

# InNOWiC

## Internationalizing Norwegian Offshore Wind Capabilities

2016-2020

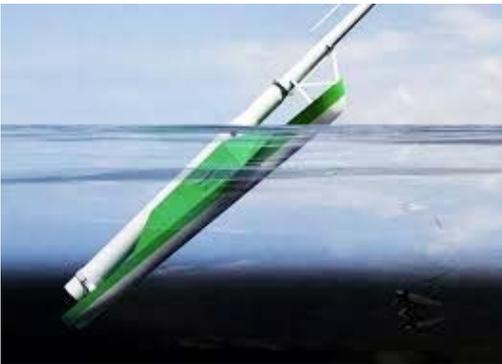
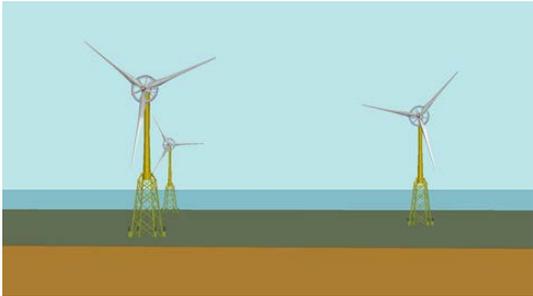
Funded by Research Council of Norway

EnergiX programme

**Science meets industry 21 June 2016**

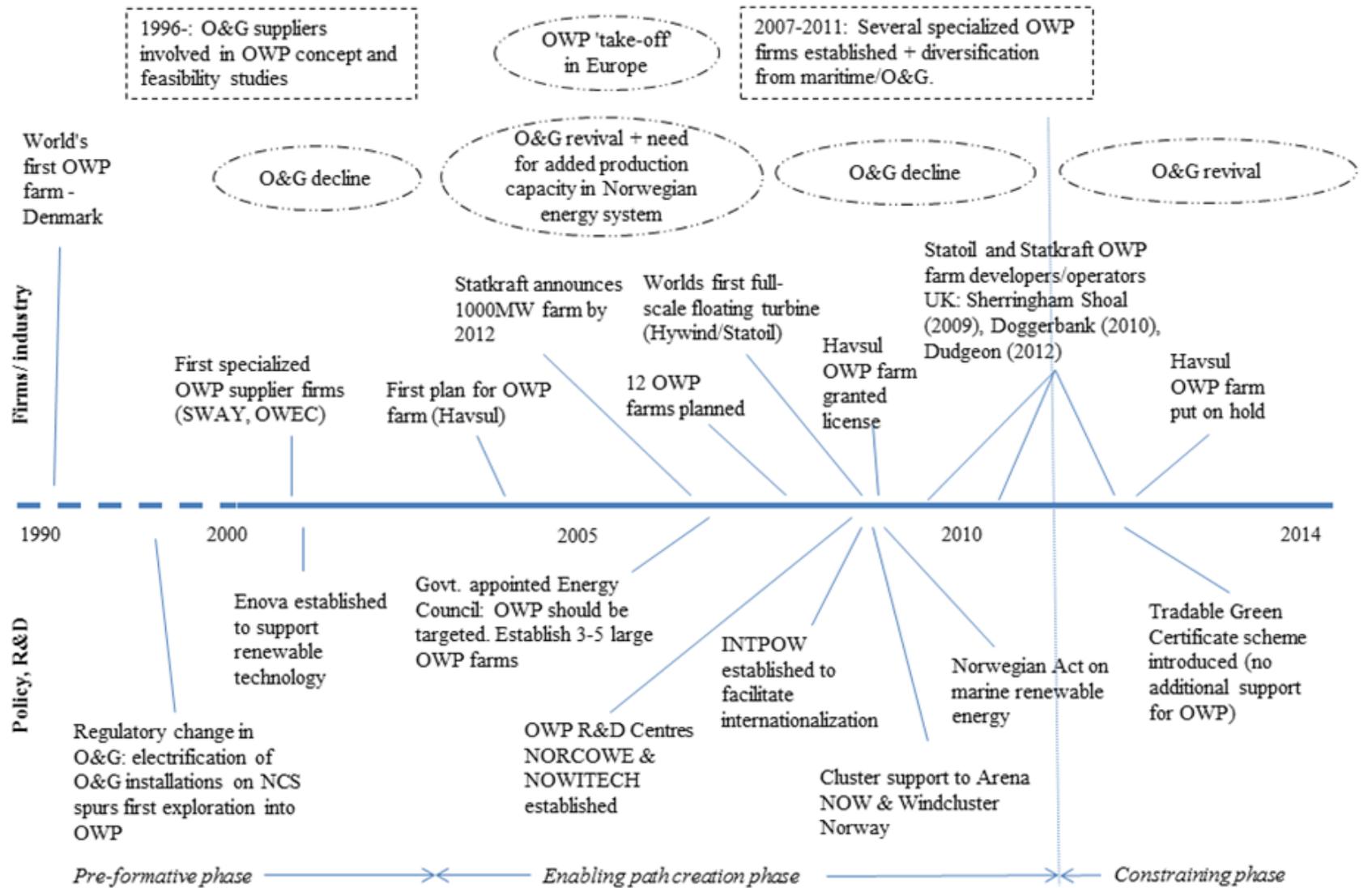
*Asbjørn Karlsen (NTNU) & Markus Steen (SINTEF)*

