

DECARBONIZATION RULES EXPLAINED

WHAT'S ON THE HORIZON OF THE MARITIME INDUSTRY?



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Introducing IMO's EEXI

A design measure to improve the energy efficiency of ships.

In force

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How to manage CII

Operational measurement categorizing ships in different ratings.

In force

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Fit for 55 as proposed by the EU

Introducing the emission trading system, Fuel EU Maritime and a tax directive.

Proposal

These are all **IMO and EU rules** affecting the maritime industry

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The shipping industry accounts for about 3% of the global Green House Gas (GHG) emissions. Both the International Maritime Organization (IMO) and the European Union (EU) establish regulations in line with the Paris Agreement temperature goals to achieve significant CO₂ reductions: the EU aims to be climate neutral by 2050 and the IMO wants to cut 50% total CO₂ emissions and 70% in carbon intensity.

IMO REGULATIONS

EEXI

Energy Efficiency
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Shipowners and cargo owners need to take steps to decarbonize and **prepare their mutual business** for the introduction of the EEXI, the CII and the Fit for 55 package.

IMO (EEXI + CII) AND EU (FIT FOR 55) REGULATIONS

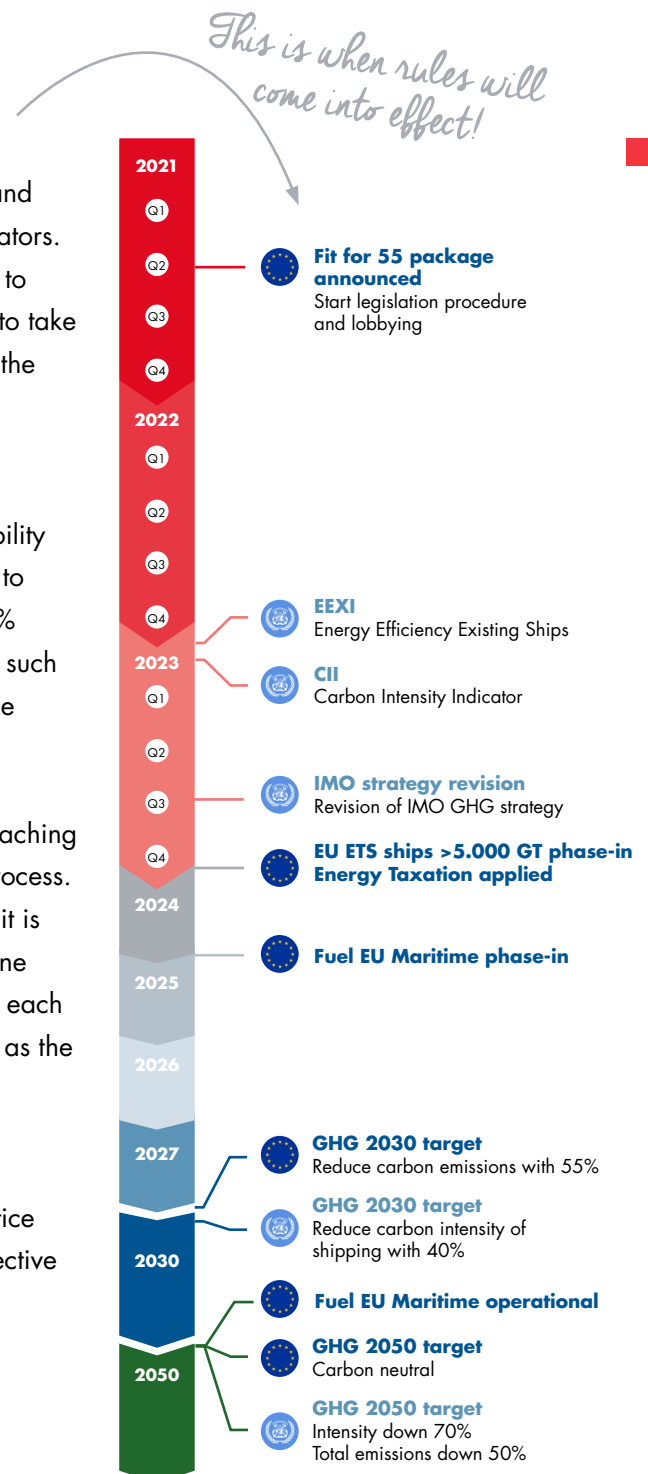
All regulations contain items that affect the maritime industry and place new and specific requirements on shipowners and operators. All merchant vessels in international trade will need to adhere to these new requirements. Shipowners and cargo owners need to take steps to decarbonize and to prepare their mutual business for the introduction of the EEXI, the CII and the Fit for 55 package.

