



# POWER

Pushing Offshore Wind  
Energy Regions

**TRANSNATIONAL STUDY**

30th March 2006, Lowestoft UK



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## POWER – Transnational Study

- Introduction to the Transnational Study
- Market Drivers
- Market Values
- Regional Development Timeframes
- Supply Chain Capabilities
- Regional Cooperation
- Regional Competition
- Supply Chain Development
- Major Issues & Risk Factors



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## Introduction to the Transnational Study

In 2005, each POWER region undertook a supply chain study to:

- Establish existing and forecast regional expenditure and employment
- Determine regional capabilities
- Assess how benefits may increase through filling supply chain gaps
- Recommend actions for further development of the supply chain
- Regional cooperation



## Introduction to the Transnational Study

This study is based on the following regional studies:

### **Denmark**

Study conducted by Offshore Center Danmark and AC Consult

### **Germany: Lower Saxony, Bremen and Schleswig Holstein**

Study conducted by Logistik-Service-Agentur

### **The Netherlands: Kop van Noord-Holland**

Study conducted by Bedrijfsregio Kop van Noord-Holland

### **The United Kingdom: East of England**

Study conducted by Douglas-Westwood Ltd





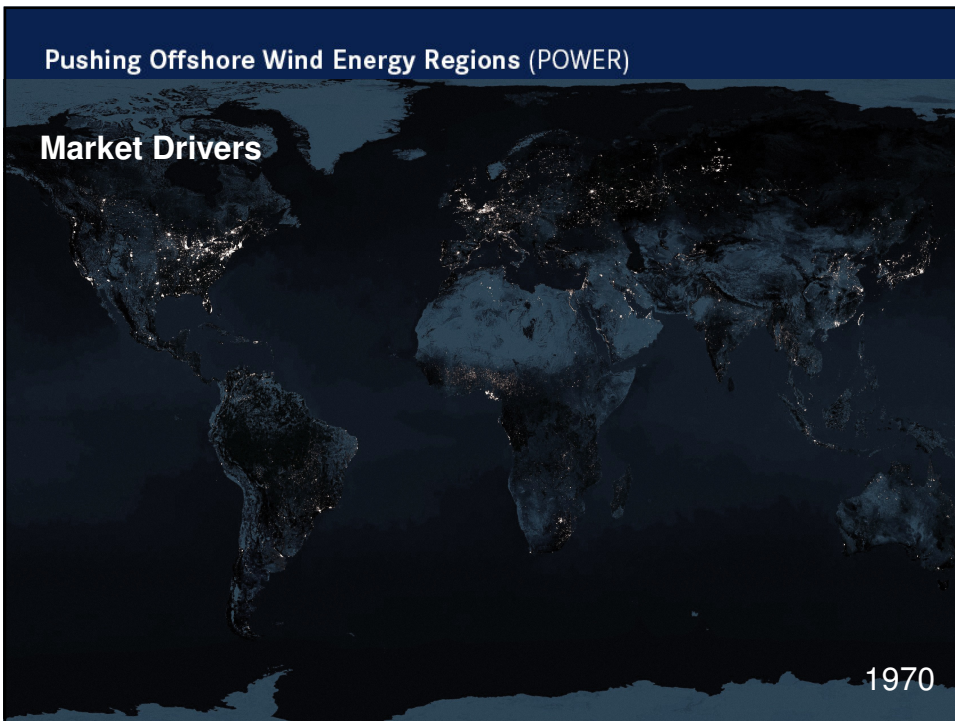
## Introduction to the Transnational Study

The Transnational Supply Chain Study's objectives are to:

- Combine results from the regional POWER studies to show the North Sea Region as an international market
- Forecast total region market value expenditure and man-hours
- Supply chains compatibility / comparability matrix
- Opportunities for co-operation and potential mechanisms
- Identify major issues and risk factors
- Recommend actions for further development of the supply chain
- Establish a future offshore wind project listing



