



EUROPEAN TECHNOLOGY & INNOVATION
PLATFORM ON WIND ENERGY

Status report of the SRA 2014 implementation and future research priorities

Outline

1. Methodology and data collection
2. Analysis of what has been happening (by research area)
3. Identifying future trends (online surveys)
4. Closing the gaps and fine tuning priority areas

Methodology

Quantitative Analysis

- Review of conference presentations (published papers and posters in conference proceedings)
- 3 years 2013 to 2015
- Over 2,700 papers analysed

Qualitative analysis

- 25 Phone interviews with experts
- Public Online survey (102 answers from onshore and 127 answers from offshore)

Results are categorized and presented under 5 pillars and 28 categories following the structure of the 2014 SRA& MDS

Methodology- Sources of information

2

Experts interviewed:

Organization
ABB
GE
Enercon
VTT
Iberdrola
Senvion
DTU
Statkraft
Loughborough University
DONG
Vestas
DNV GL
EDF Energies Nouvelles
Aalborg university
FORWIND
Irishrail
Ponderaconsult

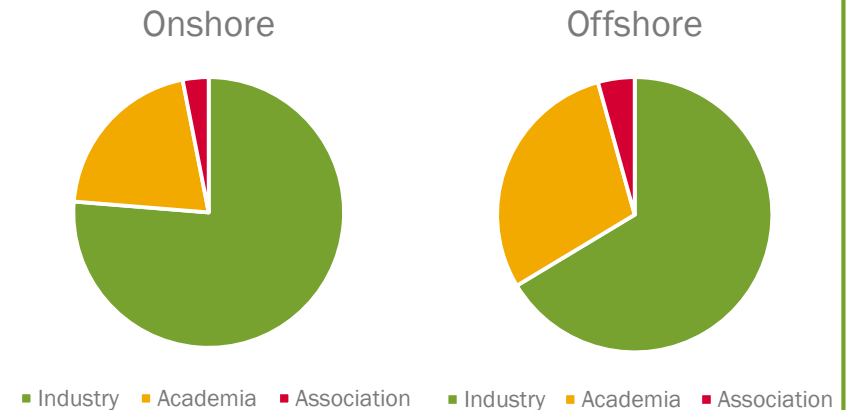
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Events:

- WindEurope Annual conference
- WindEurope offshore conference (biannual)
- WindEurope technical workshops
- Wind Integration Workshop
- WinterWind
- DeepWind

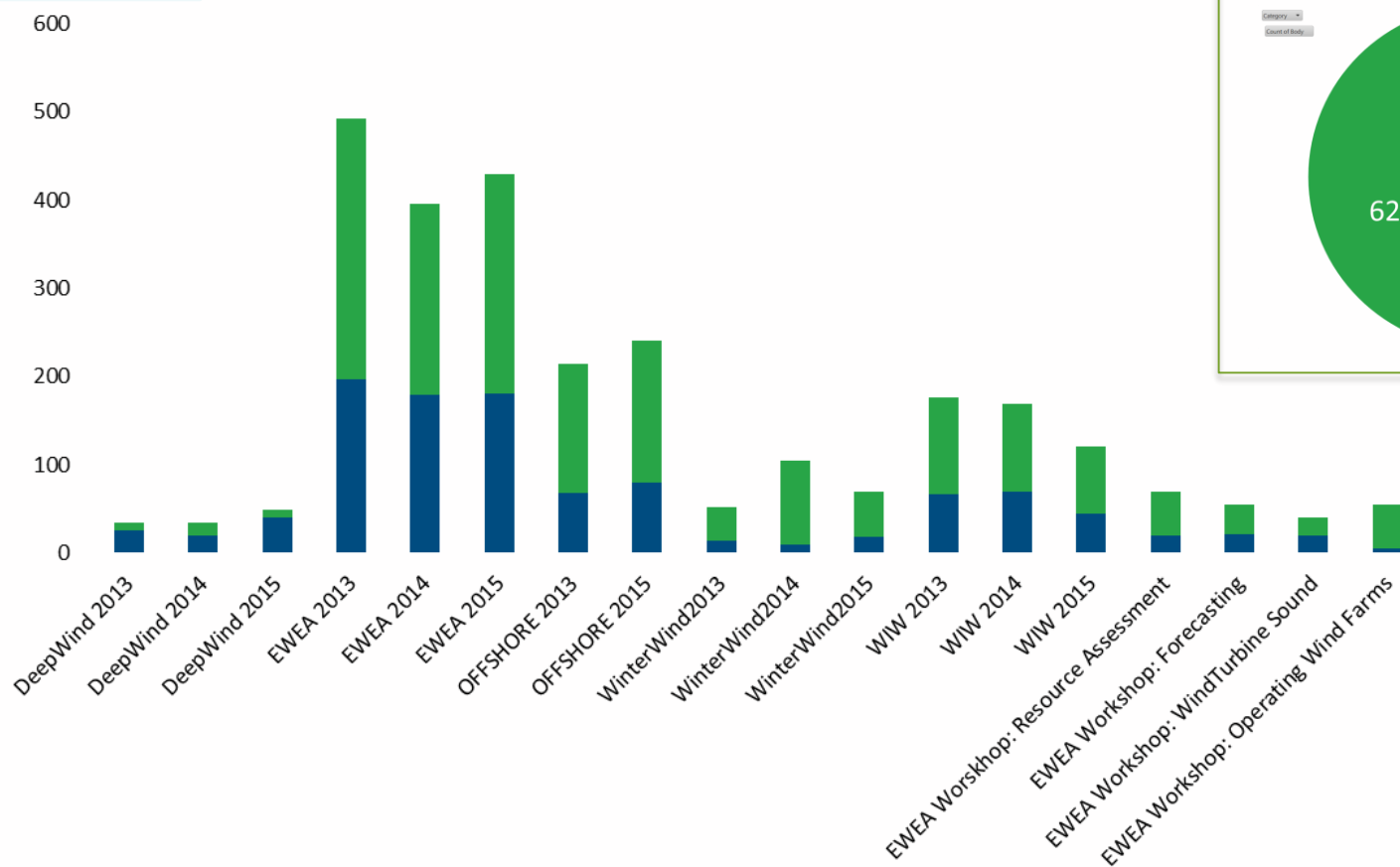
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Survey participants:

