



POWER Project - East of England

Offshore Wind Supply Chain Study for the East of England

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1. Offshore Wind in the East of England

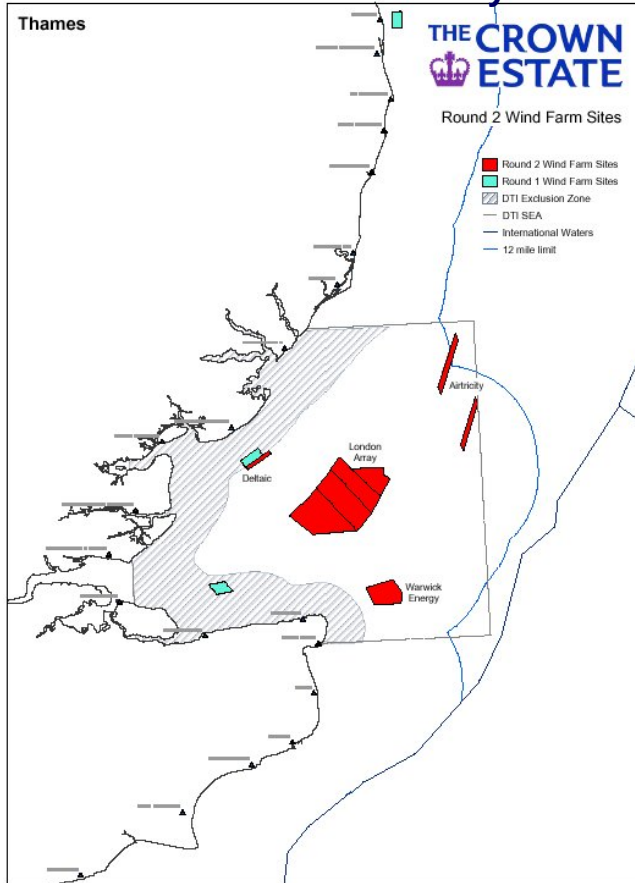


Pushing Offshore Wind Energy Regions (POWER)

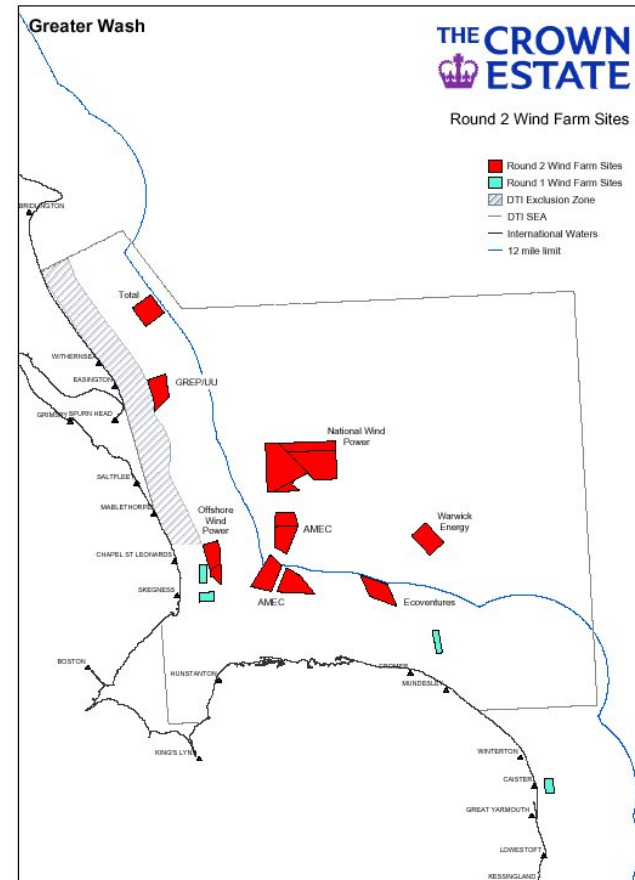
UK poised to become world's largest offshore wind market



