Swiss Re
Corporate Solutions

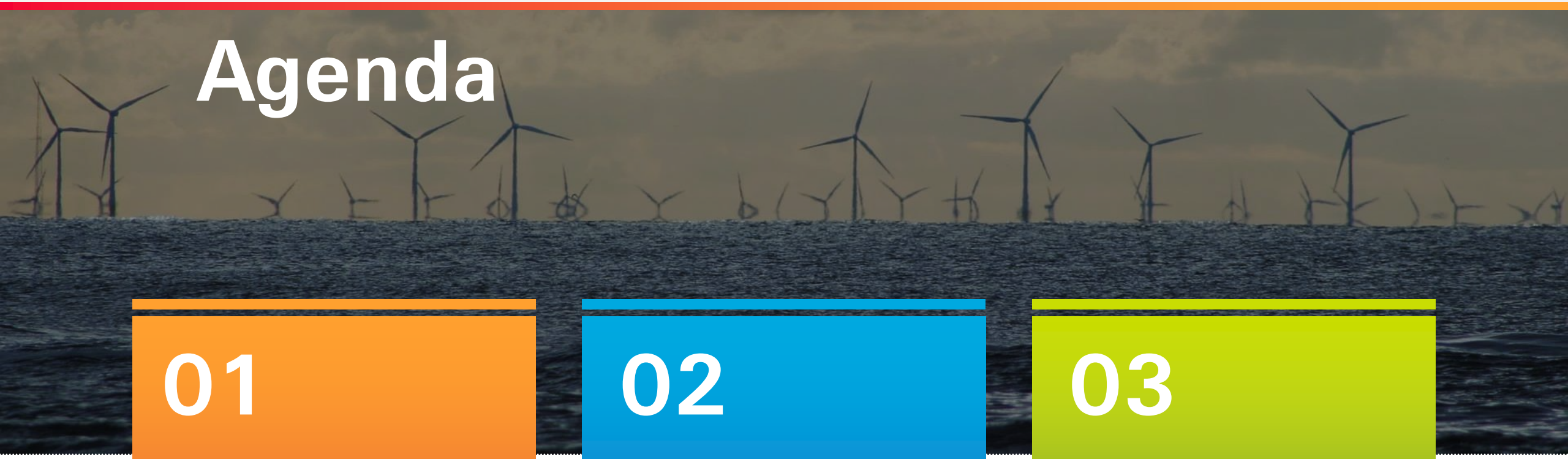
Offshore Wind

Lesson Learned in Risk Mitigation

AWEA, Asia Offshore Wind Day
Taipei 18 September 2018

Truels Kjer
Senior Risk Engineer
Centre of Competence Wind Power
truels_kjer@swissre.com

Agenda



01

Key Risk Impacting Offshore Wind Projects

- Physical factors
- Involved parties

02

How to Improve Your Risk

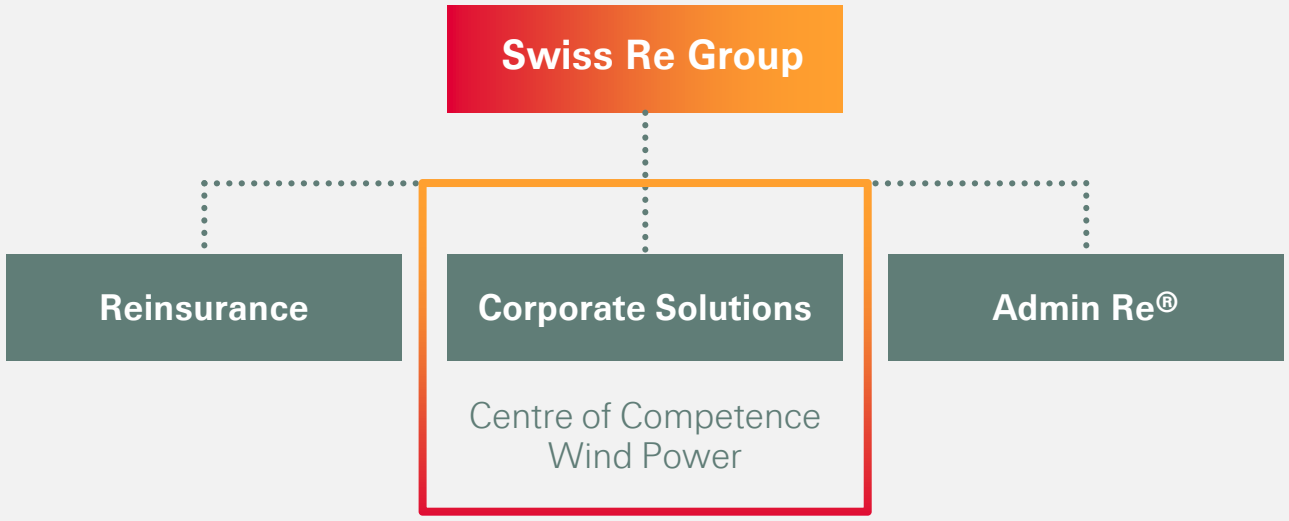
- During the planning
- During the construction and operation

