



# Lessons Learned: Offshore Cable Installation

October 2010  
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# Cable Installation has caused a lot of challenges

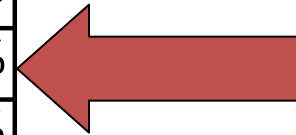
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**Will this be managed going forward?**

# Cable installation is a small part of project cost

## Average Offshore Wind Turbine Installation Costs - Split

Turbines & Sub Structures	73%
Cable	10%
Cable Installation	7%
Grid Connection	10%
	100%



Source: Global Marine Systems

# Cable installation is a small part of project cost

...but provides a surprisingly **large** part of project **problems**

“I was told by one major developer that **80%** of their problems in offshore installation, is the cables. Because it's just very difficult to do.”



It is widely recognised in the industry that **difficulties have been encountered with the export cables** for a number of offshore wind farm sites. Although some of these problems that have occurred may be attributed to the inherent uncertainties of marine operations, some can be traced back to the planning stage and **a lack of understanding of key issues.**

*Source: A Risk Based Approach to Cable Installation for Offshore Wind Farms: SE Tech*

# Cable installation issues have resulted in significant claims

## Major Offshore Insurable Losses

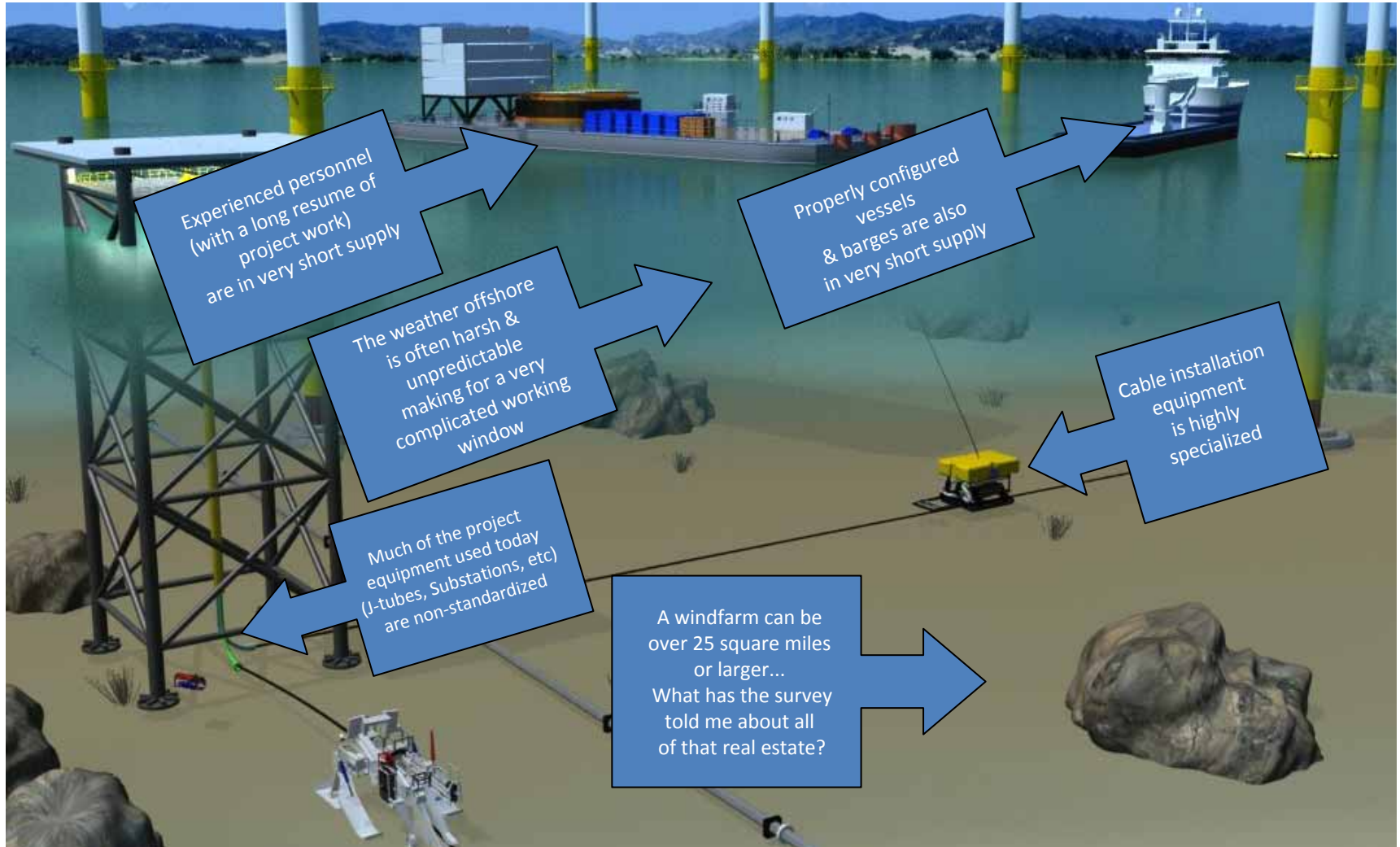
Project	Event	Estimated cost - PD only (EUR)
* Danish windfarm – CAR	Anchor drag on cable – contractor vessel	1m - 5m
* UK windfarm - CAR	Damage to cable caused by plough tipping	1m – 5m
* UK windfarm - CAR	Water damage to cable following capping	1m - 5m
UK windfarm - CAR	Transformer damage following testing	1m – 5m
* UK windfarm - CAR	Damage to cable during onshore laying	1m – 5m
Dutch windfarm – CAR	Blade damage during rock dumping	Less than 1m
Dutch windfarm – CAR	Storm damage to railings	1m – 5m
* Belgian windfarm - CAR	Foundations / J tube	20m +
Danish windfarm – Operating	Step-up transformer damage	1m – 5m
* Irish windfarm - Operating	Dragged anchor	1m – 5m
* UK windfarm - Operating	Cable fault	5m +

