

# OES & ICE Offshore Wind E-mail Forum

Discussions from  
Foundations to Finance

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# OES Offshore Wind E-mail Forum

## Contents of Presentation

- E-mail forum & How it Operates
- E-mail forum - Topics for Discussion
- Foundations – Monopiles & Gravity Structures
- J-Tube & Cable pull in Problems
- Site Investigation – When & how much
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# “OESWF”

## The OES Offshore Wind E-mail Forum

### What is it & how does it operate?

- A forum to discuss all aspects of Offshore Wind Development
- Sponsored by the Institution of Civil Engineers & the Offshore Engineering Society
- Open to all Professionals with an interest in Offshore Wind
- Contributors register through the OESWF secretary
- Contributors can remain anonymous if they wish
- Contributions are made by E-mail & distributed to all
- Launched November '04 – Discussion started January '05
- Will continue for up to a year

## Plan of Topics for Discussion

- The Consents Process
- (Energy Issues)
- Construction
- (Operation)
- Economics & Finance
- (Environmental Issues)

# Foundations - Monopiles

Monopile design is governed by:

- Providing the required stiffness to meet the limits on tower natural frequency set by the turbine suppliers
- Fatigue damage to the pile material (rather than strength) – hence low strength steels can be used

Limits to the use of monopiles:

- Largest monopiles to date: Arklow 5.1m diameter
- In water depths of 20-25m + and with larger turbines pile sizes become impractical

# Foundations for deeper water

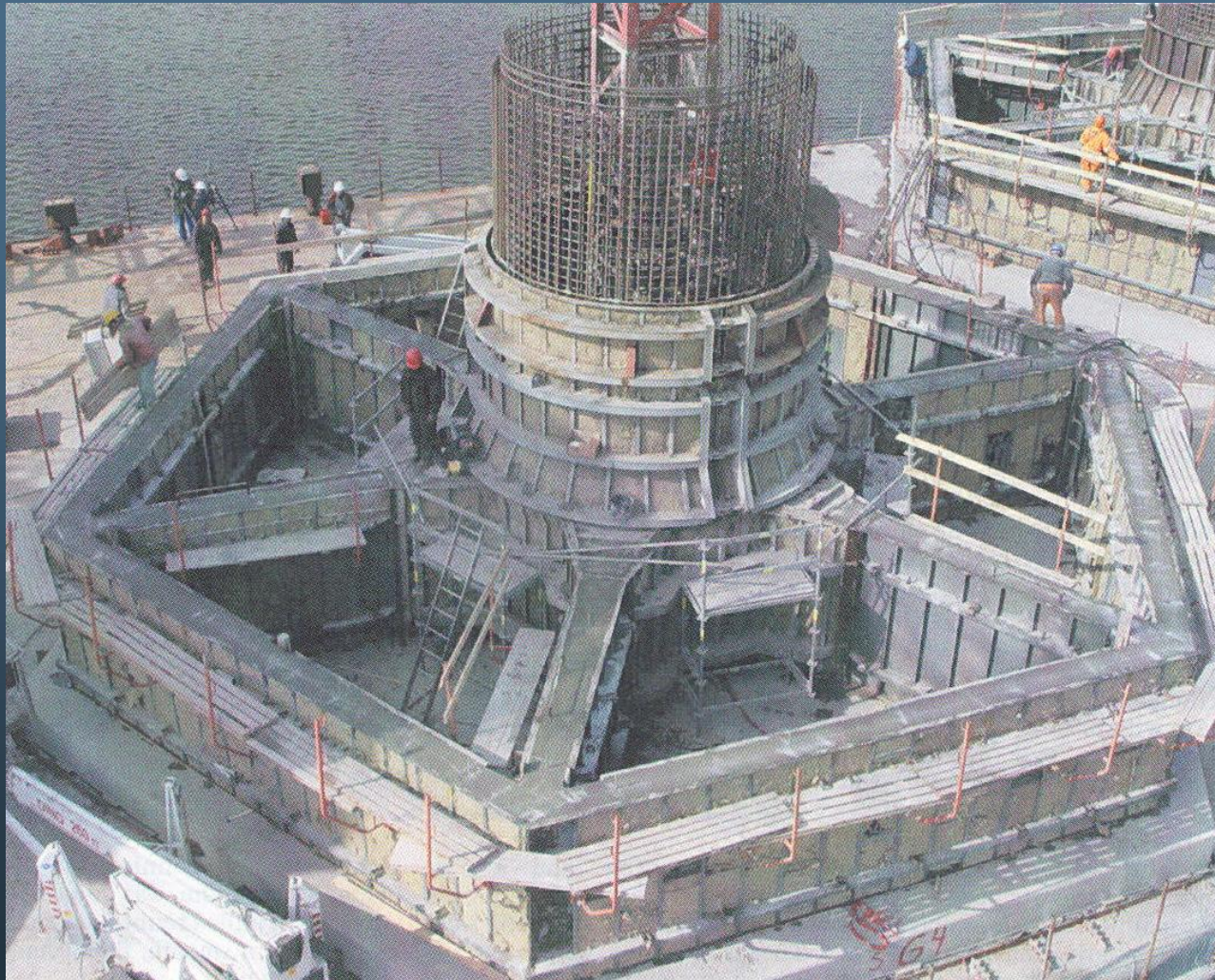
## Steel tripods:

