



NLA INTERNATIONAL

Offshore Wind – lessons from the UK

David Still & Bill Grainger

7 August 2023

**MARES TA Webinar Series**  
**Monday 7 August 2023**  
**3.00pm (Manila)**



## ***Offshore Wind – Lessons from the UK***



by **David Still CBE** - Wind Energy Associate, NLAI Ltd

*With over 30 years of experience, David Still has been a driving force in the UK wind industry. His experience covers development and manufacturing as well as operations. David developed the UK's first offshore wind farm and the development of a 10MW offshore wind turbine for Clipper Windpower UK. He has subsequently acted as a consultant to The Crown Estate on offshore wind industry issues and advised UK Government on the formulation of offshore wind policy. David Chaired the UK's wind trade association for 5 years.*

by **Bill Grainger** – Wind Energy Associate, NLAI Ltd

*A seasoned expert of the wind power industry on land and at sea Bill has extensive knowledge of engineering and environmental aspects of wind energy exploitation. He has worked on all stages of wind farm development from initial site evaluation through to consenting, installation and operations. Bill is an innovative Chartered Engineer, Chartered Health and Safety Professional and problem solver.*

*The webinar will be recorded and can be found on the webinar tab of*

<https://events.development.asia/learning-events/adb-data-room-marine-aquaculture-reefs-renewable-energy-and-ecotourism-ecosystem>

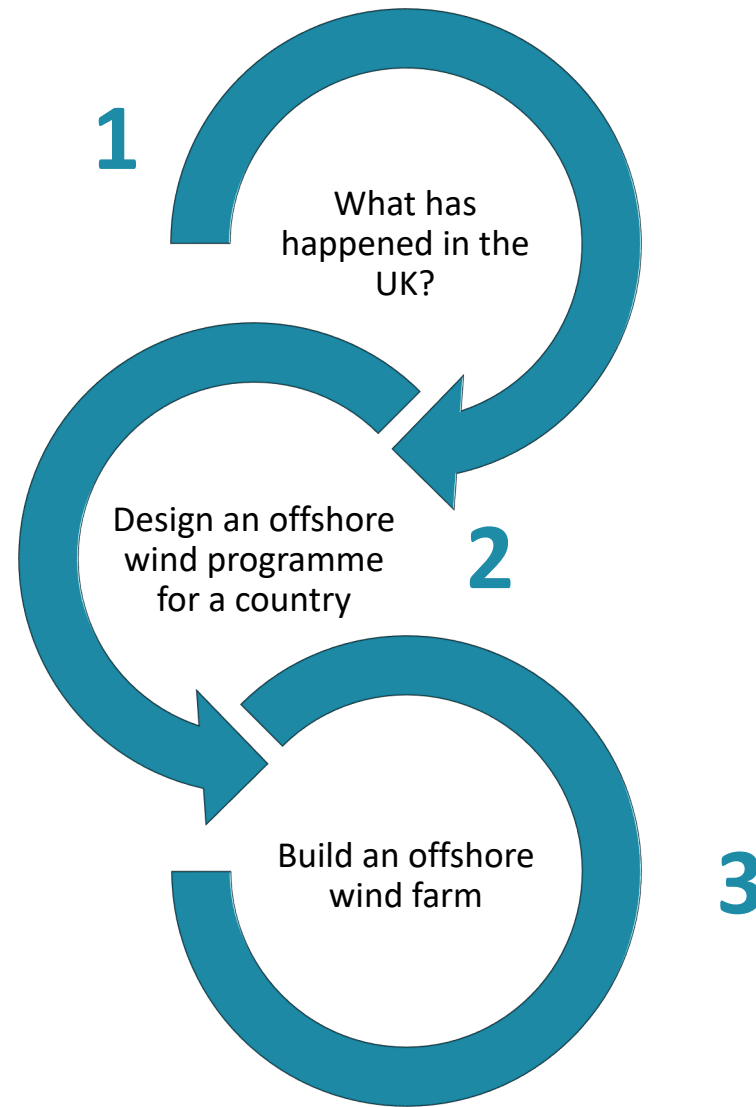


# Offshore Wind in the UK





# Offshore Wind in the UK





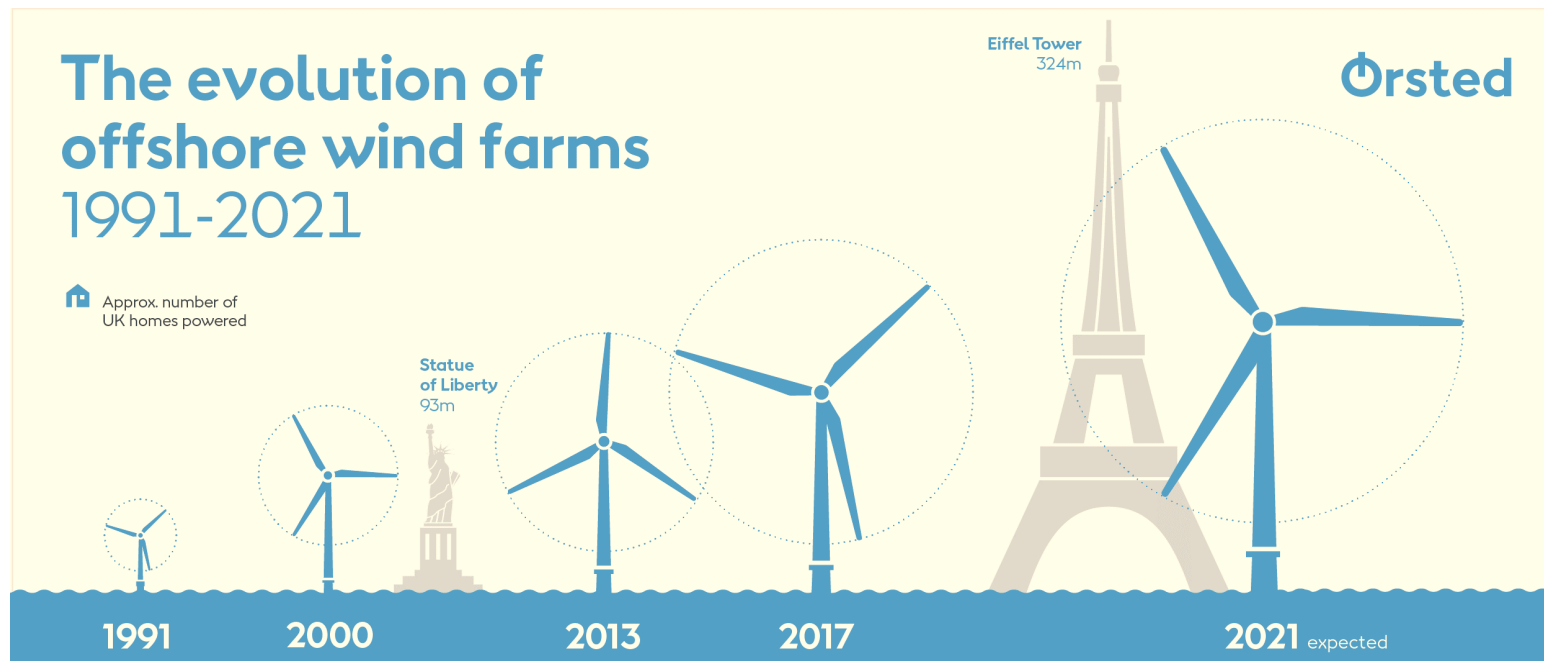
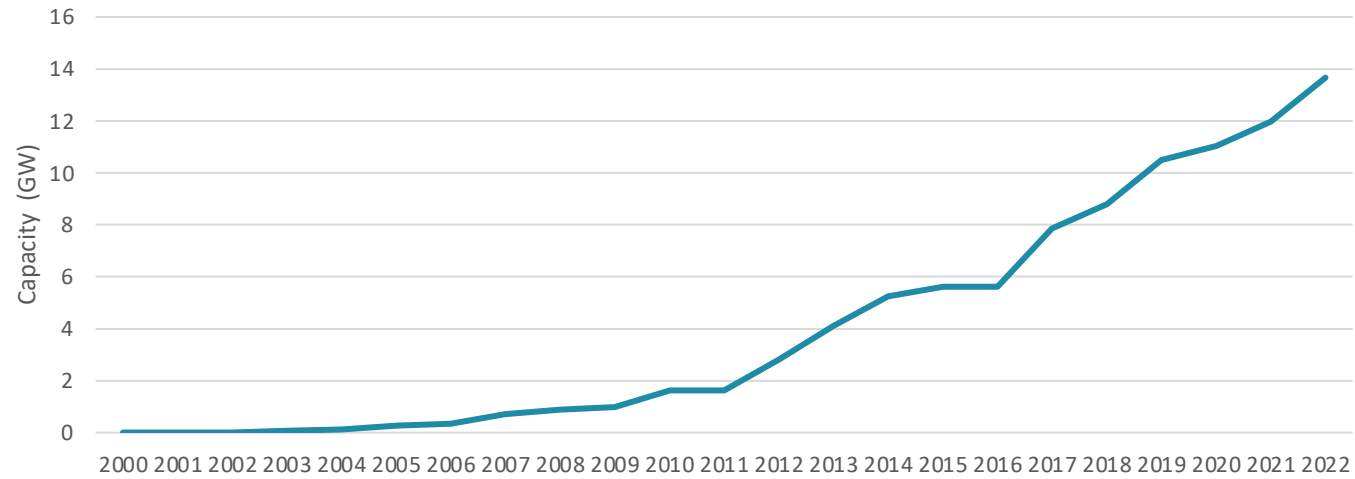
## Offshore Wind in the UK



- ✦ Seabed “owned” by The Crown Estate
- ✦ Policy “owned” by Government
- ✦ Industry represented by trade association
- ✦ Discussions on first demonstration project started in 1994
- ✦ First 2 wind turbines were built in 2000
  - Blyth



# UK Cumulative Offshore Capacity





# UK Statutory Bodies for Offshore Wind

## Overall Strategy



Department for  
Energy Security  
& Net Zero

## Owner of Seabed



THE CROWN  
ESTATE

## Consenting Authority



Marine  
Management  
Organisation

## Grid Connection

		
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## Contract for Difference

## Main Consultees

 <p>Maritime &amp; Coastguard Agency</p>	 <p>Ministry of Defence</p>	 <p>UK Civil Aviation Authority</p>
 <p>Department for Environment Food &amp; Rural Affairs</p>		





