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Traditional and new fields for shipyards´ activities – some selected ideas

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Pre-Remarks and State of the Art-1

No Market Forecast (see OECD, SEA Europe, Fairplay, Clarkson Research, Douglas-Westwood and national associations et al), but a brief introduction into the

State of the Art – current situation of shipbuilding: Overcapacities and oversupply (see in detail Session 1, see alsoVSM 2015, 38):

New slump in the global market. Despite low crude oil prices&low interest rates, shipbuilding investments are low. Supply of transport capacities exceed demand (sharpened by a large number of ships still on order)

New ship orders fell substantially during the 1st half of 2015 (ship sizes tended to increase)

Pre-Remarks and State of the Art-2

Korea reclaims in 2015 the lead in the market share among the shipbuilding nations (followed by Japan and China)

In 2015 (first half) container vessels were ordered more frequently, doubling their market share (compared to 2014); demand for cruide oil tankers has recovered whereas the market share of bulk carriers has been cut in half.

In 2015 many yards, including major companies in Korea, Japan and China, have incurred substantial losses while smaller yards went bancrupt.

Between December 2014 and July 2015, newbuilding prices have dropped by 5 percent.

Future trends and Global Maritime Technology Market (Expectations) - 1

Maritime Technology Market (Expectations): Despite the current glooming situation of shipbuilding, there is a bright future for the maritime industries by using new technologies, the emergence of new markets and sustainable trends (= as **drivers for future development**):

- *Development of global population and commodity flow*. Despite the sluggish increase of the world population, many people (especially in parts of Asia, Africa, Latin America) want to increase their living conditions. That means that in the future global trade will increase, and due to this, sea-borne trade (roughly 90 percent of global trade) as well.

Future trends and Global Maritime Technology Market (Expectations) - 2

- *Diversification/shift away from the traditional economic centres (Europe, North America, East Asia): In the future the „rest of Asia“, Latin America, Africa will be more included into the global flows (McKinsey 2014)*
- *Trend of currently non-shipping countries to build up their own shipping lines*
- *Climate Change* - Sustainability
- *Rising Demand of Energy* – Renewable Energy
- *Rising demand of food* – other basic foods (like algae)
- *Shortage of raw materials* – (not only continental areas of mining)

Future trends and Global Maritime Technology Market (Expectations) - 3

This offers opportunities for „traditional“ maritime branches like shipbuilding, shipping, fisheries, **and** non-maritime branches (like mining, elictricity & energy, IT, construction, food processing industries etc. etc.)

Threats: Political instability, lack of will to cooperate (between companies, branches, countries and world regions), technical risks, environmental uncertaincies, difficulties of financing

Future trends and Global Maritime Technology Market (Expectations) - 4

Global Maritime Technology Market – Sales Expectancy

= 355 Billion USD per annum (Brodda 2015).

From that

1. 197 billion USD come from system integration; shipyards; project developer (Building of new ships incl. Floating Offshore); Repairing&Retrofitting; Marine-Navy (newbuilding and repair), Fixed Offshore Structure, Offshore Wind Energy, Boat Building
2. 169 billion USD come from Equipment, Materials, Services (see items Point 1 + Offshore Subsea, Port Equipment, Maritime Monitoring and Security Systems).

Future trends and Global Maritime Technology Market (Expectations) - 5

These expectations are not including so called expectation markets like

- Deep Sea Mining (from 2025 onwards 5 – 12 billion EURO per annum)
- Gas Hydrates
- Other Renewable Energies than Offshore Wind
- Maritime biological populations (like algae etc.)

Remark: The expectation of capital expenditure only of the Offshore Wind Energy market between 2015 and 2024 is in total 240 billion Euros – that means 24 billion Euros per annum (Douglas Westwood 2014a) – details see below

Cluster (Meso Level), Diversification (Micro level), Path dependent developments of shipbuilding/shipyards - 1

How to meet these challenges/opportunities?

1. *Construction of Clusters (Meso Level), assisted by Public Industrial Policies (for the latter, see below). Features are:*

- Regional Concentration/Focus
- Flexible/spatial Specialization
- Competition and Cooperation
- Innovation based Knowledge
- Joint Identity and Trust

Cluster (Meso Level), Diversification (Micro level), Path dependent developments of shipbuilding/shipyards - 2

2. Diversification of shipyards (Micro level), to be understood as enlargement of the product portfolio or of the business domain. Here different dimensions can be identified:

- Markets (regions, groups of customers, groups of demand)
- Items (products, performance, technologies)
- Resources (raw/basic material, facilities/equipment, manpower, Know How/knowledge).

Cluster (Meso Level), Diversification (Micro level), Path dependent developments of shipbuilding/shipyards - 3

The starting point of the concept of „*focussed diversification*“ are the core competences of the respective shipyard.

Target is to develop *and* to marketize new products within new markets by using and further development of existing competences.

This lead to the *path depedency* of the shipyards´ focussed diversifaction strategies:

On-path evolution (Martin 2010)=*Continuous* (and *not abrupt*) change, by modified competition rules, new competitors, technological developments and new locations.

Cluster (Meso Level), Diversification (Micro level), Path dependent developments of shipbuilding/shipyards - 4

Decisive factors for the success of path-dependent developments of shipyards are:

- Special capabilities
- Market opportunities
- Regional conditions
- Pushing actors: Entrepreneurship and Public Industrial Policies

Industrial policies by maritime countries as a framework for the development for shipbuilding/shipyards

1. There are different understandings of „Industrial Policy“, coming from the „Varieties of Capitalism“ (Hall, Soskice 2001) considering the different, historically grown understandings, options of acting and strategies by single countries or/and world regions (e.g. EU, East Asia, North America).
2. Saying this, the core of Industrial Policies is *Innovation Policy:* National support programs for R&D + industrial innovation become increasingly important for economic development. Typical characteristics are:

   stronger emphasis on stimulating market forces,

   innovation-enhancing framework conditions,

   support of cooperation activities, networks and regional clusters („open innovation“).

New Markets/new forms of Organization for Shipyards - 1

Drafting from „FutureTrends“ (see charts 5&6), new markets/new forms of organizations are waiting for shipyards to be entered/applied:

- Deep Sea Mining
- Offshore – Oil and Gas
- Green Shipping: New forms of Propulsion like LNG; Waste Converting; Charging Amperage/Rates onshore (in harbours); etc.

New Markets/new forms of Organization for Shipyards - 2

- IT/Smart Factory: A new – digitized – platform is moving between customer and shipyard. Only this cooperate, which will govern this digital platform, will govern the production platform too.
  Recommendation: Governing both (digital and production) platforms.