03

Lesson Learned From Actual Claims

- Cables
- Foundation

Swiss Re Corporate Solutions - Part of Swiss Re Group



- **Leading Insurer in Wind Power** with one of the largest portfolios in Europe: Offshore Wind >11 GW under cover (> 2500 turbines)
- **Single Point of Contact** in a location near you: 11 offices in APAC with 280 employees in APAC

Swiss Re Corporate Solution Reference List

China (We are participating 1.9GW offshore)

- Xiangshui Jinhai OWF
- Laoting OWF
- Three Gorges Dalian OWF 300MW
- Three Gorges Dafeng OWF 300MW
- Jiangsu Longyuan Jiangjiasha OWF 300MW
- Binhai North OWF 400MW
- Fujian Pinghai Bay phase II 250mw

Taiwan

- Formosa 1 Phase 1
- Formosa 1 Phase 2

Japan

- Fukushima

Korea

- Small share of Offshore Wind Power

USA

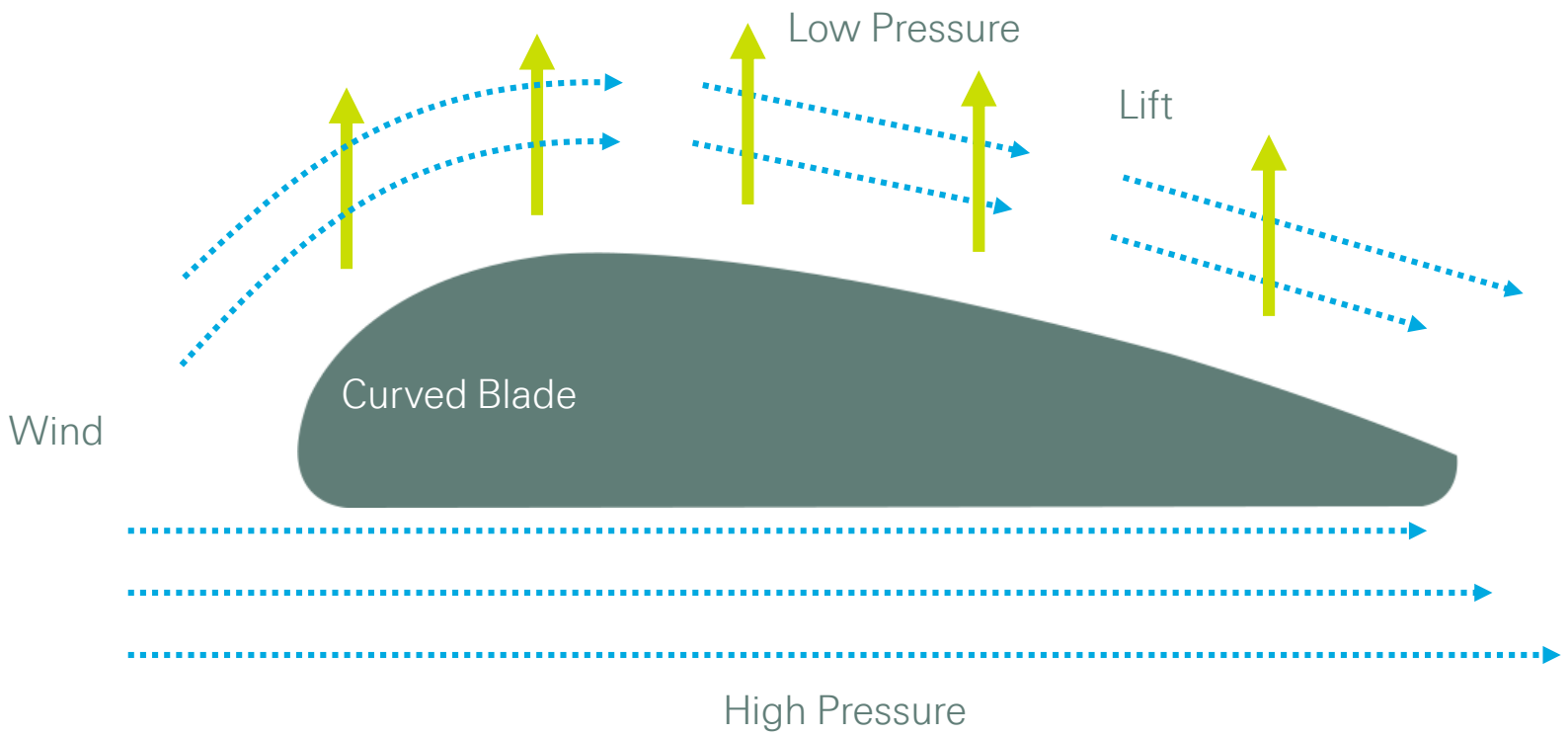
- Block Island (Lead insurer)
- Costal Virginia. 12MW

Europe

- Approximately 45 projects. Fixed and Floating and including cable projects (lead insurer or follower)

Theory 1 – How does it work?