+ warranty losses (Horns Rev / Scroby etc)



Offshore Wind Conference

# Why Does this happen? Consider problem areas hidden in this Idyllic scene



# Don't let 7% of your project derail the other 93%...

- ❑ These days, due to Largely Preventable problems:
  - ❑ Most offshore renewables projects experience some serious problems with their cable installation
  - ❑ A significant part of our business comes through Remedial work...
- ❑ While that may be personally Good for us in the short-term, it is Bad for the industry long-term

**AVOID** allowing cable installation to becoming a Project bottleneck

# Together, let's learn from experience

Offshore wind may be relatively new, but cable has been installed under the water for well over 150 years

The Industry in Europe is over a decade old, with all of the lumps to prove it - they have experience

Many of the processes and project management issues are similar in both Telecommunications & Offshore Power



*Cable tank in C.S. Great Eastern*

*Source: Smithsonian Institution Libraries*

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**What lessons can we learn from recent industry experience?**

# Lesson: Vessel Selection is a big deal

NOT about installing one cable and then replication – a successful plan will accommodate all of the (100 or so cables) holistically

- ❑ Common issues/costs to consider re: cable installation vessel on an offshore wind project
- ❑ Availability
- ❑ Weather window
- ❑ Speed of installation
- ❑ Accommodation (60 people)
- ❑ Barge management system
- ❑ Anchor handlers
- ❑ Anchor patterns – innovative to manoeuvre around foundations to keep time to a minimum
- ❑ Transfer vessels and planning
- ❑ Insurance
- ❑ Contractor interface (foundation, j-tube design – vessel coordination)
- ❑ Communications (v-sat or similar to transmit large amounts of data on a daily basis)
- ❑ Overall project logistics
- ❑ Turntable
- ❑ Manning strategy