  Keyword 1: „Connected Smart Ship“ – sensor- driven ship (e.g. cooperation between Hyunday Heavy Industries/Korea and Accenture),

  Keyword 2: Supply Chain Management (e.g. „Touchpoint Cockpit“).
- Renewable Energy: On- and Offshore Wind Energy (see in detail below).

Shipyards can (or already do) participate in these new markets/new forms of Organization by designing/building/providing

ships, components/assemblies and services (including Know-How).

Example: Offshore Wind Energy

To summarize, the need for reorientation of global shipbuilding (because of oversuppy and overcapacities), the future trends of traditonal and new (maritime and non-maritime) markets, and the industrial policies by countries and world regions, show clearly the strenghts and opportunities, but also the weaknesses and threats of these path-dependent developments of shipyards.

This will be demonstrated now by the example of offshore wind energy (OWE):

New markets for the shipbuilding industry: Ships, Components, Service, Kow How

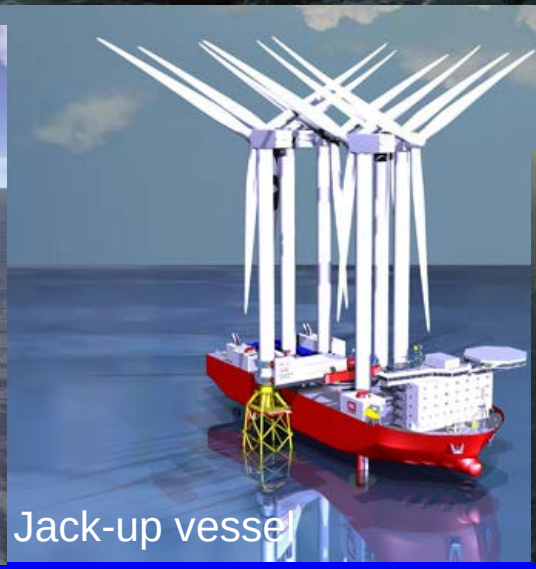
Offshore-Construction-Platform

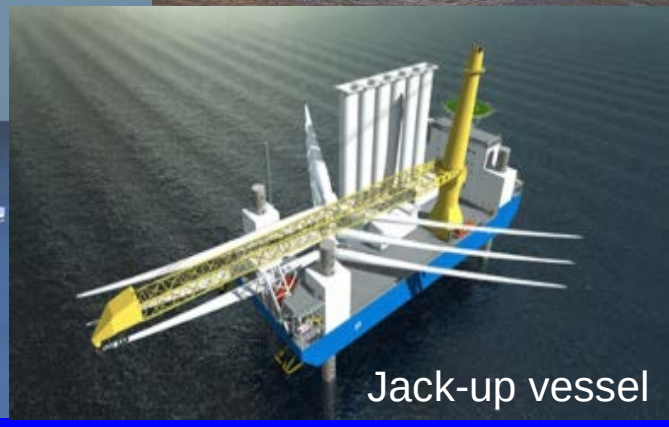

Jack-up vessel

Station Ship

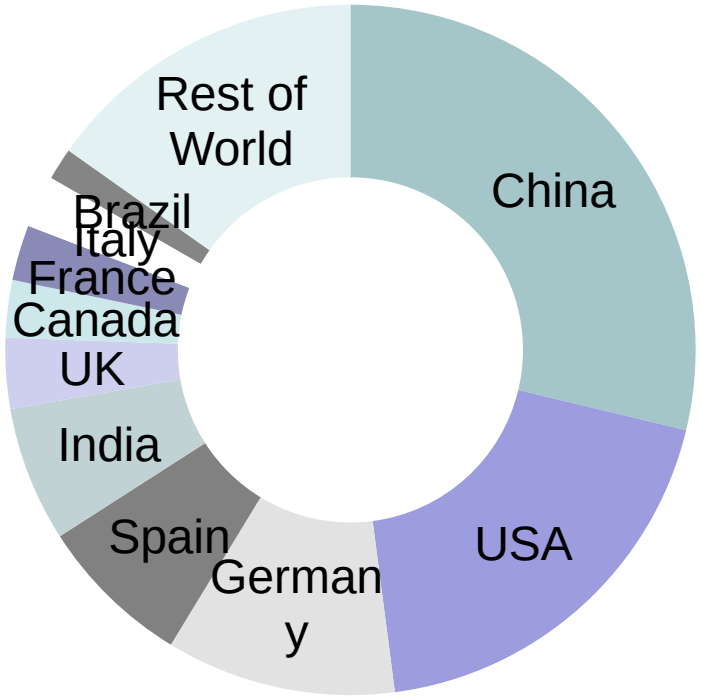

Tender


Cable-Layer


Jack-up vessel


Jack-up vessel

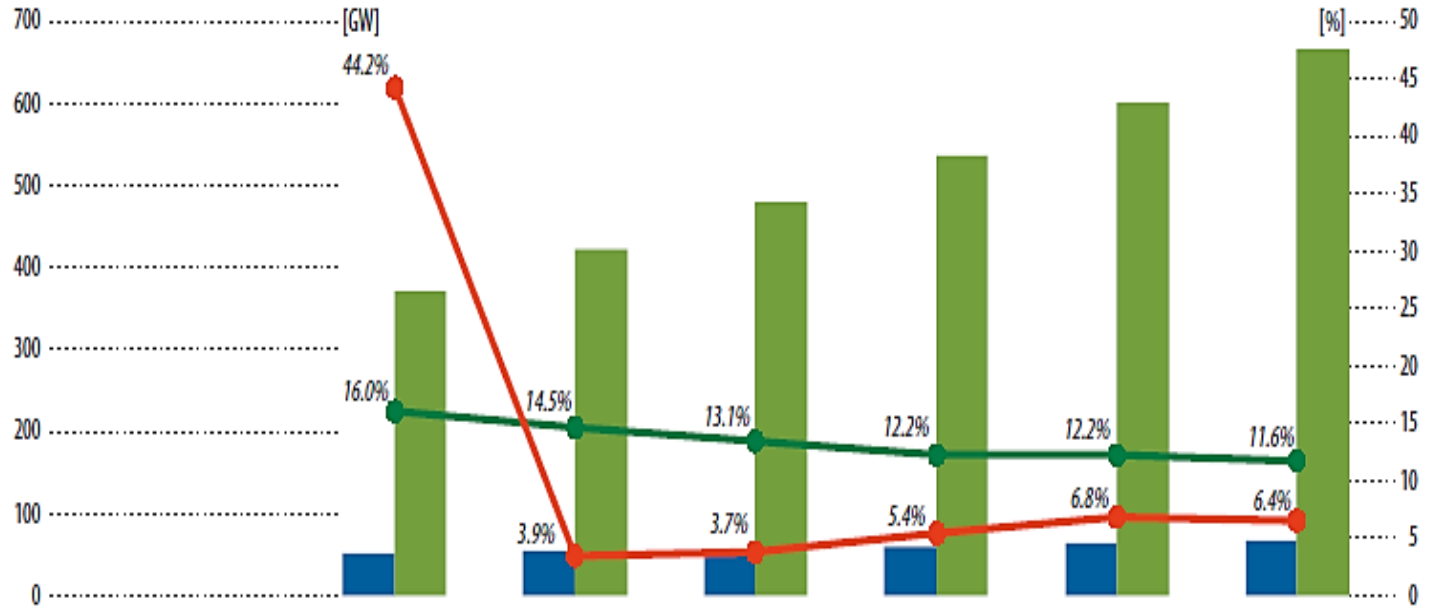
Top Ten cumulative capacity until the end of 2014 (Onshore + Offshore Wind Energy)