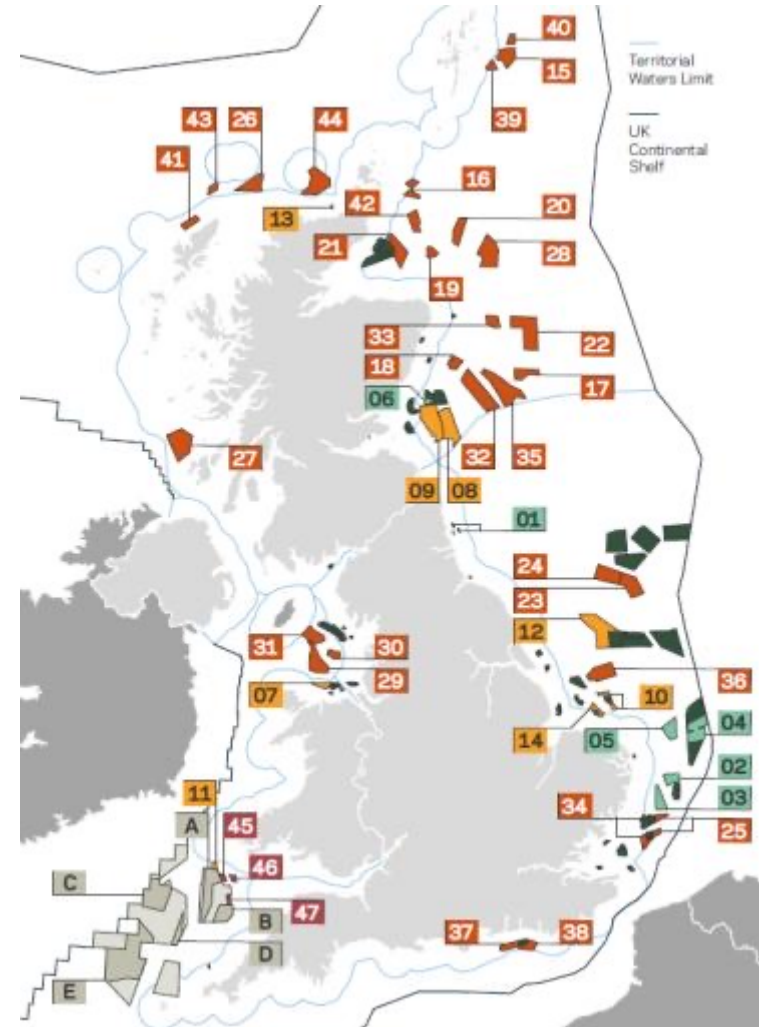
# 50 Projects Operational or in Construction 2022

© The Crown Estate



# 47+ Projects in Development 2022

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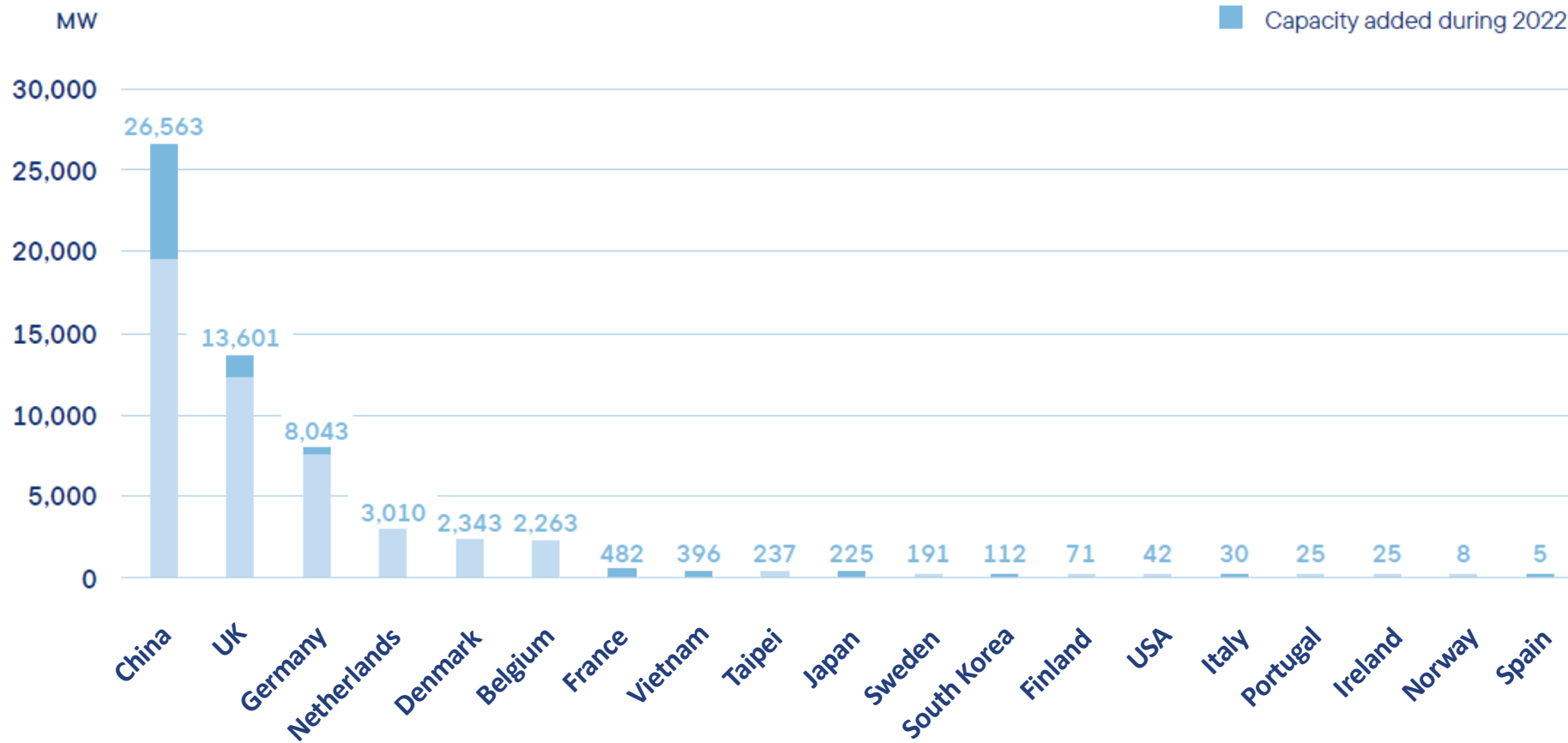




# The World

## Global offshore wind capacity in operation<sup>4</sup>

IN  
OPERATION

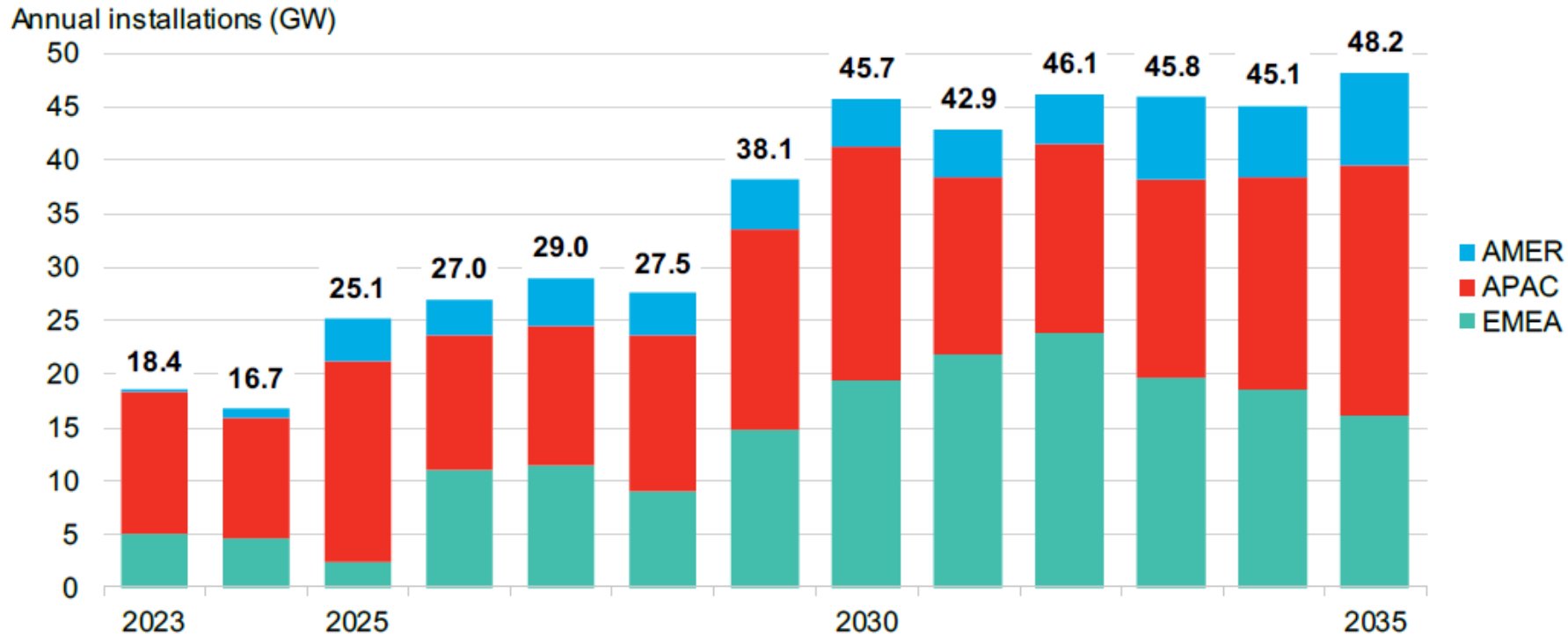


57 GW offshore wind operational end 2022



# The World

## Global offshore wind installations, by region



Source: BloombergNEF. Note: AMER = Americas, APAC = Asia Pacific, EMEA = Europe, the Middle East and Africa.



## UK Power Purchase Agreements – Contract for Difference(CfD)

- \* Wind farm owners will want an agreement to buy the electrical output for a fixed period of 5, 10, 15, 20 or more years to ensure a return on the large investment made at the start.
- \* In UK, energy is bought and sold in an open market. To give income security to owners, the Government contracts to pay the owner the difference between a fixed strike price and the price the owner sells the power on the open market. If the selling price is more than the strike price, the owner pays the difference to the Government.
- \* Limits Government exposure to cost and stops owner making excessive profits at consumers' expense
- \* At the start the developer enters a competition to set the fixed strike price.
- \* The owner does not have to use the CfD.

