“Wind Mills of the Mind”
Delivering large scale offshore wind

Andy Kinsella
CEO, Offshore
November 24th, 2011, Dundalk

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Delivering Large Scale Offshore Wind

The Task

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“Mountains of the Mind”

Delivering large-scale offshore wind energy

“The mountains one gazes at, reads about, dreams of and desires are not the mountains one climbs. These are matters of hard, steep, sharp rock and freezing snow; of extreme cold; of vertigo so physical it can cramp your stomach and loosen your bowels; of hypertension, nausea and frost-bite; and of unspeakable beauty.”

Robert MacFarlane

Source: *Mountains of the Mind, Robert MacFarlane*

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“Wind Mills of the Mind”

Delivering large-scale offshore wind energy

“The wind mills society gazes at, reads about, dreams of and desires are not the wind mills that we, the industry, have to deliver. These are matters of hard logistics, steep learning curves, unknown geology and storm ridden seas ; of extreme winds; of a commitment from industry so physical it will cramp your stomach and loosen your bowels; but will deliver benefits to society of unspeakable importance.”

Andy Kinsella

Source: *Mainstream Renewable Power, Andy Kinsella*

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Delivering Large Scale Offshore Wind

UK Offshore Experience

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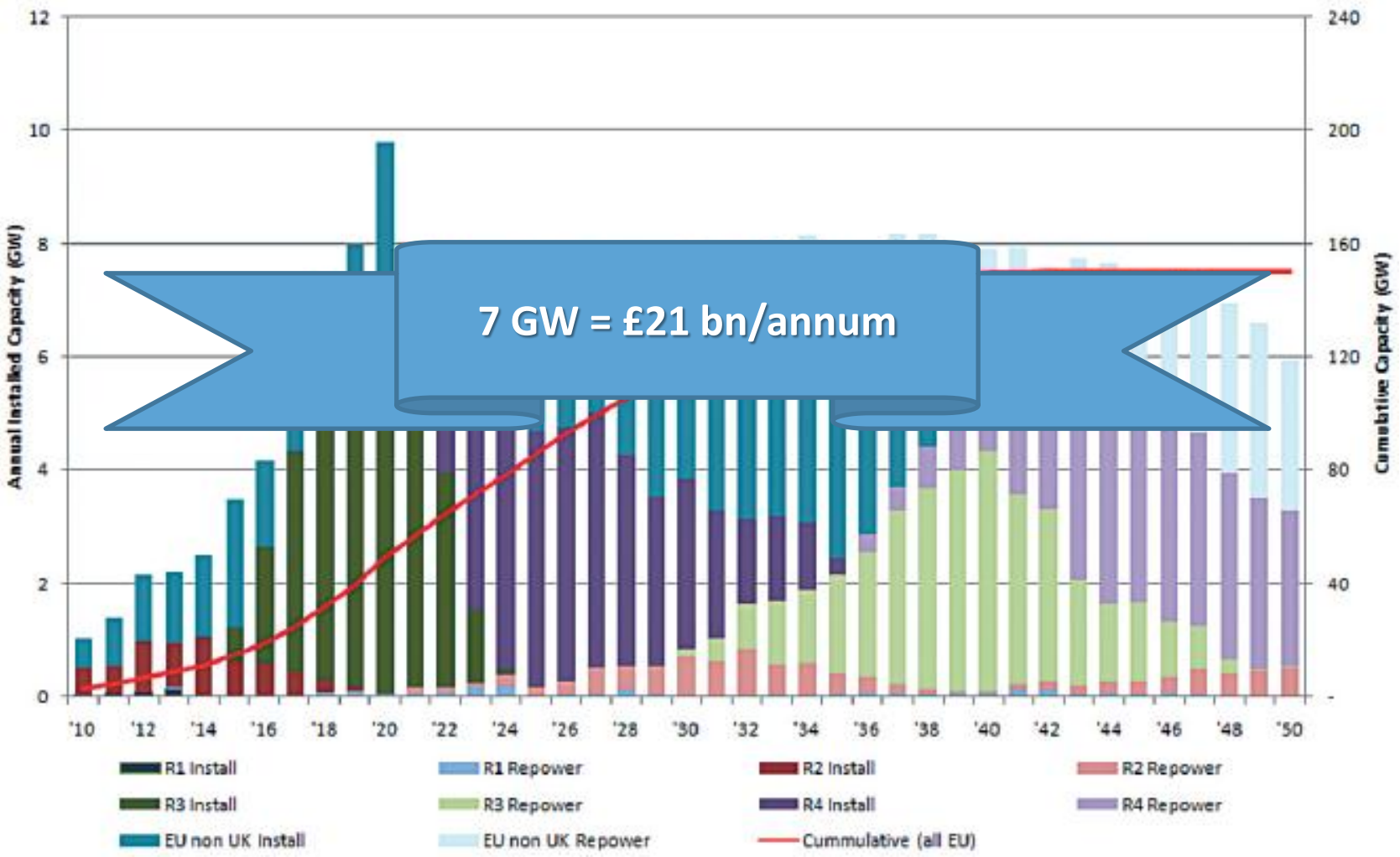
Annual & cumulative EU offshore installation to 2050



Source: *BVG Associates for The Crown Estate, 2009*

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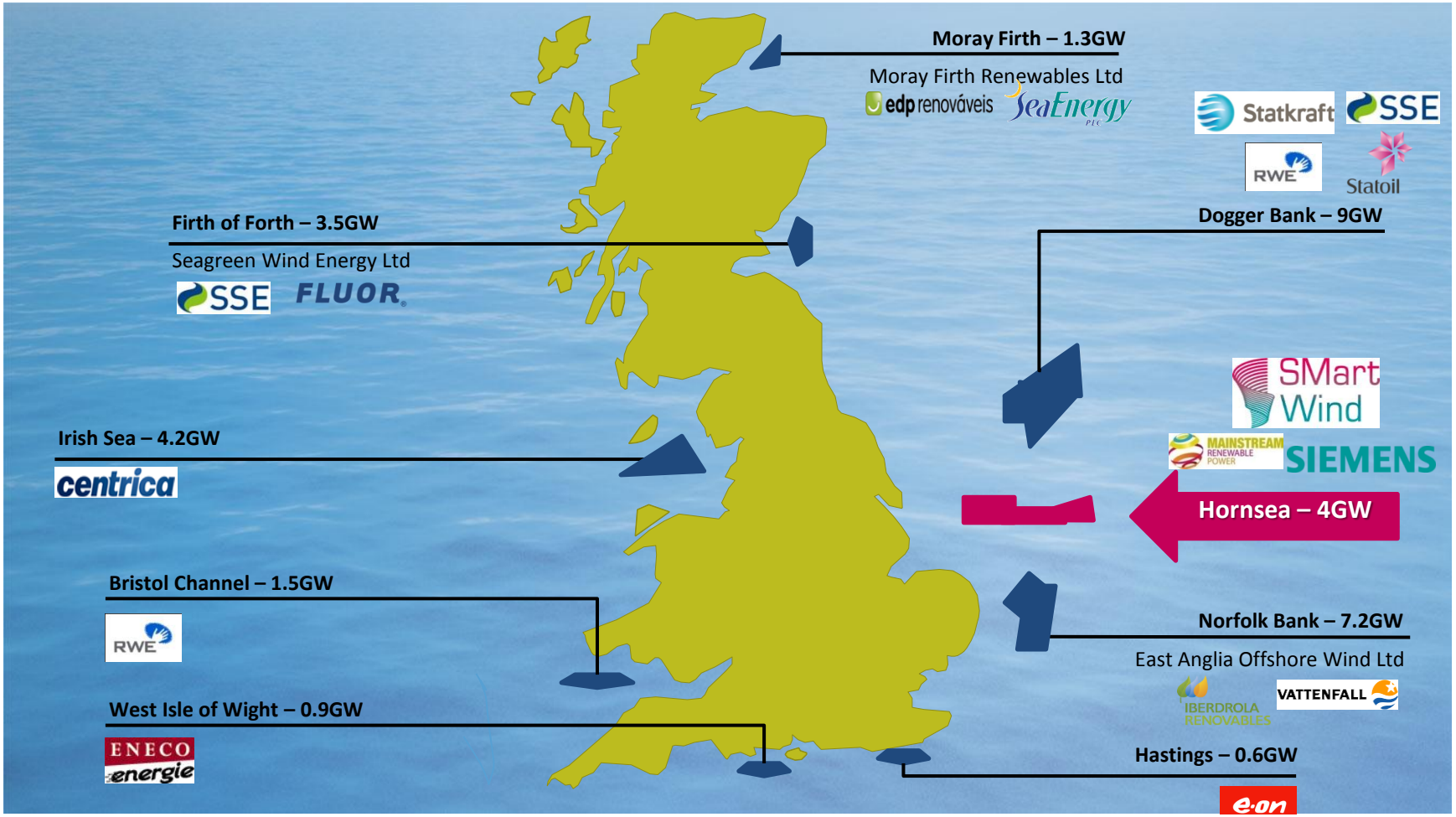
Offshore UK: Round 3, 32GW, £100bn, by 2020



Source: *Climate Change Capital, 2010*

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Valuation of the UK's offshore resource

In harnessing 29% of practical offshore resource by 2050:

- Energy production equivalent to North Sea oil and gas production
- Potential to become a net energy exporter
- Carbon reduction equivalent to 1.1 billion tonnes
- 145,000 jobs potential

Scenario 1 - Utilisation: 13%	Scenario 2 – Utilisation: 29%
78GW	169GW
Cap Ex: £170bn	Cap Ex: £443bn
Revenue: £28bn	Revenue: £62bn
50% of UK Demand	**Net Exporter**

Source: BCG for *The Offshore Valuation Group, 2010*

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Delivering Large Scale Offshore Wind

