



## EPS Long Range Forecast Guide

# How It's Made

In the offshore industry, timely, accurate, and actionable weather data is critical. Around the world, metocean conditions affect all areas of operation. Reliable and precise forecasts are essential to safely maximizing operating thresholds. Extended forecasts — those providing outlooks 15 or more days out — deliver valuable insight that supports strategic planning and risk management decisions.



## Introduction

Around the world, offshore companies face a constant challenge: to do more with less. For many, the priority is to optimize operations without compromising safety. Some are exploring how long-range weather forecasts can help minimize expensive weather-related downtime.

For organizations looking to improve cost efficiencies, long-range forecasts can help unlock new opportunities to reduce costs and optimize decision-making processes. Long-range forecasts aid planning and decision making by illustrating the forecast's confidence for a longer period. It also supports risk management and can be customized to meet your specifically requested parameters.

## Background to EPS forecasts

Traditional weather forecasts typically assess anticipated conditions between up to 10 and 14 days into the future. Looking beyond this time frame is considered long-range or long-term, which can include forecasts for up to six months out.

It's not possible to predict either wind speed or wave height for a given day three weeks ahead, let alone three months out. Therefore, long-term forecasting is "probabilistic" with a confidence measure that is included in the forecast, such as low, moderate, or high. In other words, it's all about "forecasts of opportunity."

When the forecast has a high probability of occurring and also high confidence, you can take action based on this forecast with reduced risk. If the forecast confidence is low and the outcomes are less specific, it's more difficult to use it as a basis for confident decision making. However, even low confidence, less precise forecasts can be useful.

## Abbreviations to note

EPS — Ensemble prediction system

ECMWF — European Centre for Medium-range Weather Forecasts

UKMO — UK Met Office

NCEP — National Centers for Environmental Prediction



The Ensemble Prediction System (EPS) Long Range Forecast usually contains three figures with wind and waves (precipitation, swells, and cloud are optional) and shows a forecast for the coming 15 days. Figure 1 shows the ensemble prediction from the ECMWF-model (the gray area), the operational outcome from ECMWF (the red line), UKMO (the yellow line), NCEP (the blue line), and our model Meteo (black line). The Meteo forecast is a combination of several models, filtered for nearshore effects and containing the input of the meteorologist (black line in the graphs).

Complex mathematical equations that describe the physical processes in the atmosphere along with initial weather conditions are used to compute how conditions will most likely change in the atmosphere over the next weeks. EPS forecasts are very helpful for planning and decision making, especially when they are used alongside regular deterministic forecasts. Forecast uncertainty increases

with the duration of the forecast. That is why the EPS forecasts help you to determine the forecast confidence level over a given time period. The EPS Long Range Forecast is an ensemble of 50 separate model runs from the ECMWF model compared with their operational forecast. These 50 model runs all start with slightly different initial weather conditions to help analyze the effect of different starting values.

The red line shows the operational run of the ECMWF-model. The gray area shows 80% of the 50 runs of the ECMWF-model. The highest five and lowest five runs (20%) are not included in the gray area. This gray area will normally plume wider with increasing forecast time. The wider the plume (vertical range) of the gray area, the lower the forecast confidence level.

The black line (Meteo) shows the best possible forecast for the location. This Meteo forecast is a combination of several models.

