GREEN
TECH
SOLUTION

njord

TECHNOLOGY SCREENING

HAPPY SKY
IMO NUMBER 9457220
SEPTEMBER 2025

EXECUTIVE SUMMARY

Njord has completed a Technology Screening for vessel Happy Sky. Below are the key findings.

KEY FINDINGS

9

Number of techs. found relevant

15.7

Savings potential in %

2.08

Return on Investment in Years

875,000

Total Investment in USD

421,298

Yearly Bunker Savings in USD

NJORD SCORE

Njord Score	A	B	C	D	E
Remaining Savings Potential	< 3%	< 6%	< 9%	< 12%	+ 12%

The Njord Score of vessel HAPPY SKY is E.

The score given is based on how much the vessel can improve its efficiency through the application of a combined Energy Savings Technology package, that does not supersede 2.5 years ROI.

9	15.7	2.08	E
Number of techs. found commercially viable	Savings potential in %	ROI in years	Benchmark score

The figures above highlight the total number of commercially viable technologies yet to be explored, their combined savings impact and ROI. The benchmark Njord Score reflects how similar vessels, which Njord has worked on, are currently rated.

READ MORE ABOUT THE NJORD SCORE HERE

GENERAL INFORMATION

METHODOLOGY

This Technology Screening is based on Njord's experience of +500 vessel assessments and +200 Energy Efficiency Technologies (EETs) installations. For HAPPY SKY, Njord has utilized insights from work completed on similar vessels in terms of segment, size, and trading patterns. To avoid overlapping savings when applying multiple technologies, all technologies are prioritized based on impact. For example, if Technology X (priority 1) has a 10% individual impact and Technology Y (priority 2) has a 5% individual impact, Y's effect is calculated on the remaining 90% of fuel consumption. This approach ensures accuracy when applying multiple EETs and the avoidance of counting savings twice. Novel technologies have been considered for the vessel in a separate appendix.

ASSUMPTIONS

The Technology Screening is based on data provided by Spliethoff's Bevrachtingskantoor B.V. to Njord. Equipment and installation prices are based on average figures from recent projects, and includes all-in costs (equipment, logistics, and installation). Final prices will depend on the specific project, volume, and negotiations.

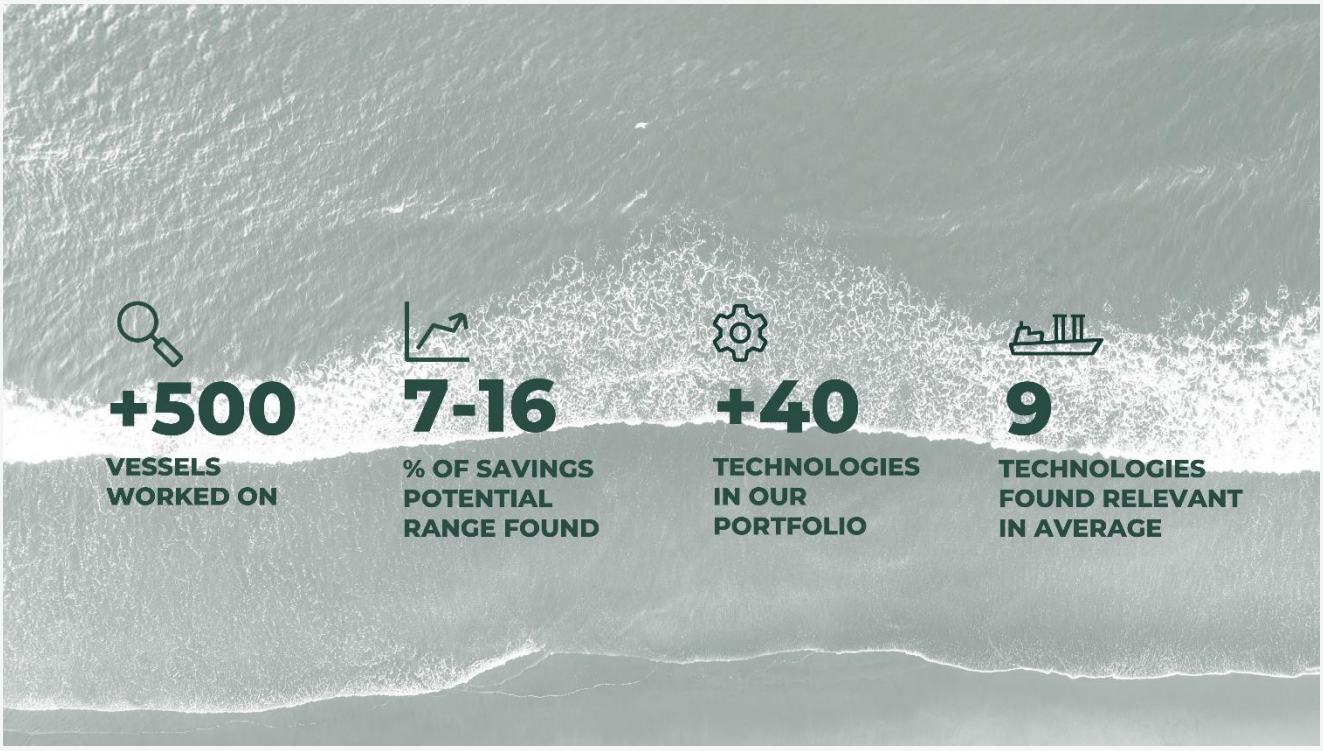
The saving potential is divided across two technology categories:

Direct Savings Technologies (DS) directly impact vessel performance post-installation and may influence EEXI.

Enabled Savings Technologies (ES) improve technical and/or operational efficiency.

The following bunker prices have been considered for the cost calculation:

HFO – 406 USD/MT
VLSFO – 499 USD/MT
MGO – 652 USD/MT
EU Carbon Price – 82.00 USD/MT



VESSEL PARTICULARS

General Information of Vessel

Vessel Name	Happy Sky
IMO Number	9457220
Vessel Owner	Spliethoff's Bevrachtingskantoor B.V.
Commercial Manager	BigLift Shipping B.V.
Technical Manager	Spliethoff's Bevrachtingskantoor B.V.
Vessel Type	Heavy Lift vessel
Build Year	2013
Flag	NLD
Classification Society	BV
Gross Tonnage	15989
Dead Weight	17683
Next Drydock Scheduled Date	February 2026

Machinery Details	
Main Engine: Type and Make	Wartsila 8L46C
Main Engine: No. of Engines	1
Main Engine: Max Power	8775
Main Engine: Max RPM	500
Main Engine: Power Limitations	15%
Auxiliary Engine: Type and Make	Wartsila 6L20
Auxiliary Engine: No. of Engines	3
Auxiliary Engine: Max Power	1025 KW
Boiler: Type and Make	Heatmaster HTF 1500 H Thermal oil
Boiler: Capacity	1500 KW
Hull: Antifouling Paint Specification and Paint Name	FB PPG Ecofleet 270 85 MicronVS PPG Sail advance NX 200 micron
Ballast Water Treatment System. Make and model	Techcross ECS 1000B x 1
Loading Computer. Make and model	Dell optiplex 990
Scrubber/EGCS? If yes, Make, Model and Type (Open or Closed Loop)	Ecospray ECO-EGC openloop

Consumption	
Annual Main Engine Consumption	5254 HFO / 208 LSMGO / 363 VLSFO
Annual Auxiliary Engines Consumption	369 LSMGO
Annual Boiler Consumption	86 LSGO
Annual "Other" Consumption	Click or tap here to enter text.

Operation Profile	
No. of Days Ballast in 1 year	61
No. of Days Laden in 1 year	128
No. of Days Idle/Load port in 1 year	57
No. of Days discharging in 1 year	100
General trade route of the vessel (voyages and ports/topography)	Worldwide
Total Annual Distance (365 days)	66135 NM