### Example

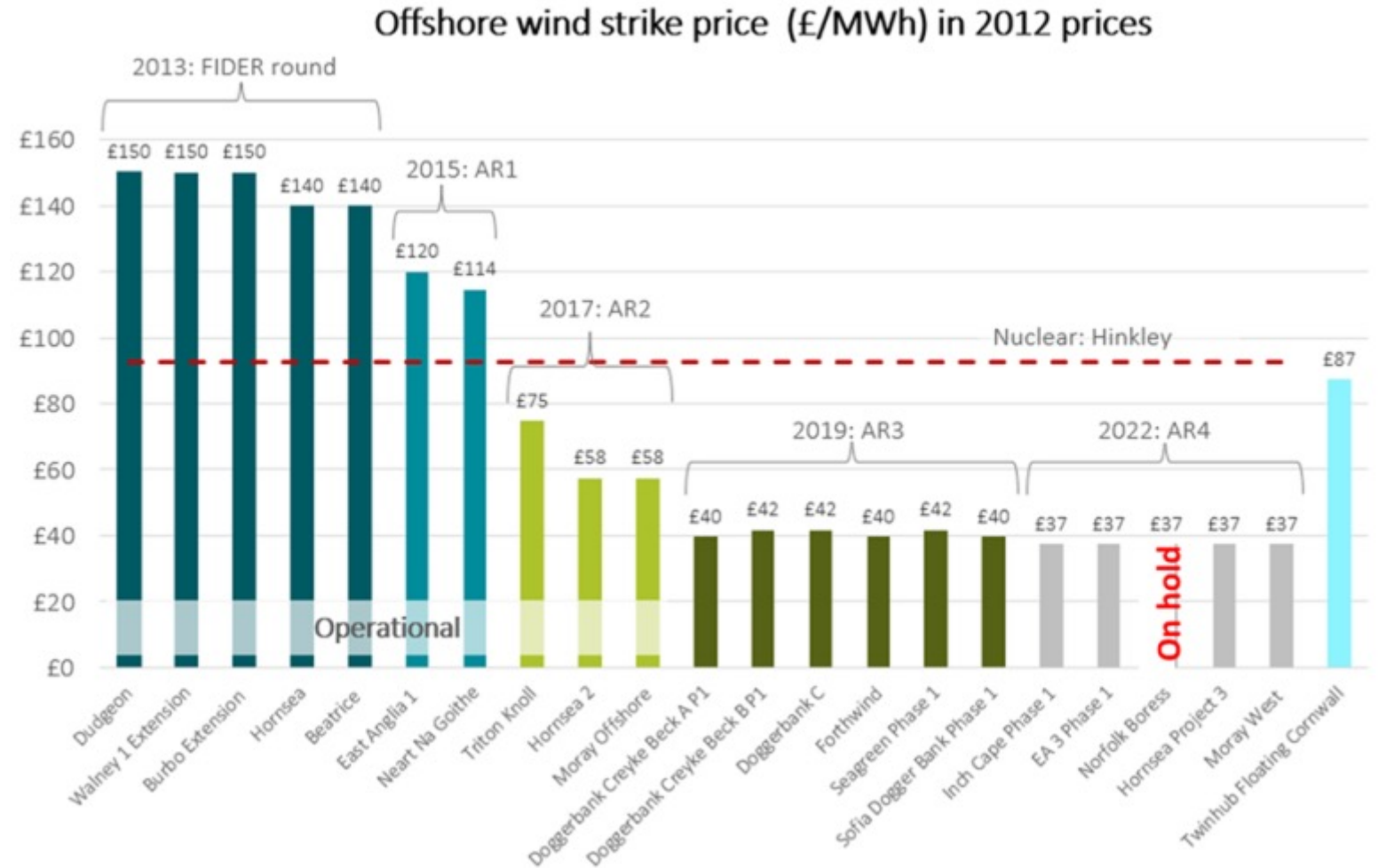
Strike Price - £40/MWh

- \* If market price is £30/MWh, Government **pays** owner £10/MWh
- \* If market price is £45/MWh, owner **pays** the Government £5/MWh



# UK CfD History

- ★ Strike Price has been driven down from over £100/MWh to £40/MWh in less than ten years
- ★ EU countries with other strategies have driven prices to similar levels





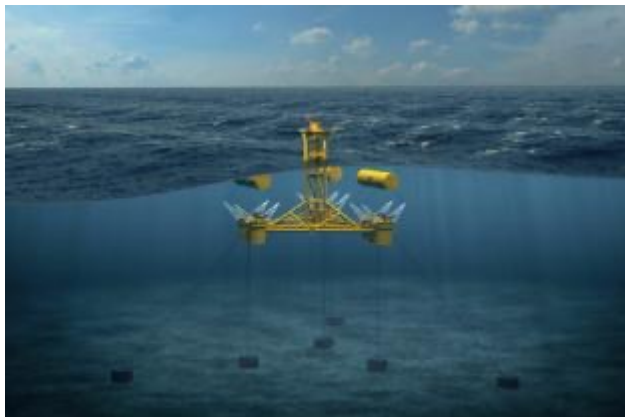
# Offshore Renewable Energy (ORE) Technologies & Uses

## Technologies

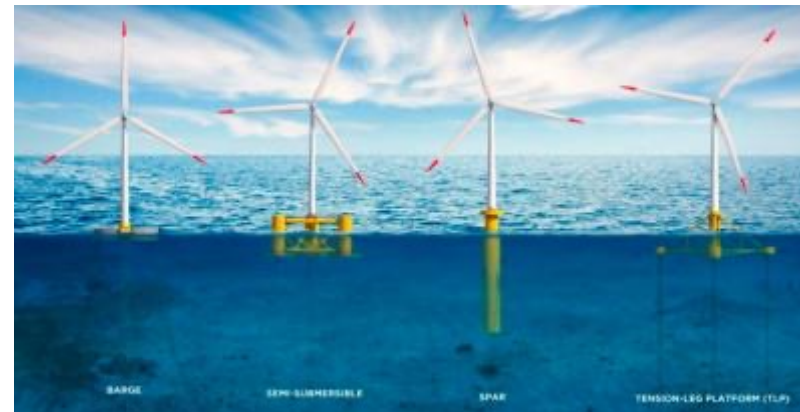
- \* Offshore wind
  - \* Fixed
  - \* Floating
- \* Tidal
- \* Wave