SMart Wind: A world class supply chain consortium

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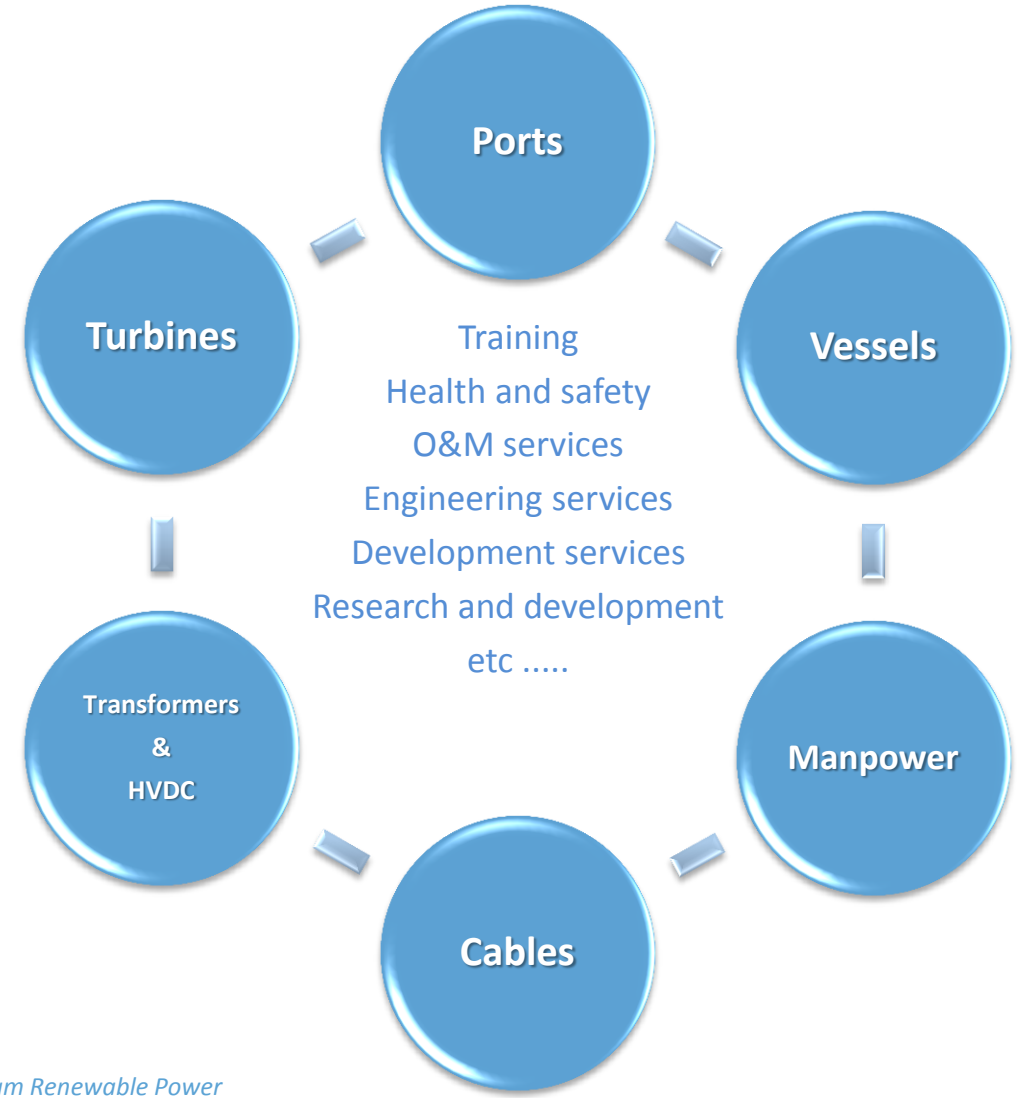
The supply chain elements



Source: *Mainstream Renewable Power*

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SMart Wind: 4,000MW, £12.0bn

- 50/50 joint Venture: Mainstream Renewable Power and Siemens
- Siemens Wind Power: World's leading offshore wind turbine provider
- Hochtief: World's third largest construction contractor
- Beluga shipping: World's biggest heavy lift shipping company
- A2Sea; Dong Siemens Joint Venture installation ship contractor
- Siemens T&D:
  - Siemens global centre of competence, interconnection- Manchester
  - One of only three suppliers of HVDC technology
- Prysmian: World's largest supplier of HV sub-sea cable

- First in Round 3 to **Consent**
- First in Round 3 to **Commercial Operation**
- **Lowest Cost of Energy** solution in the marketplace

Source: *Mainstream Renewable Power*

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Supply Chain

The challenges of large scale offshore wind

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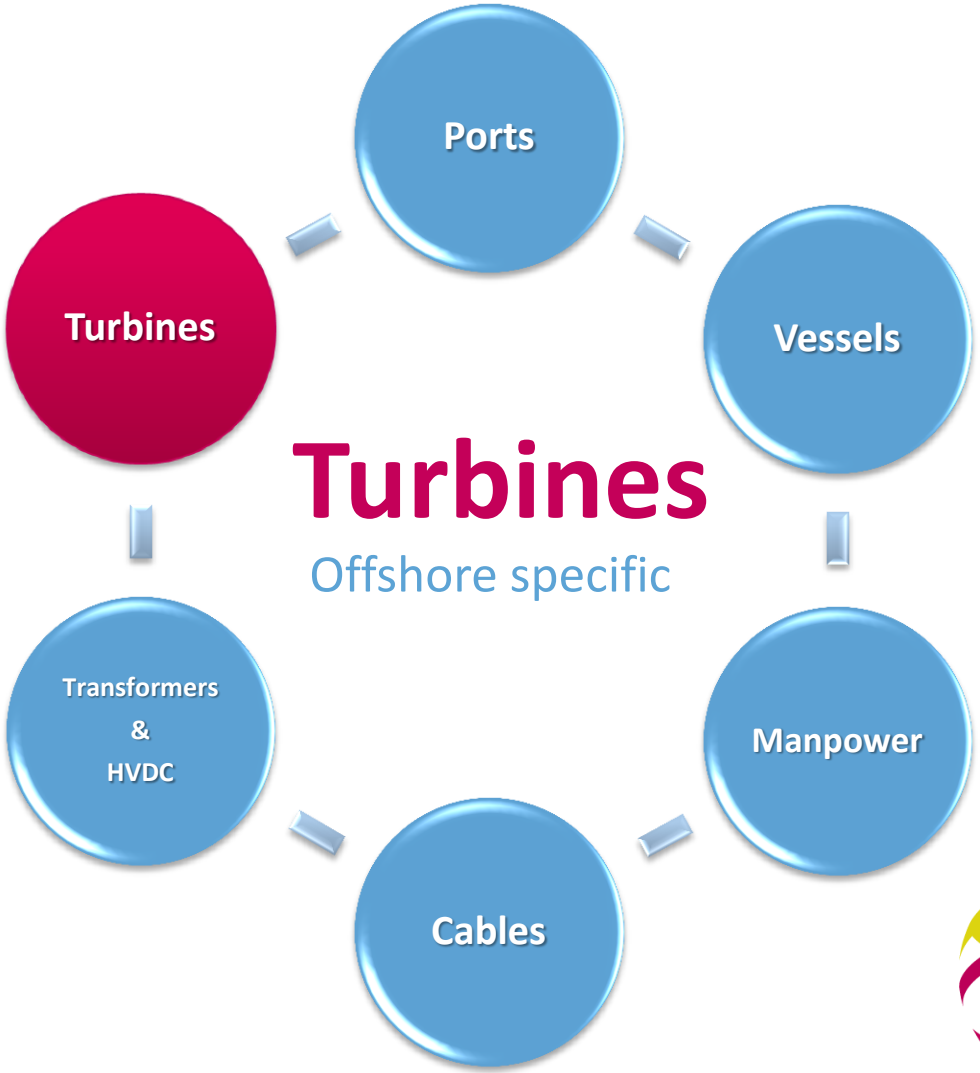

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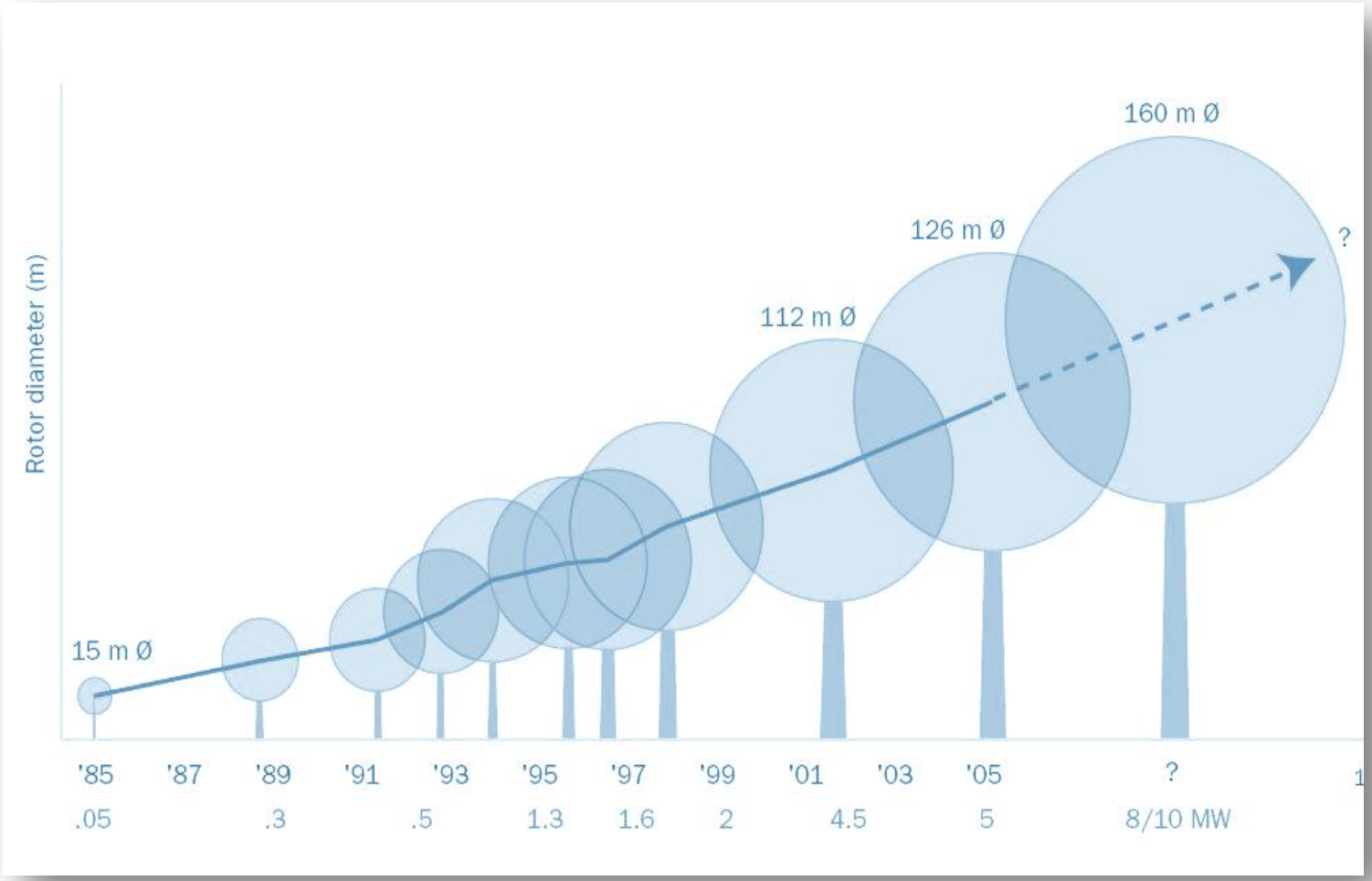
Turbines: Development



