



European Wind Energy
Technology Platform

Wind Energy Technology Roadmap

Making Wind the most competitive energy source

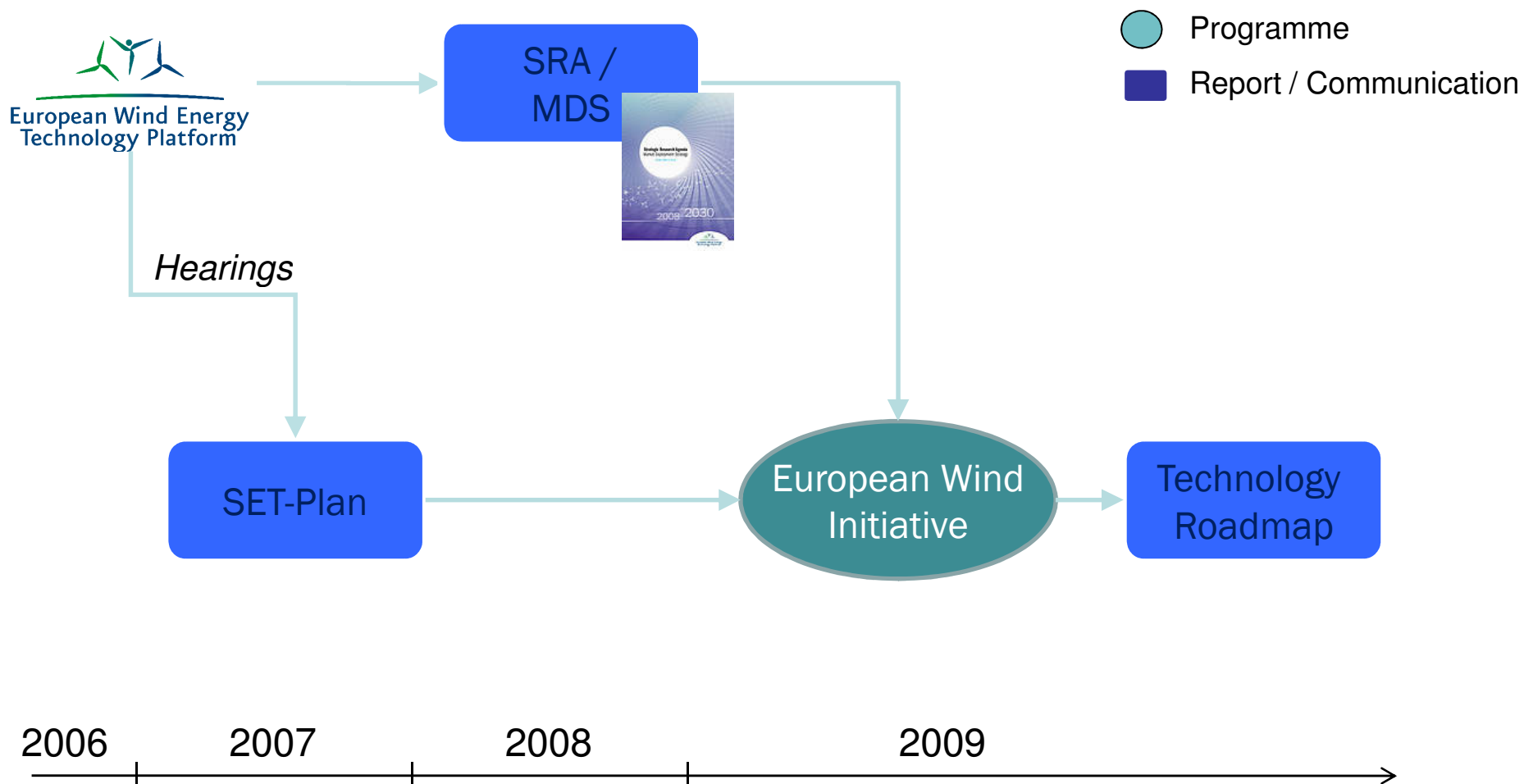
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TPWind involvement in SET-Plan process





European Wind Initiative – SET-Plan objectives (2007)

- ❑ *European Wind Initiative*: focus on **large turbines and large systems** validation and demonstration (relevant to **on and off-shore** applications).

