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Airtricity

Wind Energy

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11th November 2005

IGI conference, Dublin Castle

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Topics

- An overview of Airtricity
- Wind Energy
- Geology and onshore wind farms
- Geology and offshore wind farms

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Airtricity overview

- Founded in 1997 (originally Future Wind Partnership. 1999 changed name to Airtricity)
- A fully integrated renewable utility
- 230 Employees
- 43,000+ SME Customers
- Active in the Republic of Ireland, Northern Ireland, England, Scotland, Wales, Holland, Germany, China and the United States.

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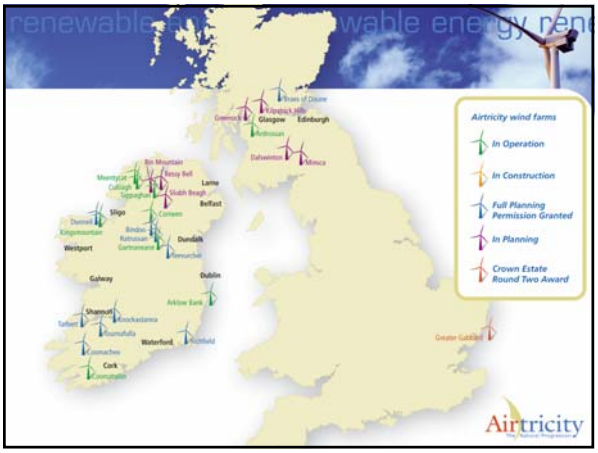

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Stronger focus on the impact of fossil fuels

- Ireland is over-exposed to oil and gas pricing
- Risks to future (and indeed current) price variability
- Gas plant once built lasts 25 – 30 years so customer exposed throughout period.
- With Huntstown 2, 63% of Ireland's demand for electricity will be supplied by gas. EU Avg. 24%
- …and we are at the end of the gas pipeline ….

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The European Natural Gas grid

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Our obligation to the environment

- The European Union has enacted legal obligations on all member states
- The polluter pays has been implemented as the main principle in many countries
- Renewable energy targets have been set, in our case 13.2% by 2010

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The reality

- We produce less than half of this target and, as things stand, we will not meet the targets we have agreed for renewable energy
- We will not meet our CO^2 emissions targets
- And we still haven't got an Energy policy

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Climate Change

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Decarbonising Electricity Production

- It is going to cost a lot of money to bring this about
- Choices are among others:
  - Nuclear
  - Fuel cells
  - Other renewables; Tidal power, Wave, Biomass, PV (Solar), Small scale hydro
  - Wind

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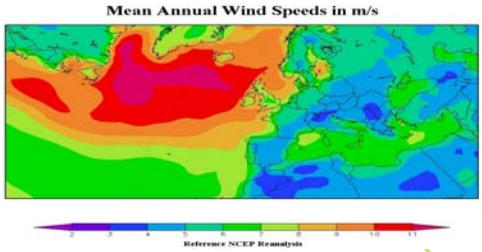

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Wind Energy

- A natural source of energy
- It is clean and emits no noxious gasses
- It is fuel free and no supplychain is needed
- The marginal cost of wind energy is zero
- The potential of wind energy introduces a totally new dimension into energy policy

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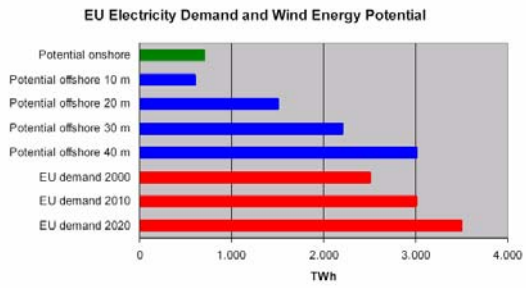
Meeting demand for power



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- Onshore wind farms and geology

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Risks to be addressed

Peat Slippage

Ground Water Contamination

Impact on bedrock formation

Increased Siltation of Water

Interference with hydro-geology through insensitively positioned roads

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Phase 1 Desk Based Research

Consult Geological Survey (NI/RoI) for their Geological Feedback on the proposed sites

Consult appropriate maps of interest – normally historic – to reveal past usage and identify features of geological interest e.g. water features, rocky outcrops etc.

Review available databases of information e.g. river water quality

Review EISs/Planning applications in the immediate vicinity of proposed site for relevant information

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Phase 2 On-site assessment

Carry out soil sample surveys

Carry out hydro-chemical water sampling

Carryout site walkover noting features

Carry out site investigations (sometimes as part of EIA or as a condition of planning)

SI to include a number of Boreholes at turbine bases and along the proposed road route

SI to also include peat probes along the road route

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Design and mitigation

Results/findings of the desk-based and on-site work used to inform the final design

Compliance with Best Practice and International Standards

Important to note that all designs have to be safe – but are always a compromise for some aspect of the development e.g. visual impact, public opinion, commercial terms, etc.