Country	MW	% Share
China	114,763	31.0
USA	65,879	17.8
Germany	39,165	10,6
Spain	22,987	6.2
India	22,465	6.1
UK	12,440	3.4
Canada	9,694	2,6
France	9,285	2,5
Italy	8,663	2,3
Brazil	5,959	1,6
Rest of World	58,275	15,8
Total Top 10	311,279	84,2
World Total	369,553	100.00

Source: GWEC, Global Wind Statistics 2014

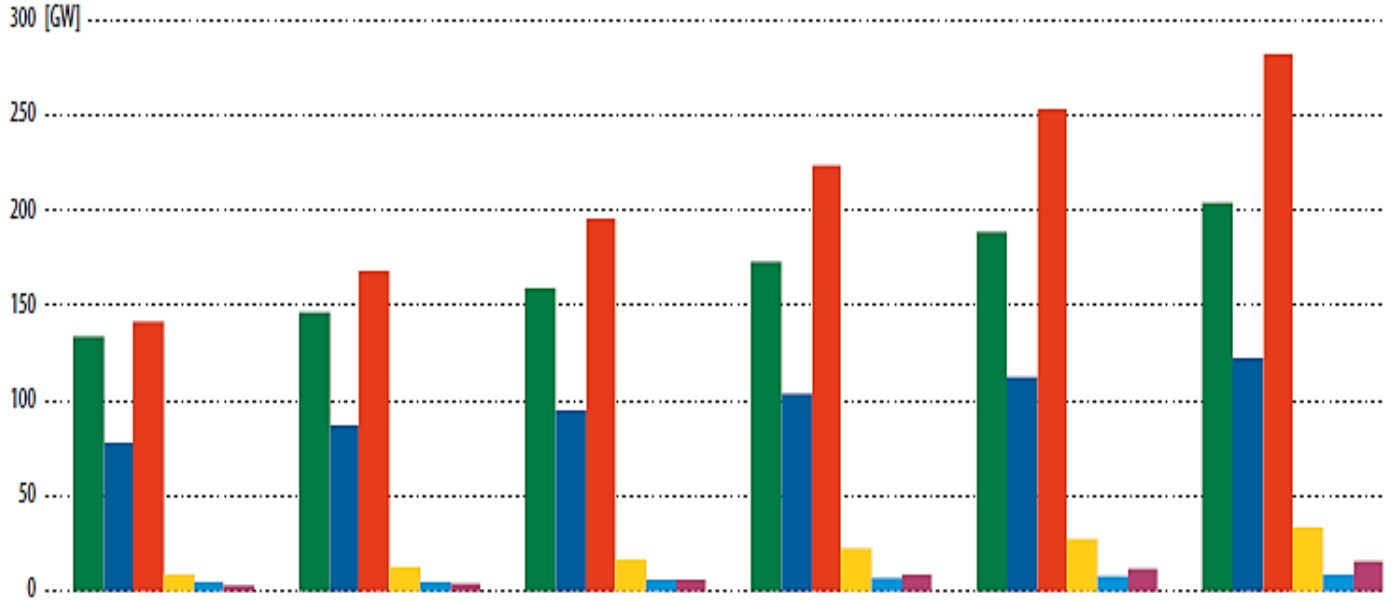
Wind energy market forecast till 2019 (Onshore + Offshore Wind Energy)



	2014	2015	2016	2017	2018	2019
Cumulative [GW]	369.6	423.1	478.6	537.1	599.6	666.1
Cumulative capacity growth rate [%]	16.0%	14.5%	13.1%	12.2%	12.2%	11.6%
Annual installed capacity [GW]	51.5	53.5	55.5	58.5	62.5	66.5
Annual installed capacity growth rate [%]	44.2%	3.9%	3.7%	5.4%	6.8%	6.4%

Source: GWEC,
Global wind report 2014

Cumulative market forecast till 2019 by regions (Onshore + Offshore Wind Energy) Forecast from 2014



	2014	2015	2016	2017	2018	2019
Europe	134.0	146.5	159.5	173.0	188.0	204.0
North America	78.1	87.1	95.1	103.1	112.1	122.1
Asia	142.0	168.0	195.5	223.5	252.5	282.0
Latin America	8.5	12.5	17.0	22.0	27.5	33.5
Pacific	4.4	4.9	5.4	6.4	7.4	8.4
Middle East and Africa	2.5	4.0	6.0	9.0	12.0	16.0

Source: GWEC,
Global wind report 2014

OWE Market Forecast till 2020/5 - 1

- Global Annual Added Capacity: From 2.0 GW in 2014 up to 57 GW by 2024, driven by continued established markets (e.g. UK, Germany, China) and bolstered by emerging markets (e.g. US and France)development: The UK will install till 2024 more than 11 GW; as well as Germany. China is expected over 8 GW capacity. US and France are expected to have their first operational windfarms in 2015 resp. 2017. In the next years till 2024 the US is expected to install 1.8 GW, France 3.2 GW (Douglas-Westwood 2014a).

