# Croatia: energy and R&I landscape

*Analysis, facts and figures from the energy and R&I contexts highlighting possible collaboration opportunities*

Mattia Cabiati

# National Energy and Climate Plan

| Indicator | 2030 target | |
|---|---|---|
| | Croatian | Overall EU – pre "fit for 55" |
| Reduction in GHG (ETS sector, compared to 2005) | At least 43%* | 43% |
| Reduction in GHG (non-ETS sectors, compared to 2005) | At least 7%* | 30% overall EU (ESR) |
| Share of RES in gross final energy consumption | 36.4%* | 32% (RED II) |
| Share of RES in final energy consumption in transport | 13.2%* | 14% (RED II) |

* Source: Croatia NECP 2021-2030, December 2019

The "**Fit for 55**" new legislative package introduced the **target of 55 %** net emission reductions by 2030 compared to 1990. Former target was -40%.

*61 % is the new target for emission reduction from ETS sector (compared to 2005)*

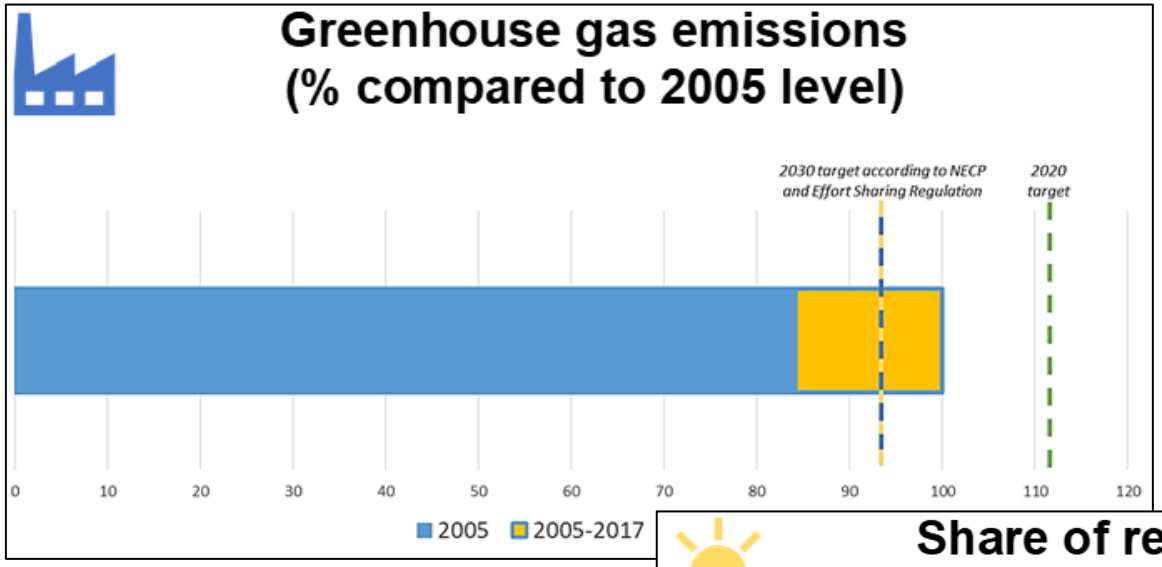
ETS (Emissions Trading System) covers:

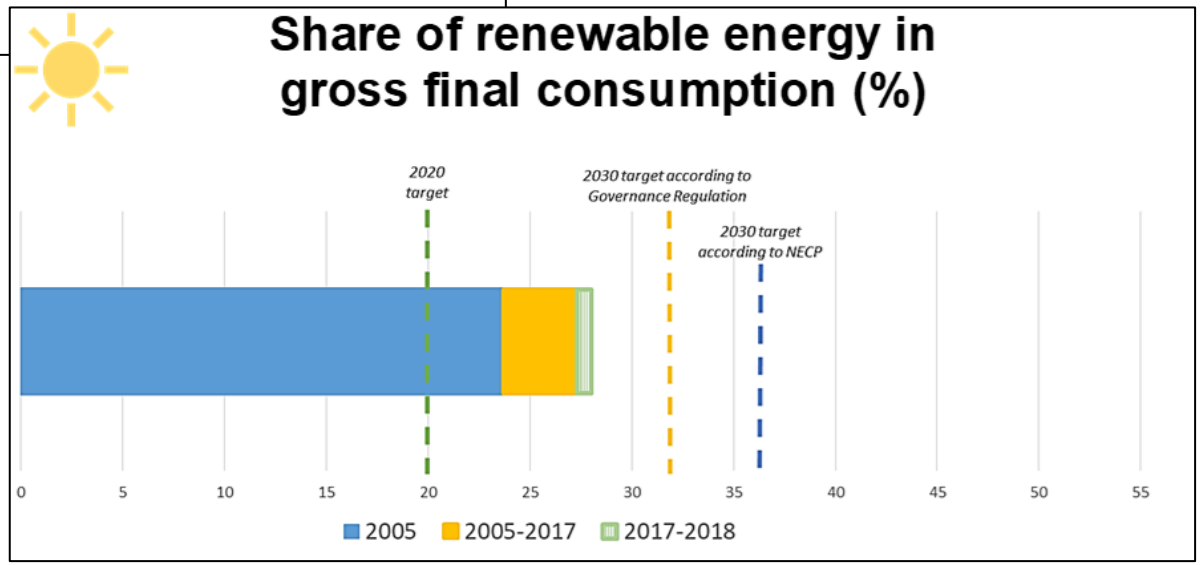
- $CO_2$ from electricity and heat generation, energy-intensive industry, commercial aviation within the EU
- Other gasses ($N_2O$ and PFCs)

Participation ETS is mandatory, but some plants could be excluded (low size or because of other national incentives.