# The rise and fall (and rise?) of offshore wind in Norway





# The history of Norwegian OWP



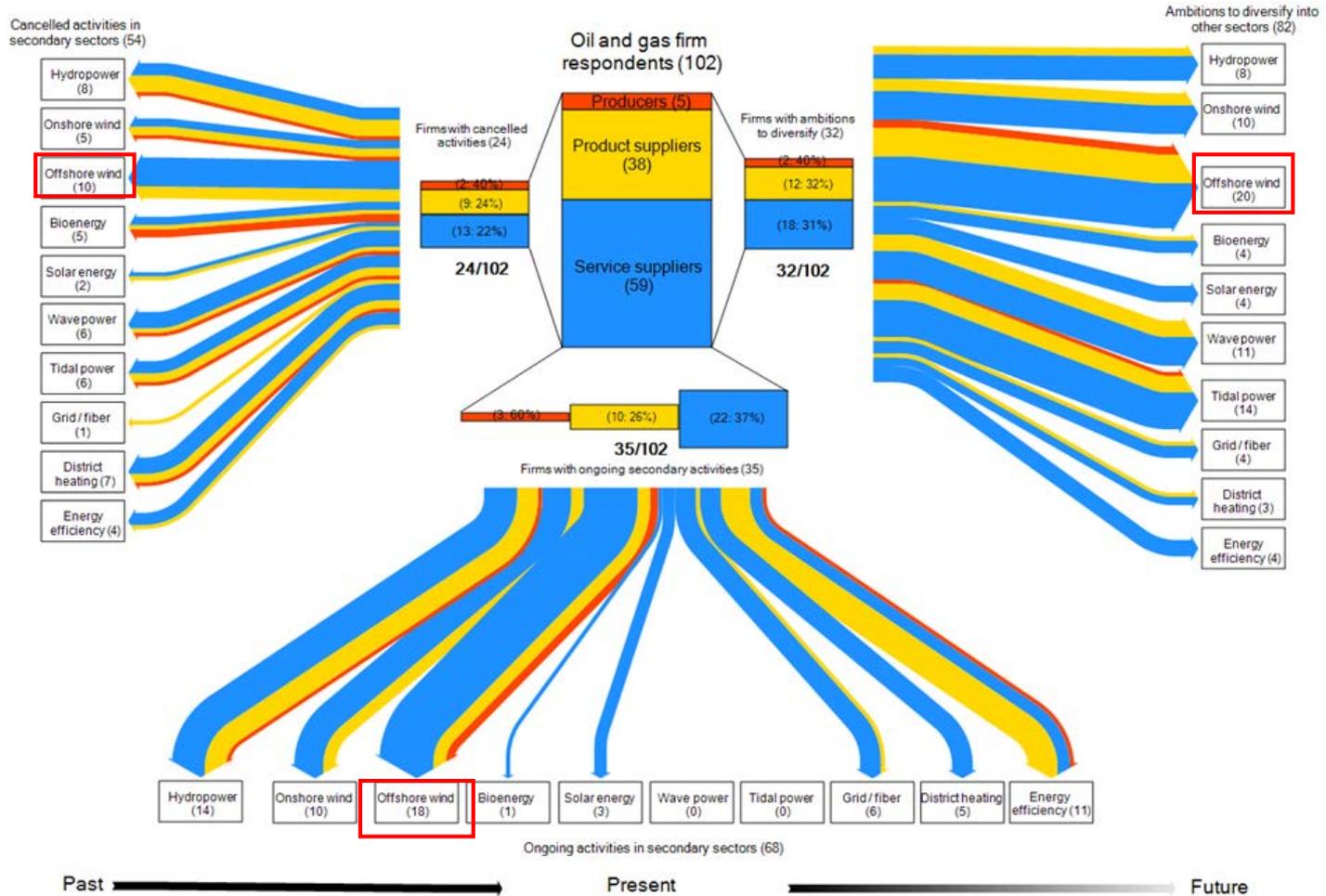
## Key policy statements:

2008: Minister of Oil and Energy (Haga): *Norway could be Europe's battery by utilizing the potential for offshore wind and hydropower.*

2009: Minister of Oil and Energy (Riis-Johansen): *Offshore wind can become the next industrial adventure!*

2011: Minister of Oil and Energy (Borthen Moe): *Offshore wind is too expensive!*

# Firms & industry I



Source: Weaver & Steen 2013; Steen & Weaver 2015)