Existing Energy saving devices and Equipment	
Main Engine	Power control system/ load control system for MECPP, fixed RPM, shaft generator
Hull	
Auxiliary Engines	Power Management System Deif
Boiler	
Others	shaft generator
Voyage Planning	SPOS, Octopus
Is Auto Logging available on the vessel?	scrubber and HLMC Huisman, Spliethoff Datacollector
Are Mass Flow Meters installed? If yes, which are the consumers?	ME , AE's
Is BWTS Installed? if yes, type and capacity	Techcross ECS 1000B x 1
Is the vessels installed with a scrubber? if yes, please specify Open Loop / Closed Loop	Open loop
Which consumers are covered by the scrubber? example ME, Auxiliary Engines, Boiler	ME, AE2 & AE3
kWHr meter available?	no
Shaft Power Meter available?	yes
Economisers (EGB) fitted on AEs and ME?	ME only
Are VFDs installed? If YES, which all equipment are covered?	Hoppe Heeling pump, scrubber pump 1&2 , scrubber dilution pump.
Other Machinery Details where ESDs applicable (e.g. Cargo plant for Gas Carriers)	
Make and Model of Loading software onboard	Seasafe V3

Any other information	

BUSINESS CASE

ANNUAL SAVINGS POTENTIAL OF THE TECHNOLOGIES CONSIDERED

Savings potential
15.7%

MT CO_2 per year savings
3,087

MT Fuel savings
989

Main Engine
942

Aux Engine
45

Other
2

A total of 9 technologies have been used out of which 5 are of direct saving category and 4 are enabled savings.

One technologies will have impact on EEXI value, and 9 technologies will have impact on CII ratings

FINANCIALS FOR THE TECHNOLOGIES CONSIDERED

Return of investment (years)
2.08

Total investment USD
875,000

Yearly bunker savings USD
421,298

Bunker prices, as mentioned in the assumption section of this report, has been considered for calculation of yearly bunker savings and return on investment.

REGULATORY IMPACT

EU-ETS IMPACT

Return Of Investment (Years)

1.60

Total investment USD

875,000

Yearly bunker savings of USD

421,298

The vessel is found to be trading less than 50% in the EU region. We have considered for reference assuming 50% of the vessel trades in the EU region.

Estimated savings from EU ETS CO2 for the years:

- 2026 (100%)

The carbon credits price is taken as 82.00 USD/ CO_2-MT

126,548 USD

The amended return on investment stated above takes into consideration the amount of EU carbon tax saved by applying the technologies suggested over 1 years only. Any additional EU trading beyond this point will improve the business case further.

FUELEU MARITIME IMPACT

Existing penalty – 194,057 $
Penalty post ESD – 163,590 $
Savings – 30,467 $

Return Of Investment (Years)

1.51

Total investment USD

875,000

Yearly bunker savings of USD

421,298

For reference, we assumed that 50% of the vessel trades were in the EU region.

Total savings towards FuelEU:

30,467 USD

The amended return on investment stated above takes into consideration the amount of FuelEU Penalty savings and the EU carbon tax saved by applying the technologies suggested over one year only. Any additional EU trading beyond this point will improve the business case further.

The FuelEU maritime regulation sets the limit on the GHG intensity of energy used on board in the EU and imposes a penalty if a vessel's GHG intensity goes beyond the prescribed limit. Thus, the regulation promotes the use of shore power, certified renewable, and low-carbon fuels without recommending any particular type of fuel.

In addition, there is a specific reward factor for wind-assisted propulsion, which can be studied at the solution design stage.

CII IMPACT

Year	2025	2026	2027	2028	2029	2030
Required CII	11.97	11.71	11.37	11.02	10.67	10.33
CII Rating	E	E	E	E	E	E
Corrected Rating- NJORD ESD	E	E	E	E	E	E

1. Annual Efficiency Ratio (AER) and CII Ratings are calculated on basis of submitted IMO DCS data for the year 2026 and as per MEPC. 78
2. * The CII Calculation is without Correction factors for electrical consumption of cargo heating as per MEPC.355(78)
3. Operational profile of vessel for the following years is assumed to be same as 2026 and after adoption of Njord EET the Deadweight remains unchanged.
4. After applying the suggested Njord EET package, no improvement in savings rate is observed. It remains in 'E' until 2030 from the current rating.
5. Based on the trading profile, to meet the CII compliance up to 2030 vessel might require a reduction in her speed or consider the implementation of novel technologies to substantially increase the savings.