EU H2020 Programme GA No. 824389

# National Energy and Climate Plan



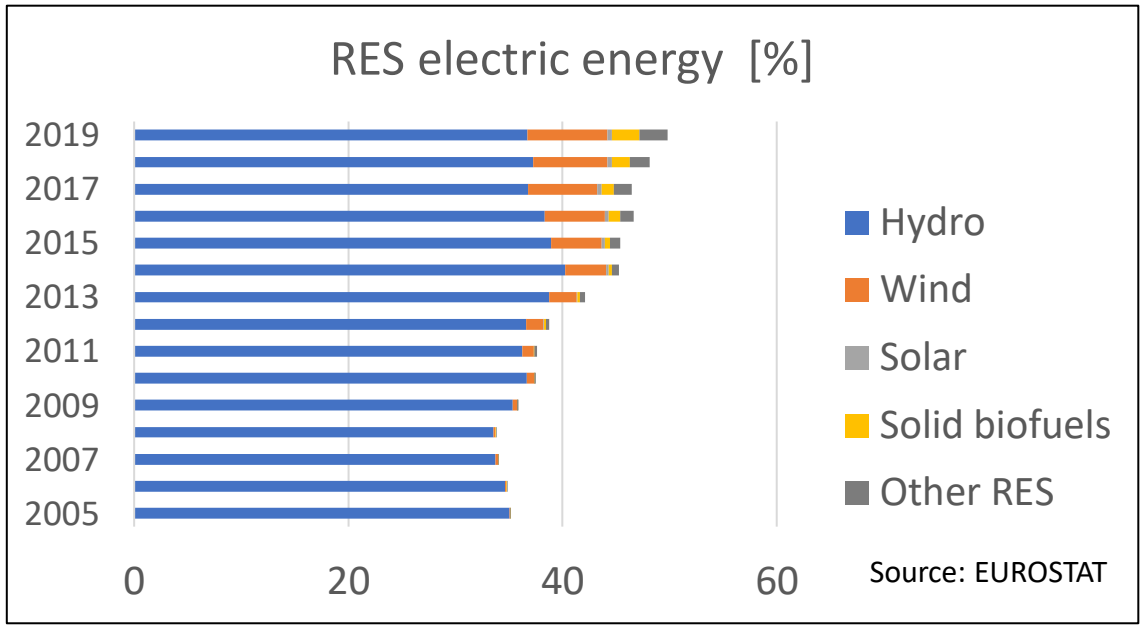
# National Energy and Climate Plan

***Current measures within the dimension of "decarbonization“***

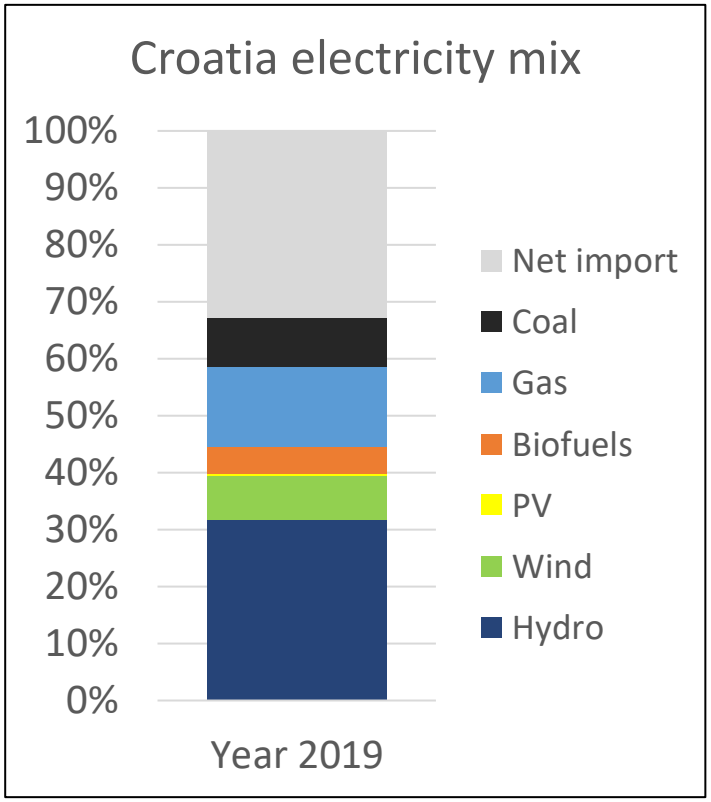
- **Feed-in tariffs and a system of premiums to support for RES and highly efficient cogeneration**. The main mechanism for the development of RES has so far been stimulating pricing (feed-in tariffs). It is expected that this system of stimulation will continue in the forthcoming period for 500 kW plants. The Act on Renewable Energy Sources and Highly Efficient Cogeneration introduced an incentive scheme through premiums.
- Increased use of renewable energy sources and energy efficiency in the industrial sector (leveraging European Structural and Investment Funds - and funds available from the EU ETS)
- Promoting the use of RES and energy efficiency through the funds of the Environmental Protection and Energy Efficiency Fund
- Implementation at the local level (National RES Action Plan)