# Firms & industry

## II

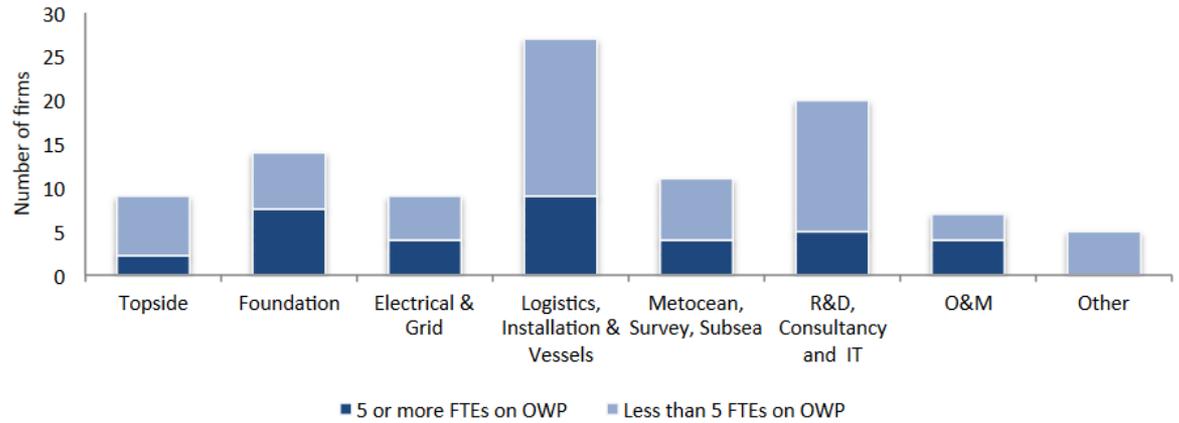


Figure 5-4 Number of firms across the OWP supply chain  
 Source: Survey data and desktop research

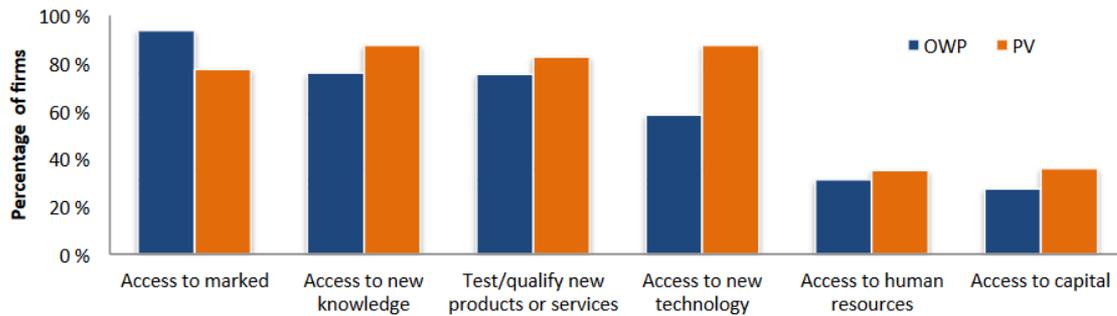
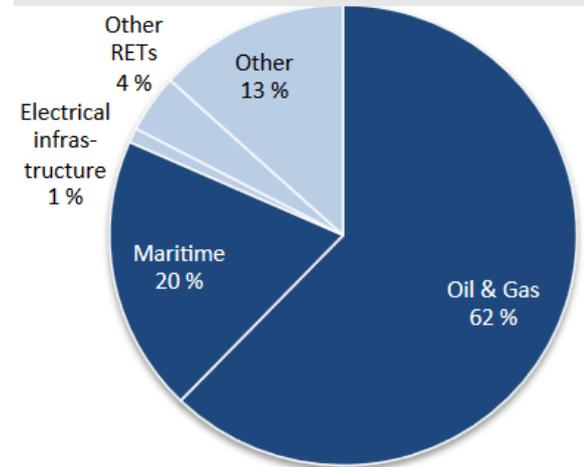


Figure 5-17 Firms responding to why international collaboration is important (yes or no on each option)

### Offshore wind based on experience in...



Source: Normann & Hanson 2015

# Framework conditions - Norway

- No domestic targets for OWP production capacity
- Norway's energy system: ca. 98% domestic electricity consumption from hydropower
- Net exports of electricity
- Tradable green certificates – until 2020 – not sufficient for OWP
- OWP developers have attempted to use the Oil and Gas Taxation Code (78% refund on exploration and investments in infrastructure)
  
- A priority area in ENERGI21
- Substantial support to R&D (NOWITECH; NORCOWE; ENOVA; INNOVATION NORWAY)
- Soft support: INTPOW, the Arena programme (Arena NOW; Windcluster Norway), GIEK (The Norw. Export Credit Guarantee Agency)

