NOWITECH
Development of EU offshore wind R&D strategies and projects through EERA and TPwind

www.nowitech.no

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NOWITECH in brief

- A joint pre-competitive research effort
- Focus on deep offshore wind technology (+30 m)
- Budget (2009-2017)
  EUR 40 millions
- Co-financed by the Research Council of Norway, industry and research partners
- 25 PhD/post doc grants
- Key target: innovations reducing cost of energy from offshore wind
- Vision:
  - large scale deployment
  - internationally leading

Research partners:
- SINTEF ER (host)
- IFE
- NTNU
- MARINTEK
- SINTEF ICT
- SINTEF MC

Industry partners:
- CD-adapco
- DNV GL
- DONG Energy
- EDF
- Fedem Technology
- Fugro OCEANOR (TBC)
- Kongsberg Maritime
- Rolls Royce SmartMotor
- Statkraft
- Statnett
- Statoil

Associated research partners:
- DTU Wind Energy
- Michigan Tech Uni.
- MIT
- NREL
- Fraunhofer IWES
- Nanyang TU
- Uni. Strathclyde
- TU Delft

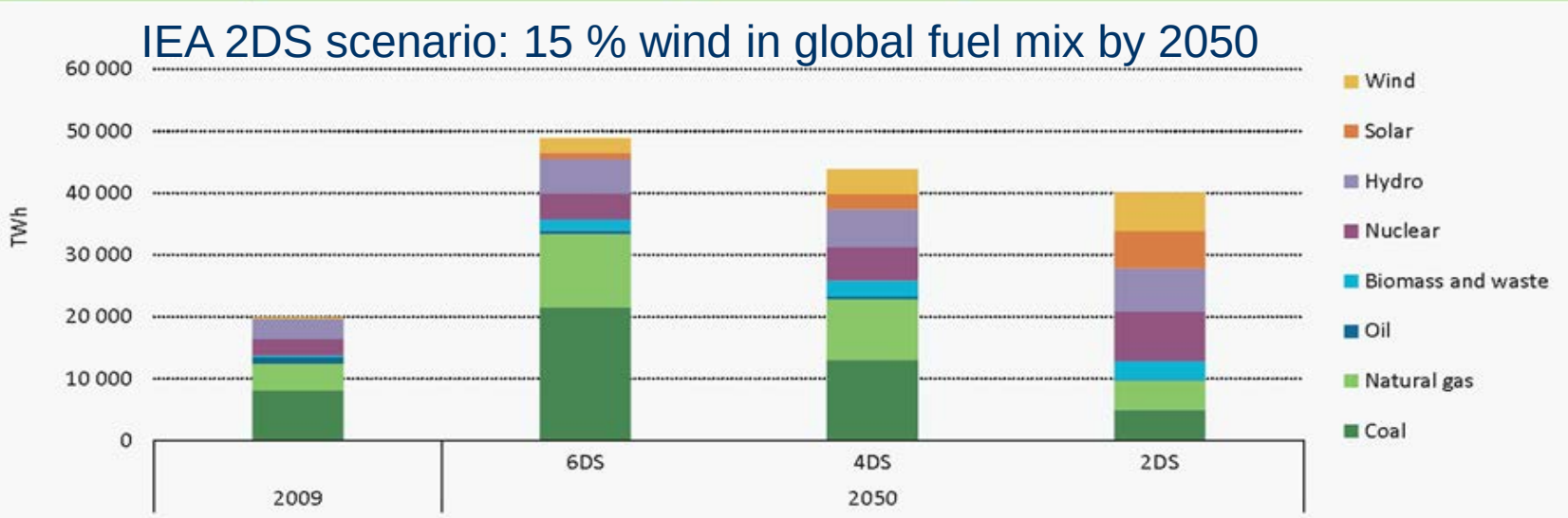
Associated industry partners:
- Devold AMT AS
- Energy Norway
- Enova
- Innovation Norway
- NCEI
- NORWEA
- NVE
- Wind Cluster Mid-Norway

A large growing global market for offshore wind

- Battle climate change
- Security of supply
- Industry value creation

Stern Review (2006):
..strong, early action on climate change far outweigh the costs of not acting.