- ❑ SET-Plan - Reaching 2020 objectives
 - **Double** the power generation capacity of the largest wind turbines, with **off-shore wind as the lead application**.
 - Enable a single, smart European electricity grid able to accommodate the **massive integration of renewable** and decentralised energy sources.

- ❑ SET-Plan - Reaching 2050 objectives
 - Bring the next generation of renewable energy technologies to **market competitiveness**.



EWI in 3 objectives

❑ To make wind energy the most competitive energy source on the market onshore in 2020, and offshore in 2030

❑ To enable the required large-scale deployment and grid integration of wind energy offshore and onshore with the aim of reaching wind penetration levels

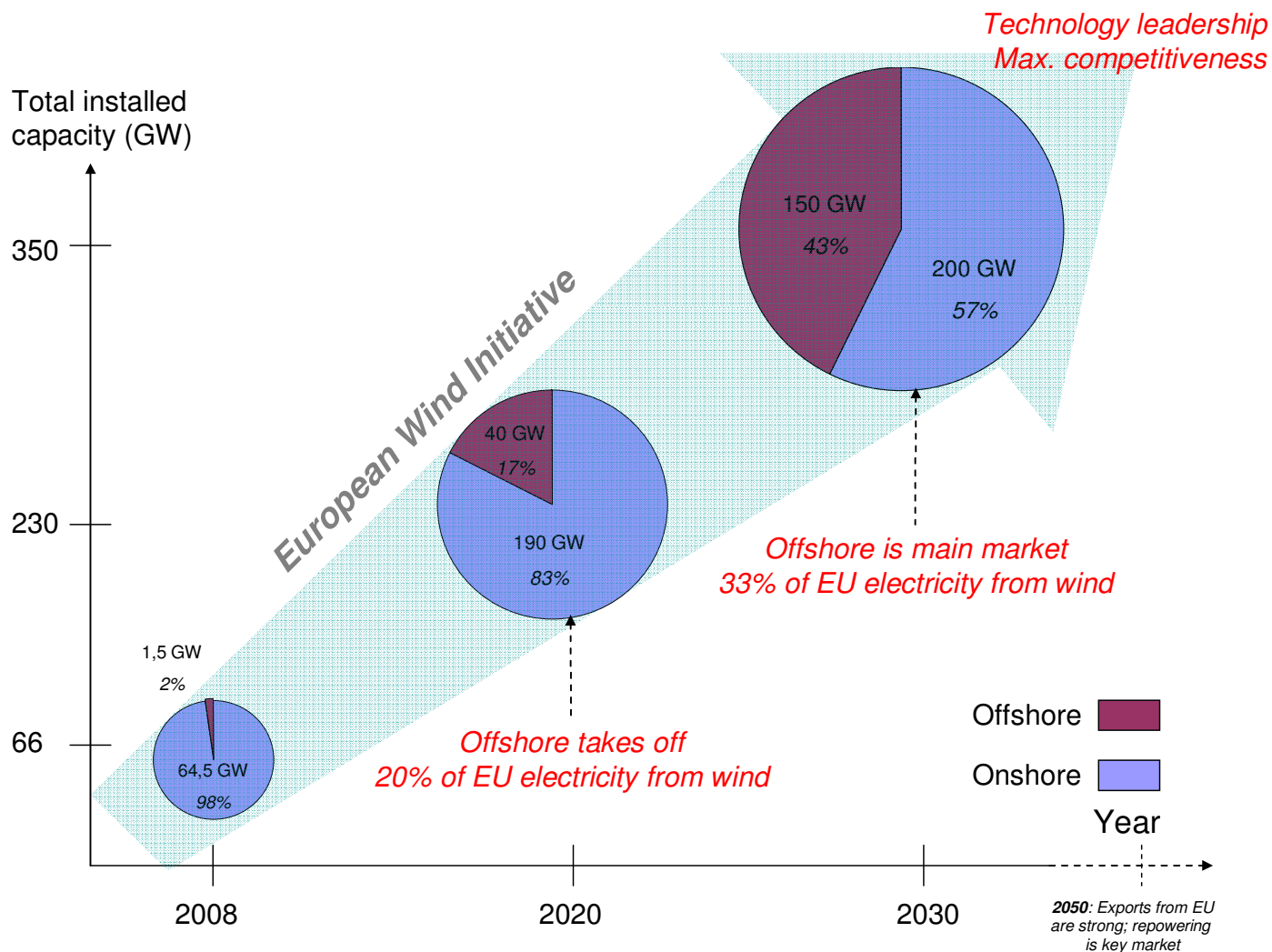
20% in 2020, 33% in 2030 and 50% in 2050

