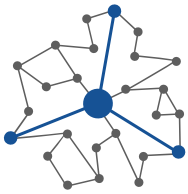

IRPWind

Integrated Research Programme
on Wind Energy

Project acronym: **IRPWIND**
Grant agreement nº 609795
Collaborative project
Start date: 01st December 2013
Duration: 4 years

Report on working networks, including recommendations on future research infrastructure and selected joint experiments

Work Package 3 – Deliverable 3.6

Lead Beneficiary: CENER
Delivery date: 22 October 2015
Dissemination level: PU

The research leading to these results has received funding from the European Union Seventh Framework Programme under the agreement 609795.

Name	Organisation
Felix Avia	CENER
Antonio Ugarte	CENER
Søren Knudsen	DTU

Document Information

Version	Date	Description			
			Prepared by	**Reviewed by**	**Approved by**
2	22 October 2015	**Name**	Felix Avia	Søren Knudsen	Antonio Ugarte

Contents

1. Executive Summary

One of the main objectives of WP3 of the IRPWIND project is promoting alignment of European wind research infrastructures and its effective joint use. The promotion will be provided through the creation of awareness about existing facilities and their specific characteristics, the application of common and transparent access procedures for experiment and facility selection and the required support both for the host and the guests. Synergy and effectiveness will be derived from networking for data and exchange of best practices.

This will, Europe-wide, lead to a more effective use of assets and better support of national R&D efforts, which are alignment to a European strategy as required by the SET-Plan and as outlined in the EERA yearly Startegic Action Plan (SAP).

First Task of WP3 is the creation of Networks of Research Infrastructures. Sharing and joint work are expected to create synergy and effectiveness or value of future results. The overall objectives of this task are:

- Promote the use of facilities for precompetitive research
- Provide trans-national access to facilities both to the research community and possibly also to industry
- Create best practices and protocols
- Develop a joint access scheme based with functionality to disseminate and handle data management.
- Run joint training and research programs.

The networking groups will provide recommendations on research experiments and new European research facilities that will promote integration of national research and strengthen the European research capability.

During the first year of IRPWIND project three Networks were created for the following research facility types:

- Research Wind Turbines for aerodynamics and loads study
- Wind Tunnels for wind energy research.
- Testing Facilities for Grid integration

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2. Introduction

The IRPWIND Work Package 3 (WP3) “Research Infrastructures” has the general objective of promoting alignment plus focusing of national research activities through joint experiments carried out in European research facilities and its effective joint use. WP3 specific objectives are:

- ✓ Raising and optimizing the use of EU Research Infrastructures (RI)
- ✓ Improving efficiency and synergy by sharing and networking RI
- ✓ Promoting alignment of member states (MS) research activities through joint experiments carried out in EU

The promotion will be provided through the creation of awareness about existing facilities and their specific characteristics, the application of common and transparent access procedures for experiment and facility selection and the required support both for the host and the guests. Synergy and effectiveness will be derived from networking for data and exchange of best practices.

By doing this, the joint use of European research facilities shall be carried out in a strategically focused and coordinated way, in which selected nationally operated facilities are employed to run specific high value carefully designed and chosen experiments, to ultimately support coordinated joint research nationally supported actions. This will, Europe-wide, lead to a more effective use of assets and better support of national R&D efforts that are alignment to a European strategy, as required by the SET-Plan.

Most large research facilities have been promoted by single MS and are operated by institutes or universities also financed mainly by MS. This creates a scatter picture of available facilities in Europe which brings a lesser effective use of their capabilities and a less useful European investment effort than possible. Although they get used in collaborative projects, the most of its time is being devoted to national activities not necessarily matching the needs of Europe. This causes that they do not bring as much value as possible to European joint efforts.

Tasks of the WP3 Research Infrastructures are:

- Task 3.1 “Networking of RI”
- Task 3.2 “Experiments selection and supported access to facilities”

First Task is the creation of Networks of Research Infrastructures. Sharing and joint work are expected to create synergy and effectiveness or value of future results.
The first Networks should be created for the following priority research facility types:

- Research Wind Turbines for aerodynamics and loads study
- Wind Tunnels for wind energy research.
- Testing Facilities for Grid integration

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The participants applicants must be EERA JP Wind Energy member having research facilities on the types selected. No financial support it is provided from the IRPWIND to finance the work associated to the Networks.

These networks were etsblished during the first year of the IRPWIND. In 2016 it is expected that a network on the European WindScanner Facility will be etsblished. This network will be based on the efforts done and partners involved in the ESFRI FP7 Preparatory Project, but it will be open for EERA JP Wind members. Other networks might also be established later on.

3. Procedure for the Networks Creation

The overall objectives of this task are:

- Promote the use of facilities for precompetitive research
- Provide trans-national access to facilities both to the industry and research community
- Create best practices and protocols
- Develop a joint access scheme based with functionality to disseminate and handle data management.
- Run joint training and research programs.

