EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION

The European Wind Initiative

Wind Power Research and Development to 2020

Photo: Acciona

Contents

1. The European Wind Initiative (EWI)

To fight climate change, improve energy security, enhance Europe's competitiveness and maintain our technological leadership, the European wind industry — together with the European Commission and Member States — created a wind energy research and development programme covering the 2010 - 2020 period. The European Wind Initiative (EWI) has a planned budget of €6bn, more than half provided by the wind power industry. The objectives are[1] to:

- maintain Europe's technology leadership in onshore and offshore wind power;
- make onshore wind the most competitive energy source by 2020, with offshore following by 2030;
- achieve a 20% share of wind energy in EU total electricity consumption by 2020;
- create 250,000 new skilled jobs in the EU by 2020.

To achieve these objectives, the EWI prioritises R&D in new turbines and components, offshore technology, grid integration, resource assessment and spatial planning.

EWI: a European focus and a global ambition

The European Wind Initiative is the roadmap to reduce the cost of wind energy. It will pave the way for the large-scale deployment of wind energy worldwide, and secure long-term European technological and market leadership.

The EWI will take the European wind industry to the next stage. It will develop the wind energy technology of the future, the necessary testing facilities, streamlined manufacturing processes, and maintain Europe's global technology leadership.

To achieve this vision, the EWI focuses on four main technology areas:

- new turbines and components;
- offshore technology;
- grid integration;
- resource assessment and spatial planning.

Through the following key research activities:

- increasing reliability, accessibility and efficiency of wind turbines;
- developing new grid management methods to allow high levels of wind power in the electricity system;
- developing wind turbine technology and manufacturing — both for onshore and offshore — to reduce the cost of wind energy. Prototypes of large-scale wind turbines in the 10 - 20 MW range will also be developed and demonstrated;
- improving the design and layout of wind farms;
- supporting the take-off of the offshore wind industry in the short to medium term and ensure long-term offshore technology leadership;
- demonstrating large wind turbine prototypes and large, interconnected offshore wind farms;

[1] SEC(2009) 1295, COM(2009) 519 final and EWI 2010–2012 Implementation Plan

- optimising the maintenance, assembly and installation of offshore turbines and their substructures;
- enabling the large-scale grid integration of onshore and offshore wind energy;
- simplifying site assessment, and gather data for improved designs on- and off-shore;
- developing new wind energy models and wind condition maps to enhance wind energy forecasts;
- designing the economic and spatial planning instruments to deploy onshore and offshore wind energy technologies.

The timely implementation of the EWI will lead to high wind energy penetration levels, reaching 20% in 2020, 33% in 2030 and 50% in 2050[2].

The EWI is implemented by the Wind European Industrial Initiative Team (Wind EII Team), established in 2010. The Wind EII Team is composed of EU, national, TPWind and EERA (European Energy Research Alliance, a network of EU R&D Institutes) representatives.

Their goal is to translate the EWI into annual funding recommendations for EU institutions and Member States. Funding recommendations are outlined in annual EWI Work Programmes.

[2] EWEA's targets today are 15.7% in 2020, 28.5% in 2030 and 50% in 2050

Photo: EWEA

Sustained European technology leadership

Total installed capacity (GW)