WAGENBORG RESPONSE TO CLIMATE CHANGE

The IMO and EU regulations are incorporated in the sustainability mission and goals of Wagenborg towards the future. We aim to make our business operations more sustainable towards a 70% CO₂ reduction by 2050. The implementation of regulations of such magnitude requires us to properly prepare in order to minimize possible negative externalities.

We believe that it's logical to start this transition by actively reaching out to our stakeholders and proactively engage them in this process. IMO regulations come in force in the short term and although it is still not fully clear what exactly the EU regulations or the timeline will exactly be, we see it as obvious to start now by informing each other of the various consequences of these regulations as well as the impact.

This document is a first step and explains all relevant IMO regulations and EU proposal in brief, what they mean in practice and how Wagenborg can help you to be ready in a 'cost'-effective way.



Introducing EEXI

**Energy
Efficiency Index
for Existing Ships**

WHAT IS IT?

The Energy Efficiency Index for Existing Ships (EEXI) measures CO₂ emissions per transport work (per ton-mile), purely considering the ship's design parameters (ship type, engine power, DWT and ship reference speed). From 2023 onwards, the calculated EEXI of all vessels over 400 GT will need to fall below a specific requirement level to comply with this IMO regulation. Despite the EEXI regulation being one of the most significant IMO measures to date, it is a design rather than an operational measure and so doesn't require measuring or reporting of CO₂ emissions while ships are in operation.

WHAT DOES IT MEAN IN PRACTISE?

The EEXI's purpose is to improve the energy efficiency of the global fleet, boost the adoption of existing clean technologies, encourage innovation and reduce engine power (to what extent financially feasible, especially for older ships). Physical modifications may be required to affect one of the variables in the formula below, such as

HOW DO YOU CALCULATE IT?

Let's look at the EEXI equation at a simplified level:

$$EEXI = \frac{\text{Fuel consumption} * \text{CO}_2 \text{ factor}}{\text{DWT} * \text{reference speed}}$$

For any given vessel, the EEXI sums the emissions from the main engine and auxiliaries, taking into account any offsetting by energy saving devices such as air lubrication or wind propulsion, and then divides this by the vessel's capacity. This effectively measures how efficiently that vessel can transport cargo.

CO₂ emission factor

- 1 mton HFO = 3,114 mton CO₂
- 1 mton VLSFO = 3,206 mton CO₂
- 1 mton MGO = 3,206 mton CO₂



From 2023 onwards, the EEXI of all vessels **over 400 GT** will need to fall below a specific requirement level.

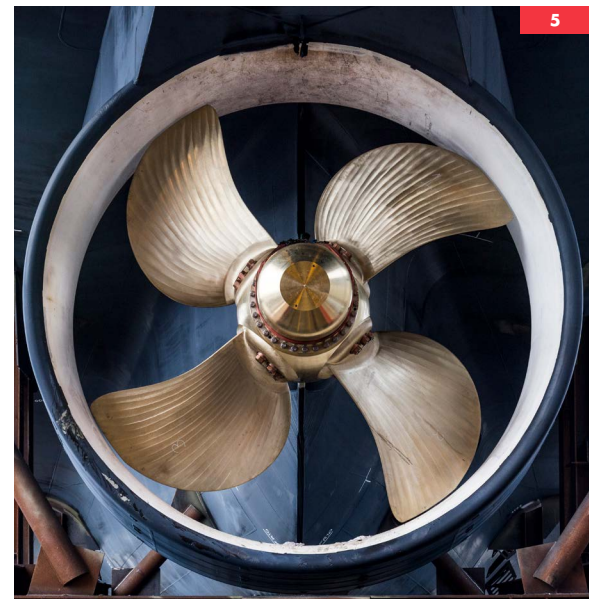


100% of the Wagenborg MPP fleet **is fully compliant** with the EEXI regulations.