Additional vessels WTIV required by 2025: 40-42 (= 177 % of the current fleet). Other vessel types such as jack-up barges or liftboats are expected to continue to participate in the market , limiting further growth for WTIVs (Douglas Westwood 2014, OECD 2015)

OWE Market Forecast till 2020/5 - 2

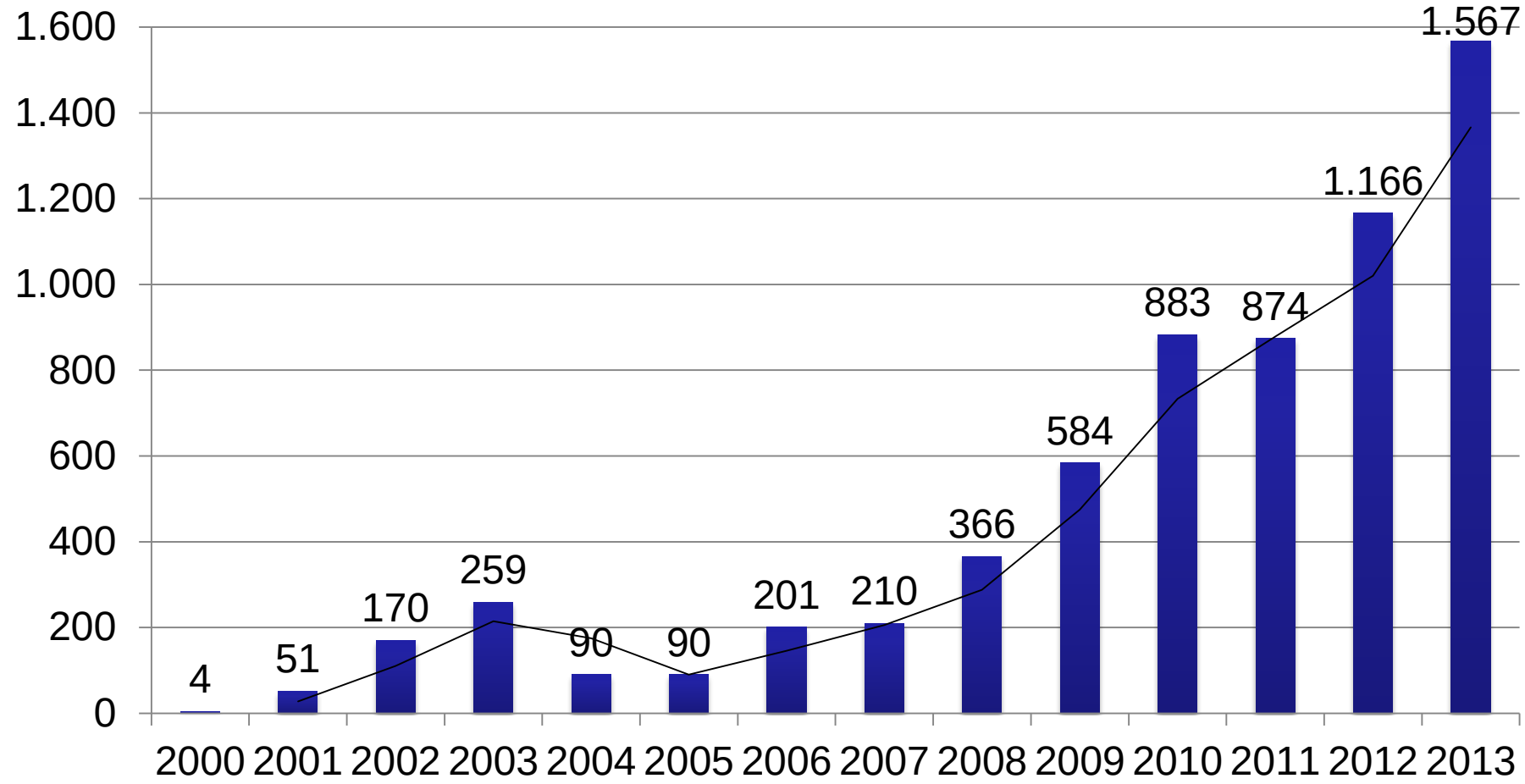
- Increasing wather depth (in the German North Sea Shelf Sea: 42 meters) und turbine size (now 10 MW), together with larger distances from shore (in Germany up to 100 km), will likely see requirements for larger cranes, challenging converter platforms on sea (transform energy at sea into co-current flow and onshore into alternating current) and long-distance cables between the offshore windfarms and the shore.
- Not only OWE vessels and components, but service (Know-How) is a further promising market for shipyards.

Various stages of expansion, offshore wind markets in March 2014 by non-European world regions

- **China**
  - 14 offshore projects in operation (fully commissioned)
  - 14 offshore projects under construction
  - 39 offshore projects authorized
- **USA**
  - 1 offshore project under construction
  - 4 offshore projects authorized
- **Japan**
  - 9 offshore projects in operation
  - 2 offshore projects authorized
- **South Korea**
  - 1 offshore project in operation
  - 1 offshore project under construction
  - 2 offshore project authorized

Source: offshore.com/windfarms ; 03.02.2014

Example Europe 1: New installed European offshore wind energy capacity from 2000-2013

