

Nye forskningsaktiviteter og muligheter i Europa og Norge innen offshore vindkraft

EERA JP wind, TPwind og FME

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About EERA

- ✓ **The European Energy Research Alliance (EERA) was established in 2008 to support the EU Strategic Energy Technology Plan (SET-Plan)**
- ✓ **Mission: to accelerate the development and deployment of cost-effective low carbon technologies**
- ✓ **Bringing together 250 research organisations**
- ✓ **Working together in 15 Joint Programmes**
- ✓ **Collaborating with European Industry**
- ✓ **With global outreach**
- ✓ **And aligning national research**





What is EERA JP Wind?

The EERA Joint Programme on Wind Energy (EERA JP Wind) started in 2010 on a voluntary basis.

The mission for EERA JP Wind is to provide strategic leadership for the medium to long-term research and to support the European Industrial Initiative and the Technology Roadmap activities on wind energy.

EERA JP Wind gives added value:

- ✓ Strategic leadership of the underpinning research
- ✓ Joint prioritisation of research tasks and infrastructure
- ✓ Alignment of European and national research efforts
- ✓ Execution of coordinated and structured research in medium to long-term programmes
- ✓ Coordination with industry
- ✓ Sharing of knowledge and research infrastructure

EERA JP Wind members

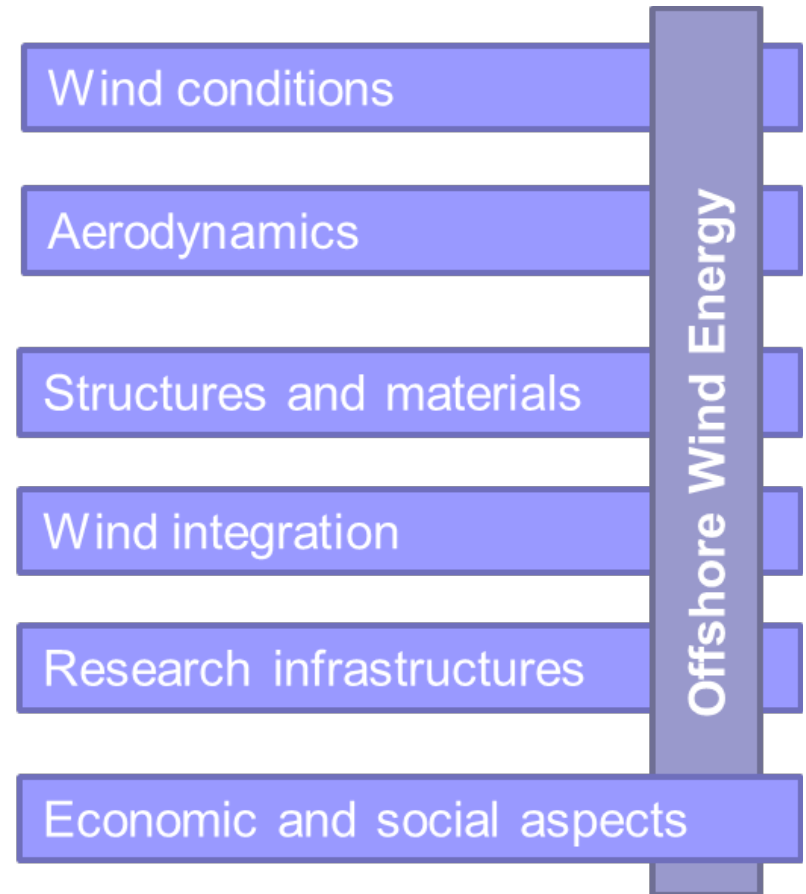
Full participants	Associated	
DTU Wind Energy	DHI, Uni. of Aalborg	DK
	University College of Dublin	IR
ECN	TU Delft, WMC	NL
SINTEF Energy Research	NTNU, IFE, UoB, CMR, MARINTEK, SINTEF Foundation	NO
CRES	NKUA	GR
CENER	CIEMAT, IREC, CTC, CIRCE, Tecnalia, IK4 Alliance	ES
Fraunhofer IWES	DLR	DE
	IEN	PO
Forwind/Oldenburg	Forwind/Hannover, University of Stuttgart, University of Aachen, TU München	DE
LNEG	University of Porto	PT
VTT		FI
TUBITAK	METUWIND	TR
Uni of Strathclyde	CATAPULT	UK
CNR	Politecnico di Milano	IT
BERA		BE