❑ Ensuring the European technology leadership on- and offshore, and developing large offshore wind turbines

Including exploring concepts up to 20 MW (10-20 MW range)

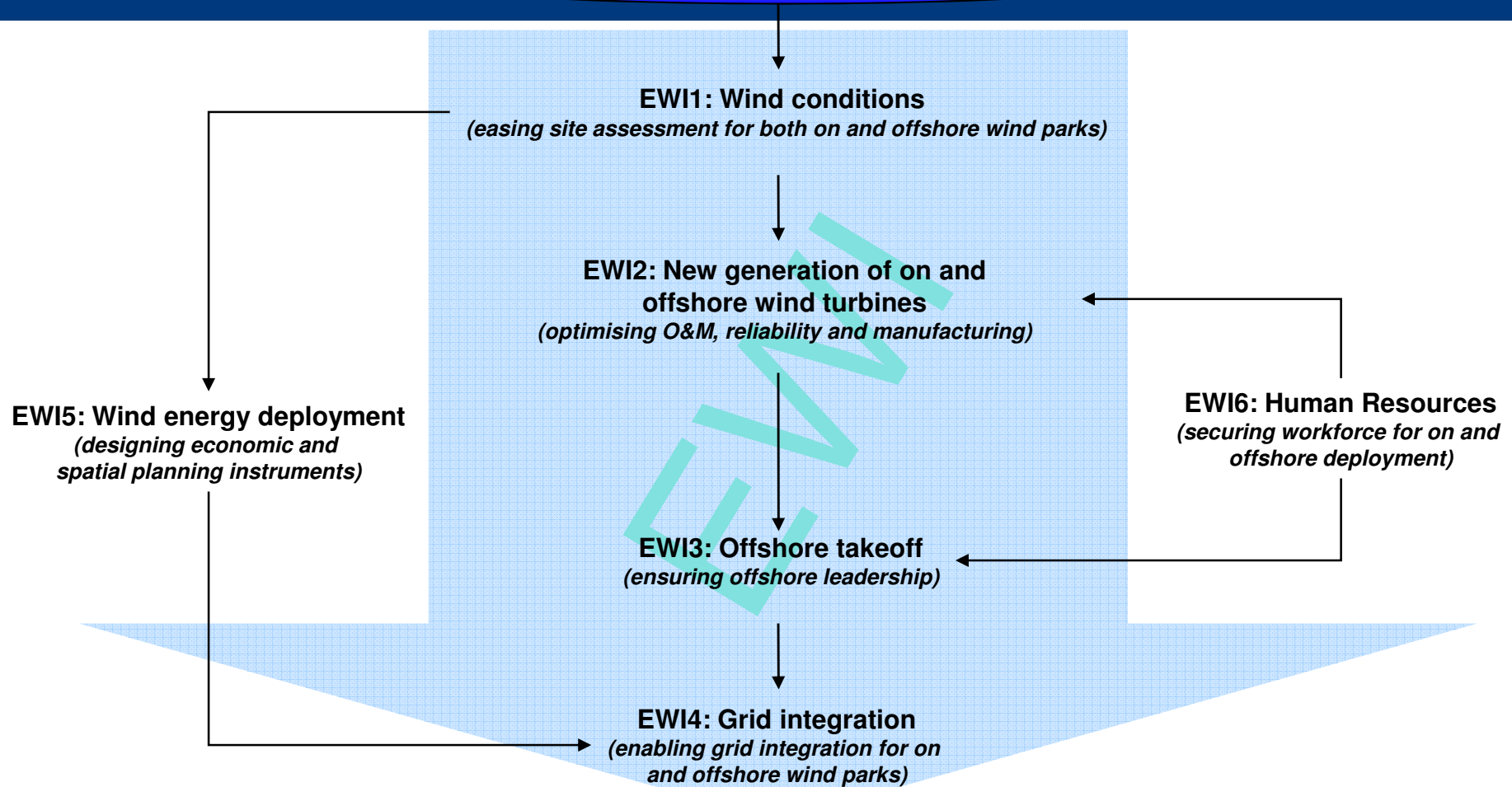


EWI – Large-scale high-tech roadmap





64.5 GW onshore / 1.5 GW offshore



High competitiveness / High penetration levels / Technology leadership

Financing Communication COM(2009) 519 final

□ Impact of the Wind Industrial Initiative:

- 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.



Technology roadmap SEC(2009) 1295

□ Strategic objective

- To improve the **competitiveness** of wind energy technologies, to enable the **exploitation of the offshore resources** and **deep waters** potential, and to facilitate **grid integration** of wind power.

□ Industrial sector objective

- To enable a **20%** share of wind energy in the final EU electricity consumption by 2020.



Technology roadmap

SEC(2009) 1295

4 sections:

- new turbines and components
- offshore technology
- grid integration
- resource assessment



New turbines and components - Objectives

- New turbines and components to lower investment, operation and maintenance costs
 - To develop **large scale turbines** in the range of 10 - 20 MW especially for offshore applications.
 - To improve the **reliability** of the wind turbine components through the use of new materials, advanced rotor designs, control and monitoring systems.
 - To further **automate and optimise manufacturing processes** such as blade manufacturing through **cross industrial cooperation** with automotive, maritime and civil aerospace.
 - To develop **innovative logistics** including transport and erection techniques, in particular in remote, weather hostile sites.



New turbines and components - Actions

- ❑ New turbines and components to lower investment, operation and maintenance costs:
 - A **R&D programme** focused on new turbine designs, materials and components addressing on- and offshore applications coupled with a demonstration programme dedicated to the development and testing of a large scale turbine prototype (10-20MW).
