Pushing Offshore Wind Energy Regions (POWER)

Lessons Learnt from Case Study Offshore Wind Farms

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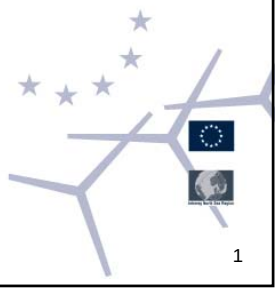
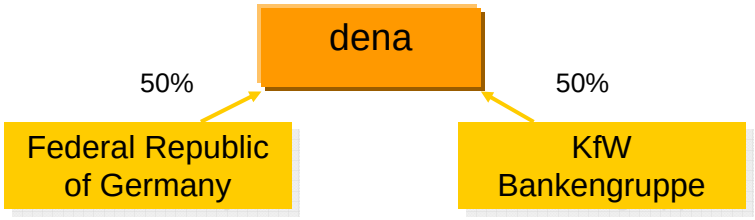
Business Breakfast and POWER Meeting
Lowestoft, UK,
30th March 2006



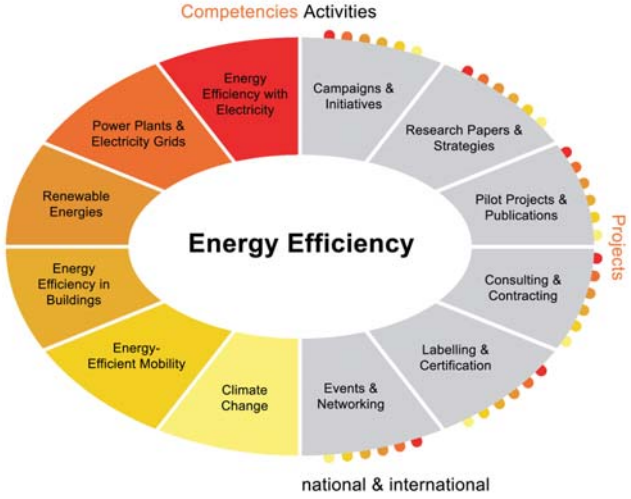
Ownership Structure of the German Energy Agency.



- Federal Ministry of Economics and Technology
- Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
- Federal Ministry of Transport, Building and Urban Development

Managing Director: Stephan Kohler

Fields of Competence and Activity at dena.



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Pushing Offshore Wind Energy Regions (POWER)

Outline of Presentation

1. Task and Methodology, Client and Contractor
2. Results and Recommendations
3. Summary

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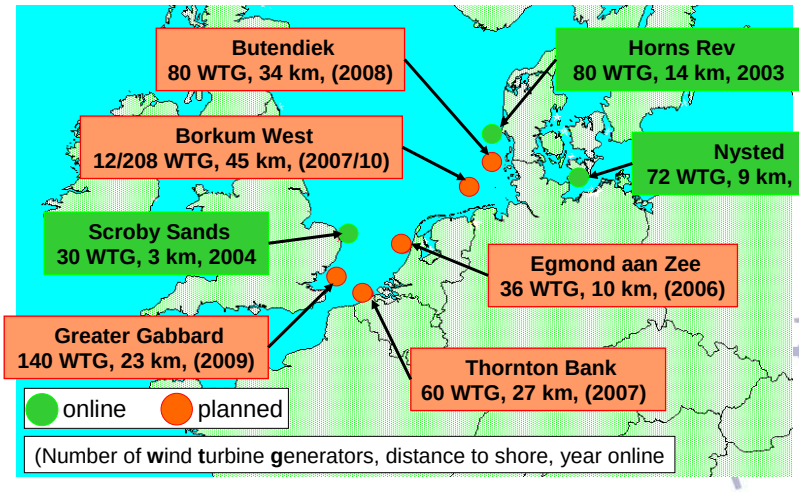
Client and Contractor

- Client:
  - Senator for Construction, Environment and Transport of Bremen
  - on behalf of INTERREG IIIB- Project "POWER – Pushing Offshore Wind Energy Regions".
- Contractors:
  - German WindGuard GmbH, Varel
  - German Energy Agency GmbH (dena), Berlin
  - University of Groningen (Faculty of Spatial Sciences)