13 full participants & 28 associated participants from 14 countries

EERA JP Wind structure

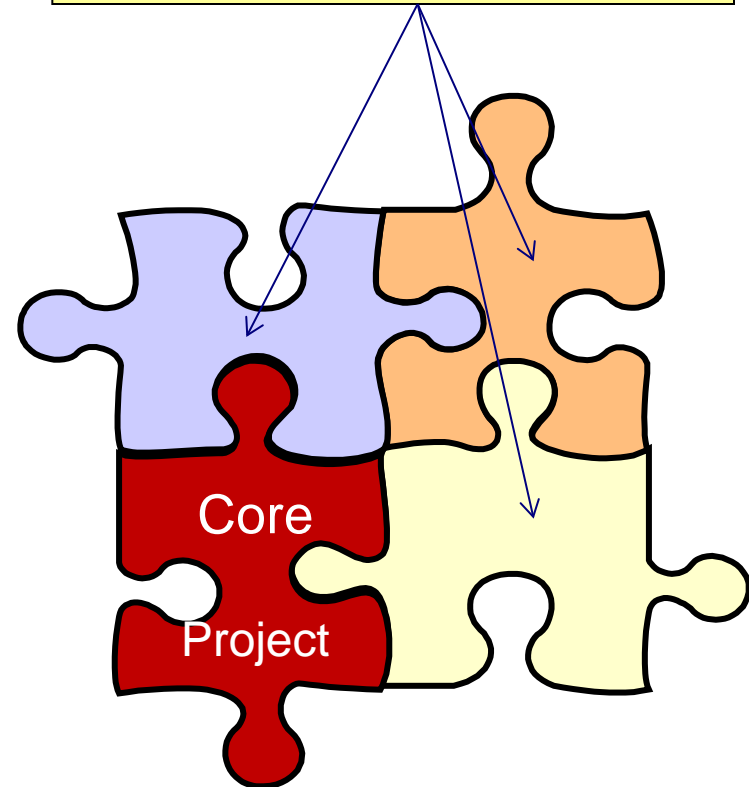
- ✓ **Wind Conditions.**
Coordinated by DTU, Denmark.
- ✓ **Aerodynamics.**
Coordinated by ECN, Netherlands.
- ✓ **Structures and Materials.**
Coordinated by CRES, Greece
- ✓ **Offshore Wind Energy.**
Coordinated by SINTEF, Norway.
- ✓ **Wind Energy Integration.**
Coordinated by Fraunhofer IWES, Germany.
- ✓ **Research Infrastructures.**
Coordinated by CENER, Spain.
- ✓ **Economic and social aspects.**
Coordinated by DTU, Denmark



EERA JP wind + IRPWIND = true

- ✓ IRPWIND is a 4 year Integrated Research Programme for Wind Energy started in March 2014 with a 9.8 MEUR EU FP7 grant
- ✓ IRPWIND and EERA JP wind are closely interlinked with IRPWIND providing funding for selected coordination and research activities:
 - ✓ Coordination and Support Actions: Mobility, Dissemination, RI
 - ✓ Core Projects: Offshore, Structural reliability, Integration
- ✓ IRPWIND gives support to EERA JP wind in developing from a voluntary network towards a “virtual research centre”.

Nationally funded collaborative projects



The EERA JP Wind project portfolio

SP: Wind Energy integration

SP: Wind conditions

SP: Offshore Wind Energy

SP: Aerodynamics

SP: Structures & materials

SP Research Infrastructures

SP: Economic and social aspects

INNWIND.eu

EERA-DTOC

New European Wind Atlas (ERANET+)

LIFES50+ (H2020)

AVATAR

WindScanner.eu

National projects...

