/programmes/connecting-europe-facility/energy-infrastructure-connecting-europe-facility-0/cross-border-renewable-energy-projects-cef-energy-new/call-cross-border-renewable-energy-cb-res-projects-application-process-cb-res-status_en

27 https://www.digitale-technologien.de/DT/Navigation/EN/Foerderaufrufe/Foerderprogramm/foerderprogramm.html

28 www.eurekanetwork.org

29 https://foerderportal.bund.de/easy/easy_index.php?wahl=easy_formulare

30 https://www.eranet-smartenergysystems.eu

31 https://interreg.eu

32 https://www.nwra.ie/collaboration/atlantic-area-programme/
33 https://www.atlanticarea.eu/
34 https://sigi2127.atlanticarea.eu/SIGI.UI/Login
35 https://www.seai.ie/grants/research-funding/research-development-and-demonstration-fund/
36 Report: "National Energy Research Development and Demonstration (RD&D) Funding Programme 2022", Sustainable Energy Authority of Ireland, 2022, Available online: https://www.seai.ie/grants/research-funding/research-development-and-demonstration-fund/SEAI-RDD-Call-Document.pdf
37 https://www.sfi.ie/funding/funding-calls/frontiers-for-the-future/
38 Report: "SFI Frontiers for the Future Programme 2022, Call for Submission of Proposals", Science Foundation Ireland, 2022, Available online: https://www.sfi.ie/funding/funding-calls/frontiers-for-the-future/SFI-Frontiers-for-the-Future-Programme-2022-Call-Document.pdf
39 Report: "Research Priority Areas 2018 to 2023", Department of Enterprise, Trade and Employment, Available online: https://enterprise.gov.ie/en/publications/publication-files/research-priority-areas-2018-to-2023.pdf