The procedure for the networks creation has the following activities:

- Request of Expression of Interest (EoI): EoI will be requested to IRPWIND and EERA members and candidate members.
- Establishment of the initially three networks: According to the EoI's received, the networks will be created.
- Appointment of the Core Group (CG): The Work Package Coordinator (WPC) will call a core group to set-up the working team. This CG will configure the Working Group (WG) composition and dedication as well as output required.
- The WG will provide recommendations on research experiments and new European research facilities that will promote integration of national research and strengthen the European research capability.
- Review of Results. The coordinator will evaluate the dynamics and results of the different working networks.

Next table shows the agenda for the first year of this task:

- Plan presentation and approval …….. 8th March 2014
- EOI request ……. 15th April - 30th April 2014
- Preparation and Establishment of Networks …….. 1st May – 31st October 2014
- Appointment of Core Group …….. 15th November 2014

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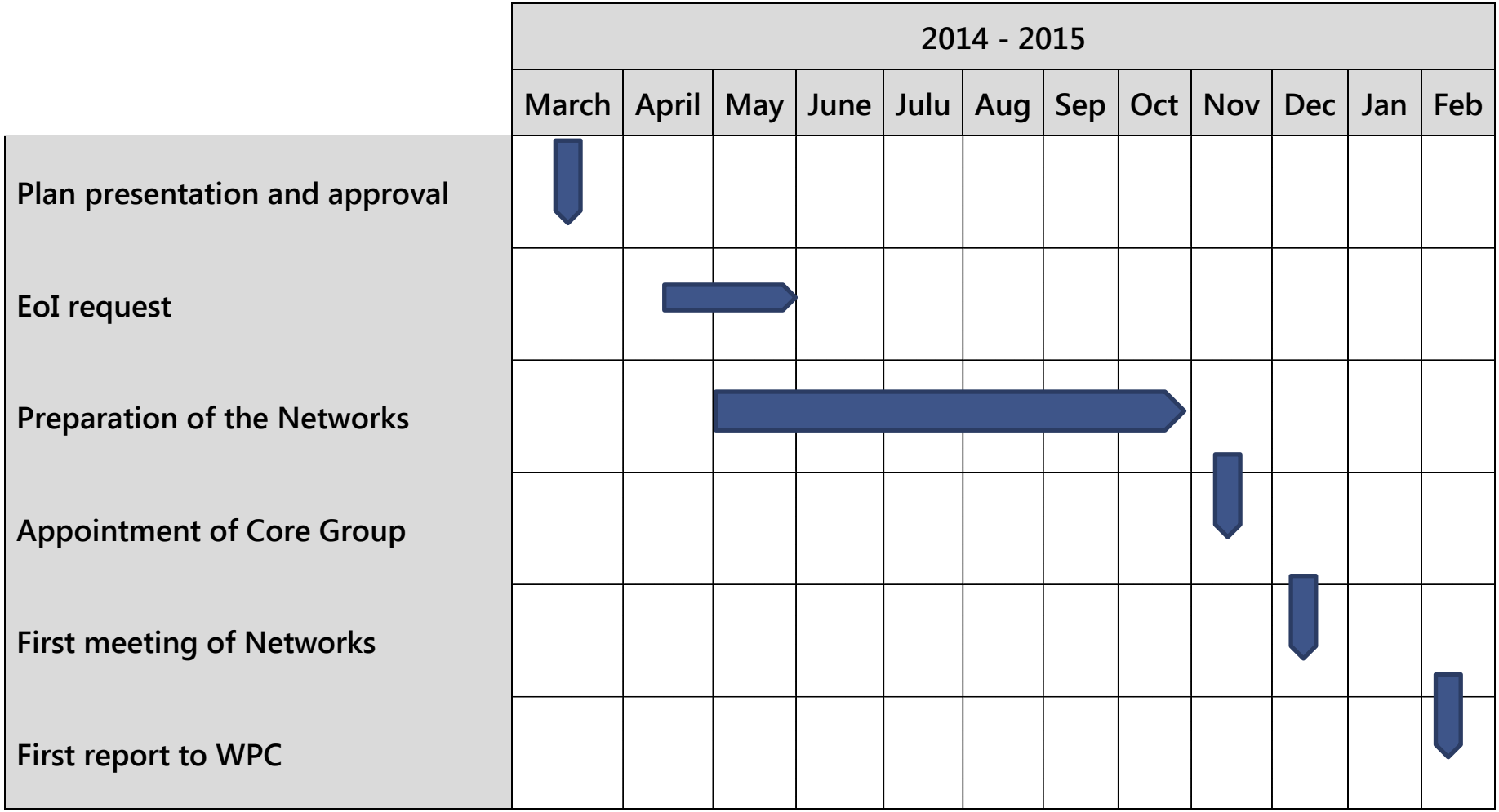
- First meeting of Networks ……. 15th December 2014
- First report to WPC …… 15thFebruary 2015

Supported by:



Supported by:

4. Establishment of the Networks

EoI's were requested in May 2014 to IRPWIND and EERA JP Wind members and candidate members to participate in the Networks Group. In Annex I you will find the template created for the EoI and sent to the EERA JP Members.