IRPwind CSA

IRPwind CP:

”European-wide measures for large-scale integration”

IRPwind CP:

”Design of offshore windfarms”

IRPwind CP:

”Structural reliability of WT sub-components”

IRPwind CSA: WP3

EERA JP wind levels of integration

5 Management of common research programmes

European Virtual Institute for Wind Energy

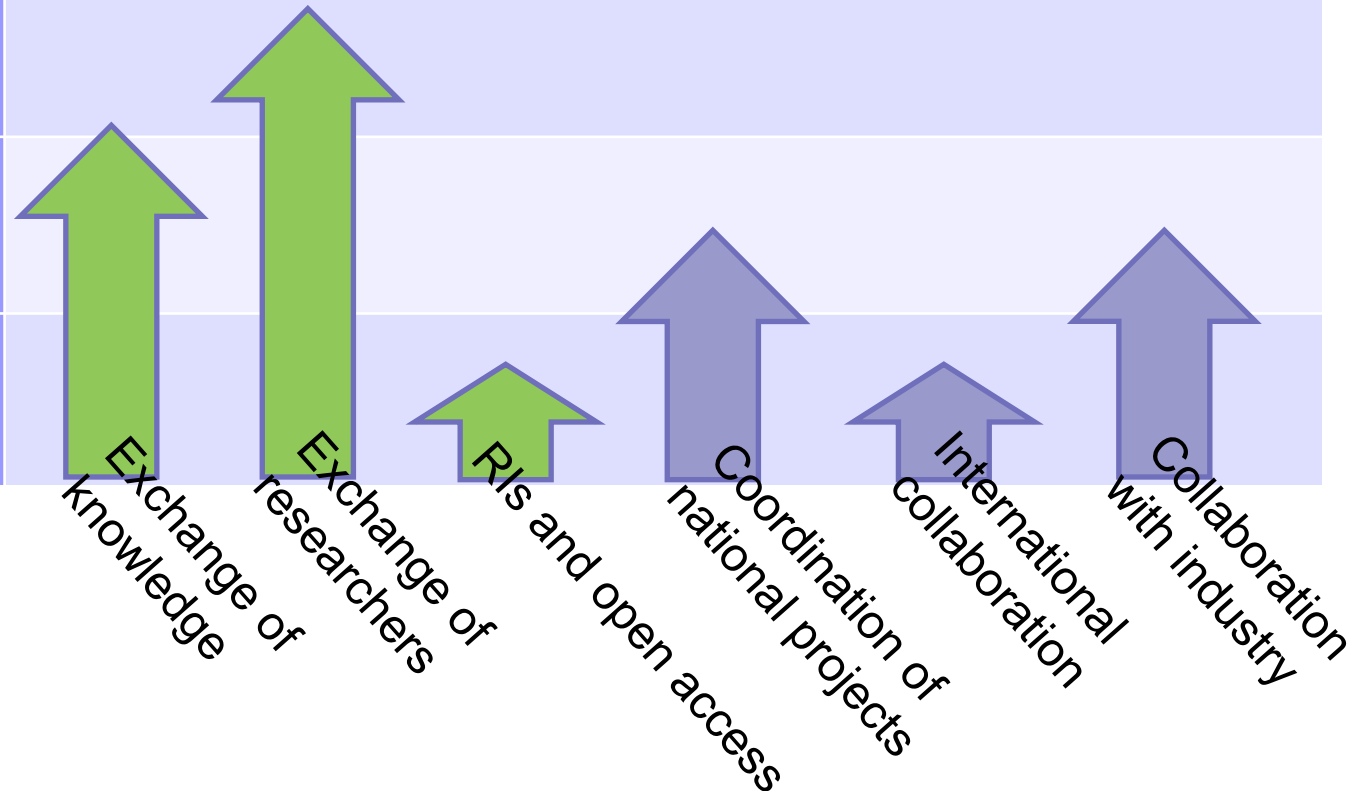
4 Comprehensive structuring

Indicative values, for illustration only

3 Coordinated research efforts across projects

2 Joint Strategy: research strategy, roadmaps, ...

1 Networking



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

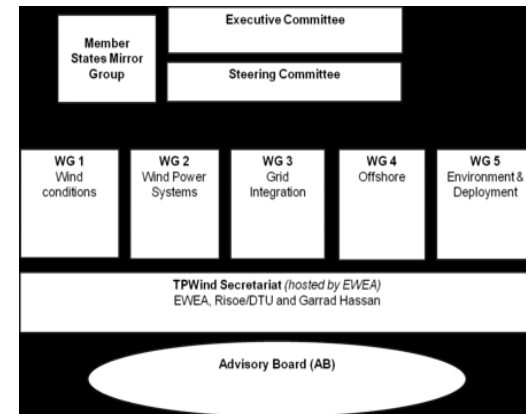
Research objectives (and project examples)

