

IUMI 2010 ZURICH

12 – 15 September

OFF SHORE GREEN ENERGY CHALLENGES / OPPORTUNITIES FOR MARINE MARKETS

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Presentation IUMI conference ZURICH 2010

- Historical notes
- Effects of the evolution
- Main risk evolution
- Claims
 - Main insured claims
 - Reaction on claims
- The future
 - Next five years
 - Next then years
- Insurance challenges
- Insurance opportunities

- The origins
 - Off shore renewable energy started only two decades ago.
 - Early parks were small and close to shore
 - Technology was copied from land based experience.
- The evolution till now
 - Turbine builders increased capacity (0,75 to 5MW)
 - Distance to shore increased
 - Park capacity increased from 20 to 250/300MW

- **COMPETITION BETWEEN TURBINE BUILDERS**
 - Race for building bigger machines.
 - Decreasing warranties from builders
 - Larger machines required other foundations
- **INCREASED DISTANCE TO SHORE**
 - Weather windows become more critical
 - Increasing depths impact on contractors equipment
 - Cable lay and offshore transformer are critical items
- **INCREASED PARK CAPACITY**
 - Contractors need to adapt their equipment
 - More impact of outside finance

- COMPETITION:
 - Continued update of turbine technology creates a permanent fear of prototype risk effects.
 - High demand kept unit price high.
 - New players are attracted by possible opportunities.



- DISTANCE TO SHORE:
 - Increased distances and depths push contractors to invest in new designed construction units.
 - Modified working methods lead to new claim types (self floating cargo)
 - Recent claim files show increase of the consequential loss in the global claim due to the weather window problems.



- INCREASED PARK CAPACITY:
 - CAR insurers have to increase limits of covers on section 1 and 4 (material damage and DSU/ALOP).
 - Financial close of actual projects tends to increase the portion of risks transferred to the market
 - Requests for non recourse finance / long term insurances

