## NOWITECH med EU som hjemmemarked

## Industry meets Science 30 Oct 2013

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# En gylden anledning for utvikling av norsk kompetanse og leverandørindustri!

- Det er gitt konsesjon for utbygging av 1.7 GW vindkraft i Midt-Norge tilsvarende ca 15 mrd. kr i investeringer.
- Stort marked for norsk kunnskap og teknologi til utbygging av offshore vindkraft i Nordsjøen og resten av verden!
- Hvordan får vi til et teknologisk og industrielt taktskifte i Trøndelag med de mulighetene som nå åpner seg ?





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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:
  - Iarge scale deployment
  - internationally leading

Research partners:

- SINTEF ER (host)
- ▶ IFE
- NTNU
- MARINTEK
- SINTEF ICT

partners:

MIT

► NREL

**TU Delft** 

Nanyang TU

► SINTEF MC

Associated research

Michigan Tech Uni.

**Fraunhofer IWES** 

Uni. Strathclyde

► DTU Wind Energy

**Industry partners:** 

- CD-adapco
- DNV GL
- DONG Energy
- ► EDF
- Fedem Technology
- Kongsberg Maritime
- Rolls Royce SmartMoto
- Statkraft
- Statnett
- Statoil

## Associated industry partners:

- ► Access Mid-Norway
- Devold AMT AS
- Energy Norway
- Enova
- Innovation Norway
- NCEI
- ► NORWEA
- ► NVE
- Wind Cluster Mid-Norway



## A large growing global market for offshore wind



#### EU OFFSHORE WIND FORECAST INSTALLED CAPACITY (GW)

OFFSHORE	WIND	<b>KEY INDICATORS</b>	

Key indicators	2010	2016
Capex (NOK)	26.6 bn NOK	92bn NOK
Capex (USD)	4.7 bn USD	16 bn USD
Added capacity	1 GW	3.6 GW
Turbines	370	975
Foundations	639	1,435
Cables	518 km	1,972 km
Installation vessels	21	45
PTVs	86	277

Source: Douglas-Westwood (2012)

- Firm EU commitment to develop offshore wind
- EU offshore wind forecast 2020:
  - Total installed capacity 40 GW
  - Total investments EUR 65.9 billions
- EU offshore wind forecast 2030:
  - Total installed capacity 150 GW
  - Total investments EUR 145.2 billions
- Significant developments also in China, Japan, Korea and USA
- The near-term large commercial market is mainly for bottom-fixed wind farms at shallow to intermediate water depths (50 m)
- Significant interest in developing floating concepts expecting large volume after 2020
- Threat: financial crisis / economic recession



## Main drivers

- Battle climate change
- Security of supply

Figure 1.10

Industry value creation

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



#### 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.
 2012 installed wind:

Copy from IEA Energy Technology Perspectives 2012

#### Norwegian Research Centre for Offshore Wind Technology

**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

# The present Norwegian market is mainly for onshore, but with huge potential offshore



- A significant Norwegian market for onshore turbines are expected through green certificates:
  - 26 TWh by 2020 in Norway and Sweden.
  - 1.7 GW wind is in planning for Mid-Norway
- Huge offshore potential, but so far no firm commitment by the Norwegian government:
  - Physical potential is excess of 1000 TWh/y!
  - NVE has identified 15 areas for development of offshore wind farms (total ~10 GW); five are suggested prioritized (public inquiry due 4/4-13)
  - Applying the petroleum taxation regime to offshore wind farms for supply to oil and gas installations may create a immediate Norwegian market (total ~100-1000 MW)
- Time to reinitiate Demo2020 to enhance offshore wind development?
  - Reduce cost of energy from offshore wind farms
  - Qualify and improve competiveness of suppliers
  - Get value from R&D results





## Main challenge: Reduce Cost of Energy



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



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## EU projects in alignment with NOWITECH

### Example recent projects

- Twenties (2009-2013), Red Electrica, DTU, SINTEF, etc.
- DeepWind (2010-2014), DTU, SINTEF, etc.
- HiPRWind (2010-2015), Fraunhofer IWES, SINTEF, NTNU, etc.
- WindScanner.eu (2013-2016), DTU, ECN, CENER, SINTEF, etc.
- EERA-DTOC (2012-2015), DTU, Fraunhofer, SINTEF, etc.
- InnWind (2012-2016), DTU, Fraunhofer, SINTEF, etc.
- LeanWind (contract negotiations); Cork, MARINTEK, SINTEF, etc.
- EERA IRP wind (contract negotiations); DTU, SINTEF, MARINTEK, etc.
- Best Paths (contract negotiations); Red Electrica, Iberdrola, SINTEF, etc.
- The projects are with separate contracts external to NOWITECH, but carried out in alignment with NOWITECH.