- ✓ **Design optimization through validation studies offshore (IRPwind WP6, LIFES50+, ..)**
- ✓ **Characterization and interaction of wind, wave and current (NEWA, ...)**
- ✓ **Innovative wind farm electric grid connection for offshore applications (BestPaths, ...)**
- ✓ **Control, operation and maintenance of offshore wind farms (new H2020 project?, ...)**
- ✓ **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 (LIFES50+, new H2020 project?, ...)**

Key results and way forward

- ✓ Activities are coordinated with EERA SP offshore wind energy
- ✓ Sharing knowledge for joint benefits and efficient use of resources through workshops and conferences
 - 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)
 - EERA DeepWind (2014, 2015, ..) with peer-reviewed papers in [Energy Procedia](#)
 - Improving wind turbine reliability (2015)
- ✓ IRPwind mobility programme (2014-)
- ✓ Preparation of strategy aligning with national and EU priorities
 - Medium to long term research strategy (IRPwind D2.8, 2014)
 - EERA JP Wind Strategic Action Plan 2014-2017 (IRPwind D2.1, 2014)
 - Integration of national projects (IRPwind D2.5, 2015)
 - Strategy on access granting to data (IRPwind D2.19, 2015)
 - Catalogue of research facilities (IRPwind D3.1, 2015)
- ✓ Joint national and EU projects
 - ABYSS (DK-NO), kick-off 2014
 - NSON (NO-UK-DE), kick-off 2014
 - EERA DTOC, kick-off 2012
 - EERA InnWind, kick-off 2013
 - EERA IRPWind, kick-off 2014
 - LIFES 50plus, kick-off 2015
 - COWIND, FME application (NO)

- ✓ *"A dedicated voice for Technology and Policy R&D, speaking for the wind energy sector and its stakeholders"*
- ✓ *Established in 2005/2006 with EWEA as secretariat*
- ✓ *Composed of more than 180 experts representing the EU wind power sector*
- ✓ *Prepared EWI 2013 – 2015 Implementation Plan, annual EWI Work Programmes and [Strategic Research Agenda \(SRA\)](#) (2014)*
- ✓ *Low activity in 2015 due to lack of EC funding for the secretariat (EWEA)*
- ✓ *TPwind and EWI likely to be replaced by a new European Technology and Innovation Platform (ETIP), TBD.*



Strategic Research Agenda /
Market Deployment Strategy
(SRA/MDS)

March 2014



EU SET-plan initiative: Global Leadership in Offshore Wind



- ✓ **Offshore wind costs must be reduced** and performance and reliability increased to meet its full contribution to the European energy mix.
- ✓ There is a need to **develop (floating) substructures or integrated floating wind energy systems for deeper waters** and for use in other climate conditions, to increase the deployment possibilities and to improve the European position in the global market.

Working document of the EC for consultation (SET Plan Secretariat – 09 October 2015):

Proposed targets in offshore wind energy

1. **Reduce the levelised cost of energy (LCoE) for fixed offshore wind*** by improvement of the performances of the entire value chain to
 - **less than 10 ct€/kWh by 2020** and to
 - **less than 7ct€/kWh by 2030;**
2. **Increase the reliability of offshore wind turbines to 99% and the capacity factor to 55% by 2020;**
3. Develop cost competitive **integrated wind energy systems** including substructures which can be used in **deeper waters (>50m)** at any distance from shore and for use in different climate conditions with LCoE of:
 - **less than 14 ct€/KWh by 2020** and to
 - **less than 9 ct€/KWh by 2030**

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
- ▶ Fedem Technology
- ▶ Fugro OCEANOR
- ▶ Kongsberg Maritime
- ▶ Norsk Automatisering
- ▶ Rolls Royce SmartMotor
- ▶ Statkraft
- ▶ Statnett
- ▶ Statoil