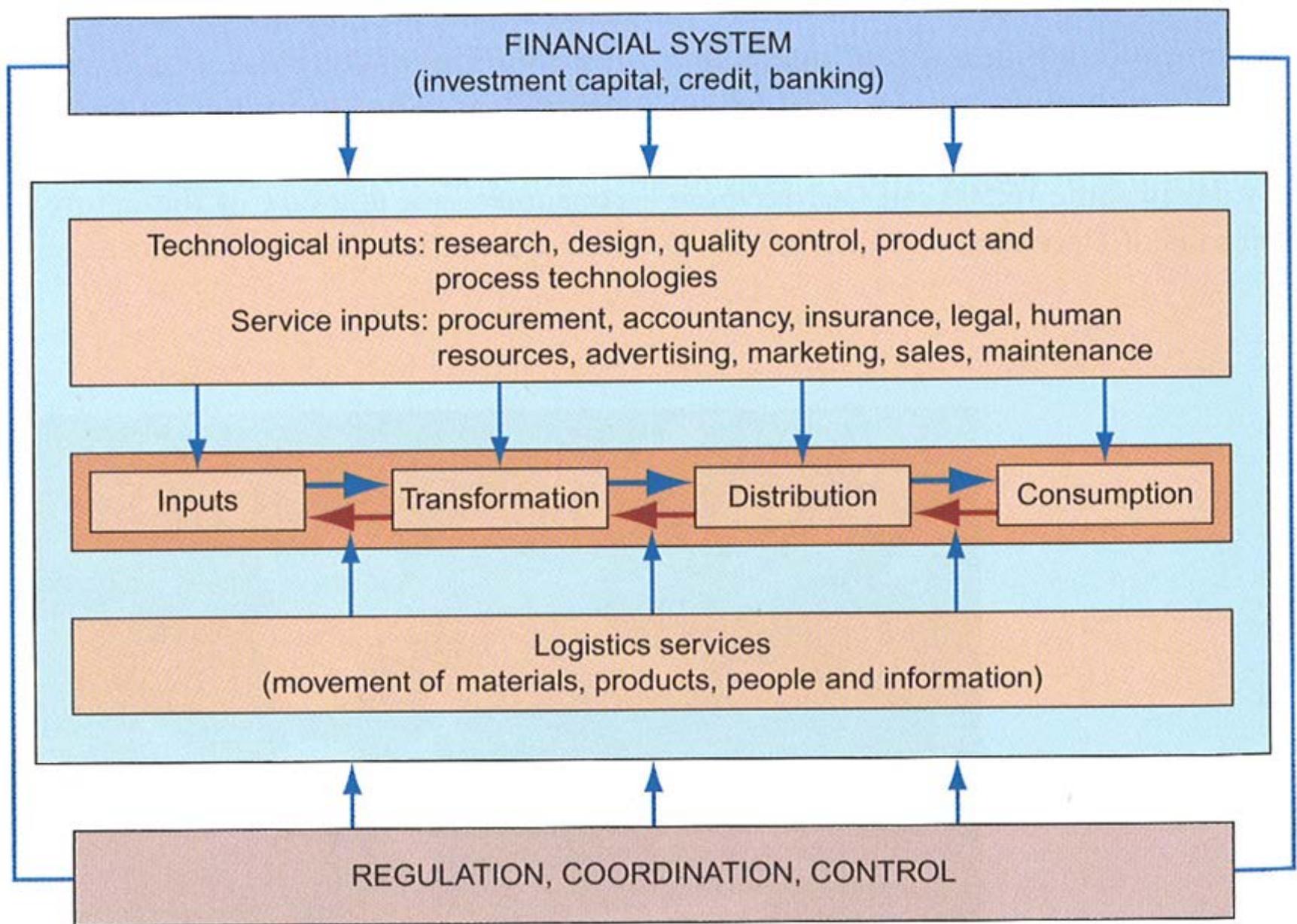
# InNOWiC: aims of the research project

## ➤ Contributions

- ✓ Theory - Global Production Network (GPN) theorizing
- ✓ Empirical:
  1. **Enhanced understanding** of how Norwegian knowledge and resources may **contribute to a transition** to low carbon energy systems, and diversification of the Norwegian 'oil economy'
  2. Territorial development outcomes – **value creation and capture** in Norwegian regions
- ✓ **Advice** to public and private stakeholders

# Research questions

- What are the **conditions for access** to offshore wind global production networks by Norwegian industry (petro-maritime suppliers in particular) and which competitive capabilities are required to succeed?
- How are **OW GPN being configured and reconfigured** over time and what roles are Norwegian firms playing in this rapidly developing industry? (WP1)
- How does the development of different OW market contexts shape a) the **evolution of GPN** and b) the **internationalization opportunities for Norwegian firms**? (WP2)
- Which internationalization, diversification and innovation strategies by Norwegian lead firms, subcontractors and suppliers **provide competitiveness** and access to international (UK, Germany and France) OW markets? (WP3)
- How should these categories of firms be **supported by industrial and R&D policies and support institutions** to enhance competitive capabilities in these regards? (WP3)



➡ Flows of materials and products

➡ Flows of information (including customer orders)