## Market Drivers



## Pushing Offshore Wind Energy Regions (POWER)

### Market Drivers

#### Coastal population growth:

Population of urban coastal areas is dramatically increasing

44% world population now live within 150km of coast

Increased pressure for non-polluting energy source on the coasts

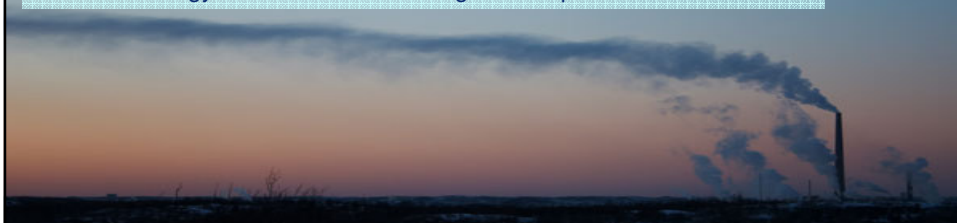
2000

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### Market Drivers

#### Environmental drivers:

- Single biggest driver for offshore wind is **governmental policy**
- Via renewable energy targets and associated subsidies
- Offshore wind is currently economically reliant on market incentives
- Political determination is, therefore, crucial
- Denmark testament to this
- Past uncertainty in The Netherlands stalled development
- UK Energy Review could have large consequence

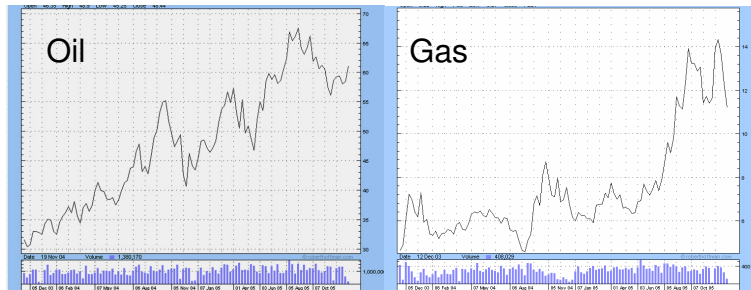


## Pushing Offshore Wind Energy Regions (POWER)

### Market Drivers

#### Oil & gas price increases:

- Prices have rocketed
- Compounded by decreased supply from mature areas e.g. N Sea
- Will increasingly impact on power generation costs
- Renewable energy will become more cost-competitive



*"...the world is at the start of a second phase of a three-stage oil super cycle that could last 'till 2012" Goldman Sachs, Dec 2005*

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### Market Drivers

#### Security of energy supplies:

- Increased oil and gas demand, especially from developing economies e.g. China (122% increase in oil demand in decade)
- Depletion of offshore gas supplies e.g. UK and USA
- Russian supply highly political – major supplier to EU with principal use being for power generation
- China and Japan competing for Russian oil
- Increased competition means supply is a major strategic issue
- 'Fuel-less' energy sources increasingly attractive



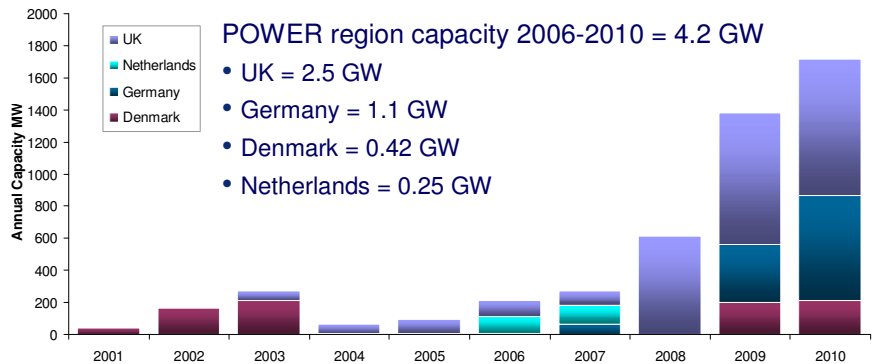
*"The era of easy access to energy is over.  
There is more competition for energy resources all over the world"  
David O'Reilly, Chief Executive, Chevron - Wall Street Journal, April 18th, 2005*

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## Pushing Offshore Wind Energy Regions (POWER)

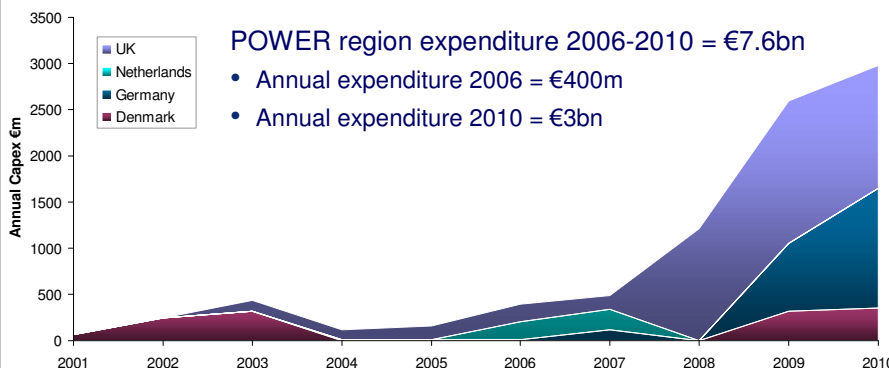
### Market Values – DWL Capacity Forecast



