



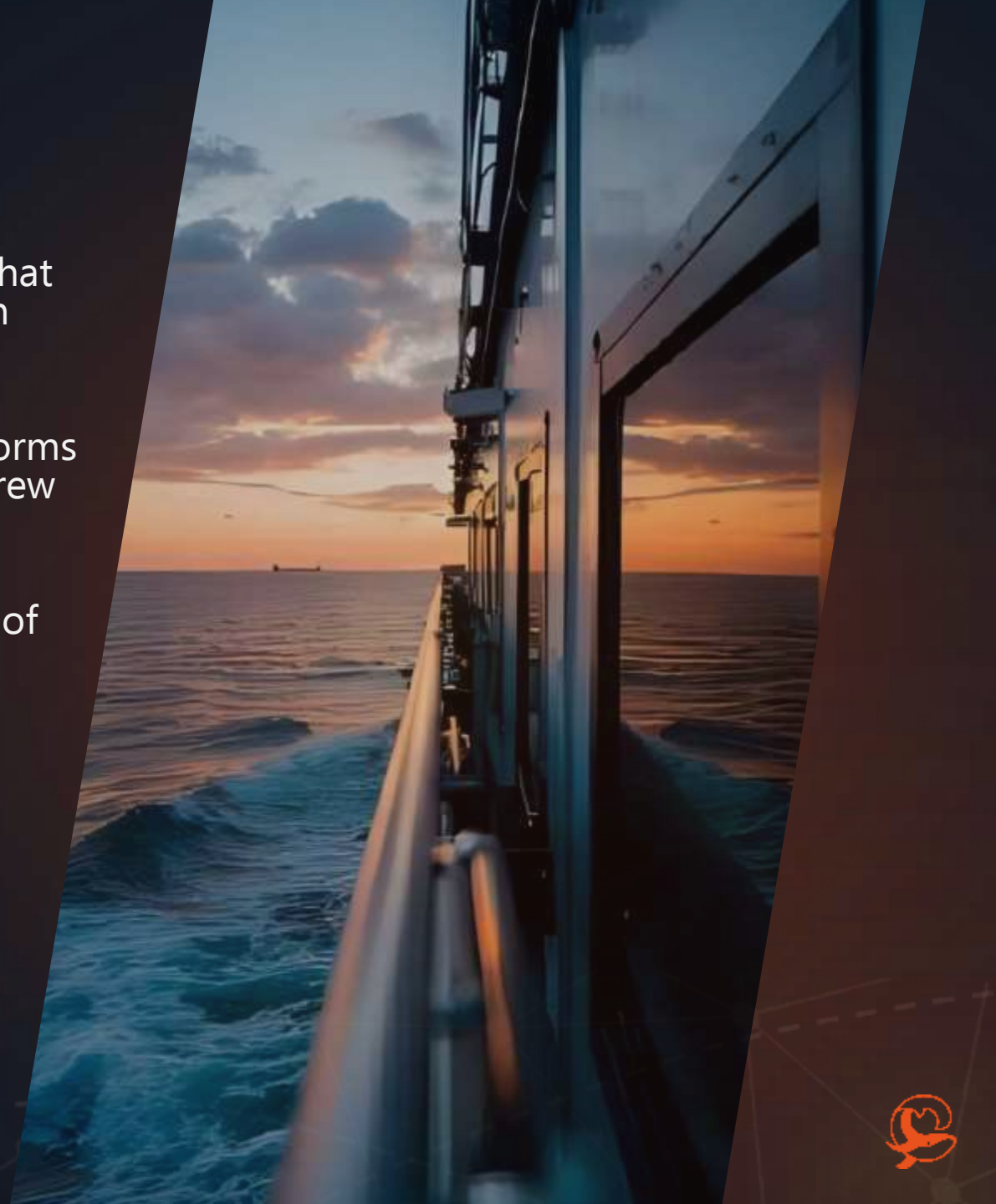
Optimising vessel schedules with digital twin technology

About Cetasol

Cetasol is a **Swedish maritime technology company** that helps vessel owners and operators cut fuel consumption and emissions.

Spun out of **Volvo Penta** and based in Gothenburg, we develop **iHelm**, a decision-support platform that transforms vessel data into clear, real-time guidance for onboard crew and actionable insights for shore teams.

With iHelm, operators save fuel, reduce emissions, and future-proof their operations for the evolving demands of sustainable shipping.



Our solution: Cetasol iHelm

Intelligent decision support

- ✓ Vessel & Fleet monitoring
- ✓ Performance analytics
- ✓ Reporting & Compliance
- ✓ Engine health monitoring
- ✓ Digital twin technology



Interactive timetable optimization



A ferry owner requested **Cetasol** to help in fuel consumption predictions ahead of changing their timetables.

Cetasol developed an online planning tool leveraging historical performance data and advanced machine learning algorithms.

The tool predicts

- trip time
- Fuel and energy use
- CO2 emissions

4. Test Performance Analysis

	Leg	Departure	Arrival	Fuel (L)	Electricity (kWh)	CO2 (kg)
0	Nacka Strand - Vaxholm	2025-06-25 10:01:00	2025-06-25 10:26:00	190	None	494
1	Vaxholm - Södra Grinda	2025-06-25 10:27:00	2025-06-25 10:59:00	80	None	208

⚠️ **Performance Impact:** Your test schedule shows increased consumption:

Total Fuel

270 L

↑ +33 L

Total CO2

702 kg

↑ +86 kg

Total Cost

5,400 SEK

↑ +660 SEK

Test schedule analysis and comparison with the original one - **higher consumption**

4. Test Performance Analysis

	Leg	Departure	Arrival	Fuel (L)	Electricity (kWh)	CO2 (kg)
0	Nacka Strand - Vaxholm	2025-06-25 10:01:00	2025-06-25 10:35:00	118	None	306.8
1	Vaxholm - Södra Grinda	2025-06-25 10:36:00	2025-06-25 11:10:00	69	None	179.4

🎯 **Optimization Successful!** Your test schedule shows improvements:

🚰 72L fuel saved

🌿 187kg CO2 reduced

💰 1,440 SEK cost savings

Total Fuel

187 L

↓ -72 L

Total CO2

486 kg

↓ -187 kg

Total Cost

3,740 SEK

↓ -1,440 SEK

Test schedule analysis and comparison with the original one - **lower consumption**



How it works



Optimisation problem

Minimizes total operational cost under real-world constraints (time, vessel limits, route conditions)

Speed & Route optimization simulator

Combines vessel-specific digital twins with route optimisation to simulate realistic voyages

Dynamic vessel performance models

Each vessel has its own data-driven performance models capturing:

- Acceleration & speed profiles
- Route alternatives "Highways"
- Fuel consumption behaviour
- Real operational statistics

Dynamic trip feasibility assessment

The feasibility of the trip is prioritized to guarantee realistic and trustworthy output. The simulator performs continuous validation by:

- Checking if requested arrival times are achievable.
- Validating time consistency between legs.
- Adjusting departure times based on calculations from preceding legs.

Further applications of digital twin technology

- ✓ Real-time speed optimization
- ✓ Simulates fuel consumption on new routes
- ✓ Support your electrification projects
- ✓ Asset condition monitoring
- ✓ Hull performance assessment



Thank you for your attention



Contact us

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