## Uses

- \* Storage
- \* Desalination
- \* Data hubs



Marine Power Systems



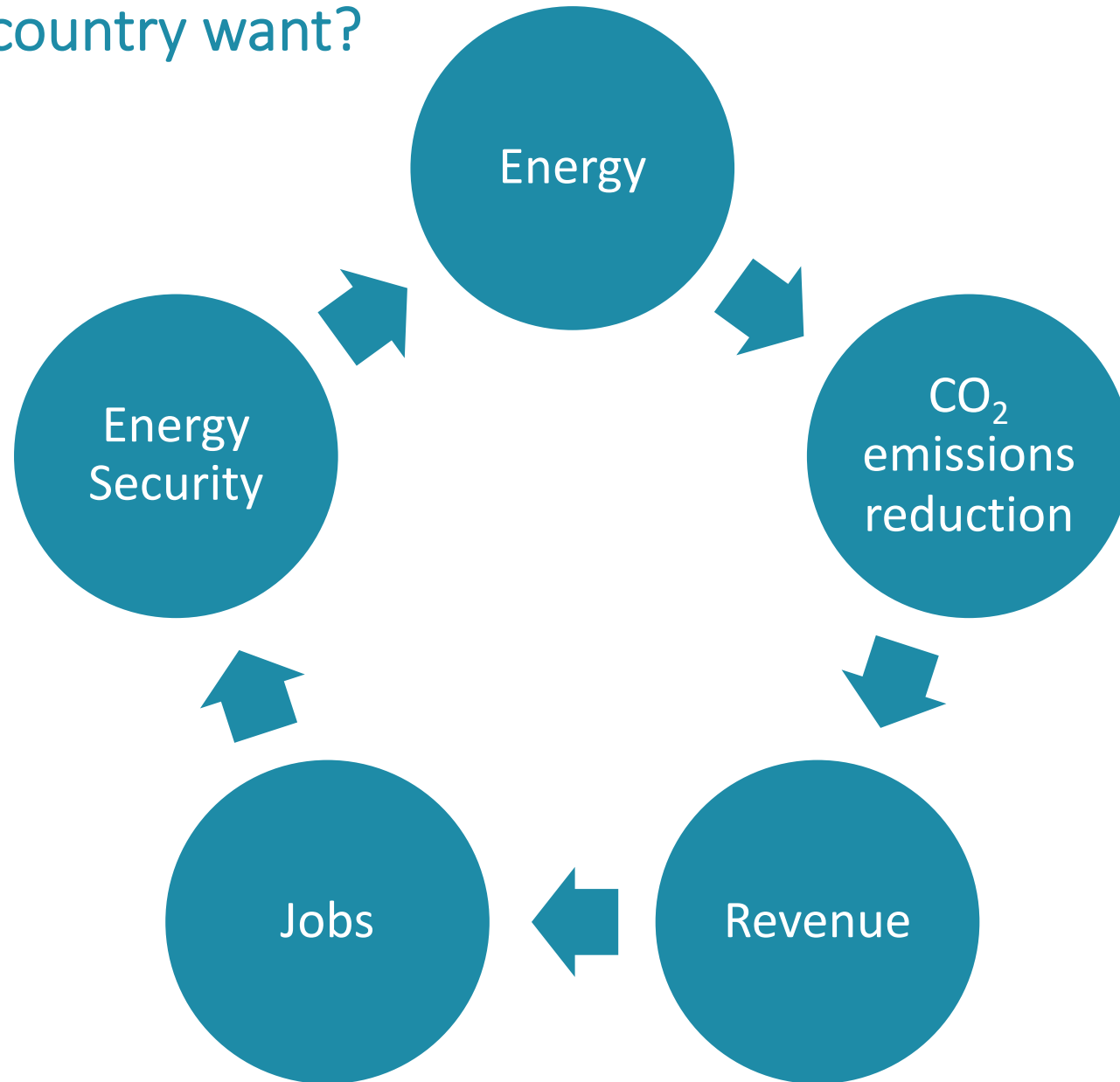
Guernsey Renewables



# Design a programme for a country



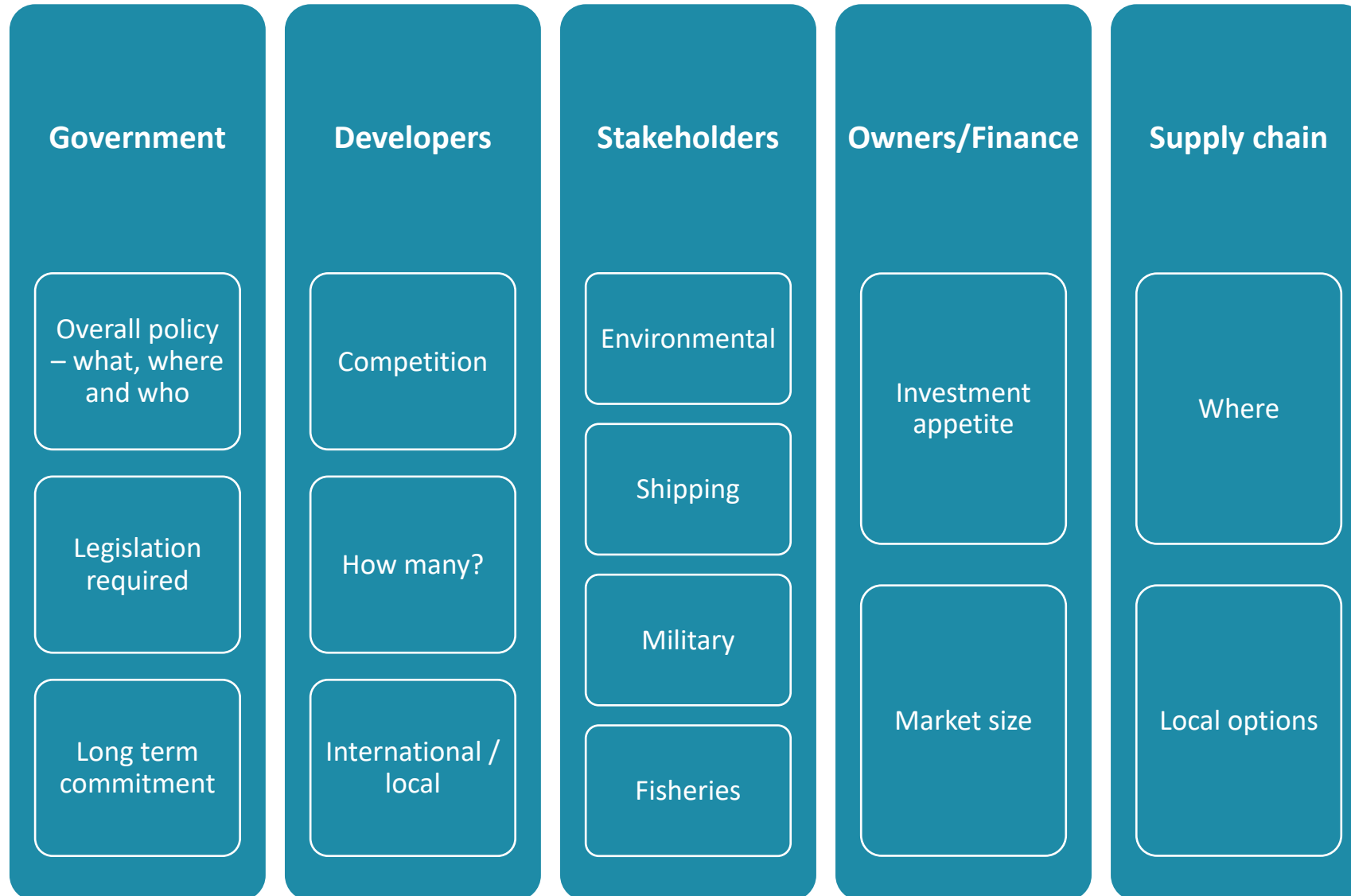
# What does the country want?







# Who is involved?





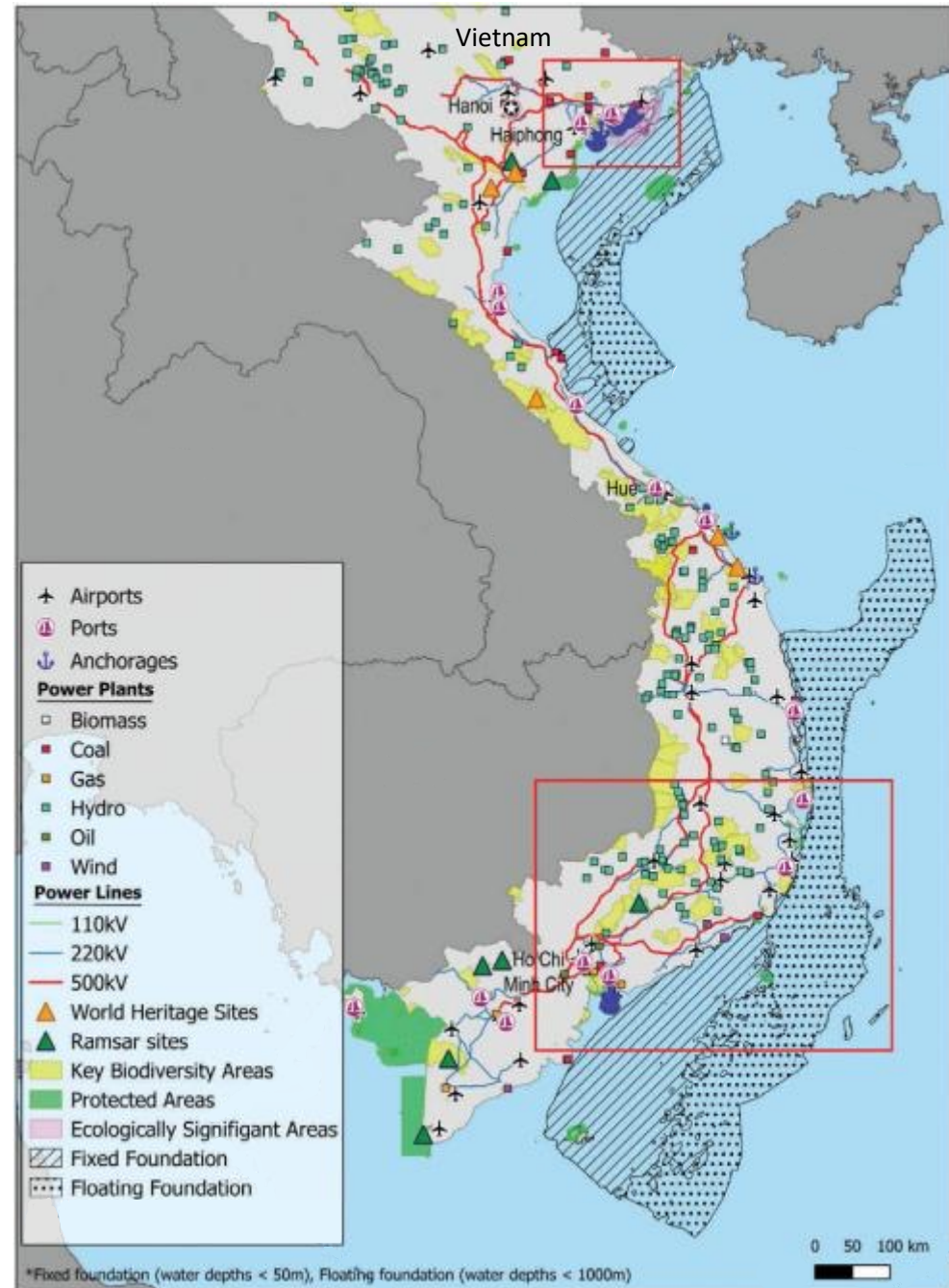
## Resource Assessment & Site Selection

- \* Wind speeds
- \* Suitable seabed area
- \* Constraints from other uses
- \* Who owns the seabed?
- \* Who controls offshore activities at present – dredging, military areas, ports, navigation?



## Site Selection

- ✦ Suitable for offshore wind farms – wind, water depth
- ✦ Restrictions due to other users
- ✦ Size of wind farms required





