

# PAN European Approach for Strengthening Research and Innovation in Smart Grids, Energy Storage and Local Energy Systems

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**Abstract**— This paper presents the main objectives, approach, results and challenges achieved so far of the H2020 project PANTERA (PAN European Technology Energy Research Approach). A special highlight of the work carried out in the Balkan region considering the first PANTERA workshop in Sofia, Bulgaria is given. Based on analysis of the results achieved, the potential for improvements and future steps are elaborated.

**Keywords**— PANTERA, PAN European Technology Energy Research Approach

## I. INTRODUCTION

Meeting the climate change and energy policy objectives of EU for 2020 and beyond requires significant transformations in the energy sector, industry and society [1-5]. Upgrading existing networks, increasing the amount

of renewable energy generation, improving the power system security, developing the energy market and realizing energy saving and efficiency are only some of the important issues [1,2].

Finding a common way forward for strengthening the research and innovation in all of the member states in the field of smart grids, flexibility, energy storage and local energy systems appears to be one of the most challenging and important problems in the energy transition process.

According to the JRC Smart Grid Projects outlook the investments in Research and Development in Energy are not even among the EU members Fig.1 [1]. Fifteen European countries account for less than 5% of the EU research and innovation funds.

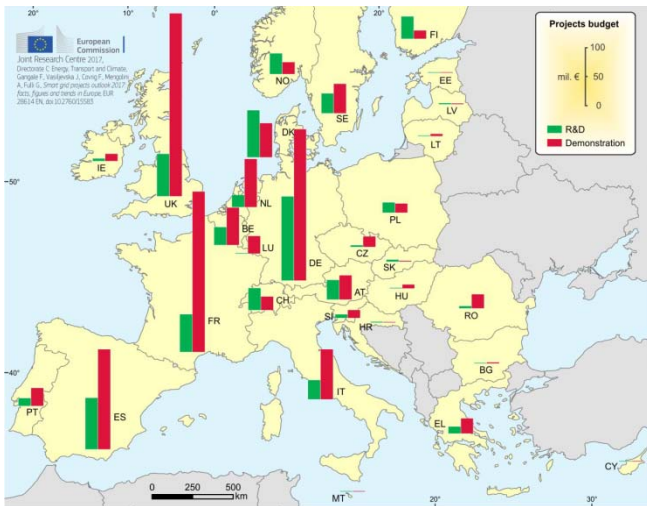


Fig. 1. R & D and demonstration investment in the EU [1].

To respond some of these challenges the EU H2020 project PANTERA (PAN European Technology Energy Research Approach, [www.pantera-platform.eu](http://www.pantera-platform.eu) [5]) has started in 2019 to set up a Pan European Forum for the Research & Innovation (R&I) stakeholders active in the fields of smart grids, flexibility, storage and local energy systems, including policy makers, standardization bodies, industry and academia experts widely representing the EU-28 energy system to collectively work for raising interest and bridging the existing gaps.

## II. PANTERA OBJECTIVES

As a coordination and support action PANTERA is targeting the following main objectives:

- Setting up a sustainable and interactive multi-dimensional platform of Pan European status.
- Developing Knowledge-sharing mechanisms that will help to identify, discuss and structure key R&I challenges.
- Organizing dedicated workshops to facilitate exchanges of experiences and capacities.
- Identify and establish communication links with local R&I.
- Delivering ready-made tools to facilitate the collection of real data/results and build a useful data repository.
- Engage and bring under the same activity umbrella facilitated by PANTERA all active EU entities / stakeholders to leverage synergies and maximize benefits.
- Exchange experience and knowledge between members of R&I community in collaboration with on-going activities aiming to wider participation, strengthen objectives and extent replicability, scalability and impact of achieved results.