an engine power limitation, energy-saving devices or using other fuels. Vessels impacted by EEXI must demonstrate compliance by their next survey on or after 1 January 2023 for the International Energy Efficiency Certificate (IEEC) to avoid a detention: a license to operate.

WAGENBORG ACTIONS AND EEXI-RESULTS

Transport efficiency has always been key in the new building series of Wagenborg vessels. By increasing the cargo intake while reducing the installed power, Wagenborg designed and built energy efficient series. Our data analysis results on how the EEXI impacts the Wagenborg fleet shows that 100% of the Wagenborg MPP fleet is already compliant with the 2023 EEXI regulations.



How to manage CII

Carbon Intensity Indicator

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WHAT IS IT?

As of 2023 IMO's Carbon Intensity Indicator (CII) regulation comes into force. The CII will categorize ships >5.000 GT into different 'energy ratings' by calculating the ship's operational parameters according to the AER method (as used by the Poseidon Principles and Sea Cargo Charter). Whereas the EEXI is concerned with how ships are built, the CII considers how efficient ships operate and transport cargo on an annual basis. The CII will therefore have a more significant impact than the EEXI on daily operations.

WHAT DOES IT MEAN IN PRACTISE?

The initial rating thresholds are set using 2019 as a base and will become stricter over time. With criteria becoming more tight over time (2% per annum), this might mean that if, for example, a ship receives a C rating and a shipowner does not take any actions for two years, this ship could then receive a rating of D the following year (see figure below page 7). The IMO will drive greener operations by encouraging charterers, ports,



Since CII considers **how ships operate**, both cargo and ship owners can affect the rating and available tonnage in the long term.

HOW DO YOU CALCULATE IT?

The CII is based on the Annual Efficiency Ratio (AER). Let's look at the AER equation at a simplified level:

$$\text{AER} = \frac{\text{Fuel consumption} * \text{CO}_2 \text{ factor}}{\text{DWT} * \text{distance travelled}}$$

To reduce their CII, shipowners will need to reduce the emissions part of the equation. In the long term, doing this will make operations more energy efficient.

CO₂ emission factor

- 1 mton HFO = 3,114 mton CO₂
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- 1 mton MGO = 3,206 mton CO₂