The Thames Estuary



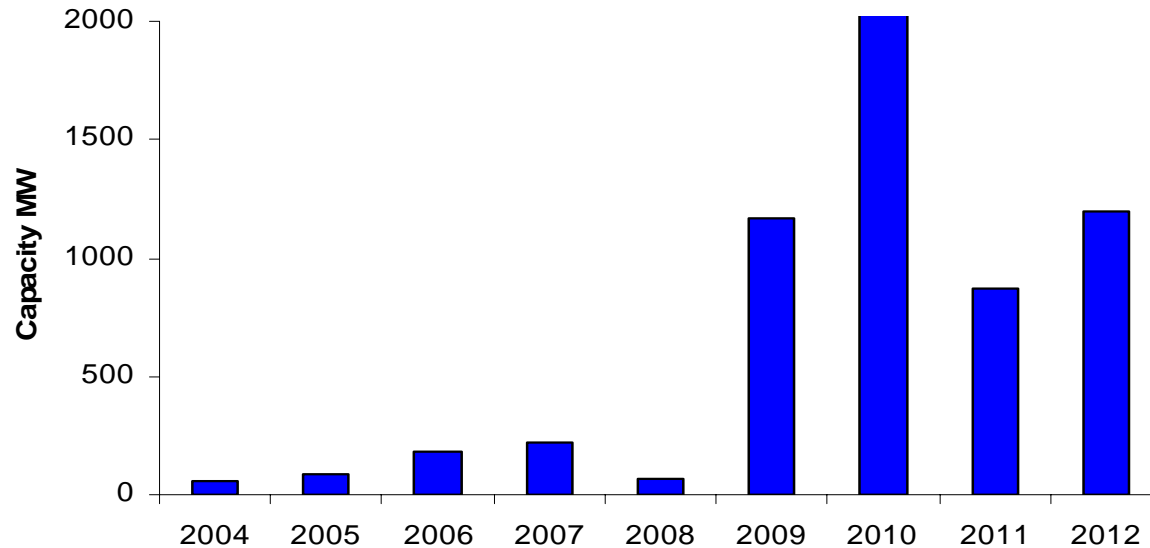
The Greater Wash



East of England has access to 2 of 3 UK Strategic Areas



East of England – Offshore Wind Profile



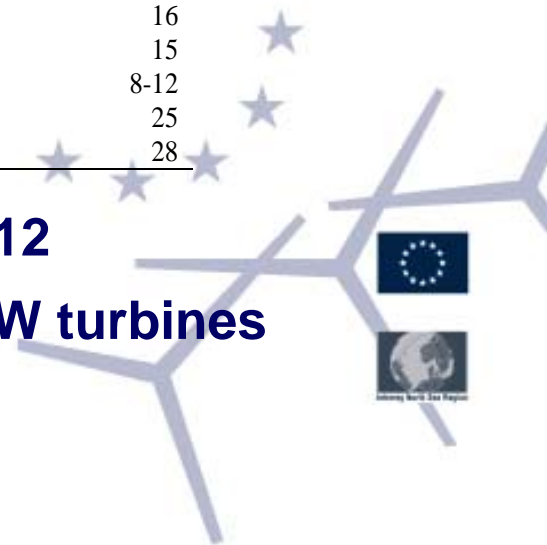
- **1 Project Operational : Scroby Sands**
- **1 Project in construction : Kentish Flats**
- **6 GW of capacity in prospect 2004-2012**
- **1,700 turbines, 1,500 km cables**
- **Potential total £6.7 billion spend 2004-2012**

East of England – Offshore Wind Prospects



Project Name	Target Online	MW	Turbine Size (MW)	Water Depth (m)
Scroby Sands	2004	60	2	2-10
Kentish Flats	2005	90	3	5
Inner Dowsing	2006	90-108	3-3.6	10
Lynn	2006	90-108	3-3.6	10
Gunfleet Sands	2007	108	3.6	8
Cromer	2007	90-108	3-3.6	23
Gunfleet Sands phase II	2008	64	4	8
Humber Gateway	2009	300	3-5	12-14
Lincs (Inner Dowsing II)	2009	250	3.6-5	13
London Array – (LAWL) 1	2009	300	3-5	8-12
Sheringham Shoal	2009	315	3-5	15
Greater Gabbard	2010	500	3.6-5	15
Dudgeon East	2010	300	3-5	20
London Array – Shell	2010	333	3-5	8-12
Thanet	2010	300	3-5	18
Westernmost Rough	2010	240	4-5	16
Docking Shoal	2010	500	4-5	15
London Array – (LAWL) 2	2011	367	3-5	8-12
Race Bank	2011	500	4-5	25
Triton Knoll	2012	1,200	4-5	28

- 18 regional projects due online prior to 2012
- 60 - 1,200 MW developments using 2 - 5 MW turbines
- In water depths of 2 - 28 metres





2. Scroby Sands Supply Chain Analysis



Scroby Sands

- East of England's first operational project
- The UK's 2nd offshore wind farm
- Developed by E.ON UK
- Site first investigated - 1995
- Permission granted - April 2002
- Vestas EPIC contractor
- 30 x 2 MW turbines
- £80m (including initial 5 years O&M)
- Commercially complete - December 2004
- Formally opened - May 2005





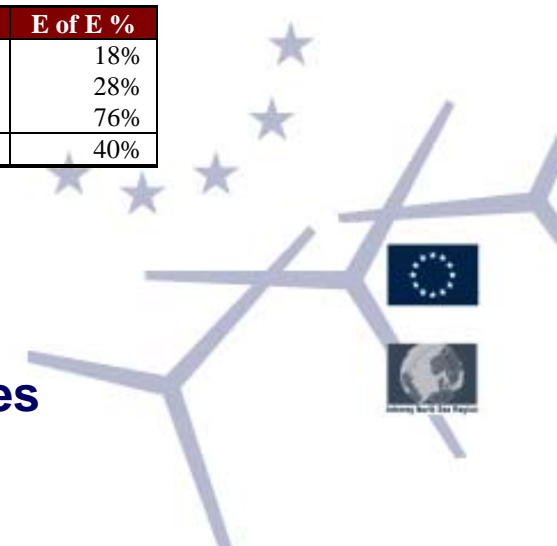
Scroby Sands – Key Statistics

- **Total cost - £80.1m**
- **UK: 48% (£38.8m)**
- **East of England: 16% (£12.8m)**
- **Man Hours – 656,100**
- **UK: 73% (479,768)**
- **East of England: 40% (260,000)**

£'000s	East of England	Other UK	Non UK	Total	E of E %
Development	335	922	480	1,737	19%
Construction	7,415	24,485	39,611	71,511	10%
Operations	5,095	550	1,180	6,825	75%
Total	12,845	25,957	41,217	80,073	16%

