Wind First!

How wind-assisted ship propulsion is the zero-emission fuel for shipping's future

SEAS AT RISK

Executive Summary

Shipping currently contributes around 3% of global greenhouse gas (GHG) emissions, which is roughly the amount produced by a country the size of Germany, and it is growing. The International Maritime Organization (IMO) now has the opportunity to pave the way for change by prioritising energy efficiency and providing a framework to enable the shipping industry to become climate-neutral – and the solution is wind propulsion. Technologies harnessing wind power, from modern sails to rotor systems, are already available and ready to be deployed, offering an immediate way to cut emissions and reduce reliance on fossil fuels.

The 'Wind First!' study investigates the integration of wind-assisted propulsion (WASP) with statistical weather routing with the aim of reducing ships' fuel consumption and supporting the IMO's GHG emissions strategy to reach full decarbonisation by 2050, with targets along the way: 30% by 2030 and 80% by 2040. This can be done by optimising routes and leveraging favourable winds for greater shipping efficiency and decarbonisation.

This report presents concrete findings and recommendations to ensure that shipping develops within planetary boundaries and to the benefit of people.

Adopting wind assisted propulsion – a true zero emission technology – can help drive the IMO to its zero or near-zero energy goal. Retrofitting existing vessels with two to four suction sails can deliver energy savings of up to two to twelve percent, which will be critical to meet the IMO's 2030 zero to near zero energy target. Wind propulsion is ready and available now.

Wind assisted propulsion can deliver one third of IMO's greenhouse gas emissions reduction target for 2030. Retrofitting vessels offers a proven and immediate solution to reaching the IMO's target of a 30% reduction in emissions by 2030.

Wind Propulsion can save money. The 'Wind First!' report offers many different routes with different vessels, and each has been proven to be financially beneficial. An average round trip from Accra (Ghana) to Shanghai (China) can save up to 105,864 USD for a bulk carrier when retrofitted with 4 sails. That means a yearly saving of nearly half a million US dollars (493,500 USD) per vessel. It is clear that WASP is not only climate-friendly – it is also a smart financial move, freeing-up funds for other investments to complete the transition to decarbonisation.

The shipping sector must phase out fossil fuels and adopt and fund wind propulsion innovation

Strong regulation needs to be adopted and implemented by IMO Member States to clean up the shipping industry and support the transition to decarbonisation must be equitable and just.

It is clear that wind-assisted propulsion is not only climate-friendly but also a smart financial move.

The Carbon Index Indicator (CII)

The CII must be strengthened to drive real emission reductions:

- **Increase Post-2026 Reduction Factors** to CII reduction targets to align with the IMO's decarbonization goals

- **Improve data transparency and integrity:** Include the CII with the IMO Data Collection System (DCS), while making it more public to increase transparency, third-party verification, and public accessibility of emissions data

Global Fuel Standard (GFS)

Ensuring the uptake of truly sustainable marine fuels and incentivising true zero-emission technologies:

- **Adopt/retain a "well-to-wake" (WtW) methodology** which accounts for emissions from the production, transport, and use of fuels, offering a more comprehensive view and ensuring that alternative fuels are compared on a level playing field.

- **Provide a reward factor for wind assisted technology:** this would reward the use of WASP technologies by counting the energy saved from wind propulsion more favorably in the compliance calculation of the GFS. How does it work? The reward factor, a multiplier of 2 would mean that the energy generated and/or saved from WASP would be counted twice when calculating a ship's GHG intensity and fuel usage. This would effectively boost compliance with emissions reduction target. As a result this multiplier acts as an incentive for shipowners/operators to invest in WASP, which in return, accelerates its adoption and plays a critical role in scaling up the technology.

- **Recognise the full impact of fuel choices:** Ensure sustainability criteria respect land rights, food security, the environment, and human health.

Universal Levy

- Support the **adoption of a universal levy** for shipping of at least 150 USD

- Ensure that the revenue mechanism is built in a way that **redistributes the revenues equitably** – necessary to balance the economic impacts of the energy transition

- Ensure that a portion of the revenue is **allocated to funding the development of WASP**

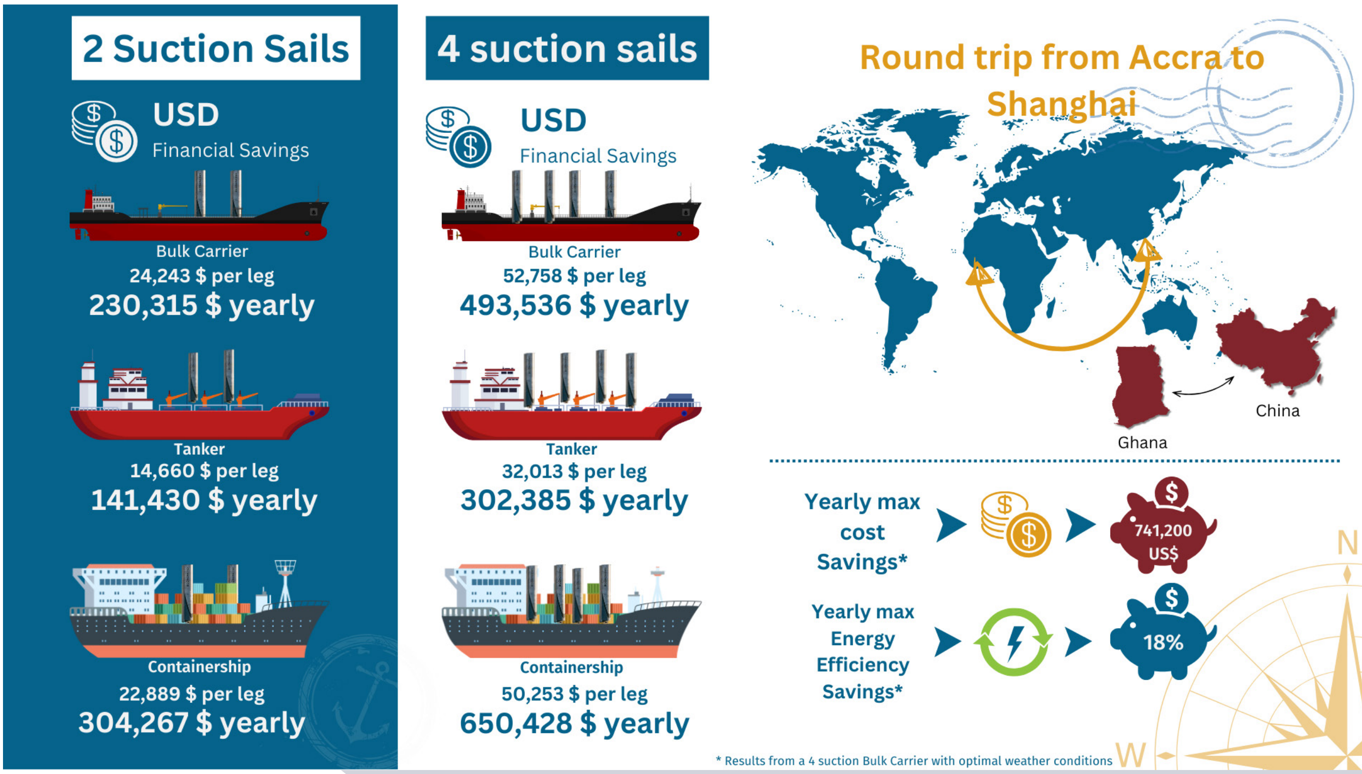
Main results

Case study of the Accra – Shanghai route.

On this route the modelled scenarios were based on three different types of vessels, a Panamax bulker (80,000 DWT), a MR Tanker (50,000 DWT), and a Post-Panamax (125,000 DWT and 14,000 TEU).

The study ran two options of wind assisted propulsion (WASP) per ship, one with 2 suction wings and one with four suction wings.

The results show **an annual maximum cost saving of up to 741,200 USD** with **an annual energy efficiency saving of up to 18%** when fitting four suction wings on a bulk carrier, with optimal weather conditions on route.



While containerships see the total greatest CO_2 reduction and money savings on this model, it is important to note that 30m suction sails on the deck of a containership, would in practice negatively affect the aerodynamics, or if raised on a stub mast could interfere with port operations. These interactions need to be further researched.

Conclusion

The Wind First! Study confirms that adopting wind-assisted propulsion - particularly suction wings – alongside optimised weather routing can significantly reduce greenhouse gas emissions and operational costs. Financial benefits include a lower carbon levy, reduced EU ETS, and improved energy efficiency ratings, leading to even more savings. The installation of WASP requires strategic navigation to leverage favourable weather routes, while meeting schedules and safety requirements.