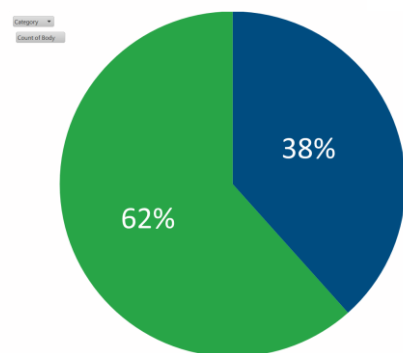


Sources of information- Quantitative analysis

Number of papers



Share industry academia

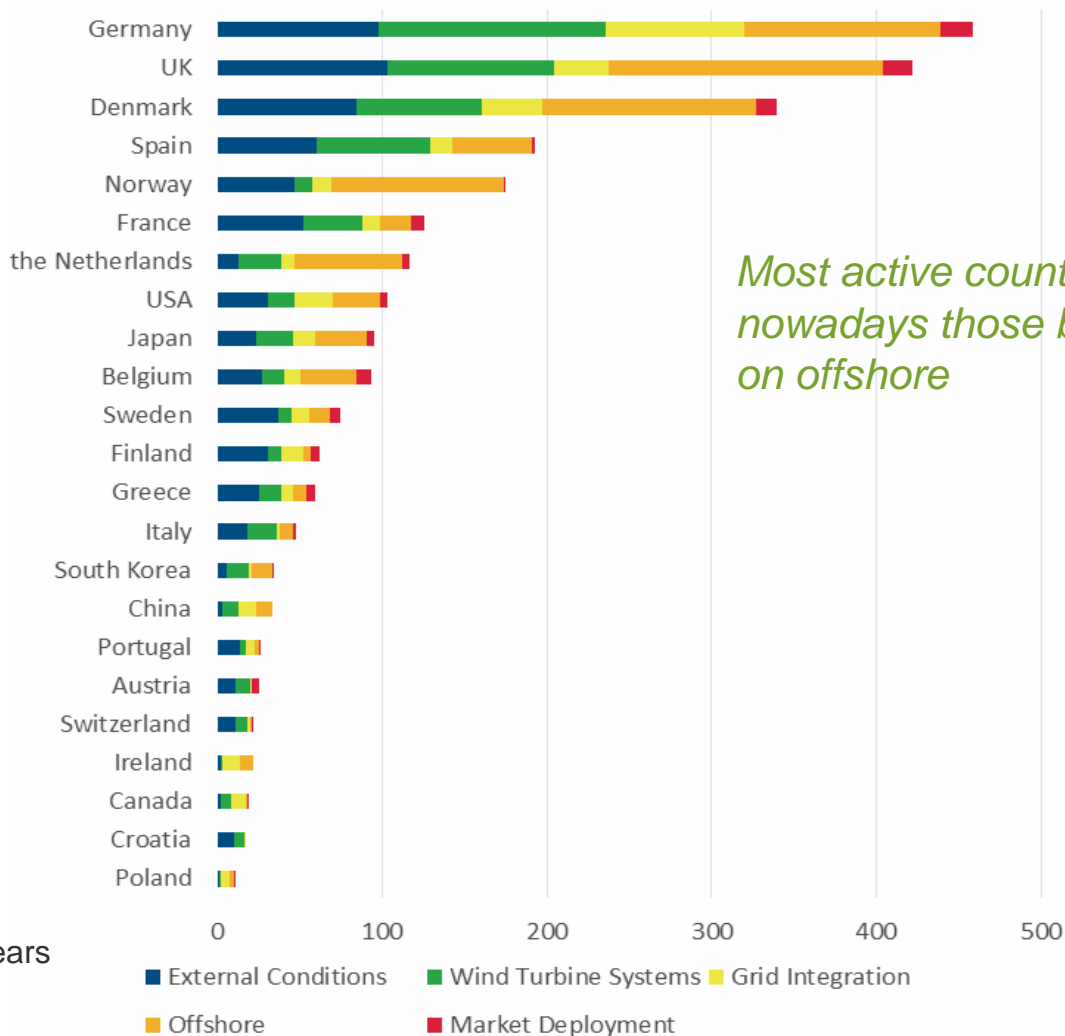


Body

■ industry
■ Academia

Event

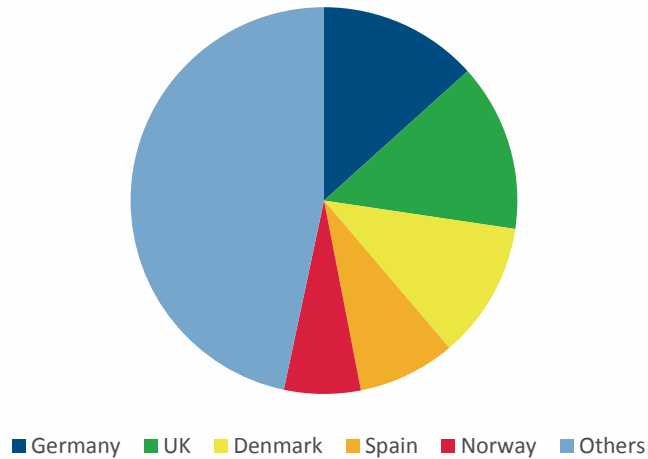
Research participation per country



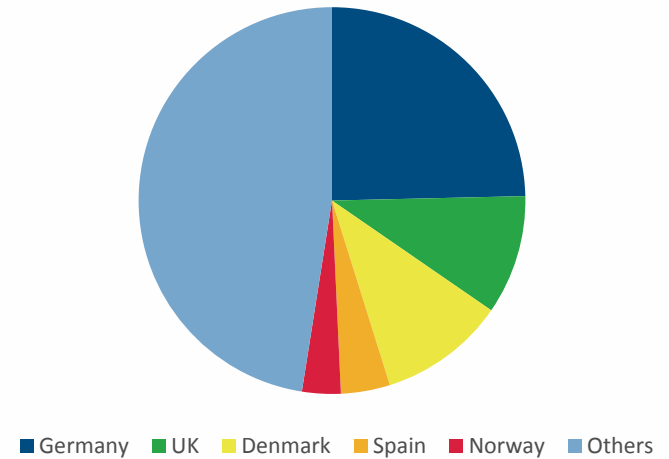
*Accumulated for three years

Research intensity per pillar, by country

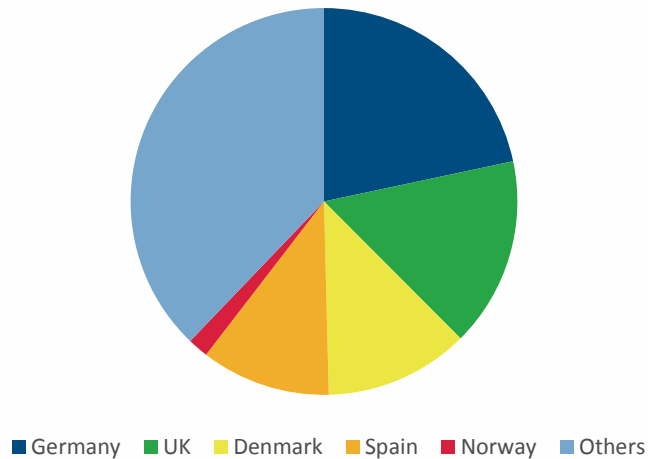
External Conditions



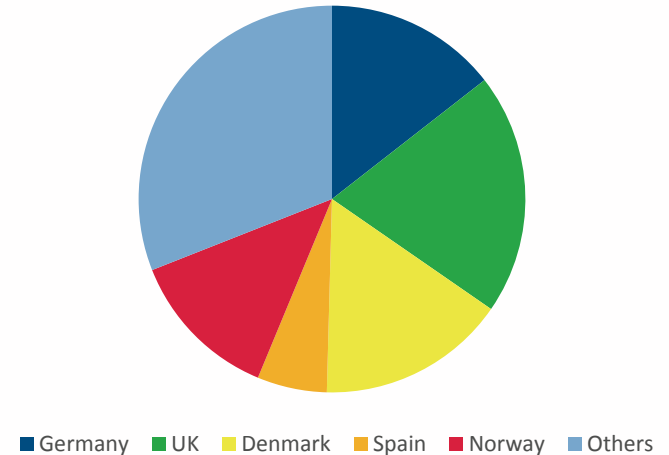
Wind Energy Integration



Wind Turbines Systems



Offshore systems





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RESULTS