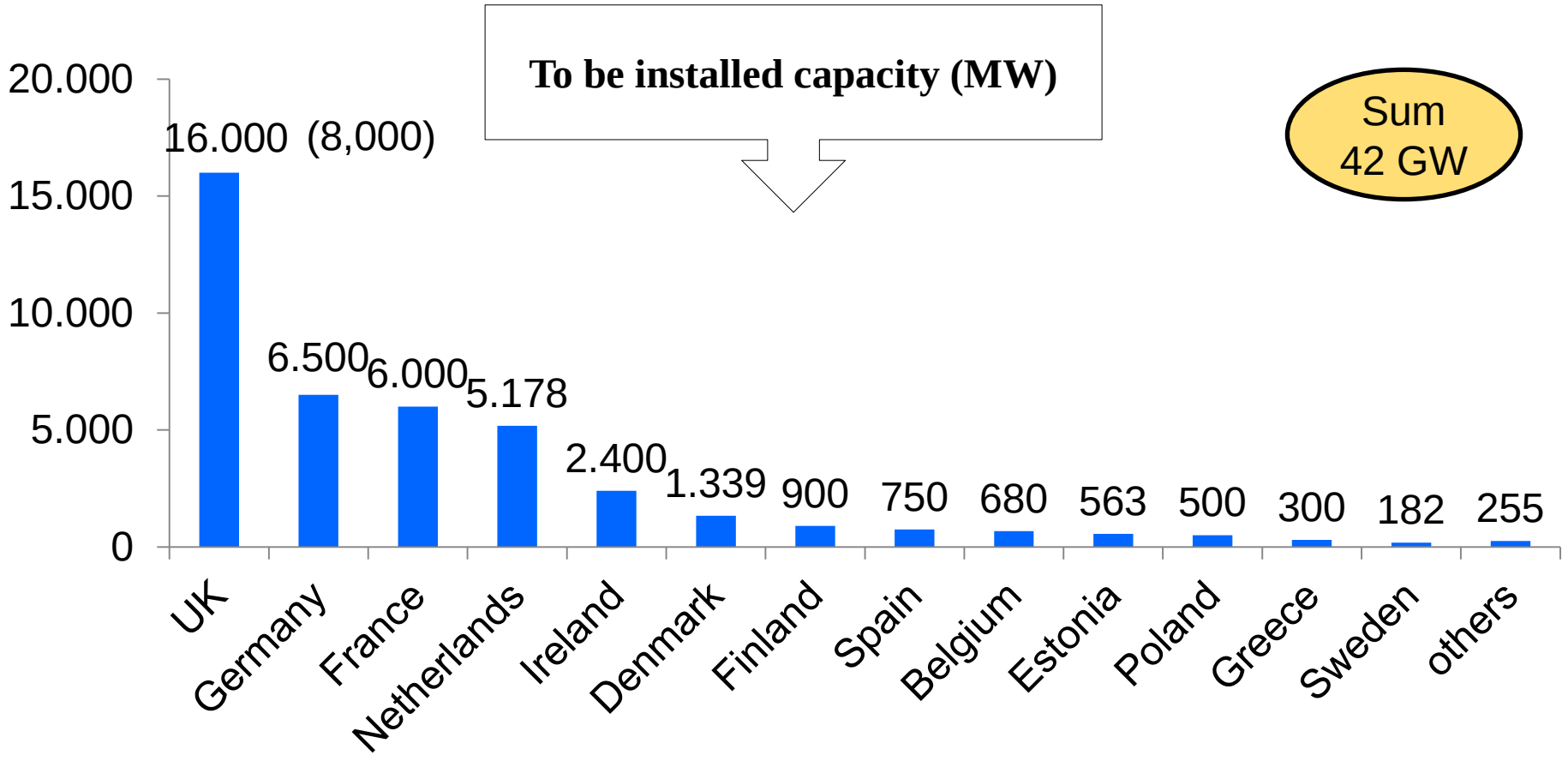


Source: EWEA, Wind In Power: European statistics 2012, own sources for 2013

Example Europe 2: Various stages of expansion, offshore wind markets in March 2014 in Europe

- **Germany**
  - 7 offshore projects in operation
  - 9 offshore projects under construction
  - 22 offshore projects authorized
- **Denmark**
  - 14 offshore projects in operation
  - 1 offshore project authorized
- **United Kingdom**
  - 22 offshore projects in operation
  - 6 offshore projects under construction
  - 8 offshore projects authorized
- **Netherlands**
  - 4 offshore projects in operation
  - 13 offshore projects authorized
- **Norway**
  - 3 offshore projects in operation
  - 5 offshore projects authorized
- **France**
  - 2 offshore projects under construction
  - 1 offshore project authorized
- **Europe**
  - 69 offshore projects in operation
  - 19 offshore projects under construction
  - 68 offshore projects authorized

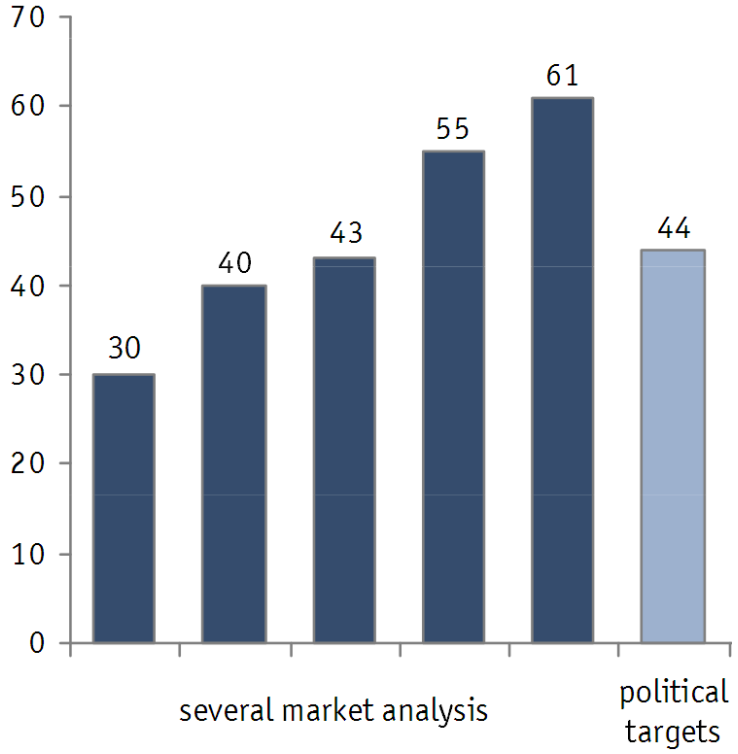
Example Europe 3: Political targets for offshore wind in Europe until 2020, status July 2014



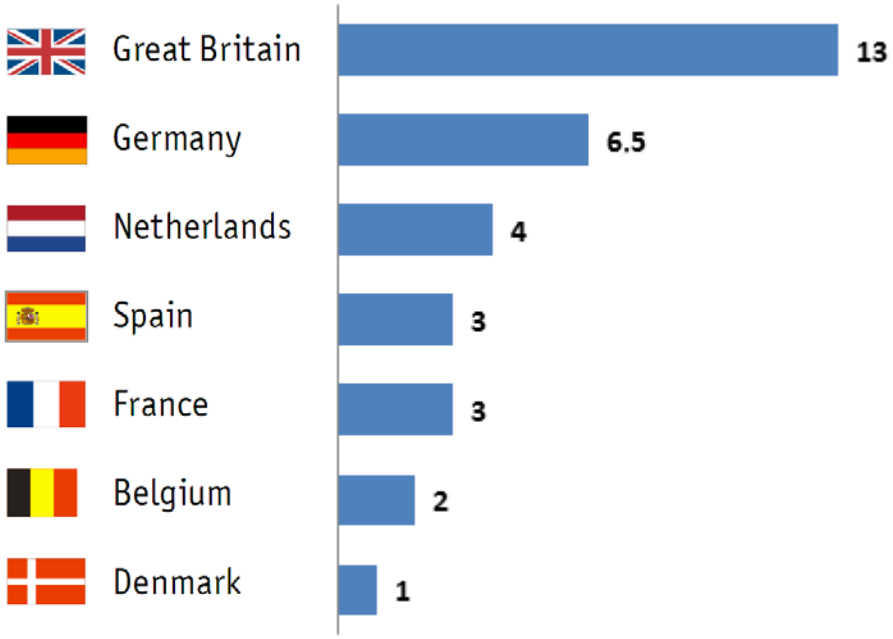
Source: EWEA, WAB Industry report 2011; NREAPs, own sources