Mitigations measures suggested to overcome and reduce potential impacts e.g. SuDS

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- Offshore wind farms and geology

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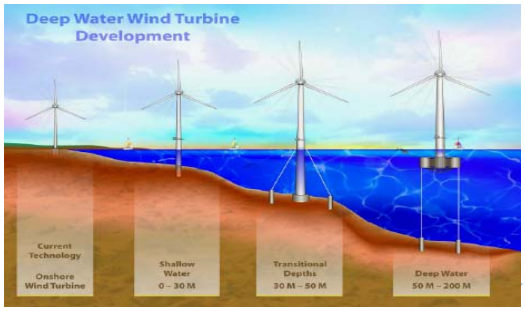
Offshore Technology development



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Arklow Bank

- Located 10 -12 km off the East coast of Ireland on the Arklow Bank
- Characterised by high wind speeds, low water depth and minor environmental impact
- The first phase of 25MW currently being operated by GE Wind Energy
- Ongoing environmental monitoring to satisfy Foreshore Lease conditions during operation of the first 25MW and in preparation of further phases of the project
- Joint Venture established with Energia Hidroelectrica de Navarra (EHN)

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- Offshore construction on the Arklow Bank, Summer 2003

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Greater Gabbard

The Site

- 500MW offshore site awarded as part of The Crown Estate Round Two tender in the UK
- Located in the Outer Thames of the East coast of England
- Distance to shore is 18 Miles (26 km)
- Developed in Joint Venture with Fluor

Current activities

- Environmental Impact Assessment being completed
- Bird and cetacean monitoring
- Site investigations completed
- Construction of Met Mast completed this week
- Stakeholder consultation ongoing

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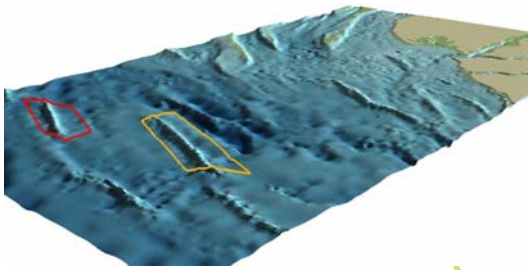
3D Image of the Greater Gabbard site



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Offshore ground conditions

A site investigation is a critical step in any seabed risk management process and is vital to ensure the success of any offshore project.

A recent survey of European offshore wind farm projects concluded that approximately 25% of total project capital expenditure (CAPEX) could be directly attributed to the chosen foundation system.

This fact alone highlights the importance of achieving an optimum foundation solution and thus the need for a focussed and cost-effective site investigation.

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Offshore Site Investigations

- Site investigations normally comprise of:
  - Desk based geological/archaeological survey
  - Geophysical investigations
    - Topography of the seabed
    - Correlation with soil borings and in-situ testing
    - Shallow geological information (up to 50m)
    - Knowledge about obstacles, stones, boulders, wrecks and/or archaeological remains at the sea floor
  - Geotechnical investigations
    - Accurately determine each soil interface
    - Soil sampling with subsequent laboratory testing
    - In situ tests (CPT's)

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Geotechnical data requirement

As relevant for the design, the geotechnical site investigations should provide the following types of geotechnical data for the soil deposits:

- Data for soil classification and description of the soil
- Shear strength parameters
- Deformation properties
- Permeability
- Stiffness and damping parameters for prediction of dynamic behaviour of the wind turbine structure.

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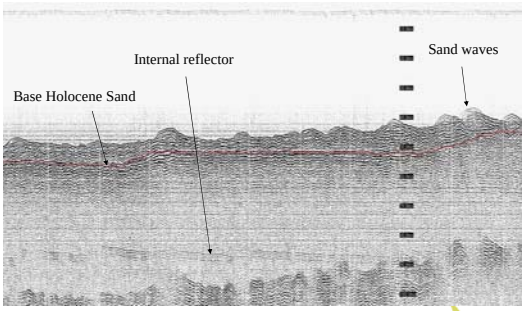

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Core examples – Greater Gabbard

0.00m – 0.48m

0.48m – 0.98m

3.57m – 4.07m

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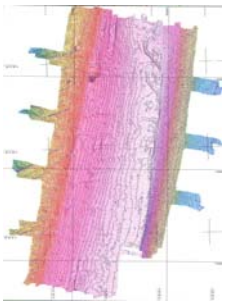
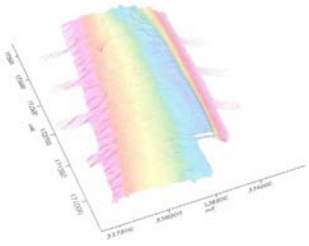
Bathymetry examples – Arklow Bank





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The Offshore SuperGrid™

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Thank you

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