Source: Croatia NECP 2021-2030, December 2019

# Renewable Energy Sources




Total electricity consumption
2019: 18,8 TWh

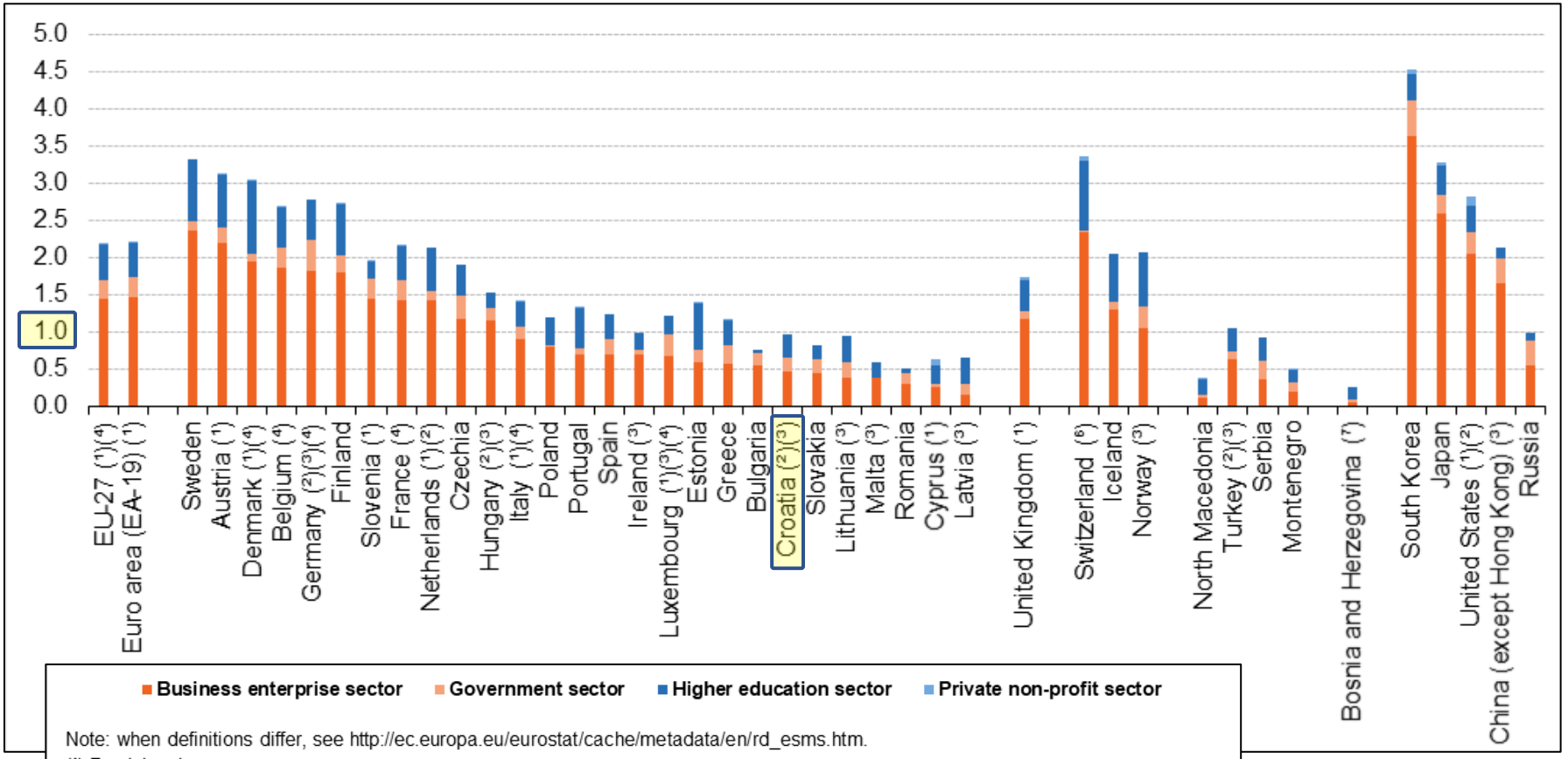




IRENA – RES installed capacity 2020

# Gross R&D expenditure 2018

## *% on GDP, 2018*




Note: when definitions differ, see http://ec.europa.eu/eurostat/cache/metadata/en/rd_esms.htm.
(1) Provisional.
(2) Definition differs.
(3) Private non-profit sector: not available.
(4) Estimates.
(5) 2016.
(6) 2017.
(7) 2014
*Source:* Eurostat (online data code: rd_e_gerdtot)

eurostat

# H2020 projects in Croatia

## H2020 Thematic priority

*Secure, clean and efficient energy*

Projects with at least one Croatian partner

| Reference city | # | Toatal EU funding (k€) |
|---|---|---|
| Zagreb | 122 | 18.229 |
| Rijeka | 9 | 1.526 |
| Koprivnica | 3 | 386 |
| Split | 2 | 191 |
| Krk | 2 | 111 |
| Topusko | 1 | 1.204 |
| Cres | 1 | 188 |
| Labin | 1 | 139 |
| Pula | 1 | 128 |
| Cakovec | 1 | 123 |
| Osijek | 1 | 74 |
| Solin | 1 | 50 |
| VelikaGorica | 1 | 40 |
| PorecParenzo | 1 | 37 |
| Pazin | 1 | 20 |
| Krizevci | 1 | 18 |

Source: EC Funding & tender opportunities portal

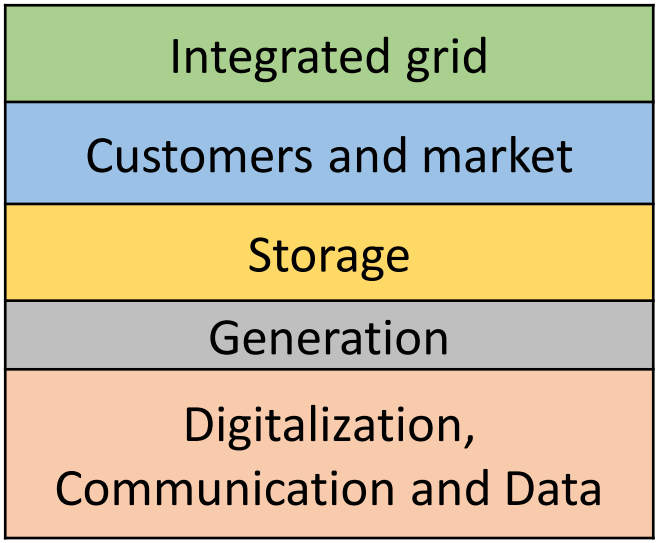

- Croatia received ~ 0,19 % of H2020 UE contribution
- Croatia has the ~ 0,90 % of EU-27 population (2019)
- Croatia accounts for ~ 0,39 % of EU-27 GDP (2019)