## III. PANTERA CONCEPT AND APPROACH

The PANTERA concept is visually depicted on Fig. 2

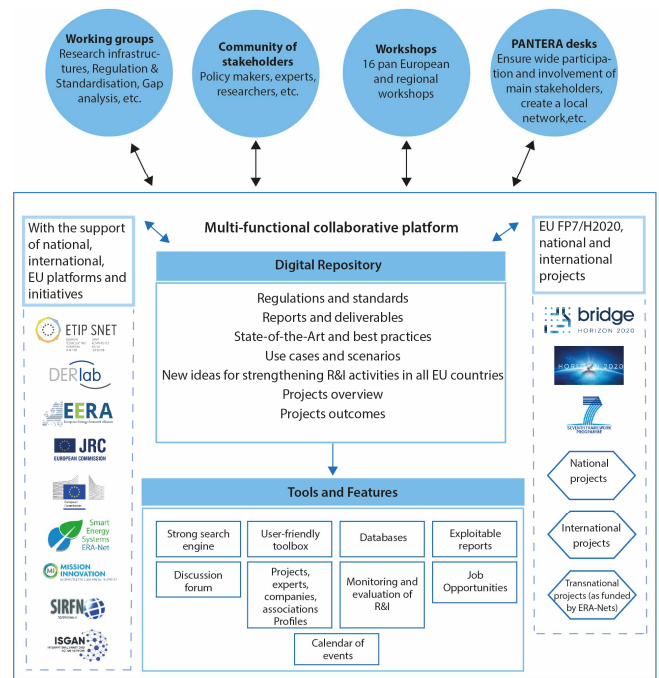


Fig. 2. PANTERA concept.

### A. PANTERA platform

The key objective of PANTERA's interactive multi-functional platform is to connect the R&I community of EU to enhance collaboration, wider interest and use on the project results, avoid duplication and lost financing, strengthen the participation of all Member States in support of the fifth pillar of the Energy Union (RIC) and energy transition. All contributing entities will benefit through the enhanced connectivity and services to all beneficiaries and prospective users. The PANTERA consortium and collaborating stakeholders are currently working on the platform design and development. It is planned to be online in autumn 2020.

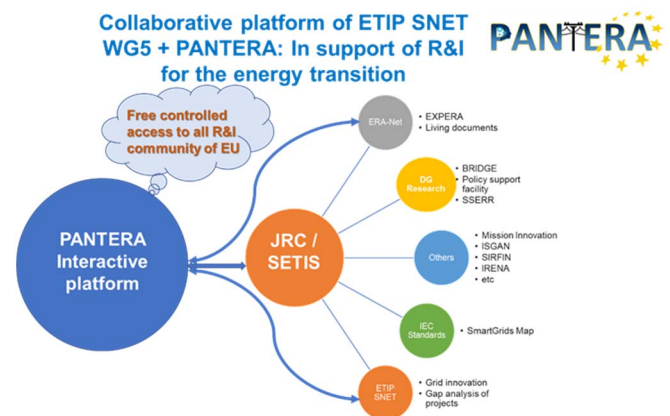


Fig. 3. PANTERA platform.

The PANTERA platform aims to facilitate close collaboration with the main potential contributors i.e. DG Research, DG Energy, JRC, BRIDGE, ERA-Net and ETIP SNET to deliver the missing functionalities, solutions, services and also to maximize the benefits of the existing platforms in the field of smart grids by sharing available project results, information and knowledge.

The PANTERA consortium and collaborating stakeholders are currently working on the platform design and development. It is planned to be online in Autumn 2020.

The conceptual design of the platform relies on the following main pillars (Fig. 4):

- Research & Innovation
- Synergetic Affiliations
- Education & Training
- Open communication.