# Core concepts

**Global production networks**



**Strategic coupling**



**Territorialized/regional assets**

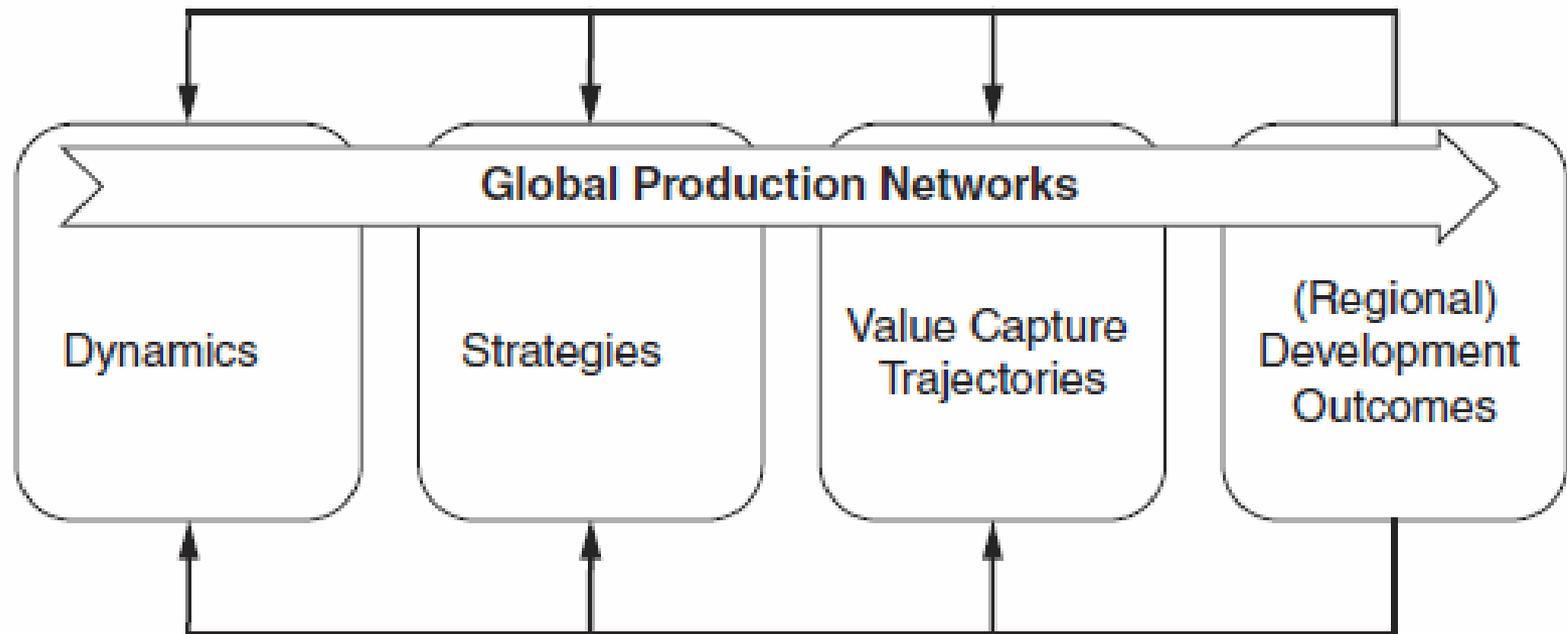
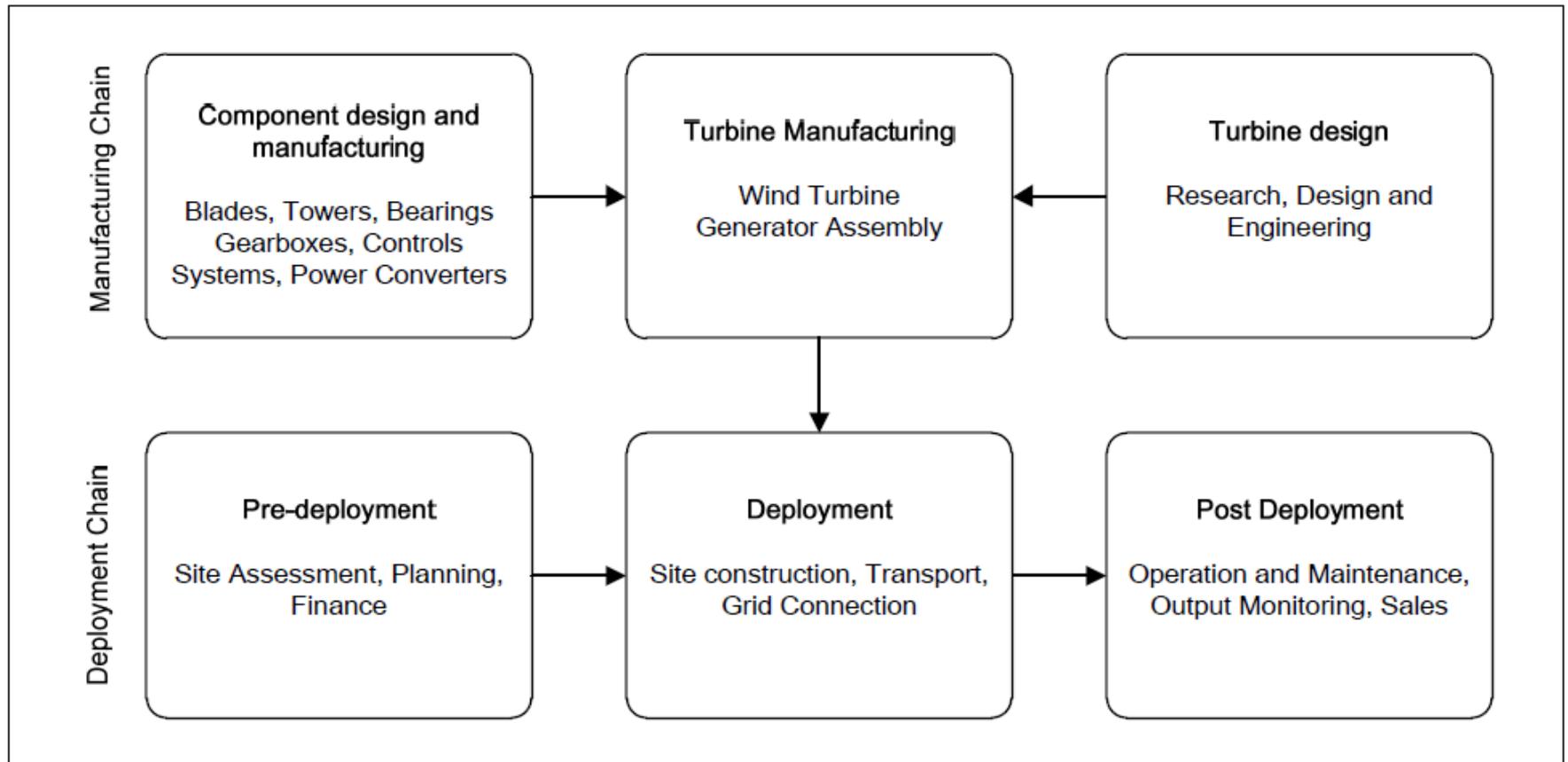


