

The use of probabilistic forecasts to minimise weather downtime

Introduction

One of the most difficult jobs in the mobilisation of critical resources in the renewables industry is planning ahead for what are often referred to as medium range weather impacted events, which can result in unwelcome downtime due to weather. However, due to the volatile and chaotic nature of the atmosphere, there are a number of uncertainties associated with medium range weather forecasting or forecasts for typically between 5 and 15 days in advance. Nevertheless, these uncertainties can be reduced and thus forecast accuracy increased by implementing probabilistic techniques.

Probability weather forecasting specifies how *likely* a defined weather event is to occur on a particular occasion and represents that probability as a percentage. A probability of 10% means that the forecast event will occur 10 times out of 100.

Planning for Weather Related Event

When planning for weather related events, Project Manager's will typically set operational thresholds for a process and then determine the likelihood of these thresholds being breached. Taking into account such factors as individual attitude to risk, the cost variables involved in mobilising a date that far in advance, the losses involved in missing that deadline and having to wait until favourable conditions occur.

However, consultancy with a meteorologist to define the operational thresholds helps to define the probabilities of the weather event occurring and helps to minimise the degree of uncertainty around the weather impact on the operation. Regardless of the probability of the event however, there still exists a degree of uncertainty reflected in the forecast. To further reduce this degree of uncertainty, meteorologists use a system called ensemble forecasting.

Ensemble Prediction System (EPS) Forecasting

A traditional deterministic weather forecast runs a forecast model once, whereas, an ensemble weather forecast runs the model a number of times, with each run having a slightly different set of initial conditions, thus producing a representative sample of the possible future states of the atmosphere as well as the uncertainties in these predictions.

Probabilistic Ensemble Forecasting based on a precise location and pre-set thresholds has been proved to be an invaluable tool for planning for and reducing weather downtime. Evidence suggests that when probabilistic forecasting is used intelligently with deterministic forecasts the outcome is a more accurate forecast and thus an improvement in the bottom line. Whilst probabilistic forecasts still equate to a degree of missed opportunities they also allow for operations to be more prepared and ready to take advantage of a greater number of possible weather windows, thus reducing any downtime.

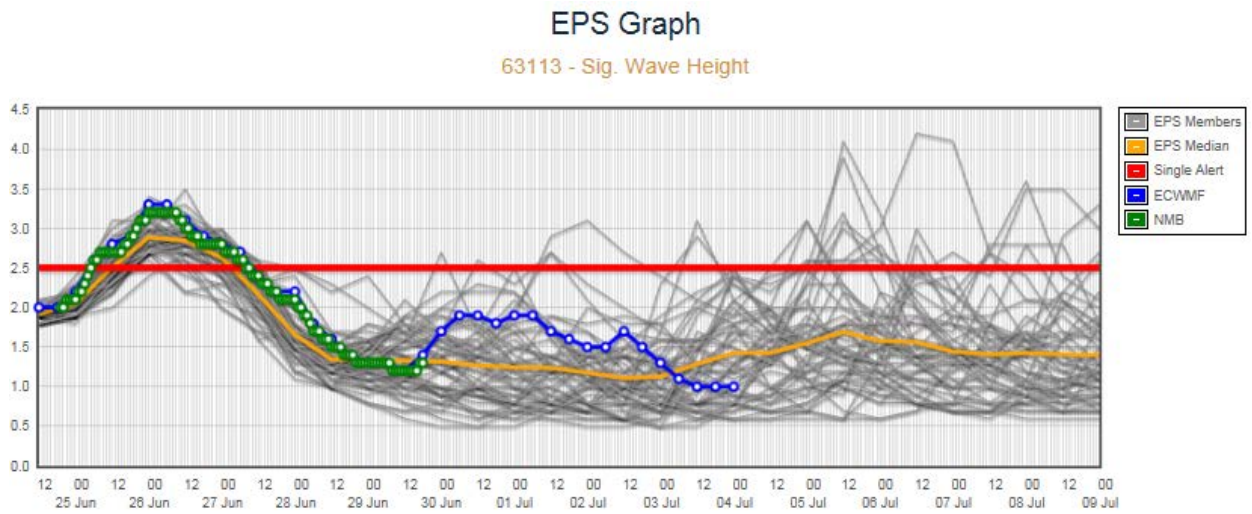


Figure 1: EPS Graph illustrating various national weather service medium range forecast models demonstrating the likelihood of significant wave height occurring at a predefined threshold level.

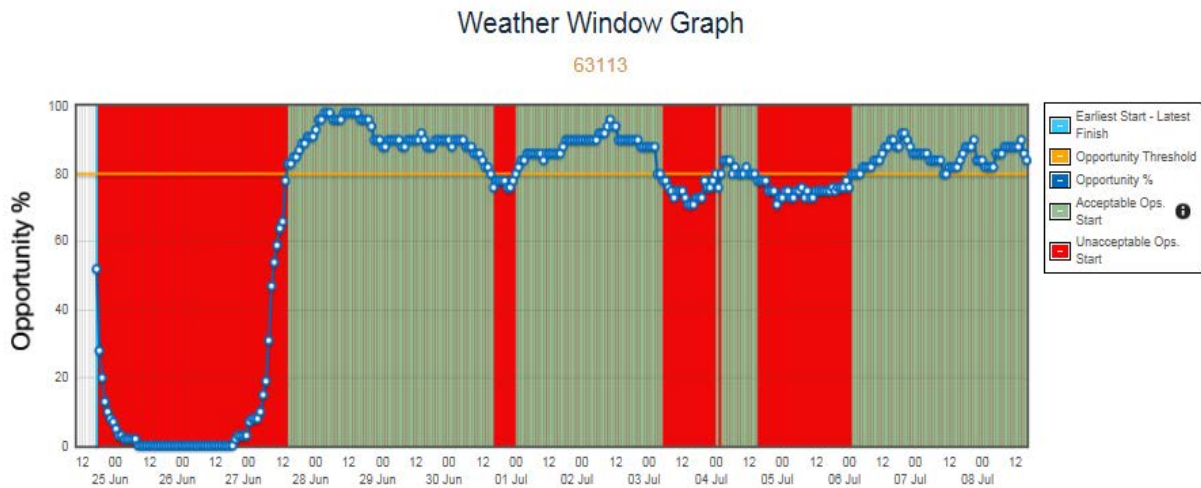


Figure 2: The same information as displayed on the EPS Graph in figure 1 reflected as weather windows. The red column illustrates shut down conditions and the green columns illustrate weather windows for the given thresholds. The probability of the events occurring is set at 80% along the left side of the graph. Illustration from WeatherWindowPlanner – a high resolution medium range metocean planning tool from MeteoGroup.