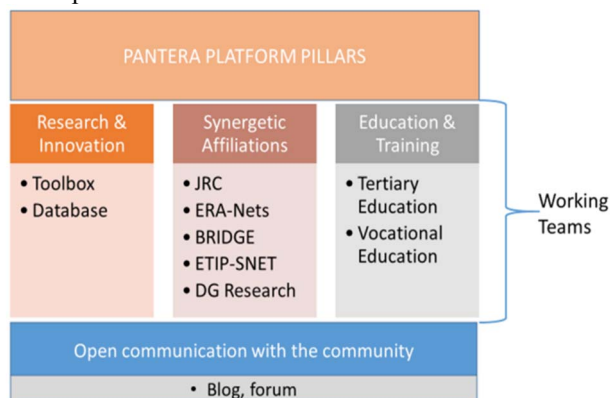


Fig. 4. PANTERA platform pillars.

In more detail, the platform will be developed with the aim to provide a rich bundle of functionalities, including the collection of project-related data and metadata from well-known and established platforms such as Smart Grids projects map of JRC, NER300 projects, Expera Smart Grids plus, ETIP SNET, etc. Integration with such platforms is a pre-requisite for keeping the PANTERA Platform up-to-date even after the end of the project. In addition, engagement and interaction with R&I project participants are considered as key means for further enriching the initially collected data with impact related information (via appropriate web forms) in a well-structured and formalized manner.

The platform will store information, containing meta-data about the projects, such as project IDs, acronyms, budget details (per project, per partner and/or per country), application domains and technologies deployed in each project demonstrator etc.

Moreover, the PANTERA platform will encapsulate regulation data (national and EU-wide) and standardization information (further enriching them with appropriate metadata) in terms of detailed documentation, which will complement project-related information, towards completely conceptualizing and contextualizing each R&I activity in the Smart Grid universe around the EU, with a special emphasis in low-spending Member States.

This amount of collected data will comprise valuable input for the provision of baseline analytics and visualizations over aggregated project-relevant information, enabling the provision of quick snapshots about the status quo of R&I activities per member state, technology type, stakeholder, etc. Moreover, further analysis of data will enable the revelation of valuable insights, patterns and trends through advanced data analytics (and respective visualizations) that will aim at effectively increasing knowledge and intelligence of Smart Grid R&I stakeholders,

based on results achieved in completed and on-going efforts EU-wide.

Knowledge extraction will be further facilitated by a strong and versatile search engine which will feature advanced functionalities for filter-based drilling into a wealth of information over user-friendly dashboards, towards offering a unique user-experience and facilitating the identification of best practices that fit to each user's criteria in a simple and straightforward manner.

Scenario building will also be made feasible, in an easy and user-friendly manner with semi-automatic estimation (emulation) of anticipated impact based on best practices and collected project data.

The PANTERA platform will also provide:

- A working teams area/spaces, accompanied by a living documents repository to facilitate collaboration between involved stakeholders and enable the provision of document-based detailed information about R&I activities and best practices;
- A discussion forum, that will complement the working teams instruments with a more direct and transparent interaction and communication channel;
- An events calendar for communicating and increasing awareness in upcoming interesting events, workshops and webinars relevant to Smart Grid R&I activities, either organized by PANTERA or beyond;
- A training area for educating stakeholders on Smart Grids R&I relevant issues, through tertiary (reports, best practices) and vocational (webinars) education means.

All pillars are both supported by and give feedback to the working teams (WTs) of PANTERA. Members of WTs are separately selected representing all relevant stakeholders / partners and they will function through a restricted area of the PANTERA platform accessible through a personalized password system.

#### B. Working teams

The work of PANTERA is organized in 5 Working Teams (WT) dedicated to Research infrastructures, Regulation & Standardization, Gap Analysis, Innovation support to the market uptake, Global & European Research and innovation community.

Working teams form a feeding source for the platform and involve PANTERA partners and stakeholders in specific R&I topics identified. The consortium partners take responsibility for each thematic area.

The WTs, will lay down annual mode of working with objectives and identified deliverables. The output of the work will be channelled through the multi-functional platform of PANTERA in appropriate format and content that will facilitate the objectives of the WTs set.