In total seven participants are interested to participate in the Research Wind turbines Network, of which three (CRES, CENER and CATAPULT) are onshore and the other four offshore.

For the network of Wind Tunnels for wind energy research for the time being there are six participants (two of them are in construction).

Last for the network of Testing Facilities for Grid integration, seven centers have expressed their interest to participate in this Network.

All the networks are expected to grow in the coming years and additional networks might be set up.

Following tables list the centers participating in the three networks.

Research Wind Turbines		
ORGANIZATION	COUNTRY	Contact
BERA – Belgian Energy Research Aliance	BELGIUM	Prof. Dr. Ir. Christof Devriendt
ForWind – Center for Wind Energy research	GERMANY	Dr. Stephan Barth
CRES – Centre for Renewable Energy Sources and Saving	GREECE	Fragiskos Mouzakis
NTNU –Norwegian University of Science and Technology	NORWAY	Michael Musculus & Jan Onarheim
SINTEF Energy Research	NORWAY	Karl Merz
CENER – Spanish National Research Centre for Renewable Energies	SPAIN	Antonio Ugarte
Offshore Renewable Energy Catapult	UK	Dr. Chong Ng

Supported by:

Wind Tunnels		
ORGANIZATION	COUNTRY	Contact
DTU – Technical University of Denmark	DENMARK	Christian Bak
ForWind – Center for Wind Energy research	GERMANY	Dr. Stephan Barth
CIRIVE – Politecnico di Milano Wind Tunnel	ITALY	Prof. Alberto Zasso
Delft University of Technology	NETHERLANDS	Carlos Simao Ferreira, Nando Timmer
NTNU – Norwegian University of Science and Technology	NORWAY	Prof. Lars Saetran
METUWIND – Center for Wind Energy	TURKEY	Prof. Dr. Oguz Uzol

Testing Facilities for Grid Integration		
ORGANIZATION	COUNTRY	Contact
Delft Univ. Of Technology	NETHERLANDS	Henk Polinder
SINTEF Energy Research	NORWAY	Ole Christian Spro
IREC – Catalonia Institute for Energy Research	SPAIN	Dr. Oriol Gomis-Bellmunt
CIRCE – Research Centre for Energy Resources and Consumption	SPAIN	Miguel García-Gracia
TECNALIA – Research & Innovation	SPAIN	Susana Apiñániz Germán Perez
University of Strathclyde	UK	Prof. William Leithead Dr. Olimpo Anaya-Lara
Offshore Renewable Energy Catapult	UK	Dr. Chong Ng

Supported by:

5. Research Wind Turbines Network

The objective is create a network of existing Research Wind Turbine Facilities (RWTF) owned and operated by the key Europeans research organizations involved in wind energy research.
RWTF serve as a platform to develop and support the basic understanding of wind turbines by using simulation tools, design basis and standards, while developing new concepts. Normally researchers only has limited or no access to commercial wind turbines. Therefore the largest public research organizations own different research wind turbines, allowing researchers to have easy, unfettered and "non-conditional" access to fiddle with a wind turbine. This is essential for research but also education. The proposal is to connect these institutional owned Research Turbines together in a European network and make them available also for much larger group of researchers.
According with the available information on existing research wind turbine facilities owned by EERA members, the following members have been identified as partners in the network:

- BERA - Belgian Energy Research Aliance
- ForWind - Center for Wind Energy research
- CRES - Centre for Renewable Energy Sources and Saving
- NTNU -Norwegian University of Science and Technology
- SINTEF Energy Research
- CENER – Spanish National Research Centre for Renewable Energies
- Offshore Renewable Energy Catapult

In the following subparagraphs is included information about the technical characteristics of the facilities including the contact persons.

Supported by:

Belgian Energy Research Aliance (BERA). Belgium
Contact: Prof. Dr. Ir. Christof Devriendt. cdevrien@vub.ac.be
Infrastruture Description: A VESTAS V90 windturbine installed in Belwind Offshore Wind Farm

Center for Wind Energy research (ForWind). Germany
Contact: Dr. Stephan Barth. stephan.barth@forwind.de
Infrastruture Description: Research Wind Frarm 2+1 multi-megawat WTs (2017) & "Semi" Research WT operated by Deutsche Wind Guard

Centre for Renewable Energy Sources and Saving (CRES). Greece
Contact: Dr. Fragiskos Mouzakis. mouzakis@cres.gr
Infrastruture Description: CRES Test Station is situated 100 km SE of Athens, in a complex terrain and currently comprises 3 commercial Wind Turbines (E40-500, NEG 48/750, V47-660) and a 100 m meteorological mast. Three additional Wind Turbine positions are reserved for repowering and new technology testing.

