

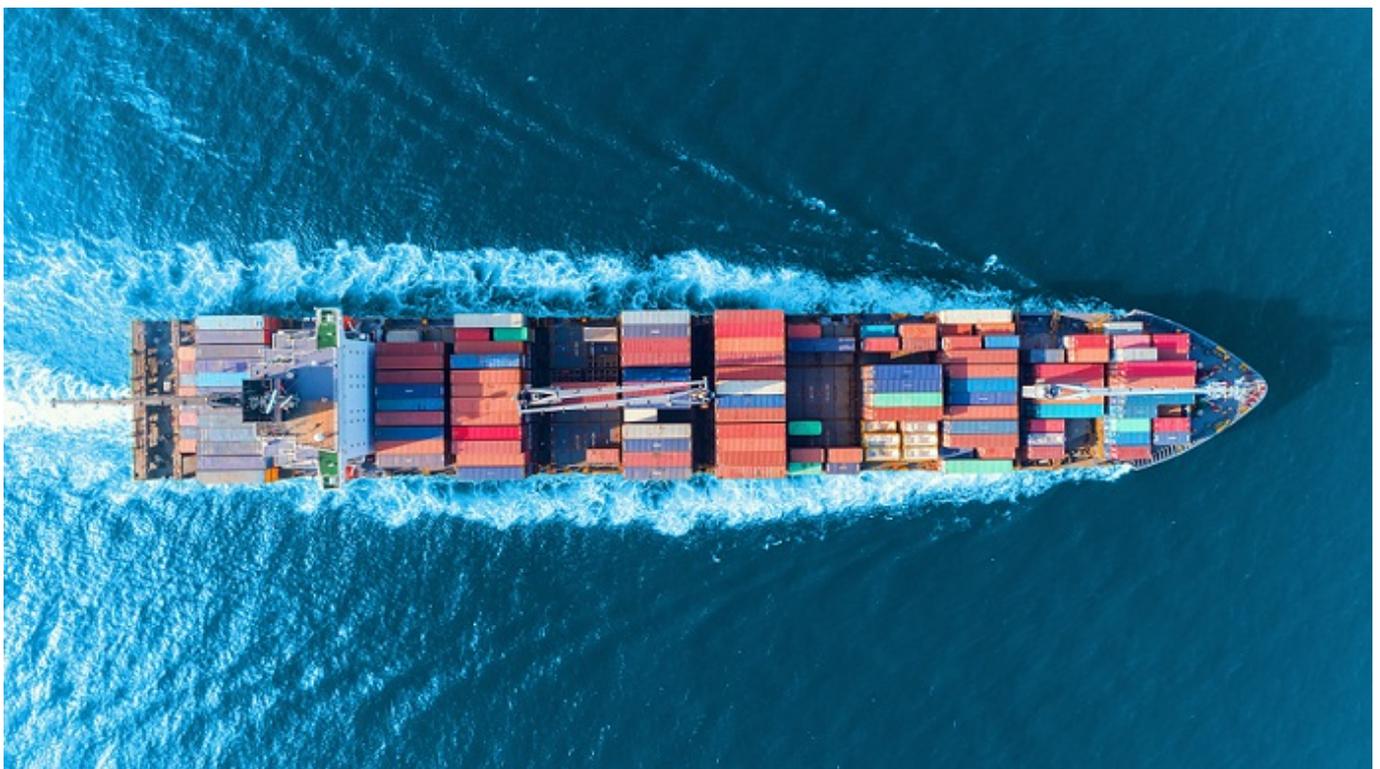


MARITIME FORUM

Cluster story: Maritime Transport

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It is estimated that over 80% of the volume of international trade in goods is carried by sea. Maritime transport is the backbone of today's global economy and also happens to be the most efficient transport mode in terms of emissions per tonne/km. Can the greenest transport mode become even greener?