Figure 1.10 Fuel mix in electricity generation, by scenario

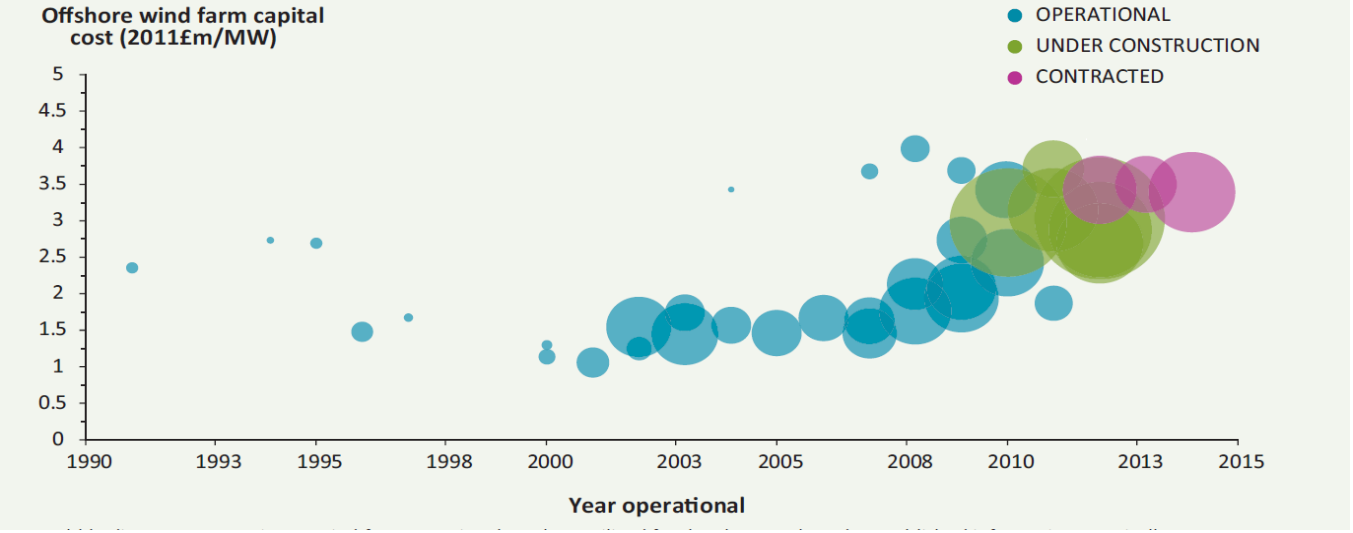


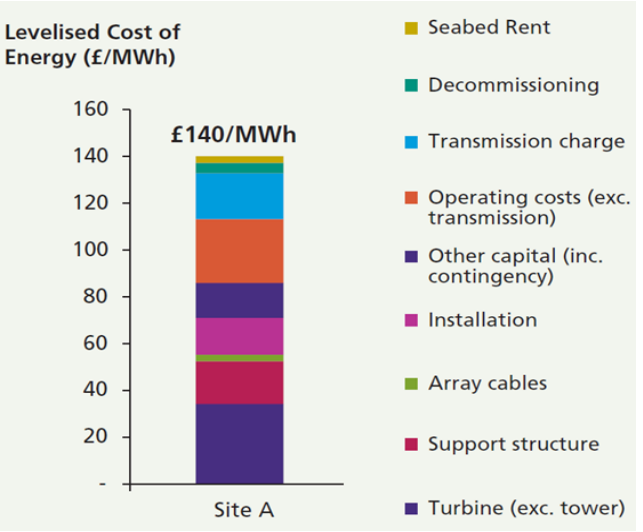
Key point *Diversification of fuels and increased use of low-carbon sources in the 2DS achieves a high degree of decarbonisation in electricity generation by 2050.*

Copy from IEA Energy Technology Perspectives 2012

2012 installed wind:
Total 282 GW incl 5 GW offshore
2050 2DS wind:
6000 TWh/3000 h = 2000 GW
Required annual installations to reach 2DS goal for wind:
2000 GW / 40 y = 50 GW/y
+ end of lifetime replacements