Norwegian University of Science and Technology (NTNU). Norway
Contact: Prof. Dr. Michael Musculus. michael.muskulus@ntnu.no
Prof. Dr. Jan Onarheim. jan.onarheim@ntnu.no
Infrastruture Description: It consists of a met-ocean mast and a floating wind turbine. The floating wind turbine is called FLEX-WT (Floating Experimental Wind Turbine). This is planned to be a commercial-model 225 kW pitch-regulated, three-bladed HAWT atop a floating platform. The turbine and platform will be heavily instrumented. An interface will allow for custom generator and pitch control strategies to be implemented.

SINTEF Energy Research. Norway
Contact: Mr. Karl Merz. karl.merz@sintef.no
Infrastruture Description: It consists of a met-ocean mast and a floating wind turbine. The floating wind turbine is called FLEX-WT (Floating Experimental Wind Turbine). This is planned to be a commercial-model 225 kW pitch-regulated, three-bladed HAWT atop a floating platform. The turbine and platform will be heavily instrumented. An interface will allow for custom generator and pitch control strategies to be implemented.

CENER. Spain
Contact: Mr. AntonioUgarte. augarte@cner.com
Infrastruture Description: The experimental wind farm in Alaiz has 6x5MW position in a complex gesography with Class IA wind. The farm has been provided with 4 measuring masts of 120 meters. Data at 4 height in 12 location is available. ???

Offshore Renewable EnergyCatapult. UK
Contact: Dr. Chong Ng. chong.ng@narec.co.uk
Infrastruture Description: ORE Catapult (Narec) is in the process of procuring a latest generation full size wind turbine nacelle (>5MW). This nacelle will be located in one of the nacelle test facility within the centre in Blyth, UK. a) With this, researchers will be able to gain access to a nacelle representative of the offshore turbines and its components without the need of expensive offshore logistic. b) Together with the cutting edge nacelle test rig (15MW), the 6 degree of freedom wind load simulation, allows any research

project/programme to simulate any loading condition in controlled manner, independent from the weather conditions and in accelerated way.

Supported by:

6. European Network of Wind Energy Tunnels

The objective is to link existing Wind Tunnels in Europe, which are developed and operated for wind energy research purposes mainly.
The objective is to create a network of existing Wind Energy Research Wind Tunnels today operating or being established at national level.
A coordinated effort within wind tunnels dedicated for wind energy in Europe will improve the efficiency of each wind tunnel and thereby extract research and development not only from other European countries, but Worldwide.
Wind tunnels are costly but a necessary instrument for the research community, but up until now this has mainly been used by the hosting institutions and local/regional partners. This project will make them available for other researchers. This action could help overcome this difficulty and open these wind tunnels to a much wider set of users.
According with the EoI received the folowing members have been identified as partners in the network:

- DTU - Technical University of Denmark
- ForWind - Center for Wind Energy research
- CIRIVE - Politecnico di Milano Wind Tunnel
- Delft University of Technology
- NTNU - Norwegian University of Science and Technology
- METUWIND - Center for Wind Energy

In the following subparagraphs is included information about the technical characteristics of the facilities including the contact person.

Supported by:

DTU - Technical University of Denmark
Contact: Mr. Christian Bak. chba@dtu.dk
Infrastruture Description: Based on e.g. the wind tunnel experience at DTU, with the DTU wind tunnel with closed test section dimensions 0.5m x 0.5m and maximum flow speed of 60m/s, with the VELUX wind tunnel with open test section dimensions of 3.4m x 3.4m and maximum flow speed of 40m/s and tests in international wind tunnels, a national research infrastructure is planned and is now in the design process to be finalized end 2015. The tunnel is a closed wind tunnel with test section dimensions H x W x L=2.2m x 3.3m x 10.0m, maximum flow speed of 105m/s and turbulence intensity at maximum 0.1%. The tunnel will be dedicated to wind turbine airfoil tests, where also the ability to carry out aeroacoustic tests will be possible

Politecnico di Milano Wind Tunnel (CIRIVE)
Contact: Prof. Alberto Zasso. alberto.zasso@polimi.it
Infrastruture Description: Low Speed / Boundary Layer Test Section of 14m x 4m with maximum wind velocity of 16 m/s and turbulence index <2% and High Speed / Low Turbulence Test Section is 4m wide, 3.84m high and 6m long

Delft University of Technology
Contact: Prof. Carlos Simao Ferreira. c.j.simaoferreira@tudelft.nl and Nando Timmer
Infrastruture Description: The following wind tunnels are available: Low Speed low turbulence Wind Tunnel (120m/s, test section area 1.25m*1.80m), Open Jet Facility (30m/s, 3meters diameter), Boundary layer Wind Tunnel (30 m/s, 1.5m*0.3m test section), Aeroacoustic Vertical Wind tunnel, several 0.6m*0.6m wind tunnels, water towing tank.