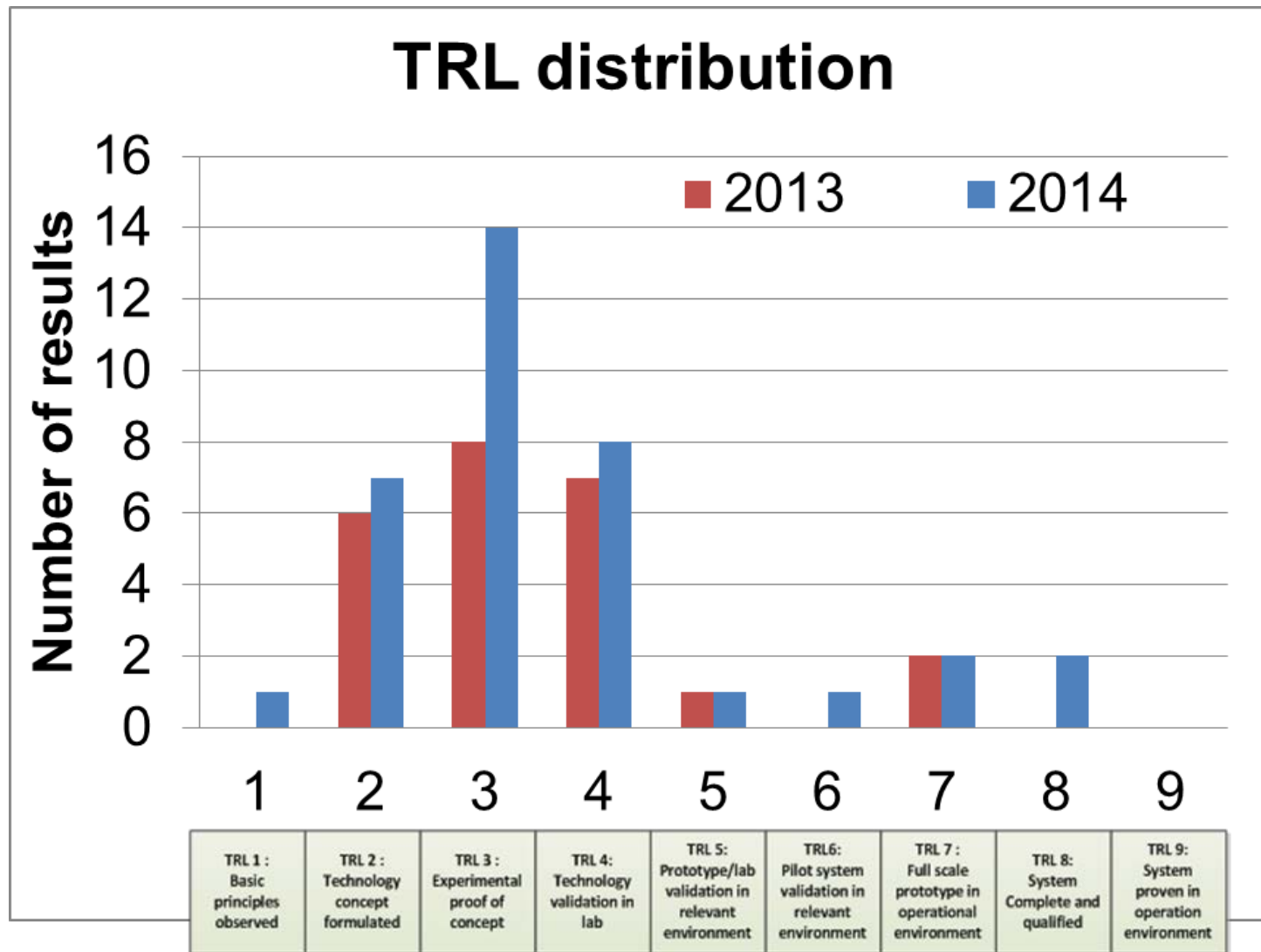
Associated research partners:

- ▶ DTU Wind Energy
- ▶ Michigan Tech Uni.
- ▶ MIT
- ▶ NREL
- ▶ Fraunhofer IWES
- ▶ Uni. Strathclyde
- ▶ TU Delft
- ▶ Nanyang TU