# H2020 projects in Croatia

PANTERA project has analyzed some projects involving Croatia trying to understand which area are the most tackled considering the ETIP SNET / PANTERA technologies classification

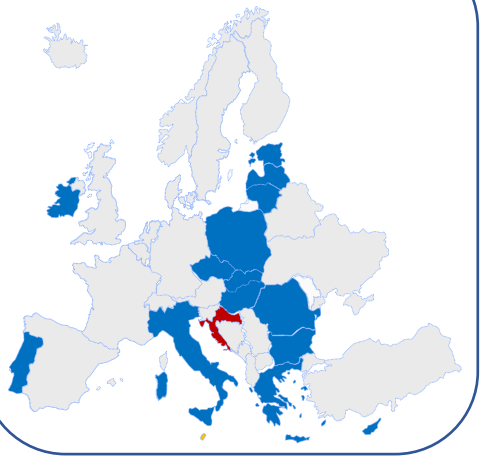
*More details during the panel discussion*

***Technologies and solutions***



# Feedbacks from the survey

**PANTERA key countries**



What are the ***main*** barriers, gaps which limit the funding and development of R&I in the energy field?

- **Lack of responsive networking facilities**
- **Limited monetary resources**
- **Limited human resources**
- **Limited national policy in support of R&I activity**

What kind of benefits and/or support do you expect from PANTERA?

- **Firsthand insight** into interesting smart grid projects, results, ideas and initiatives
- **Networking** and potential partnerships
- **Learning from others experience** (especially in practice-oriented projects)
- Cross-cutting information about different project initiatives
- Policy recommendations

*We are still collecting feedbacks at the following link!*

# Test facilities: collaboration opportunities

Test facilities:

- ❖ Are needed to test innovative solutions and results from low TRL projects
- ❖ Are costly both in set up and maintenance
- ❖ Require skilled personnel

→ **Not easy to built test infrastructures**

**Collaboration initiatives can support the development of local facilities and help projects in testing their results**

Initiatives implementing a network of collaborative smart grid testing facilities

DERlab

ISGAN
INTERNATIONAL SMART GRID ACTION NETWORK

ERIGRID 2.0
Connecting European Smart Grid Infrastructures

# DERLab

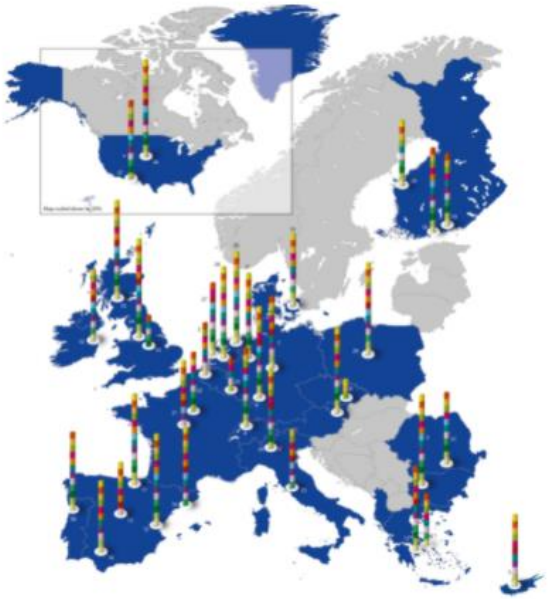
DERLab is an association of over thirty institutes from Europe and U.S. performing testing and research related to Smart Grids and grid integration of DER

https://der-lab.net

- Accredited **testing of DER-units and SG-equipment**
- **Support of SG development** and integration of Renewable Energies
- Information and **knowledge exchange**
- Contribution to **standardisation** activities

# DERLab - database

The Database of DER and Smart Grid Research Infrastructure **contains systematic information on research infrastructure and related assets, testing capabilities** and services of research institutes and organisations worldwide focusing on DER and Smart Grids.