Among vessel types, Panamax bulkers consistently achieve the highest fuel savings percentage. It is critical to understand that the results are done on current oil prices. General understanding is that fuel cost savings will quadruple over the period to ~2040 (when majority fuel needs to be e-fuel).

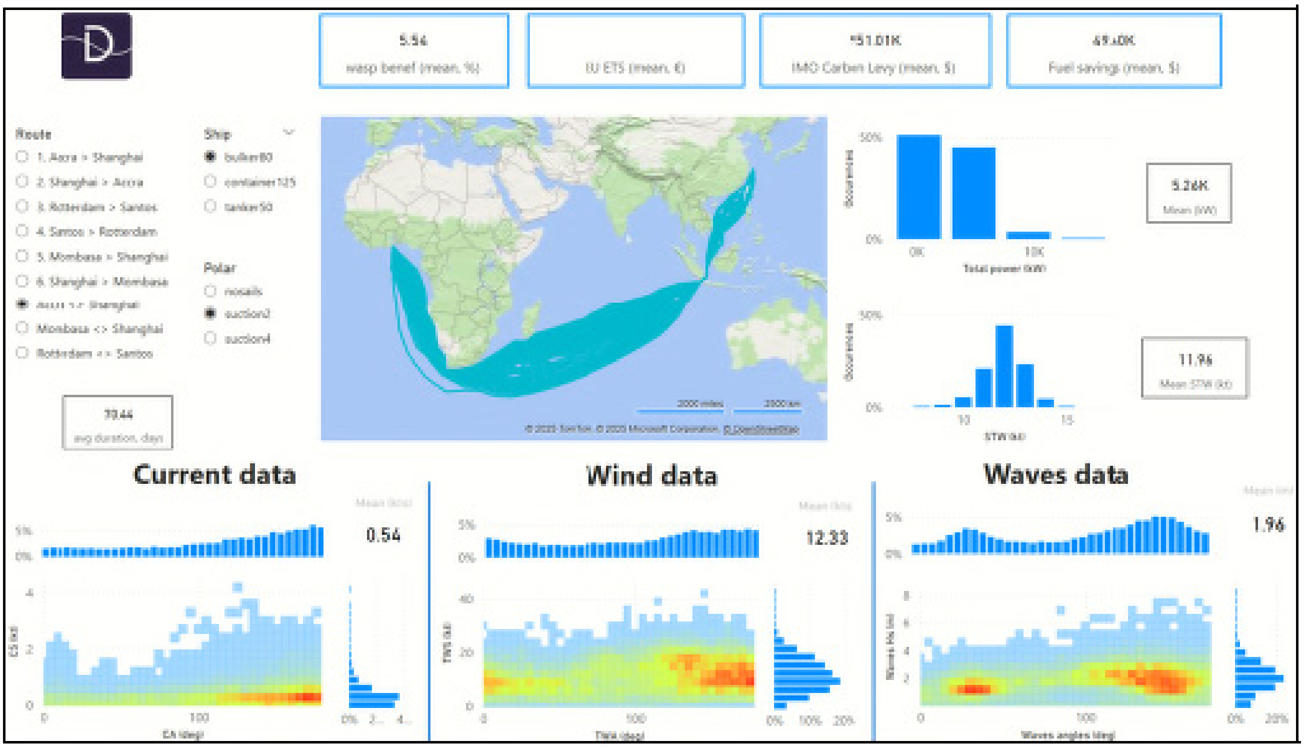
Installing four suction wings is generally more beneficial than two but shipowners must weigh fuel savings against capacity and investment costs.

Appendices

In this section, we summarise the main weather routing results for each route, vessel, and WASP system.