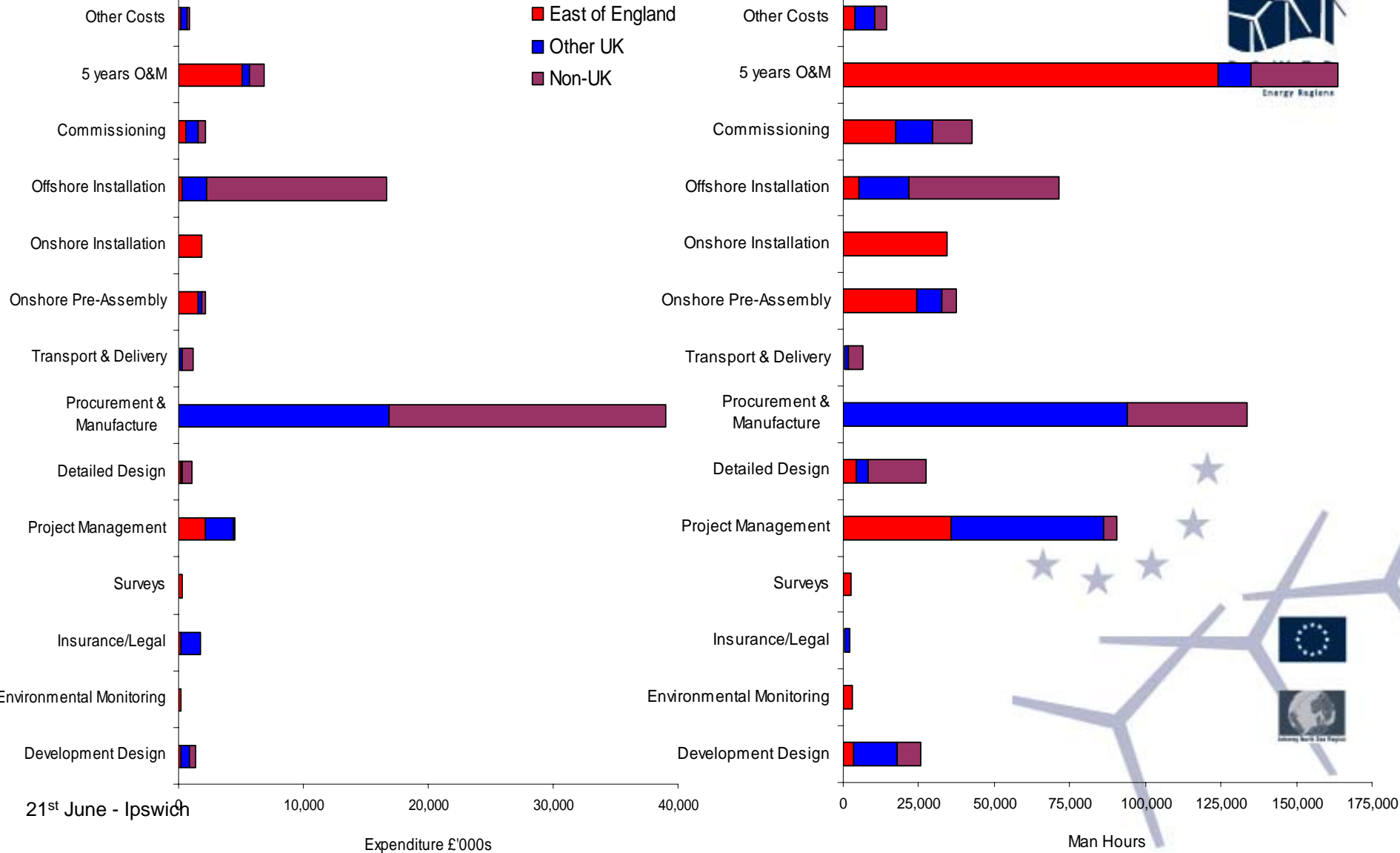
Hours	East of England	Other UK	Non UK	Total	E of E %
Development	5,189	15,974	8,000	29,163	18%
Construction	130,050	193,680	139,446	463,176	28%
Operations	124,160	10,715	28,855	163,730	76%
Total	259,399	220,369	176,301	656,069	40%

- **Construction phase of highest value (£7.4m)**
- **Operations highest level of regional content (75%)**
- **Region gained from low-value, labour-intensive activities**



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Scroby Sands – Value & Hours by Tier 1 Category





3. POWER Survey Findings





The Survey

- Focused on companies;
 - active in the industry or with the capability / desire to be so
 - throughout lifecycle of offshore wind developments
 - located within East of England or active within regional developments
- 95 companies initially identified for interview
- Interviews completed with 32 regional companies
- 21 (66%) of companies had experience in offshore wind
- All 11 others recognised potential of offshore wind as viable market

“Future diversification will be a function of the prosperity of the oil and gas sector – we have been waiting for 4 years for offshore wind to develop into the industry we all hoped for, however, it is still to materialise.”