Task and Methodology

- Task :
  - Analyse experiences and lessons learnt from eight offshore wind farms in Europe (three online and five planned)
- Target groups for results:
  - authorities, politics, project developers
- Methodology:
  - desk top research
  - questionnaire
  - interviews with project management

Analysed Offshore Wind Farms



Power Generation

Wind Farm (Country)	Generated Power (GWh / a)	Household Equivalents (3500 kWh / a)
Scroby Sands (UK)	171	49,000
Nysted (DK)	480	137,000
Horns Rev (DK)	600	171,000
Egmond aan Zee (NL)	345	99,000
Thornton Bank (BE)	986	282,000
Butendiek (GE)	800	229,000
Greater Gabbard (UK)	1,750	500,000
Borkum West (GE)	260 / 4,300	74,000 / 1,229,000

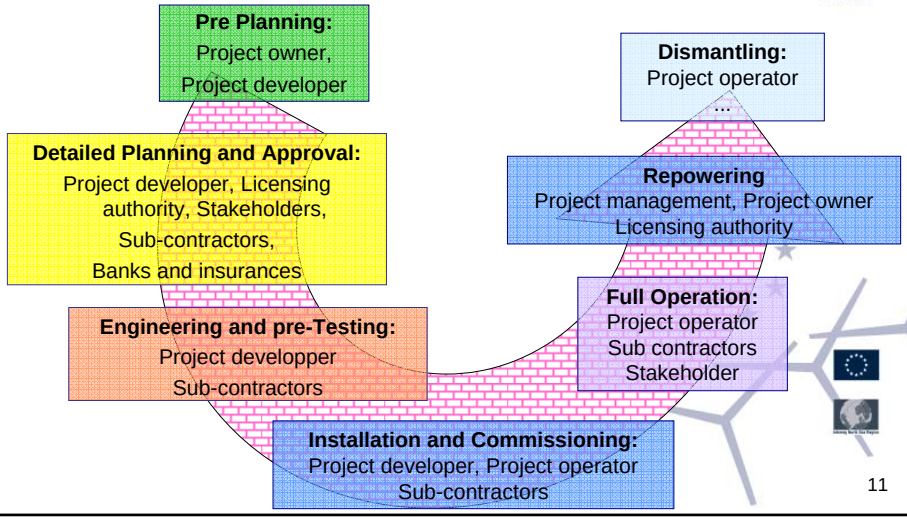
2. Results

- Politics
- Project Management
- Authorities

Politics:
Stable Framework Conditions and Support

- Offshore wind energy is a young business. It needs stable framework conditions to support its development.
- Support in situations where basic experiences in operating and financing is lacking.
- Politics should support offshore wind energy on
  - public acceptance
  - sufficient onshore and offshore test sides
  - coordinated licensing procedures
  - grid integration
  - financial support for first projects.

Project Management: Project Phases



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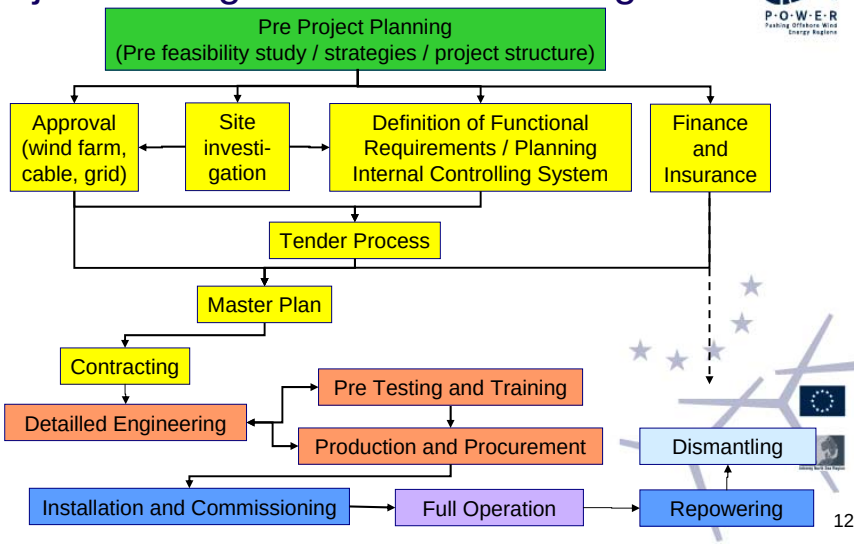
Project Management: Work Packages



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Project Management: Public Acceptance

- Public might be afraid of the unknown new technology.
- Public is interested in information.
- Public acceptance is crucial for offshore wind farms.
- Strategies for media and stakeholder involvement should be developed in the pre-project planning phase.