# Lesson: Cable Planning areas requiring detail

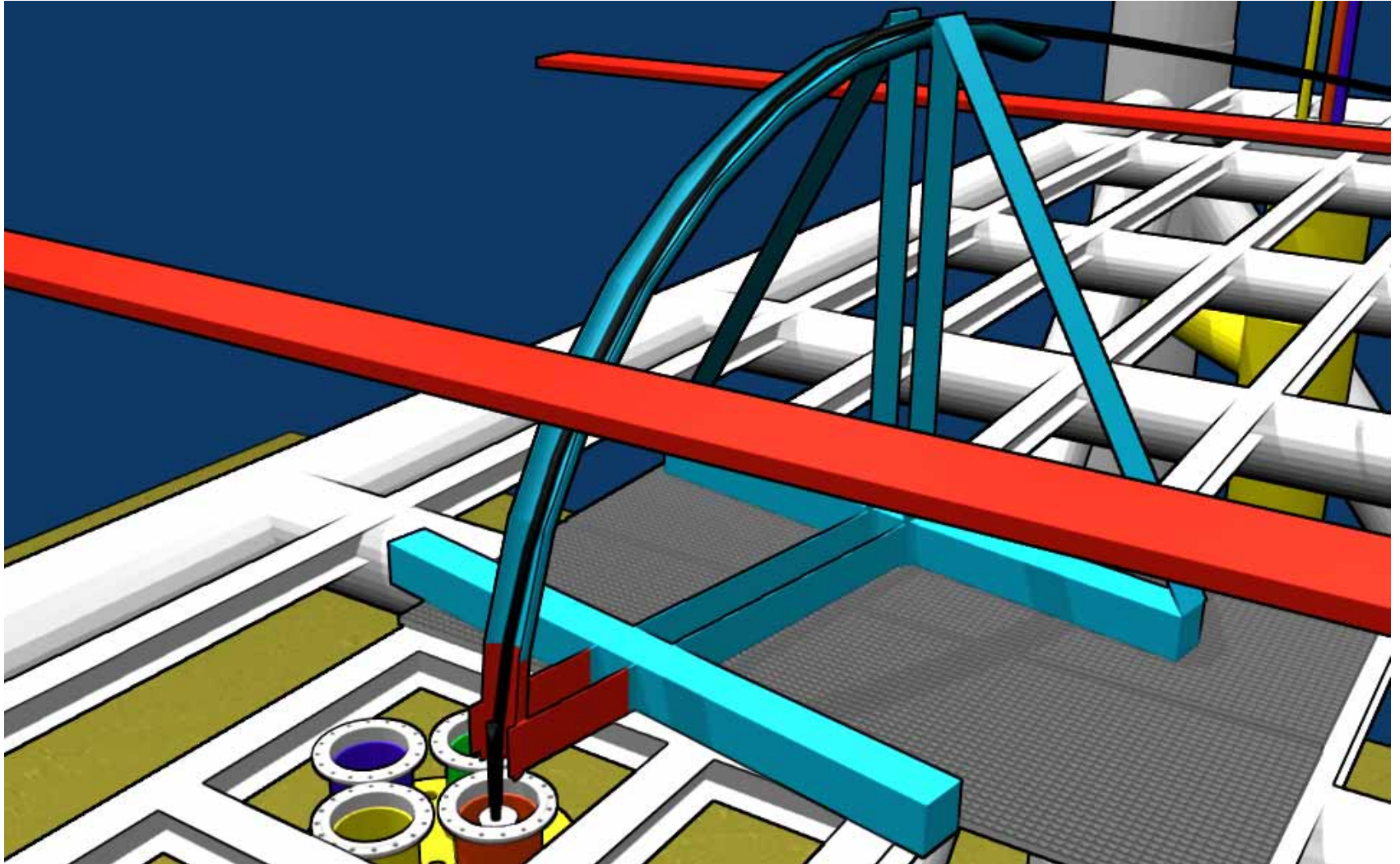
## Know Areas

- Route Survey
- Route Planning
- Engineering Detail Turbine
- Permitting
- Engineering at Substation
- Cable Selection
- Vessel Scheduling
- Engineering at Power Grid
- Vessel Selection
- Engineering at Interconnect