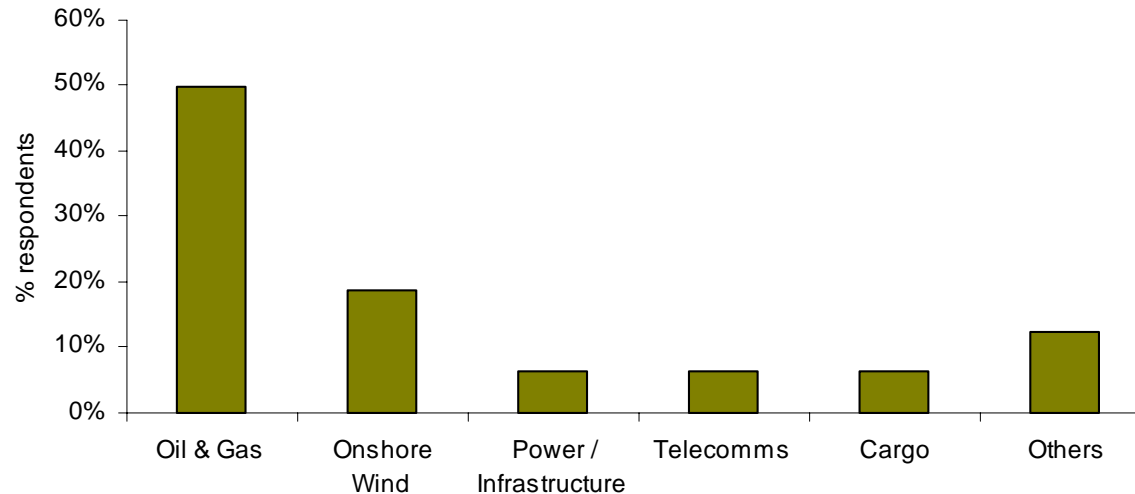
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Location of companies interviewed



Primary Markets



“Offshore renewables has only recently emerged having taken 2-3 years to develop, oil and gas will remain the dominant component of company turnover.”

- **Primary market of company’s is, and will remain, oil & gas**
- **50% source 75%+ turnover from regional activities**
- **81% expect offshore wind to be growing proportion of turnover**
- **Attracted by high capex and project size, scale and quick turnaround**

Areas of Concern

“We currently have no belief in the economics of offshore wind”



59% of companies have experienced some form of problem. Main issues;

- project economics - specifically tight project margins
- developers not understanding true costs and risks of offshore?
- project delays causing uncertainty – justify investment decisions?
- allocation of risk out of balance
- difficulties penetrating supply chain – tendering process & duration
- market intelligence lacking at all levels of supply chain
- low levels of industry R&D (exceptions – Trinity House, CEFAS & TWI)

Problems expected to continue HOWEVER solutions are possible



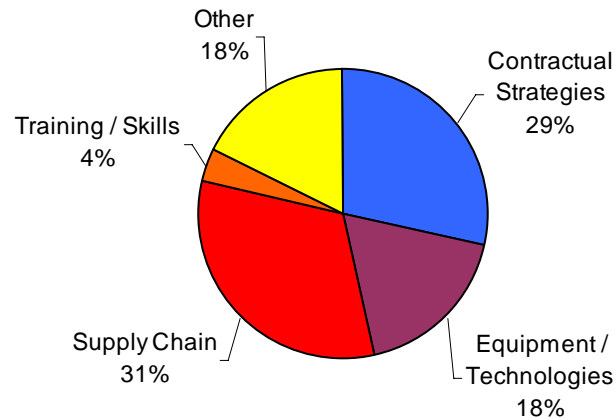
Lessons Learnt

“Market penetration has been eased by collaboration which has allowed us to profile our competencies and develop our products tailored to specific industry requirements.”

- **The need for companies to operate in their area of expertise**
- **New areas should be undertaken through strategic partnerships with established players**
- **Timing of market entry is crucial**
- **Early market entry is risky but can be beneficial in the long-term**
- **However, real supply chain yet to emerge**
- **Interaction in supply chain vital (particularly developer–contractor)**

“We have benefited greatly from an early involvement in the market and an examination of contract strategies prior to entering the market.”

Barriers to Entry



59% of companies believe there are significant barriers to entry:

- penetrating existing and future supply chains
- restrictions created by prevailing contract strategies
- lack of equipment and technologies

“While the opportunity is there it becomes a question of timing and market maturity – we will require a return on the time and money we have invested.”

East of England Strengths

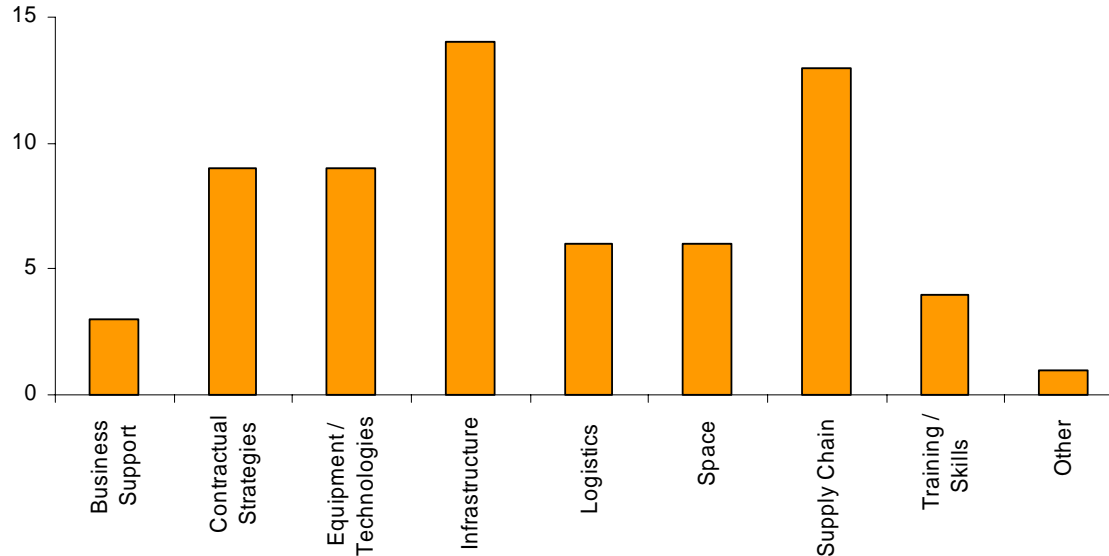


“Believes suppliers will appear if market materialises – however currently in a time lag.”