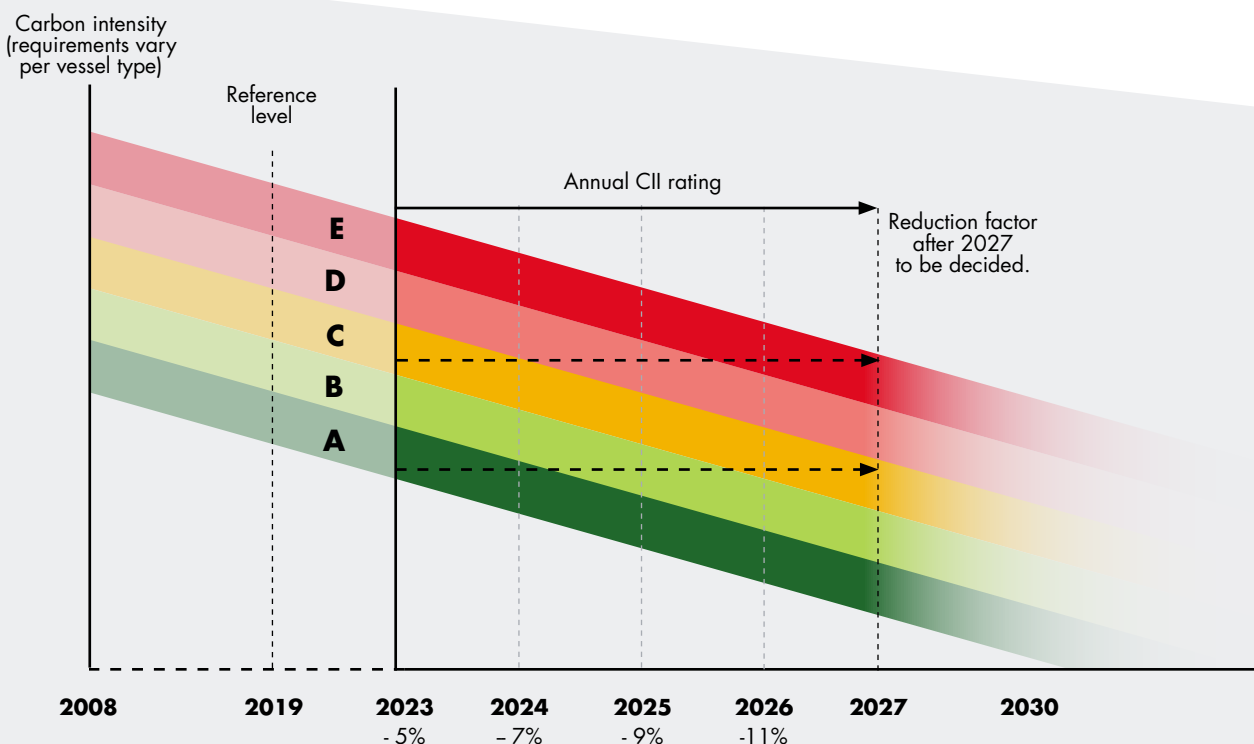


Wagenborg MPP vessels built after 2007 **score an A or B rating** according the 2023 CII regulations.

insurance companies, financial institutions and other stakeholders to provide incentives for ships rated A or B. If a ship's rating is too low, shipowners might be viewed as less desirable to work with by the mentioned stakeholders. Corrective actions may be required, such as reducing speed to lower average fuel consumption. For ships that achieve a D rating for three consecutive years or an E rating in a single year, a corrective action plan needs to be developed as part of the Ship Energy Efficiency Management Plan (SEEMP) and approved.

WAGENBORG ACTIONS AND CII-RESULTS

The CII is based on actual fuel consumption and carbon intensity and actions that improve the operational efficiency of a vessel. Wagenborg introduced a.o. live data connections, weather routing technology, trim optimizing, combinator sailing, fuel efficiency reporting and deepening of various ship series to improve operational efficiency. These actions resulted in a relative CO₂ reduction of 23,2% (baseline 2008). A preliminary data analysis on how the CII impacts the Wagenborg fleet shows that the gearless vessels built after 2007 score an A or B rating (based on 2021 CO₂ data).





Fit for 55

Proposal: regulation not approved yet
**The European
Green Deal**

WHAT IS IT?

Mid 2021 the European Commission has released its "Fit for 55" legislation proposal, supporting its commitment to reduce net greenhouse gas emissions by at least 55% by 2030. Three of the proposed actions will have a direct impact on the shipping industry and the business of Wagenborg and her customers:

- The European Union Emission Trading System (EU ETS)
- Fuel EU Maritime
- Revision of the Energy Taxation Directive (ETD)

EMISSIONS TRADING SYSTEM (ETS)

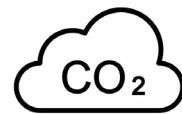
The European Parliament, the European Commission and the European Council (EU Member States) are in the final process of negotiating on the EU ETS reform, including the extension of ETS to the shipping industry.