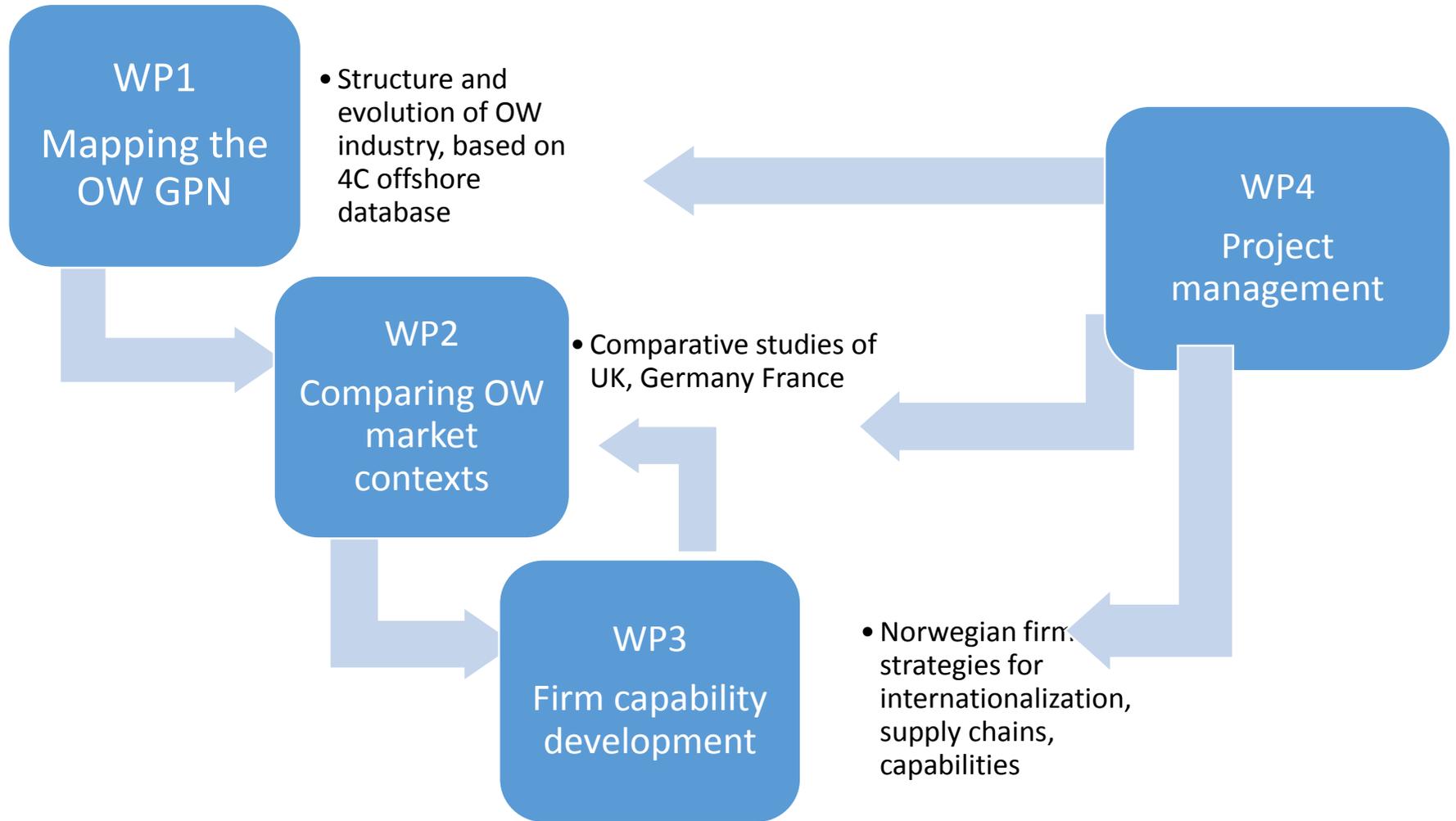
Figure 1.3. GPN 2.0: a theoretical schema