Assessing past/current trend

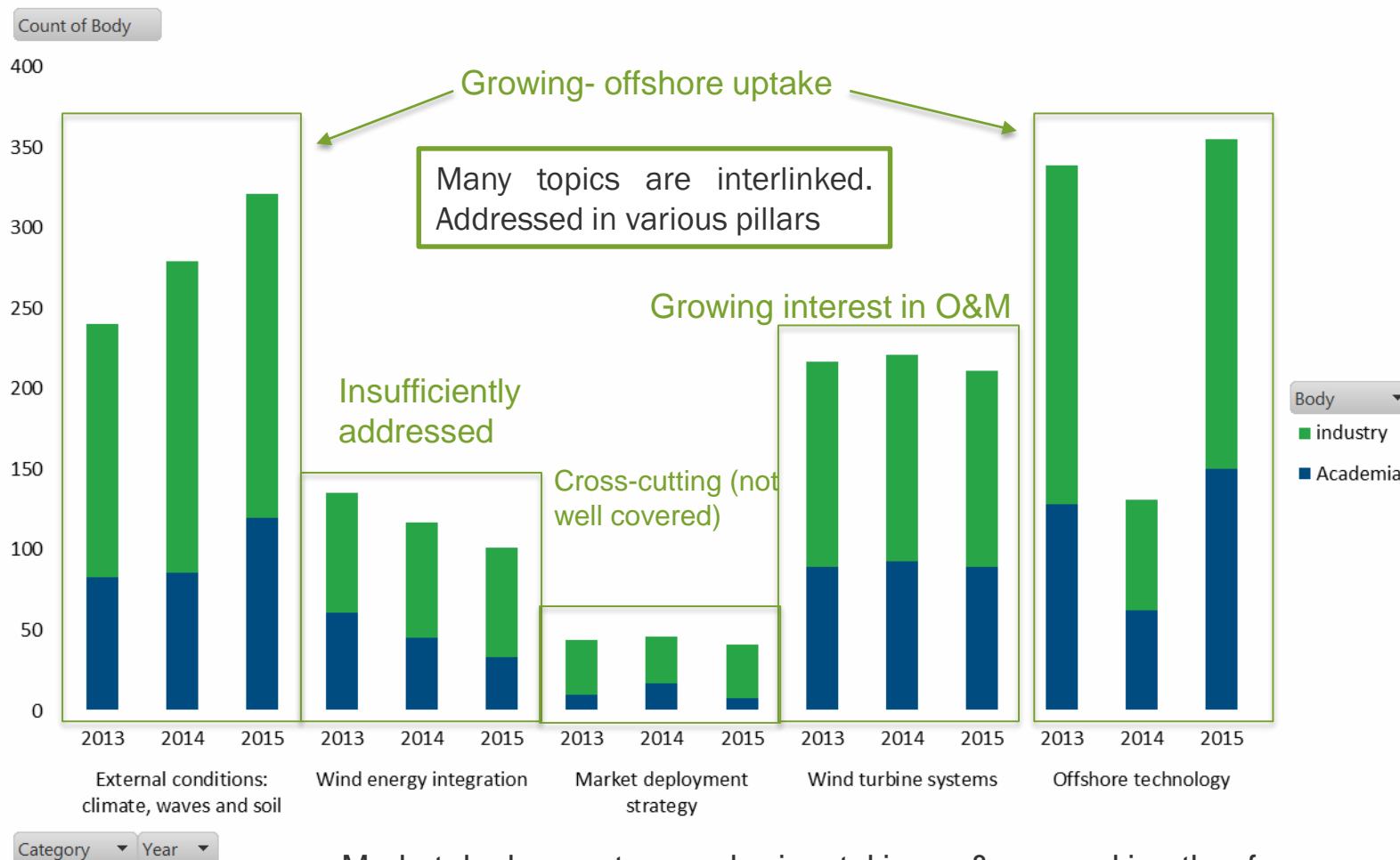
Structure the quantitative analysis

- 28 Sub-categories under 5 Pillars. About 120 R&I topics

Pillar	Sub-category
External condition: climate, waves and soil	1.1 Measurement systems
	1.2 Interaction climate-wind turbines
	1.3 Multi-scale modelling
	1.4 Wakes
	1.5 Forecasting
	1.6 Condition monitoring
	1.7 Standardization
Wind turbine systems	2.1 Wind turbine as a flow device
	2.2 Wind turbine as mechanical structures/materials
	2.3 Wind turbine as a grid connected electricity plant
	2.4 Wind turbine as a control system
	2.5 Innovative concepts along the value chain and integrated design
	2.6 Operation and maintenance (O&M)
	2.7 Standards and certification

Pillar	Sub-category
Wind energy integration	3.1 wind power capabilities for ancillary services provision
	3.2 Grid connection, transmission and operation
	3.3 grid management and power markets
Offshore technology	4.1 Sub-structures
	4.2 Logistics, assembly and decommissioning
	4.3 Electrical infrastructure
	4.4 Wind turbines
	4.5 Operation and maintenance
	4.6 External conditions
Market deployment strategy	5.1 Enabling market deployment
	5.2 Adapting policies
	5.3 Optimising administrative procedures
	5.4 Integrating wind to the natural environment
	5.5 Ensuring public acceptance of wind power