As the speed of the wind is higher on the upper side the pressure is lower and the result is a lift and therefore a up going torque



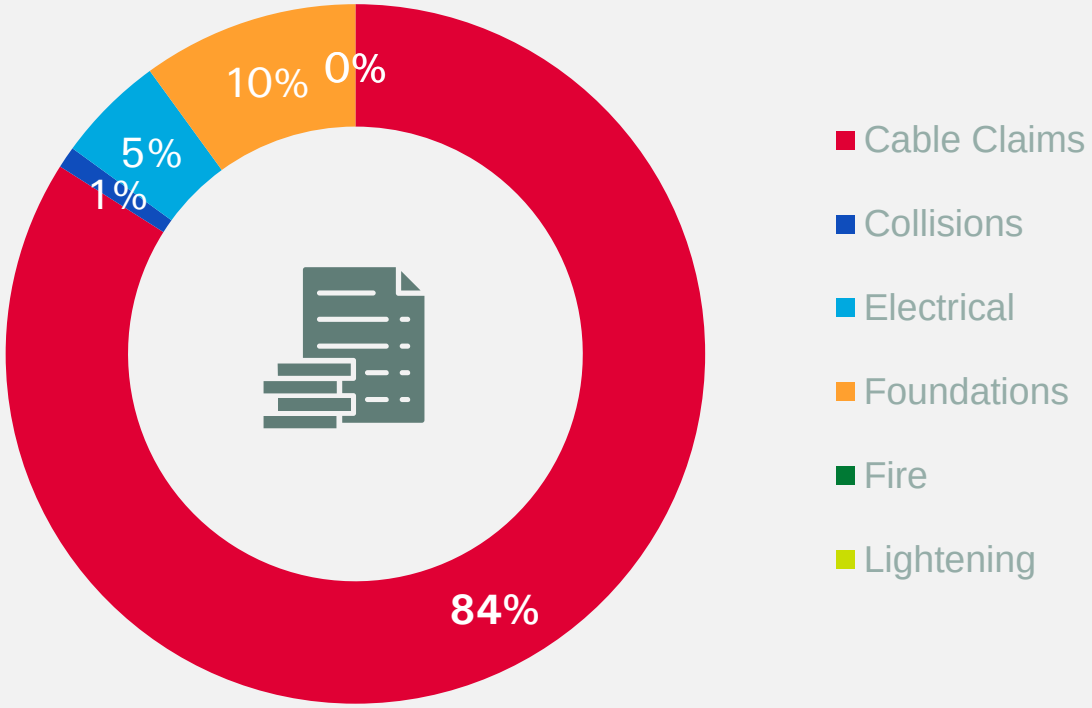
Onshore & Offshore wind turbines - Difference

Onshore	Difference	Offshore

- Wind speed and turbulence
- Visual impact
- Acoustic noise
- Erosion / corrosion
- Capital cost (opex / capex)
- Maintenance
- Energy production, availability
- Access
- Limited manufacturers

Motivation. Construction claims (2002-2017)

Total Claims Cost (%)



Source Lloyd Warwick

RISK FACTORS. Primarily Construction. Partly Operation.

Technology risks

- **Proven technologies**
- Costs to repair
- Vessel costs, long term charter
- Quality of design

Physical factors

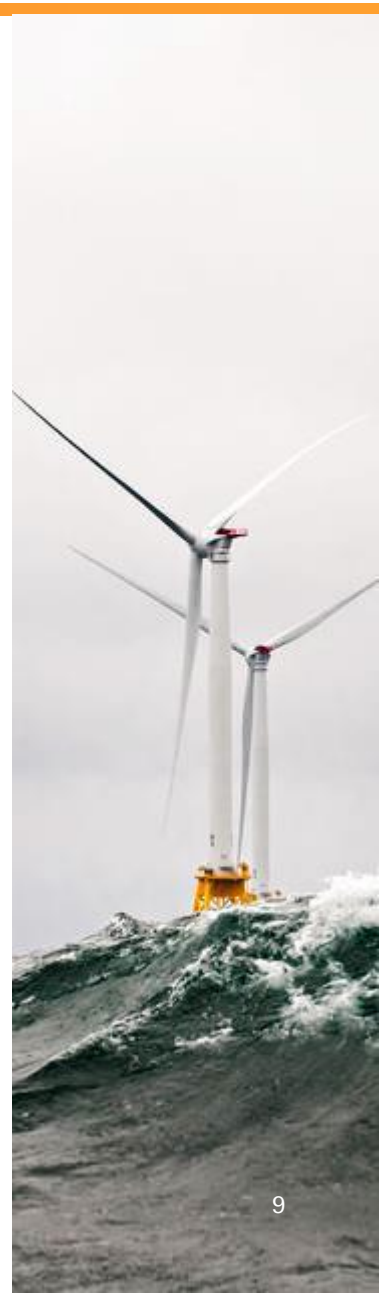
- Distance from shore
- Sea & geography
- Water depth
- **Weather. Particular NatCat**
- Monitoring