- **Through servicing oil and gas industry, and other related industries, the region has capability to support the development of offshore wind**
- **Local suppliers identified in; survey, environmental, cable, diving, port, switchgear, oceanographic instrumentation, support vessels, etc**
- **All aspects of development and operations phases can be undertaken**
- **Specific Strengths: Project management, offshore engineering, environmental consultancy, insurance, surveys and O&M**
- **Regional agencies supporting companies to develop relationships & interact**
- **Offshore Renewable Energy Centre and Outer Harbour vital to maximising transfer of related experience to requirements of offshore wind**

“If the region can service and supply the Southern North Sea, and further a field within the oil and gas industry, it can do the same for offshore wind.”

East of England Weaknesses



- **Lack of manufacturing capability**
- **Offshore contracting element yet to develop due to project delays**
- **Supply chain currently lacks a 'leader' (i.e. Shell)**
- **Poor regional infrastructure**
- **Currently limited port and 'lay-down' facilities**
- **Uncoordinated approach from different regional agencies**

Scenario 2 Developments



- Scenario 2**
- Turbines of 4 MW and above
 - Projects located in 25 m of water or greater

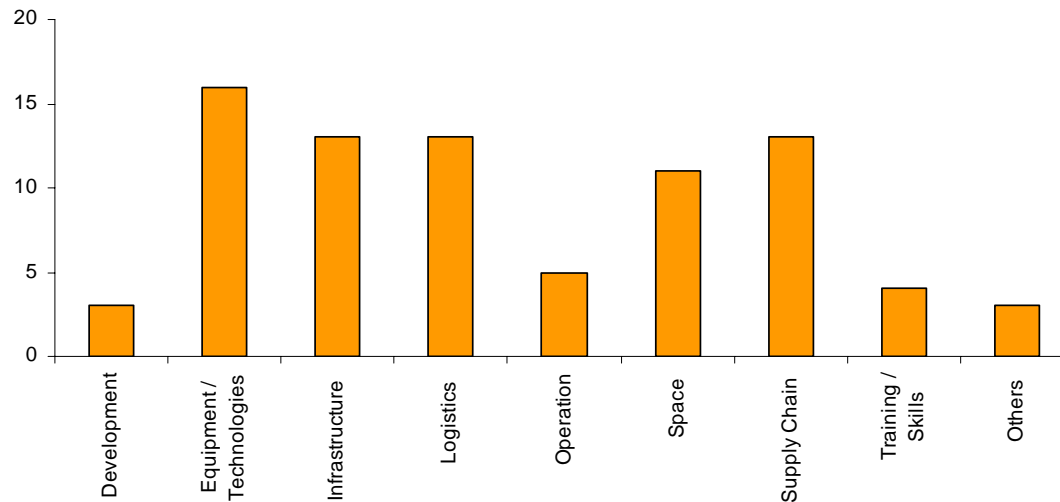
Scenario 2 projects broadly comparable with UK Round 2 developments

Impact of Scenario 2;

- Offshore activity will dramatically increase
- Greater opportunities for regional companies
- Improved flow of projects
- Development of 'real' supply chain
- Focus on quality instead of cost
- Emergence of economies of scale
- New contracting and financing strategies to emerge
- Standardisation and best-practice guidelines



Scenario 2: Principal Challenges



- Availability of equipment / technologies for construction
- Necessary investment in regional ports (i.e. GY Outer Harbour)
- Regional infrastructure is constraining
- Increased competition from the continent
- Evolution of contracting and financing strategies
- Entry of turbine manufacturing / assembly capability?

“The east coast is, in principal, the ideal location to base such activity but unsure it will be ready for 2010.”



Supply Chain 'Wish List'



“The region’s business support agencies are highly significant when they are linked up and communicating in advance”

- **Business Support** – a more coordinated approach needed
- **Development Assistance** – continued government support crucial
- **Manufacturing Capability** – a regional and UK weakness
- **Marketing** – promotion of region and individual companies
- **Market Intelligence** – central source is needed
- **Relationships** – need fostering throughout supply chain
- **Research & Development** – UK government not doing enough

“Increasingly proactive, however, still need a greater cohesion between the respective agencies”



4. Scenario 1 – East of England Capability



S1: Regional Strengths & Weaknesses



Proven Regional Capabilities

High	Medium	Low
Environmental Monitoring Onshore Installation Onshore Pre-Assembly O&M Surveys	Commissioning Project Management	Detailed Design Development Design Insurance/Legal Procurement & Manufacturing Offshore Installation Transport & Delivery

- **Current capabilities profiled within Scroby Sands**
- **Cannot currently offer complete service BUT can offer substantial one**
- **Core skills, experience and capabilities in place**
- **New area of focus for strong base of regional suppliers**
- **Further opportunities for diversification wide-ranging, developing upon region's offshore engineering and oil & gas experience**



S1: Proven Capability - Scroby Sands

£000s	Total	East of England	Other UK	E of E %
Procurement & Manufacture	38,986	8	16,821	0%
Offshore Installation	16,700	283	1,940	2%
5 years O&M	6,825	5,095	550	75%
Project Management	4,551	2,201	2,175	48%
Onshore Pre-Assembly	2,200	1,614	230	73%
Commissioning	2,175	613	978	28%
Onshore Installation	1,825	1,825	0	100%
Insurance/Legal	1,779	211	1,568	12%
Development Design	1,409	149	780	11%
Transport & Delivery	1,225	55	235	4%
Detailed Design	1,111	180	156	16%
Other Misc. Costs	838	202	486	24%
Surveys	260	248	12	95%
Environmental Monitoring	190	162	28	85%
Total	80,073	12,844	25,957	16%