- Offshore oil technology - tubular steel structure
- Not used yet for a large wind turbine offshore
- Fatigue of joints will be critical because of very large number of loading cycles

## Gravity structures:

- Concrete spread base type
- Used at Vindeby(10), Tuno Knob(11), Middlegrunden (20), Nysted (72) – all in relatively shallow protected water

# Foundations – Gravity Structures



# Foundations – Gravity Structures

Potential supply concerns for adoption of gravity structures:

- Lack of operational construction sites close to developments
- Relatively undeveloped supply chain compared to steel alternatives
- Lack of knowledge in developers of the concrete alternatives

Some technical concerns:

- Site investigations are typically planned around deep piles rather than spread bases
- Control of verticality

# Foundations – Gravity Structures

## Construction Options for Gravity Structures

- Buoyant Structure, either towed to site or transported on a submersible barge, installed by ballasting down
- Non-buoyant Structure transported to site on a barge, installed by lifting – this option seems likely to more economic for large numbers of structures



# Foundations – Gravity Structures

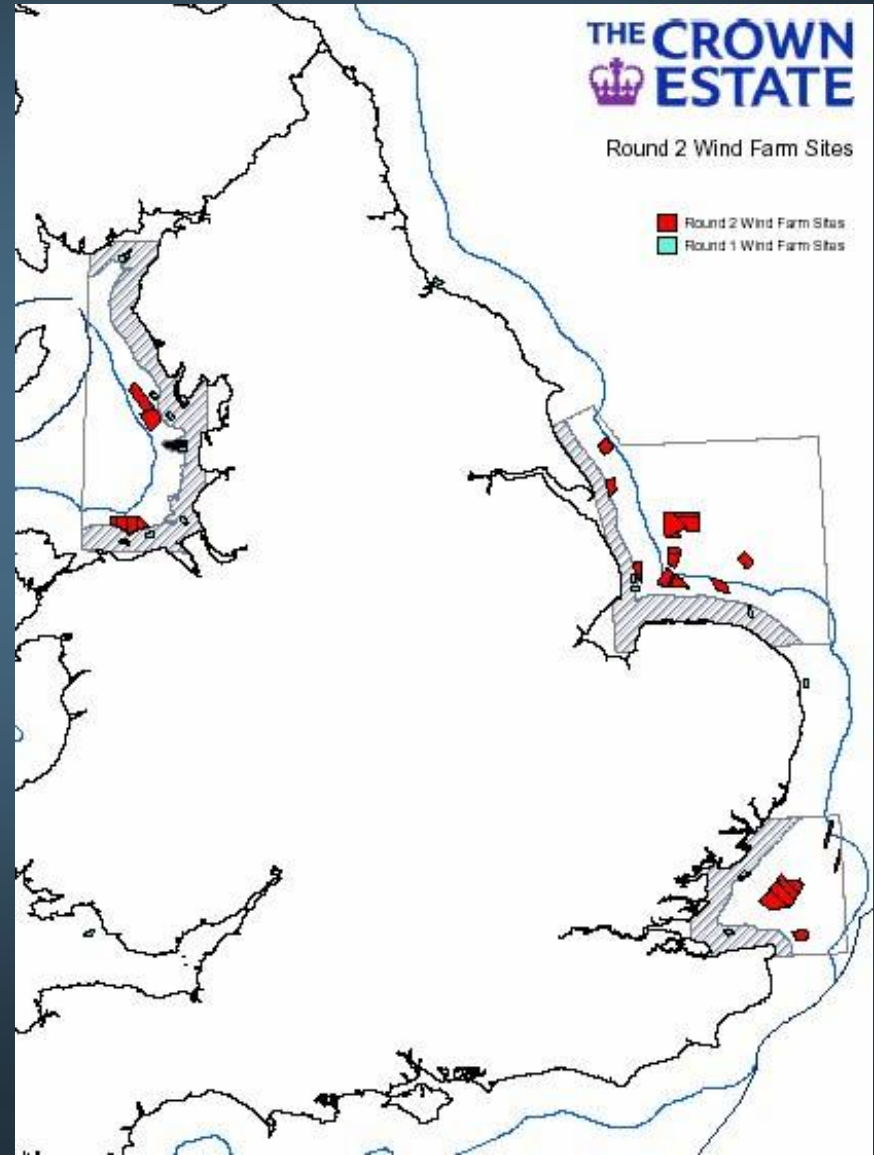
## Construction Sites in UK

### Existing sites

- East coast – Nigg, Graythorpe
- West coast – Hunterston, Ardyne Point

### Other options

- Ports – Tees, Felixstowe, Liverpool
- Estuaries – Tees, Humber, Thames



# Foundations – J Tubes & Cable Pull-in

Some problems with J-tubes and Cable pull-ins

– mostly due to scour, current and wave effects:

- Scour around monopiles resulting in free spans of cables
- High currents and breaking waves resulting in cable fretting
- Scour protection covering J-tube exits
- Scour protection drawn into the J-tube during pull-in
- Monopile transitions set at the wrong level resulting in J-tube exit below mudline

# Site Investigation – When & how much?

Views vary on the need for early and more Site Data

