



# WeatherFactor API

## Confidently select and bid on profitable voyages

Bidding cargo is a risky business as it is difficult for traders to predict the weather's impact on future voyage costs. Our WeatherFactor API can help.

### **An example**

There's a trade opportunity for a Supramax bulk carrier to sail at 13 knots set speed, from the Gulf of Mexico to Gibraltar in laden conditions starting on January 15. The trader plans to bid using a commercial platform, like VESON or Q88.

Where should the trader set the freight rate to maximize the chances of winning the bid while ensuring the voyage is profitable?

## Calculating the numbers

Let's walk through the decision-making process. We'll assume the vessel is hired on a time charter contract where the charterer pays a fixed daily rate plus voyage costs, including fuel and port charges. For reference, we've included common calculations below.

|                        |   |                  |   |              |   |                 |   |                   |   |              |
|------------------------|---|------------------|---|--------------|---|-----------------|---|-------------------|---|--------------|
| <b>Voyage revenue</b>  | = | Cargo weight     | × | Freight rate |   |                 |   |                   |   |              |
| <b>Voyage cost</b>     | = | Fuel consumption | × | Fuel price   | + | Voyage duration | × | Ship charter rate | + | Port charges |
| <b>Expected profit</b> | = | Voyage revenue   | - | Voyage costs |   |                 |   |                   |   |              |

To determine freight rate and profit margin — and bid more competitively — the trader must accurately estimate the voyage duration and required fuel weeks in advance. Typically, traders rely on personal experience as many organizations lack the scientific data and tools to correctly analyze how the weather will likely impact the voyage.

## WeatherFactor API

WeatherFactor API calculates the duration and fuel consumption of future voyages. It simulates the trader's requested voyage using a vessel digital twin model and 20 years of hindcast weather data. The multiple outcomes include defined confidence intervals, as shown below. Depending on the amount of risk the trader is willing to take, they can use the corresponding calculation to determine voyage costs with greater confidence.

| Mean fuel | Std fuel | 5% fuel | 25% fuel | 75% fuel | 95% fuel | Mean duration | Std duration | 5% duration | 25% duration | 75% duration | 95% duration |
|-----------|----------|---------|----------|----------|----------|---------------|--------------|-------------|--------------|--------------|--------------|
| 577       | 16.7     | 551     | 563      | 591      | 601      | 36.9          | 0.8          | 35.6        | 36.4         | 37.5         | 38.0         |

WeatherFactor integrates with commercial platforms for a more seamless freight rate calculation workflow. When the trader makes a WeatherFactor request, it calculates and returns the data within seconds.

## Securing profitable bids

When bidding for cargo, the trader must determine their freight rate based on market dynamics and voyage cost calculations. Below, we've outlined an example freight rate calculation for a future voyage from port A to port B. Here, the WeatherFactor API sample provides a 95% confidence interval using the table on the previous page as input. It offers the greatest certainty that the trader won't underestimate voyage costs.

This freight rate calculation includes the following assumptions:

|                           |               |
|---------------------------|---------------|
| Cargo weight              | 52,760 tonnes |
| Daily charter rate        | \$22,500      |
| Bunker (fuel) price/tonne | \$500         |
| Fixed port charges        | \$50,000      |

Based on these assumptions and WeatherFactor API's 95% confidence interval results, the trader can calculate a freight rate that ensures a profitable voyage. Per the sample below, a freight rate greater than 22.85 USD/tonne cargo will ensure the future voyage is profitable.

The calculation is shown below:

Voyage revenue  $-$  Voyage cost  $>$  0

52,760  $\times$  Freight rate  $-$  [ Fuel consumption  $\times$  500  $+$  Voyage duration  $\times$  22,500  $+$  50,000 ]  $>$  0

Freight rate  $>$  [ 601  $\times$  500  $+$  38  $\times$  22,500  $+$  50,000 ]  $\div$  52,760

Freight rate  $>$  22.85 USD/tonne cargo

## Conclusion

With our WeatherFactor API, traders can confidently make profitable cargo bids by ensuring proper freight rate calculations with our cutting-edge voyage simulation technology. Its vessel digital twin models and 20 years of hindcast weather data factor in the impact of environmental conditions in voyage cost calculations, including duration, fuel consumption, and emissions. With this information, traders can make more competitive bids to improve their chances of winning the job while also protecting their profit margins.

Source: Nilsson, J. & Nilsson, M. (2021). Estimating Weather Margin Seasonality in Shipping Using Machine Learning. Masters thesis, NHH.