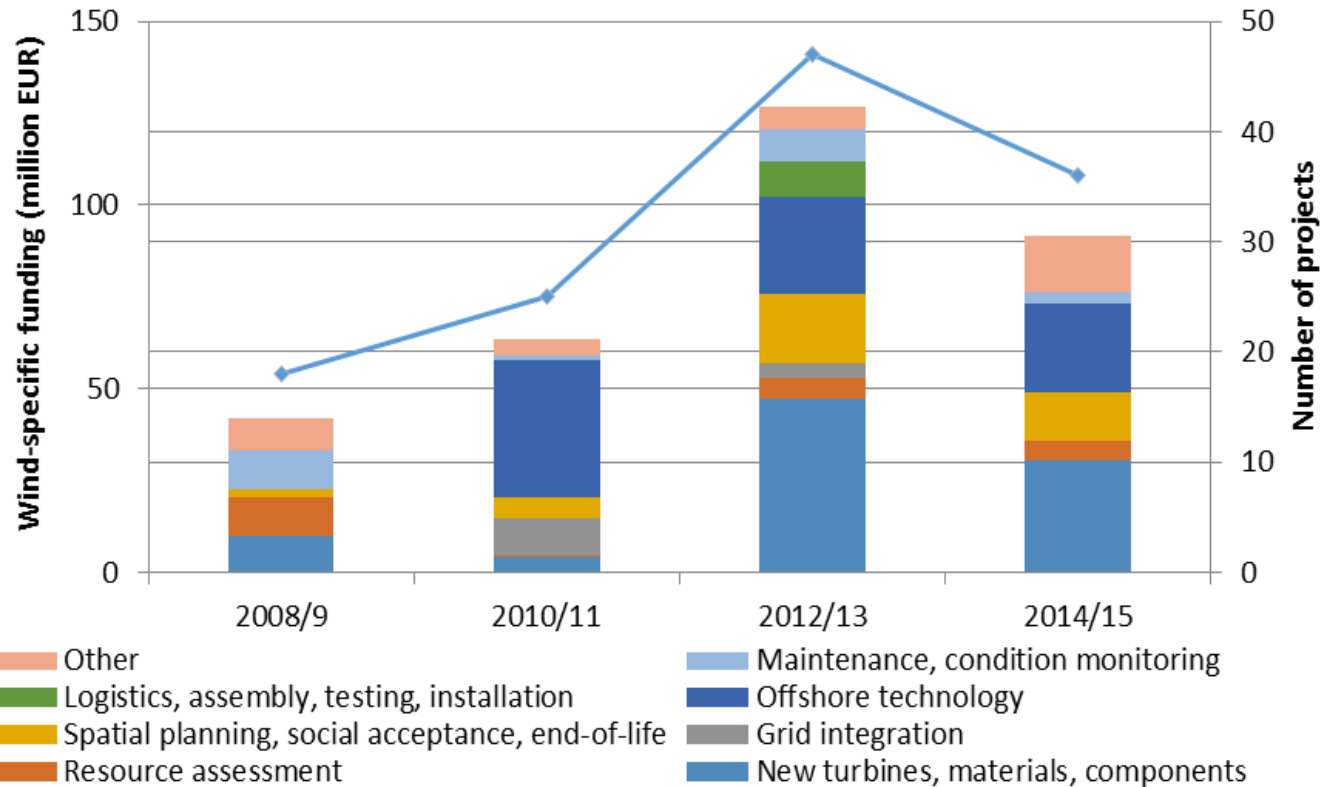
Research activity per pillar, annually



Market deployment: cross horizontal issue & covered in other forums
 Offshore: Biannual event. Addressed in pillar external conditions

EC funding

Wind-specific EC funding per category



- Most on turbine systems
- Very little on grid integration
- Growing on offshore and Market deployment
- Decreasing budget (no aligned with market growth)



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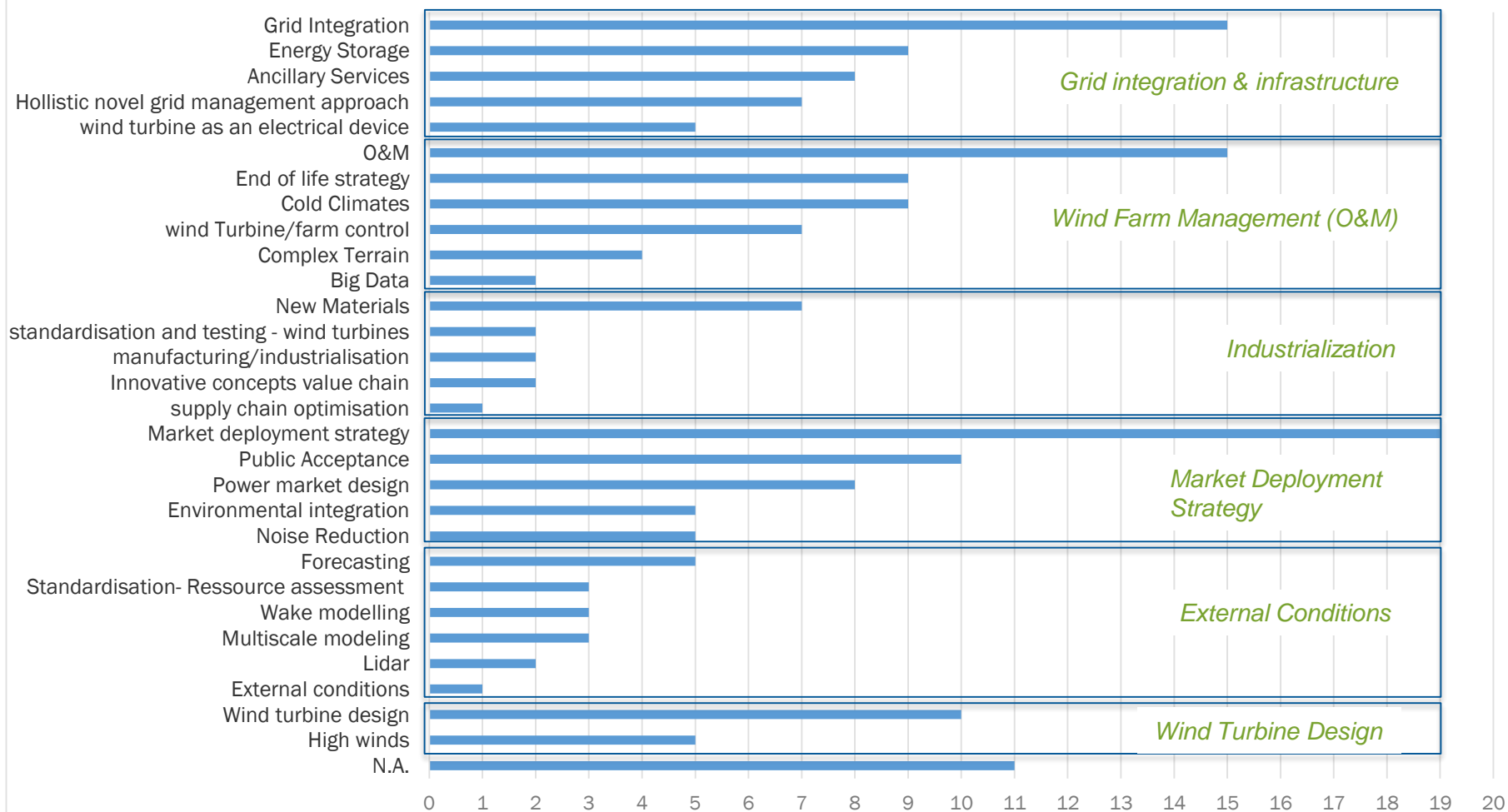
RESULTS