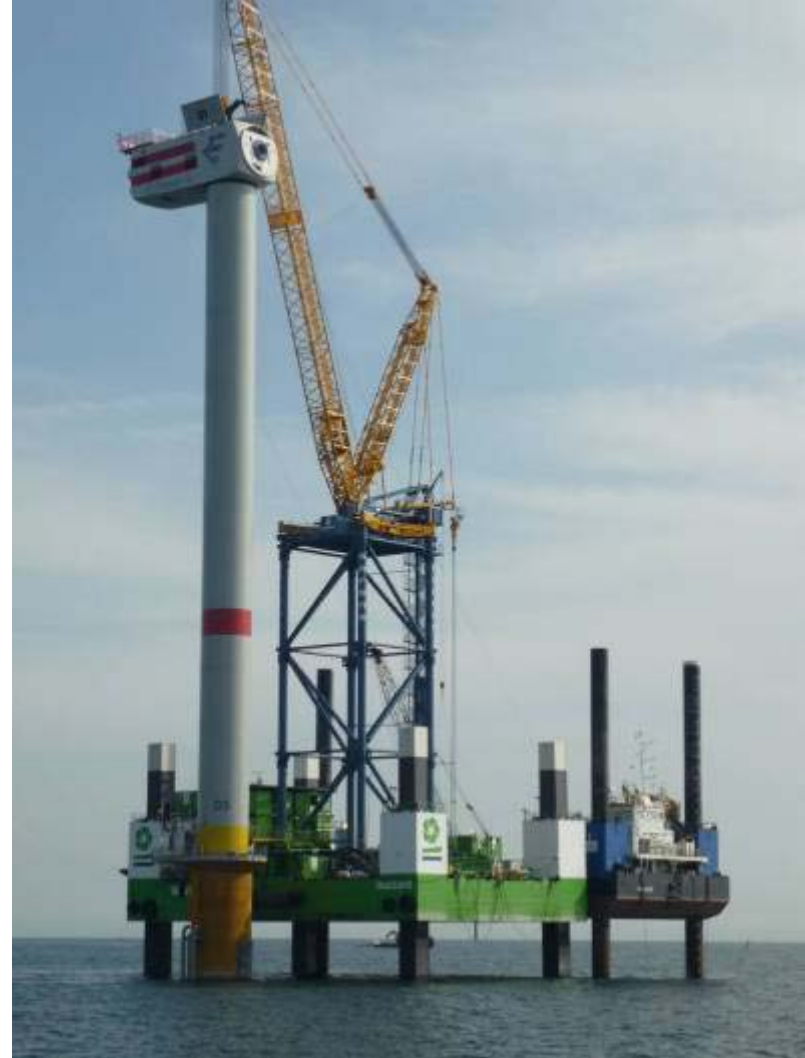


- DURING THE CONSTRUCTION:
 - Only a limited number of claims but with a substantial impact.
 - Cable damages remain an eye catcher.
 - Use of self floating cargo caused recent problems.

- DURING OPERATIONS:
 - One transformer damage was reported with only limited impact.
 - Gear box problems with one turbine type raised questions.
 - At present the grouting issue resulting from a deficient norm is a main concern

INSURANCE MARKET REACTIONS TO CLAIMS PATTERNS ENCOUNTERED

- Increase of the deductible levels
- Incorporation of specific exclusion clauses (series loss, only Leg 2)
- Increased attention paid to prevention
- Not much competition on rates





- THE NEX FIVE YEARS
 - Basic trends
 - New wind generator technologies
- WAIVE AND CURRENT GENERATORS

THE NEXT 5 YEARS - Basic trend

- Developers will endeavour materialising the generation two wind mill parks with substantial impact of external financing.
- Governments will be required to increase their support to reach the 2020 targets of theoretical installed production
- New turbine builders will try to gain market share.
- Existing turbine builders have the focus on consolidating turn over and technology.
- Contractors are gearing up to meet the new challenges inherent to the concession locations
- Emerging new locations - United States/France

THE NEXT 10 YEARS - New technologies & trends



- The floating turbines
 - Two developers at least active in this field
 - Intention is to
 - Increase the production output
 - Eliminate the problem of limited distance from shore
 - Reduce the cost of foundations



- The horizontal turbines
 - At least one developer concentrates on types of horizontal generators
 - Intention is to:
 - Increase the theoretical power per unit
 - Have a less critical gearbox



- These technologies are still early stage developments and at present only one prototype has been installed.
- If technical issues are resolved could be competitive as production is more stable and predictable which is important in electricity production.



- The market will be asked to deliver still more underwriting capacity on construction risks.
- There will be a continued issue of « proto type » due to evolutions in:
 - Turbine types/engine capacities
 - Field locations / deeper water - anchoring
 - Building techniques / floating cargo
 - Building equipments / DP positioning
 - Liability during operations / floating crafts
- Risk accumulation during the operational phase for catastrophes - parks located in a same zone.
- Maintain present insurance products to allow financing the projects.

- New insurance business (floating units) not only for the construction period but also during operations and upon dismantling of the wind mill parks.
- Different marine products involved:
 - Cargo during construction and maintenance
 - Hull for building and maintenance crafts/ROV's during full life period but also floating turbines
 - P&I owners/charters including specialist operations - contractual (units / vessels-crafts)
 - Consequential damage protections
- Niche products will be looked after
 - If basic deductibles remain high
 - if the generator systems become floating
- in respect of all main risks; property/BI/liability.

- Cargo insurance:
 - During construction: cover to reduce increasing levels of deductibles under the classic CAR policies.
 - During maintenance: transports of equipments, tools and spares with waiver formulas including machinery break down for the equipments
- Hull:
 - Smaller crafts: crew + equipment transits
 - Survey vessels: ROV equipped units to survey foundations and carry out maintenance
 - Repair vessels for major interventions at top level - jack up barges with heavy cranes and DP2 vessels
- P&I:
 - Specialist operations issues
 - Contractual liabilities including penalties.