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Let's play a game. Pick any civilisation in the history of mankind that thrived. There are plenty of options: the Bronze Age Indus Valley civilisation of Asia. The Phoenicians. The Egyptians. The Greeks. The Romans. Or more recently, the British Empire. Now, can you list the top reasons they were able to flourish? No matter what century or corner of the world they were from, all of these societies had one thing in common: they were masters of trade. More specifically, what really gave them an edge over their neighbours was their ability to move goods across water bodies.

Maritime transport is the quintessential blue economy activity. Although its origins have been lost in the

mists of time, and technological breakthroughs have revolutionised the transport industry over the centuries, shipping remains the backbone of today's global economy. It is estimated that [over 80% of the volume of international trade in goods is carried by sea](#) [1] – a percentage that is even higher for most developing countries. On top of that, maritime transport also happens to be [the most efficient transport mode in terms of emissions per tonne/kilometre](#) [2].

There is just one fundamental problem: environmentally friendly as they may be, nearly all ships today still rely on fossil fuel to keep sailing, and burning fossil fuel is not good for the environment. CO₂ emissions exacerbate global warming, while nitrogen oxides and sulphur dioxides are conducive to a wide range of negative impacts, including acidification and eutrophication, as well as respiratory diseases.

But if maritime transport is the “greenest” transport mode, can the shipping industry really expect to make it even greener? The answer: “yes”. The shipping industry is going to extreme lengths to reduce its environmental footprint. One consequence of this effort has been an increasingly stringent set of international and EU regulations, such as the [International Convention for the Prevention of Pollution from Ships](#) [3] and the [EU Sulphur Directive](#) [4]. Another consequence has seen the industry take on certain bottom-up initiatives, such as the [Environmental Ship Index](#) [5], the [Green Award](#) [6] and the [Clean Shipping Index](#) [7].

The EMFF plays a part through its funding of a number of projects, all with the ultimate goal of curbing shipping emissions. There are essentially two ways to curb shipping emissions, all other things being equal: use a less polluting fuel or improve efficiency. The following explains both options.

Fuel

Who said that ships have to burn fossil fuels? What if they could be powered by a type of fuel that is abundant, free, and has zero emissions? Too good to be true? Except it is true, when that fuel is wind! Four EMFF projects are set to exploit wind power to cut shipping emissions.

[GREENing the BLUE](#) [8] worked on the design and introduction of a tilting wingsail based on aeronautical design. Having the wingsail reduces fuel use and pollutant emissions in maritime transport through wind energy co-propulsion. It's not an engineering fantasy: [the wingsail does work](#) [9]!

[Aspiring wingsails](#) [10] has installed a wingsail on a fishing boat and, at the same time, it also is developing a performance monitoring system to gauge performance before and after wingsail installation.

[Seawing4Blue](#) [11] has a slightly different wind solution. It is developing an automated kite based on parafoil technology to tow commercial ships. This parafoil “sea wing” operates as an auxiliary to the ship's engines which, on average, reduces fuel usage and greenhouse gas emissions by 20%. In action the “sea wing” unfolds, operates and refolds autonomously.

[WINNEW](#) [12] has even more ambitious goals. The project is developing 363 m² wingsails which, when installed on commercial ships, can reduce fuel consumption and CO₂ emissions by up to 45%. To achieve such an impressive goal, AYRO, the company behind WINNEW, is developing new mechanical and mechatronic studies to adapt its existing solution to bigger vessels. This will be validated and tested at sea before starting large-scale commercialisation.

[PowerFLEX](#) [13] is working on an “onshore power supply” that can deliver shore-side electrical power to a ship at berth while its main and auxiliary engines are turned off. When the onshore power supply comes from renewables, it eliminates all CO₂, air pollutants, noise and vibration at the port terminal. The main objective of the project is to advance the technological and market readiness of a competitive OPS

solution.

[SpaceTech4Sea](#) [14], on the other hand, will demonstrate, validate and commercialise an innovative ultralight liquified natural gas (LNG) fuel tank, by utilising cutting-edge aerospace technologies and novel shipbuilding techniques. The technology – already adopted by NASA, Lockheed Martin Corporation and Space Missile Centre – needs to be fine-tuned and certified for marine applications. The proposed innovation is 86% lighter than the average LNG tank of the same net volume.