Organisation

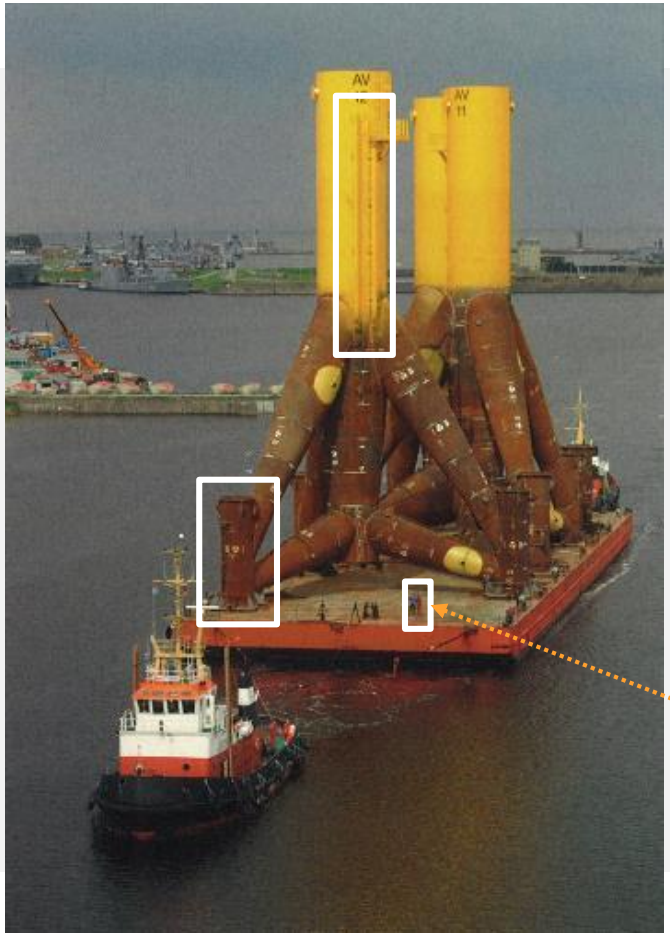
- Experience.
  - Project manager
  - Package managers
- Design and Scope of Work
- Time schedule
- Contingency Plans

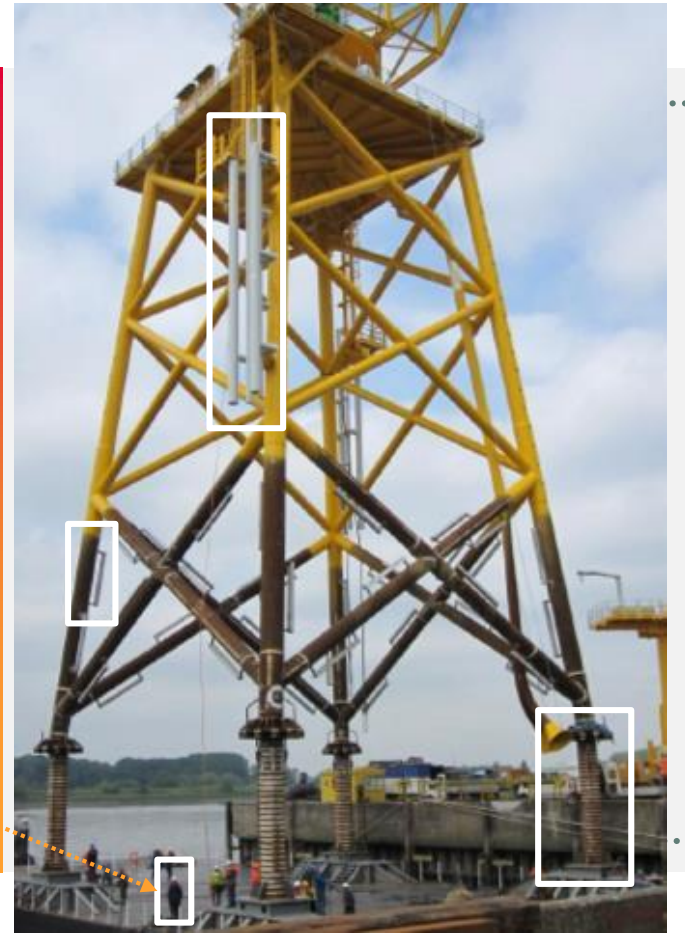
Contractors

- Experience
- **Tools, vessel, availability**
- Installation methodology and timeline
- Contingency Plans