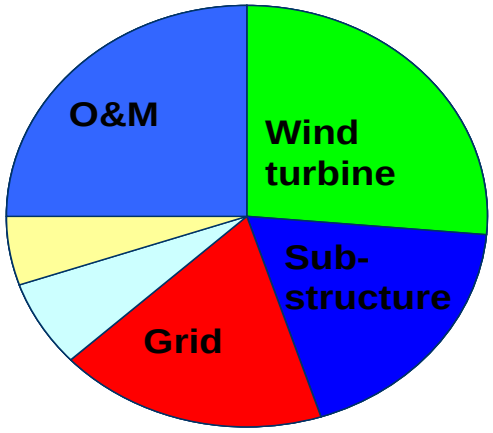
Main challenge: Reduce Cost of Energy





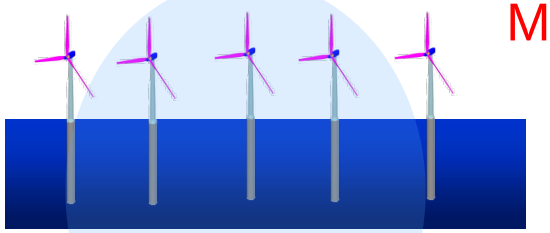
Graphics from: The Crown Estate (2012) Offshore wind cost reduction pathways study

From R&D to innovations to cost reductions



NOWITECH focus area

Market impact



Pilot implementation

Prototype

Lab testing

Knowledge

Idea

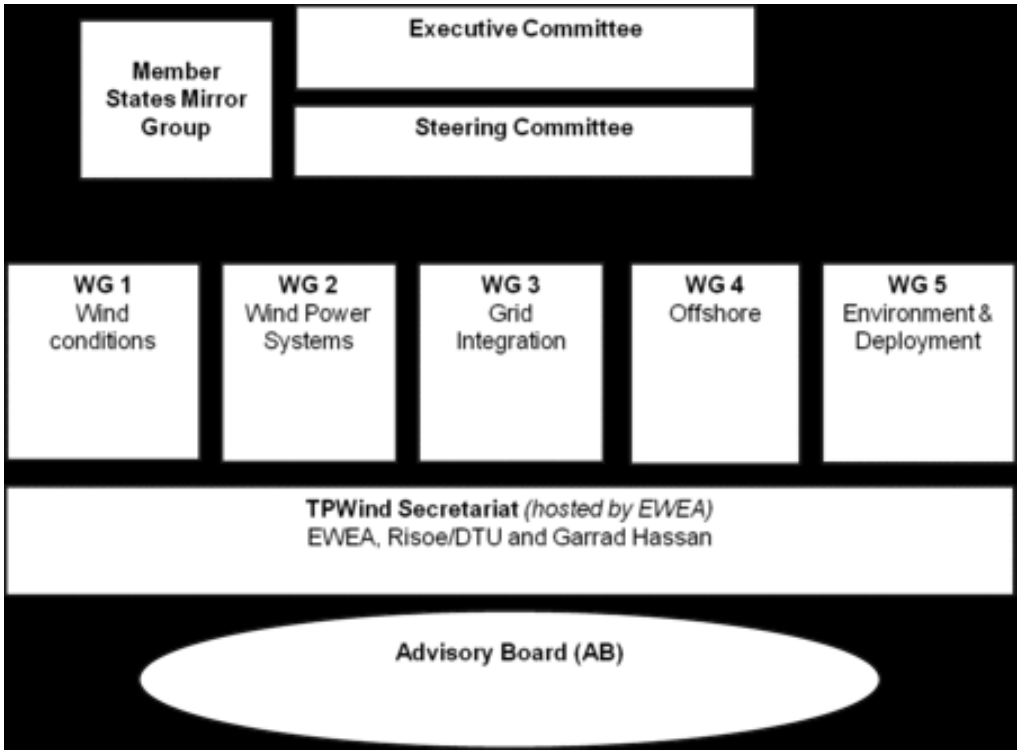
Industry driven development

0 → 4 → 10 → TRL

TPwind - www.windplatform.eu

"A dedicated voice for Technology and Policy R&D, speaking for the wind energy sector and its stakeholders"

- established in 2005/2006
- a permanent forum composed of more than 180 wind energy experts representing the EU wind power sector (industry and R&D community).