[TECOW](#) [15] aims to introduce the world's first emission-free high-speed ferry by 2023 in Stockholm. TECOW is developing this green hydrogen-fuel-cell-driven high-speed ferry based on proven air-foil technology. It builds on previous research projects such as [BB GREEN](#) [16].

Efficiency

[AspBAN](#) [17] is working to launch platforms for EU Atlantic ports that will work as blue economy hubs, thus diversifying their business models and revenue sources. This will result in a final pool of 30 innovative start-up solutions developed as pilots in 30 Atlantic ports, attracting €6 million in direct private investment, mobilizing €4.5 billion of potential private investment, and making a reduction of at least 100,000 tonnes of CO₂ emissions in the operations of the 30 ports.

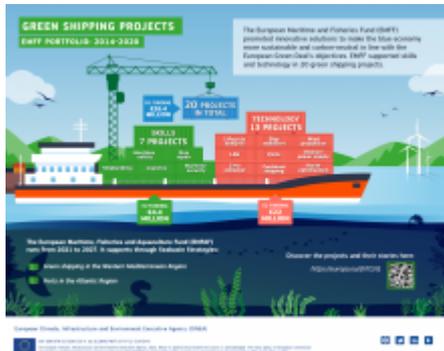
[CleanerSHIP](#) [18], true to its name, has taken an entirely different approach. The current maritime transport fleet is made up of ships that may have been built up to 30 years ago, when the applicable environmental standards were less stringent. To comply with today's requirements, shipowners must modernise their fleet, but this can be quite expensive. A potential more affordable solution calls for retrofitting their vessels – which is exactly CleanerSHIP's proposition. The project is working on FS MARINE+ for 2-Stroke applications, a retrofit solution for ship engines that significantly improves efficiency, leading to reduced fuel consumption, fewer emissions and lower maintenance costs.

[CO2NTROL](#) [19], a recently-launched project, has taken what might seem like a naïve approach to improving engine efficiency and cutting down emissions – it proposes that ships simply sail shorter or better routes. After all, if a voyage is shorter or “easier”, it follows that fuel consumption is lower as well. At issue is how to calculate shorter or better routes. CO2NTROL has taken on the challenge by devising a platform that leverages several data sets to calculate the optimal route for a container in terms of CO₂ emissions, from pick up to delivery.

[ZBoxBlueLogistics](#) [20] has come up with an ingenious solution to another shipping problem – empty containers. It is estimated that about 25% of containers are transported empty. A container leaves its port of departure fully loaded, but then is unloaded at its port of destination and it's not always possible to stack it to the limit for one more voyage. Thus it's returned empty. Moving empty containers across the globe costs shipping lines up to €25 billion a year. As a solution, ZBoxBlueLogistics has designed a container with a Z-folding mechanism that makes it possible to stack up to 5 units – so they occupy the same space as 1 standard container. Zbox saves 80% of space allocation at ports and 30% of all costs directly related to container size. The project will showcase a Pay-As-You-Save business model. More importantly, CO₂ emissions are reduced.

[VesselsLife.com](#) [21] developed a web-based platform that delivers ship life-cycle assessment decisions and support services to the entire maritime industry, including shipowners, shipyards, vetting companies, investors, cargo owners, busters, and maritime consulting companies. For example, the platform helps solve problems related to minimisation of operational costs, maximisation of revenue, selection of the best retrofit technology, evaluation of different recovering actions after a costly damage, and so on. A basic characteristic of the platform is the use of key performance indicators, such as capital and operational

expenditure, energy efficiency, and NO_x and SO_x emissions.