Assessing future trends

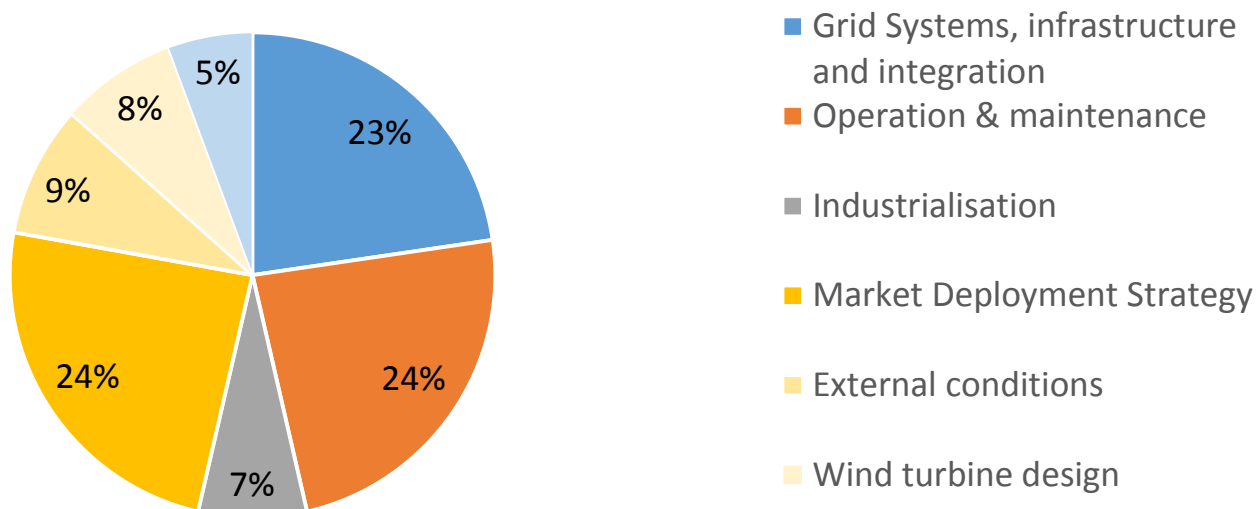
etipwind.eu

Onshore wind Survey- Identifying future trends

Top priorities for Onshore Wind



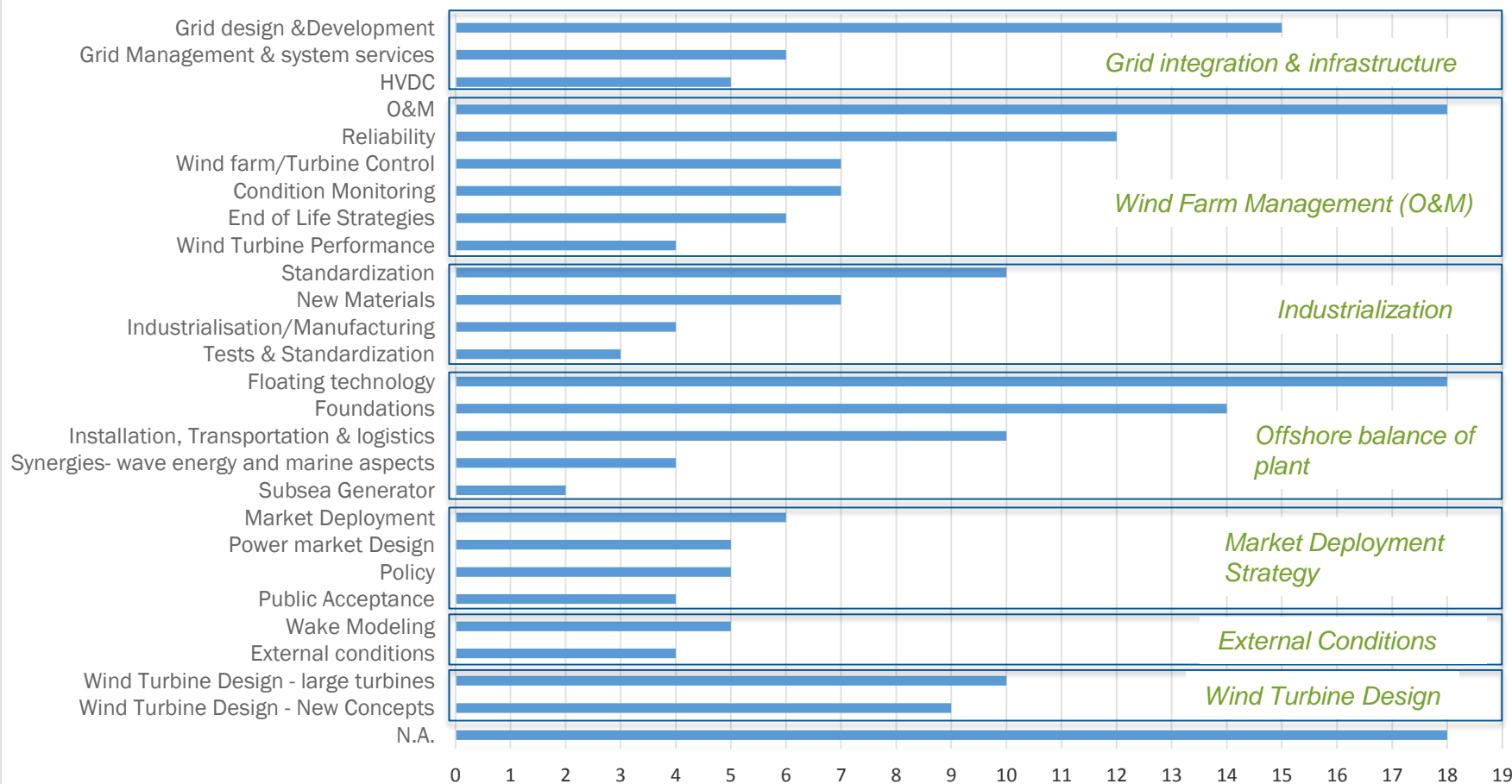
Onshore wind Survey- Identifying future trends