Scope

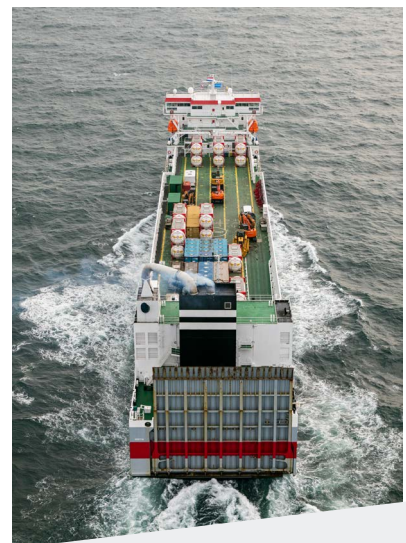
- Vessels > 5.000 GT will be covered.
- From 2025 general cargo ships between 400 GT and 5000 GT will be covered by the EU MRV. By end of 2026, the Commission will present a report on the possibility to include them in the EU ETS.
- In addition to carbon dioxide, methane and nitrous oxide will be covered by the EU MRV from 2024 and by the EU ETS from 2026.
- The geographical scope remains unchanged (100% on intra-EU voyages and 50% of voyages from/to the EU).

Phase-in period

- 2024: 40 % of verified emissions;
- 2026: 70 % of verified emissions
- 2027: 100 % of verified emissions



Starting in 2024 ETS
will put **a price on
CO₂ emissions** for
ships >5.000 GT.





EU MRV Regulation will be amended to apply to ships of > 400GT by 2025.

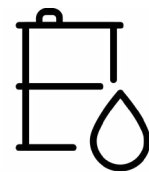
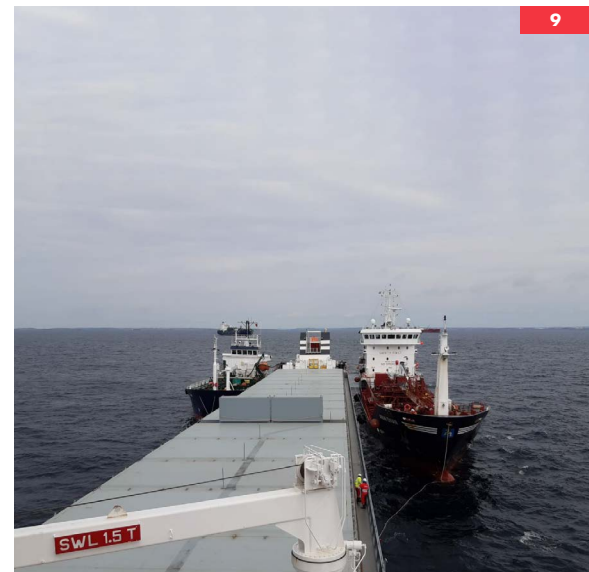
The FuelEU Maritime initiative is a new regulation proposal due to come into effect by 2025 in various phases for ships > 5.000 GT. This regulation sets maximum limits over the years on the GHG intensity of energy used on-board by ships arriving, staying or departing from EEA ports by forcing the use of renewable and low-carbon fuels.

- 2025: 2%
- 2030: 6%
- 2035: 13%
- 2040: 26%
- 2045: 59%
- 2050: 75%

ENERGY TAXATION DIRECTIVE (ETD)

A revision of the Energy Taxation Directive (ETD) proposes that conventional fossil fuels, such as HFO, VLSFO, MGO, and non-sustainable biofuels in the maritime industry will no longer be fully exempt from energy taxation for intra-EU voyages in the EU. Sustainable marine fuels will benefit from a minimum rate of zero to foster their uptake.

The directive sets a minimum tax rate for different fuel categories, which is highest for fossil fuels: 1 ton HFO results in additional € 36 per tonne HFO and 1 ton MGO results in € 38,70 per tonne MGO (€0,90/GJ). The lowest minimum rate (€0,15/GJ) applies to electricity, advanced sustainable biofuels, biogas and renewable fuels. Sustainable and alternative fuels in the maritime sector will have a minimum tax rate of zero over a 10-year period.