Source: Industry, various

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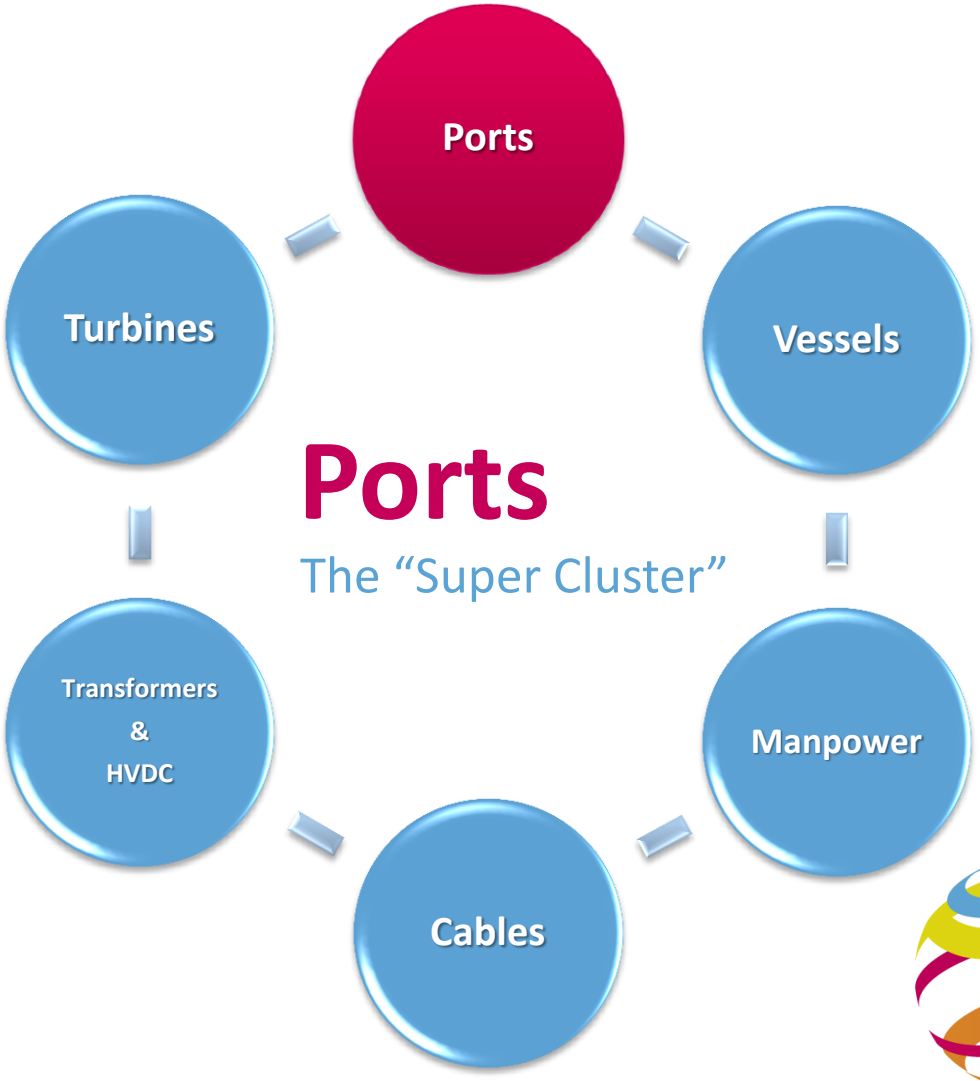

Ports

The “Super Cluster”

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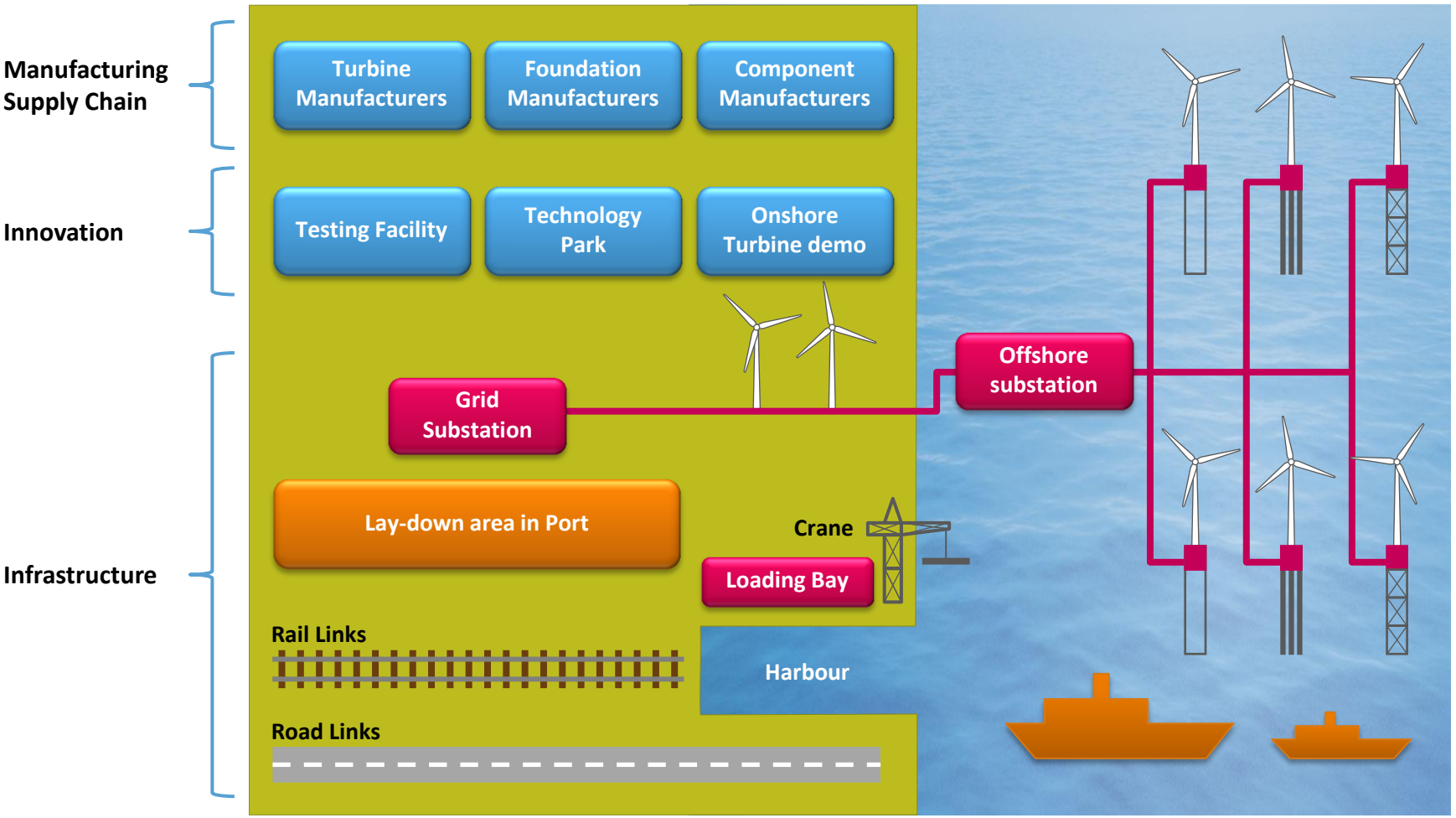
Ports: The Super Cluster