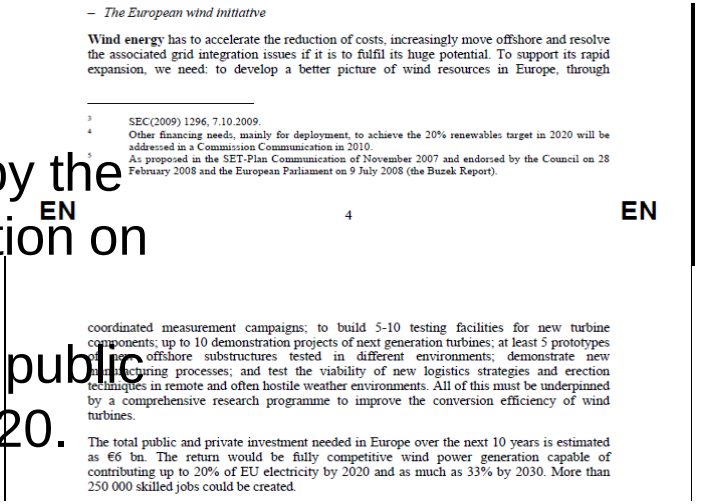


TPwind - www.windplatform.eu

Main deliverables so far:

- The “Strategic Research Agenda / Market Deployment Strategy” (SRA/MDS), published by TPWind in 2008, which outlines the R&D challenges faced by the European wind energy sector. This publication quickly became a reference text in the sector

- The “European Wind Initiative” (EWI), published by the European Commission in 2009 in its Communication on “Investing in the Development of Low-Carbon Technologies” (COM(2009) 519) suggesting total public and private R&D investment of €6 bn for 2010-2020.



– *The European wind initiative*

Wind energy has to accelerate the reduction of costs, increasingly move offshore and resolve the associated grid integration issues if it is to fulfil its huge potential. To support its rapid expansion, we need: to develop a better picture of wind resources in Europe, through

3 SEC(2009) 1296, 7.10.2009.
4 Other financing needs, mainly for deployment, to achieve the 20% renewables target in 2020 will be addressed in a Commission Communication in 2010.
5 As proposed in the SET-Plan Communication of November 2007 and endorsed by the Council on 28 February 2008 and the European Parliament on 9 July 2008 (the Buzek Report).

EN 4 EN

coordinated measurement campaigns; to build 5-10 testing facilities for new turbine components; up to 10 demonstration projects of next generation turbines; at least 5 prototypes of new offshore substructures tested in different environments; demonstrate new manufacturing processes; and test the viability of new logistics strategies and erection techniques in remote and often hostile weather environments. All of this must be underpinned by a comprehensive research programme to improve the conversion efficiency of wind turbines.

The total public and private investment needed in Europe over the next 10 years is estimated as €6 bn. The return would be fully competitive wind power generation capable of contributing up to 20% of EU electricity by 2020 and as much as 33% by 2030. More than 250 000 skilled jobs could be created.

TPwind - www.windplatform.eu

TPwind activities 2011 – 2013

2011:

- Develop the EWI 2013 – 2015 Implementation Plan
- Prepare EWI 2012 Work Programme
- Renew the Steering Committee

2012:

- Update the SRA/MDS to be published ultimo 2013
- Prepare EWI 2013 Work Programme

2013

- Update the SRA/MDS to be published ultimo 2013
- Develop the EWI 2016 – 2018 Implementation Plan
- Prepare EWI 2014 Work Programme