Example Europe 4: Leading markets until 2020 (Offshore wind energy) Status: July 2014

To be installed offshore power in all European countries (GW)



Leading European countries until 2020 (GW)/Selection



Source: EWEA, WAB Industry report 2011

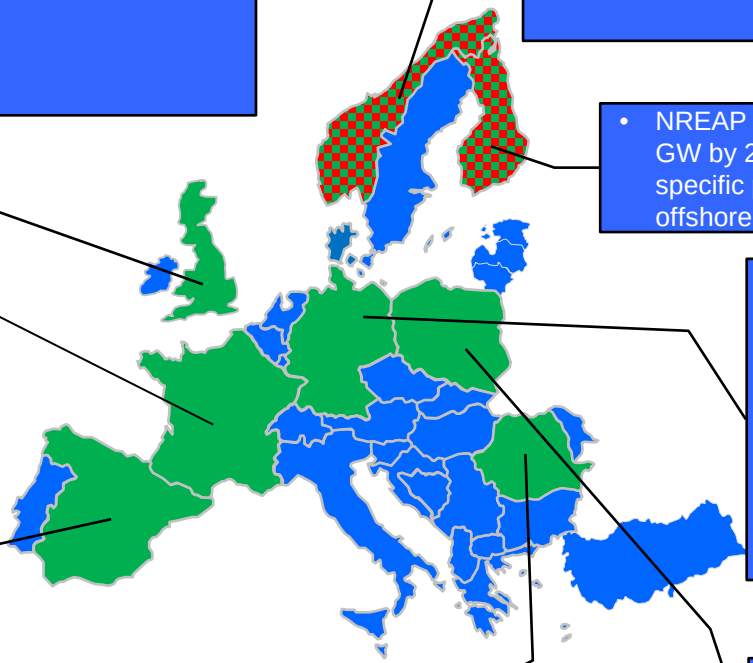
Example Europe 5: Political programs existing for the development of the offshore wind energy/ status March 2014

- NREAP (8-16GW by 2020, 39 GW by 2030)
- Renewable Energy Strategy 2009
- Renewables Obligation (RO)
- Offshore Wind Capital Grants Scheme
- (Energy Technologies Institute)

- Offshore Energy Act
- Energi21

- NREAP (total wind energy capacity 2.5 GW by 2020 [onshore & offshore], no specific plans for the development of offshore capacities)

- NREAP (6 GW by 2020)
- Offshore wind tendering mechanism



- NREAP
- EEG ([German Renewable Energy Act] 6.5 GW by 2020, 15 GW by 2030)
- Law on Energy an Climate Fund
- Kfw Programme Offshore Wind Energy
- Federal States Support for Renewable Energy

- NREAP
- Renewable Energy Plan 2011 - 2020 (750 Mw by 2020)

- NREAP (500 MW offshore wind energy until 2020)
- Energy Policy of Poland until 2030

- NREAP (total wind energy capacity of 4 GW by 2020 [onshore & offshore])

Source:
www.iea.org/policiesandmeasures/renewableenergy/

Example Europe 6: The European Perspective 1: Existence of networks bringing together the different branches (Shipbuilding and Wind Energy Industry)/status March 2014

RenewableUK
East of England Energy Group

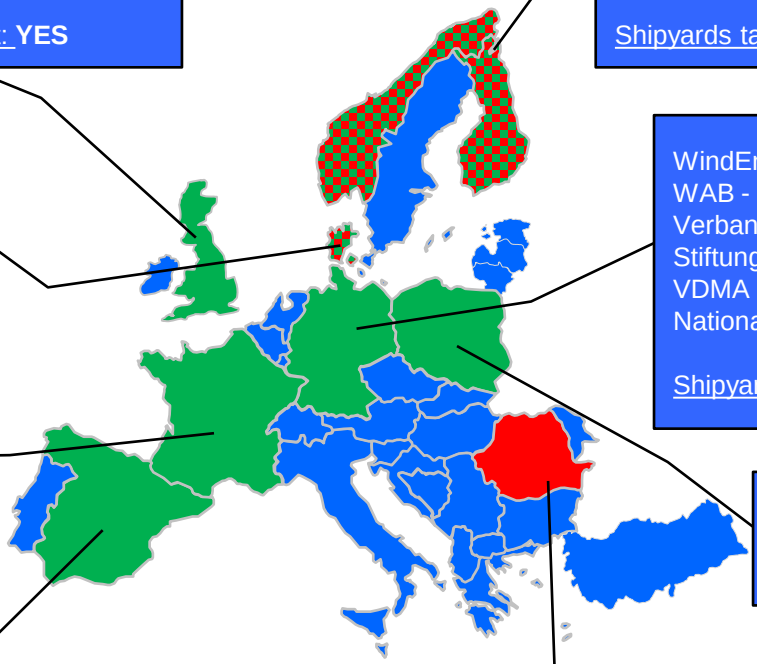
Shipyards take part: **YES**

Finnish Wind Power Association (FWPA)
Wind Power Technology Group

Shipyards take part: **YES**

Offshoreenergy.dk
Danish Marine & Offshore Group
Danish Wind Industry Association

Shipyards take part: **YES**



WindEnergy Network e.V.
WAB - Wind Energy Agency
Verband für Schiffbau und Meerestechnik
Stiftung OFFSHORE-WINDENERGIE
VDMA AG Schiffbau- und Offshore-Zulieferindustrie
Nationale Maritime Konferenz

Shipyards take part: **YES**

French Maritime Cluster (CMF)

Shipyards take part: **YES**

Polish Wind Energy Association

Shipyards take part: **YES**

Wind Energy Association (AEE)
Spanish Maritime Cluster (CME)