Source: *Mainstream Renewable Power*

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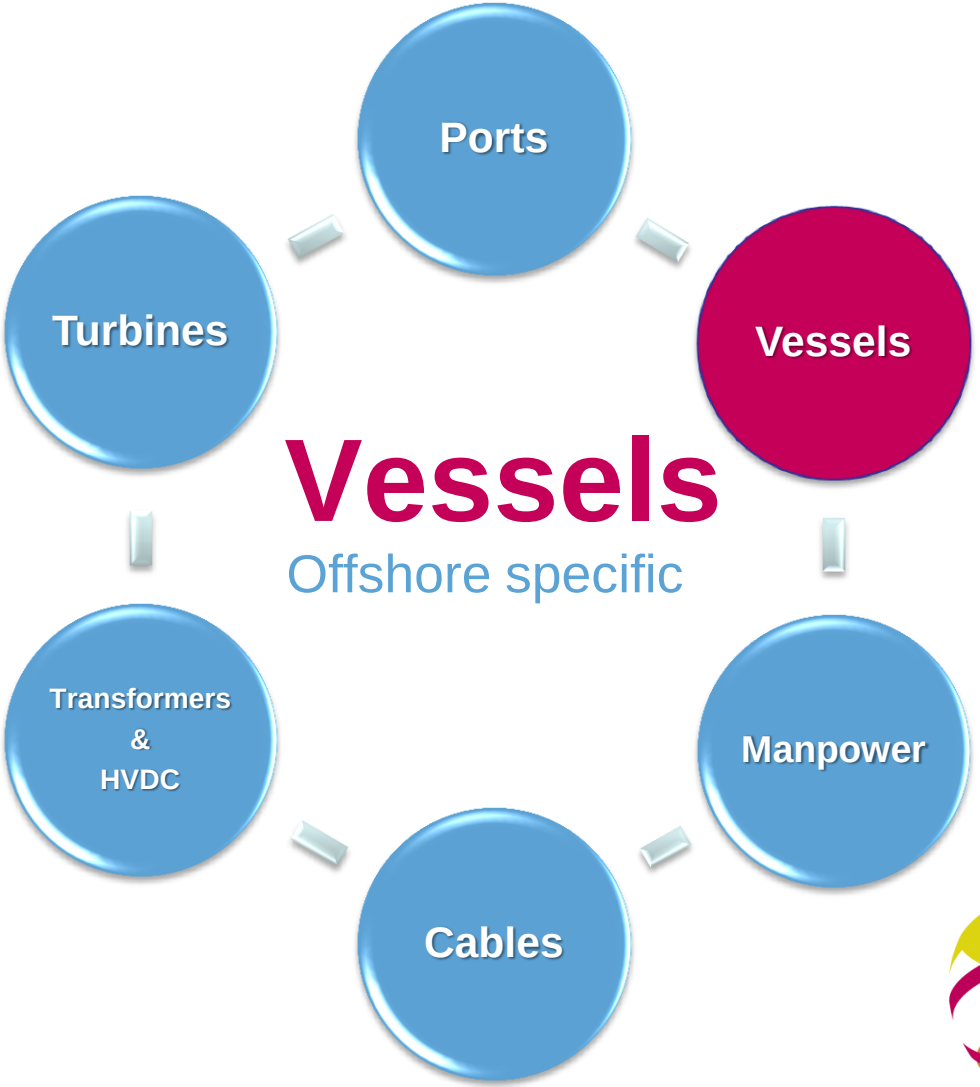

Vessels

Offshore specific

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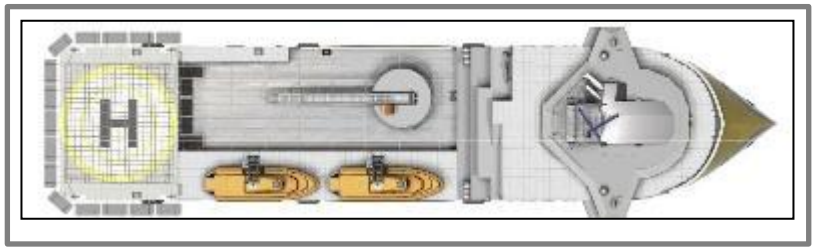
Vessels

- All-weather ship(s) able to operate all year round
- Enormous increases in size & capabilities
- CAPEX around €200m each
- Minimum of ten of these constructor ships
- Additional flotilla of new special purpose vessels
- Cost effective Helicopter support solutions
- Total cost about £5bn



Source: *Mainstream Renewable Power/Beluga Hochtief/Huisman/Sea Energy Ltd*

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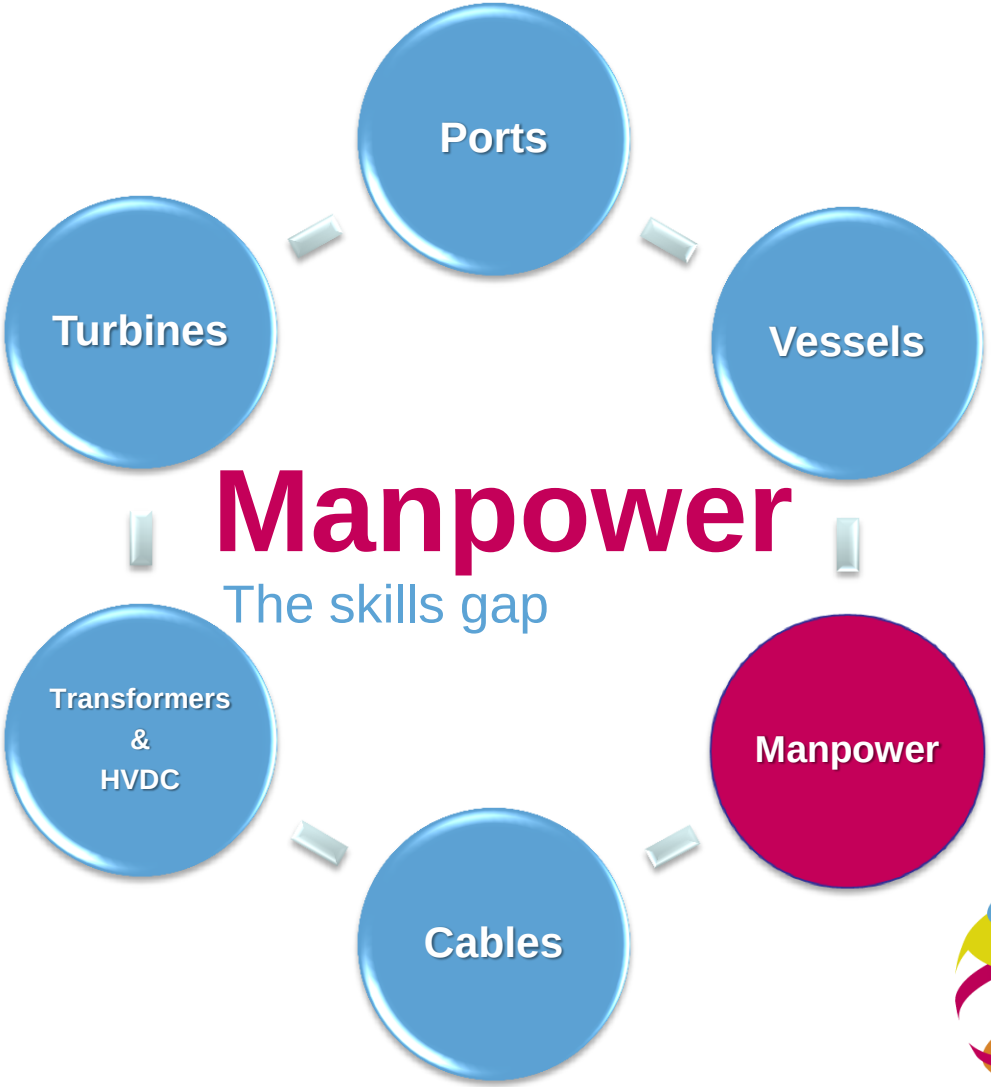

Manpower

The skills gap

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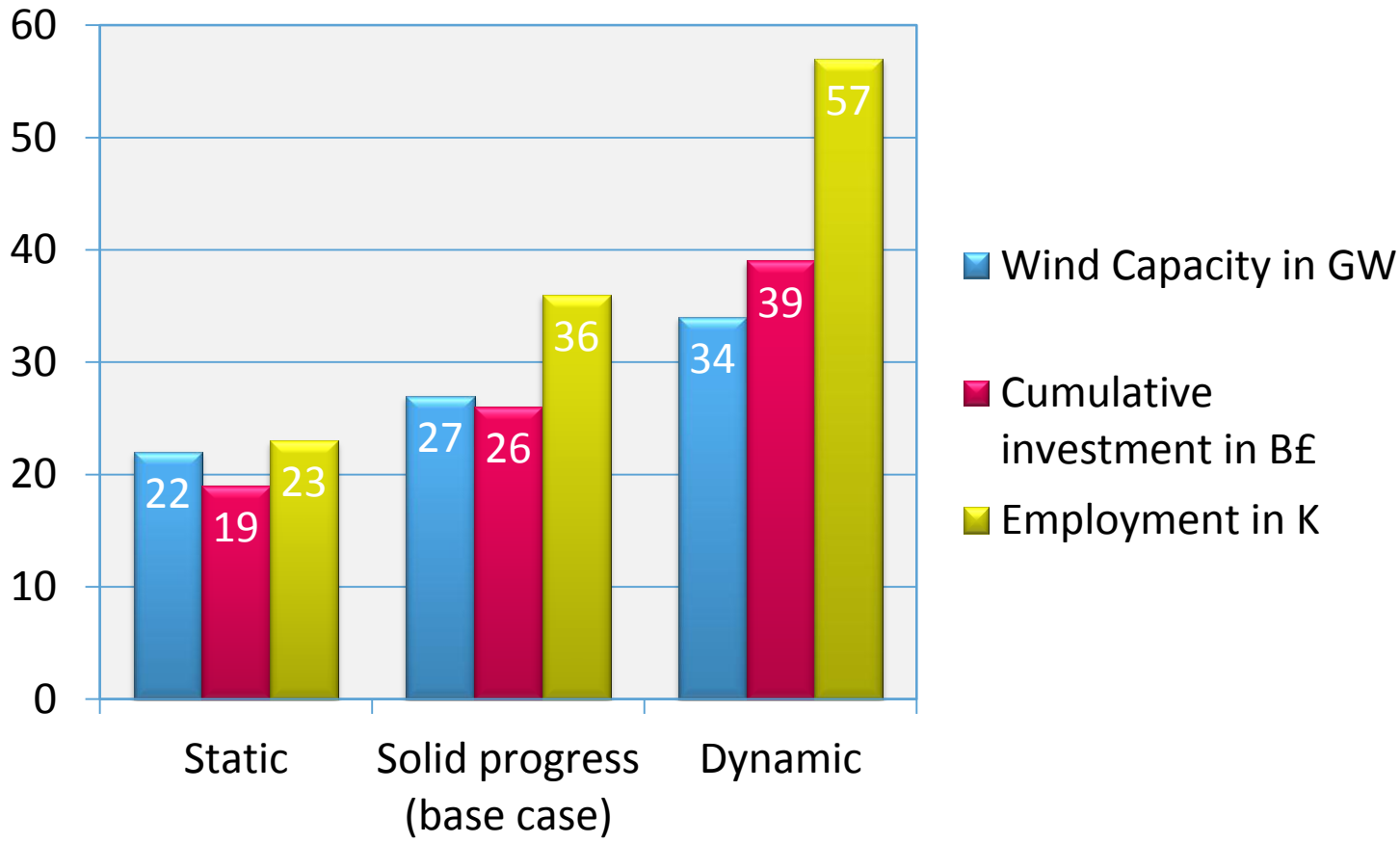
Supply Chain: Manpower