TPwind – new SRA & call for SC members

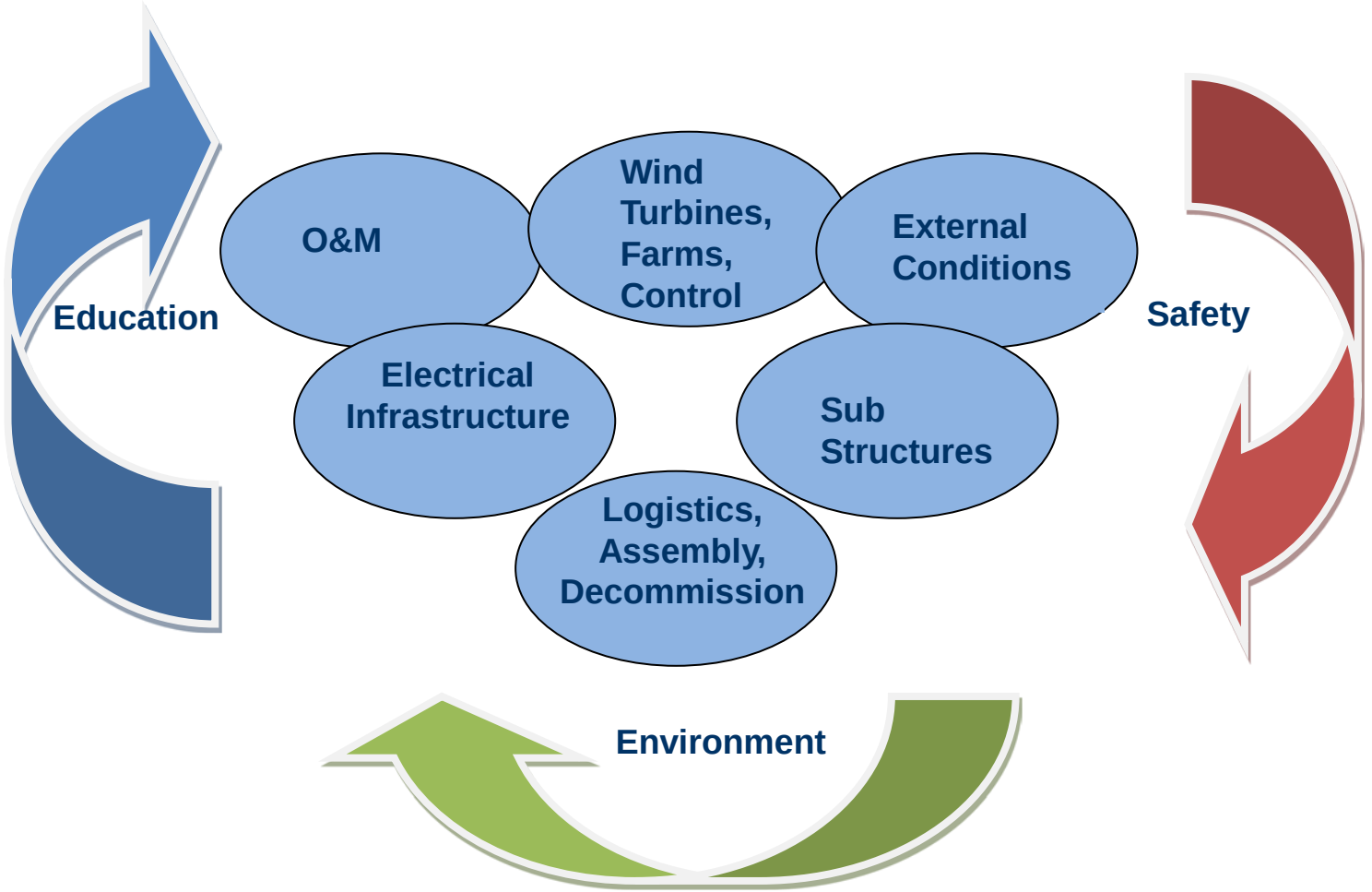
http://www.windplatform.eu/fileadmin/ewetp_docs/Documents/reports/TPWind_SRA.pdf

TPWind call for expression of interest to select new Steering Committee members is open. The deadline for applications is 18 May 2014

http://www.windplatform.eu/

European Wind Energy Technology Platform

TPwind – new SRA offshore topics



EERA JPwind - www.eera-set.eu

"Coordinating energy research for a low carbon Europe"

- established in 2009/2010.
- a permanent forum with 13 full participants & 23 associated participants from 14 countries, and increasing….
- committed resources 200 py