#### C. PANTERA desks

PANTERA desks are groups of stakeholders that are active in the field of smart grids and more in general in the energy system sector of a specific region. The main aim of these desks is to foster the participation of local stakeholders to PANTERA activities, in particular to PANTERA

workshops. Moreover the activity within PANTERA desks will aim to support the PANTERA platform development and to bring the discussion as close as possible to the local stakeholders and thus finding of the barriers and gaps that limit investment in the smart grids field. They will be created up six desks (Fig. 5) gathering the PANTERA targeted countries and a regional desk that gathers countries from the North Europe that will try to find out the best practices in participating to EU initiatives and projects.

PANTERA 6+1 is a unique approach established by PANTERA consortium which aims at ensuring wide participation and involvement of stakeholders throughout the project, fostering regional workshops and PANTERA platform implementation by considering different needs and expectations of stakeholders as well as national processes and cultures. It includes six Desks (Fig. 5) addressing countries that appear to have a lower rate of smart grid investment and one best practice desk committed to gathering and analysing lessons-learned from more successful countries.

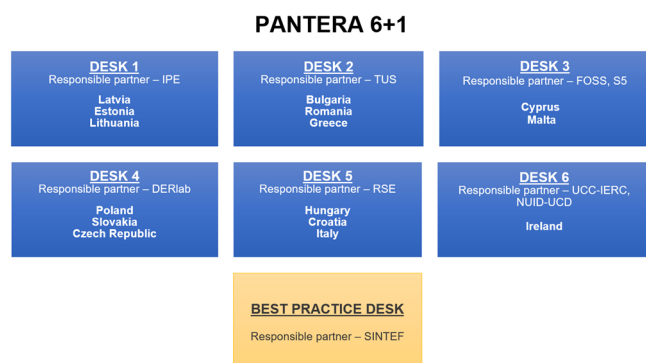


Fig.5. PANTERA desks 6+1 approach

The long-term mission of PANTERA 6+1 Desks' framework is to become a driver for increasing smart-grid research activities in the target countries and to support creation of a true pan-European R&I community.

#### D. Workshops

PANTERA consortium is planning to organise sixteen workshops on both regional and Pan-European level. In addition to that PANTERA consortium is planning to organise several mini and nano workshops in combination with conferences and events. The goal of the workshops is to identify gaps and key challenges in regions in the first place and to find solutions. The outcome from the workshops are feeding in the PANTERA platform, PANTERA desks and working teams.

### IV. PERFORMED ACTIVITIES

#### A. PANTERA Workshops

The 1<sup>st</sup> PANTERA Workshop entitled “PAN European Research and Innovation activities for Smart Grids, Energy Storage and Local Energy Systems” was held in Sofia, Bulgaria on 02.07.2019. The event gave the first presentation of the PANTERA initiative and received a high level of interest joining 49 stakeholders from 9 countries in an open forum to share their experience, expectations and perception on which is the right way forward to strengthen the research and innovation activities in the region. The

high level management of the Bulgarian DSOs, TSO, electric vehicle cluster, Electricity trading companies, Ministry of Energy, as well as key Stakeholders from the energy industry and academia from Bulgaria, Romania, Greece and Cyprus indicated their commitment to the PANTERA process (Fig. 6).



Fig. 6. The 1<sup>st</sup> PANTERA Workshop in Sofia, Bulgaria.

The event gave the first public presentation of the PANTERA project objectives, concept and mood of operation. Focusing at the most challenging topics for the energy transition in the Balkan region such as: concepts and future trends in smart grids, flexibility, storage and local energy Systems; European Commission (EC) R&I policy and trends; EU and national R&I funding opportunities; Local and Pan-European R&I challenges and gaps; Good R&I practices from countries with both high and low activities in smart grid R&I, the workshop gained high level of interest among the main energy sector stakeholders.