Norwegian University of Science and Technology (NTNU)
Contact: Prof. Lars Saetran. lars.satran@ntnu.no
Infrastruture Description: A 2x3x11 m test section closed return WT with 1000 km/h max speed equipped with balances for load on object measurements

METU Center for Wind Energy (METUWIND)
Contact: Prof. Dr. Oguz Uzol. uzol@metu.edu.tr
Infrastruture Description: METU Centre for Wind Energy operates several wind tunnels (WT).These includes several small to medium scale WT as well a large-scale multi-purpose WT that will be operational in the summer of 2015.

Center for Wind Energy research (ForWind)
Contact: Dr. Stephan Barth. stephan.barth@forwind.de
Infrastruture Description: A new turbulent windtunnel in Oldenburg that will be accessible for researchers in 2016. The WT is optimized for investigations on wind turbines models e.g. respect to wake effects or the flow field within wind farms

Supported by:

7. Network of Testing Facilities of Wind Turbines for Grid Integration

The objective is create a network of existing research wind turbine facilities of wind turbines for grid integration, owned and operated at national level by the key research organizations. Distributed generation labs provide the means to test wind turbines able to develop ancillary services off-grid before they are implemented into the grid. In that sense experimental R&D Wind Plants provide a controlled and well instrumented step prior to a full speed spread of the systems. Mobile labs are an essential part of the validation of designs since they provide evidence in real grid implementations.
According with the EoI received, the following members that have research wind turbine facilities of wind turbines for grid integration have been identified as partners in this network:

- Delft Univ. of Technology
- SINTEF Energy Research
- IREC - Catalonia Institute for Energy Research
- CIRCE - Research Centre for Energy Resources and Consumption
- TECNALIA - Research & Innovation
- University of Strathclyde
- Offshore Renewable Energy Catapult

In the following subparagraphs is included information about the technical characteristics of the facilities including the contact person.

Supported by:

Delft University of Technology
Contact: Dr. Henk Polinder. h.polinder@tudelft.nl
Infrastructure Description: DENLAB which is an autonomously operating renewable energy environment that meets the energy needs of 10 households by wind and solar energy and a combined heat and power system. The system has 12kW (120 m2) solar panels installed, 30kW wind power (simulated by an anemometer and a motor-generator set), 5.5kW CHP (combined heat and power; simulated by a motor-generator set), 100kWh energy storage (simulated by a bi-directional inverter) and a grid -connection.

SINTEF Energy Research
Contact: Mr. Ole Christian Spro. OleChristian.Spro@sintef.no
Infrastructure Description: The joint SmartGrid of NTNU and SINTEF is designed as a flexible structure where passive electrical components, electrical machines and power electronic converters up to 70 kVA power range can be tested. In addition a mobile test laboratory was recently added in the SINTEF portfolio, called DIP-Lab

IREC - Catalonia Institute for Energy Research. Spain
Contact: Dr. Oriol Gomis-Bellmunt. ogomis@irec.cat
Infrastruture Description: : IREC has laboratory facilities specifically developed for grid integration studies. Real storage systems (flywheel, super-capacitors and batteries), wind emulators (SCIG, DFIG, PMSG and Multiphase PMSG) and PEV charging point are integrated

CIRCE - Research Centre for Energy Resources and Consumption. Spain
Contact: Mr. Miguel García-Gracia. mggracia@fcirce.es
Infrastructure Description:

- The MEGHA (voltage dip tests mobile laboratory) electrical test system, acting as a mobile electric substation, makes it possible to carry out tests on wind turbine behavior when faced with 5MW voltage dips.
- QuEST Lab (Quality Test for Energy Systems Lab) is designed to test equipment up to 10MW (depending on network conditions) and also electrical networks up to 20 kV.
- RTDS (Real Time Digital Simulator) performs closed-loop real time simulations, which will allow enhancing and verifying algorithms and control devices.
- The Electrical Metrology Lab (LME-CIRCE) complies with all the specifications of the UNE-EN ISO/IEC 17025 regulations and received accreditation in 2007 for measurement tests in Wind Turbines and Distribution networks.
- The Renewable Energy Integration Lab consists of a micro-grid that includes four benches between 22 kW and 90 kW and energy storage systems based on supercapacitors and Ion-lithium batteries