[22]

More info on maritime transport

Project name	Start Date	End date	Total budget in €	EU contribution in €
GREENing the BLUE: bound4blue wingsail demonstration project (GREENing the Blue [8])	01/01/2019	31/12/2021	1,246,386	810,151
Aspiring wingsails for the fishing and maritime transport sectors (Aspiring wingsails [10])	01/11/2019	31/05/2022	995,598	647,138
The automated wing to power ships, providing 20% of fuel savings and emissions reduction (Seawing4Blue [11])	01/09/2021	31/08/2023	3,571,360	2,499,952
OceanWINGS: the NEW wind propulsion technology to lead the shipping industry's shift towards a blue economy (WINNEW [12])	01/09/2021	30/11/2023	3,367,113	2,356,979
Low-cost and flexible onshore power supply for container ships consumers' and onboard batteries charging (PowerFLEX [13])	01/09/2020	31/08/2023	3,419,828	2,393,879
Implementing aerospace technology on marine LNG applications promoting sustainable blue economy (SpaceTech4Sea [14])	01/01/2019	30/06/2022	1,639,548	1,065,707
Transition to Emission-free Commuting on Waterways (TECOW [15])	01/10/2021	30/09/2024	3,834,768	2,500,000
Atlantic Smart Ports Blue Acceleration Network (AspBAN [17])	01/04/2021	31/03/2023	1,372,279	1,097,823
Retrofit Fuel and Emissions Reduction for Large Ship Engines (CleanerSHIP [18])	01/09/2020	31/08/2022	2,935,730	2,055,010
Collaborative platform for shipping container operations to take control of CO2 emissions by route optimisation (CO2NTROL [19])	01/08/2021	31/07/2023	3,742,432	2,619,702
Foldable Shipping Containers for Sustainable Blue Growth (ZBoxBlueLogistics [20])	01/10/2020	31/03/2023	3,082,242	2,157,569
Holistic Life Cycle Analysis (LCA) Platform for the Shipping Industry (VesselsLife.com [21])	01/11/2019	31/03/2021	901,234	585,802
Ship stabilizer for all season, fuel economy optimized, comfortable and safe crew transfer in the offshore and maritime industry (4SeasonCTV [23])	01/11/2021	31/10/2023	2,021,048	1,414,734

Further, the EMFF also supported several projects addressing skills in the area of green shipping, ship building, logistics, maritime safety at sea, etc., such as:

Project name	Start Date	End date	Total budget in €	EU contribution in €
Advanced Skills in Safety, Environment and Security at Sea (ASSESS [24])	01/02/2017	31/01/2019	695,624	557,399
Cooperation in Education and Training for Blue Careers (CETBC [25])	01/01/2017	31/12/2018	676,933	542,346
Common maritime education standards in the westmed (CMES-WestMed [26])	01/01/2019	31/12/2020	623,819	499,056
Atlantic Maritime Ecosystem Network (MarENet [27])	01/11/2019	31/10/2021	867,923	694,338
Maritime Logistics Engineering and Management (MarLEM [28])	01/11/2019	30/04/2023	810,791	648,633
Blue Career Centre of Eastern Mediterranean and Black Sea (MENTOR [29])	01/03/2017	28/02/2019	689,763	551,810
Establishment of Eastern Mediterranean Regional Network: pooling, sharing, development of innovative face-to-face and digital training/mentoring tools for the maritime sector (Sea of Experience [30])	01/11/2019	31/10/2022	935,008	748,006

Projects from other programmes

[Bio2Bunker](#) [31] (CEF)

[Coordinated Supply of Onshore Power in Baltic Seaports](#) [32] (CEF)

[CSHIPP](#) [33] (Interreg)

[DEEP-SEA](#) [34] (Interreg)

[EALING](#) [35] (CEF)

[EcoSail](#) [36] (H2020)

[EfficienSea 2.0](#) [37] (H2020)

[GREEN C-PORTS \[38\]](#) (CEF)
[GUTTA \[39\]](#) (Interreg)
[H2PORTS \[40\]](#) (H2020)
[INOMANS²HIP \[41\]](#) (FP7)
[ISTEN \[42\]](#) (Interreg)
[H2SHIPS \[43\]](#) (Interreg)
[LEWIATH \[44\]](#) (H2020)
[MAGPIE \[45\]](#) (H2020)
[METRO \[46\]](#) (Interreg)
[MariGreen \[47\]](#) (Interreg)
[MONALISA 2.0 \[48\]](#) (Interreg)
[NAUTILUS \[49\]](#) (H2020)
[SuperGreen \[50\]](#) (CEF)
[SUPER-LNG \[51\]](#) (Interreg)
[SUSPORT \[52\]](#) (Interreg)
[STEERER \[53\]](#) (H2020)