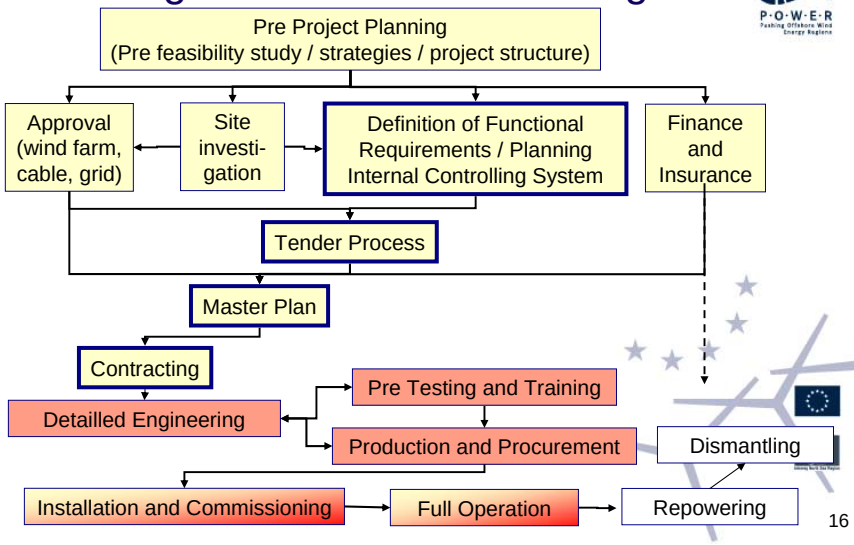
Project Management: Public Awareness

- Increase public awareness with:
  - Newsletter, press release, TV or Radio.
  - Project specific website
    (e.g. Greater Gabbard, Horns Rev, Nysted, Butendiek, Egmond aan Zee and Thornton Bank).
  - Information centre
    (e.g. Scroby Sands, HornsRev, Nysted, Thornton Bank).
  - Brochures, touring exhibitions, public hearings, charity.

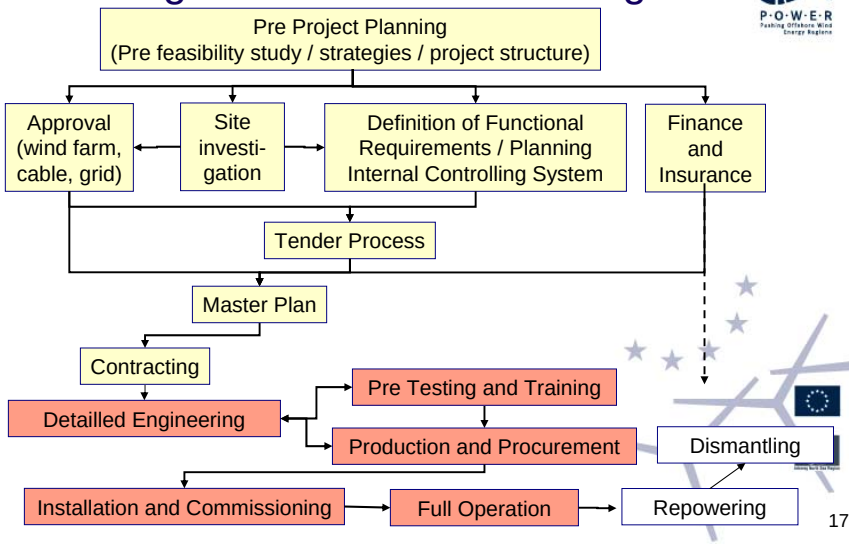
Project Management: Risk Management

- **E**ngineering, **P**rocurement, **C**ommissioning Contract**:**
  - EPC contractor covers all risks (including risks for installation and for bad weather).
- Multi Contracting**:**
  - Client and contractors share risks.
  - Client must have sufficient engineering skills for tender process.
  - Client must be able to control and mange the complete process and interfaces.
- Expert's estimation: MultiC ~ 20 % cheaper than EPCC

