

Clean Energy Transition Partnership

2023 Call Module 1

DC technologies for power networks

Michele de Nigris
TRI 1 Lead

Sustainable Development and Energy Sources Department Director - RSE

September 26 th 2023

What it is

What

CETPartnership 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.

Why

CETPartnership supports the implementation of the European Strategic Energy Technology Plan (SET Plan), with the ultimate objectives, in line with REPowerEU Plan, to:

- achieve a climate-neutral society by 2050
- diversify Europe's energy supplies
- strengthen Europe's clean energy value chains, making them more sustainable

CETPartnership builds on existing SET Plan initiatives (ERA-Nets, IWGs, ETIPs, etc.), and aims to create synergies with the National Energy and Climate Plans and with the Recovery and Resilience Facility (RRF).

How

It pools national and regional RDI funding for the broad variety of technologies and system solutions required to make the energy transition. Financing is provided by national and regional funding agencies and institutions and by a top-up from the European Commission.

It envisions a transition driven by industry, public institutions, academia and citizen groups that will make Europe the front-runner in clean energy innovation and implementation.



30 Countries

23 EU Member States
+ 7 Associated Countries

55 Funding Partners

Funding Agencies
& Ministries

Top-up

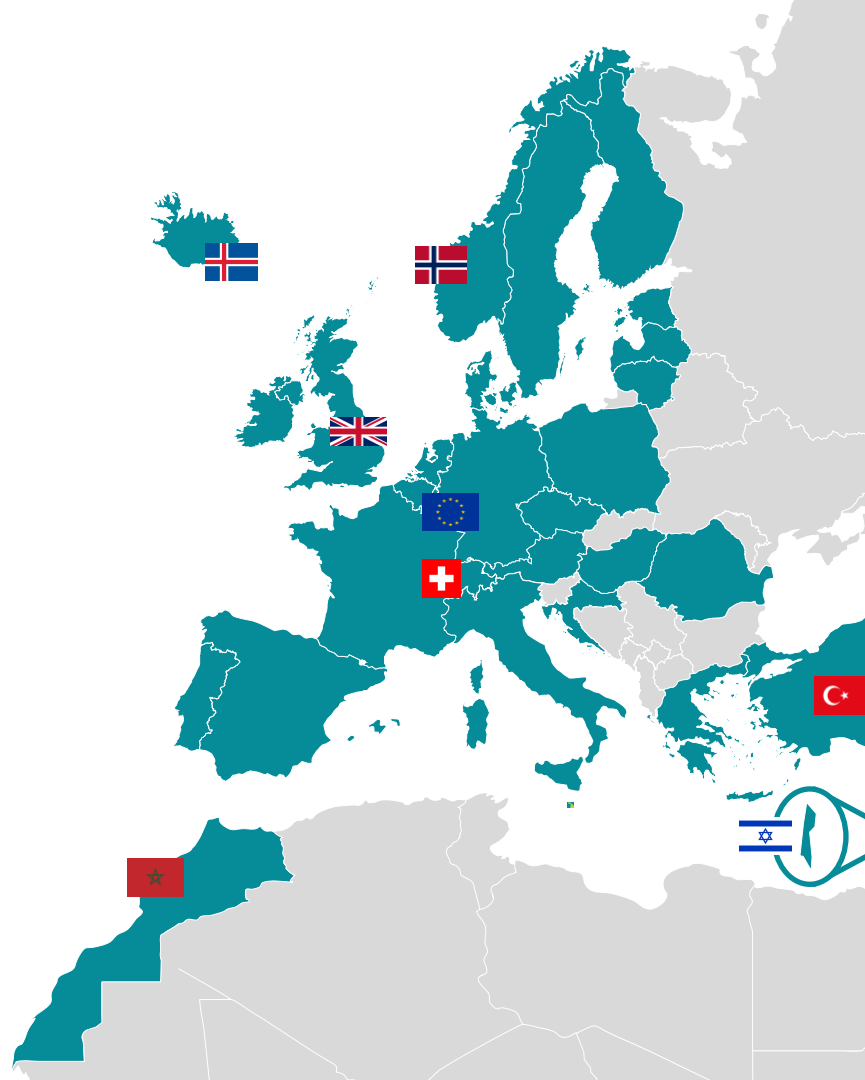
European Commission is the
single biggest financing
organisation

13 Coordination Units

Coordinator: BMK / FFG

Annual Calls for RTDI Projects

100 – 140 M € per year
2022 - 2027



Transition Initiatives (TRIs)

What is a TRI?