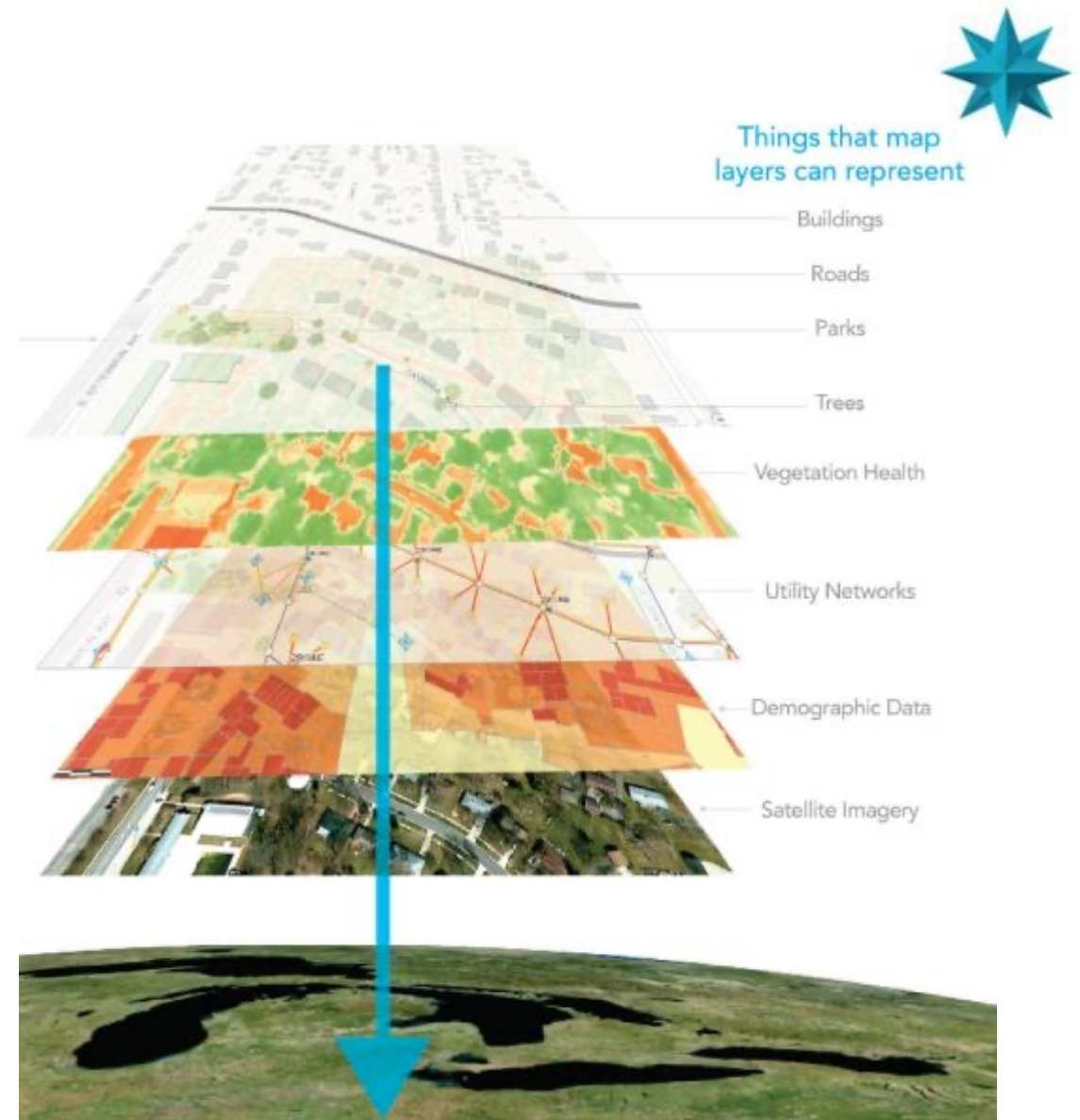
## Consenting

- \* Who decides where the sites will be?
- \* Who issues exploration licenses?
- \* Who gives consent to build?
- \* What skills are needed to make these decisions? Do they have them?
- \* Decommissioning requirements
  - \* Bond to pay for decommissioning– when is it put in place and how much
  - \* Plan for decommissioning prepared at design stage and reviewed as part of consent

## Stakeholder Engagement

- ✦ Talk to other users of sea area
- ✦ Good central GIS for all data
- ✦ Shipping lanes, anchorages
- ✦ Fishing
- ✦ Cables/pipelines
- ✦ Mineral extraction
- ✦ Military areas
- ✦ Oil & Gas
- ✦ Recreational use

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# Infrastructure & Services Development Opportunities

- ✦ Grid
- ✦ Ports
- ✦ Manufacturing
- ✦ Support Services





## Grid Connection

- \* Existing arrangements – connections, regulations, control
- \* Will wind farm owner be charged for connection to grid – UK **YES** Other countries **NO**
- \* Who will design, build and pay for new infrastructure onshore to take power to consumers
- \* Will the existing grid company provide the offshore infrastructure
  - \* In UK to speed process up, developers design, consent and build electrical connection to shore and then hand it over to an owner operator.
  - \* Grid company does this in other countries
- \* Offshore hubs – several wind farms sharing links to shore
- \* Landing points – where should connections come ashore
- \* Technology – High Voltage AC for < 40 km or High voltage DC (HVDC) for distances > 40 km



# Timeline

Main Activities	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Policy and outline Strategy	█							
Lease arrangements		█						
Permitting Process Development		█	█					
Power Purchase Framework		█	█					
Electrical Grid Strategy and Investment		█	█					
Port and Logistics Strategy and investment		█	█					
Supply Chain Engagement		█	█					
Legal and Regulatory Framework			█	█				
Demonstration Project				█	█			
Allocation Rounds					█	█	█	█
Site evaluation, design and consenting						█	█	█
Construction								█





# Green Port Hull



■ Horsaes Four Offshore Wind Farm   ■ Existing Horsaes offshore wind farm projects



**greenporthull**

Making a difference

- OVER 3,400 JOBS CREATED/SAFEGUARDED
- OVER 428ha of land developed and 5,000 sq metres floor space created
- £249m value of contracts won by companies in the region
- £71.5m PUBLIC SECTOR INVESTMENT ATTRACTED
- 2,400 PEOPLE RECEIVING TRAINING
- £450m private sector investment secured
- LOCAL BUSINESSES SUPPORTED TO MORE THAN 800

[greenporthull.co.uk](http://greenporthull.co.uk)