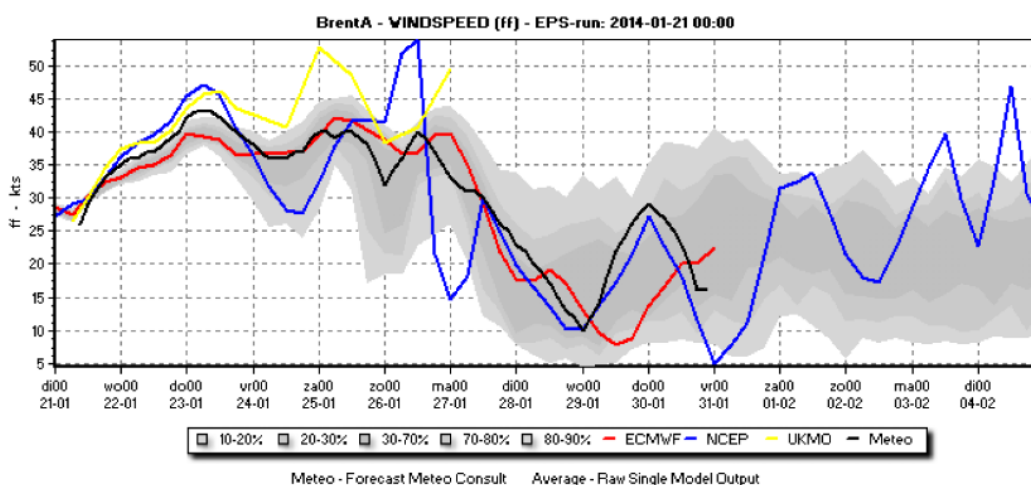


Figure 1 – Wind speed in knots

In addition, near shore effects are included, as well as input of the meteorologists in the weather room. The blue line is the operational run from NCEP and the yellow line is the operational run from UKMO.

### Example of EPS long range forecasts

The forecast offers an optional synoptic overview written by the meteorologist on duty and a number of EPS graphs. Available elements include:

- Wind speed\*
- Wind direction\*
- Significant wave height\*
- Swell height
- Sea/swell period
- Clouds
- Precipitation

The elements marked with an asterisk (\*) are default. The other elements are only available by request and with a maximum of six total elements.

Figure 1, shown previously, displays the 10-meter wind speed (six-hourly) in knots for the next 15 days. At the top of the figure is the name of the location and the date and time of the EPS run.

Figure 2 shows the six-hourly wind direction in degrees (dd), where 180dd = south, Odd = north, 90dd = east, 270 dd = west. Wind direction simply means the direction that the wind is coming from. The smaller the range of the lines at a given time means the higher the confidence level is regarding the wind direction for that given moment.