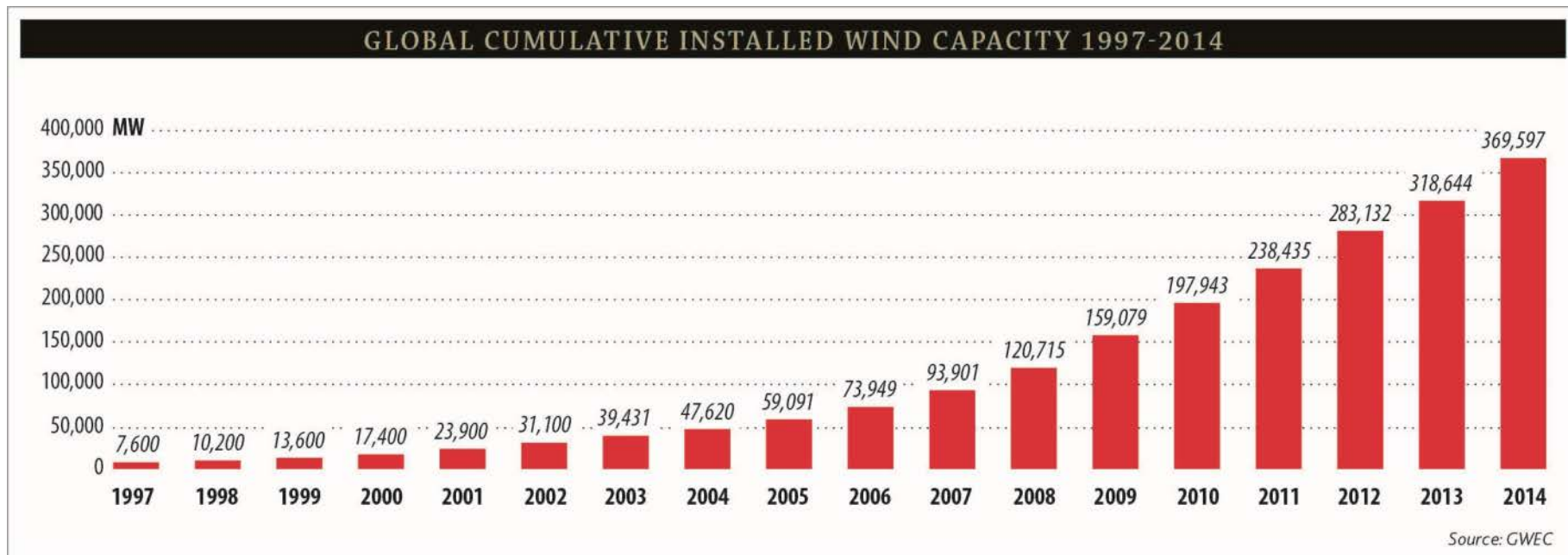
Associated industry partners:

- ▶ Devold AMT AS
- ▶ Energy Norway
- ▶ Enova
- ▶ Innovation Norway
- ▶ NCEI
- ▶ NORWEA
- ▶ NVE
- ▶ Wind Cluster Norway

Successful innovations are achieved



Wind energy in strong development



- ✓ Land based: 8 GW in 1997; 361 GW in 2014
- ✓ Offshore: 8 GW in 2014; 361 GW in 2031 ??

A huge long-term market for green technologies

- ▶ 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.