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## Pushing Offshore Wind Energy Regions (POWER)

### Market Values – DWL Capital Expenditure Forecast



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## Regional Development Timeframes



	Installed Capacity	Planned Capacity	Initial Development	Market Growth
Denmark	426 MW	415 MW	2001-2003	2009-2010+
Germany	6 MW	1,076 MW	2008-2009	2009-2010+
The Netherlands	13.4 MW	228 MW	2004-2005	2010+
The UK	304 MW	2,471 MW	2003-2007	2008-2010+

- Each POWER country is at a different stage in offshore wind development
- First activity: DK > NL > UK > DE
- Current capacity: DK > UK > NL > DE
- 2010 capacity: UK > DE ≥ DK > NL

## Regional Development Timeframes



### Denmark

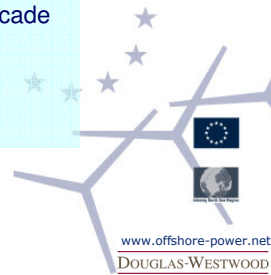
- Initiator of offshore wind industry in 1991
- First large scale projects
- In 2003 after Horns Rev & Nysted, progress stalled
- Current prospects: 2x 200MW projects for construction 2009/2010
- Further development remains unclear

## Regional Development Timelines



### Germany

- Only individual nearshore prototype turbines installed
- No full-scale projects yet built
- Technically difficult project sites – deepwater
- Very high number of projects planned
- Largest amount of planned capacity >65 GW
- Large scale development only begins towards end of decade
- This development timeframe is accepted by industry
- Learning lessons from elsewhere in Europe



## Regional Development Timelines



### The Netherlands

- Early adopter – Two small projects in 1990's
- Two projects nearing offshore construction
- Moderate future prospects, but not for some time
- Market conditions are uncertain & have compromised confidence
- Long-term mechanism would prove successful – sufficient interest





## Pushing Offshore Wind Energy Regions (POWER)

### Regional Development Timelines



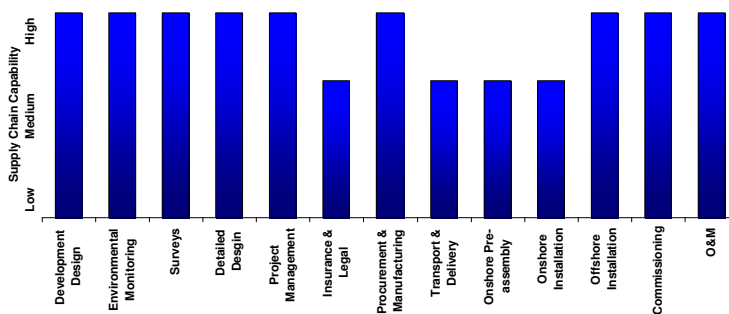
#### The UK

- First small project in 2000
- Three full projects in operation, 1 in construction
- Many projects planned for next 10 years: >8 GW
- Excellent market prospects – best in world short-to-mid term
- Structured and supportive development framework
- 2006 Energy Review may impact costs and project success +/-



## Pushing Offshore Wind Energy Regions (POWER)

### Denmark - Supply Chain Capability

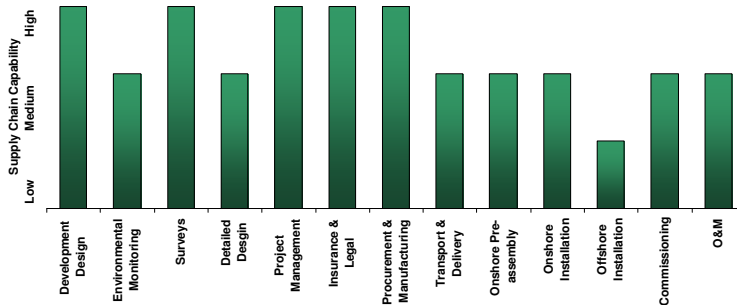


- Denmark has strong industry capabilities
- All aspects of project design & management are well-proven
- Turbine production established, offshore cables & foundations not as strong
- World-leader for turbine installation
- Has the most experience in operations & maintenance