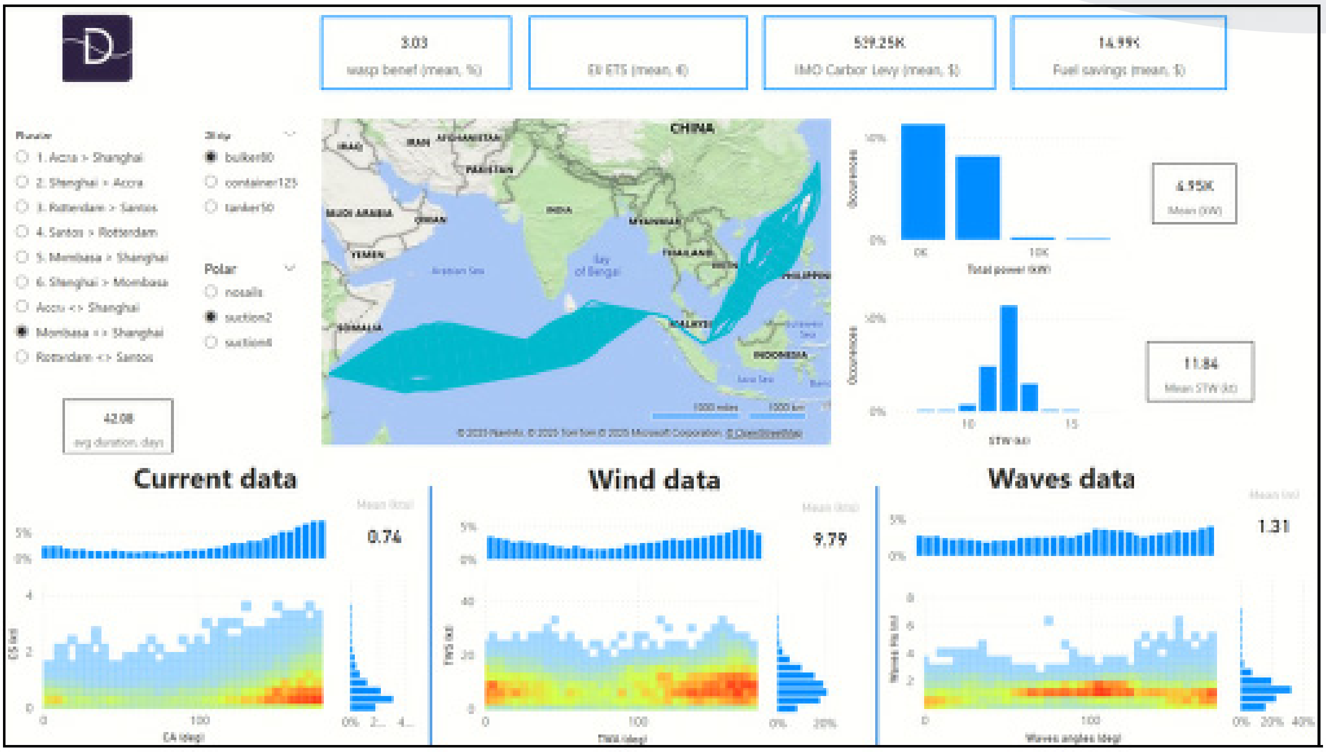
Bulker with 2 WASPs

Weather routing on Accra <> Shanghai

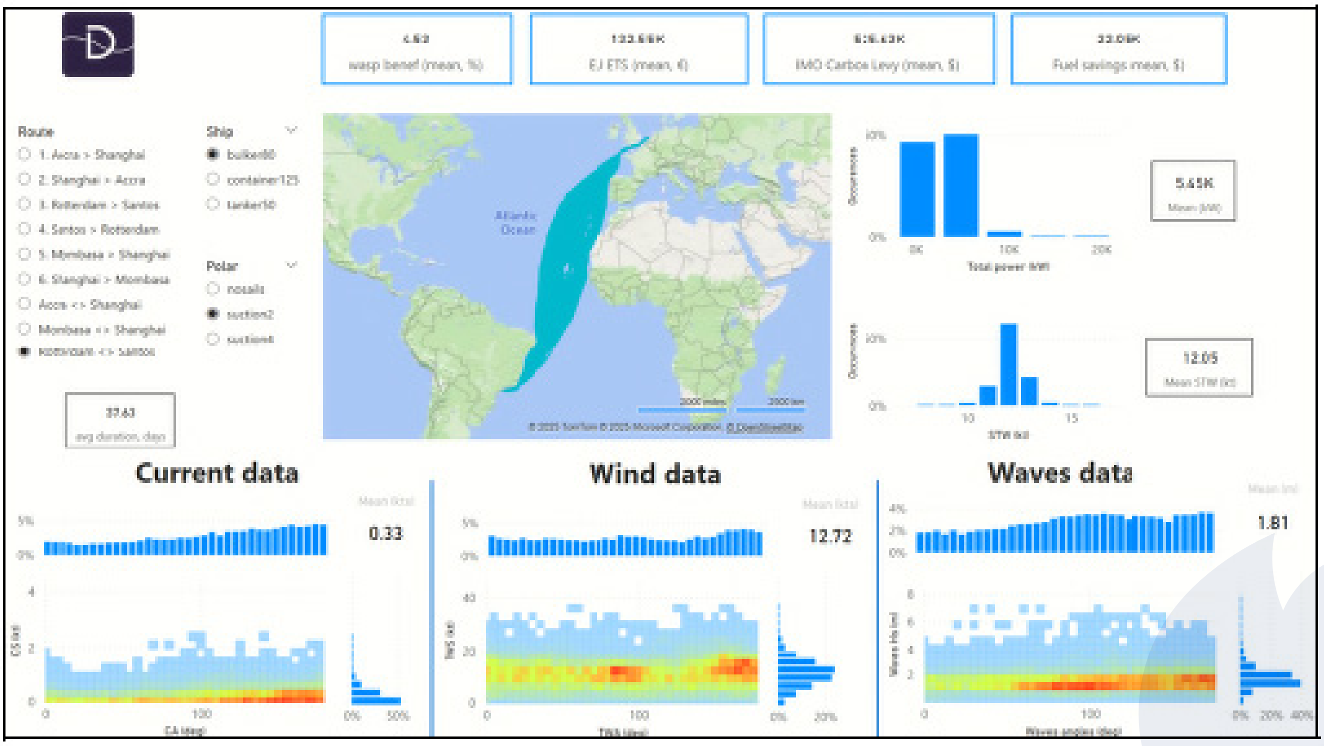


Bulker with 2 WASPs

Weather routing on Mombasa <> Shanghai

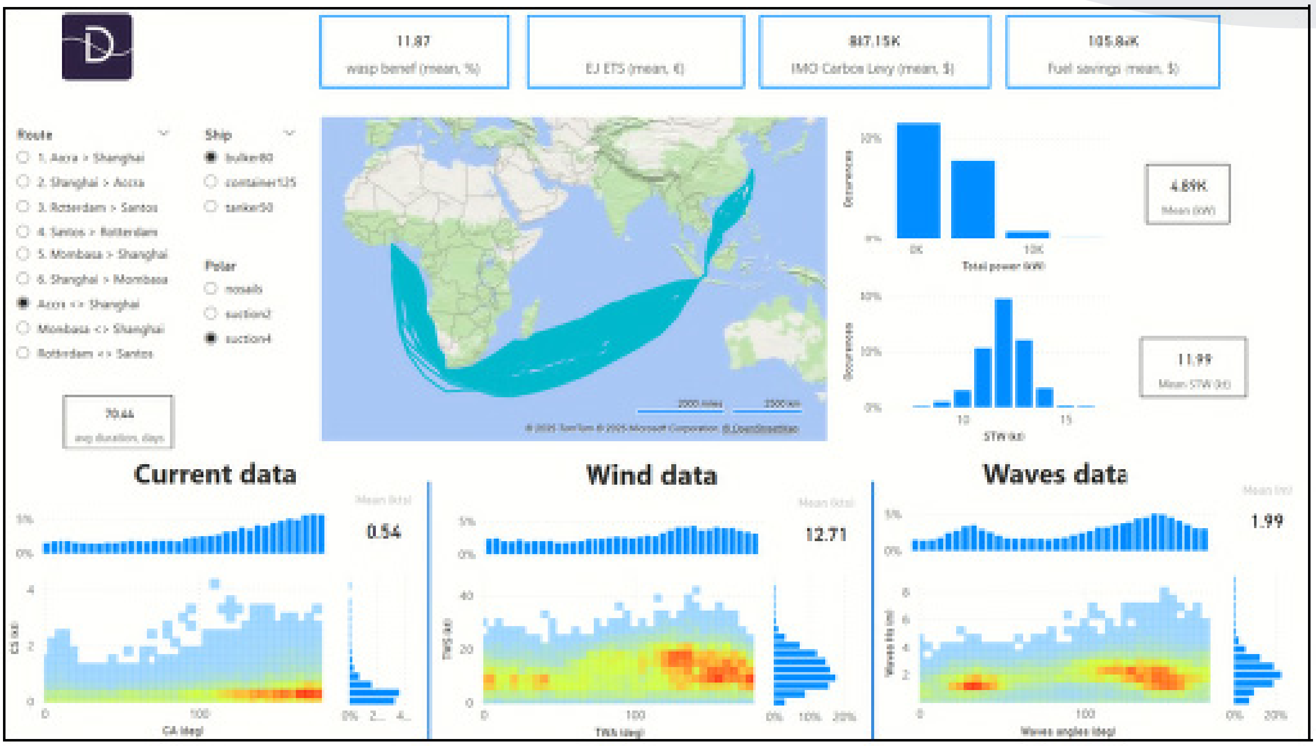


Weather routing on Rotterdam <> Santos



Bulker with 4 WASPs

Weather routing on Accra <> Shanghai



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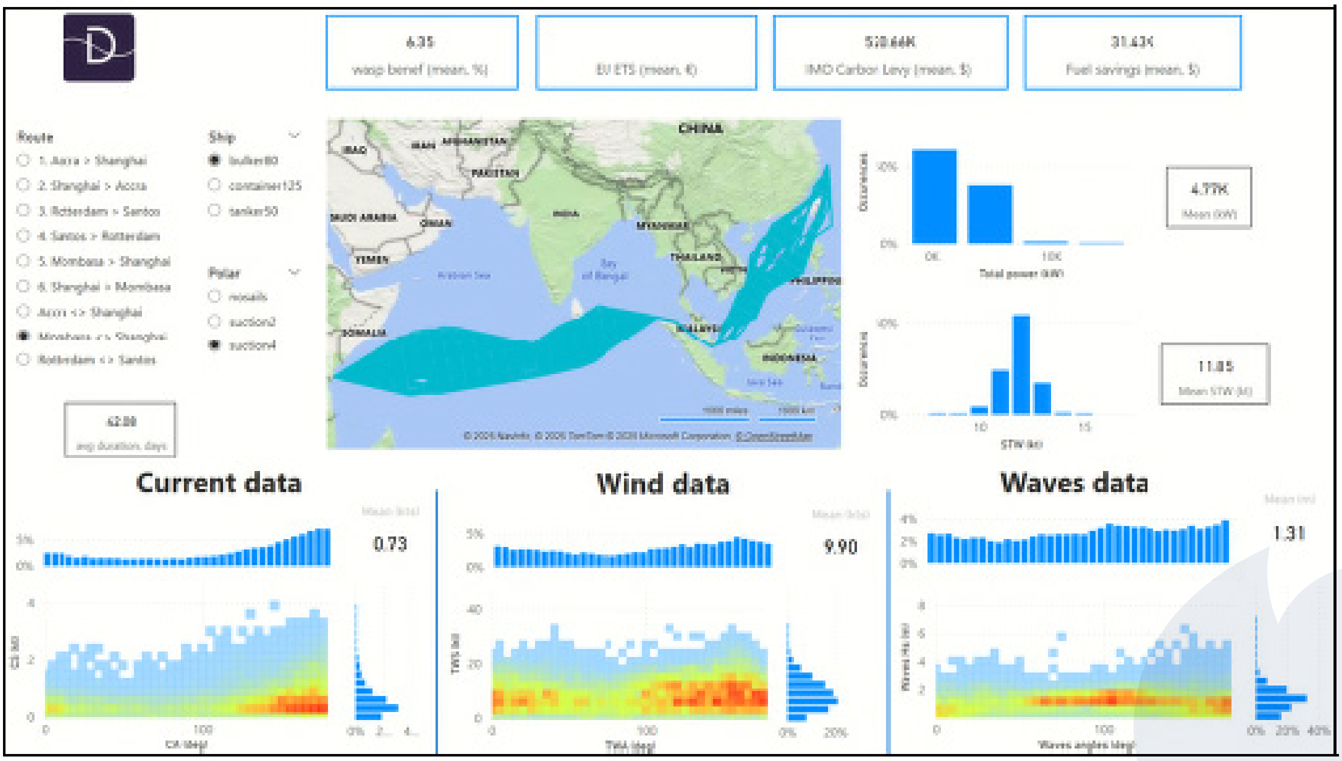