After setting the scene, the main objectives and the way of building the PANTERA process from Dr. Venizelos Efthymiou (FOSS), a presentation of the present day energy policies and vision on energy transition of Bulgaria (presentations) was presented from the Ministry of Energy of Bulgaria. Mario Dionisio and Sebastian Gras (EC) presented the EC R&I objectives, policy and future trends. A set of presentations focusing on the status on grids and R&D&I in participating Member States outlined the main results, strengths and shortcomings in Bulgaria, Romania and Greece. Luciano Martini (RSE-EERA JP for SG) presented the contemporary Pan-EU R&I community state of stakeholders' involvement and enhanced collaboration opportunities. Ludwig Karg (ERA-Net Smart Energy Systems) presented the leading achievements of ERA-Net Smart Energy Systems in building a European wide knowledge community for RDI on member state level”.

A roundtable with open discussion dedicated to the status on grids R&D&I in participating member states entitled SWOT analysis for identifying areas of actions and next steps was organized to envisage the main barriers and space for improvements.

A second roundtable setting the PANTERA initiative in focus presented a forum for discussion of the regional stakeholders on their expectations from PANTERA and the way how PANTERA can facilitate the active collaboration of participating member states.

The process made evident that the team work in small groups of active stakeholders with high interaction achieves very good high quality results. Thus a smaller scale workshop formats with shorter duration could also be a promising for the future.

As a result the first PANTERA workshop achieved its main objectives and also set some of the main topics providing potential for improvement of the process.

### B. PANTERA interviews

A set of interviews was organized during the first PANTERA workshop in Sofia in July 2019, to receive an immediate feedback from the stakeholders which will allow the adequate adjustments to the process.

Since the research is rather qualitative with a fairly limited number of respondents, the interviews were initially planned and conducted as so-called “semi-structured” interviews, allowing new ideas to be brought up during the interview as a result of what the interviewee says. The set of guiding questions was related to several topics, where the following are most interesting for the present paper:

- Architecture of Smart Grid landscape: specifics of the national organization, decision-making and national R&I support schemes
- Technical issues from the Smart Grid domain, including importance/prioritizing and if possible, reasoning

Due to the limited number of participants, the interviews were not statistically significant and thus had to be analyzed in a qualitative way.

Considering the first point, at least three different directions related to coordination were defined:

- It was noted that better coordination is needed between the R&I community and industrial companies, especially when it comes to fundamental research financed by the government.
- Long-term alignment and coordination of R&I efforts within the research community on national level will support meeting the overall national targets, including implementation of SmartGrids technologies.
- The respondents were not aware of any existing practice of coordinated research funding pooled together from several industrial partners, as for example several DSOs together or DSOs plus manufacturers. No organization takes or is willing to take a coordinating role for R&I projects, which are financed by combined funding pooled together from several industrial actors as for example DSOs.

The first draft of the PANTERA platform technical topics was based on the taxonomy, previously suggested and verified by ETIP-SNET. Interviewees were asked about feedback to the list of the technical topics (functional objectives in ETIP-SNET's terminology). Some of the respondents pointed out that it can be too early to explore some of the suggested topics. This does not necessarily mean that these are irrelevant but can be introduced to the stakeholders later on. It is, for example, difficult to introduce active demand response schemes, before deployment of advanced metering systems, which function as a key enabler.

Results of the interviews will be used as an important input to the succeeding activities in the project.

### C. PANTERA questionnaire

The project has developed a questionnaire (available on the PANTERA website <http://pantera-platform.eu>) to be sent to the project stakeholders in order to get relevant information especially related to: their involvement in EU level initiatives, their willingness to be deeper involved and in supporting PANTERA in finding the main gaps and challenges that according to them are limiting a better EU level R&I integration.

The questionnaire will be available until the end of the PANTERA project, but since already several replies are present, the first considerations can be derived. Many repliers stated that networking and access to reliable information and data is of key importance to enhance the R&I activities and especially to deeper the R&I integration at EU level. In this respect, it is important to mention that two of the PANTERA activities (organizing workshops and building a knowledge sharing platform) are fully aligned in view of covering these needs.