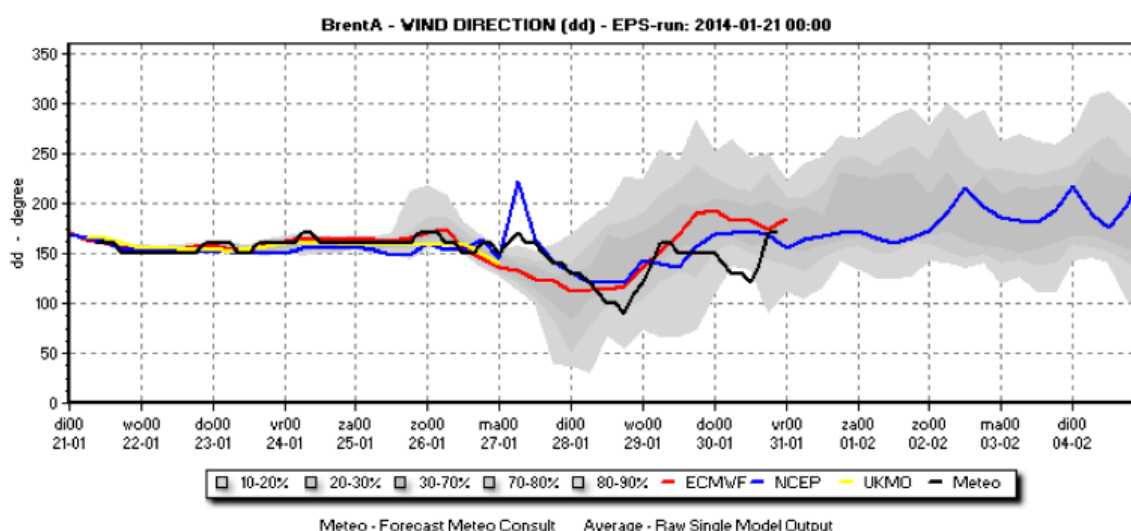


Figure 2 – Wind direction in degrees

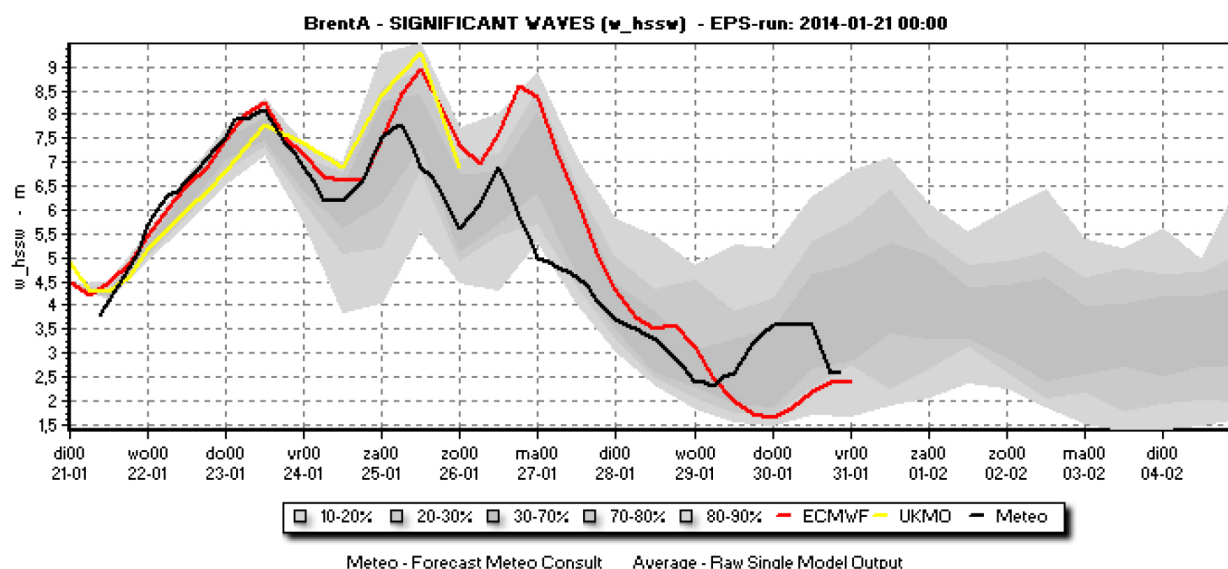


Figure 3 – Significant wave height in meters

Figure 3 shows the significant wave height (also referred to as  $H_s$ ) in meters. This is the mean height (crest to trough) of the highest third part of all waves. It is equivalent to four times the square root of the area under the wave energy spectrum graph, which is usually referred to as the mean spectral wave height  $H_{m0}$ .

### Using EPS long range forecasts

EPS Long Range Forecasts are particularly useful for planning and risk management. They provide additional value alongside a regular deterministic forecast. For example, the deterministic forecast will state the wind speed and direction for a given time, e.g. 270 degrees and 23 knots at 12UTC on 22 January.

However, the tabular forecast does not give you a good sense of the confidence that the winds will remain below your limit, 25 knots

for example, when you are planning your operations. That is where the EPS forecast graphs come in. By referring to the graphs, you can see the probability that the winds will stay below your limit of 25 knots, which is immensely helpful in supporting your decisions.

### In summary

- EPS Long Range Forecasts consist of graphs for your specifically requested parameters.
- EPS Long Range Forecasts aid planning and decision making by illustrating the confidence of the forecast for a longer period.
- EPS Long Range Forecasts, paired with regular deterministic forecasts, provide the ultimate in decision-making power.
- These forecasts can help you spot long-term trends and can assist you in operational planning and risk management activities.