Useful links

[DG MOVE's page on maritime transport \[54\]](#)
[EU Maritime Transport environmental impact report \[55\]](#)

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Links

- [1] <https://unctad.org/webflyer/review-maritime-transport-2021>
- [2] <https://www.eea.europa.eu/publications/rail-and-waterborne-transport>
- [3] [https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-\(MARPOL\).aspx](https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx)
- [4] <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32016L0802>
- [5] <https://www.environmentalshipindex.org/>
- [6] <https://www.greenaward.org/>
- [7] <https://www.cleanshippingindex.com/>
- [8] <https://bound4blue.com/en/>
- [9] <https://vimeo.com/682211340>
- [10] <http://aspiringwingsails.eu/>

[11] <https://www.pole-mer-bretagne-atlantique.com/fr/naval-et-nautisme/project/seawing4blue>

[12] <https://ayro.fr/winnew-project/>

[13] <http://www.powercon.dk/index.php/services-and-products/powerflex>

[14] <https://www.oceanfinance.gr/business-development/spacetech4sea/>

[15] <https://emff.easme-web.eu/?b=891836528>

[16] <https://www.bbgreen.eu/>

[17] <https://aspban.eu/>

[18] <https://fuelsave-global.com/cleanership/>

[19] <https://buyco.co/co2ntrol/>

[20] <http://zboxbluelogistics.com/>

[21] <https://shippingsaas.eu/>

[22] <https://webgate.ec.europa.eu/maritimeforum/sites/default/files/infographic.png>

[23] <https://www.dacoma.dk/4seasonctv>

[24] <http://assess.dia.units.it/>

[25] <https://emff.easme-web.eu/?p=749363>

[26] <https://cmeswm.eu/>

[27] <https://www.marenet.org/home/>

[28] <https://grupoqualiseg.com/marlem>

[29] <http://mentor.cubiclemon.net/>

[30] <https://seaofexperience.org/>

[31] <https://ec.europa.eu/inea/en/connecting-europe-facility/cef-transport/2019-nl-tm-0196-w>

[32] <https://ec.europa.eu/inea/en/connecting-europe-facility/cef-transport/2019-eu-tm-0125-w>

[33] <https://interreg-baltic.eu/project/cshipp/>

[34] <https://www.italy-croatia.eu/web/deep-sea>

[35] <https://ec.europa.eu/inea/en/connecting-europe-facility/cef-transport/2019-eu-tm-0234-s>

[36] <https://ecosailnavigation.com/>

[37] <https://cordis.europa.eu/project/id/636329>

[38] <https://ec.europa.eu/inea/en/connecting-europe-facility/cef-transport/2018-eu-tm-0117-s>

[39] <https://www.gutta-visir.eu/>

[40] <https://h2ports.eu/>

[41] <https://cordis.europa.eu/project/id/266082/reporting>

[42] <https://isten.adrioninterreg.eu/>

[43] <https://h2ships.org/>

[44] <https://cordis.europa.eu/project/id/836347>

[45] <https://www.magpie-ports.eu/>

[46] <https://www.italy-croatia.eu/web/metro>

[47] <http://en.marigreen.eu/>

[48] <https://www.seatrafficmanagement.info/projects/monalisa-2/>

[49] <https://nautilus-project.eu/project-nautilus>

[50] <https://ec.europa.eu/inea/en/connecting-europe-facility/cef-transport/2017-el-tm-0048-w>

[51] <https://superlng.adrioninterreg.eu/>

[52] <https://www.italy-croatia.eu/web/susport>

[53] <https://waterborne.eu/projects/coordination-projects/steerer/>

[54] https://transport.ec.europa.eu/transport-modes/maritime_en

[55] <https://www.eea.europa.eu/highlights/eu-maritime-transport-first-environmental>