Potential benefits by 2020 in three industry development scenarios



Source: *The Bain Report*

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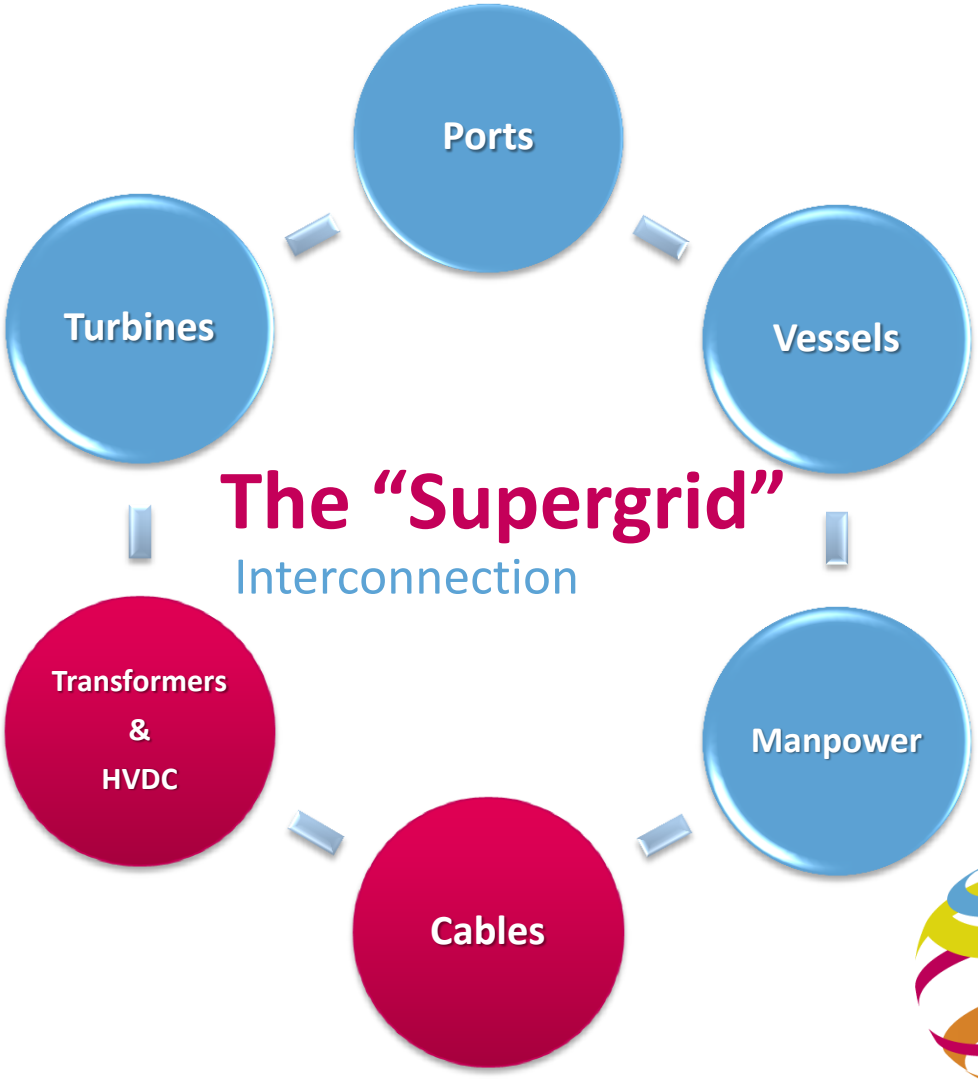

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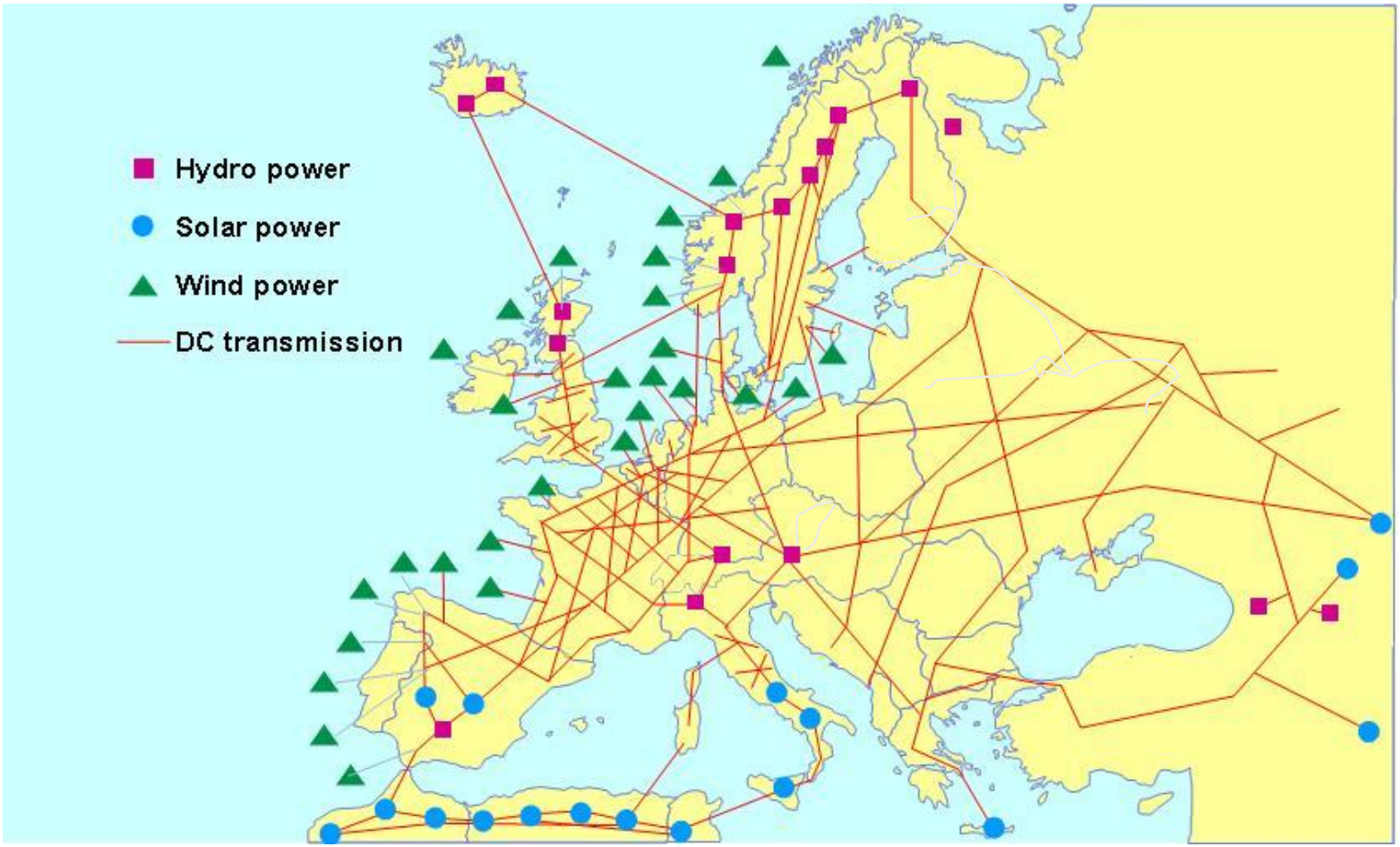
Renewables Supergrid



Source: *Friends of the Supergrid*

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FRIENDS OF THE SUPERGRID

"is a group of companies and organisations with a mutual interest in promoting the policy agenda for a European Supergrid and empowered to build, the know-how to deliver it in practice".

ALSTOM

elia
Powering a world in progress

GE

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nexans

nationalgrid

HOCHTIEF

PRYSMIAN CABLES & SYSTEMS

Rte
Réseau de transport d'électricité

SIEMENS

VATTENFALL

Source: *Friends of the Supergrid*

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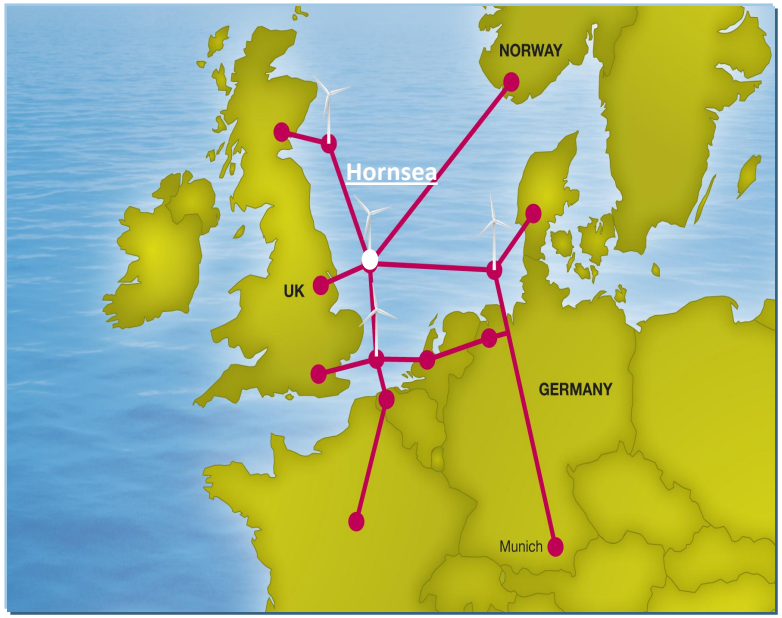
Supergrid: Hornsea - Hub of Phase One

- Capex - €28bn (2010 value)
- 30% return on equity
- 23GW of wind at 40% capacity factor (must carry the cost)
- 6 year build out with 40yrs of operation
- Capacity Factor:
  - 40% if the wind alone trades on the system
  - 90% when wind and other energy/service providers use the network.