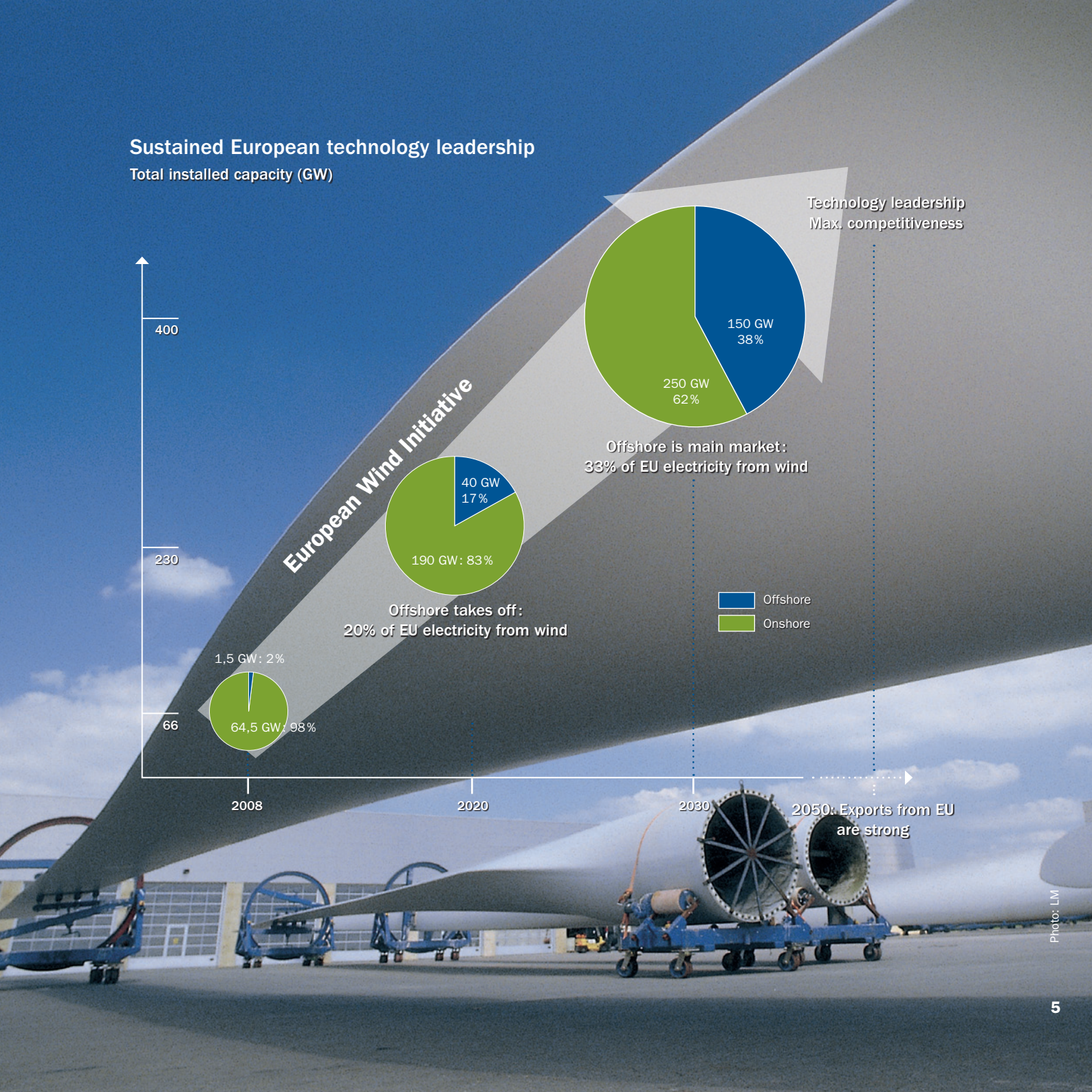
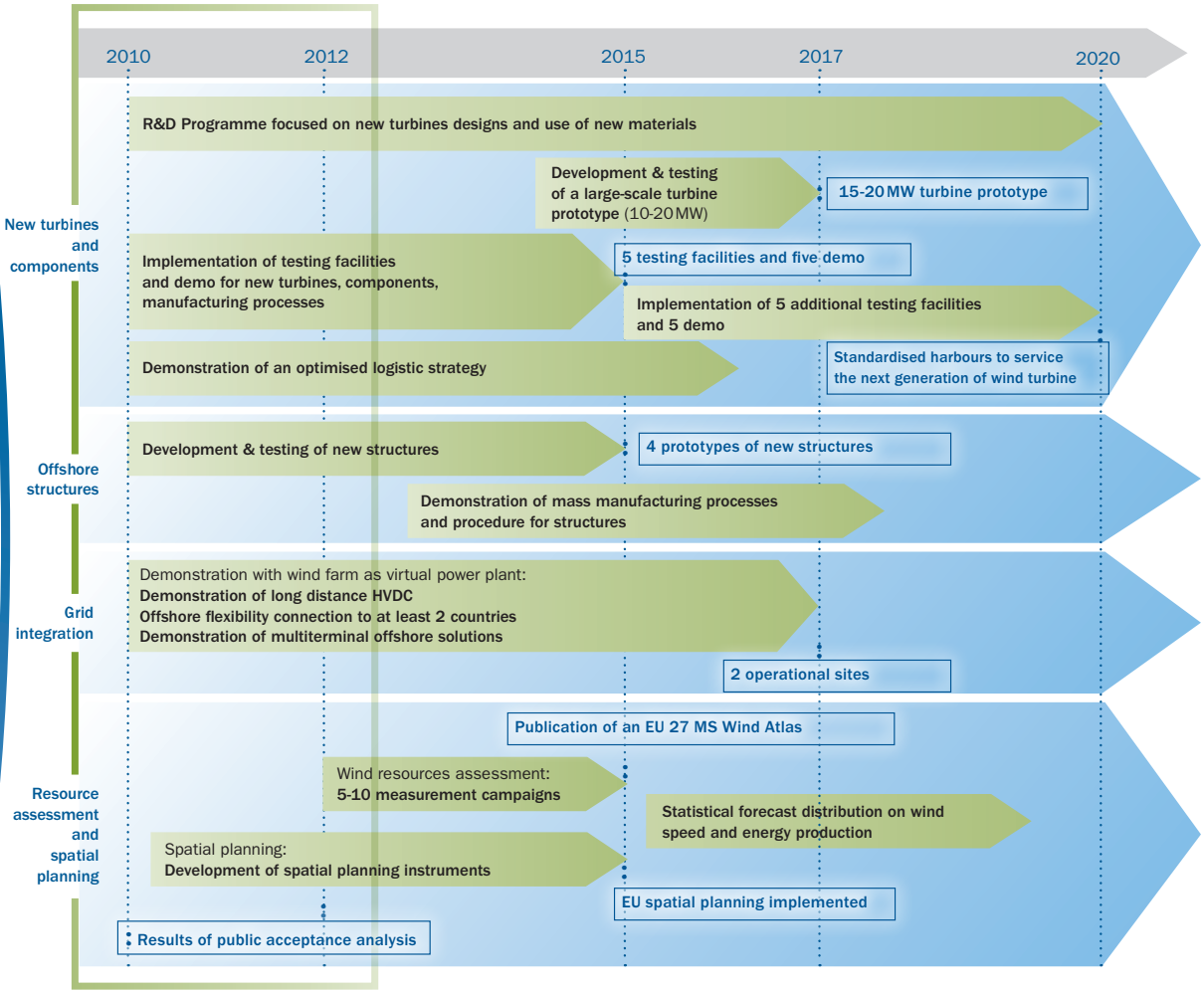