Foundations – Jacket

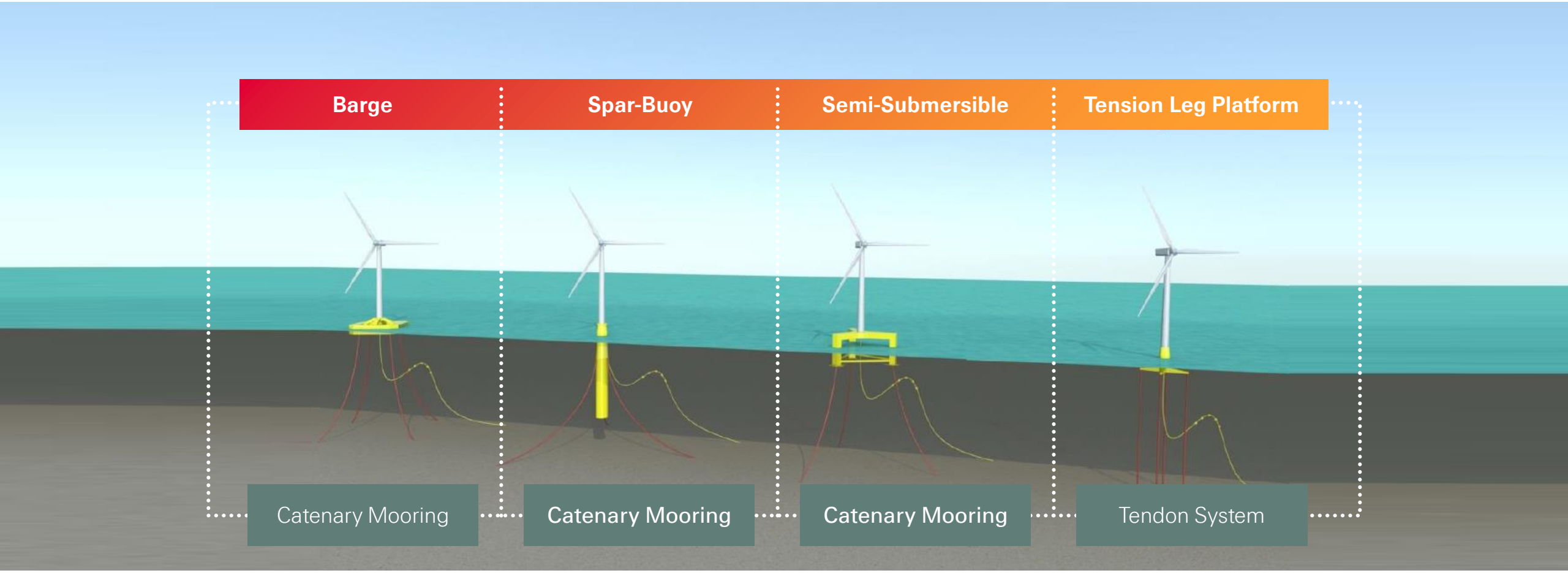




47,8m (+6,2m midsection)