 - A **network of 5-10 European testing facilities** to test and assess efficiency and reliability of wind turbine systems.
 - An **EU cross-industrial cooperation and demonstration programme** drawing upon the know-how from other industrial sectors (e.g. offshore exploration) for mass production of wind systems focused on increased component and system reliability, advanced manufacturing techniques, and offshore turbines. A **set of 5 – 10 demonstration projects** testing the production of the next generation of turbines and components will be carried out.



Offshore Technology - Objectives

- ❑ Offshore technology with a focus on structures for large-scale turbines and deep waters (> 30 m).
 - To develop new **stackable, replicable and standardised** substructures for large scale offshore turbines such as: tripods, quadropods, jackets and gravity-based structures.
 - To develop **floating structures** with platforms, floating tripods, or single anchored turbine.
 - To develop manufacturing processes and procedures for **mass-production of substructures**.



Offshore Technology - Actions

- ❑ Offshore technology with a focus on structures for large-scale turbines and deep waters (> 30 m).
 - A **development and demonstration programme** for new structures distant from shore aiming at lower visual impact and at different water depths (>30m).
 - At least **4 structure concepts** should be developed and tested under different conditions.
 - A demonstration programme on **advanced mass-manufacturing processes** of offshore structures.



Grid integration - Objectives

- ❑ Grid integration techniques for large-scale penetration of variable electricity supply.
 - To demonstrate the feasibility of **balancing power systems with high share of wind power** using large-scale **storage systems** and High Voltage Alternative Current (**HVAC**) or High Voltage Direct Current (**HVDC**) interconnections.
 - To investigate **wind farms management** as “virtual power plants”.