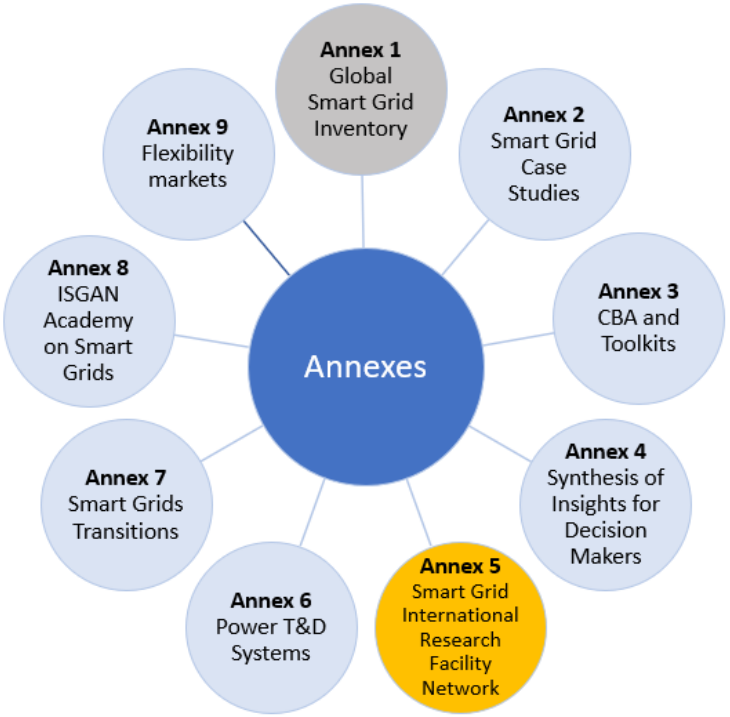
| | High Voltage & High Power | Microgrids & Distribution Network | Power Electronics | Power Quality & EMC | PV Systems | Wind Systems | Biomass / CHP Systems | Fuel Cell Systems | Storage Systems | E-Mobility | Smart Buildings | ICT | Cybersecurity | HIL / Co-simulation | Education & Training |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Austrian Institute of Technology (AT) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 2 Lemcko of Ghent University (BE) | | ■ | | ■ | ■ | ■ | | | ■ | ■ | ■ | | | | ■ |
| 3 Technical University of Sofia R&DS (BG) | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 4 HES-SO Valais (CH) | | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 5 FOSS of the University of Cyprus (CY) | ■ | ■ | ■ | ■ | ■ | | ■ | | ■ | ■ | ■ | | | ■ | ■ |
| 6 Brno University of Technology (CZ) | ■ | | ■ | ■ | | | | | | | | | | | |
| 7 Fraunhofer IEE (DE) | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | | ■ | ■ |
| 8 Karlsruhe Institute of Technology (DE) | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 9 RWTH Aachen (DE) | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 10 DTU Electrical Engineering (DK) | ■ | ■ | ■ | | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ |
| 11 CRES (EL) | | ■ | ■ | ■ | ■ | | | | ■ | | ■ | ■ | | | ■ |
| 12 NTUA (EL) | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 13 CIEMAT (ES) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | ■ | | | | |
| 14 EES-US Group of the University of Seville (ES) | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ |
| 15 ITE (ES) | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 16 SEER (ES) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| 17 TECNALIA (ES) | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 18 VTT Technical Research Centre of Finland (FI) | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 19 TUAS (FI) | | ■ | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 20 University of Vaasa (FI) | ■ | ■ | ■ | ■ | | | | | ■ | | ■ | ■ | ■ | ■ | ■ |
| 21 CEA-INES (FR) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | | | | |
| 22 EDF (FR) | | ■ | ■ | | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | |
| 23 Enel (IT) | | | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | | |
| 24 RSE (IT) | ■ | ■ | ■ | ■ | ■ | | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | |
| 25 SnT (LU) | | ■ | | | ■ | | | | ■ | | ■ | | | ■ | |
| 26 KEMA (NL) | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 27 TNO (NL) | | ■ | | | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 28 TU Delft (NL) | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 29 TU Lodz (PL) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | ■ |
| 30 INESC Porto (PT) | | ■ | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 31 MicroDERlab Group (RO) | | ■ | ■ | ■ | ■ | | | ■ | ■ | | | ■ | ■ | ■ | |
| 32 University College Dublin (IE) | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ |
| 33 Keele University (UK) | | ■ | | | | | | | ■ | | ■ | ■ | ■ | | |
| 34 University of Manchester (UK) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 35 University of Strathclyde (UK) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 36 NREL (US) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 37 Sandia DETL (US) | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |

# ISGAN


The **International Smart Grid Action Network** is a strategic platform to support high-level government attention and action for the accelerated deployment of smarter, cleaner electricity grids around the world.

