



How to Reduce Fuel Consumption with Weather Routing

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A modern approach to weather routing

A modern approach to weather routing can help companies reduce fuel consumption and its related financial and environmental costs. Sailing the shortest distance between two ports isn't always the fastest or most fuel-efficient.

Instead, forward-thinking charterers, owners, and vessel managers use accurate weather data to optimize their routes based on the voyage's KPIs, fuel consumption, ETAs, and other charter-party conditions, while ensuring crew and cargo safety.

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Today, weather routing not only helps vessels avoid adverse conditions; it also helps ensure each ship runs at its peak performance. From pre-voyage planning to compliance and beyond, weather routing supports sustainable, cost-effective shipping and can reduce fuel consumption.

Charterers, shipping companies, and ship owners can elect to use weather data, both onboard and onshore.

Vital to all of this is accurate weather data, underpinned by maritime expertise. All forecasts start with numerical weather prediction model data that passes a complex in-house, post-processing procedure. Combining knowledge from nautical meteorologists and ex-seafarers means complexities, such as currents, straits controlled by pirates, and common obstacles are factored in, along with all route advice.

Weather routing onboard

Modern weather routing allows captains to navigate with reduced fuel consumption and emissions. This is made possible by calculating and recalculating the most efficient route throughout the voyage. It ensures the latest weather and sea conditions are always taken into account so that the planned route remains optimal.

Route planning is complicated. Captains must manage safety, efficiency, fuel consumption, ETAs, speed ranges, and additional constraints like trim and seakeeping. Onboard tools can support greater decision-making confidence by helping them to calculate the route that best meets their KPIs.

Onboard routing systems

enable the captain to calculate the optimum route without compromising safety.

Onshore monitoring systems

use aggregated vessel data to provide fleet operators, operations managers, and performance managers with performance analysis.

Onshore dedicated-routing teams

can also provide optimal route guidance for vessels thanks to the expertise of experienced master mariners.

"Weather routing is a vital tool for us to ensure maximum safety for our crews, cargo, and vessels. It also helps us to save time, money, and of course, fuel."

Karel van Zijl
Spliethoff Group

"Ten years ago, a route analyst was not yet such a familiar concept. Nowadays, it is not only important to avoid rough conditions, but above all, to get the performance of the ships as high as possible. A lot of customers want to know how their ship performs, fuel and speed-based."

Eefje Verhoeven
Senior route analyst

Technological advancements allow more data onboard than ever before. The variable speed algorithm can help set the appropriate speed to arrive on time, avoiding serious weather. Other tools, such as voyage trim optimization, specifically help reduce fuel consumption and increase fleet utilization.

Weather routing onshore

A lot can change after a vessel leaves port. While the most efficient route can be planned, the optimal route changes with the weather. It's why charterers, owners, and vessel managers need detailed weather information to adapt their routes during the passage and support post-voyage analysis.

Adverse weather alerts provide valuable notification of changing conditions along a planned route. This insight supports quick plotting of an alternative route — before it affects vessel performance or becomes a safety risk.

By recalculating the optimal route using the latest weather forecasts, onshore teams can support captains, helping them reduce travel time, fuel, and emissions.

Three benefits of saving fuel through weather routing

1. Reduced fuel consumption = reduced costs

Optimal weather routing can offer fuel savings between 2-5%, depending on the type of vessel, the season, and the conditions. With fuel savings of 5% and a bunker price of \$5,000/ton, a ship burning 50 tons of fuel per day could see savings of more than \$8,500 on fuel costs over a seven-day transit.

2. Reduced fuel consumption = reduced emissions

Studies show the shipping industry can reduce emissions by up to 55% through measures that reduce fuel consumption. Specific techniques like speed reduction and weather routing can reduce emissions by 17-34% and 1-4%, respectively — saving up to €280 per ton.

Reducing emissions by reducing speed does have limitations because time is always a key consideration in shipping. However, full knowledge of conditions can allow a vessel to slow down. For example, if adverse weather at a terminal means the vessel cannot handle the cargo, relaying this information to the captain means they can reduce the speed. Otherwise, the vessel must wait outside the port until the weather improves. The same can also apply if the lay days and canceling clause in a charter party allow.

3. Reduced fuel consumption doesn't compromise efficiency

Weather routing ensures that the benefits of reduced fuel consumption and cost savings do not compromise efficiency. Taking a voyage's KPIs into consideration, the optimal route means you can reduce fuel consumption without missing ETAs, breaking charter party agreements, or impacting safety.

The risks of inaccurate weather routing information on fuel consumption

Optimized routing is the art and science of developing the best route for a ship based on its characteristics, cargo requirements, and the most current weather forecasts.

There are many variables, which makes it hard to compare two journeys. However, the choice of route can make a massive difference to a voyage's profitability. For example, when masters are passing Skagerrak on their way to the U.S. East Coast, they will typically ask for advice on the next part of the route. They can either pass just above the British Isles or sail through the English Channel. In theory, a master can knock 35 hours off the journey if they don't go through the English Channel. However, the weather can be worse on the alternate route, eliminating the time-savings. The best route will vary depending on conditions, which is why accurate weather data is essential.

The goal is not to avoid all adverse weather but rather to find the right balance. It's about minimizing transit times and fuel consumption without placing the crew and vessel at risk. Operational cost savings are increased by reducing transit times, fuel consumption, and cargo and hull damage.

For example, vessels not taking advantage of dynamic speed routing to increase efficiencies can end up navigating around bad weather rather than simply slowing down or speeding up to avoid it. This approach increases the distance traveled, fuel used, and, inevitably, emissions.

Learn more

To discover additional benefits and how you can add accurate weather optimized routing to your operations, please visit our solutions page: www.dtn.com/weather/shipping/

Inaccurate weather routing information can result in:

- Unoptimized routes and unnecessary fuel consumption
- Increased emissions from added fuel use
- Greater risk of not meeting the voyage's KPIs, including costs and ETAs, due to adverse weather