TECNALIA - Research & Innovation
Contacts: Ms. Susana Apiñániz. susana.apinaniz@tecnalia.com and Mr. Germán Perez. german.perez@tecnalia.com
Infrastructure Description:

Supported by:

- THOR: Programmable grid to test wind power converters (Power 1,25 MW and up to 5 MW in the future).
- Electrical PTO Lab: Turbine emulator to simulate the mechanical output of a wind turbine

University of Strathclyde. UK
Contact: Prof. William Leithead. w.leithead@strath.ac.uk
Infrastructure Description: University of Strathclyde, Power Networks Demonstration Centre (PNDC)
The PNDC at Strathclyde is an environment for accelerated testing, demonstration and validation of existing and novel operation, control, protection and automation technologies aiming to facilitate the deployment of distributed generation and renewable energy.
In summary, the Centre consists of an outdoor compound containing overhead and underground 11 kV equipment, comprising pole- and ground-mounted transformers and substations with associated protection and control equipment.
There are test points at which devices to be demonstrated can be connected directly to the 11 kV network.
An LV network is also available, supplied via several transformers from the 11 kV system. The LV network can be loaded using a variety of programmable load banks, and contains points for connections of devices under test.
An industry-standard supervisory control and data acquisition (SCADA) system with control room, a real time power system simulator (RTDS), a large indoor LV laboratory and several other laboratories, along with comprehensive high-fidelity monitoring and data historian facilities are also available and complement the primary system hardware existing at the centre.

Offshore Renewable EnergyCatapult
Contact: Dr. Chong Ng. chong.ng@narec.co.uk
Infrastructure Description: HV development laboratories – for generator/system insulation systems development.
Live environmental chamber for prototype system development (chamber is 1x1x1 m). Can get power (HV and current) into the chamber.
Flexible three phase 415V LV power systems that can be used for a) island system testing (using generators as the source, or through isolating power transformers).
Testing/demonstrating up to 100kW levels can be achieved in this manner. b) utilising the CPTC drives and motors to drive a generator with up to 100kW input power. The system allows grid connection for power recirculation or through load banks to dissipate the energy generated. Grid conformance testing on generators is possible with the G59 test equipment in the facility.
An 11kV system is available and can potentially be configured to accommodate different test specimens.
Within the CPTC HV Test Lab, a vibration test rig is available to test loads up to 500kg for endurance and accelerated ageing programmes. We have used this before on compliance testing for sensors and measurement kit for offshore wind deployment.
HV development laboratories – for generator/system insulation systems development.
Live environmental chamber – for prototype system development (chamber is 1x1x1 m).
Can get power (HV and current) into the chamber.

Supported by:

Flexible three phase 415V LV power systems that can be used for a) island system testing (using generators as the source, or through isolating power transformers). Testing/demonstrating up to 100kW levels can be achieved in this manner. b) utilising the CPTC drives and motors to drive a generator with up to 100kW input power. The system allows grid connection for power recirculation or through load banks to dissipate the energy generated. Grid conformance testing on generators is possible with the G59 test equipment in the facility.
An 11kV system is available and can potentially be configured to accommodate different test specimens.
Within the CPTC HV Test Lab, a vibration test rig is available to test loads up to 500kg for endurance and accelerated ageing programmes. We have used this before on compliance testing for sensors and measurement kit for offshore wind deployment.

8. Appointment of the Core Group Creation

After the establishment of three networks, the coordinator has to establish a Core Group (CG) to set-up the working team. This core will configure the working group composition and dedication, as well as output required.
The working groups will provide recommendations on research experiments and new European research facilities that will promote integration of national research and strengthen the European research capability.
The responsibilities of the Core Group are:

- Selection of the coordinator to be proposed for each network
- Set of topics be dealt with, general objectives and meeting planning
- Supervision and assistance to the coordinator of its network
- Co-decide to close networks once objectives are matched.

The PC requested to the centers that expressed their interest in participating in the networks if they were interested in becoming members of the Core Group. According with the answers received the PC has selected the following persons for the CG:

- Dr. Stephan Barth, Center for Wind Energy research (ForWind), Germany
- Dr. Oriol Gomis-Bellmunt, Catalonia Institute for Energy Research (IREC), Spain
- Dr. Chong Ng, Offshore Renewable EnergyCatapult, UK

Supported by:

9. First Meeting of Networks

The first meeting of networks of the project still has not been realised. The first call for the meeting was done in February2015, proposing the date of 26 of February. Unfortunately was not possible to reach a minimum numbers of attenders.
A second call was made proposing the date of March, in parallel with the EWEA Offshore 2015 Conference. In Annex II is presented the agenda for this meeting. One again we did not reach quorum from attenders.
There are several reasons that are clearly influencing this situation. However it is clear that the economic crisis affecting many countries makes it more difficult to get funds to attend these meetings, and unfortunately there is not budget available in this WP to support the cost associated to attend the meetings. On the other hand the profusion of events in the sector difficult to select the date to avoid agendas overlaps.
So, it was decided to explore options for a Web-based Networks Meetings so to facilitate participation. Physical meetings, where a proper atmosphere is created, facilitate the exchange of information between the participants. The main conditions for creating this atmosphere are:

- Participants continuously see their colleagues and capture the feelings produced during presentations and discussions.
- Casual discussions that occur during coffee breaks and lunches are crucial to creating the atmosphere of the meeting.
- The organization of meetings with virtual participation has the following disadvantages:
- Forces the host to have the adequate systems to manage and organize such meetings.
- Difficult to ensure the number of people who listen to the presentations.
- Difficulty in maintaining attention for large meetings
- Create a certain distrust of the speakers that have no direct input to the feelings of virtual participants

However it was decide to make a call for a virtual Network Meeting for April 2015.

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10. Future Work

In the first meeting of EERA RI Networks will be defined the work program for the second year. According with the Annex I of IRPWIND, the activity of Networks for the second year of the project should be focused in appointment of the Working Groups that will elaborate the recommendations on future research infrastructure and joint experiments.
The work package coordinator, together with the Core Group and Working Groups will define KPIs for this WP. For the time being there is a list of KPIs that are under discussion:

- Number of Networks created
- Number of participants in the Network
- Number of meetings of the Network
- Number of tests carried out at the facilities of each IRPWIND participant
- Number of joint tests carried out by two or more IRPWIND participants
- Total duration (days) of joint tests carried out by two or more IRPWIND participants
- Number of cross tests carried out by two or more IRPWIND participants
- Total duration (days) of cross tests carried out by two or more participants
- Number of jointly planned new research facilities at national
- Number of jointly planned new research facilities at international level
- Number of Memoranda of Understanding (MoU) and agreements on the joint use and development of research facilities
- Joint research proposal prepared (by 3 or more partners) and submitted

The main constrain that makes difficult to get useful outputs is that there is not budget available in this WP to support the cost associated to these activities.

11. Links between this task and task 3.2 Experiments selection and supported access to facilities"

The established networks will be instrumental in defining and developing a limited number of relevant, joint experiments where one or more of the Research Infrastructures will be used. Both Research Infrastructure owners and users should be involved in the development and implementation of the experiments. Data from the experiments should benefit ongoing or planned national and/or European projects and results and data should be openly shared with EERA JP Wind members. An ambitious scheme for providing open access will be among the criteria, when deciding on which experiments to implement.
In order to ensure transparency an open call will be issued among all EERA JP Wind members to gather all relevant ideas and input. The networks will shape the scope of the calls and also subsequently evaluate the input. The final decision on which experiments to conduct will be taken by the Management Board based on the recommendations from the networks.
The exact rules and conditions will be specified when issuing the call.

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ANNEX I: Call for Expressions of Interest for participation on the Networks created under the Wind IRP

9th June 2014

CALL FOR EXPRESION OF INTEREST to participate in the FUTURE NETWORKS within the Integrated Research Program on Wind Energy (IRPWIND)

Call opens: 9th June2014
Deadline for submitting the applications: 20th June 2014
A call for Expressions of Interest is open in the frame of WP3_ Research Infrastructures of the EERA Wind Integrated Research Program (IRPWIND).
The Research Infrastructures scheme within the IRPWIND has the general objective of promoting alignment plus focusing of national research activities through joint experiments carried out in European research facilities and the effective joint use of European research facilities.
The focus and alignment will be gained by means of:

- Creation of access protocols to selected European research facilities and definition of prioritization procedures for selecting the most urgent and relevant experiments in the European context.
- Implementation of a technical committee to select the experiments that will benefit the most national research activities and promote cooperation and alignment and to match experiment with the most appropriate European research facility.
- Funding of selected strategic joint experiments, including infrastructure use, at chosen national facilities supporting national R&D efforts

Frist action of WP3 is the creation of Networking's of Research Infrastructures. Sharing and join working are expected to create synergy and effectiveness or value of future results.
Among the topics to deal with the following are expected:

- Sharing of best practices, protocols or standards
- Proposal of experiments
- Proposal of new or reinforcements of facilities.