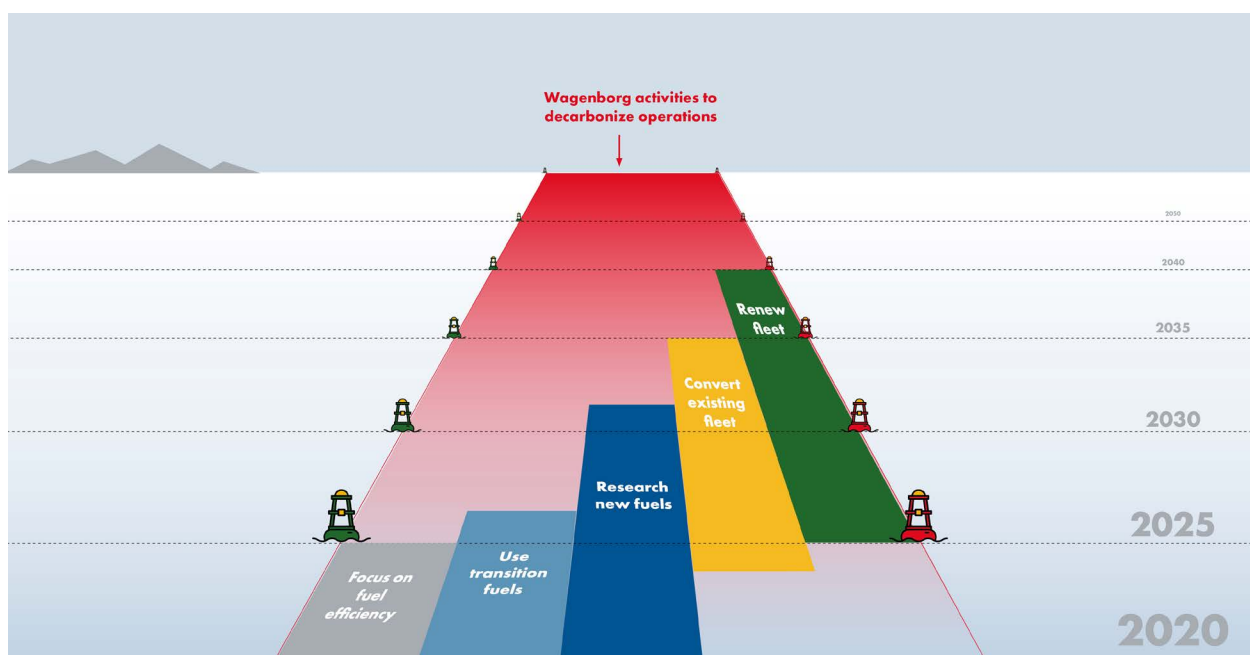


Starting in January 2024, all bunker fuel sold in the EU and used on voyages within the EU will be taxed.

Sustainability according **Wagenborg**

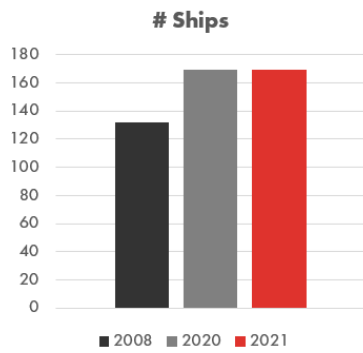
10 Wagenborg takes active part in the shipping and transport decarbonizing energy transition. Together with our stakeholders - authorities, clients, investors, public, employees, suppliers - we accept sustainability challenges to reduce our environmental footprint. Our sustainability strategy is built on 5 consecutive steps.

Our mission is to make our business more sustainable every day and to pass this on to future generations. In line with the IMO ambitions, we have set a target to reduce our CO₂ emission by 40 % per ton/mile in 2030 compared to 2008. In addition we set a goal to reduce CO₂ emissions by 70 % in 2050 compared to 2008. To achieve this target and these goals, we follow our 2050 roadmap.

