Interreg
Italy - Croatia
GUTTA
EUROPEAN UNION

Project	GUTTA
Work Package number	2
Work Package title	Communication activities
Deliverable number	2.2.6
Deliverable title	Submission of first open-access peer-reviewed journal paper
Deliverable Responsible Partner	CMCC
Deliverable Lead authors	Gianandrea Mannarini (CMCC)
Deliverable Contributors	Lorenzo Carelli (CMCC), Josip Orović (Unizd), Giovanni Coppini(CMCC), Mario Leonardo Salinas (CMCC)
Deliverable due date	30-04-2022
Deliverable latest review date	05-08-2022

1. Executive Summary

This report documents the submission and publication of some peer-reviewed journal papers related to the GUTTA project's developments.

For the shortcuts employed in this report, we refer to the official GUTTA Glossary, which can be found at https://zenodo.org/record/3676344 .

2. Key information on the papers

Despite in Activity 2.2 the GUTTA project was just committed to submit one peer-reviewed journal paper, two were submitted and even published during the lifetime of the project. They are shorty documented in the following subsections.

2.1 First paper

The following paper was submitted on Dec. 22, 2020, and published on Jan. 23, 2021:

Towards Least-CO2 Ferry Routes in the Adriatic Sea

Authors: Mannarini, G. (CMCC); Carelli, L. (CMCC); Orović, J. (UniZd); Martinkus, C.P. (CMCC);; Coppini, G. (CMCC).

Abstract

Carbon intensity of ship emissions is a cornerstone of contemporary regulatory actions, with measurable targets of reduction being enforced in the coming decade. Short term measures to achieve them include voyage optimization. Therefore, the VISIR ship routing model was upgraded for computing least-CO_2 routes depending on ocean analysis products related to waves and sea currents. The speed loss in waves and the CO_2 emission rate of a medium size Ro-Pax ship were obtained from a coupled command-bridge engine-room simulator. The geographical and topological features of least-CO_2 routes resulting from VISIR were characterised by means of various types of isolines. A case study in the Adriatic Sea leads to bundles of optimal routes with significant spatial diversions even on short-sea routes. The carbon intensity savings were compared to the CO_2 savings, highlighting also their dependence on both route lengthening and

fractional engine load. For a case study in winter, carbon intensity reductions up to 11% were computed with respect to least-distance routes between the same couple of ports of call. This is promising, as a reduction of this magnitude represents a significant amount of the carbon intensity curbing target required at International level

Key Figure

HRZAD_ITBLT_20190125_1200
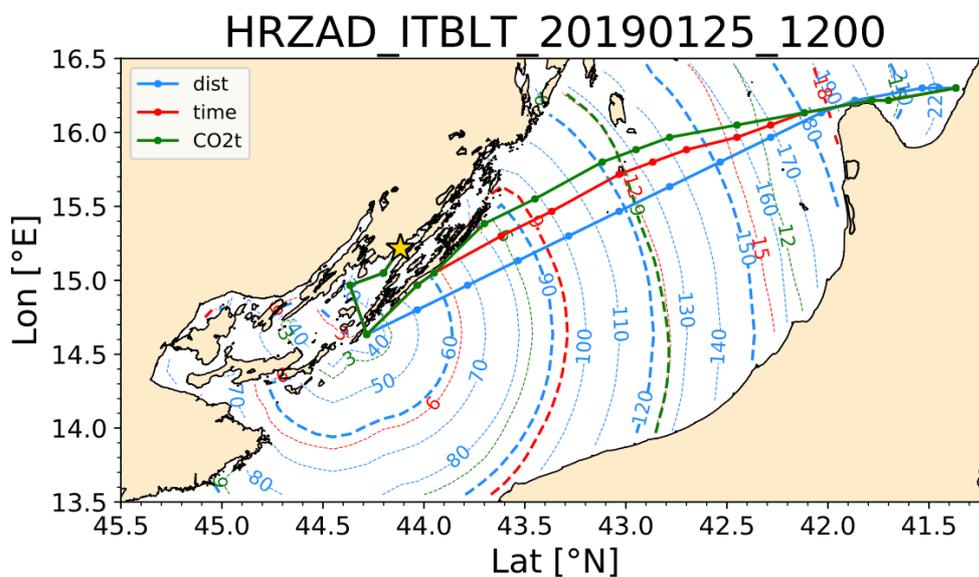
2.2 Second paper

The following paper was submitted on Apr. 1, 2022, and published on Apr. 27, 2022:

How COVID-19 Affected GHG Emissions of Ferries in Europe
Authors: Mannarini, G. (CMCC); Salinas, M.L. (CMCC); Carelli, L. (CMCC); Fassò A. (UniBg).

Abstract

Unprecedented socioeconomic conditions during the COVID-19 pandemic impacted shipping. We combined ferry CO_2 emissions in Europe (from the EU-MRV) with port call data and vessel

parameters, and analysed them using mixed-effects linear models with interactions. We found a generalized reduction in unitary emissions in 2020, confirming its causal relation with COVID-19. Furthermore, for larger ferries, additional and COVID-19-related reductions between 14% and 31% occurred, with the larger reductions for those built before 1999. Ferries operating in the Baltic and Mediterranean Seas experienced comparable reductions in their unitary emissions, but in the North Sea per-ship emissions decreased by an additional 18%. Per-ship emissions at berth, while showing increases or decreases depending on ferry type, did not significantly change at the fleet level. We believe that our methodology may help assess the progress of shipping toward decarbonisation in the presence of external shocks.

Graphical Abstract