**Figure 2.1 Basic wind industry value chain**



Source: Lema *et al* 2011

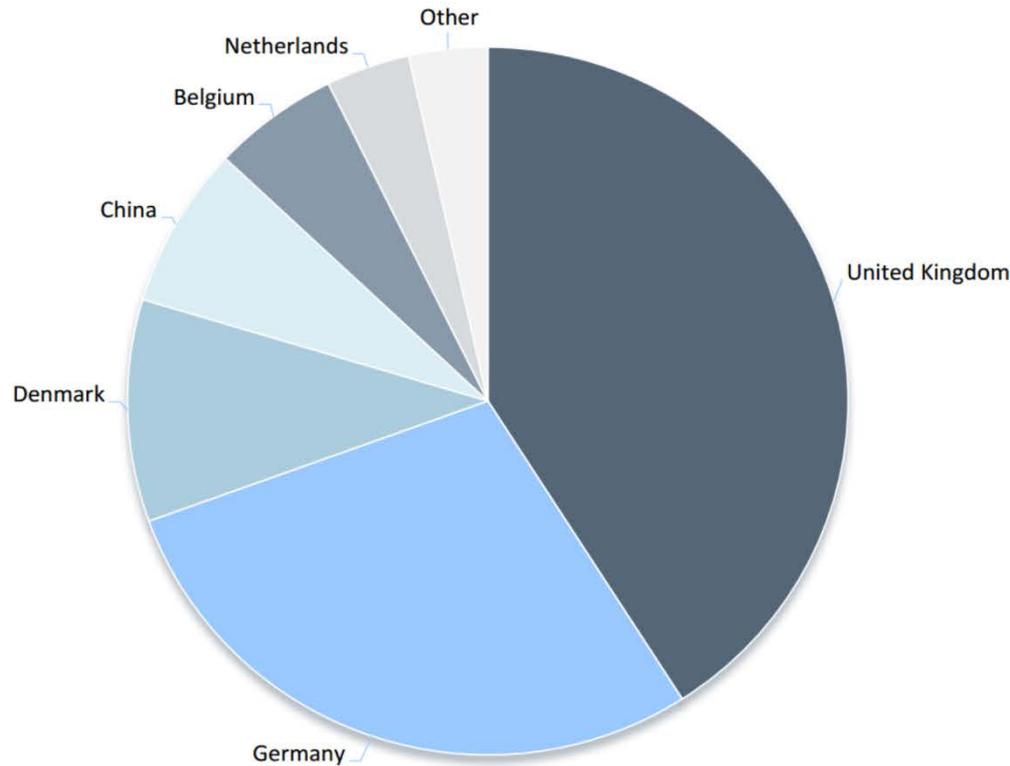
# Work packages



# Comparing the British, German and French market

	Market	Industrial capacity	Policy Regime	Institutional traits
<b>UK</b>	<b>Leader</b> -5128 MW installed -9753 MW consent authorized	<b>Deployment partial</b> -Branching from O&G -No domestic turbine manufacturers	<b>Accelerated</b>  Ambitious targets  Support from Government	<b>50 % local content</b>  Focus on attraction of inward investments ... Towards domestic industrial development
<b>Germany</b>	<b>Established</b> -3746 MW installed -6269MW consent authorised	<b>(Fully) Integrated supply chain</b> -World leader w/Denmark -Some shortages in maritime industries?	<b>Mature</b>  Ambitious targets  Strong government support and planning capacity	<b>Strong focus on industrial development</b>  <b>Barriers to external entrance:</b> National standards, contractual documentation?
<b>France</b>	<b>Embryonic</b> -0 MW installed -1 operational testsite -2023 target: 6GW -Floating	<b>Build-up phase</b> - Some export to international OW projects - Two 'domestic' turbine manufacturers: Adwen, GE	<b>Emergent</b>  Relatively ambitious targets  Government support somewhat uncertain	<b>High local content requirements (50%)</b>  Focus on national industrial development

# Installed capacity by European countries



	Installed capacity (MW)
United Kingdom	5128
Germany	3578
Denmark	1271
China	925
Belgium	712
Netherlands	472
Sweden	202
Vietnam	99
Japan	75
Finland	32
Ireland	25
South Korea	5
Norway	2
Portugal	2