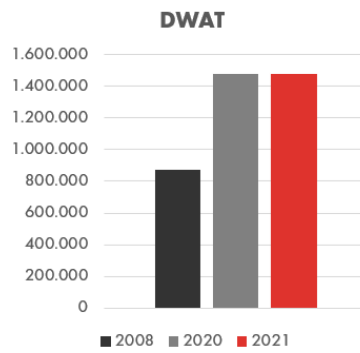


Roadmap towards 2050 to comply with CO₂ reduction targets and goals

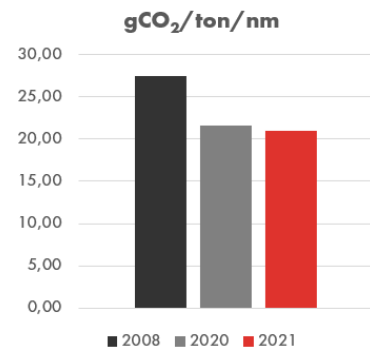
1. Fuel efficiency: Reduce fuel consumption by using available tools and improve logistic chain
2. Transition: Use of transition fuels which have less emission (drop in fuels, such as GTL or HVO)
3. Research: Investigate and test potential new carbon neutral fuels (methanol, hydrogen, electric)
4. Conversion: Convert the current fleet towards carbon neutral vessels (new propulsion and energy systems)
5. Renewal: Renew the existing fleet by carbon neutral vessels (new design emission free and new energy systems)



+28%



+70%



-24%

FUEL EFFICIENCY

Real-time monitoring of fuel consumption, optimal route planning and just-in-time arrivals are other components in our increasingly efficient shipping concepts. All Wagenborg vessels have weather systems on board to determine the fastest, efficient and most optimal route. Close cooperation between shore operators and vessels able us to avoid bad weather conditions and further reduce the risk of damage. This fuel efficiency program has contributed to a relative CO₂ reduction of 23,7% (baseline 2008).

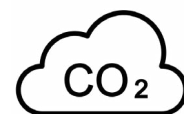
LIFE TIME EXTENTION FLEET AND REFIT PROGRAM

Wagenborg has scheduled an extensive refit program for the 25 year old vessels in her fleet. In the upcoming years systems, steel sections and equipment will be installed, replaced or upgraded during their fifth class renewal. By installing new systems and upgrading existing systems during regular maintenance and refit projects, our fleet remains ahead of compliance. In combination with improving operational performance, Wagenborg is able to make steps forward in terms of sustainability.

By innovating, modifying, refitting and improving our vessels Wagenborg aims to extend the life time of her vessels without making compromises to the quality of service. As a result, a recent inventory of our relatively young fleet (~14 years) validated an economic life time of the entire fleet of minimum 30 years.

NEW BUILDING AND FLEET RENEWAL

Besides investing in existing tonnage, Wagenborg is researching the use of alternative fuels and techniques for future new buildings. However, uncertainties in technical developments, ship financing and continuously evolving regulations make it difficult to make a choice now, given the 30 year lifespan of a ship.



To achieve a **70% CO₂ reduction** by 2050, we follow our roadmap with **5 consecutive steps**.