# Preferred Method: 3D cable installation modeling



# Lesson: Once Installation begins, be flexible & prepared for the unexpected

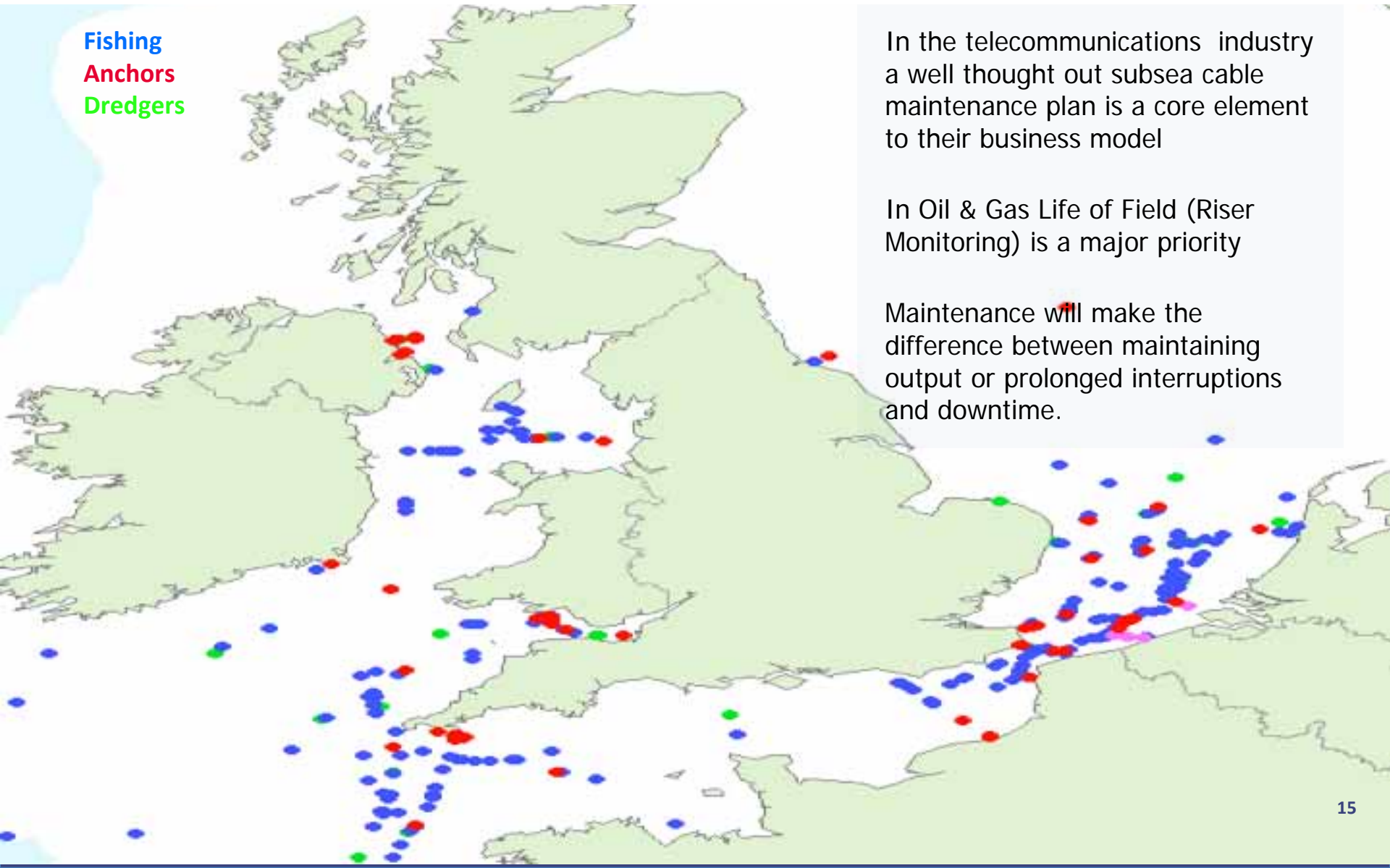
A good installation project team will have planned for the following:

- ❑ Survey Issues
- ❑ Weather delays
- ❑ Equipment issues
- ❑ Cable issues
- ❑ Cable burial
- ❑ Contingencies
- ❑ Management of change
- ❑ Delays by preceding suppliers
- ❑ Site inspection
- ❑ Approval processes
- ❑ Permitting issues



# Lesson: Once operational what is the Maintenance Plan?

Fishing  
Anchors  
Dredgers



In the telecommunications industry a well thought out subsea cable maintenance plan is a core element to their business model

In Oil & Gas Life of Field (Riser Monitoring) is a major priority

Maintenance will make the difference between maintaining output or prolonged interruptions and downtime.