The Transition Initiatives (TRIs) are **thematic configurations** of CETPartnership funding partners in order to work together on a specific **Strategic Research and Innovation Agenda (SRIA)** Challenge.

How many TRIs are there?

The CETPartnership has established the following **7 TRIs** which address the seven CETPartnership RTDI Challenges as described in the Strategic Research and Innovation Agenda (SRIA). Each of the TRIs is led by one of the CETPartnership partners, known as the TRI Lead.

 <p>INTEGRATED NET ZERO EMISSIONS ENERGY SYSTEM</p>	 <p>ENHANCED ZERO EMISSION POWER TECHNOLOGIES</p>	 <p>ENABLING CLIMATE NEUTRALITY WITH STORAGE TECHNOLOGIES, RENEWABLE FUELS AND CCU/CCS</p>	 <p>HEATING AND COOLING SOLUTIONS</p>
<p>TRI 1: Integrated Net-zero-emissions Energy System</p>	<p>TRI 2: Enhanced zero emission Power Technologies</p>	<p>TRI 3: Enabling Climate Neutrality with Storage Technologies, Renewable Fuels and CCU/CCS</p>	<p>TRI 4: Efficient zero emission Heating and Cooling Solutions</p>
 <p>INTEGRATED REGIONAL ENERGY SYSTEMS</p>	 <p>INTEGRATED INDUSTRIAL ENERGY SYSTEMS</p>	 <p>INTEGRATION IN THE BUILT ENVIRONMENT</p>	
<p>TRI 5: Integrated Regional Energy Systems</p>	<p>TRI 6: Integrated Industrial Energy Systems</p>	<p>TRI 7: Integration in the Built Environment</p>	

Transition Initiative 1

Challenge → TRI 1 implements the CETPartnership Challenge 1 on the “**Optimised, integrated European net-zero emission energy system**”

Mission → to develop the optimised, integrated European net-zero emissions energy system, where electricity distribution and transmission grids are seen as the “backbone” of the future low-carbon energy systems with a high level of integration among all energy carrier networks

Main features

- higher level of circularity, with energy efficiency at its core
- greater direct electrification of end-use sectors
- renewable and low-carbon fuels for end-use applications more difficult to electrify



INTEGRATED
NET-ZERO-EMISSIONS
ENERGY SYSTEM

TRI 1 Lead
Michele de Nigris (RSE, IT)