A graphic summary of the questionnaire replies is presented in Fig. 7.

The process is still on going and the stakeholders are warmly invited to reply to this questionnaire (<http://pantera-platform.eu/stakeholders>). Their replies and participation as PANTERA stakeholder would be very valuable and beneficial both for the stakeholders and for achieving the project objectives.

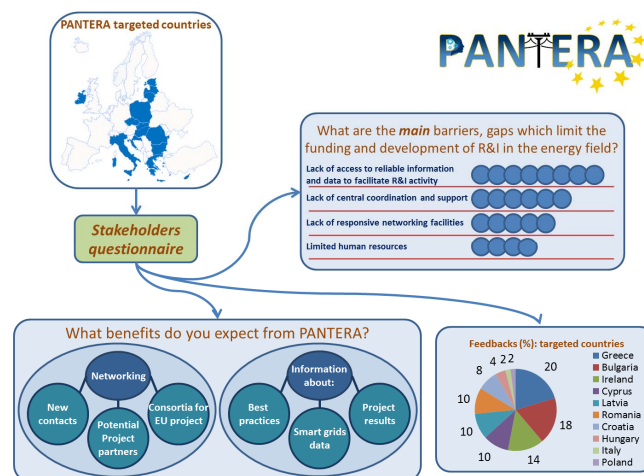


Fig. 7 PANTERA stakeholders questionnaire summary infographic

### D. Review of Strategic priorities

In order to prepare a strong basement for the further work within the PANTERA process an extensive review of the EU strategies and policy developments with special focus on target countries was performed. The adopted bi-directional approach allowed to develop the topic from the process and content perspective. The process perspective covered analysis of stakeholders' engagement in co-creation of the EU legislation in energy sector, whereas content perspective covered the analysis of the state of the EU and target countries.

The analysis of stakeholder engagement process completed with anticipated conclusions, that target countries are less involved in the EU energy policy formulation processes. Still an increased understanding of necessary future steps was created. These steps shall include: informing of stakeholders on EC open consultations in energy and R&I sector and other relevant EU level activities via PANTERA platform, workshops, Desks; assisting the stakeholders from target countries to build stronger relations with other EU level organization and initiatives; educating the stakeholders and advertising the EC Transparency Register as an instrument for enhancing stakeholder involvement during the workshops.

In the content part of the review country profiles for six PANTERA Desks covering fifteen target countries were created. These aim at monitoring the progress of the target countries towards the EU objectives and national 2020/2030 targets, and structure countries' specific information from various reference sources. Furthermore, country profiles provide information on each country's specific shortcomings for further detailed gap analysis in the frame of PANTERA process and underline open topics for further discussion with national stakeholders within the PANTERA workshops and Desks.

## V. CONCLUSION

Although in its initial stage of development the PANTERA project has already set the main objectives, approach and steps ahead needed for strengthening the research and innovation activities in the field of smart grids, flexibility, storage and local energy systems. Putting a special focus on the Balkan region where highest potential for improvements is present the first PANTERA workshop in Sofia, Bulgaria was organized. The first results confirm the efficiency of the approach and indicate the main challenges present as well as space for future improvement.

## VI. FUTURE WORK

The next PANTERA workshop entitled "Ireland's Smartgrid, Energy Storage and Local Energy Systems Landscape: Research & Innovation Roadmap" will take place in Dublin, Ireland on 02.12.2019. It will investigate the opportunities and challenges for research and innovation in Smart Grids, Energy Storage and Local Energy Systems in Ireland. It also aims to support local organization in Ireland to facilitate further R&D efforts in the Smart Grids domain.

It is important to mention that the process of contacting stakeholder will continue through the whole duration of the PANTERA project and will be especially exploited in coincidence with the workshops organization.

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