Photo: LM

EWI: priorities for 2010 - 2015

Because the EWI was developed by TPWind in cooperation with the European Commission and EU Member States, it was the result of a shared process. It was finalised in 2009 and submitted to the European Commission, which published it as the Wind Energy Roadmap. As requested by EU Institutions and Member States, TPWind developed the EWI 2010 - 2012 and 2013 - 2015 Implementation Plans. The first plan was published after the official launch of the EWI in 2010; the second will be published by the EC in 2013.



Source: European Commission, "A Technology Roadmap" - SEC(2009) 1295

For the 2013 - 2015 period, the EWI will launch several priority activities in the four strategic technology areas:

New turbines and components

- introduce large scale turbines and innovative design for reliable turbines rated 10–20 MW;
- improve reliability of large wind turbines and wind farms;
- optimise and demonstrate turbines for complex terrain and cold climates;
- define methods and standards for testing large wind turbine components;
- improve size and capabilities of system-lab testing facilities for 10 - 20 MW turbines;
- provide field testing facilities for 10 - 20 MW to increase reliability;
- encourage mass production of large scale turbines, and develop cost effective methods to transport and install these machines.

Offshore technology

- introduce new bottom fixed substructures minimising lifecycle costs;
- devise new modelling techniques;
- facilitate mass manufacturing of substructures and improved logistics;
- develop and demonstrate multi-MW floating platforms;
- improve facilities, infrastructures and logistics for offshore wind;
- reduce installation noise and environmental impact;
- increase reliability and improved O&M strategies;
- extend turbine life-time and plan decommissioning;
- improve design models and practices;
- improve measurement technology;
- develop an EU offshore atlas.

Grid integration

- connect wind farms to multi-terminal offshore grids;
- improve HVDC connected wind power plants;
- improve electrical design of wind power plants and connection to networks (AC or DC, onshore or offshore);
- develop wind plant modelling for system studies;
- provide better grid support services;
- test wind power plant capabilities (methods and facilities);
- analyse wind power impact on electricity markets;
- improve wind power forecasting techniques.