Bulker with 4 WASPs

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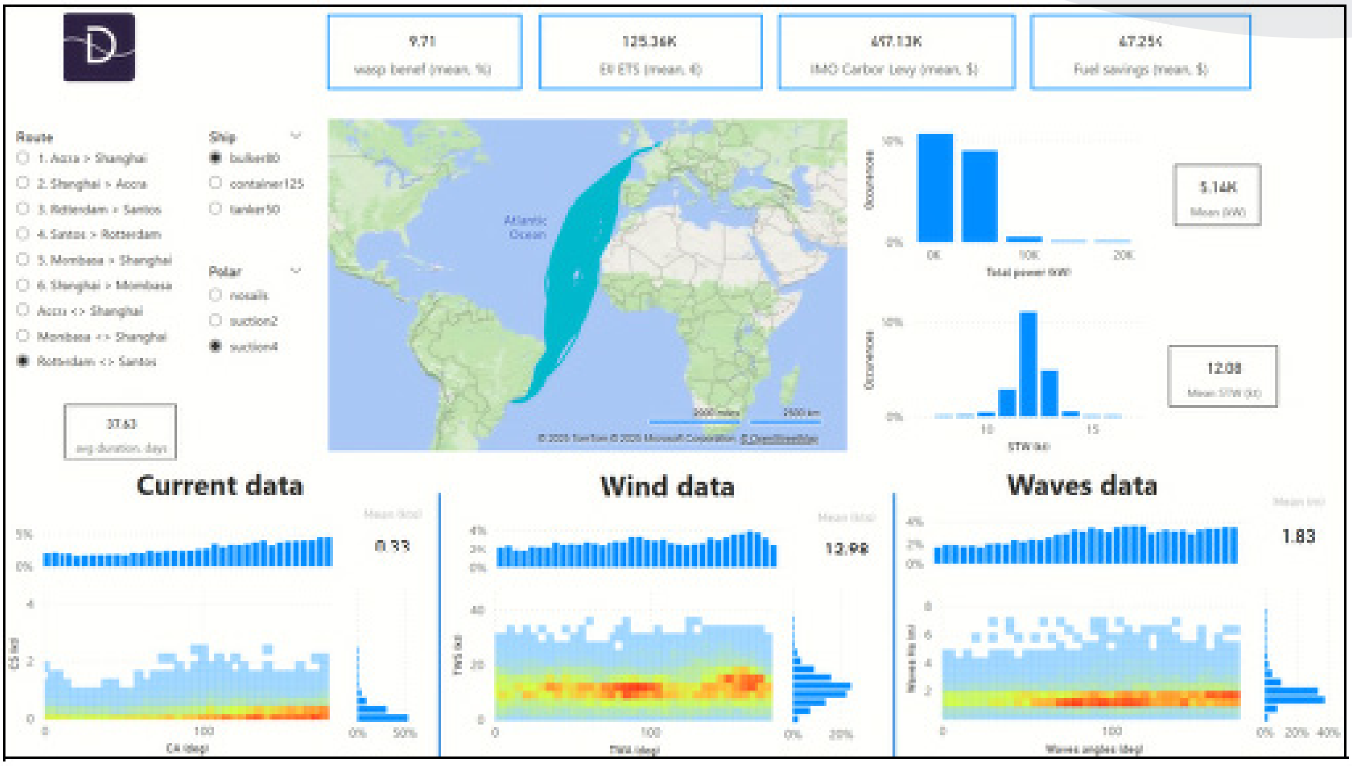
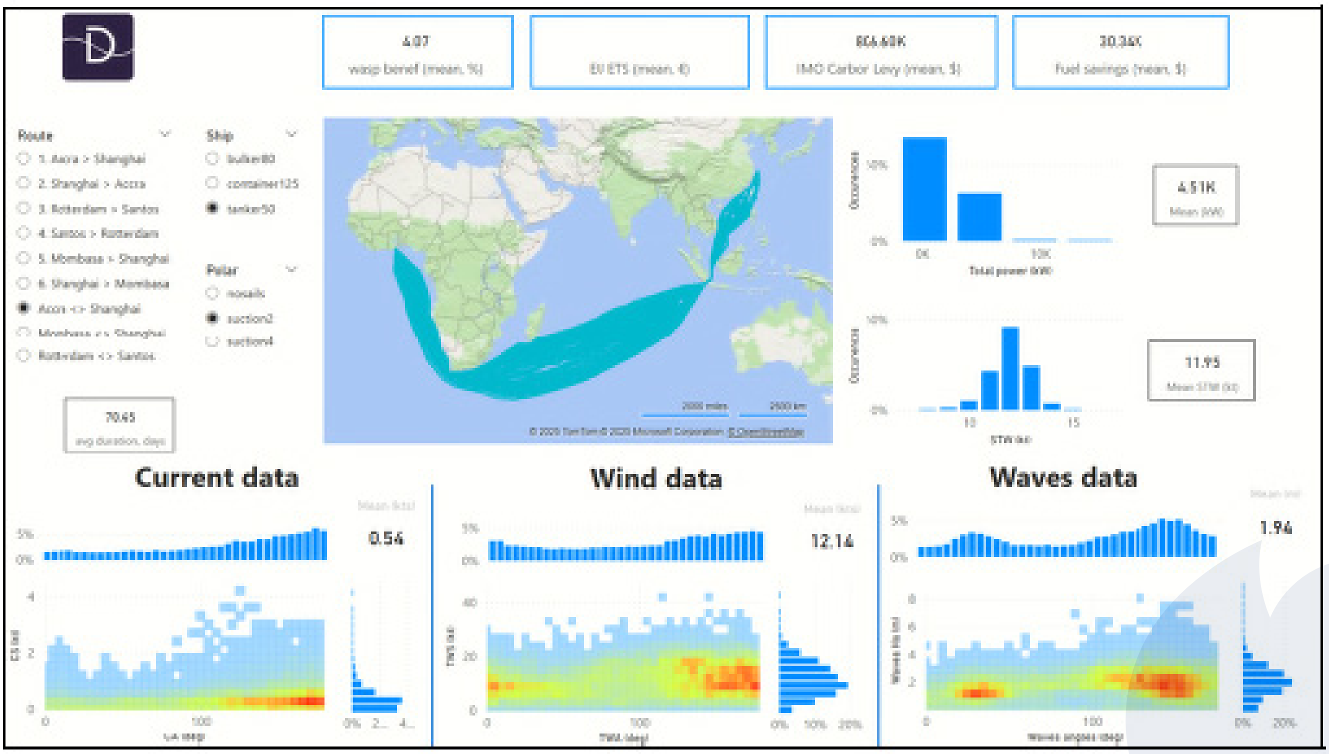
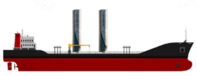


Tanker with 2 WASPs

Weather routing on Accra <> Shanghai





Tanker with 2 WASPs

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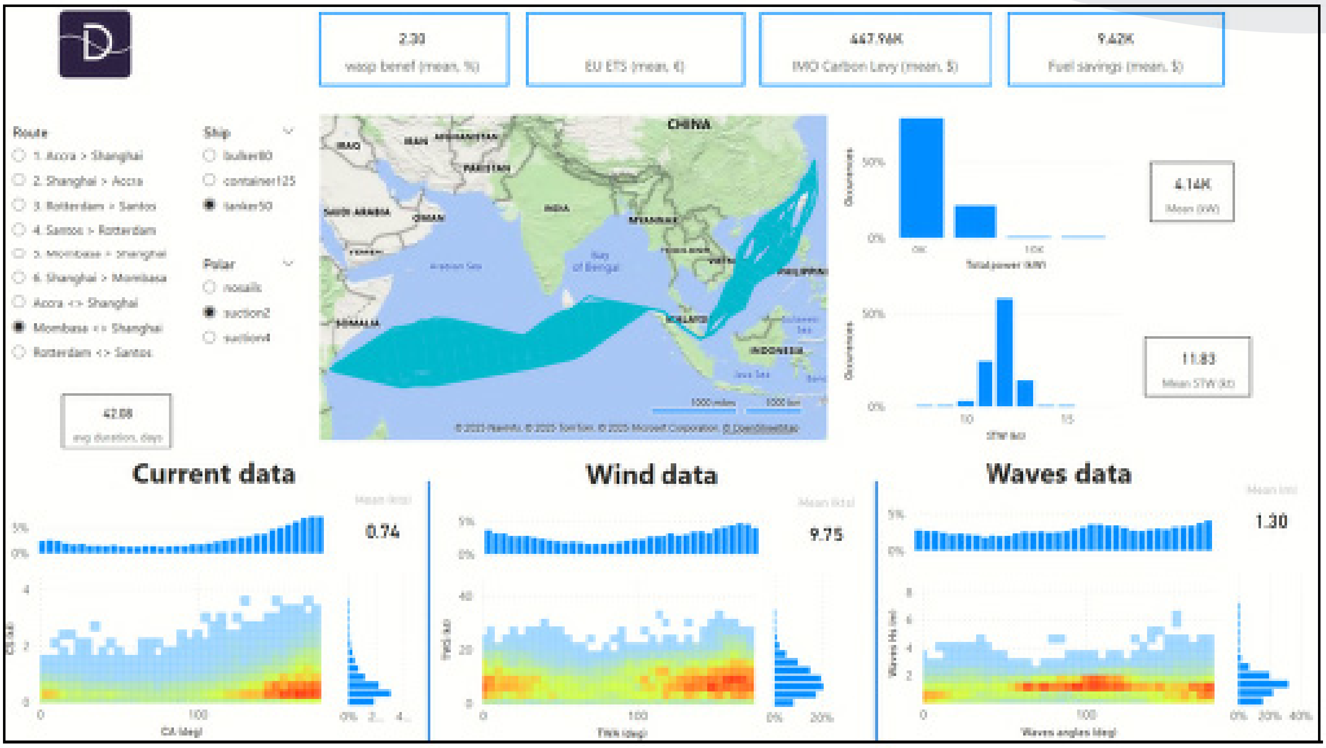