- Region lacks consolidated base of experienced suppliers
- Little of potentially substantial regional capability realised to date
- Regional experiences to date illustrate difficulties of sector – SMEs etc
- Lack equipment and infrastructure to fully support developments
- High cost base & relatively static capacity – as with broader supply chain
- Regional content based on low value, service based activities

Regional Supply Chain Profile



Activity	Regional Companies
Accountancy, Financial, Insurance & Tax	30
Cables & Connectors	38
Control Systems, Topsides & Subsea	20
Diving & Underwater Services	15
Electrical Equipment, Materials & Services	61
Electronics	29
Environmental Assessment & Monitoring	38
Fabrication & Construction	52
Feasibility / Front End Studies	15
Foundations & Piles	6
Freight, Logistics & Transportation	29
Gears & Gearboxes	4
Hydraulics & Pneumatics	23
Inspection & Testing	33
Installation & Commissioning	33
Instrumentation	65
Integrated Services	17
Land & Premises	41
Legal	14
Legislation & Regulations	21
Maintenance, Modification & Operation	43
Material & Product Handling	24
Navigation Aids	4
Personnel	58
Ports & Supply Bases	4
Project Management	59
Research & Development	21
Rotor Blades	1
ROVs	12
Safety, Security & Firefighting	89
Scour Protection	2
Steel & Metal Materials	46
Support Vessels	18
Survey & Positioning	24
Wind Turbines & Towers	15

- **Mapergy** – enables distribution of companies by geographic location
- **Catalogue of Energy Industry Classifications** – sector, role & activity
- **Integrated & applied to regional companies (1,275) with offshore wind capability**
- **Preliminary analysis of company capabilities complete – role & activity**
- **Illustrates key areas of current regional strength & weakness**
- **Limitations;**
 - capability v capacity?
 - current v future capability?