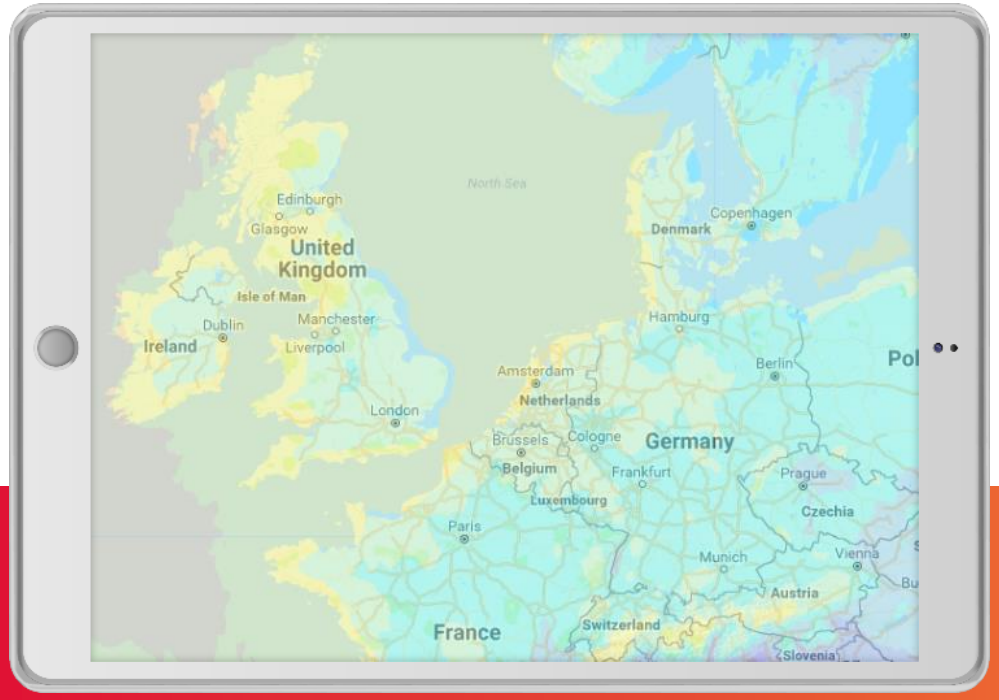
37,7m

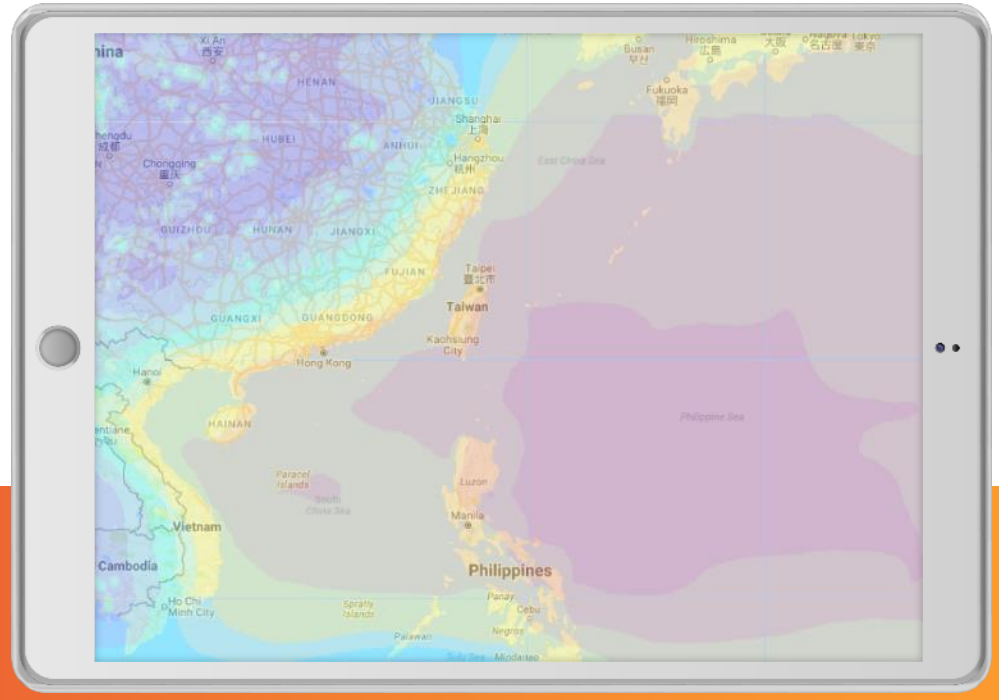
Foundations – Floating



Moving into Stormy Seas…

Typhoon exposure





Local 50 Year Peak Gust Speed

- Extreme (>70 m/s)
- Very High (60-70 m/s)
- High (50-60 m/s)
- Significant (40-50 m/s)
- Moderate (35-40 m/s)
- Moderate (30-35 m/s)
- Low (25-30 m/s)
- Low (20-25 m/s)
- Very Low (<20 m/s)

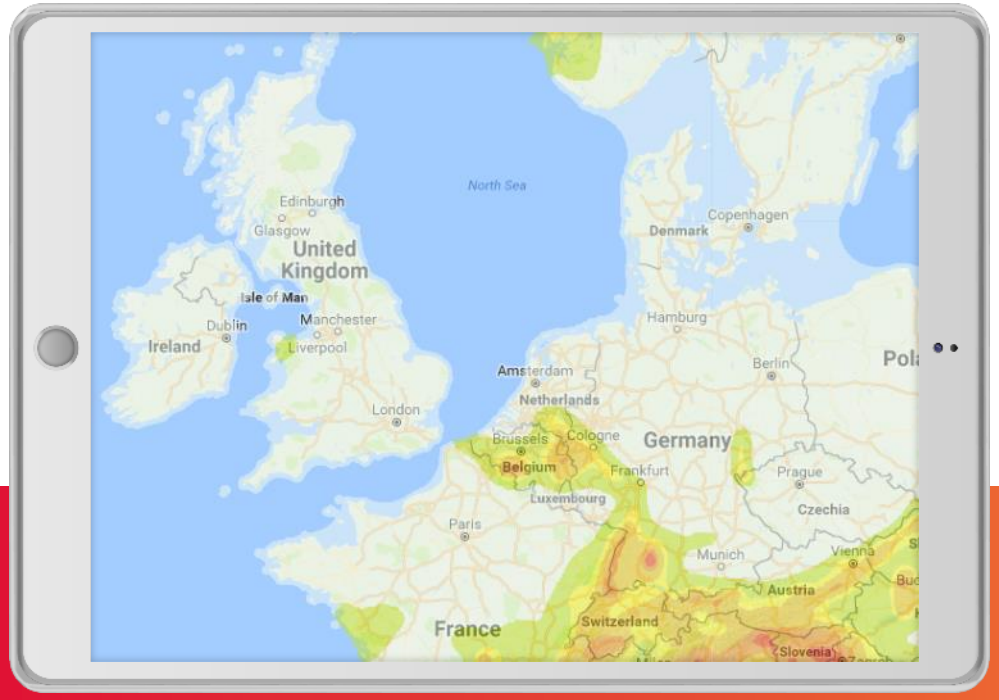
- Vast majority of current offshore windfarms in European waters with relatively benign NatCat exposure