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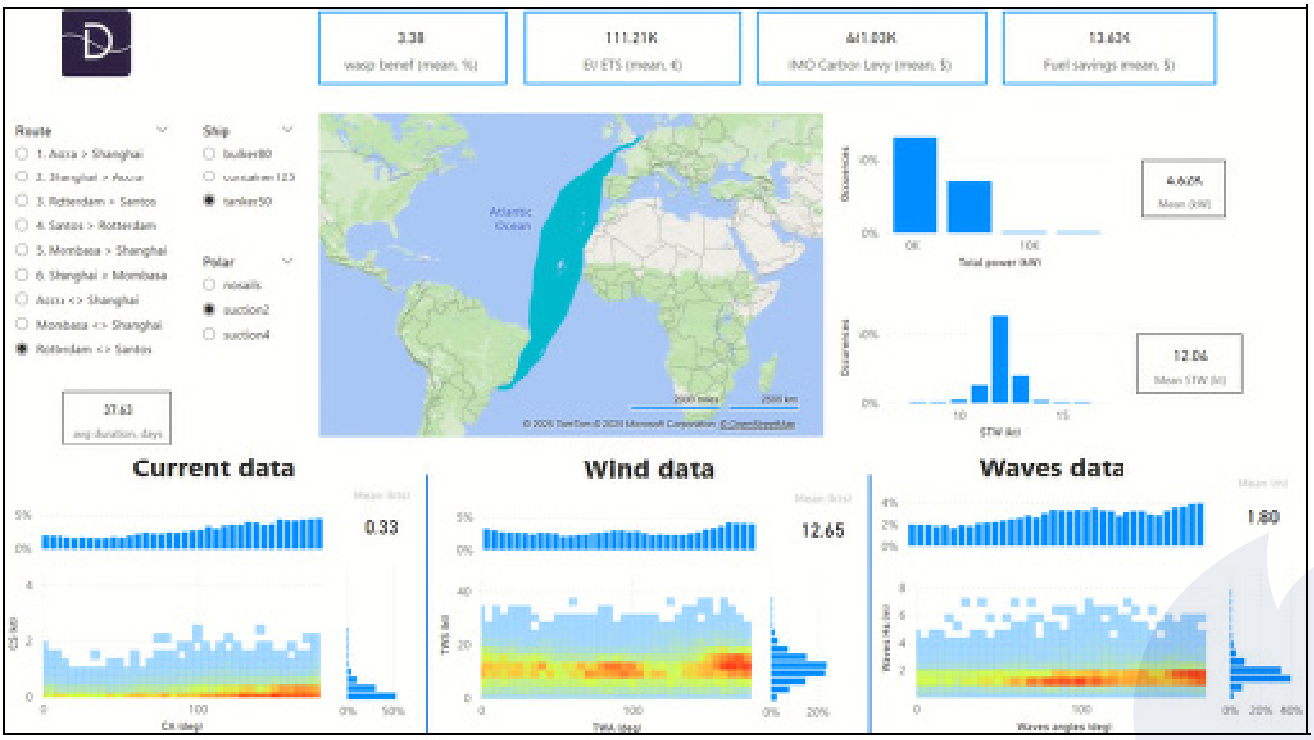

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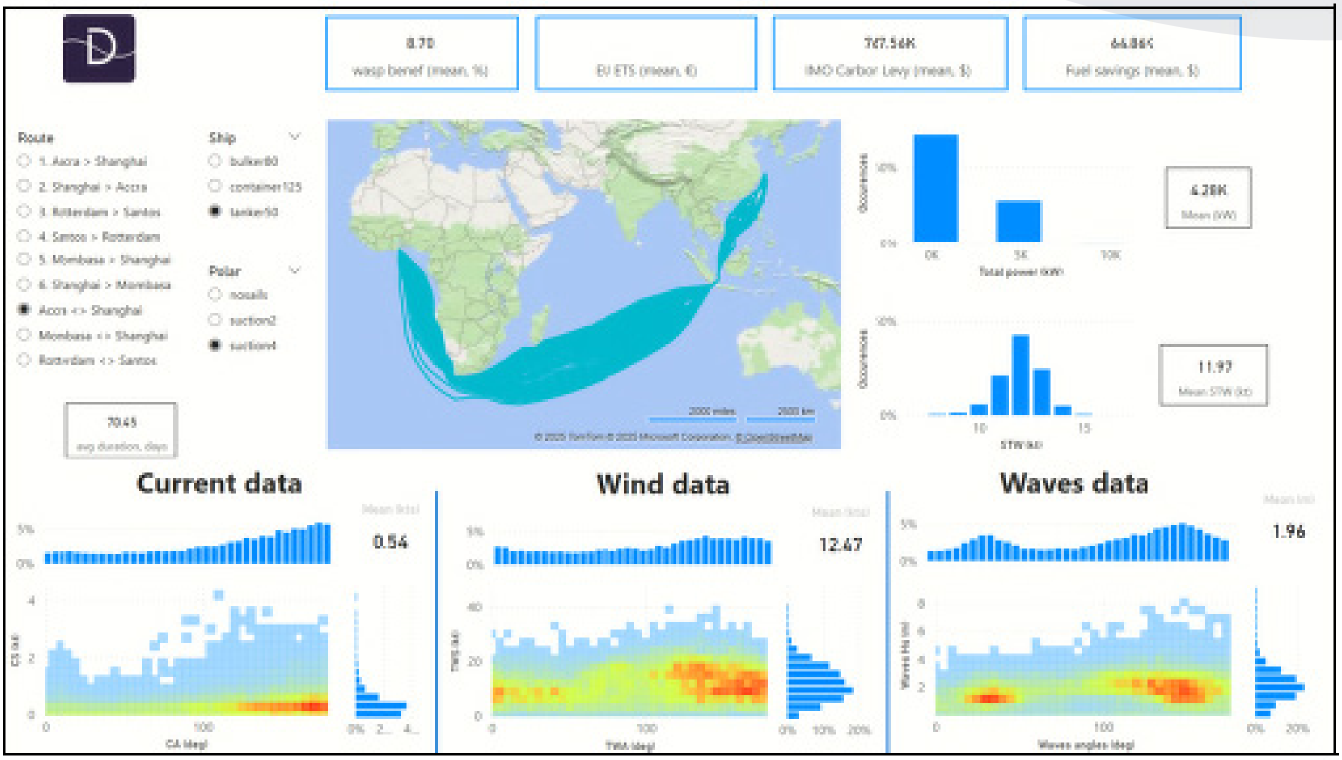