5. Scenario 2 – East of England Capability



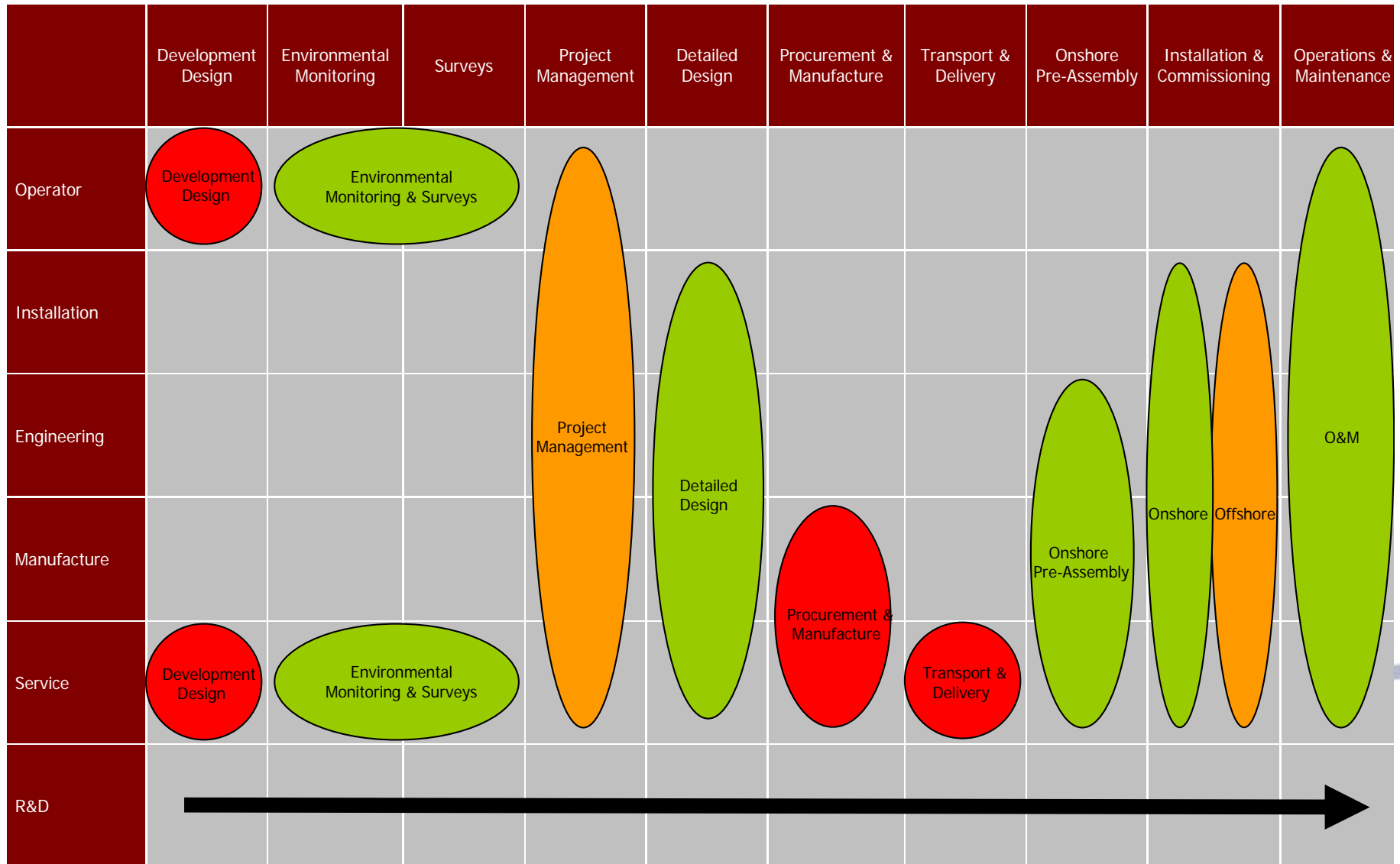


Principal Challenges in Scaling-Up

- **Contract Strategy:** risk and cost *must* be balanced - emergence of new strategies for Scenario 2 projects and beyond?
- **Logistics:** ports must be improved as a matter of priority
- **Turbines:** drive for larger turbines - can production meet forecast demand?
- **Foundations and Towers:** production capacity questionable – must place contracts early
- **Installation Vessels:** Scenario 2 projects will need vessels with greater capability to cope with increased turbine weight, tower height and water depth.
- **Steel Prices:** recent price increases are a concern - how will they impact manufacturing costs for offshore wind?

As developments increase in number, scale and complexity the capability and capacity of regional suppliers will be challenged

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S2: Regional Strengths & Weaknesses



Potential Regional Capabilities

High	Medium	Low
Environmental Monitoring Onshore Installation Onshore Pre-Assembly O&M Surveys <i>Commissioning</i> <i>Detailed Design</i> <i>Insurance/Legal</i>	Project Management <i>Offshore Installation</i>	Development Design Procurement & Manufacturing Transport & Delivery

- **Potential capability exists in; Commissioning, Detailed Design, Insurance / Legal and to a lesser extent, Offshore Installation**
- **Procurement & Manufacturing unlikely in region at present**
- **Difficulties in establishing foothold in areas currently low capability**



6. Future East of England Content





Key Areas of Future Content

- **Strengths / Weaknesses:** Development & Operations v Construction
- **Fabrication:** little capability at present - can this high-value area be capitalised on?
Forthcoming multi-phase projects increase viability of investment & manufacturers setting-up
- **Ports:** use of regional ports as a construction, pre-assembly and operations base proved to be key factor in gaining regional value
- **Onshore Installation:** cable installation and grid interface
- **Offshore Installation:** huge demand anticipated - no regional capability (other than cables).
- **Operations & Maintenance:** proven area of high regional content on Scroby and high potential for future – what lies beyond initial 5 year warranty?

Vital regional supply chain galvanised to fully develop established capabilities and the required levels of investment are realised



Forecast Regional Content

Forecast Regional Content is presented for three cases:

High Case – assumes regional project manager, use of regional port & contractors successful at tender where capabilities exist.

Proven Case – assumes regional content achieved on Scroby Sands is replicable

Low Case – assumes non East of England port is used, no manufacturing & installation content on the offshore components of the project and majority of O&M is conducted from within the region



Forecast Regional Content: 2004-2012

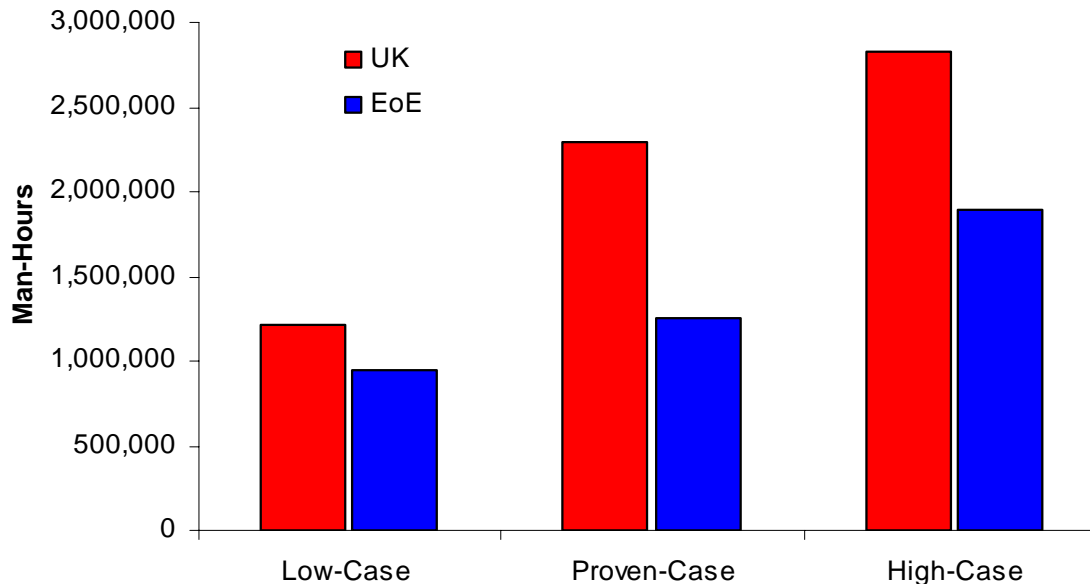
Forecast Regional Content in a Typical Scenario 2 Project (500 MW)