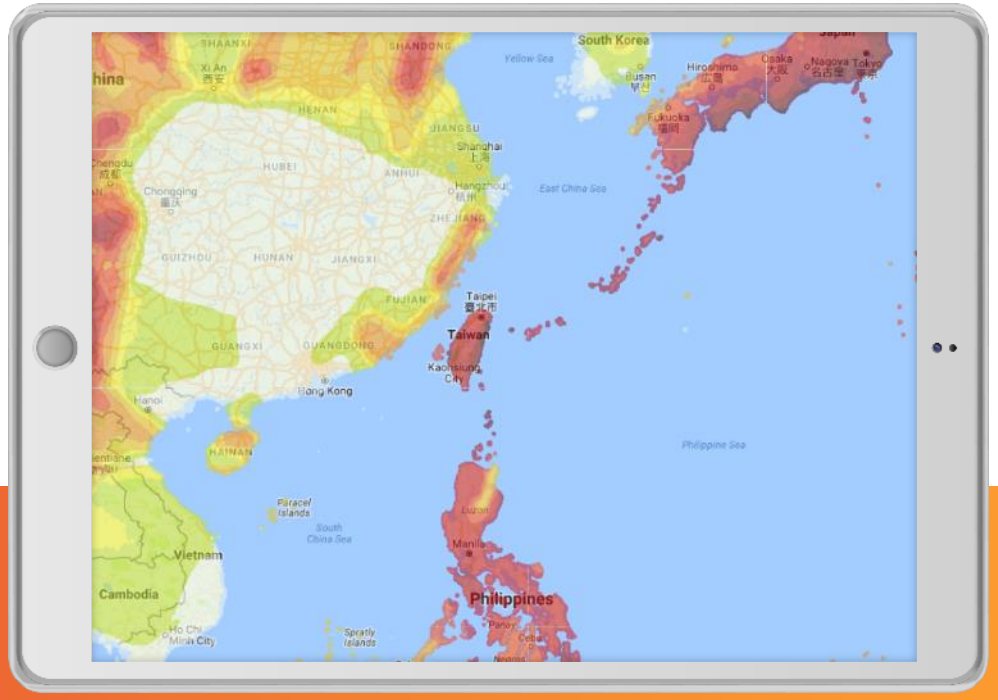
- Very limited experience with typhoon resilience of wind turbines
  - Typhoon Soudelor 2015, Taiwan
  - Typhoon Usagi 2013, Guangdong Province

Source: Swiss Re Geoportal

...and Shaky Grounds

Earthquake exposure





PSA 0.3s [g] - Return Period 475y

- Extreme (1.82-20)
- Very High (1.22-1.82)
- Very High (0.82-1.22)
- High (0.61-0.82)
- High (0.41-0.61)
- Significant (0.27-0.41)
- Moderate (0.18-0.27)
- Low (0.14-0.18)
- Low (0.09-0.14)
- Very Low (0.06-0.09)

- No Earthquake exposure in Northern Europe

- Very limited experience with earthquake resilience of wind turbines
  - California EQ 1986 , USA
  - Tsunami Fukushima 2011, Japan

Source: Swiss Re Geoportal

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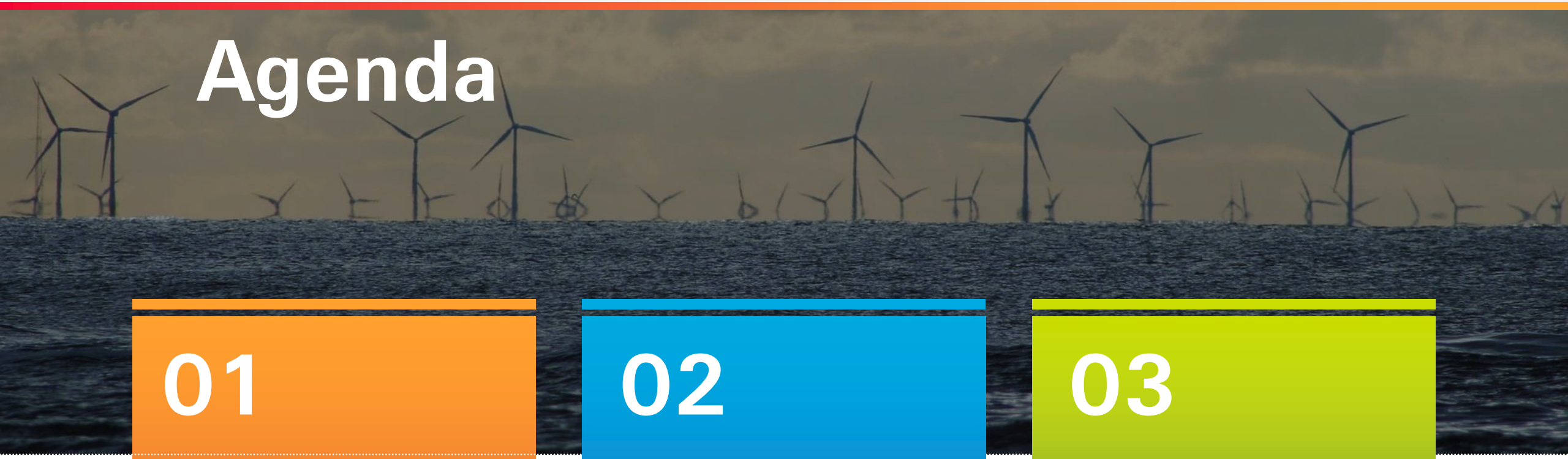