Networks will be created for the following priority research facility types:

- Research Wind turbines for aerodynamics and loads study;
- Wind energy tunnels
- Grid integration

EOI's are requested to IRPWIND and EERA Wind JP Members and candidate members to participate in the Networks Group. No financial support it is provided from the IRPWIND to finance the work associated to the Networks creation.
The EOI should contain:

Supported by:

- Representative name and position;
- Interest to be participant, member of the core group and coordinator of the network;
- Background of representative and institute as well as associated research infrastructures;
- Topics to be addressed by the network

The applicants must be EERA JP Wind Energy member having research facilities on the types selected.
The coordinator will call a core group to set-up the working team based on the EOI's received. This core will configure the working group composition and dedication as well as output required.
The working groups will provide recommendations on research experiments and new European research facilities that will promote integration of national research and strengthen the European research capability.
The responsibilities of the different actors are:

- Project Coordinator (PC)
  - Launch the process and maintain its dynamics;
  - Assist the Coordinator of the network;
  - Co-decide to close networks once objectives are matched;
  - Propose new networks during the period;
  - Consolidate and submit reports to the IRPWIND coordinator.
- Core Group (CG)
  - Selection of the coordinator to be proposed;
  - Set of topics be dealt with, general objectives and meeting planning;
  - Supervision and assistance to the coordinator of its network;
  - Co-decide to close networks once objectives are matched.
- Coordinator
  - Manage meetings;
  - Lead the meetings of the group;
  - Coordinate writing of Results;
  - Report for deliverables;

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ANNEX II Agenda for First meeting of EERA RI Networks

Date: 24th March 2015

Venue: National Renewable Energy Centre (CENER)

Ciudad de la Innovación 7, 31629 Sarriguren (Navarra) Spain

AGENDA

Tuesday 24th March

09:00 Introduction by EERA IRP WP3 Coordinator

09:20 Recognition of Participants

09:30 General session:

- Information on the EOI Process
- Members of Network
- Mandate and topics for networks
- Composition of Core Group
- Appointment of coordinator

●*11:00 Coffee Break*

11:30 Parallel sessions (11:30-13:30):

●*13:30 Lunch*

15:00 Conclusions from the Parallel Sessions.
16:30 Work program for next year
16:50 AOB

17:00 End of the meeting

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1st Session: Research Wind Turbines Infrastructures
Chairman's: Dr. Stephan Barth and Dr. Michael Musculus

- Research Wind Frarm 2+1 multi-megawat WTs (2017) & "Semi" Research WT operated by Deutsche Wind Guard
- *Dr. Stephan Barth ForWind - Center for Wind Energy research*

- FLEX-WT (Floating Experimental Wind Turbine).
- *Dr. Michael Musculus, DLR, NTNU -Norwegian University of Science and Technology*

- CRES Test Station
- *Mr. Fragiskos Mouzakis, CRES - Centre for Renewable Energy Sources and Saving*

- ALAIZ Experimental Wind Farm
- *Mr. Antonio Ugarte, CENER – Spanish National Research Centre for Renewable Energies*

- Offshore Renewable Energy Catapult
- *Dr. Chong Ng - Offshore Renewable Energy Catapult*

- Belwind Offshore Wind Farm
- *Prof. Dr. Ir. Christof Devriendt- BERA - Belgian Energy Research Aliance*

2nd Session: Wind Energy Tunnels
Chairmans: Prof. Alberto Zasso and Mr. Carlos Simao Ferreira

- Politecnico di Milano Wind Tunnel
- *Prof. Alberto Zasso, CIRIVE - Politecnico di Milano Wind Tunnel*

- Delft University Wind Tunnels
- *Mr. Carlos Simao Ferreira, Delft University of Technology*

- DTU Wind Tunnels
- *Mr. Christian Bak, DTU - Technical University of Denmark*

- Turbulent windtunnel in Oldenburg

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- *Dr. Stephan Barth, ForWind - Center for Wind Energy research*

- Norwegian University Wind Tunnel
- *Prof. Lars Saetran, DLR, NTNU -Norwegian University of Science and Technology*

- METU Centre Wind Tunnels
- *Prof. Dr. Oguz Uzol, METUWIND - Center for Wind Energy*

3rd Session Testing Facilities of Wind Turbines For Grid Integration
Chairmans:Dr.Chong Ng and Dr. Oriol Gomis-Bellmunt

- HV development laboratories
- *Dr. Chong Ng - Offshore Renewable Energy Catapult*

- IREC laboratory facilities
- *Dr. Oriol Gomis-Bellmunt, IREC - Catalonia Institute for Energy Research*

- DENLAB
- *Mr. Henk Polinder , Delft Univ. of Technology*

- The MEGHA
- *Mr. Miguel García-Gracia, CIRCE - Research Centre for Energy Resources and Consumption*

- SmartGrid of NTNU and SINTEF
- *Mr. Ole Christian Spro, SINTEF Energy Research*

- THOR and Electrical PTO Laboratories
- *Ms. Susana Apiñániz and Mr. Germán Perez, TECNALIA - Research & Innovation*

- Power Networks Demonstration Centre
- *Prof. William Leithead, University of Strathclyde*

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