Result: from 4.67 cents to as low as 1.55 cents per kilowatt- hour (c/kWh) depending on gearing and utilisation

Source: *Friends of the Supergrid*

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Cost of Energy

A Bigger Picture

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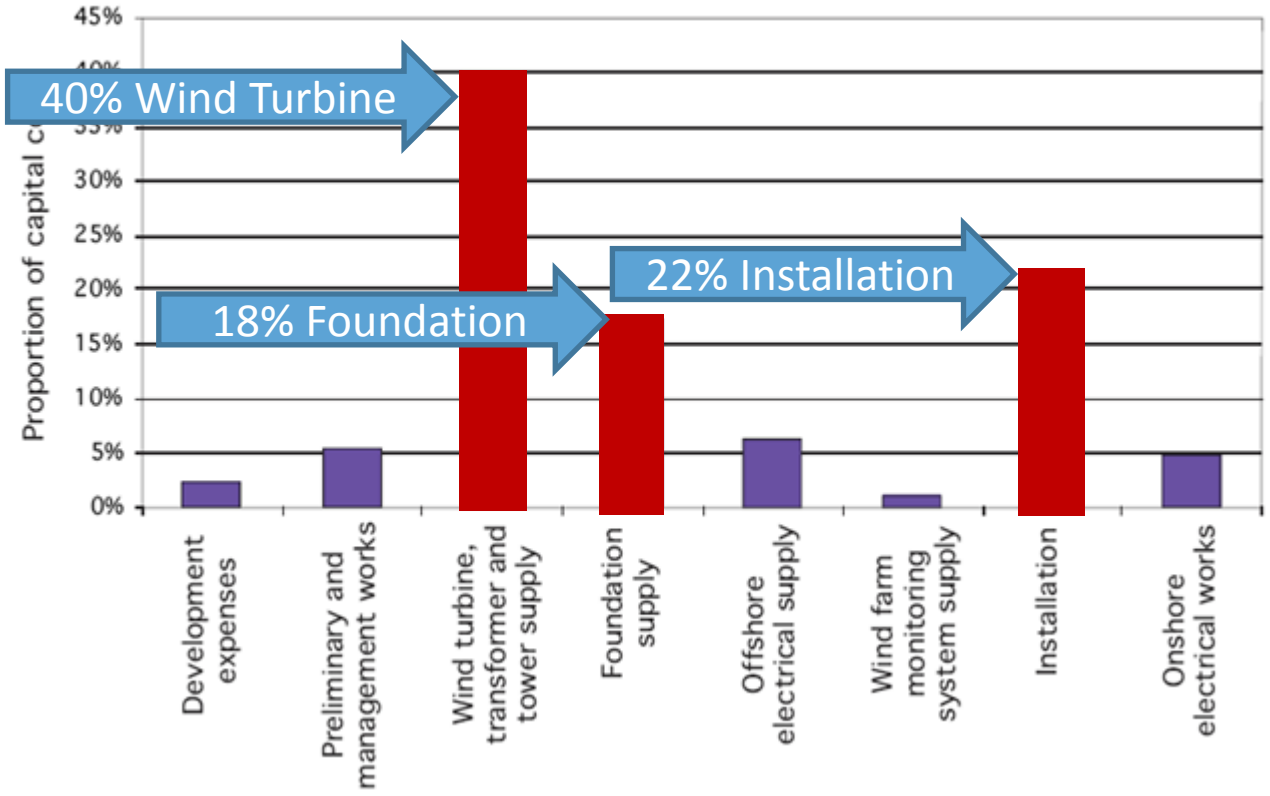
Cost of Energy: Offshore wind farm typical costs

Figure 2.1 Typical breakdown of capital costs (UK Round 1) (Garrad Hassan, 2003)



Source: *Garrad Hassan, 2003*

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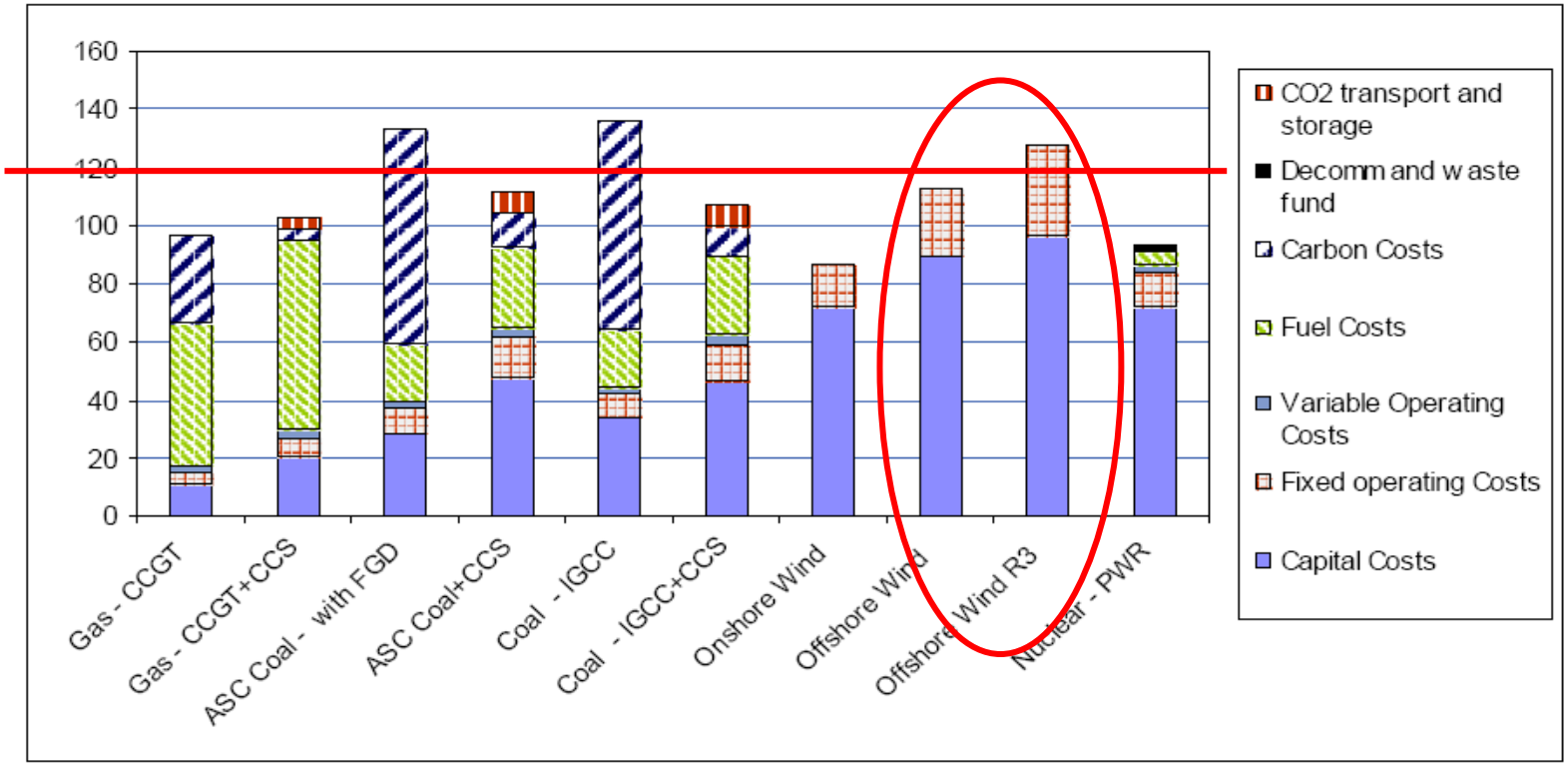
Cost of Energy: Levelised costs of main technologies

Figure 7.5: Levelised costs of main technologies on NOAK basis for project started in 2017: £/MWh



Source: Mott MacDonald

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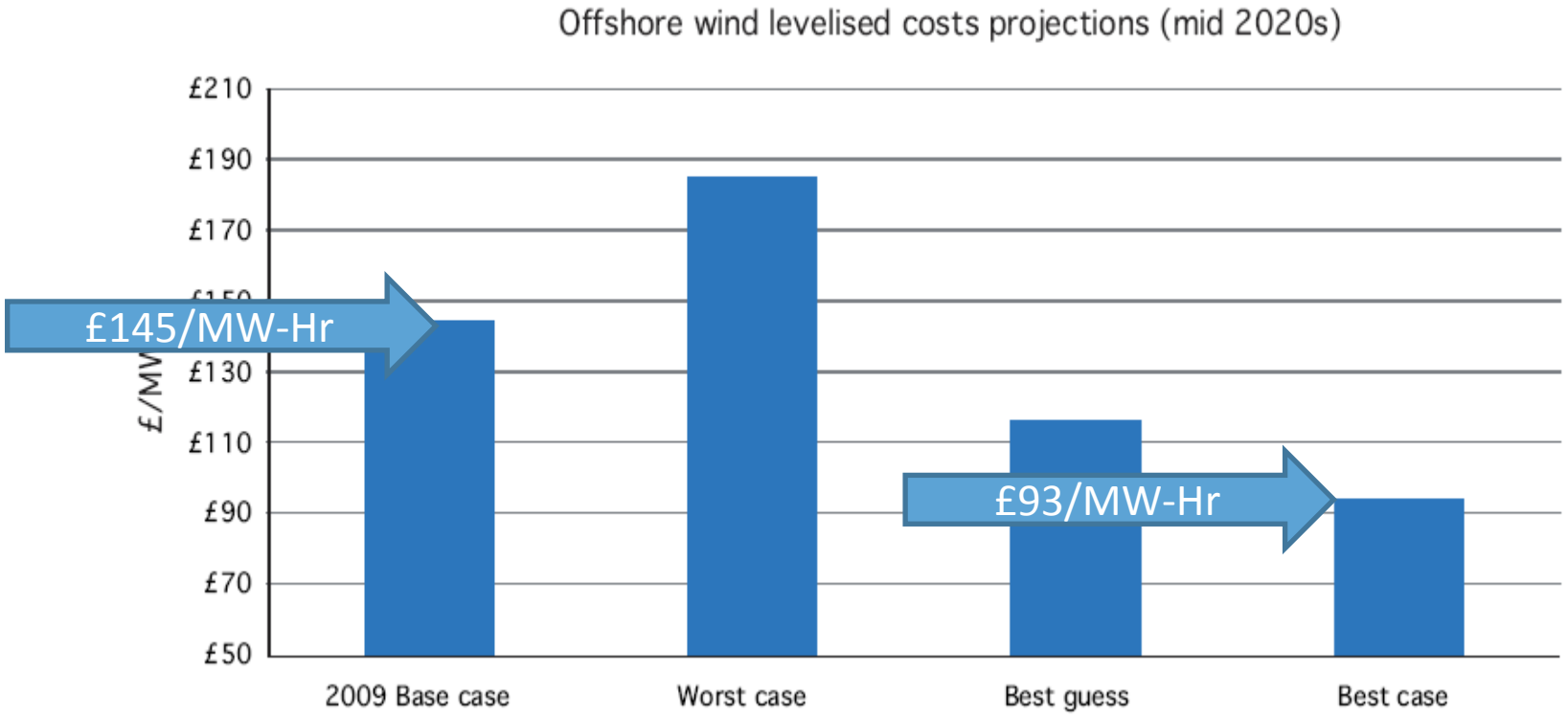
Offshore Wind cost projections