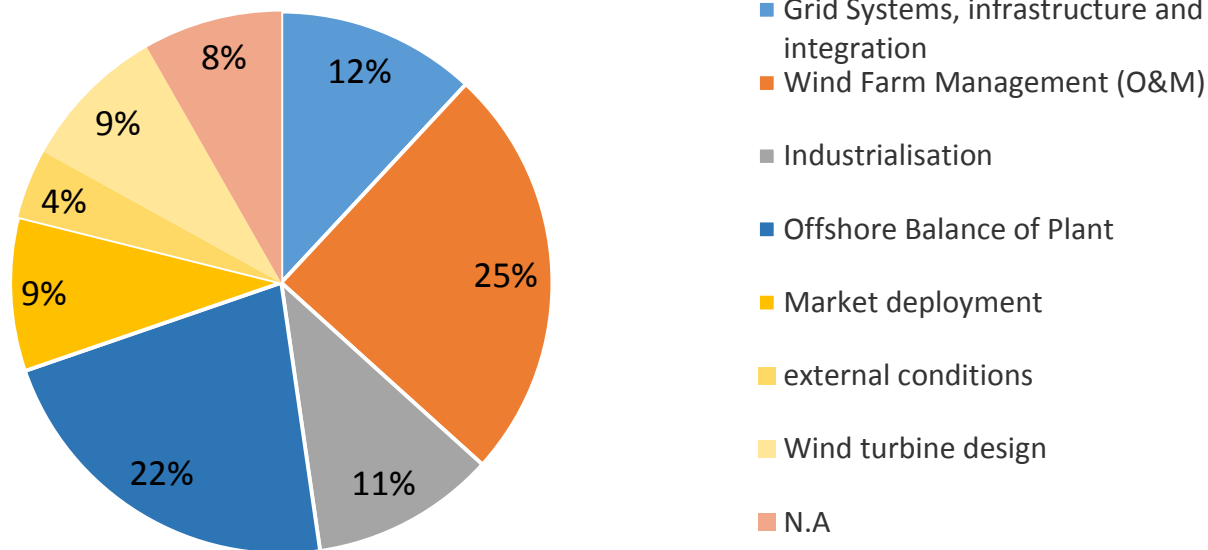
- Wind Farm Management (O&M) and Grid integration are seen as the main priority topic for R&I
- Market Deployment is essential to push R&I

