Downtime Assessment for Facilities Offshore of Ireland

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Introduction

To exploit the offshore oil and gas reserves off the west coast of Ireland, the offshore industry must have confidence that its facilities, particularly ship-shaped facilities in deep water, can operate safely. Wave climate statistics have to be accurately assessed, especially for the likelihood of extreme water crest elevations and also the distribution of weather windows. These impact directly on the assessment of facilities' downtime periods. This proposal has arisen from discussions with Providence Resources Ltd, and will build on the findings of a previous PIP Report, "Cost Effective Field Development Study for Atlantic-Ireland Basins", Challenge Energy (2009)[1] which emphasised the need for facilities downtime analysis. The project is funded by the Petroleum Infrastructure Programme

Aims & Objectives

The aim is to develop a validated methodology for the assessment of facilities downtime, applicable to oil and gas fields Offshore Ireland.

Objectives are:

-To collate, archive, and interpret existing wave data from buoys in the Atlantic to the west of Ireland in terms of event statistics.

-To undertake physical wave model tests creating long simulations of irregular waves from which extreme events can be extracted, in order to validate the theory and to investigate facility response.

-To develop a wave climate model of the North Atlantic including regions overlapping oil and gas fields discovered off the west of Ireland.

-To determine parameters and limits by which facilities downtime can be assessed.

-To develop risk assessment tools.

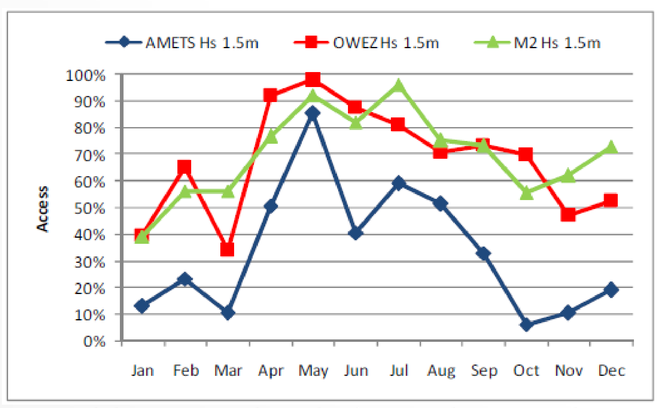
Benefits

The offshore oil and gas industry would gain valuable insight into the expected temporal changes to sea states and facility responses over different time windows, allowing downtime periods to be predicted. The work would lead to improved confidence in the operability of maritime facilities in the deep water Atlantic, west of Ireland. It would also be possible to make rational decisions as to what levels of risk are tolerable to or affordable for high value maritime assets by integrating models for wave environment, system response, failure characteristics and consequences. The outputs will also contribute to the design methodology for maritime facilities Offshore Ireland. A coherent database of validated wave data would also result from this work.

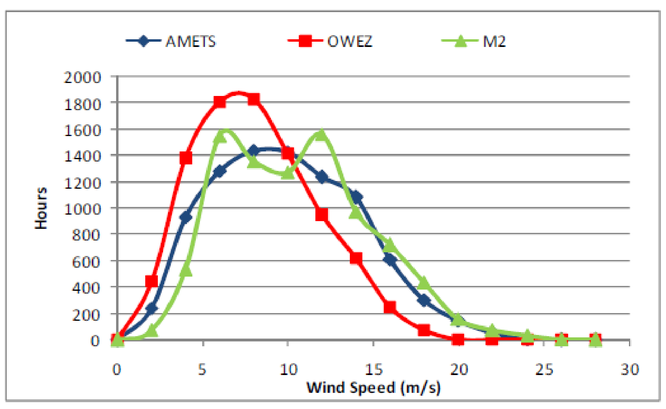
M Buoy and K Buoy locations around Ireland with AMETS inset

Data

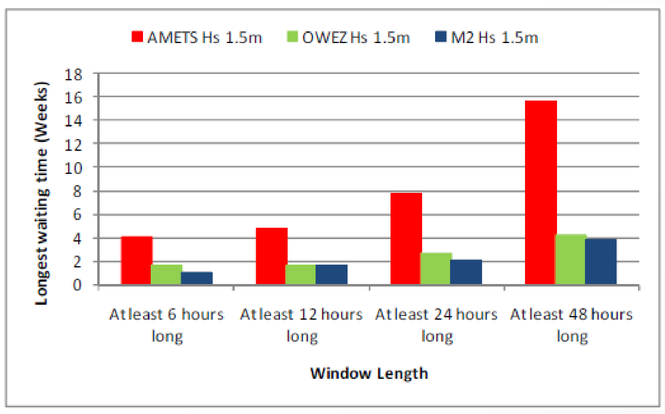
The Fugro metocean study (Fugro GEOS, 2001)[2] used data up to 1999 from two of the K Buoys around Ireland. UCC has access to longer time series until 2008 from the K Buoys. Data is also available from 2003 supplied by the Marine Institute M Buoy Data network, part of which overlaps the K Buoy data and is useful for validation purposes. The new M Buoys however show the extreme and directional data. There is also access to data from the newly installed wave measurement system at the Wave Energy Test Site in Belmullet since 2010, at 50m and 100m depths. Taken overall, we have a high quality, long duration data set for evaluation purposes. We also have access to the SWAN North Atlantic model outputs produced operationally by the Marine Institute since 2009.



Monthly access levels for and access limit of Hs 1.5m at all three locations[3]



Wind Speed Frequency at AMETS, OWEZ and M2[3]



Longest waiting periods for windows using an access limit of Hs 1.5 m at all three locations[3]

NDBC 3 m Discus Buoy

References

[1] Challenge Energy (2009) PIP report, *Cost Effective Field Development Study for Atlantic-Ireland Basins*

[2] Fugro GEOS (2001), West of Ireland Descriptive Regional Climatology, Marine Environmental Desktop Study, Rockall Studies Group / Porcupine Studies Group (Petroleum Infrastructure Programme: *West of Ireland Descriptive Regional Climatology, Fugro GEOS Reference C50090/2054/F0* *

[3] M. O'Connor, D. Bourke, T. Curtin, T. Lewis and G. Dalton. (2014) *Weather windows analysis incorporating wave height, wave period, wind speed and tidal current with relevance to deployment and maintenance of marine renewables*

* Publication is not a public document

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