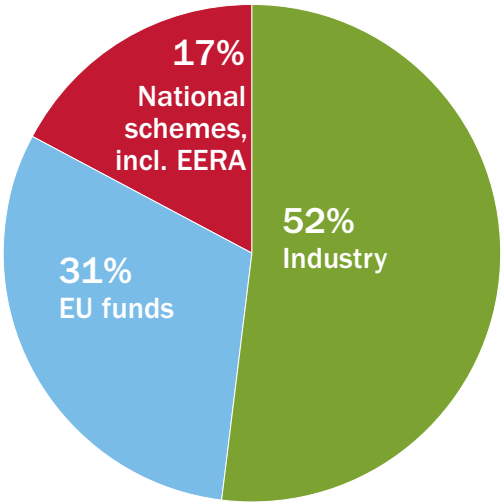
Resource assessment and spatial planning

- analyse wind and weather conditions in the EU;
- study wind resources and loads;
- reduce noise emissions;
- recycle turbines and devise end-of-life scenarios;
- improve passive and active turbine aerial markings;
- analyse wind energy environmental impacts and benefits;
- improve offshore planning procedures;
- analyse present and future wind energy costs;
- analyse the economic and social costs and benefits of wind power;
- review the impact of industrial policies for wind.

Financial resources for successful implementation

The implementation of EWI requires an annual investment of public and private resources of approximately €600 million (totalling €6bn between 2010 and 2020).

According to TPWind estimates, the wind industry should finance 52% of the total estimated budget, the EU 31%, and Member States 17%.



Where do the EU funds come from?

For the 2007 - 2013 period:

- **The 7th Framework Programme for Research and Technological Development (FP7).** This is the EU's main tool to finance the SET-Plan priorities. The funding is provided via annual calls for proposals.
- **The Intelligent Energy Europe Programme (IEE).** This also funds European energy policy via annual calls for proposals. It will be part of Horizon 2020 during the 2014 - 2020 financial period.
- **The 2009 European Energy Programme for Recovery (EEPR).** This is a one-off support mechanism, to co-finance offshore wind demonstration projects while boosting Europe's economic recovery.
- **European Investment Bank (EIB) instruments.** The most notable is the **Risk Sharing Finance Facility** (RSFF).

For the 2014 - 2020 period:

- **Horizon 2020** (replacing FP7) will combine all research and innovation funding currently provided through the FP7, the innovation related activities of the IEE, and the European Institute of Innovation and Technology. It will cover all research stages including demonstration projects, such as those funded by the EEPR.
- **European Investment Bank (EIB) instruments.** The Risk Sharing Finance Facility will be replaced by **Access to Risk Finance Facility** part of which is explicitly dedicated to SET-Plan activities— soft loans and equity participation for RDI projects.

Progress so far

The EWI has a planned budget of €6bn for 2010 - 2020, to be provided by the private and public sector, with the industry funding approximately 52% of the total. EU and national authorities should allocate an average of €288m per year to ensure the implementation of the initiative. EU funds are expected to cover 31% of the EWI estimated budget, resulting in annual investment of approximately €186m.

The following EU financial resources have been allocated to various EWI strategic technology areas[3]:

EWI Technology area	EU funds allocated so far (2010-2012)
EWI Technology area	EU funds allocated
1 New turbines and components	€36.2m The most significant EU project in this field so far is UPWIND (http://www.upwind.eu/)
2 Offshore technology	€604.2m This amount includes several FP7 projects and the European Energy Programme for Recovery (EEPR), which provided €565m to nine innovative offshore wind energy projects in 2009. The most significant EU projects so far in this strand are: • MARINA PLATFORM, managed by Acciona (http://www.marina-platform.info/index.aspx) • ORECCA and HIPRWIND, coordinated by the Fraunhofer Institute (http://www.orecca.eu and http://www.hyperwind.eu/) • DEEPWIND and MERMAID, managed by DTU Wind (http://www.risoecampus.dtu.dk/Research/sustainable_energy/wind_energy/projects/VEA_DeepWind.aspx?sc_lang=en and http://www.mermaidproject.eu/) • H2OCEAN, coordinated by Meteosim Truewind S.L. (http://www.h2ocean-project.eu/) • TROPOS, managed by the Consorcio plataforma oceanica de Canarias (http://www.troposplatform.eu/)
3 Grid integration	€73.01m This amount also funds the implementation of the European Electricity Grid Initiative (EEGI) and should therefore be split with it. Like the EWI, the EEGI is part of the SET-Plan and has similar objectives related to grid integration of renewables. The most significant EU project in this field so far is TWENTIES (http://www.twenties-project.eu/)
4 Resource assessment and spatial planning	€16m
Total	**€729.41m**

[3] Until August 2012, when this brochure was drafted.
We took into consideration actions contributing to EWI implementation, even those started before the EWI was launched in June 2010 (FP6, EEPR, FP7 and IEE). However, actions completed before June 2010, were not taken into consideration.