Figure 1. Installed capacity by country

12.53GW installed worldwide

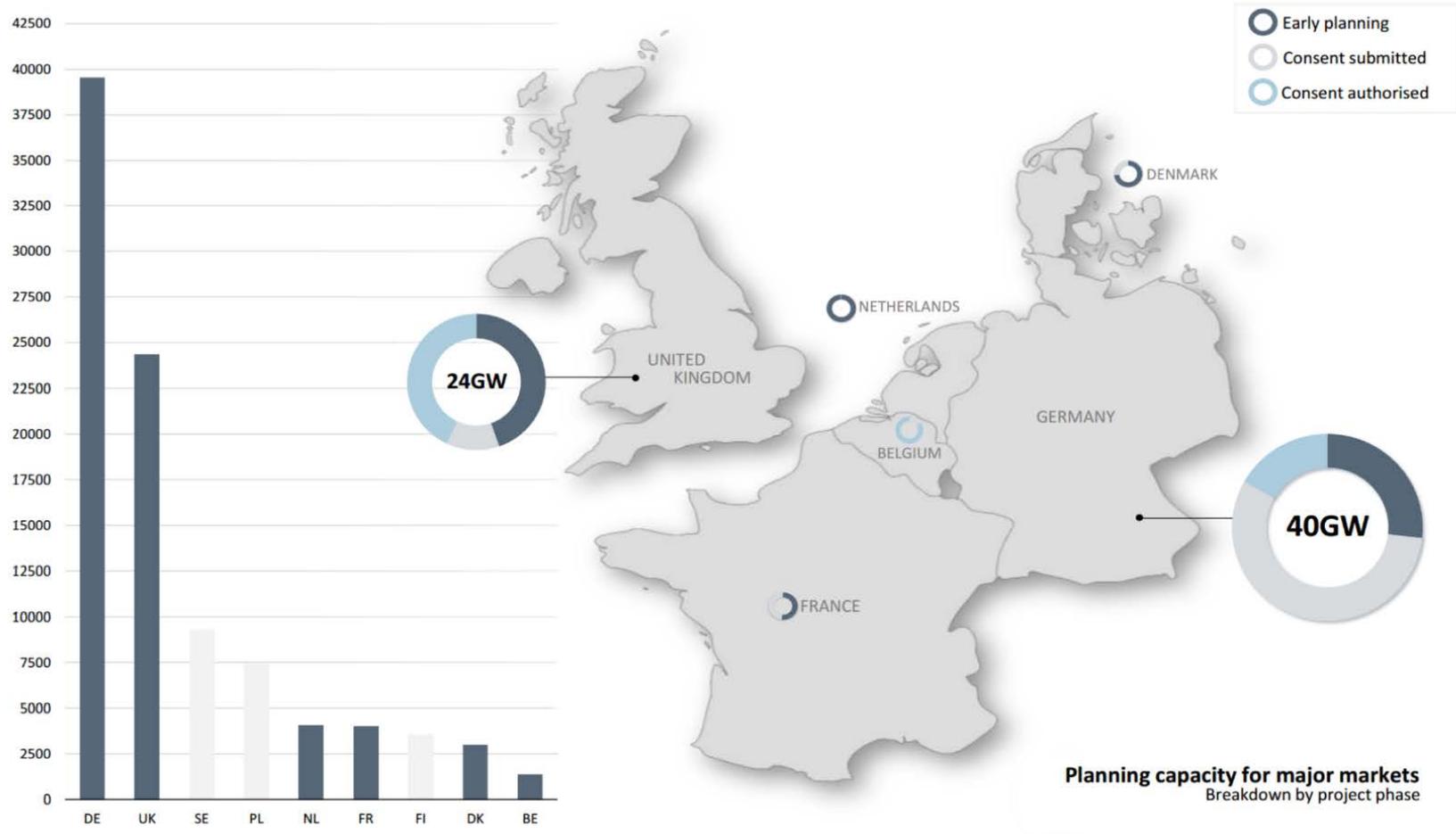


Figure 5. Planning capacity breakdown by country

Source: 4 C Offshore: Offshore Wind Overview Report February 2016

# Norwegian firms in the UK: level of activity (No. of engagements), the most prominent firms are:

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Name of firm	No. of engagements	Name of firm	No. of engagements
ABB AS	18	Nexans Norway AS	2
DNV GL Group	17	Fred Olsen Renewables Ltd	2
Statkraft (incl 2 x Statkraft Development)	13	Volstad Maritime AS	2
StormGeo AS	13	Ugland Construction AS	2
Statoil ASA	12	Oceanteam ASA	1
Solstad Offshore ASA	8	Main Tech AS	1
Master Marine AS	6	Pelagic Power A/S	1
Parker Scanrope AS	4	Eide Contracting AS	1
Siem Offshore AS	4	Seloy Undervannsservice A/S	1
Technocean AS	4	Norsea AS	1
Fred Olsen United AS	4	Farstad Shipping	1
VisSim AS	3	Trelleborg Offshore Norway AS	1
OWEC Tower AS	3	Aibel AS	1
DeepOcean Group Holdings	3		

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NB. This includes: **former engagements**, **multiple involvements in the same project**, and projects that may have been cancelled

# Norwegian suppliers entering German market

**Norwegian developers:** Statoil's share in Arkona

- Mostly about serving the deployment chain:

## **Shipping – vessels:**

- *Volstad Maritime DE01, DE06 and DE08.*
- *Odfjell DE05++*
- *Fred Olsen Windcarrier DE21++*
- *Siem Offshore DE23 ++*
- *Østensjø DE30*

## **Other suppliers:**

- *Aker Verdal/Kværner (trad. O&G supplier of foundations) DE06*
- *Aker Solutions DE06 (engineering)*
- *StormGeo (Weather forecasting service and decision support)*
- *DNV-GL merger (classification & certification services)*