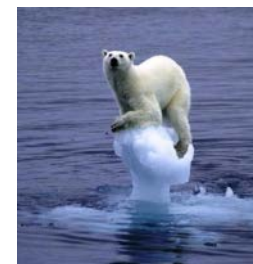
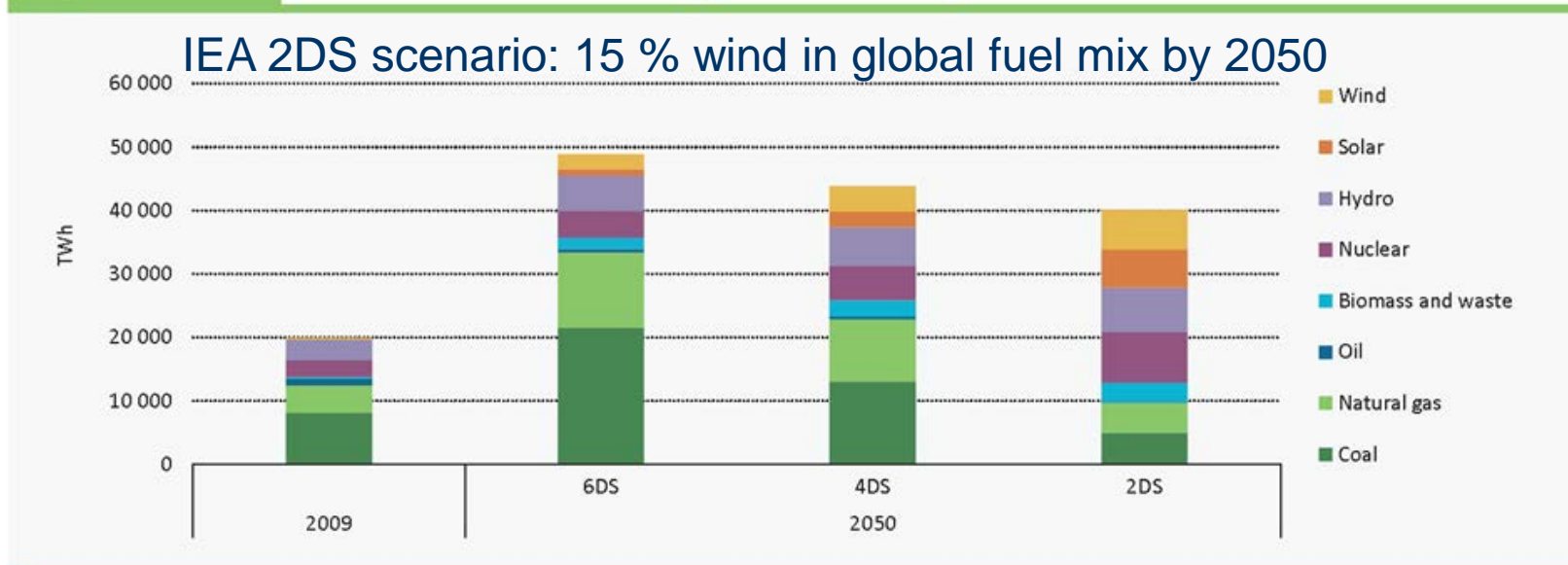


Figure 1.10 Fuel mix in electricity generation, by scenario



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

2013 installed wind:
 Total 318 GW incl 7 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

COWIND: Centre for Offshore Wind Energy Research

New FME on offshore wind energy research in development

▶ **Key ambitions:**

- Create added value for user partners through research based innovations
- Reduce cost of energy with 30 % for reference offshore wind farm
- Double the annual turnover within offshore wind energy for the Centre partners

▶ **Start-up in 2016/2017, pending on funding. Duration 8 years.**

▶ **Work programme:**

Site characterization // Wind farm design // Collection and transmission // Support structures and foundation // Operational control and maintenance // Open calls

▶ **Annual budget 60 MNOK:**

financed by RCN (50 %), user partners (25 %) and research partners (25 %)

▶ **Application deadline 25 Nov. 2015.**

▶ **Host: SINTEF Energy Research**

▶ **Research partners: CMR, IFE, MARINTEK, met.no, NGI, NTNU, SINTEF, UiA, UiB, UiS + international**

▶ **Industry / user partners (TBC):**

3B-Fibreglass, 4Subsea, ABB, Acona, Adwen, Amon, Axess, DNV GL, Dr. tech. Olav Olsen, Fedem Technology, Fjellstrand, Force Technology, Fred Olsen Windcarrier, Fugro Oceanor, Grieg, Jotun, Kjeller Vindteknikk, Kongsberg Maritime, Maintech, Mitsubishi Electric, Oceaneering, Odfjell, OWEC Tower, Reinertsen, Siemens, Statkraft, Statoil, StormGeo, Ulstein, Umoe Mandal, Vattenfall, Vestas, ..

▶ **More industry / user partners are invited to join.**

Norway has an important role to play



Norwegian energy and petro-maritime industries, and the research carried out in NOWITECH and NORCOWE and in other projects, have established Norway as an important actor within the offshore wind energy sector:

- ▶ Hywind, the world's first full-scale floating turbine has proven successful operation on the west coast of Norway since 2009.
- ▶ Norwegian industry parties are strong suppliers to the offshore wind market within installation, substructures, power collection and transmission.
- ▶ Statoil and Statkraft are developing large offshore wind farms within the UK sector. DNV GL is leading in consulting and certification services.

Still, there is very significant potential to increase the Norwegian engagement in the offshore wind energy sector. Establishment of COWIND is critical to achieve this.

We make it possible!

www.NOWITECH.no



**EERA DeepWind'2016
13th Deep Sea Offshore Wind R&D Conference
Trondheim 20-22 January, Norway**



Thank you!