Shipyards take part: **YES**

No network:
no participation of unions and/or shipyards

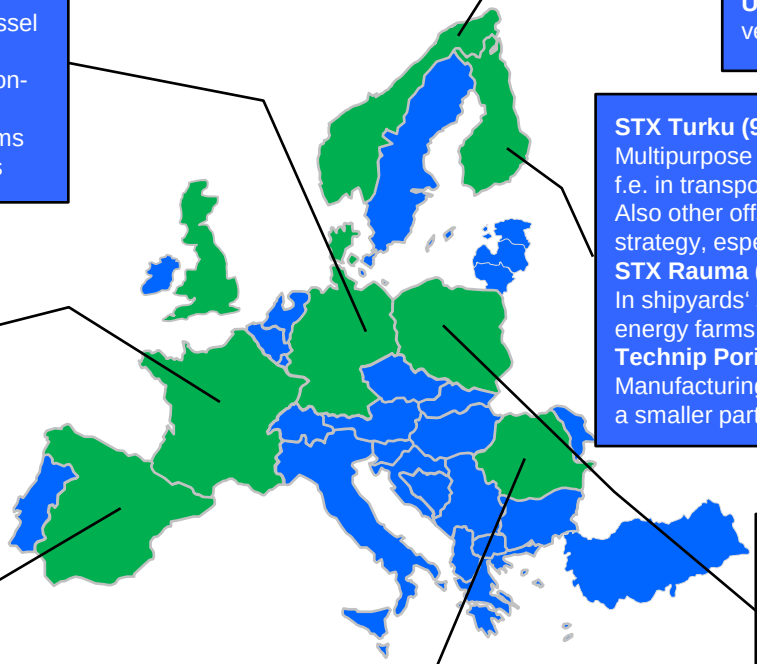
Example Europe 7: The European Perspective 2: Shipyards involved in Offshore Wind Energy Business/ status March 2014

SIAG/NSWE (900 empl.): Foundations and turbines
A&R (470 empl.): SWATH-based offshore-support-vessels
J.J. Sietas Shipyard (900 empl.): Jack-Up-Vessel for Offshore-Construction
P+S Werften (2,000 empl.): Offshore-Installation-Vessels, Cable-Layer
NORDIC Yards (700 empl.): Converter Platforms
NOBISKRUG (300 empl.): Converter Platforms

Fjellstrand AS (100 empl.): Support vessels
Havyard Group: Support vessels
Ulstein (800 empl.): Installation support vessel

STX Turku (900 empl):
Multipurpose cargo vessel is under construction: it will be used f.e. in transport of offshore wind farm structures.
Also other offshore wind energy projects are part of shipyards' strategy, especially floating platforms.
STX Rauma (700 empl):
In shipyards' strategy building of foundations for offshore wind energy farms is important, but nothing really has happened yet.
Technip Pori (800 empl):
Manufacturing fixed and floating offshore windmills, but it is only a smaller part of business.

STX France (2,200 empl.):
Building one prototype of jacket for Alstom **Groupe**
DCNS (12,500 empl.):
Offshore floating wind turbines



NAVANTIA (5,546 empl.):
Offshore wind technical programs in deep water.
CNN (Construcciones Navales del Norte) (230 empl.):
Technical programs and offers of installing boats

Gdansk Shipyard Group:
Tower manufacturing, subsea structures, support and construction vessels
Crist S.A.: Jack-Up Vessels, Supply Vessels

Damen Shipyards Galati (1,994 empl.):
Is currently building a cable-laying vessel for Van Oord

Example South Korea 1, OWE and shipyards
Status July 2014

- Installed wind energy capacity (onshore & offshore):
  - 2012: 483 MW; New 2013: 79 MW; Total (End 2013): 561 MW
- Target: 23 GW installed wind energy capacity in 2030 (2.5 GW offshore)
- Korean shipyards involved in offshore wind:
  - Hyundai Heavy Industries (26,000 empl.; Turbines)
  - Samsung Heavy Industries (13,000 empl.; Turbines, Installation Vessels)
  - Daewoo Shipbuilding & Marine Engineering (30,000 empl.; Turbines)
  - STX Corporation (44,000 empl.; Turbines)
- The Korean Wind Energy Industry Association (KWEIA) promotes the wind power industry through building and strengthening cooperation projects, exchanging information and experience between its members
- The shipyards mentioned above are members of the KWEIA

Example South Korea 2: political programs 1, concerning OWE Status July 2014

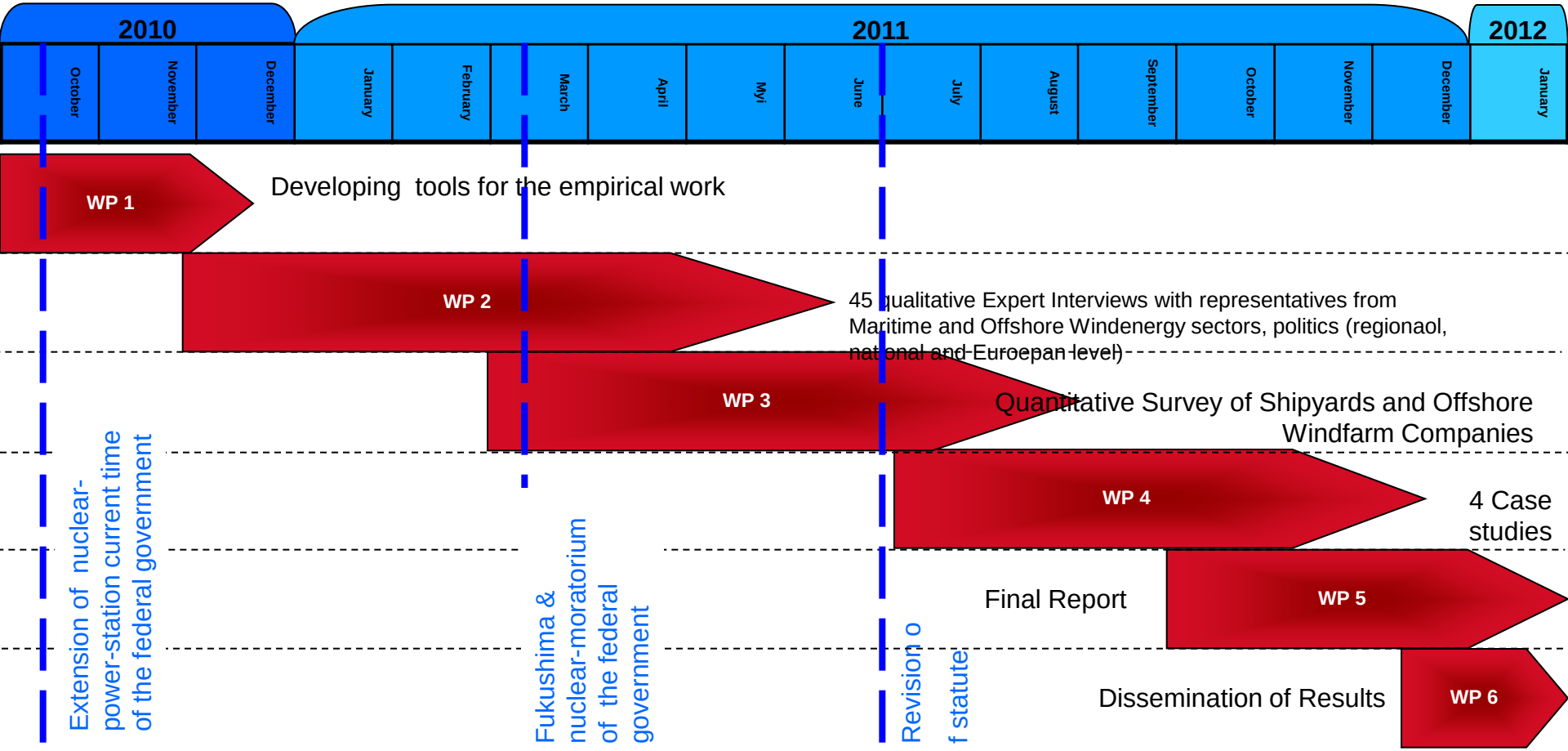
- Renewable Portfolio Standards (RPS)
  - Enforces power producers to supply a certain amount of the total power generation by new and renewable energy
  - Aim: to create a competitive market environment for the sector; to accelerate Korea's renewable energy deployment
- National Strategy for Green Growth 2009-2050
  - provides outline for further sustainable, environmentally friendly, based on renewable energy and energy efficiency economic development
  - The strategy specifies various agendas in order to meet different goals like: Increase use of renewable energy sources; Development of green technologies; Engineering a structural basis for the green economy
- The First National Energy Master Plan 2008-2030
  - outlines future energy policy direction, such as the realization of low-carbon society, and calls for energy security increase, rational use of energy, and environment protection
  - the government will actively support the development and deployment of non-fossil energy (new and renewable energy, nuclear energy)
- Import tax reduction for renewable energy products
  - 50% import duty reduction on 31 products used in the generation of renewable energy