Regional Growth Fund

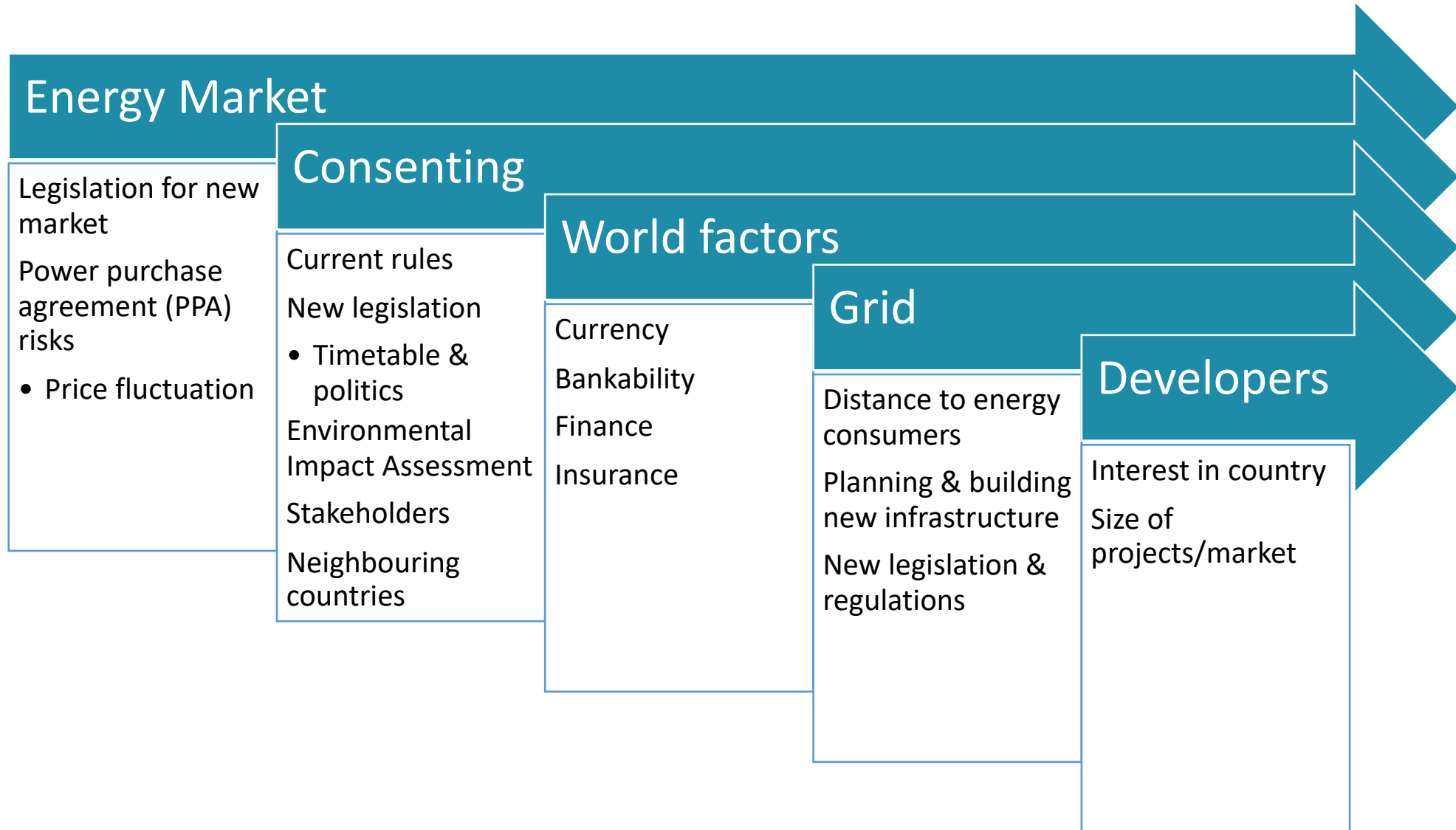


EAST RIDING OF YORKSHIRE COUNCIL



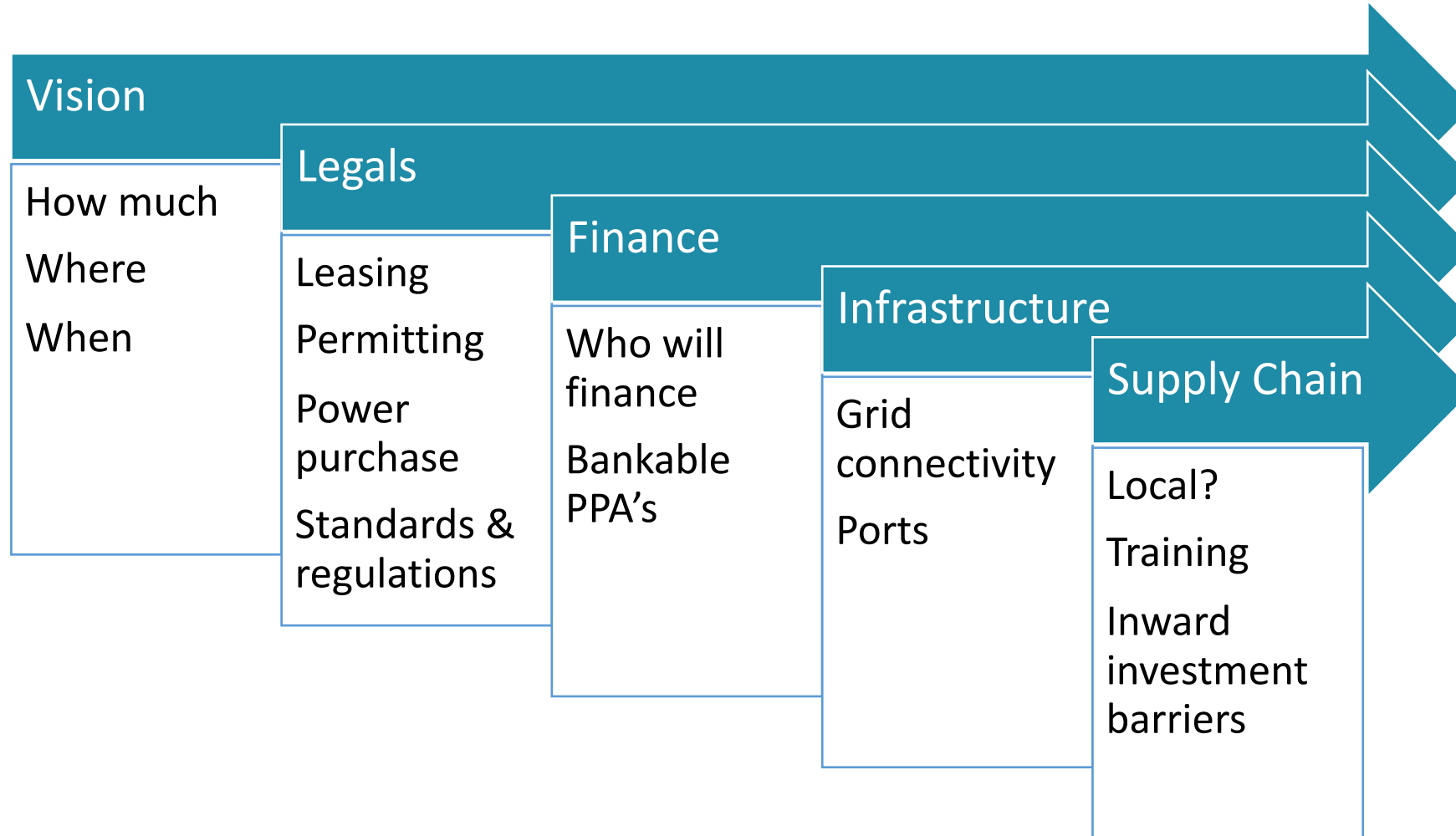


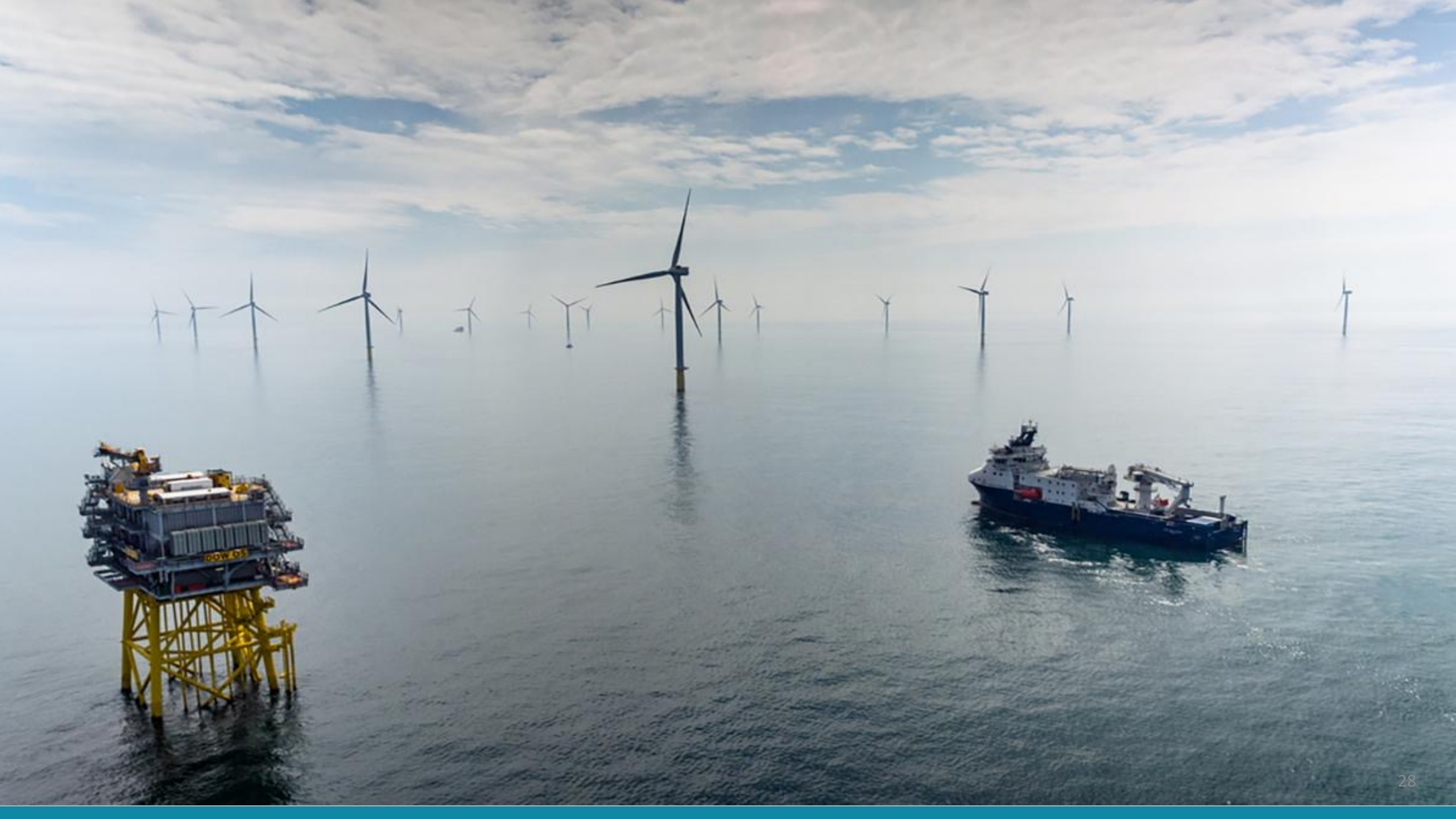
# Risk





# Agree the Plan and Deliver







# Building an offshore wind farm



## Feasibility Study

- ✦ Seabed area – area available, likely wind speeds, extreme winds, water depth, seabed geology, current uses, natural environment – existing data
- ✦ Onshore electrical transmission system to take power to
- ✦ Ports to use as bases for installation and maintenance
- ✦ Electrical energy requirement – possibly for green hydrogen as well
- ✦ Existing electricity market and regulatory framework
- ✦ Likely costs based on international experience



## Developing the Sites

- \* Survey the seabed for foundation and cable laying design
- \* Collect environmental data on wildlife in the area
- \* Produce constraints map to protect other users of area
- \* Early discussions on suitable wind turbines
- \* Design the turbine layout for best energy collection
- \* Design electrical energy collection network
- \* Environmental assessment of designs
- \* Apply for consent to build



## Technical and Equipment Procurement

- ✦ Logistics review – ports, storage areas, service base, local construction and marine regulations
- ✦ Decide on contracting strategy – multi-contract or turn-key
- ✦ Select standard contracts to be used
- ✦ Select contractors
- ✦ Prepare invitations to tender
- ✦ Reserve manufacturing capacity and installation vessels