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How to Improve Your Risk

- Clear and well defined organization with experience
- Detailed Scope of Work for each operation
- Marine Warranty Surveyor (MWS)
- Kick Off Meeting – Manage Expectation
- Monitoring
- Contingency Plans
- Claims Protocol

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How to Improve Your Risk.
Marine Warranty Surveyor (MWS)

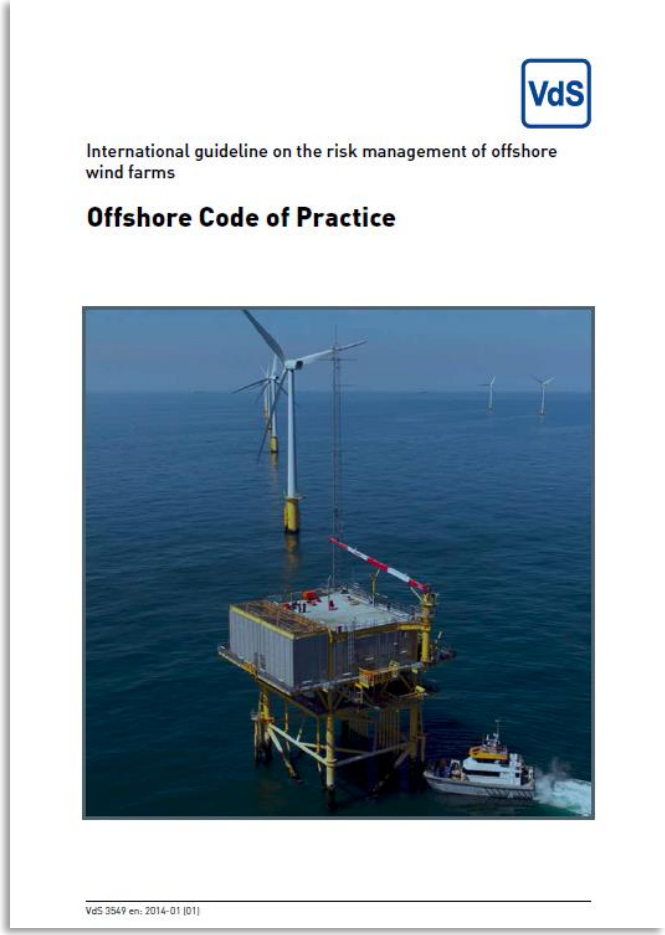
Scope of Work

- Meeting attendance (Feedback to project and insurer)
- Document Reviews (approval)
  All scope of works, routing, installations, whether criteria, contingency plans
- Vessel and Equipment Surveys (approval - report)
  Suitable for the work / fit for purpose
- On-Site surveillance (Certificate of Approval – approval)
  Secure safe operations according to procedures
- Contracted by the project
- Qualification

Information

Offshore Code of Practice. OCoP

- Considered a virtual offshore wind farm
- Identified 500+ risks:
  - Very high / high /medium / low
- Risk mitigation measures reviewed
- First edition published in Jan 1, 2014
- Issued in German, English and Chinese + Japanese translated by Swiss Re



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03

Lesson Learned From Actual Claims

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Over boarding. Cable Claim

Array Cable Installation Incident - DOL Jun 2015

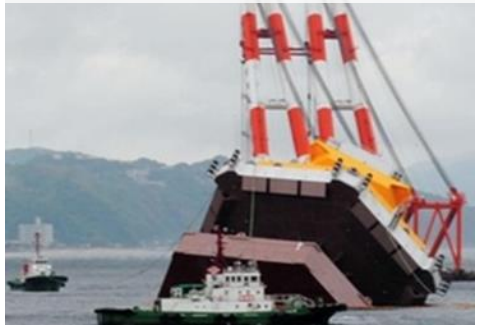
Bend on the
N05-N04 cable

Distressed jute
cable protetection

Cables

Tilting of foundation - DOL May 2016

Fukushima Hamakaze Spar Tilts Back into Position



Full Shape

Built in dockyard of Hitz

Carried to Susoto Port on 2 May

The floater lost control & leaned on 9 May

Floater recovered stability again on 14 May

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Thank you!

Q&A

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