Example South Korea 3: political programs 2, concerning OWE Status July 2014

- Act on the promotion of the development, use and diffusion of new and renewable energy
  - aim: protect natural environment; promote sustainable development and economy; diversify energy sources through promotion and deployment of new and renewable energy technologies
  - establishes New and Renewable Energy Policy Council under the Ministry of Knowledge Economy responsible for development and implementation of the policies in the sector of renewable energy in Korea
- 2nd Basic Plan for NRE Technology Development, Utilisation and Deployment
  - Research, Development and Deployment Plan for new and renewable energy: framework for further development of renewables
  - Funding: US$ 7.6 billion
  - Grants and tax credits for companies investing in renewable energy RD&D
- Subsidy programme (Renewable energy demonstration and deployment)
  - Provides grants for renewable energy demonstration projects (to build a basis for new technology development) and for general deployment of new renewable energy technologies (aimed at market expansion by partially subsidising installation costs)

Evidence from an Empirical Project on Offshore Windindustry and Potentials for Shipyards in Germany (Ludwig, Seidel, Tholen 2012)





Results 1: Abstract of the answers given by windpark operators/Germany

- Up to 2012 there were no ideas about ordering special types of ships from German shipyards.
- Cooperation between operators of windfarms and shipyards in planning the windfarms could hardly be found.
- Windfarm operators mainly prefer to *charter* instead of ordering new OWE ships
- **BUT**: Shipyards are able to produce converter platforms or basic structures like tripods/monopiles/floating construction platforms

Results 2: Different perceptions by shipyards and by offshore-windfarm operators in Germany

There is a **significant discrepance** between the perception of the role of the shipyards in relation to their attendance in OWE business on the one hand and vice versa the perception of the windfarm operators in relation to the role of shipyards on the other hand.

Please note: Apart from the types of products the energy and shipbuilding sectors are very different:

- Mentalities
- Supply industry and customes
- Financing etc.

Results 3: The German shipyards, do they benefit from the OWE?

- Just a few shipyards bring theirselves strategically into line for producing special ships for the Offshore-Wind Farms
- Others are involved in building up components and assemblies (e.g. converter platforms, basic structures like tripods, monopiles, floating construction platforms)
- Most of the shipyards do not have a spezific strategy. They hope for effects of pull-in steps.

Results 4 (Case Studies): Typology of market entry strategies of shipyards

	Corporation	Concentraion on product ship	Integration of strategical business partner	Financial condition for reorientation	Primarily shipbuilding market	Intervention by politics + innovation policies
Active, strategical reorientation						
passive, externally controlled reorientation						
Cooperative collaboration of shipyards						
Independent reorientation of shipyards						

Homework: Please find out the position of your shipyard applying this typology

Conclusions 1

Conclusion/Germany:
After a one year the „Gold Rush Fever“ of shipyards and energy companies (2011/12) evaporated, followed by a 2 years start of learning process (2012-2014) of the industries and the government (energy and industrial policy) in terms of new technology, financing (1 windfarm 1,5 billion Euro) and prices (for products and energy).
From July 2014 onwards a realistic compromise between the government (EEG law), windfarm operators and windfarm constructors and the industry (among these: shipyards) was agreed = ongoing learning curve.

Conclusion/World Market:
The OWE market remain small as compared to offshore gas and oil, but this will be changed in the future.
Furthermore, as we have seen before, especially in the OWE market, several types of policies by the respective governments and world regions (like the EU) have a significant impact on shipbuilding in the context of renewable energy.
Additionally the OWE includes big challenges in terms of logistics, large investment requirements and construction/technological risks.

Conclusions-2 (can be adapted to all path-dependent developments/all market entries of shipyards)

Both branches will be successful in the international competition, if they will follow the trends like

- (Partly) *De-Clining of borders between corporates* (here: merger of OWE company & Shipyard, especially of R&D and Processing);
- (Partly) *De-Clining of borders between branches* (here: between energy & Shipbuilding Industry & Maritime Supply Industry);
- Implementing core changes within the companies according to the concept of „Smart factory“. Characterized by adaptability, resource efficiency and advanced kowledge (labour force) as well as integration of customers, business partners, supply companies and value processes, or in short words: Bringing together the core businesses of Internet Companies and Manufacturing Companies (Networking of the Know How not only from shipyards, but from various branches as maritime supply industry, energy companies, mechanical and plant engineering industry);
- Advanced Human Resource Management.

References

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Thank you very much for your attention