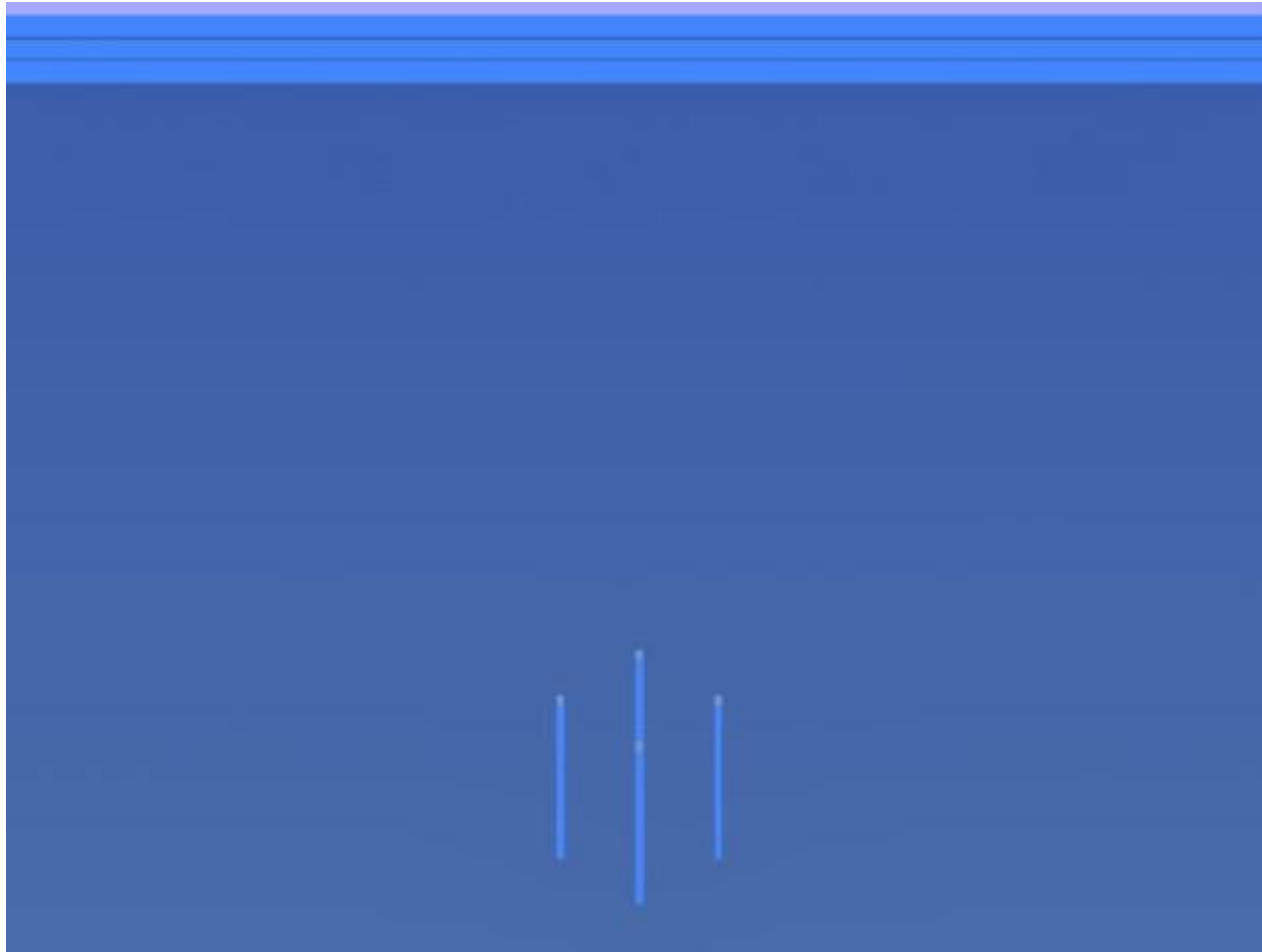
# Installation



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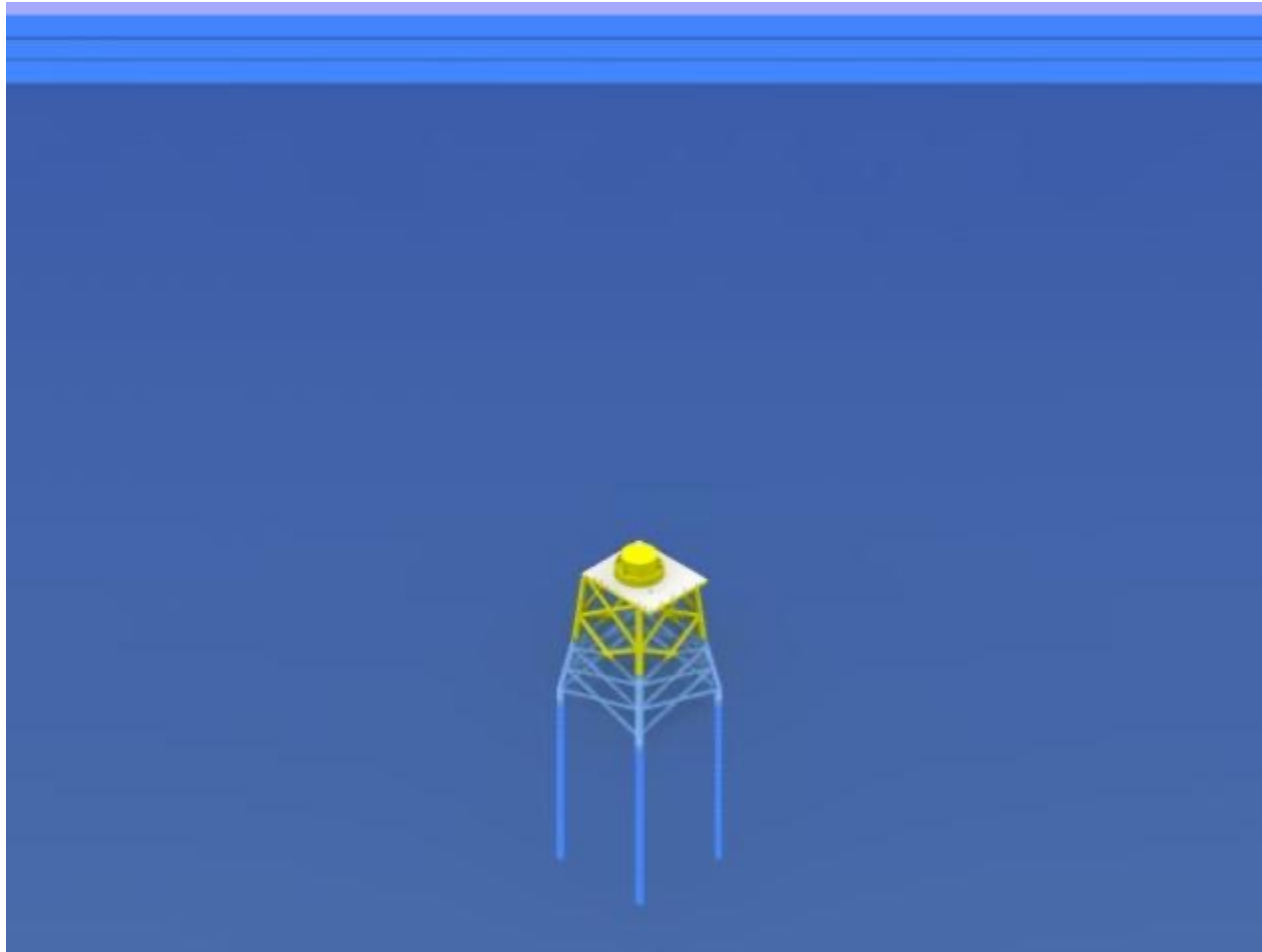