EU institutions met their EWI funding target for the first three years of implementation (2010 - 2012) largely thanks to the EEPR, which provided almost 78% of the total EU allocation. However, the EEPR was a 2009 one-off emergency plan to fight the economic and financial crisis and is not an active EWI funding instrument.

Apart from EEPR funds, the European Commission allocated €164.41m to the EWI through the FP6, FP7 and IEE Programme (i.e. as from 2006, when the UPWIND project was launched). This corresponds to an annual average of €27.4m, which is considerably below the EU annual funding target of €186m (€1.3bn from Horizon 2020). From 2014, EU institutions should therefore increase their annual financial contribution by almost seven times, to ensure a proper implementation of the EWI in the years ahead. Horizon 2020, which will replace the FP7 and IEE Programme from 2014, should address this to avoid a shortfall in planned EU funding targets.

The low EU budget and lack of coordination of EU and national funds — which is one of the SET-Plan pillars — are slowing down the implementation of the EWI.

Both issues should be addressed in the next EU programming period (2014 - 2020). Simpler, more effective EU-national cooperation mechanisms should be put in place and dedicated and sufficient EU funds should be allocated.

EWI Component	Total planned budget (€m)	2013 – 2015 estimated budget (€m)	2013 – 2015 expected EU financial contribution (€m)	2013 – 2015 budget share (percentage of EWI budget spent over the 2013 – 2015 period)
1. New turbines and components	2,500	630 (763 in 2010 - 2012)	195	25%
2. Offshore technology	1,200	790 (315 in 2010 - 2012)	244	66%
3. Grid integration	2,100	235 (337.33 in 2010 - 2012)	72	11%
4. Resource assessment and spatial planning	200	86 (36 in 2010 - 2012)	26	43%
Total	**6,000**	**1,741** (1,443 in 2010 - 2012)	**537**	**29%** (24% in 2010 - 2012)

EWI requirements for 2013-2015 and beyond

The EU plans its budget for seven year periods, the current one running from 2007 to 2013 and the new one starting in 2014. However, the EWI follows three year planning cycles. Consequently the EWI implementation plan for 2013 - 2015 falls between two EU financing periods – FP7 and Horizon 2020.

The budget envisaged for the 2013 - 2015 period (as defined in the EWI Implementation Plan) is outlined in the table on page 10.

Despite the different EU programmes available, wind energy R&D remains underfunded. There is a significant gap between the financial needs recognised by the European Commission and the funds that have been allocated. For the new EU financial perspective 2014 - 2020, the European wind industry calls for €1.3bn in a dedicated budget line. But achieving this could be difficult: the proposed Horizon 2020 non-nuclear energy research budget of €5.6bn, covering all energy technologies and IEE programmes, is not sufficient, even with the inclusion of the additional €1bn for the SET-plan as suggested in the Access to Risk Finance Facility. Moreover, the proposal contains no clear indications for SET-Plan technologies, such as budget lines or funding targets.

Photo: EDF

EWEA recommendations

For the new EU financial framework 2014 - 2020:

- fulfil the Europe 2020 vision of 3% of GDP allocated to research;
- provide adequate support to renewable energy research, development and innovation matching the SET-Plan objectives - thereby adapting the EU financial perspectives to the Europe 2020 Strategy and the 2020 renewable energy targets;
- substantially increase wind energy R&D funding, and to maintain Europe's global leadership in wind technology;
- establish a dedicated budget line with €1.3bn for the EWI under the Horizon 2020 to provide financial and political security for investment in long-term projects;
- ensure strong involvement of the EIB in the SET-Plan by financing projects with a greater technological risk and secure that at least €1bn of the Access to Risk Finance Facility is spent on SET-Plan projects.

For implementation of the SET-Plan:

- ensure a robust EU political and financial framework for implementation of the SET-Plan as a key instrument for maintaining EU technology leadership and promoting renewable energies;
- ensure effective coordination of EU and national wind energy R&D funds by simplifying current mechanisms (e.g. ERANET+) or creating new ad-hoc ones;
- follow the funding recommendations of the Wind EII Team at both the EU and national level to make sure that public funds are allocated where the wind energy sector needs them;
- allow for a 'bottom-up' approach to wind R&D topics identification by publishing open calls for proposals to address the most compelling research needs and market gaps;
- avoid the creation of new complex SET-Plan implementation mechanisms: current mechanisms (IEE Teams) have proven effective and should be reinforced.