Contractors say:

- Developers should carry out SI prior to inviting bids.
- Bids made without SI data will carry large risk money
- SI for cabling is also important to check seabed conditions for cable burying and is also needed at bid stage

The alternative view is:

- Developers are reluctant to spend on SI until they have consent
- Until some basic designs are done, the wrong SI may be done

# Consents & Planning Process

Six step process for site development:

1. Dti undertakes Strategic Environmental Assessment (SEA)
2. Crown Estate invites tenders for sites within SEA area
3. Crown Estates allocate sites to Developers (with Dti input)
4. Developers plan their windfarm and carry out EIA and have consultations with stakeholders
5. Developers submit ES and consent application
6. Consent received

The whole process typically takes up to 4 years

# Consents & Planning Process

Comments, concerns and alternative ideas:

- Why should developers have to determine the major constraints (MoD, shipping, air traffic, etc.). Better for Dti to do this for SEA areas?
- Developers are reluctant to carry out adequate site surveys pre-consent, due to the risk of consent not being achieved
- Could Dti provide a grant to developers for site surveys to be carried out pre-consent – this would provide better ES, speed the consent process, reduce risk in bids

# Economics & Finance

BWEA work on Offshore Windpower economics suggests:

- Banks will require about 50% equity investment
- Banks are concerned with two main risks:
  - Uncertainty of income from the Renewables Obligation – a matter of government policy
  - Technical risks that they do not understand – should improve over time as round 1 projects are completed

# OES Offshore Wind E-mail Forum

## Next steps for the E-mail forum

- Discussion continues – open to all
- Evening meeting in London in June
- Further meeting in Autumn to debate the key issues
- Report summarising the contributions and (perhaps) including recommendations for action