# Installation - Piles in Place



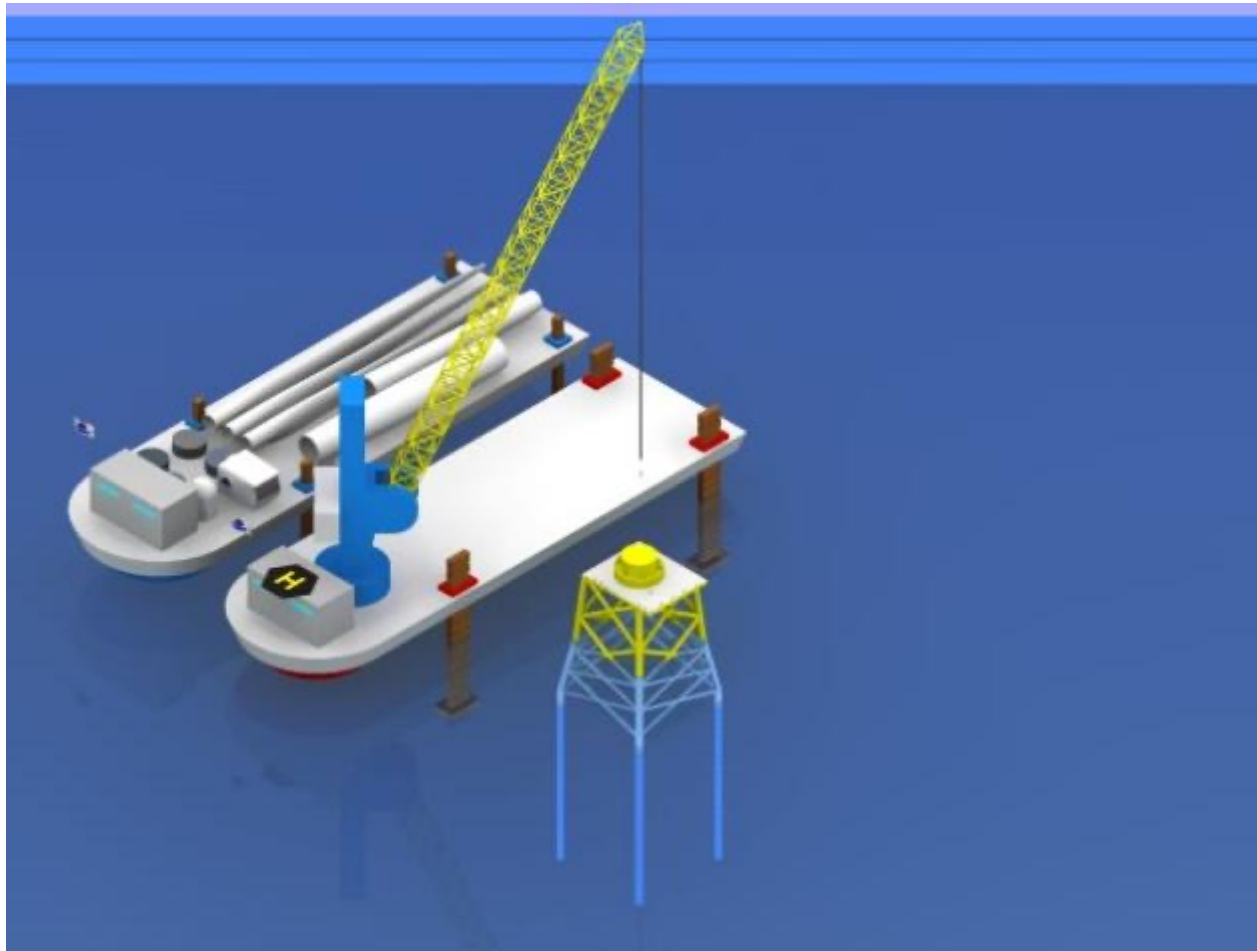


## Installation - Foundation in Place



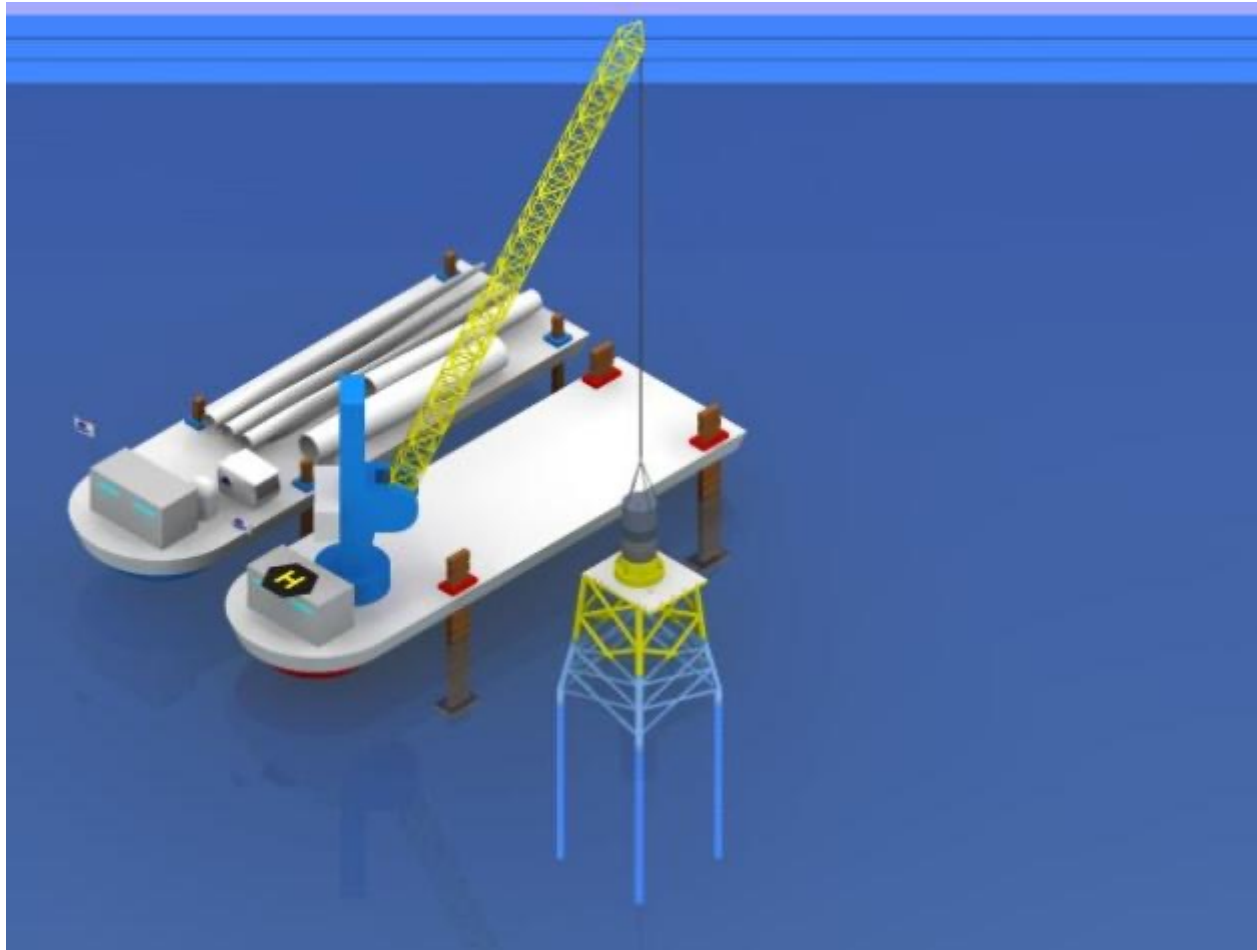


## Installation – Vessels jacked up



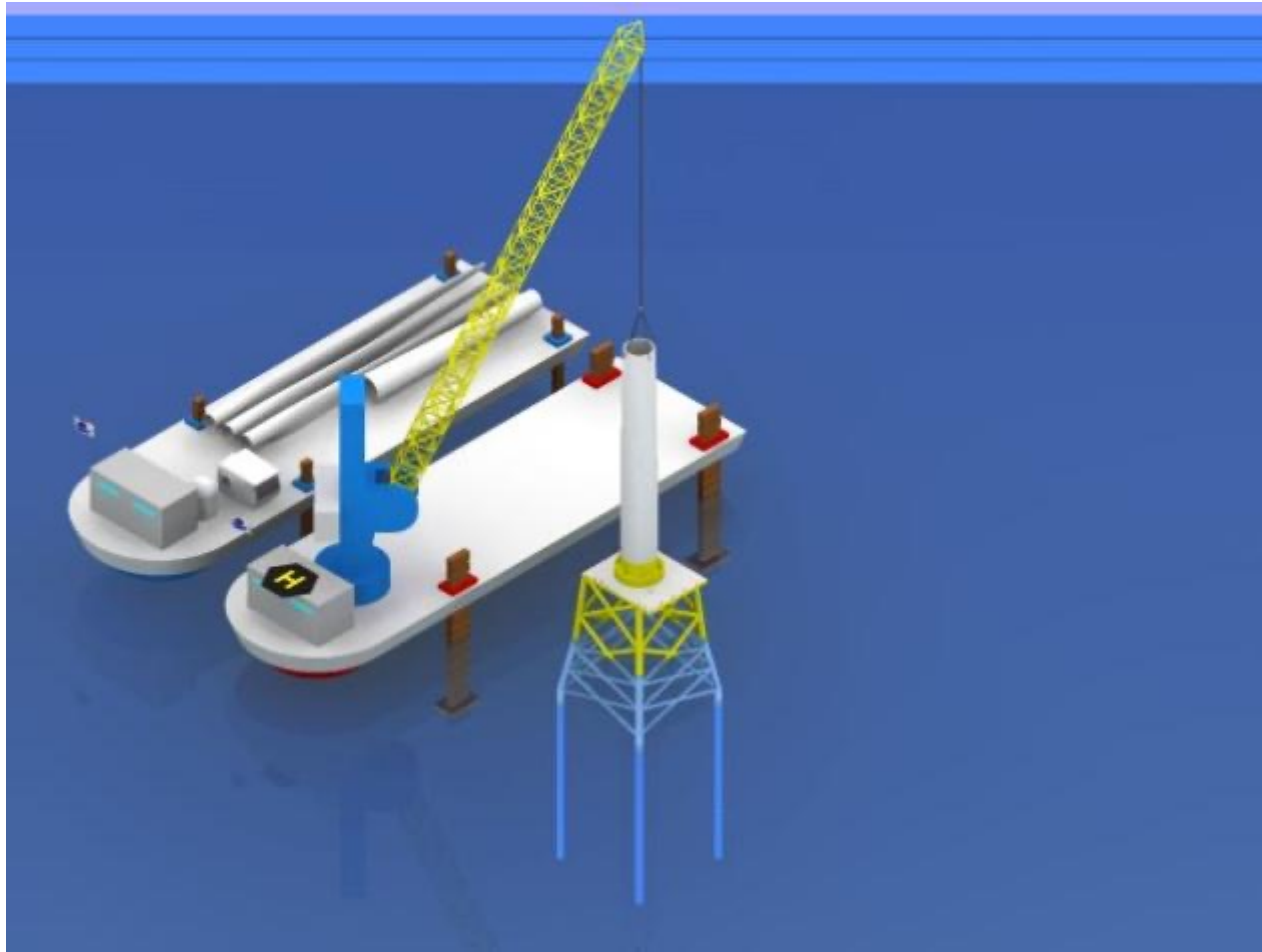


# Installation - Power Modules





# Installation - First Tower Section





## Installation - Second Tower Section





## Installation - Nacelle with Hub Lifted in Place







## Installation - First Blade in Horizontally





## Installation - Second Blade



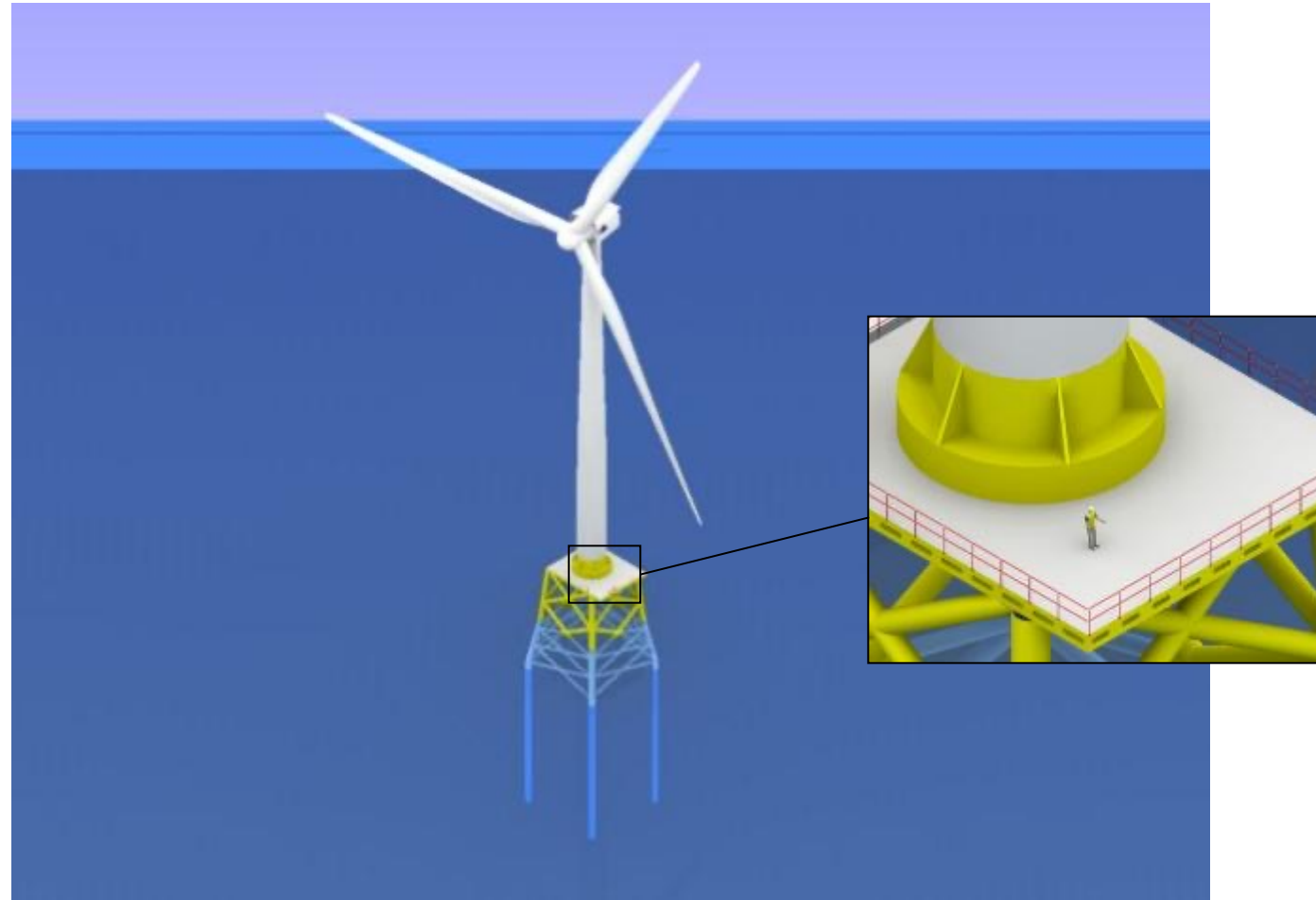


## Installation - Third Blade





# Installation - Completed Turbine



# Installation – Electrical System



- ✦ Laying cable links collecting energy from turbines to substation
- ✦ Install offshore substations which transform voltage so suitable for efficient transmission to shore
- ✦ Laying cables to shore



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## Operation and Maintenance

- ✦ Specialist vessel with
  - ✦ Accommodation
  - ✦ Small crane
  - ✦ Access ramp
  - ✦ Spares
  - ✦ Medical facilities
  - ✦ Helicopter deck



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## Future of Offshore Wind

- ✦ Wind turbine unit size still increasing
- ✦ Global market increasing requiring more manufacturing, more vessels and more trained people
- ✦ Providing hydrogen as well as electricity
- ✦ Repowering will start in Europe in 15 years' time, giving a sustainable industry



**Mingyang Smart Energy 115.5 m long blade for 16.6 MW turbine with typhoon rating**



# QUESTIONS





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