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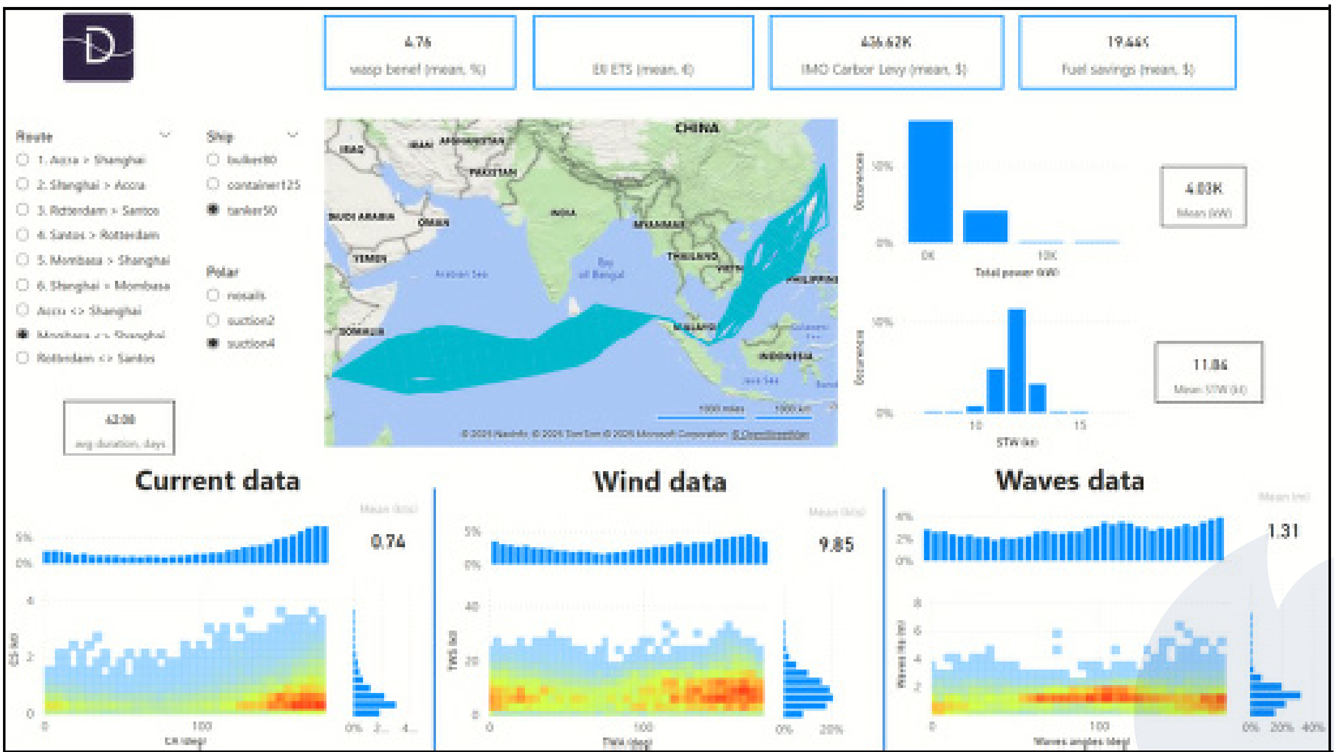
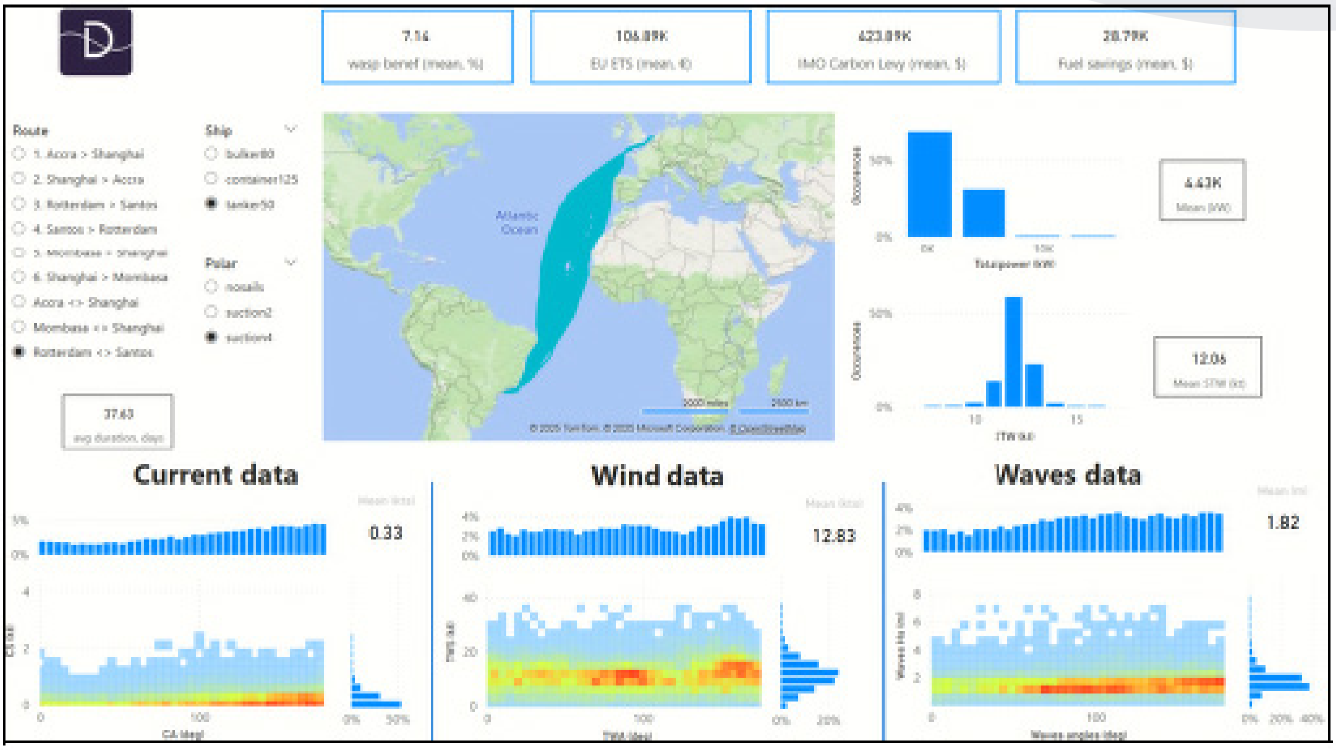