## Pushing Offshore Wind Energy Regions (POWER)

### Germany - Supply Chain Capability



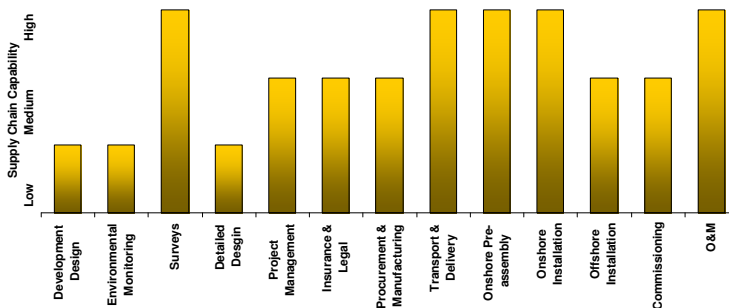
- German regions' core strength is in manufacturing
- High-value turbine & turbine component supply work
- Ports not yet fully capable of supporting industry but are developing strongly
- Offshore construction capabilities undeveloped
- Offshore wind capabilities largely unproven to date



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## Pushing Offshore Wind Energy Regions (POWER)

### The Netherlands - Supply Chain Capability



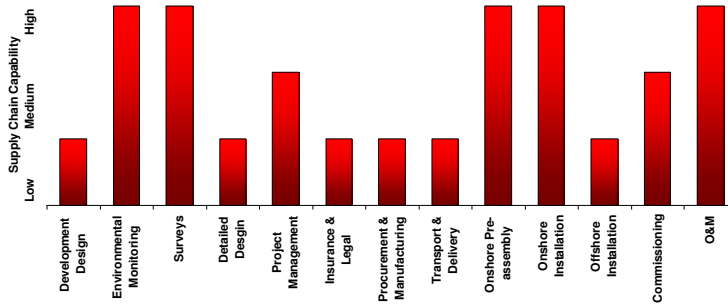
- Netherlands has broad range of capability
- Moderate manufacturing capability although strong for cables/foundations
- Extremely good ports for logistics, construction & servicing
- Offshore installation is an area targeted for growth



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### ■ The UK - Supply Chain Capability



- East of England region has proven capability
- Strong developmental support – surveys/environmental
- Region lacks offshore wind manufacturing
- Ports are an asset and have been used for offshore wind
- Operations & maintenance a key development area



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## Pushing Offshore Wind Energy Regions (POWER)

### Supply Chain Capability – Summary



#### Denmark

Environmental Monitoring  
Surveys  
Development Design  
Detailed Design  
Project Management  
Procurement & Manufacture  
Offshore Installation  
Commissioning  
Operations & Maintenance

Transport & Delivery  
Onshore Pre-Assembly  
Onshore Installation  
Insurance/Legal

#### Germany

Surveys  
Development Design  
Procurement & Manufacture  
Insurance/Legal  
Project Management

Environmental Monitoring  
Detailed Design  
Transport & Delivery  
Commissioning  
Onshore Installation  
Onshore Pre-Assembly  
Operations & Maintenance

Offshore Installation

#### The Netherlands

Surveys  
Onshore Pre-Assembly  
Transport & Delivery  
Onshore Installation  
Operations & Maintenance

Insurance/Legal  
Project Management  
Procurement & Manufacture  
Offshore Installation  
Commissioning

Development Design  
Detailed Design  
Environmental Monitoring

#### The UK

Environmental Monitoring  
Surveys  
Detailed Design  
Onshore Installation  
Onshore Pre-Assembly\*  
Operations & Maintenance

Project Management  
Commissioning

Offshore Installation  
Development Design  
Procurement & Manufacture  
Transport & Delivery  
Insurance/Legal

High  
Capability

Moderate  
Capability

Low  
Capability



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### Ports & Logistics



- 18 ports analysed within 120 nautical miles of each development area
- Factors examined include:
  - Quay access, storage space, dedicated berths, operator market focus, planned improvements,

Port researched commissioned by DWL from LSA, Bremerhaven

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Attributes	Emshaven (NL)	Emden (DE)	Wilhelmshaven (DE)	Brake (DE)	Bremerhaven (DE)	Cuxhaven (DE)	Brunsbüttel (DE)	Esbjerg (DK)
Water depth at the quayside and the connection to sea - 5-10m (at low water)								
In case of locks, dimensions (width between fenders) 25-40m	n/a			n/a		n/a	n/a	n/a
Available dedicated berth >300 m				Dedicated to general cargo			Dedicated to general cargo	
Operation area at quayside available for assembling/handling:								
•turbines & transformers								
•foundations monopile								
•cables								
Own heavy lift crane and ground equipment	Special solutions necessary, rental equipment is available, but depends on market constraints							
Available port operator with offshore focus								
Management and staff with wind energy experience								