Grid integration - Actions

- ❑ **A programme** focused on wind farms management as “virtual power plants” to demonstrate at the industrial-scale:
 - Offshore wind farms **interconnected to at least two countries** and combined with the use of **different grid interconnection techniques**.
 - **Long distance** High Voltage Direct Current.
 - Controllable **multi-terminal** offshore solutions with multiple converters and cable suppliers.

A virtual power plant is a cluster of distributed generation installations which are collectively run by a central control entity in order to increase the system flexibility (including with the support of existing storage systems) and to make the best of available potential (spatial smoothing)



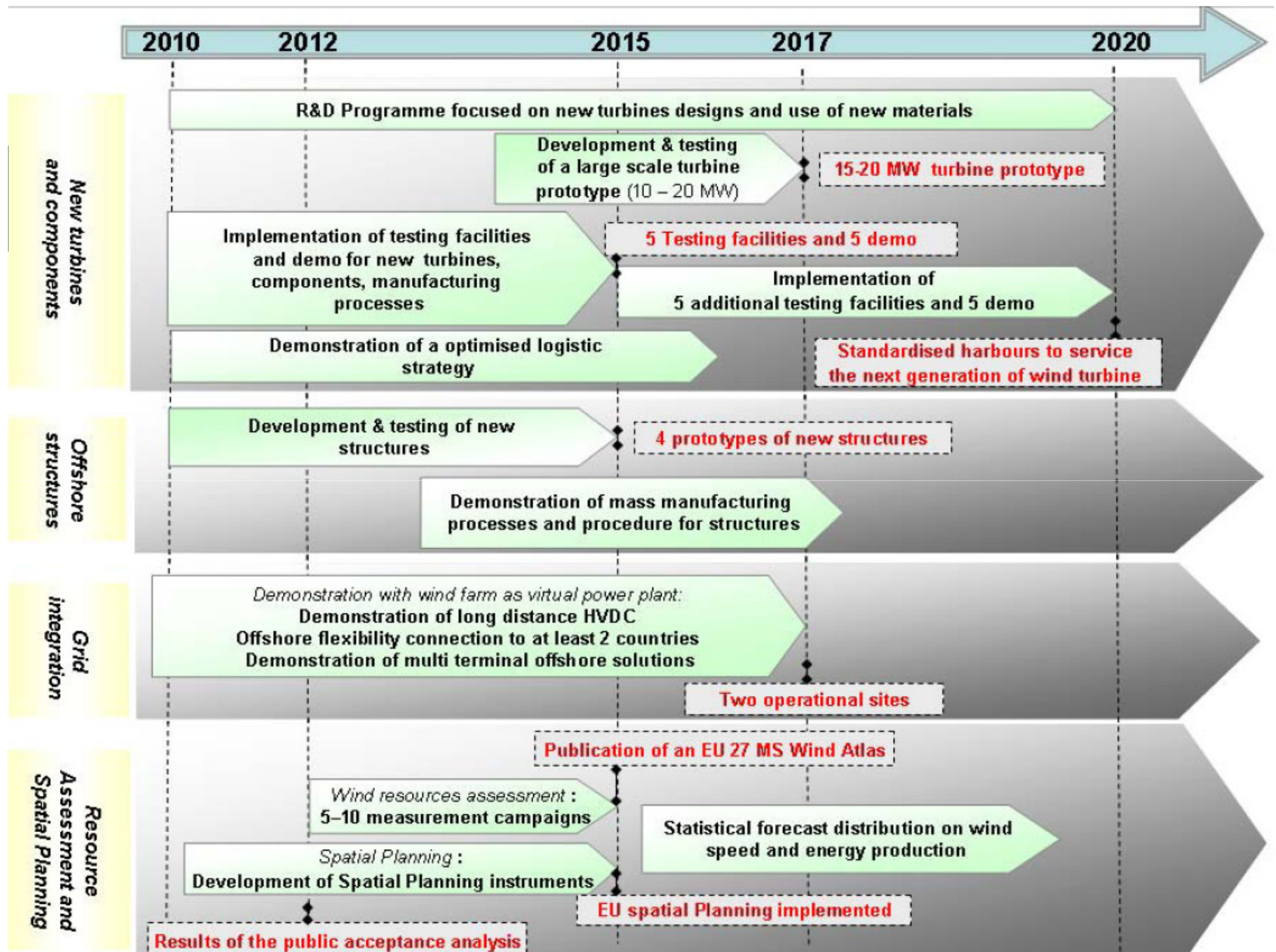
Resource assessment & spatial planning - Objectives