Offshore wind Survey- Identifying future trends

Top priorities for Offshore Wind

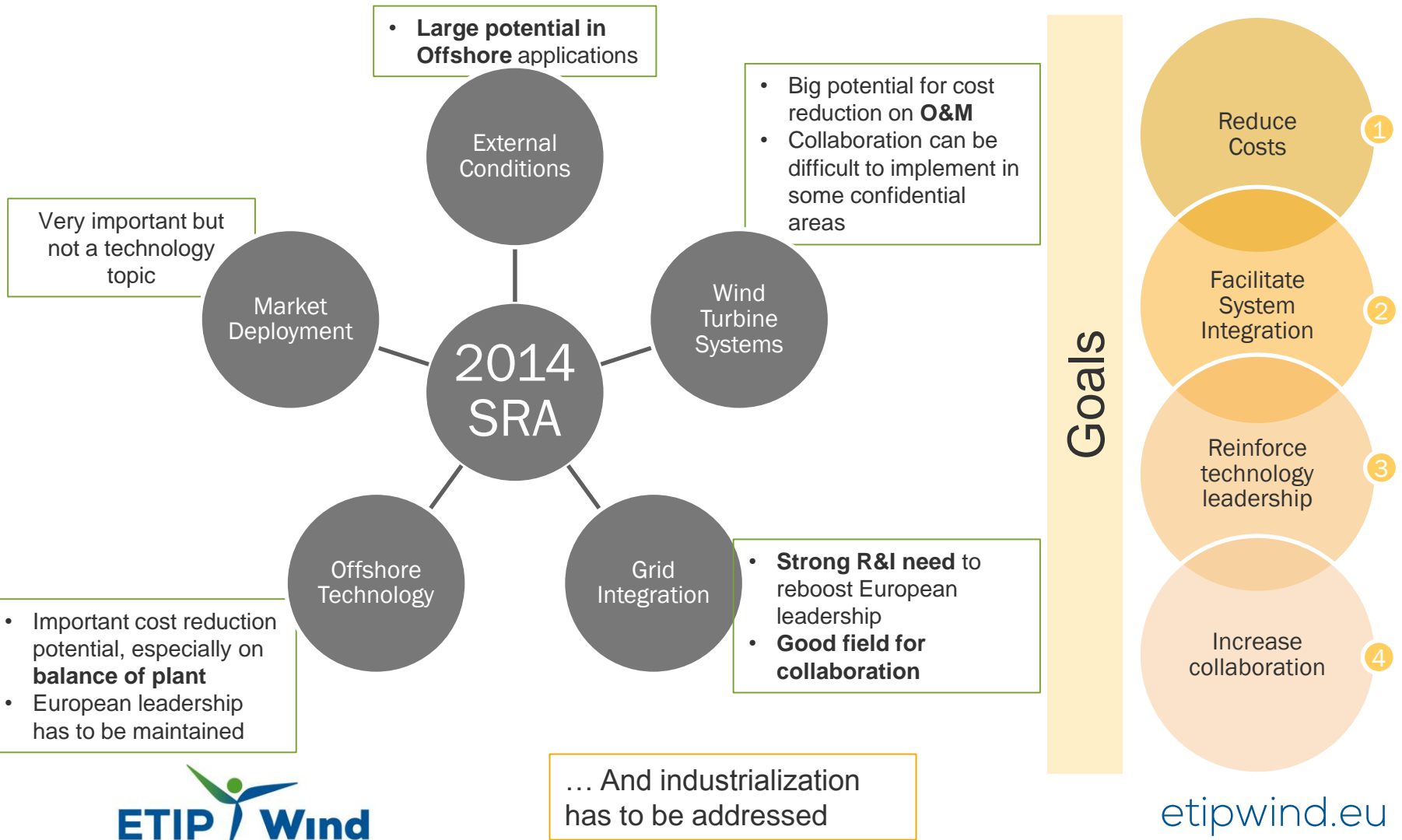


Offshore wind Survey- Identifying future trends



- O&M is still the main priority topic
- Offshore balance of plant triggers significant challenges
- Industrialization is a more important need compared to Onshore

Reconfiguring the SRA structure...



Fine tuning the key priorities per pillar

Wind Farm Management (O&M)

- Wind Turbine/Farm Control
- Maintenance planning
- Conditioning monitoring
- Big data analysis
- Reliability
- End of life strategy (inc. lifetime extension)

Grid Systems, Integration and Infrastructure

- Ancillary Services
- Power Market design
- Energy Storage
- Holistic grid management approach
- Grid codes
- Grid design& deployment (inc. HVDC)

Industrialisation

- New materials
- Standardization of components, test methods, quality levels
- Harmonization regulatory aspects (e.g. offshore)
- Supply Chain optimization
- Life Cycle, decommissioning

Offshore Balance of Plant

- Floating technology
- Industrialized foundations and towers
- Installation, transportation and logistics
- Offshore substations and cable



Market deployment Strategy

Conclusions (1/2)

Structure

- Existing SRA structure is not fully suited for today's situation. Generally, topics need to address both onshore and offshore
- Market deployment strategy is crucial, special category

Technology R&I Pillars

- **System integration:** insufficiently addressed. High priority for both onshore and offshore
- **Wind turbines systems:** less focus on turbine technology, more on Wind Plant management (O&M, reliability, end-of-life)
- **New category:** industrialization (Standards and test, new materials)
- **Offshore category:** most of the attention and increasing interest. More focus on balance of plant (foundation, logistics, weather interaction, floating technology)
- **External conditions** relevant, especially for offshore; crucial aspects to improve O&M

Conclusions (2/2)

Leading Countries

- In Europe, Germany, the United Kingdom and Denmark are (by far) the most active countries in wind R&I. NL and NO also very active in Offshore
- UK is (most active) leading Wind Offshore R&I. Worldwide, Europe has an important lead on Offshore, having almost all the installations.
- General feeling EU is leading in research. On grid integration, US leads developments on battery storage and Market Design.
- China fast increasing effort (fast market growth).

Research breakthrough

- Stakeholders consider that no major breakthrough has happened in the wind sector. Mostly incremental improvements drove R&I.

EC funding

- Important to lead progress. Significant changes needed to improve participation and effectiveness (faster from idea to results, flexibility, pre-qualification, IPR management challenging, etc.).

Quotes

“O&M represent the biggest potential for cost reduction”

“Optimize Installations and standardization represent high potential for cost reduction in offshore”

“Incremental research is the path to reducing the cost of Wind electricity”

“Public funding should favor a horizontal approach in order to tackle a wider range of issues and stimulate exchanges of ideas”

“Public funding should be spent on pragmatic research rather than theoretical considerations”



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Thanks for your attention

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