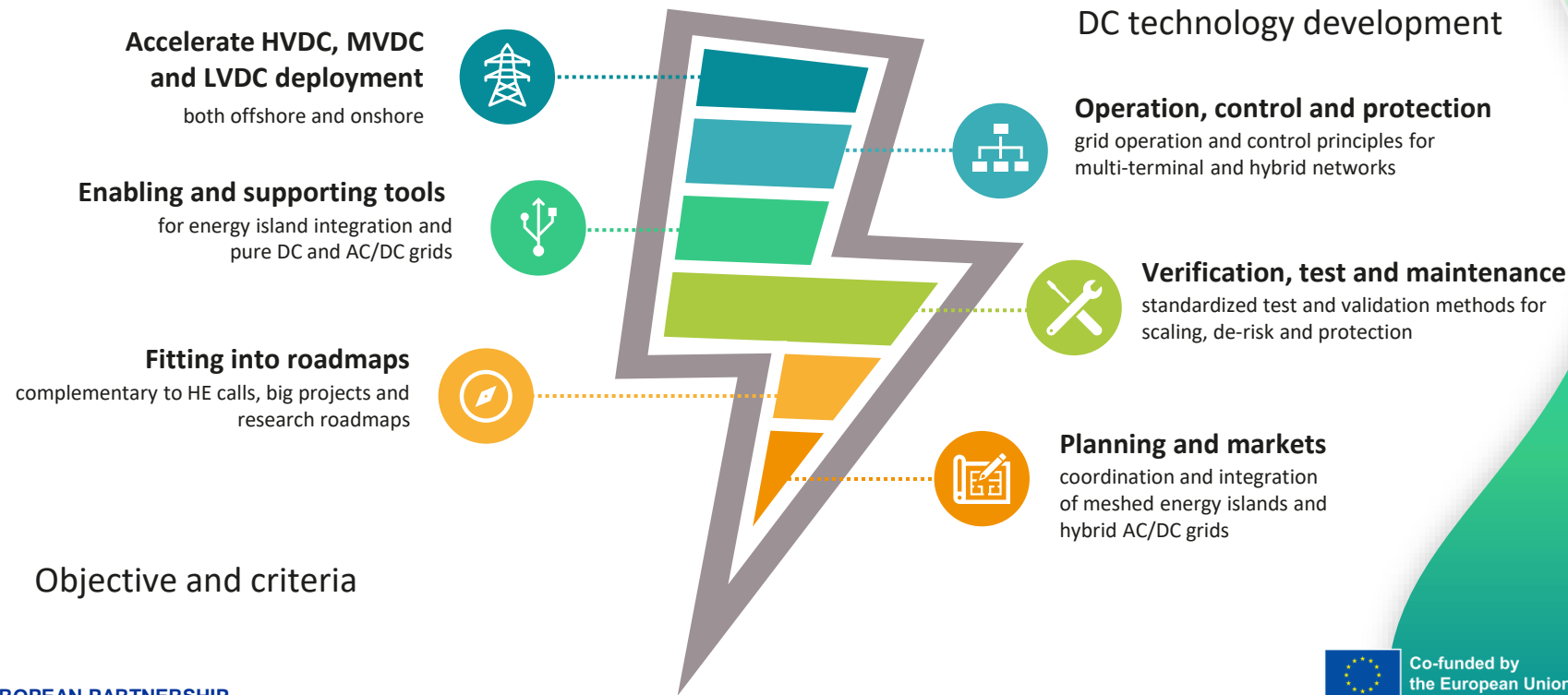
TRI 1 Office
Giuseppe Palazzo (RSE, IT)