- ❑ Resource assessment and spatial planning to support wind energy deployment.
 - To assess and map **wind resources** across Europe and to reduce forecasting uncertainties of wind energy production.
 - To develop **spatial planning** methodologies and tools taking into account environmental and social aspects.
 - To address and analyse **social acceptance of wind energy projects** including promotion of best practices.



Resource assessment & spatial planning - Actions

- ❑ A **R&D programme** for forecasting distribution of wind speeds and energy production that includes:
 - Wind measurement **campaigns**.
 - **Database** on wind data, environmental and other constrains.
 - **Spatial planning tools** and methodologies for improved designs and production.





EWI / Wind Roadmap – 75 % match



EWI component	EWI Action	Roadmap
Wind conditions	European wind resource map	😊
	Measurement campaigns	😊
New generation of on and offshore turbines	Large long-medium term R&D programme	😊
	Industry-led full-scale European demonstration activities	😊
	Optimising manufacturing processes	😊
	Optimising logistics	😊
	Cross-industrial cooperation and demonstration program	😊
Offshore takeoff	Development of offshore access vessels, and best practices	😊
	Automated manufacturing of steel and concrete substructures of varying designs	😞
	Demonstration programmes to test innovations in offshore technology	😊
	Development of onshore facilities supporting offshore deployment	😊
Grid Integration	Strong coordination with the offshore oil & gas service sector	😞
	Grid management solutions	😊
	Long-term planning	😊
Deployment	New grid technology solutions	😞
	Support schemes	😊
	Long-term spatial planning	😞
Human Resources	Social acceptance of wind energy projects	😊
	A European training institute	😞



Missing elements

- ❑ **Grid planning** – coordination with the European Grid Initiative

- ❑ **Training** – coordination with the European Energy Research Alliance and the European Institute of Technology

- ❑ **Missing:**
 - Offshore access vessels, and best practices
 - Onshore facilities supporting offshore deployment



Indicative costs (2010-2020)

*“The overall breakdown of non-nuclear energy research financing in 2007 was 70% private to 30% public. Given the public policy-driven nature of the energy transition and the current economic situation, **a significant rise in the public share of the burden in the short term towards a more equal level of commitment** would have to be explored.” COM(2009) 519 final.*

Technology objectives	Costs (M€)
1. New turbines and components	2 500
2. Offshore structure-related technologies	1 200
3. Grid integration	2 100
4. Resource assessment and spatial planning	200
Total	6 000

- ❑ R&D investment: 383 M€ (2007)
 - Industry 292 M€ (76%)
 - Public 91M€ (24%)
- ❑ SET-Plan 600M€/y



Financing elements – Impact assessment SEC(2009) 1297

- ❑ 4 policy options are compared:
 - No action - BAU
 - increased funding channeled through the existing investment vehicles
 - a strengthening of the existing investment vehicles within modified institutional arrangements / specific mandate for the EIB to invest in infrastructural funds / using the Capacity Building Scheme
 - new investment vehicles
- ❑ Possible sources of funding:
 - ETS system from 2013 onwards, ETS NER, EEPR
 - Research Framework Programmes
 - CIP High Growth and Innovative SME Facility (GIF)
 - EIB: RSFF, Marguerite fund, a new “efficiency and renewables” instrument



Implementation – a complex issue

- ❑ **The industry has to be involved** – *not detailed by the Communication*
- ❑ The Wind Energy Roadmap **should work as a flexible rolling Programme**
- ❑ **Intellectual Property Rights and concurrence should not be an obstacle**
 - A light structure is needed for a quick implementation
- ❑ The SET-Plan **financing instruments are broad and complex**
 - The instruments will not evolve on short notice as legislative processes are lengthy
- ❑ **Coordination is needed** between instruments and between initiatives



