

Investigating the carbon intensity of ferries

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Climate change mitigation requires curbing emissions from all sectors, including shipping. The European Union has set ambitious targets to achieve this goal. The European regulation number 757 on Monitoring, Reporting, and Verification of CO₂ emissions (EU-MRV) contributes to it by collecting CO₂ emission data from all vessels above 5,000 GT

calling at ports within the European Economic Area.

In this area, ferries represent just 3% of all vessels. However, in 2018 they accounted for 10% of CO₂ emissions from all ships in the EU-MRV. Why carbon footprint of ferries is so high? Is it related to sea or navigational conditions? Or perhaps to any characteristics of the vessels?

A CMCC study presented last June during the 21st IEEE International Conference on Mobile Data Management and realized in the framework of GUTTA project's activities, explores this issue while providing new insights and perspective.

The analysis, led by Gianandrea Mannarini, senior scientist at the CMCC Foundation, explores various energy efficiency indicators. Results reveal some clustering in the [vessel](#) population and the key factors are year of build, vessel length, service speed, and fuel type. Georeferencing data provide additional information on the continental patterns of the Ro-Pax emissions.

About the half of the total ferry emissions stem from the Mediterranean; this largely reflects a greater number of ships operating in this sea. More in detail, the study highlights a weak correlation between CO₂ emission per service hours and the mean annual sea state (significant height of waves where the ferry operates); this correlation is slightly higher just for smaller ferries (i.e., length below 120 meters). Researchers also assess which factors influence ferry carbon intensity, defined as CO₂ emissions per transport work, highlighting a great variability spanning five orders of magnitude, while the ferry size varies by less than two.

"This variability is influenced by many factors," Gianandrea Mannarini explains, "such as [ferry](#) size, propulsion features, age and other characteristics of the Ro-Pax vessels, such as number of vehicles carries, number of cabins available and other passenger services. However, we

will have to use data from multiple years for better analyzing how ferries performed with respect to emissions."

In certain ways, energy efficiency reflects the ship's age and the tendency to build bigger and bigger ships during the last decades. "The data," Mannarini adds, "indicate that some of the most carbon intensive vessels were built during the past 20 years. More and better time-resolved [emission](#) data from the vessels, possibly at individual voyage level, would enable a better assessment, which is the first step for informing International policies and regulations aimed at reducing both carbon intensity and absolute emissions."

More information: Gianandrea Mannarini et al, EU-MRV: an analysis of 2018's Ro-Pax CO2 data, *2020 21st IEEE International Conference on Mobile Data Management (MDM)* (2020). [DOI: 10.1109/MDM48529.2020.00065](#)

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