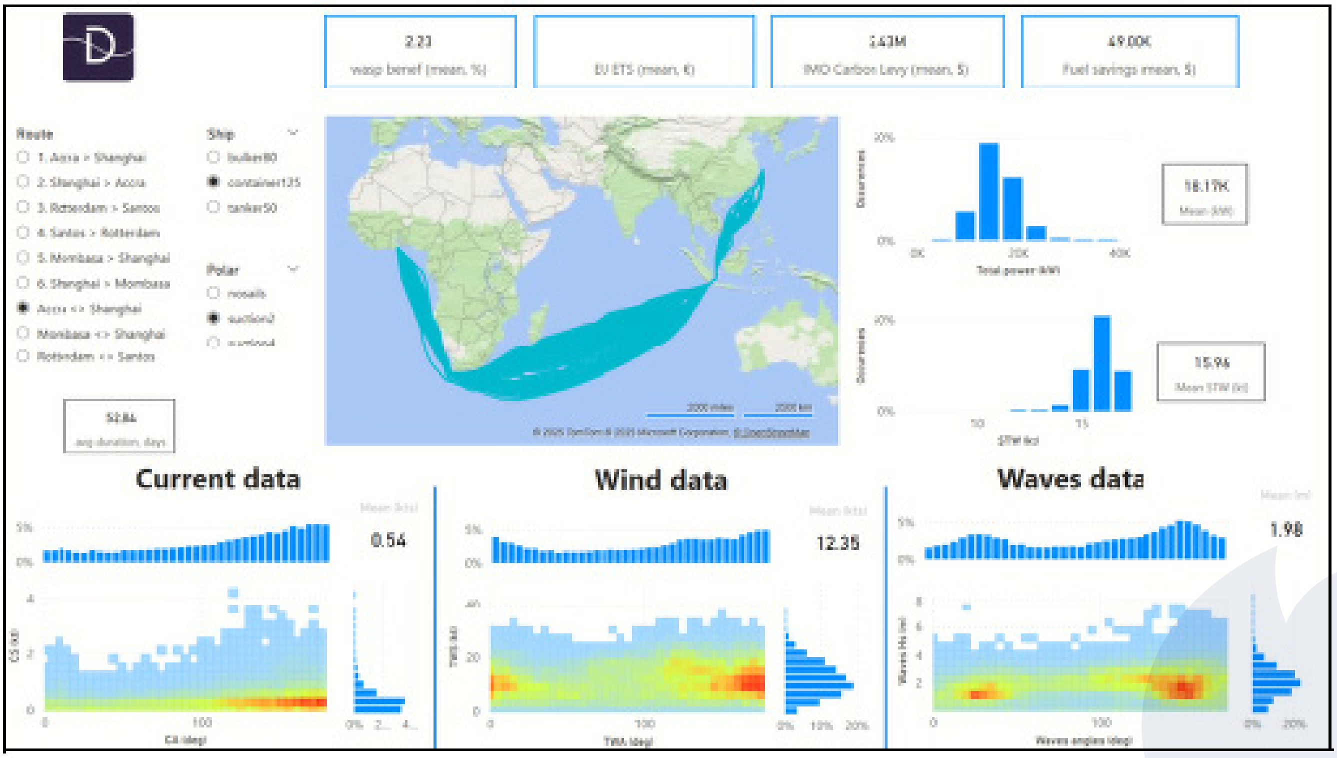
Tanker with 4 WASPs

Weather routing on Rotterdam <> Santos



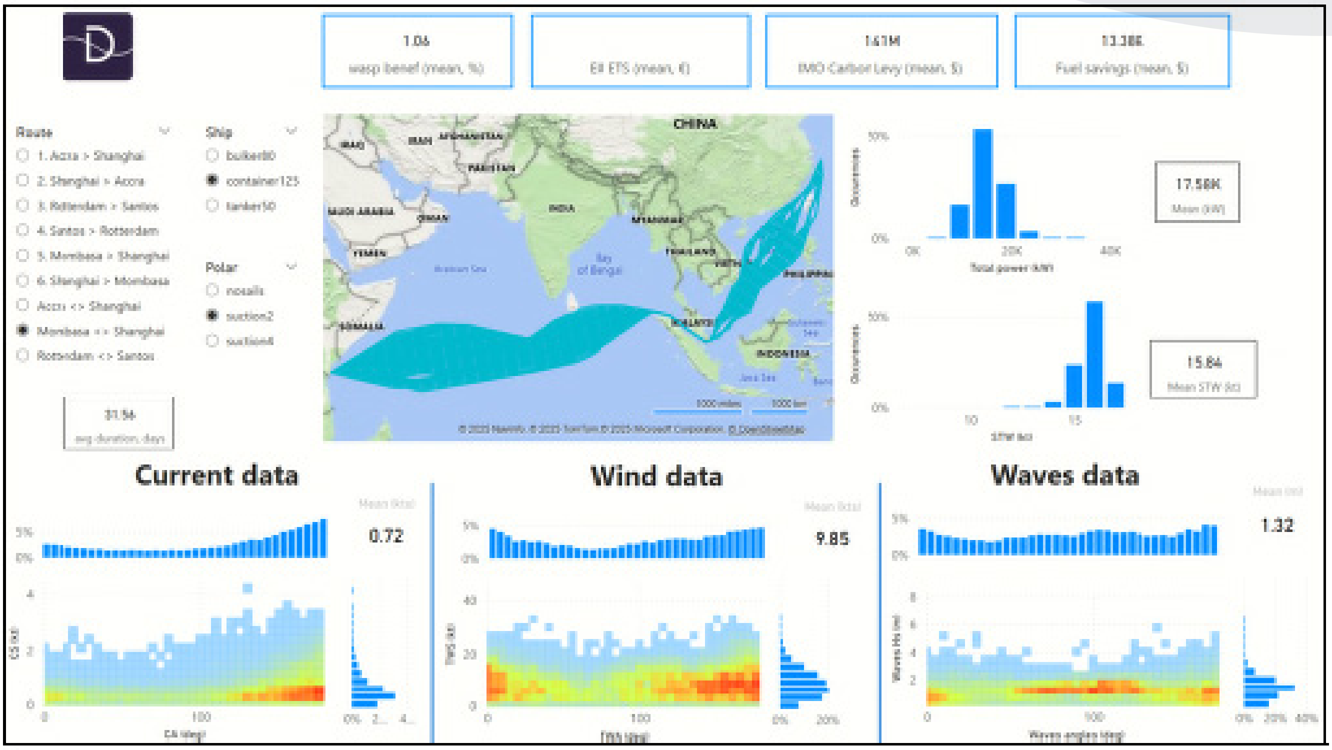
Containership with 2 WASPs

Weather routing on Accra <> Shanghai

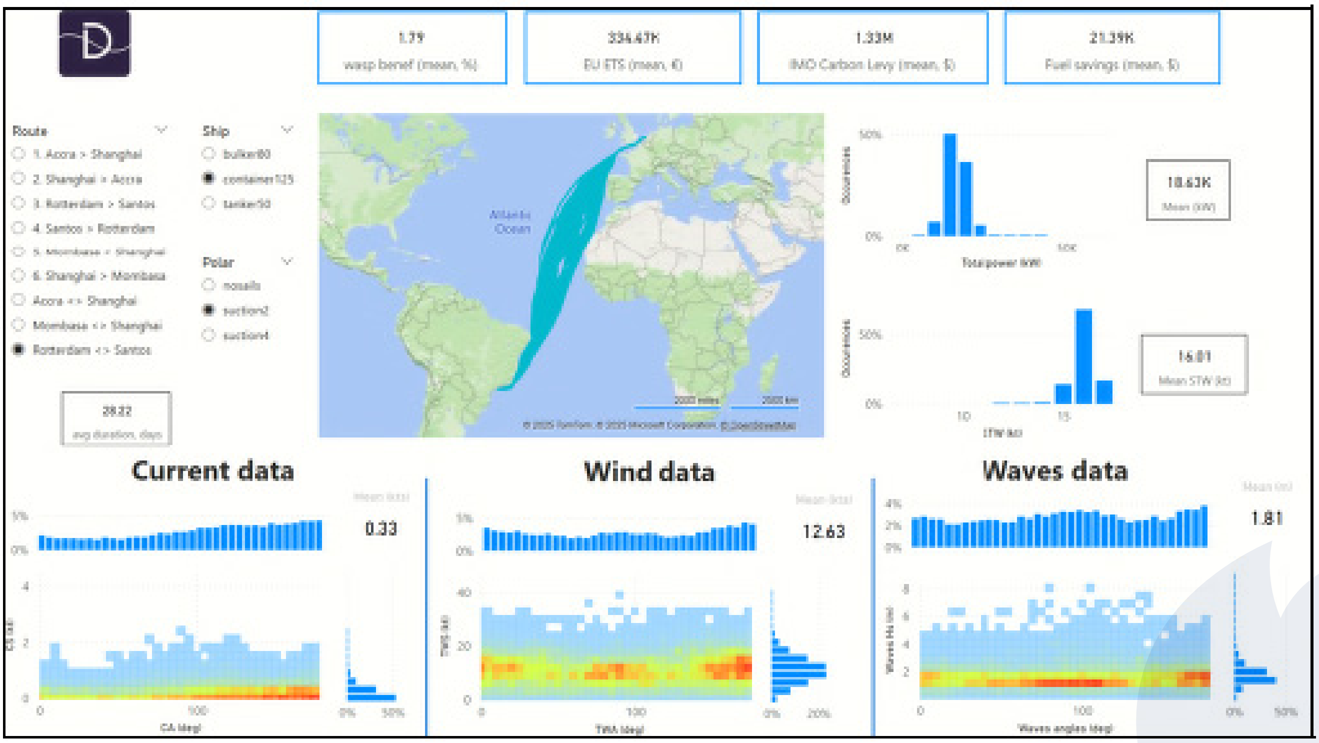


Containership with 2 WASPs

Weather routing on Mombasa <> Shanghai



Weather routing on Rotterdam <> Santos



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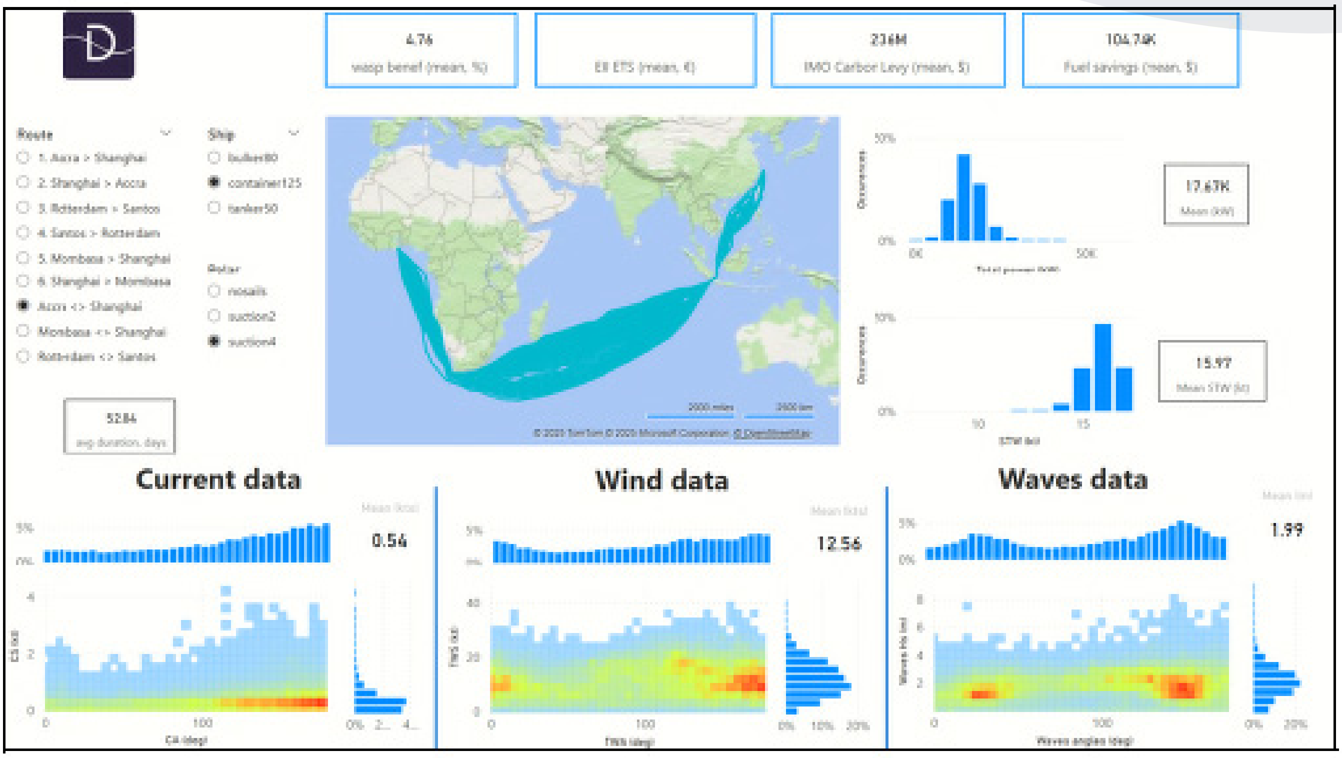

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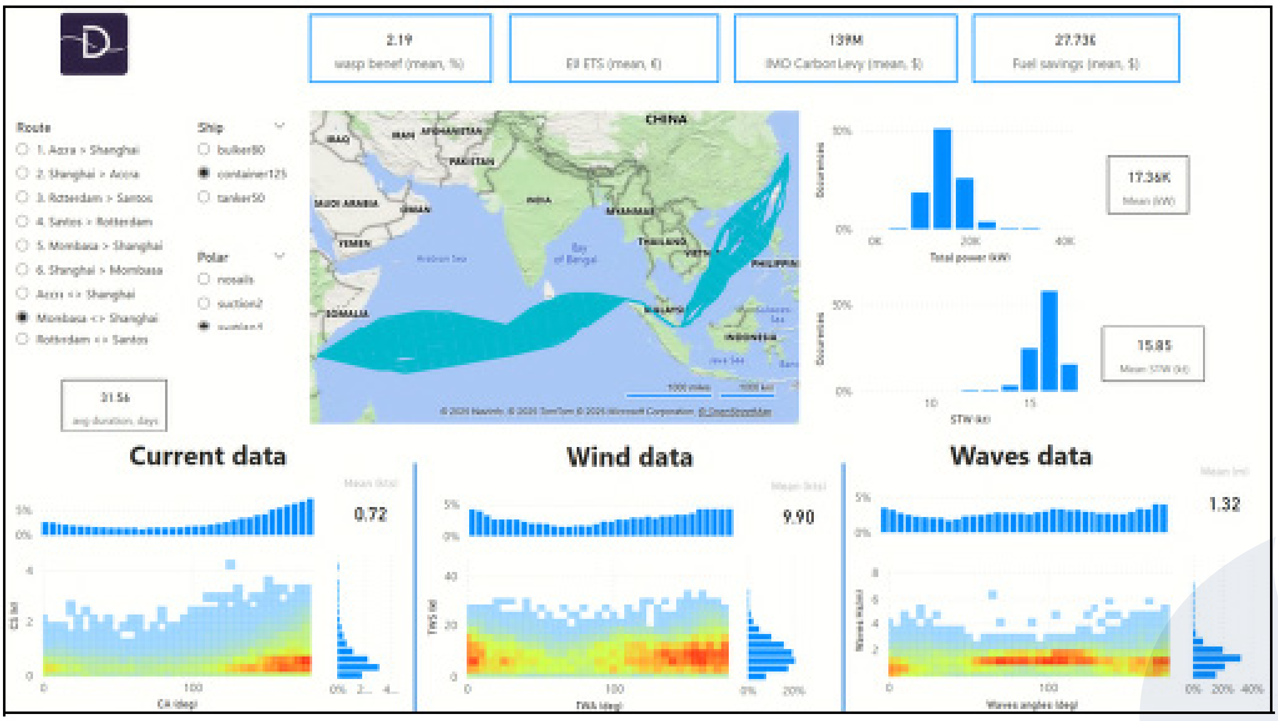