Source: UK Energy Research Council

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Irish Sea

Opportunity at scale

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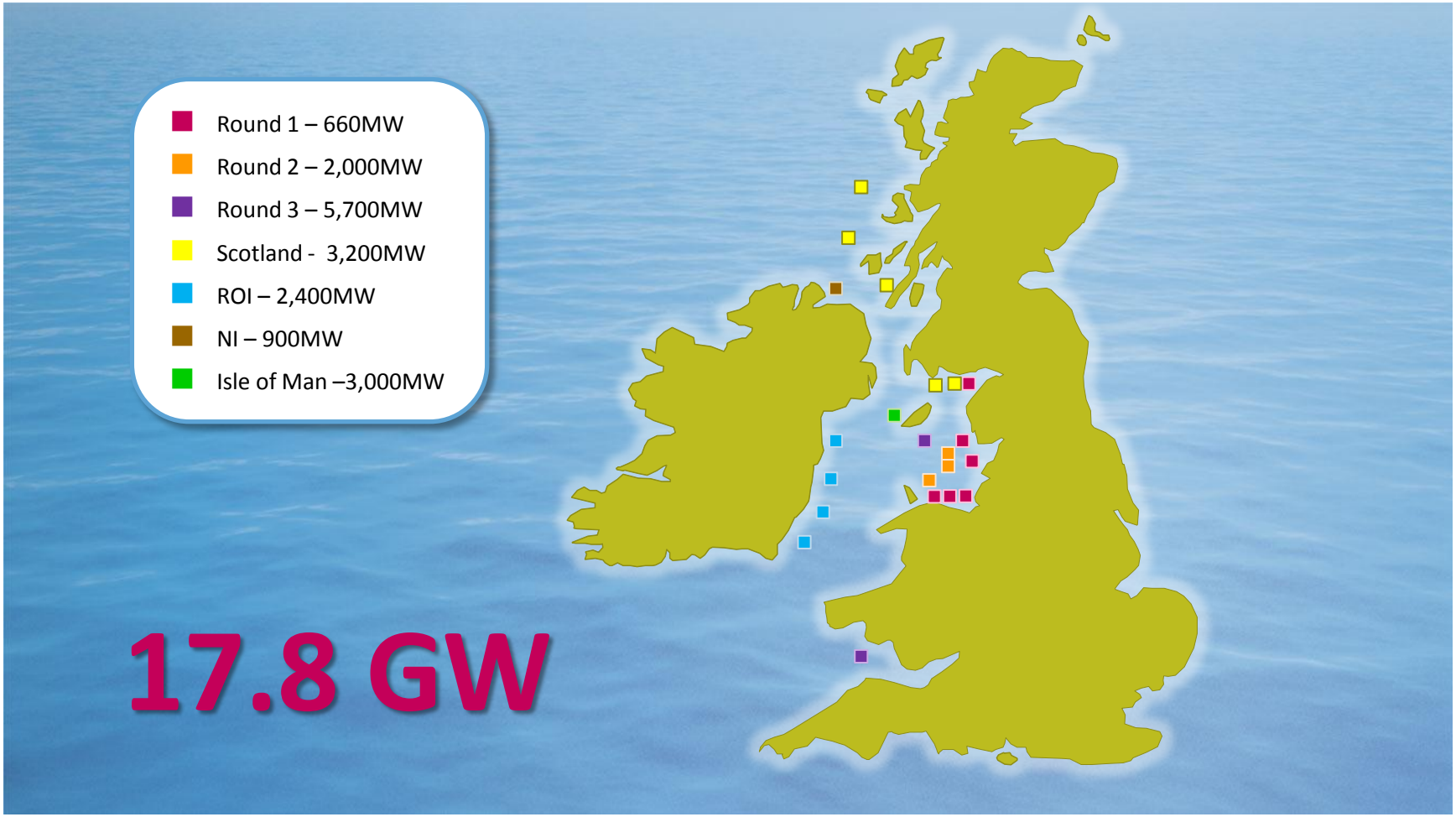
Current “Irish Sea” Zone Awards: 17.8 GW



Source: *TCE, DETI, DCMNR, Gov Isle of Man*?

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Northern Ireland

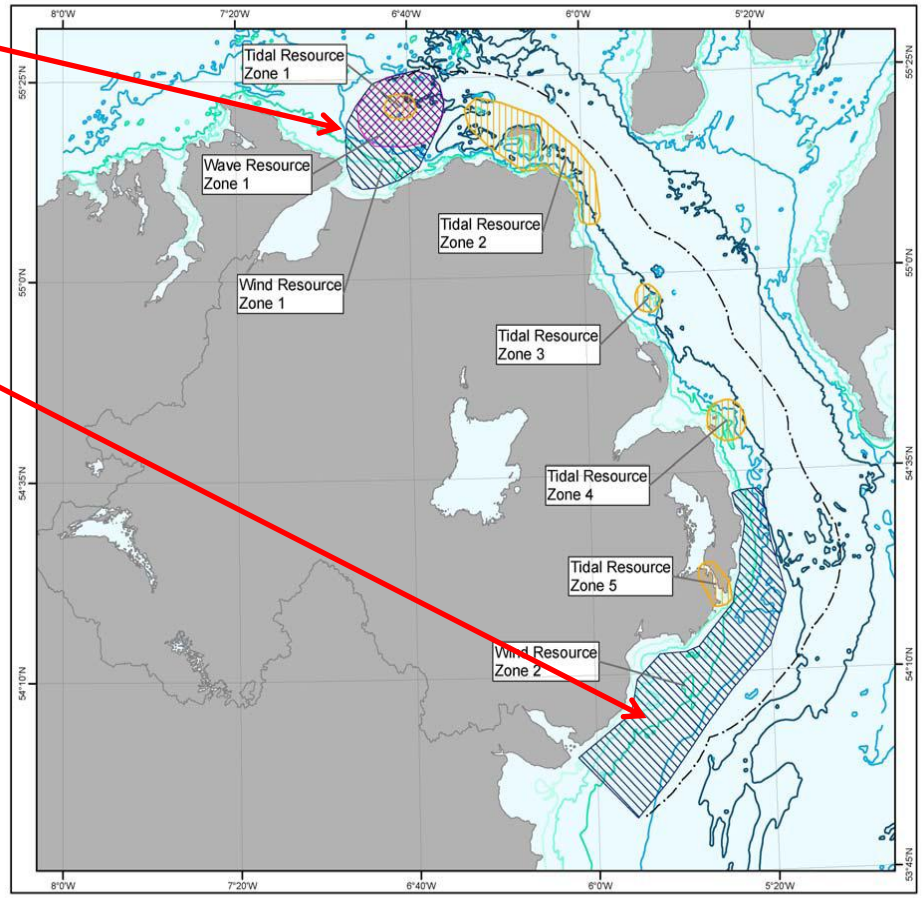
- 2 areas for development

WIND RESOURCE ZONE 1:

