Avoiding Damage to Offshore Wind assets through a Risk Based Approach
- Aon Experience
- What can lead to project failure?
- Estimated Maximum Loss and Risk Mitigation
- A European Insurance Approach
- Insurable Risk vs. Business Risk
- Underwriting Considerations
- Claims – Examples of damage to offshore wind assets
Aon

- A leading global provider of risk management, insurance and reinsurance brokerage, and human resource solutions and outsourcing services
- 66,000 Aon colleagues worldwide across 500 offices, servicing clients in over 120 countries
- Number one broker in the region
- Extensive network of 30 offices and over 2,100 employees in the region
- Energy / Construction / Engineering / Marine specialists
- Broker to some of the largest companies in the region

Aon network office
Able to be serviced by another Aon territory
Aon Asia office locations
Aon Experience

- 7,200 MW of offshore wind project experience and benchmarking
- Vestas, Siemens, Senvion, BARD and AREVA Turbines
- Gravity based, monopile, tripod, jacket foundations and floating wind turbine technologies placed
- Debt financed and balance sheet JV projects
- 15 Estimated Maximum Loss scenario studies
- Handled 120+ Offshore Wind Claims to date
- Largest team in the market Insurance market dedicated to Renewable Energy
- 80% Offshore Wind Market Share
European Offshore Wind Experience
What can lead to project failure?

Cost Overruns

- Slip in execution schedules
- Cost Competitiveness

- Schedule Competitiveness
- Production vs. Plan
What can lead to project failure?

- Lack of Sponsor Experience
- New Technology or Methodology
- Contract Frustration
- Insufficient Planning
What can lead to project failure?

- Slip in execution levels
- Poor weather
- Installation Interdependency
- OEM Production Delays
- Contractor Insolvency
What can lead to project failure?

- Sponsor Experience
- Use of technology
- Currency fluctuation
- Location
What can lead to project failure?

Schedule competitiveness

- Contractor Experience
- Location
- Technology
- Planning
What can lead to project failure?

- Poor operability of key equipment
- Lower load factors
- Inadequate site analysis
What can lead to project failure?

A common theme:

- New Technology
- New Location
- New Sponsor(s)/Contractor(s)

One in isolation is manageable through a risk based approach, all three has a high probability of physical damage to assets and delays in revenue.
### Case Study

<table>
<thead>
<tr>
<th><strong>Project:</strong></th>
<th>German Offshore Wind</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Turbines:</strong></td>
<td>5 MW Multibrid (Areva)</td>
</tr>
<tr>
<td><strong>Nature of Loss:</strong></td>
<td>Temperature spikes in the turbine due to bearing coating</td>
</tr>
<tr>
<td><strong>Root Cause:</strong></td>
<td>Local supplier switched the bearing coating from zinc to a zinc alloy which expands twice as much as zinc</td>
</tr>
<tr>
<td><strong>Action:</strong></td>
<td>Replacement of six bearings requiring <strong>two</strong> jack up barges</td>
</tr>
<tr>
<td><strong>Cost Overrun:</strong></td>
<td>EUR 25 million (estimated)</td>
</tr>
<tr>
<td><strong>Schedule Impact:</strong></td>
<td>8 month delay</td>
</tr>
</tbody>
</table>
### Estimated Maximum Loss (EML)

<table>
<thead>
<tr>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project initiation</td>
<td>Review of information supplied by TGC</td>
<td>Impact model generated</td>
</tr>
<tr>
<td></td>
<td>Major loss exposures identified for:</td>
<td>Figures calculated for:</td>
</tr>
<tr>
<td></td>
<td>- Property damage</td>
<td>- EML</td>
</tr>
<tr>
<td></td>
<td>- Business interruption</td>
<td>- Mitigated loss</td>
</tr>
<tr>
<td></td>
<td>- Third party liability</td>
<td>- Duration of loss</td>
</tr>
<tr>
<td></td>
<td>Identify worst case scenarios</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interview key personnel to validate scenarios and explore further</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final project plan</td>
<td>A model for each scenario which details impact on the business</td>
</tr>
<tr>
<td></td>
<td>Information gathered for the EML study</td>
<td>Report detailed findings of the study</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 week</td>
<td>1.5 weeks</td>
<td>3 days</td>
</tr>
</tbody>
</table>
EML study information requirements

- Asset Inventory with asset values
- Predicted operating revenues
- Project description including logistics and vessels to be used for construction
- Construction schedule
- WTG configuration (number, layout)
- Inter Array Cable configuration (number, layout)
- Offshore substation details (number, layout, transformers etc)
- Detail of interface risk with TSO

- Details of any cable crossing agreements
- Contractual terms relating to serial defects of WTG, foundations, cables etc
- Summary of wind data for the site (including any studies for extreme wind storm events)
- Details of any specifications for bespoke Items
- Emergency Response and Business Continuity Plans (if available)
- Selected suppliers
- Known Third Party exposures
- Detail of contractual arrangements, crossing agreements, etc. with detail of liability levels
Loss Scenario Analysis

- Property damage, resultant delay and third party liability scenarios
- Evaluates risk mitigation strategies
- Satisfying investor / partner expectations
- Sets loss limits and indemnity periods

With detailed results provided
A European Insurance Approach

Insured
- Equity
- Debt Finance
- Project SPV

Additional Insured
- Wind Turbines
- Cables
- Foundations
- Electrical Infrastructure
- Balance of Plant
- Sub-contractors/Suppliers
- Sub-contractors/Suppliers
### Insurable Risk vs. Business Risk

**Insurable Risk**
- Physical Damage to the Wind Farm including during marine transit
- Revenue Loss following physical damage to the Wind Farm
- Third party legal liability arising out of the construction and operation of the wind farm
- Terrorism

**Business Risk**
- Performance Risk
- Defects
- Non-Damage Delay
- Wear and Tear
- Changes to government incentives
- Weather risk
- Risks covered by a warranty or guarantee
Underwriting Considerations

Hard Factors

Coverage
- Values at risk; Period; Deductibles; Sub-limits; Design Coverage

The Insured and Additional Insured
- Number of successful projects; Loss History; Track Record;

Location
- Distance to shore/nearest port; water depth; weather window; natural catastrophe exposure;

CAPEX
- Cost competitiveness compare with market standard

Schedule
- Ambitious relative to seasons

Technology
- Certification; OEM’s Operational track record; Lead replacement time;
Underwriting Considerations

Soft Factors

Project People
- Core Project Team and Contractors; Offshore Experience; Track record of working together; Lessons Learned;

Project Strategy
- End goal of the Project;

Contracting Party
- Disclosure prior to inception; Why choose x over y; Experience and credibility; Local Content;

Fit for purpose
- Project location suitability; Past track record; Vessel;

Risk Management
- Attitude to third party verification (MWS) and scope of input; Risk Mitigation measures; Experienced Risk Advisors and Technical Advisors;
Claims

Roots causes usually include:

- Inexperienced Contractors and/or Suppliers
- Unsuitable equipment and supply chain limitations
- Defective Design
- Limited quality assurance
- Difficult offshore working conditions
- Inadequate working methodologies and contingency planning
- Deviations from the methodology

The majority of offshore wind insurance claims have occurred during the construction phase.
Over 76% of offshore construction claims are cable related

Average loss ratio exceeding 120% during construction
Claims

Design and manufacture
Damage from third parties
Operating Claims

- Average loss ratio exceeding 4% during operation
- Frequently covered under Warranty

Components:
- Cable
- Foundation
- Transformer
- Blade
- Transition Piece
- Turbine