£000s	Total	High	High %	Proven	Proven %	Low	Low %
Development Design	4,000	400	10%	423	11%	422	11%
Environmental Monitoring	500	492	98%	426	85%	427	85%
Insurance/Legal	12,000	11,652	97%	1,423	12%	1,424	12%
Surveys	750	750	100%	715	95%	716	95%
Project Management	11,000	5,929	54%	5,320	48%	4,776	43%
Detailed Design	6,000	6,000	100%	972	16%	540	9%
Procurement & Manufacture	301,250	773	0.3%	62	0%	0	0%
Transport & Delivery	7,500	1,425	19%	337	4%	0	0%
Onshore Pre-Assembly	16,000	13,360	84%	11,738	73%	0	0%
Onshore Installation	30,000	30,000	100%	30,000	100%	30,000	100%
Offshore Installation	130,000	49,970	38%	2,203	2%	0	0%
Commissioning	16,000	14,352	90%	4,509	28%	2,575	16%
5 years O&M	45,000	35,235	78%	33,593	75%	29,176	65%
Other Misc. Costs	6,000	5,286	88%	1,446	24%	805	13%
Total	586,000	175,624	30%	93,169	16%	70,862	12%

If current lack of manufacturing capability & offshore installation equipment not confronted region will continue to lose out in key segments

Forecast Regional Content: 2004-2012

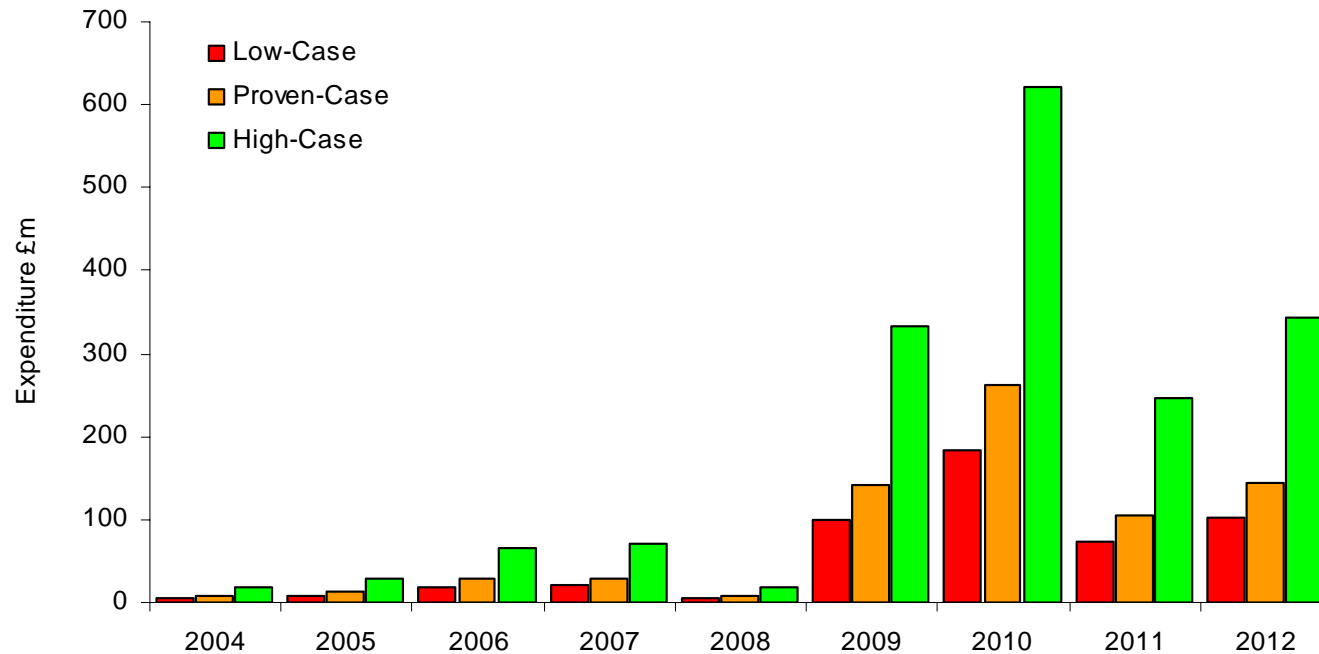


Man-Hours	E of E	UK
High-Case Content	1,899,152	2,826,570
Proven-Case Content	1,259,425	2,291,745
Low-Case Content	945,577	1,216,236
Total Typical S2 Project	3,199,433	

Forecasts include initial 5 years operations & maintenance



Forecast Regional Content: 2004-2012



£m	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
Low-Case	6	9	19	21	5	99	184	73	102	518
Proven-Case	8	12	28	30	8	142	263	105	145	741
High Case	19	29	65	70	18	333	620	247	343	1,746
Total E of E £m	75	113	250	270	70	1,285	2,390	954	1,320	6,727

Development & construction \$6.7 billion – annual SNS spend £700m to 2008



7. Conclusions





East of England Capabilities

- Offshore wind significant 'alternative' market to regional companies
- Region has a proven capability in developing offshore windfarm
- Development and Operations key areas - Construction highest value
- Manufacturing capability currently lacking
- Scenario 2 projects bring new challenges – capability & capacity
- Competition from the continent is strong (not to mention UK)
- Key questions remain for the development of regional supply chain★
- Region must target areas of existing competence
- Developing the 'gaps' should be investigated at a regional level
- Early engagement and full government support of regional companies wishing to explore supply chain opportunities vital to region

Regional Supply Chain Development



If the region is to harness potential within offshore wind it is vital it proceeds in an increasingly proactive and cohesive manner

- **Knowledge Holding and Transfer** – provision of market intelligence
- **Relationship Building** – facilitating business to business linkage
- **Innovation Support** – funding and support for SMEs
- **Strategic Support** – inward investment and public sector infrastructure

Realistic assessment of regional capabilities and targeted and joined-up strategic approach vital in fostering industry awareness and promoting the region if future regional content is to be maximised.