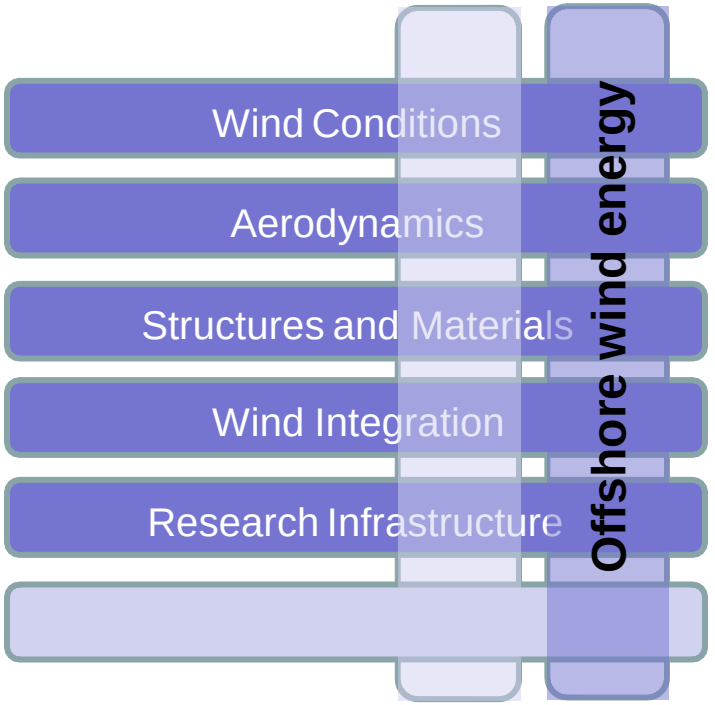
The programme vision is:

- to provide strategic leadership for the scientific–technical medium to long term research
- to support the European Wind Initiative and the Technology Roadmap's activities on wind energy, and on basis of this
- to initiate, coordinate and perform the necessary scientific research.

EERA JPwind - www.eera-set.eu

The joint programme comprises 7 SPs:

- Wind Conditions. Coordinated by Risø DTU in Denmark.
- Aerodynamics. Coordinated by ECN in the Netherlands.
- Offshore Wind Energy. Coordinated by SINTEF in Norway.
- Grid Integration. Coordinated by FhG IWES in Germany.
- Research Facilities. Coordinated by CENER in Spain.
- Structures and Materials. Coordinated by CRES, Greece
- (New) Socio-economic aspects. Coordinated by DTU, Denmark



SP Offshore Wind Energy

Overall objective

Pre-competitive research laying a scientific foundation for the industrial development of more cost effective offshore wind farms and enabling large scale deployment at any seas

SP Offshore Wind Energy

Participants

AAU (DK)	IFE (NO)
BERA (BE)	IK4 Allliance (ES)
CENER (ES)	IREC (ES)
CIEMAT (ES)	LNEG/INETI (PT)
CIRCE (ES)	METUWIND (TR)
CMR (NO)	NTNU (NO)
CNR (IT)	Politecnico di Milano (IT)
CRES (HE)	SINTEF Energy Research* (NO)
CTC (ES)	TECNALIA (ES)
DHI (DK)	Tubitak Uzay (TR)
DTU (DK)	University College of Dublin (IR)
DUT (NL)	University of Athens (HE)
ECN (NL)	University of Bergen (NO
ENEA (IT)	UoP (PT)
Fh IWES (DE)	UoS (UK)
ForWind (DE)	VTT (FI)
IEN (PL)	WMC (NL)