BASIC TECHNOLOGIES

*The savings ranges stated in this table showcases how technologies will perform on respective machinery (Main Engine/Auxiliary Engine/Boiler) if installed individually.

Technology		Description	Savings Category	Regulatory Impact EEXI/CII	Install in Drydock / Service	Savings Range %	Cost Range (USD)
	Flow Stream Duct	A pre-swirl hydrodynamic device to improve the flow into the propeller by creating a swirl in the opposite direction of the propeller's rotation, the device helps to straighten the wake and reduce rotational losses.	DS	CII and EEXI	Drydock	2.5 - 3.5	200K–250K
	Main Engine Lube Oil Fine Filters	Filtering engine oil instead of purification in a separator saves on separator running costs and lube oil replenishing intervals and eases the operation.	ES	CII	Both	0.2-0.8	25K-35K
	RPM & PITCH Optimisation	RPM and Pitch Optimization systems adjust engine speed and propeller pitch in real time using optimized combinator curves. This helps maintain consistent power and speed throughout a voyage, improving fuel efficiency and overall propulsion performance.	ES	CII	Both	5.0- 8.0	150K-200K
	Auto Pilot Upgrade	Updated autopilot includes unique algorithms that ensure highly precise steering performance where it is needed, even at low speed	ES	CII	Both	0.8 -1.8	25k-35k
	Propeller Fouling Protection - Ultrasound for Propeller	Ultrasonic propeller antifouling system. This device emits ultrasonic waves through the shaft to prevent marine growth on the propeller blades. As it's a preventive system, installation must begin with a clean propeller surface.	DS	CII	Both	0.5-1.0	25K-35K
	Premium Hull Coating - Premium Antifouling Coating	The Premium antifouling paint is ultra-low friction and has an excellent hydrolysis property. It uses silyl methacrylate as a binder, which enables worldwide trading vessels.	DS	CII	Drydock	2.0 - 3.0	100K–130K*

Technology		Description	Savings Category	Regulatory Impact EEXI/CII	Install in Drydock / Service	Savings Range %	Cost Range (USD)
	Auxiliary Engine Lube Oil Fine Filters	Filtering of engine oil instead of purification in a separator. This saves on separator running costs and lube oil replenishing intervals and eases the operation.	ES	CII	Both	0.4-1.0	40K-60K
	Variable Frequency Drives	Variable frequency drives enable capacity control of pumps and fans, instead of on/off operation. These drives operate autonomously by sensing the running parameters of the engine. and system load.	DS	CII	Both	1.2-2.0	150K-210K
	LED	LED lights with low power consumption on AE have a longer running range and are a direct savings.	DS	CII	Both	0.4-1.0	40K-60K

*The numbers represent the total cost. However, delta paint cost has been considered for the business case.

NEXT STEP - NJORD'S SOLUTION DESIGN

Get a detailed verification of each technology in scope, and have a tailor-made installation guide, ready to execute.

NJORD'S SOLUTION DESIGN INCLUDES THE FOLLOWING:

- Confirmation of consumption profiles
- Confirmation of fuel savings per technology
- EEXI and CII impact analysis per technology
- Alignment and retrieval of CFD calculations from suppliers (if required, at cost)
- Recommendations for which supplier to choose per technology
- Determination of cost per technology (including and split in logistics, equipment, and installation costs)
- Performance studies for selected relevant technologies

WE PARTNER WITH THE LEADING TECHNOLOGY PROVIDERS to design systems custom made for your vessels. Get to know how this will impact on the existing vessel performance.

THROUGH OUR SOLUTION DESIGN, we provide you with the clarity and guidance you need to reduce emissions, comply with regulations, and save fuel.

OUR TEAM OF INDUSTRY EXPERTS ANALYSE THE SYSTEMS ON THE VESSEL and find the best suited technology and tailor fit it to the existing environment on board!
When we design solutions, we deep dive into actual operational and consumption profiles in the last 365 days to scope out the best possible fit.

READ MORE ABOUT SOLUTION DESIGN HERE

BREAKDOWN OF SAVINGS, COSTS, AND PAYBACK TIME FOR INDIVIDUAL TECHNOLOGIES

DETAILED ANALYSIS OF EVERY TECHNOLOGY AND HOW IT AFFECTS

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