Risk Management: Multi Contracting



Risk Management: EPC Contracting



Project Management: Avoidance of offshore Work

- Costs:
  factory : quayside of harbour : offshore ~
  1 : 3 : 5 (up to 10)
- As much as possible should be tested and assembled in factories.
- Avoid offshore work.

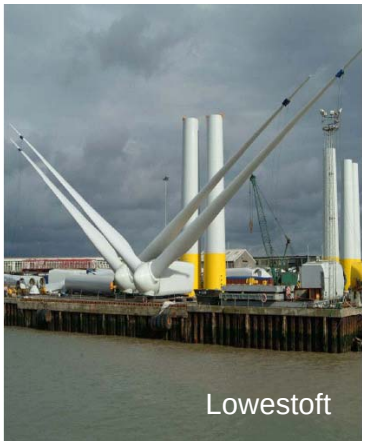
Project Management: Pre-Testing

- Before serial production of wind farm elements starts:
  - Test ease of service and maintenance for main components in a full size model of turbine and tower.
  - Test access to wind turbine (full size model offshore).
  - Test training courses for personnel.
  - Small number of turbines must demonstrate a sufficient trial period (onshore or offshore).
  - Evaluate experiences of tests.

Project Management: Logistic Harbour

- Criteria to choose harbour for logistic:
  - Sufficient space at quayside (~1,000 m^2 per wind turbine).
  - Good accessibility by both sea and road (truck loads).
  - Ability to start vessel loading immediately upon arrival.
  - Short distance to wind farm site isn't the most important.

Logistic Harbours

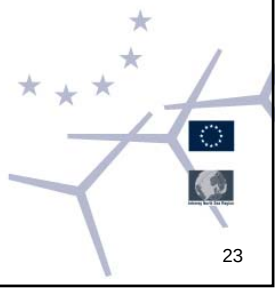


Authorities: Spatial Planning

- Pre-selection of offshore wind farm sites by authorities in the framework of a spatial planning process has advantages:
  - Less conflicts with competing land use.
  - Less site investigations.
  - Streamlined approval process.
  - Higher level of planning safety.

Authorities: Approval Procedure

- Appointment of one single leading authority:
  - High value for both, the planning authorities and the project developer.
  - Approval process can be streamlined.
  - Discrepancies can be avoided.
  - Organisational effort can be reduced.



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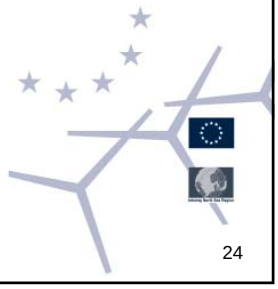
Authorities: Approval Procedure

- Coordinated approval procedure for:
  - Wind farm in the offshore exclusive economic zone
  - Cable route in the 12-nmi-zone and
  - Onshore cable route / infrastructure to point of grid connection.



Summary

Recommendations for Offshore Wind Development

Pushing Offshore Wind Energy Regions (POWER)

Recommendations

Politics:
- Stable framework conditions
- Support for young business

Authorities:
- Spatial planning and pre-selection of
  - wind farm sites and
  - cable routes.
- Coordinated approval procedure for
  - wind farm,
  - cable to shore and
  - onshore cable and infrastructure.

Recommendations

Project Management:

- Sufficient skills for management of large projects.
- Media and stakeholder strategy from the beginning.
- Good accessibility of logistic centre and sufficient space.
- Avoid offshore work.
- Extended pre-testing and evaluation before serial production.

Risk management:

- Multi Contract - EPC Contract ?

Thanks for your attention

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Further information on offshore wind energy:
www.offshore-wind.de

Subsequent to discussion of the presentation „Repowering“ was added to slide 11, 12, 16 und 17