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### Ports & Logistics

- Examples of ports specialising into certain areas
  - E.g. Bremerhaven (DE) – construction, Den Helder (NL) – O&M
  - Investment is happening now – long-term dedicated vision
- **Few ports fully capable** of economically handling large future projects
- Port specifications and existing activities limit usage
- Therefore, **port choice is not local** or national, but international
  - E.g. Developers looking to other POWER countries
- Opportunities for **multiple ports** to be used for individual projects
  - E.g. Lowestoft and Great Yarmouth (UK) for Scroby Sands – split foundations and topsides

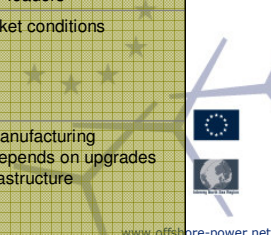


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## Pushing Offshore Wind Energy Regions (POWER)

### Regional Strengths & Weaknesses

Country & Region	Key Strengths	Key Weaknesses
<b>Denmark</b>	<ul style="list-style-type: none"> <li>• Turbine manufacturing</li> <li>• Established wind supply chain</li> <li>• Early experience in offshore wind</li> <li>• O&amp;G skills/experience</li> <li>• Key industry players</li> </ul>	<ul style="list-style-type: none"> <li>• Few suitable ports</li> <li>• Lack of offshore projects planned</li> <li>• Long-term prospects uncertain</li> </ul>
<b>Germany</b> Schleswig-Holstein & Bremen/Niedersachsen	<ul style="list-style-type: none"> <li>• Turbine manufacturing</li> <li>• Established wind supply chain</li> <li>• Good long-term market prospects</li> </ul>	<ul style="list-style-type: none"> <li>• No projects yet</li> <li>• Offshore Germany technologically difficult</li> <li>• Highly dependent on next-generation turbines</li> <li>• Lacks offshore 'leaders'</li> </ul>
<b>The Netherlands</b> Kop van Noord-Holland	<ul style="list-style-type: none"> <li>• Good ports</li> <li>• Manufacturing capability of support structures and turbine components</li> <li>• O&amp;G skills/experience</li> </ul>	<ul style="list-style-type: none"> <li>• Uncertain market conditions</li> </ul>
<b>The United Kingdom</b> East of England	<ul style="list-style-type: none"> <li>• High growth market</li> <li>• Long-term market prospects</li> <li>• O&amp;G skills/experience</li> <li>• Proven O&amp;M capability</li> <li>• Support mechanisms in place</li> </ul>	<ul style="list-style-type: none"> <li>• Very limited manufacturing</li> <li>• Use of ports depends on upgrades</li> <li>• Poor local infrastructure</li> </ul>



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### Regional Co-operation

- The POWER region has total capability throughout the supply chain
- But no single region is entirely self-sufficient
- Therefore there is much potential for regional co-operation
- Each region has a different set of capabilities and needs
- POWER region can also co-operate on:
  - Best practice guidelines
    - Increases safety, lowers costs and instigates co-operation
  - Technological initiatives
    - Deepwater technology, installation methods, foundation design



### Regional Competition

- Many examples of common capabilities between regions
- Staggered regional timeframes increase competition
- With few current projects this is especially pronounced
- Almost all aspects of supply chain is internationally open
- Companies actively looking Europe-wide and further afield
- Current EU projects being built predominantly by POWER region supply chain
- External content (non-POWER) in EU projects is low
- Competition *can* be healthy: lowering costs & driving improvements





## Conclusions – Supply Chain Development

- Access to market intelligence – project & tender information
- Facilitation of business to business linkage
- Funding & support for SMEs
  - Ongoing funding and support mechanisms
  - Coordinated business support
  - Coordinated supplier activity
  - Market intelligence
  - Export market support
- Funding & support for R&D and innovation
  - Cost reduction – all elements must be scrutinised
  - High-capacity, low-weight, *offshore* turbines
  - Foundation design
  - Installation methodology
  - Reliability
  - Operations, maintenance and decommissioning



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## Conclusions – Supply Chain Development

- Inward investment and public sector infrastructure: grid, ports etc.
- Use offshore oil & gas industry development expertise
  - NOT being used effectively – *listen* to O&G contractors
  - UK, Netherlands and Denmark have key skills
- POWER regions must address the opportunities of the global market
  - North America and S.E. Asia both have significant potential
  - Export value of skills and technology is high
  - Global market is an opportunity and a threat to POWER regions
  - POWER region must build on its current advantage to capture and defend current and future markets



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