Norwegian Research Centre for Offshore Wind Technology

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## Active in strategic EU R&D networks



### EERA, <u>www.eera-set.eu</u> (SINTEF coordinating SP on Offshore Wind Energy)



#### EU TP Wind, <u>www.windplatform.eu</u> (SINTEF in Steering Committee and heading WG Offshore)



EAWE, <u>www.eawe.eu</u> (NTNU is chairing)



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## A great possibility to influence EU RDD priorities



Technology Platform

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



#### Home

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#### TPWind new call for expression of interest

TPWind Application Form

TPWind report: "Workers wanted - The EU wind energy sector skills gap"

TPWind brochure "The way forward"

Strategic Research Agenda / Market Deployment Strategy

The European Technology Platform for Wind Energy (TPWind) is sponsored by:

Platinum sponsor: SIEMENS

Gold sponsor:

#### Call for expression of interest

TPWind published a "call for expression of interest" to select new Working Group members. This call concerns Working Groups only: the Steering Committee (the Platform's main decision-making body) will be renewed at a later stage in early 2014.

#### How to apply

Step 1) Candidates willing to join TPWind Working Groups should carefully read the guidelines of the call (<u>click here to download them</u>).

Step 2) Following this step, an application form (<u>click here to access it</u>) has to be filled in and submitted online.

#### Deadline

The deadline of the call is 31 December 2013, at midnight (Brussels time). Any application received after the deadline will be disregarded. Moreover, please note that a candidate cannot submit more than one application: every submission after the first one will not be taken into consideration.

New Working Group members will be selected according to the modalities outlined in the call's guidelines: the final decision of the selection committee will be irrevocable.

For any questions on the call, please contact Ms. Manuela Conconi: manuela.conconi@ewea.org; +32 2 213 1856(2).



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## Superconducting generators reduce weight: a step-changing technology for realizing future cost efficient large offshore wind turbines



> 100 times the current density compared to copper

- More than doubles the achievable magnetic field
- Eliminates rotor losses
- ➢ Operating at 20-50 K



- > New materials give new electromagnetic designs
  - Possible step-changing technology
  - > Activity in new FP7 project : InnWind



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## HVDC is required for realizing the future offshore grid



- New HVDC technology is required for realizing the future offshore grid for power exchange between countries, connecting offshore wind and offshore oil and gas platforms
- In BestPaths (new FP7 project in contract negotiation) three new technologies for HVDC converter stations shall be demonstrated in lab scale at SINTEF for assessing interoperability when connected to a multi-terminal grid
- Existing HVDC VSC converter solutions include ABB HVDC Light, Siemens HVDC PLUS and Alstom HVDC MaxSine



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## **Remote presence reduce O&M costs**

It is costly and sometimes impossible to have maintenance staff visiting offshore turbines

Remote operation, condition monitoring, maintenance

- Remote inspection through installation of a small robot train on a track in the nacelle and equipped with (heat sensitive) camera, various probes, microphone, etc.
- The concept shall be demonstrated in LeanWind (new FP7 project in contract negotiations) with a Norwegian SME (Norsk Automatisering) as developer and supplier of the remote presence concept



ROBOT

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- Felles målforståelse og samarbeid mellom myndigheter, industri og forskning er nøkkelen for å lykkes!





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# EERA DeepWind'2014 11'th Deep Sea Offshore Wind R&D Conference

### Make sure to be there:

- ► EERA DeepWind 2014
- 11th Deep Sea Offshore Wind R&D Conference, Trondheim, 22 - 24 January 2014
- Details at www.sintef.no/deepwind2014
- Deadline for abstracts 1 November 2013



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## We make it possible

NOWITECH is a joint 40M€ research effort on offshore wind technology (2009-2017).

- 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