Contact
TRI1@cetpartnership.eu

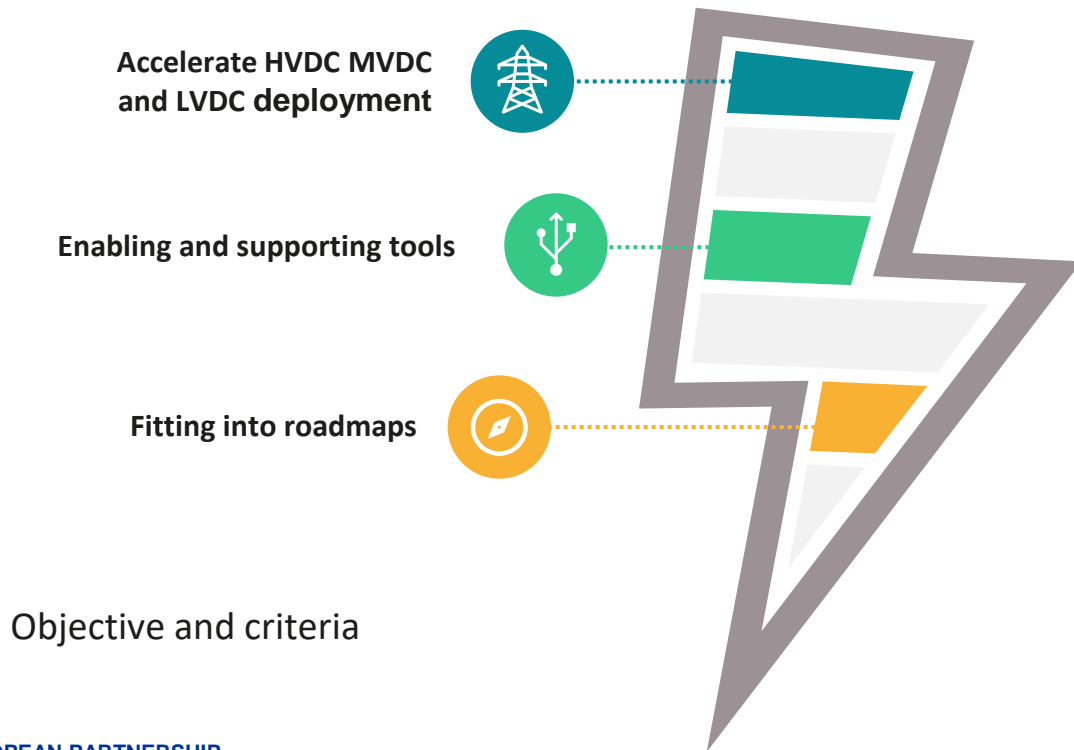


TRI 1 Call Module 2023 – DC technologies for power networks

TRI 1 worked with its Partners and discussed with experts from ETIP SNET, ETIPWind and IWG HVDC on the scoping of a new Call module for Joint Call 2023: **DC technologies for power networks**



TRI 1 Call Module 2023 – DC technologies for power networks



DC grids are becoming increasingly important for:

- **long-distance transmission** via HVDC
- connecting **energy islands** to electricity grids
- **MVDC and LVDC** networks and grids/microgrids, empowered by power electronics area advancements

Enabling and grid operation technologies at HV and MV (LV) levels, **on top of the converters**, are necessary

E.g. **supporting** activities and tools for verification **validation**, testing and study of technologies and their integration; work with test facilities and hardware in the loop; support, **control** and **measurement** tools

Acting in a **complementary** and integrated way with respect to Horizon Europe calls and big projects (e.g. OSMOSE, Interopera, etc.)

Fitting into the research roadmap of ETIP SNET, ETIPWind, IWG HVDC, and IWG4 on integrated energy systems

TRI 1 Call Module 2023 – DC technologies for power networks

Results should

- enable **scaling for verification** of operation, scaling for **testing** of individual components, detection and clearance of faults as well as easier **maintenance**
- benefit both hybrid **AC/DC grids** and pure **DC grids**, whether onshore or offshore – the analysis of DC microgrids is also permissible
- provide practical advice on how the **integration of energy islands** and the conversion of infrastructures can be done **sustainably**, with an environmental impact as low as possible and at low cost



Projects' targets

Operation, control and protection

grid operation and control principles for multi-terminal and hybrid networks



Verification, test and maintenance

standardized test and validation methods for scaling, de-risk and protection



Planning and markets

coordination and integration of meshed energy islands and hybrid AC/DC grids

TRI 1 Call Module 2023 (CM 2023-01)

DC technologies for power networks

Rationale – Why this Call Module?

- Focus on both continuity with 2022 and on new fields, not covered in the previous Joint Call
- Leverage the knowledge and the results that will arise from 2022 projects on planning tools and flexibility technologies adding new technological perspectives in the field of DC networks and energy islands
- Work in an integrated and complementary way with respect to outstanding Horizon Europe projects (e.g. OSMOSE, Interopera, etc.), contributing with CETPartnership results to a capital-intensive sector, otherwise out of reach