Implementation – a first idea

- ❑ The main SET Plan governing body is the **SET-Plan High Level Steering Group** (SET-Plan SG)
 - European Commission, Member States, EIB

- ❑ Due to its composition, **this body can decide to implement parts of the roadmaps** through:
 - FP7 calls, CIP, ETS.. (EC, MS)
 - National programmes (MS)
 - EIB instruments (EC, EIB)

- ❑ What is missing?
 - **A body advising the SET-Plan SG on ‘when’ and ‘how’ launching ‘what’**



Implementation – a first idea

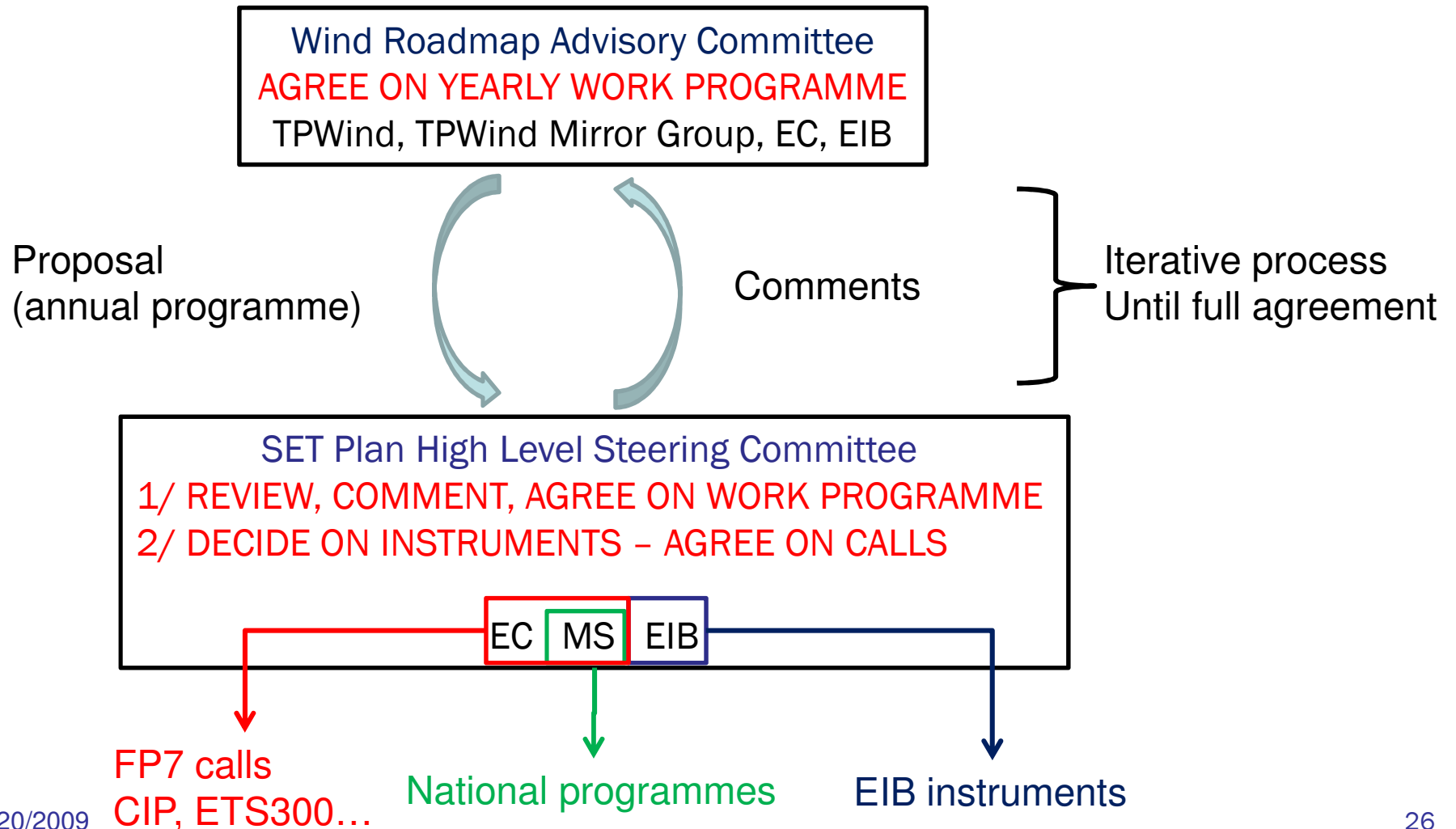
- ❑ Creating an **Advisory Committee (AC)** for each roadmap:
 - Technology Platform, EC, EIB + other roadmap representatives on ad hoc basis (*joined calls*)