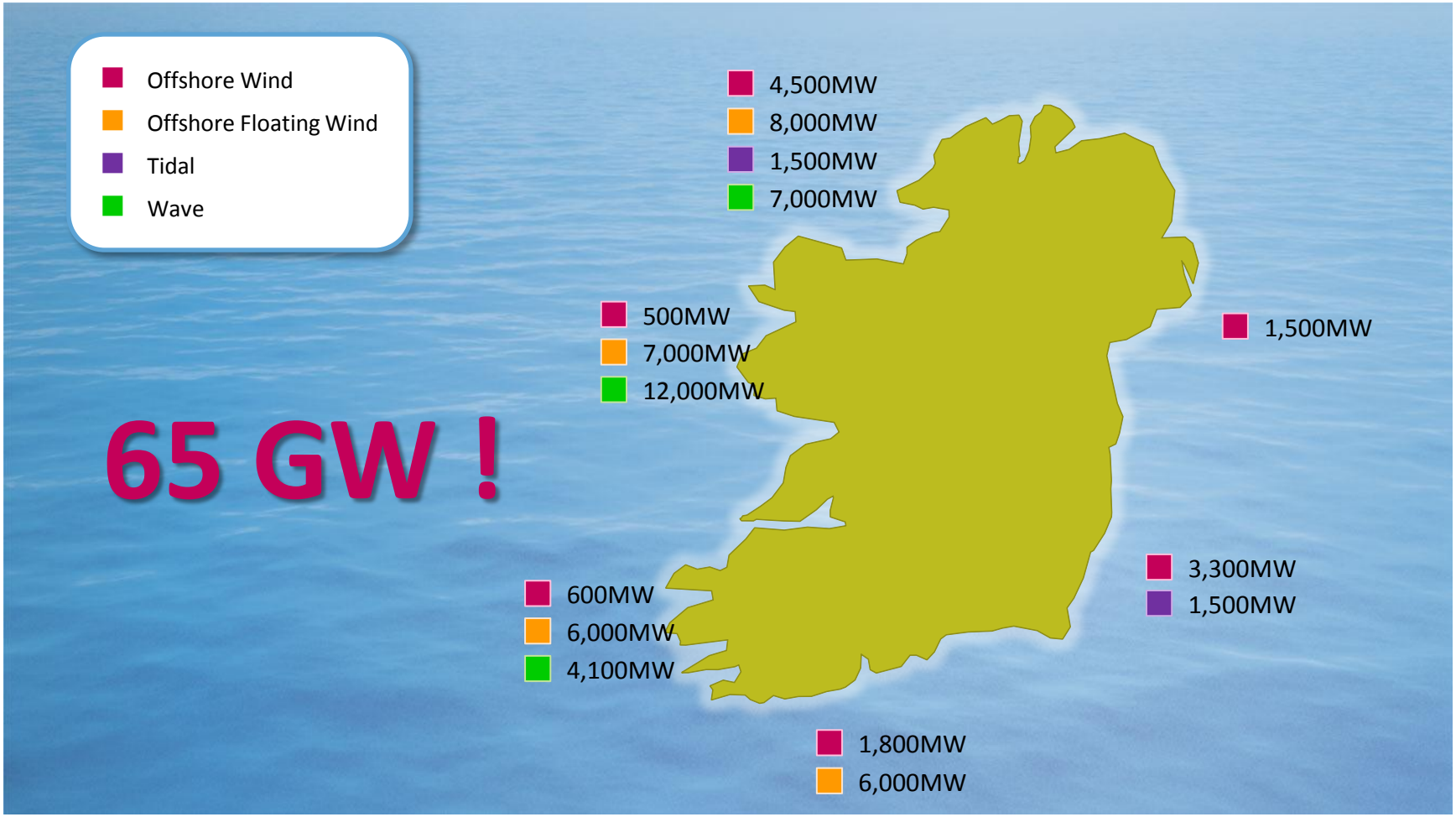
- 300 MW
- Adjacent to Giant's Causeway

WIND RESOURCE ZONE 2:

- 600-1000MW
- County Down Coast



The Opportunity: Ireland's Offshore Energy Resource 65GW



Source: *Offshore Renewable Energy Development Plan, SEAI*

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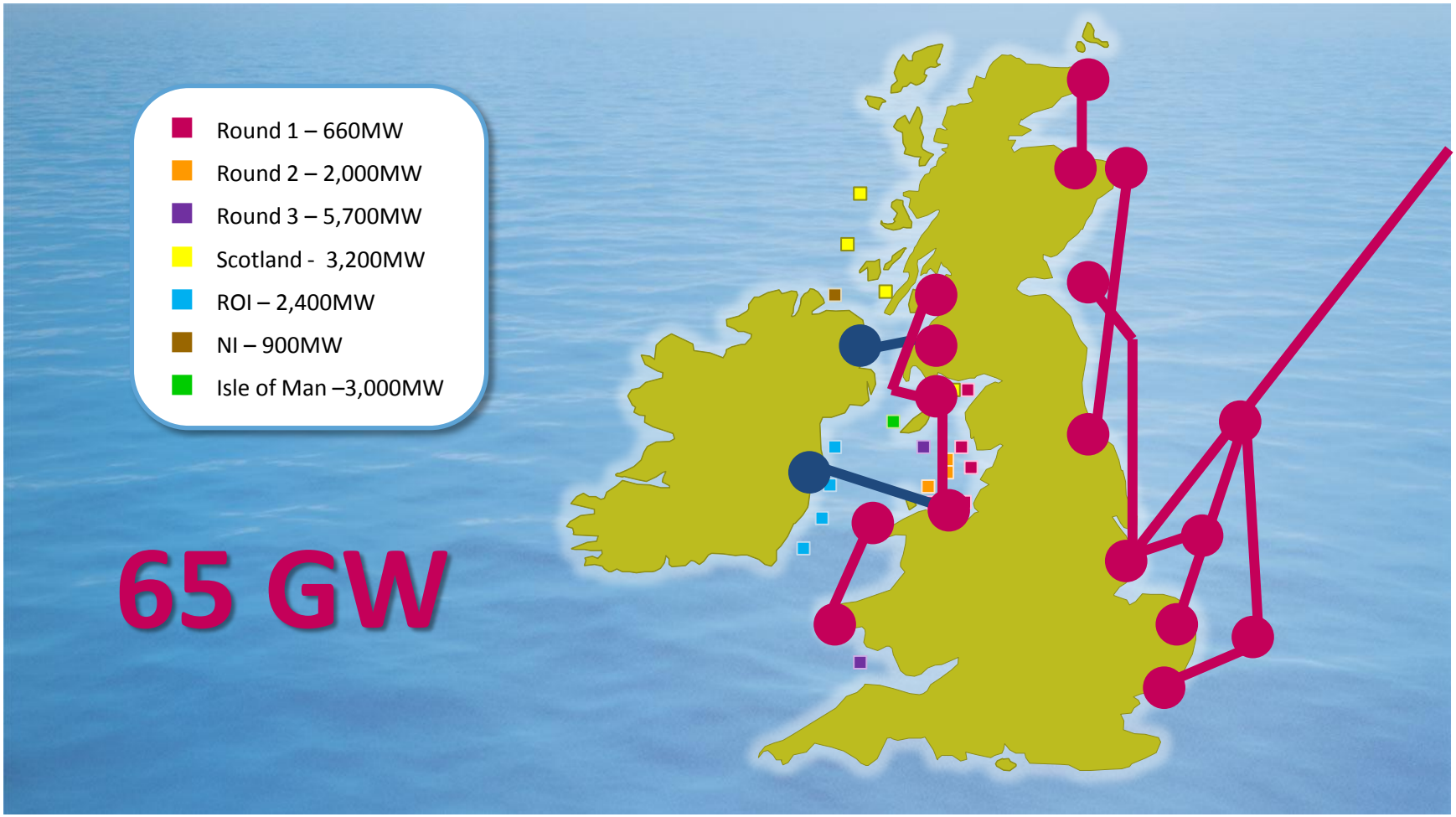
Getting to Market: “Irish and North Sea” Grid



Source: *TCE, DETI, DCMNR, Gov Isle of Man*?

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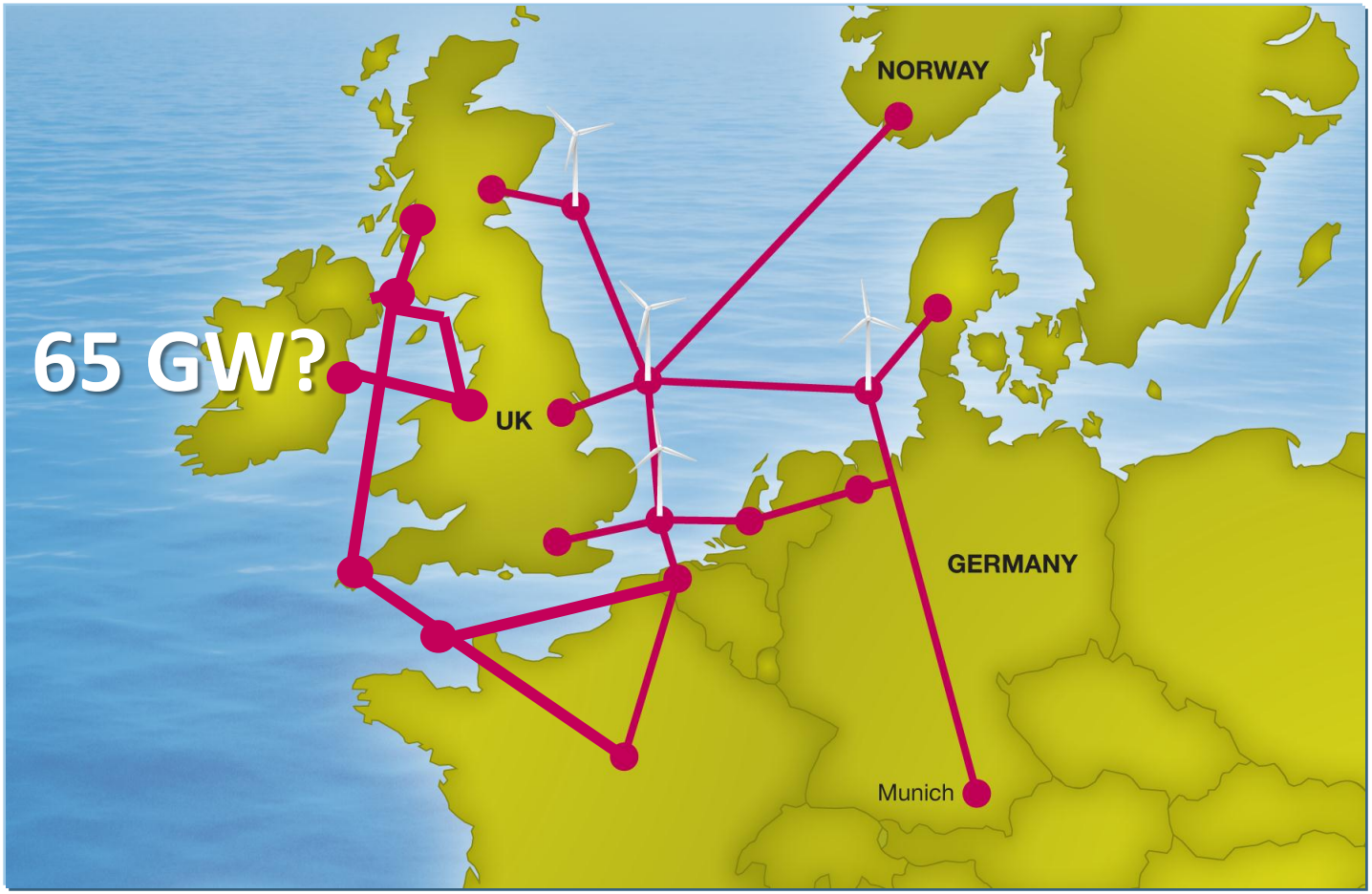
Ireland: An opportunity to be lost?



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Delivering large scale wind in the North Sea

Thank you

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