2. Background

The Strategic Energy Technology Plan

The Strategic Energy Technology Plan (SET-Plan)[4] published by the European Commission in November 2007 aims to increase, coordinate and focus EU support for key low-carbon energy technologies, such as wind power.

The SET-Plan began with the establishment of the **European Industrial Initiatives (EIIs – the EWI being one of them)**[5] which bring together industry, the research community, the Member States and EU Institutions to develop key energy technologies chosen by the European Commission at EU level.

The funds required to implement the SET-Plan have been estimated at up to €71.5bn, of which €6bn should be allocated for the wind power sector.

The SET-Plan has two major timelines:

For 2020, the SET-Plan provides a framework to accelerate the development and deployment of cost-effective low carbon technologies such as wind power. This framework is needed to help meet the 2020 targets to reduce greenhouse gas emissions by 20%, and ensure that 20% of Europe's energy comes from renewable energy sources.

For 2050, the SET-Plan sets a target of limiting climate change to a global temperature rise of no more than 2°C. This is in line with the goal of reducing EU greenhouse gas emissions by 80-95%. The SET-Plan aims to lower the cost of renewable energy and place the EU's renewable energy industry at the forefront of the rapidly growing low carbon technology sector.

[4] http://ec.europa.eu/energy/technology/set_plan/set_plan_en.htm

[5] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52009DC0519:EN:HTML:NOT

The SET-Plan objectives for 2020 and 2050 are aligned with the objectives of the wind energy sector

These are outlined in the Strategic Research Agenda[6] published by the European Wind Energy Technology Platform (TPWind).

• **Phase 1: Short term (2020).** The market matures in Western Europe and develops in Central and Eastern Europe. Competition from low labour cost countries intensifies. Large-scale deployment of offshore wind energy begins. Installed wind power capacity reaches 230 GW, of which 40 GW is offshore. In 2020, wind energy meets 20% of EU electricity consumption.

• **Phase 2: Medium term (2020 - 2030).** Wind energy continues to develop both onshore and offshore, with further cost reductions and high penetration levels. Deep offshore technology expands on an industrial scale. Exports from Europe grow substantially. Installed capacity reaches 400 GW in 2030, and annual installations reach 20 GW. Half is offshore and 7.5 GW comes from repowering. In 2030, wind energy accounts for 33% of EU electricity consumption.

• **Phase 3: Long term (2030 - 2050).** The main European market is offshore wind. Repowering and exports from Europe are substantial. In 2050, wind energy provides 50% of the EU's electricity needs.

[6] http://www.windplatform.eu/92.0.html

The wind industry's R&D network: TPWind

The European Wind Energy Technology Platform[7] (TPWind) is a network and R&D forum that brings together more than 150 wind energy researchers and experts, representing the major EU players in the sector. TPWind is financed by the European Commission and coordinated by the European Wind Energy Association (EWEA), which hosts its Secretariat. EWEA manages the platform in cooperation with Garrad Hassan, now part of the Germanischer Lloyd group, and DTU Wind (Technical University of Denmark).

TPWind is critical for the SET Plan process: it developed the European Wind Initiative in cooperation with the European Commission and Member States and its 2010 - 2012 and 2013 - 2015 implementation plans. It is now supporting the European Commission and Member States to ensure the plan is achieved.

At the Barcelona European Council of 2002, the European Union set the goal of increasing its research effort to 3% of GDP by 2010. Technology platforms were set up to help achieve this. They brought together public and private organisations, to define a common R&D agenda in strategic sectors such as wind energy. The aim was to mobilise a critical mass of public and private investment, to strengthen Europe's global leadership in wind technology.

[7] http://www.windplatform.eu/

Photo: Siemens Vattenfall

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About EWEA

EWEA is the voice of the wind industry, actively promoting wind power in Europe and worldwide. It has over 700 members from almost 60 countries, including wind turbine manufacturers with a leading share of the world wind power market, plus component suppliers, research institutes, national wind and renewables associations, developers, contractors, electricity providers, finance and insurance companies, and consultants. This combined strength makes EWEA the world's largest and most powerful wind energy network.

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