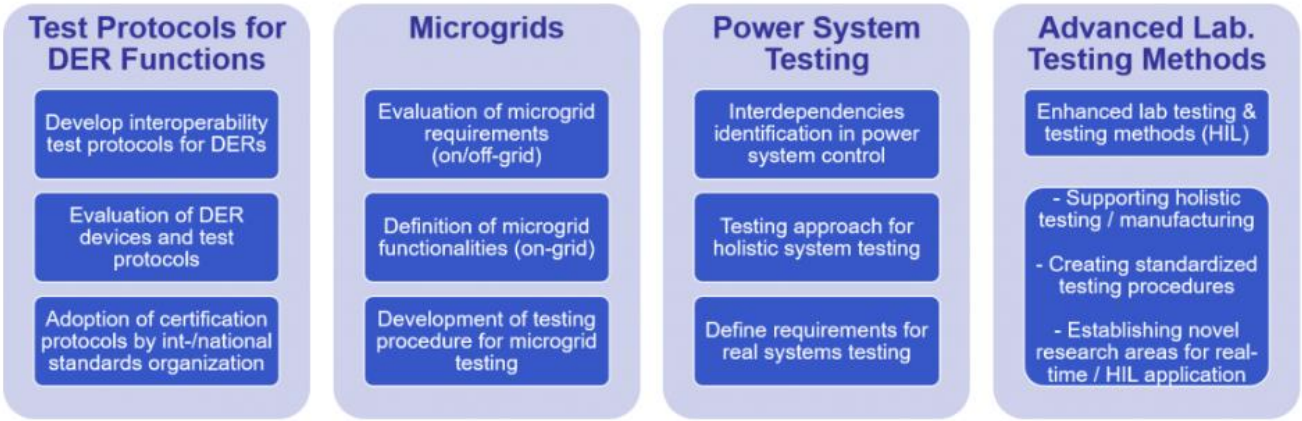
www.iea-isgan.org

- ISGAN is a Technology Collaboration Programme of the International Energy Agency for the cooperation on Smart Grids
- ISGAN is also an initiative of the Clean Energy Ministerial established as an Implementing Agreement under a framework of the IEA.
- ISGAN is organized in working groups called Annexes



# ISGAN Annex 5: SIRFN

**Smart Grid International Research Facility Network (SIRFN)** builds a framework for proposing, selecting and implementing projects that matches evaluation needs with testing capabilities and shares non-proprietary results for the improvement of smart grid technologies, protocols, and standards.




Four focus areas

# ERIGrigrid 2.0 EU project

**ERIGrid 2.0 is an EU project** that, based on the results of ERIGrid-1, will expand the research services and tools of European research infrastructures for validating smart energy networks with the electric power grid as the main backbone.

**The ERIGrid project is providing transnational laboratory access** and education to engineers working in the domain of smart grids and DER in 9 most advanced first-class European Laboratories in 11 EU countries.


PANTERA and ERIGrid 2.0 projects started a collaboration with, among other, the objective of fostering the interaction with local stakeholders

# Feedbacks from the survey and potential opportunities

What are the ***main*** barriers, gaps which limit the funding and development of R&I in the energy field?


What do you expect from PANTERA?

- **Firsthand insights**
- **Networking**
- **Learning from others experience**
- **Cross-cutting information**
- **Policy recommendations**

- **Networking for EU projects**
- **Sharing policies with other countries could support and facilitate national policies shaping**
- **Outcomes from international initiatives can support voice of local stakeholders towards policy makers**
- **Skills through collaboration**