Containership with 4 WASPs

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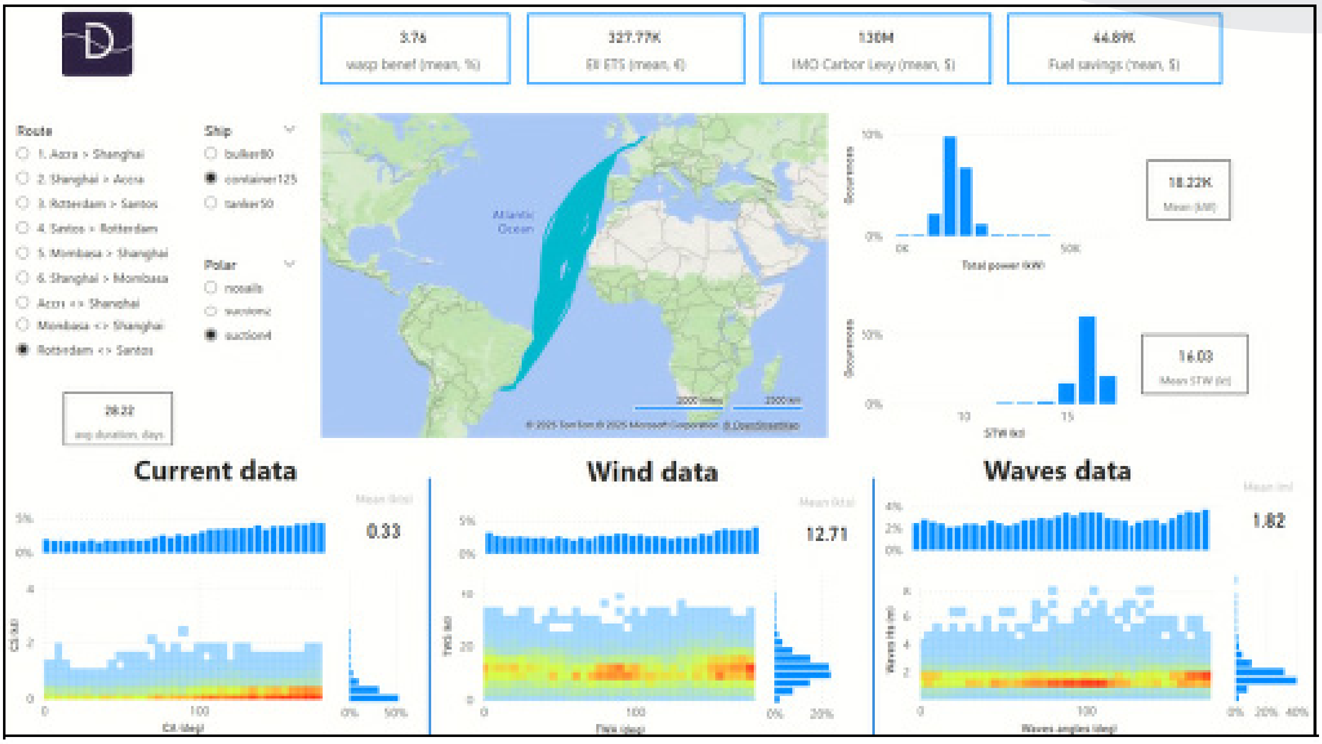

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Authors: Dmytro Dudka, Sylvain Fuguet (D-ICE Engineering)

Executive Summary written by Seas At Risk

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Contact

secretariat@seas-at-risk.org

@SeasAtRisk

Seas At Risk

@seasatrisk_ngo

Seas At Risk

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D-ICE ENGINEERING