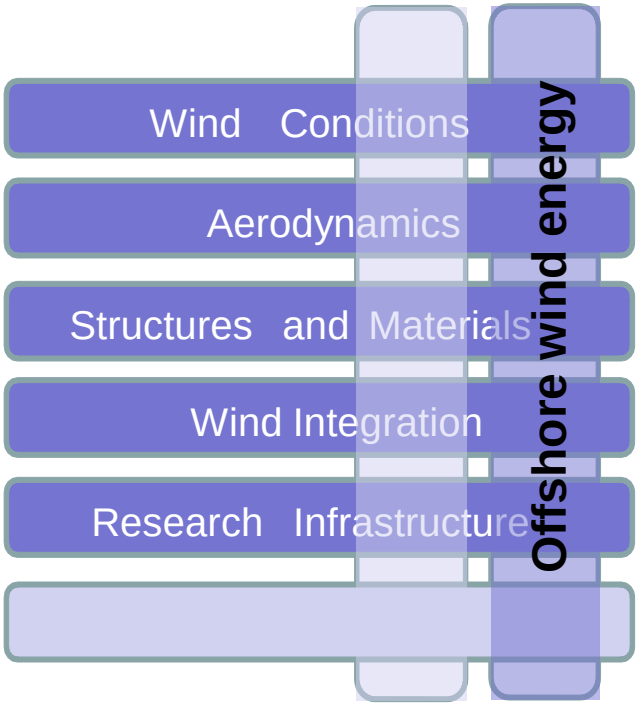
Table to be updated

*SP coordinator

SP Offshore Wind Energy

Research objectives

- ✓ **Design optimization through validation studies offshore, including development of integrated numerical design tools and establishing a open database with measurements for validation of tools.**
- ✓ **Characterization and interaction of wind, wave and current as input for developing standard design load cases.**
- ✓ **Innovative wind farm internal grids for offshore applications, and connection to HVDC transmission.**
- ✓ **Control, operation and maintenance of offshore wind farms.**
- ✓ **Development of novel concepts for deep sea, including multi-use of wind farm areas giving step-changes in technology for reducing cost of energy from offshore wind farms.**



SP Offshore Wind Energy

Key results

- ✓ Sharing knowledge for joint benefits and efficient use of resources
- ✓ Expert workshops
  - Integrated design tools (2010)
  - Offshore grid development (2010)
  - Predictive tools for O&M (2011)
  - Offshore wind farm grids (2012)
  - Offshore learnings / O&M (2013)
  - Innovative wind turbines (2013)
- ✓ Deep Sea Offshore Wind R&D Conference: EERA DeepWind 2014
- ✓ Preparation of strategy aligning with national and EU priorities
- ✓ Joint national projects
  - ABYSS (DK-NO), kick-off 2014
  - NSON (NO-UK-DE), kick-off 2014
  - more in progress..
- ✓ New EU projects
  - EERA DTOC, kick-off 2012
  - EERA InnWind, kick-off 2013
  - EERA IRPWind, kick-off 2014
  - more in progress..

SP Offshore Wind Energy

Research Strategy (draft)

Key topics (based on gap analysis)	Schedule*
✓ Design optimization through validation studies offshore	2014-2018 (IRPWIND)
✓ Characterization and interaction of wind, wave and current	2014-2018 (ERA-NET+)
✓ Innovative wind farm internal grids for offshore applications	2015-2020 (H2020)
✓ Control, operation and maintenance of offshore wind farms	2015-2020 (H2020)
✓ Novel concepts for deep sea, incl. multi-use of wind farm areas	2015-2020 (H2020)

*A portfolio of instruments for funding will be considered, also combinations of national projects

EERA
European Energy Research Alliance

EERA DeepWind'2015
12th Deep Sea Offshore Wind R&D Conference
Trondheim 4-6 February, Norway

NOWITECH partnere er attraktive i EU prosjekt

Prosjekttittel	Partnere	Status
Best Path	Red Electrica , Iberdrola, SINTEF Energy etc	Startet 2014
IRPWIND	DTU, SINTEF Energy, MARINTEK, NTNU, Fh IWES, etc	Startet 2014
WindScanner.eu	DTU, Fh IWES, ECN, ForWind, CENER, SINTEF Energi, LNEG, Uni of Porto, CRES	Pågår
InnWind: Innovative wind conversion systems (10-20MW) for offshore applications	Risø DTU, SINTEF Energi, etc.	Pågår
EERA-DTOC: EERA Design Tools for Offshore Wind Farm	DTU Risø, SINTEF Energi, etc	Pågår
MARINET: Marine Research Infrastructures Network for Energy Technologies	HMRC University College Cork, Risø DTU, NTNU, Universityof Strathclyde, Fraunhofer IWES, SINTEF Energi, etc	Pågår
HiPRwind: offshore wind	Fraunhofer. SINTEF Energi, NTNU etc.	Pågår
Twenties (www.twenties-project.eu)	Red Electrica, SINTEF Energi etc	Avsluttet 2013
DeepWind: Future Deep Sea Wind Turbine Technologies	Risø DTU, Statoil, SINTEF Energi, MARINTEK etc.	Avsluttet 2013

We make it possible

NOWITECH is a joint 40M€ research effort on offshore wind technology.

- **Integrated numerical design tools**
- **New materials for blades and generators.**
- **Novel substructures (bottom-fixed and floaters)**
- **Grid connection and system integration**
- **Operation and maintenance**
- **Assessment of novel concepts**

www.NOWITECH.no