Innovation targets

- Support projects that accelerate the deployment of HVDC, MVDC and LVDC
- benefiting both hybrid AC/DC grids and pure DC grids, whether onshore or offshore
 - development, testing and validation of solutions for operation at scale and individual components for HVDC and MVDC
 - tools and methods for fault management and maintenance
 - sustainable and efficient integration of energy islands and conversion of existing offshore infrastructures
 - tools and methods for LVDC applications at industrial, building, street and district level to improve efficiency and reduce losses

Project characteristics

- Focus on the enabling technology and grid operation technology level at HV, MV and LV levels, on top of the converters (e.g. supervision and control), considering scalability
- Working (potentially) on existing infrastructures (support control and measurement tools), or on test facilities (HiL)
- Considering standard architectures, interoperability and cybersecurity by design
- Budget of 10 M€: 2-3 projects shall be funded with 2 - 4 M€ each. Projects addressing planning and markets are expected in the range of 1 - 2 M€

Target groups

Need owners

- Offshore wind farms/energy islands and grid operators

Potential applicants

- Universities and research institutes
- Industry and SMEs in the fields of components, systems and devices for energy systems as well as software (services)

TRL

TRL jump of 1-2 classes

Knowledge Community

Selected projects will benefit from a **structure** that will accompany them through **knowledge communities** and **impact groups** fostering information and best practice exchange and guaranteeing an **outreach of the results** to European and international levels.

Selected applicants will join the CETPartnership community, whose spirit is characterized by a **solution-oriented approach**, focused on technology demonstration, adoption and market uptake.

Participation to knowledge community is **part of the project**. Knowledge community activities, organized by Knowledge Community Management and Funding Partners, structured on a digital collaboration platform, include:

Formative evaluation



Reporting



Feedback uptake

Working groups



Thematic and cross-cutting working groups



Living documents



Joint communication and dissemination activities

Deliverables



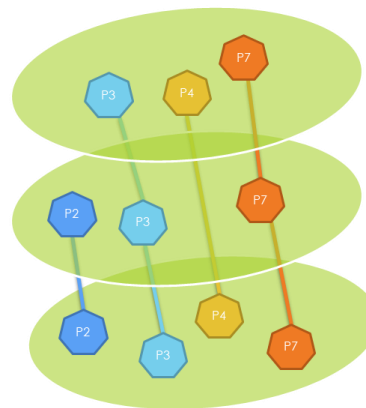
Periodic reports, events and results presentations

Three-layer Research Model

Applicants are encouraged to consider aspects beyond technology, according to the **Three-layer Research Model**, a framework that facilitates a structured approach to fostering innovation in project design. Applicants are encouraged to cover more than one layer.

- Methodologies and approaches to study the layers included in the project should be clearly defined.
- The work plan and deliverables should reflect all included layers and the potential interconnections between them.
- Interdisciplinary teams may be of great value.
- Risk assessments for the projects should consider all layers involved in the project.

The layers represent three domains where barriers to transition may be present.



3 - **Transition**

Why do we or don't we do it? (e.g. community and society, policy, education, etc.)

2 - **Marketplace**

How do we organise it? (e.g. living labs, sandboxes, business models, regulatory frame, etc.)

1 - **Technology**

Which technology solution do we need?

Today agenda

10:00-10:30	Introduction – Overview on CETPartnership, TRI 1 and Call Module 1
10:30-11:15	Panel 1 – Power runs on HVDC
	Peter Sandeberg – ETIPWind
	Nuno Souza e Silva – ETIP SNET
	Dirk Van Hertem – IWG HVDC
	Moderated by Michele de Nigris – RSE, TRI 1 Lead
11:15-11:30	Break
11:30-12:15	Panel 2 – The increasing role of MV and LV DC
	Alfredo Felix Cota – Incit-EV
	Javier Iglesias – Hitachi Energy
	Tero Kaipia – Zero Hertz System
	Enrico Ragaini – ABB
	Moderated by Chiara Gandolfi – RSE
12:15-12:45	Call procedure and funding mechanism and Q&A
	CETPartnership Call Management Team
12:45-13:00	Q&A and Conclusions