How we jointly can **make a next step**

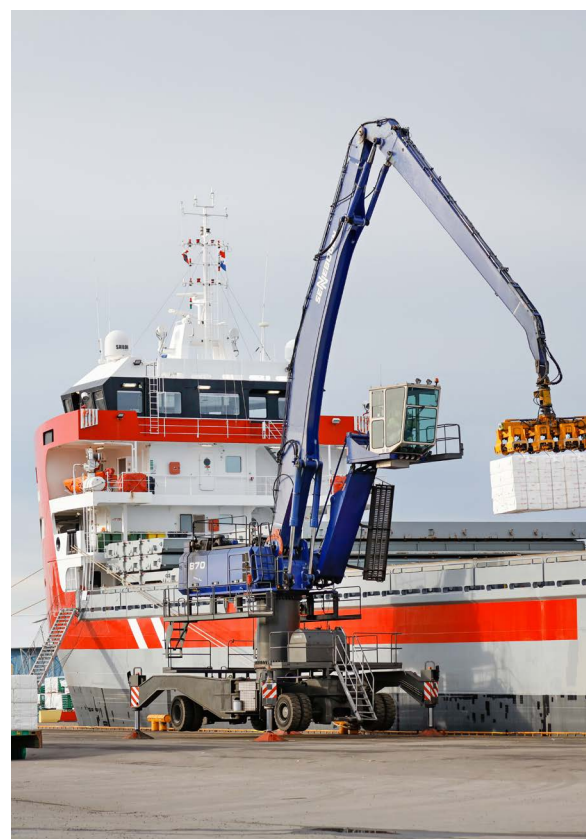
12 The EEXI and the CII will start to have an effect as from January 2023. Shortly after, ETS, FuelEU Maritime initiative and the Energy Taxation Directive are proposed to come into force. Although the EU did not decide yet, we want to and will keep you up to date by showing the future impact of the regulatory changes in a transparent way with calculations of available data.

All actions that reduce emissions per distance sailed will improve a ship's CII rating and avoid costs caused by emissions on top of the fuel costs themselves. Changing to low-carbon fuels is one route to decarbonization. Due to relatively high costs, demanding requirements and developing infrastructure, making ship operations more efficient is often the more feasible solution.

Finding and removing operational inefficiencies of ships will be incentivized. That's why Wagenborg values a close cooperation with her customers on this topic as critical. Voyage optimization and ship performance can only be successful if entire supply chains are as efficient as possible.

By addressing various questions, Wagenborg and her customer can prepare themselves for EEXI, CII and For for 55. How to:

- minimize waiting time for loading/discharging?
- minimize ballast miles?
- maximize the ship cargo capacity?
- optimize speed and route?
- involve all supply chain partners?
- select future fuels and shipping concepts?



Making ship **operations more efficient** is often the more feasible solution.

A sustainable MPP fleet

SERIES	# SHIPS	DWCC	EEXI	AER ^(*)	CII rating ^(*)
A type	15	15.750	✓	13,51	C
B type	2	8.600	✓	25,16	C
D type	3	8.350	✓	17,81	C
E type	4	10.200	✓	12,03	A
Exl type	3	10.900	✓	11,81	A
EasyMax	2	13.600	✓	8,73	A
F type	6	13.500	✓	10,43	A
FS 6.000 type	10	5.800	✓	n.a.	Not in scope
H type	1	5.650	✓	17,76	B
Icerunner	10	3.350	✓	25,39	Not in scope
IJ type	5	11.000	✓	15,375	D
K type	1	8.500	✓	17,50	
L type	4	6.900	✓	14,25	A
LL type	3	7.500	✓	19,82	D
M type	5	8.400	✓	16,23	C
Nassauborg	1	19.600	✓	13,11	D
Oranjeborg	1	15.125	✓	17,27	C
R type	3	22.000	✓	7,68	A
Saimax	12	3.500	✓	20,62	Not in scope
T type	4	19.500	✓	10,52	B
Veka type	9	3.450	✓	24,23	Not in scope
V type	4	8.300	✓	14,57	B
Vxl type	3	9.300	✓	13,56	B
Vxxl type	3	11.300	✓	10,35	A
W type	4	8.600	✓	15,23	B
Z type	3	7.300	✓	15,84	B

(*) Annual Efficiency Ratio in gCO₂/t[nm] - based on 2021 ERP data

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Founded in 1898, Royal Wagenborg is an international maritime logistics conglomerate. The family-owned and managed company offers a variety of sustainable maritime logistics services with regard to shipping, ports & terminals and offshore services. Managed out of the Delfzijl (NL) headquarters, Wagenborg has built a global commercial network. With about 2,900 employees Wagenborg serves clients predominantly in the Baltic, northwest Europe, the Mediterranean, the Americas and the Far East.



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