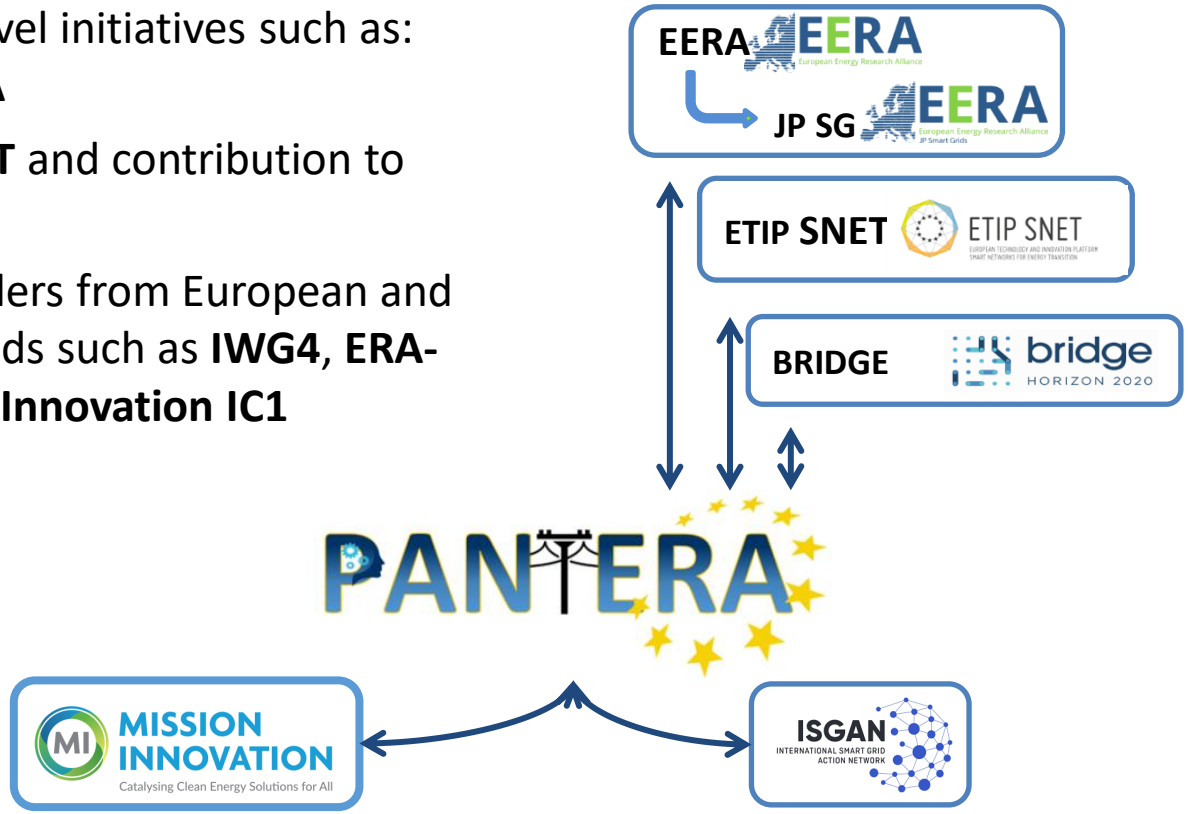
# PANTERA project

- Identify R&I stakeholders active in the fields of smart grids, storage and local energy systems and **establish effective communication links and potential collaboration**.
- **Organise dedicated workshops to facilitate exchanges of experience and best practices** among members of R&I community in collaboration with already on-going activities.
- **Develop an enhanced knowledge-sharing mechanisms** that will help to identify, discuss and address the key R&I challenges in the field of smart grids.
- **Develop a pan-European multi-functional collaborative platform** through which ready-made tools will facilitate the collection of data and results from on-going projects and initiatives.

**PANTERA Regional Desks approach**

# PANTERA project

- Interaction with European level initiatives such as: **ETIP SNET, BRIDGE and EERA**
- **Collaboration with ETIP SNET** and contribution to the Regional Workshops
- Involvement of key stakeholders from European and global initiatives on smart grids such as **IWG4**, **ERA-Net SES**, **ISGAN** and **Mission Innovation IC1**



# PANTERA: EIRIE platform

EIRIE's vision is to become a **reference operational point** to unify European activity, **incentivize further investments in smart grids** and support access to key exploitable results. We believe **pan-European cooperation, enabled by the right tools**, will help bridging the existing gaps.

- **Advanced search tool**
- **Community of stakeholders**
- **Living documents**

EIRIE
EUROPEAN INTERCONNECTION FOR RESEARCH INNOVATION & ENTREPRENEURSHIP
PANTERA

Link to the EIRIE platform

# Mission Innovation

MISSION INNOVATION
Catalysing Clean Energy Solutions for All

***To dramatically accelerate the availability of clean, affordable and reliable clean energy around the World by:***

**MI 2.0**

23 governments responsible for over 90% of global public investment in clean energy innovation commit to greater action to make clean energy affordable, attractive and accessible to all this decade.

2 June 2021
https://cem12mi6chile.com

# Thank you for your attention!

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EIRIE Platform: https://ses.jrc.ec.europa.eu/eirie/en