# Lesson: Maintenance: What is the plan?

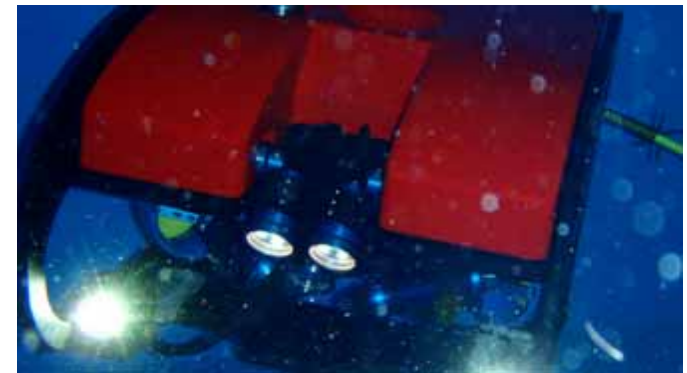
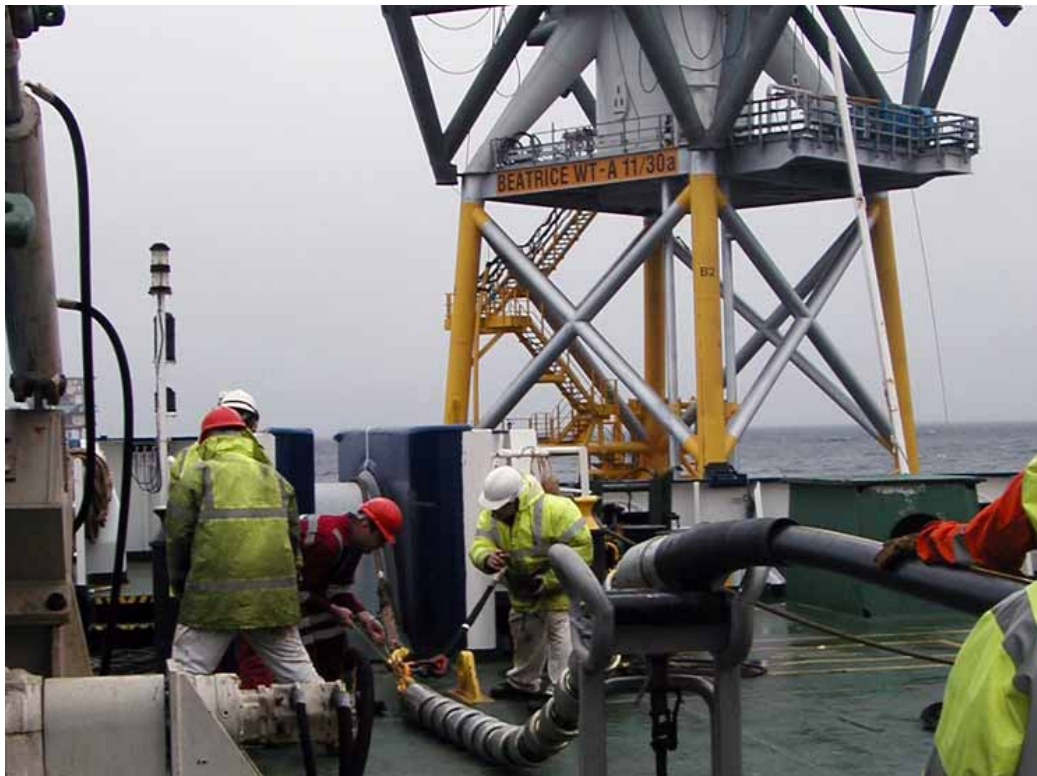
- ❑ Most offshore wind farms are too new to have proven maintenance models in place
- ❑ Maintenance is costly, some type of group arrangement with groups of wind farms in a region should be considered
  - ❑ Cable Monitoring & Integrity
  - ❑ Spare Cable Availability
  - ❑ Spare Joint Availability
  - ❑ Cable Re-laying
  - ❑ Jointing/Splicing Expertise
  - ❑ Vessel Availability
  - ❑ Personnel Transport



# Lesson: Offshore Wind is Too Expensive!

We must collectively look for ways to improve installation quality & drive down costs.  
All of our projects & business are interdependent.

□ As we learn to work together we will find plenty of areas where we can improve overall efficiencies and control costs



# Summary

## Keep cable installation from becoming a bottleneck on your project

Lets learn what we can from industry experience thus far; for example...

- ❑ Selecting the correct installation vessel is a big deal
- ❑ Discovering cable problems on site is expensive, try to avoid it
- ❑ Once Installation begins, be flexible and prepared for the unexpected
- ❑ Once operational what is the maintenance plan?
- ❑ We must collectively look for ways to improve installation quality & drive down overall industry costs

**QUESTIONS?**



**Thank You**