- ❑ Role: **agreeing each year on** ‘when’ and ‘how’ launching ‘what’, with ‘which budget’

- ❑ The SET-Plan SG can **agree or propose changes** to the work programme – to be validated by the AC

- ❑ Once accepted, the SET-Plan SC would **propose funding sources** for the different activities, be it:
 - FP7 calls, Member States willing to participate through their national programme (Join programming), or EIB instruments

Implementation – a first idea





Implementation – first idea

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none">• Rapid to implement• Builds on existing structures• Builds on existing instruments• Flexible financing depending on the programme phase• No IPR or commercial issues• Enables step by step programme implementation• TPWind will propose programme updates	<ul style="list-style-type: none">• Lack of ambition?• High level of coordination needed• Bureaucratic• Follow up of programme difficult if processes not clear – cross references are needed in all calls + a central monitoring body (JRC?)	<ul style="list-style-type: none">• Rapid launch of Initiatives• Involvement of the industry• Coordination of existing instruments• Member States can join on ad hoc basis	<ul style="list-style-type: none">• SET-Plan SG should follow AC recommendations and not act by its own• Member States might not follow decisions from SET-Plan SG• All technologies will compete for getting funding every year (<i>if budget remains constant</i>)



SET-Plan Workshop Oct. 21-22 – A strong positive outcome

- ❑ The EC Wind Energy Roadmap represents **a very good starting point for boosting the development of wind energy** and contributing to the achievement of EU's 20% target for renewable energy production by 2020
- ❑ The Wind Energy Roadmap provides a **concrete and transparent plan**, which will give confidence to the sector by showing where future R&D efforts will lead it
- ❑ The Wind Energy Roadmap **shifts the focus from the coordination of isolated projects to the coordination of whole Programmes**, in order to maximize their effectiveness at EU level and their impact throughout the next decade
 - **to launch the wind initiative as early a possible**
- ❑ The Wind Energy Roadmap is the **successful outcome of a concerted process** that involved, since 2007, the European Commission, SETIS, Member States, the Industry and the Academia (represented through TPWind)



Time is the essence – a concrete proposal

- ❑ **Clear call from stakeholders** to launch the Industrial Initiative as soon as possible:
 - The industry should be involved
 - A simple approach is required for quick implementation
 - A proposal for implementation is made:
 - Advisory group to the Steering Group to preserve the programmatic approach and coordination of financing sources
 - Industry strongly involved for priorities and timing of implementation / yearly proposals

- ❑ Clarity is needed on the funding sources
 - To avoid loss of confidence of Industry and keep pace
 - Risk sharing approach
 - Grants schemes suited for RD&D
 - Loans and equity for deployment



Requires systemic approach

- ❑ **Grids** – not only a wind issue
 - Coordination within relevant Roadmaps
 - Urgent action required to avoid that grid issues become a showstopper
 - Coherence between SET-Plan effort, regulatory framework and i.e. TEN-E – a European grid concept is needed !

- ❑ Missing elements for an **integrated supply chain approach**
 - Education and training: critical for the success of the programme, need to be more emphasised and needs to find some structure to co-ordinate (EIT, Universities, EERA)
 - Key support elements and infrastructures (i.e. vessels, harbours)



Next steps

- Key points:
 - Implementing structure
 - Industry involvement
 - Coordination of funding sources
 - Key performance indicators

Thank you for your attention!



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