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## 1. Executive Summary

The GUTTA-VISIR (GV in short) web application for discovering ferry routes of minimum CO<sub>2</sub> emissions was developed in the frame of the GUTTA project. Feedback from both project-internal and external (cf. previous deliverable, D.5.1.1) users was collected. It is here critically reviewed with the aim to extract suggestions for enhancing the fitness-for-use of GV. The selection of updates is here justified, and the new features of the latest version of GV are described.

## 2. Introduction

The aim of the GUTTA-VISIR<sup>1</sup> (GV) service is reported in Appendix A.1. and can be summarized as the realization of a user-friendly, web-based system for browsing least-CO<sub>2</sub> ferry routes in the Adriatic sea.

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<sup>1</sup> <https://www.gutta-visir.eu/>

One of its earliest operational and public versions (v.1.2.1) was documented in previous GUTTA deliverable D.4.4.1. Instead, in D.5.1.1. the process of formal collection of feedback from project-external users of GV was documented. It provided a general picture of satisfaction with the service, but also some suggestions how to improve it further. It is the purpose of the current deliverable to critically review such external feedback, merging it with the project-internal one, to assess and possibly enhance the fitness-for-use of GV.

It should be noted that GV underwent several updates even before the formal collection of feedback, as documented in the version history in Appendix A.2. In this deliverable, just changes from v.1.2.7 to v.1.3.0 are discussed and presented.

The document contains the critical assessment of the collected feedback in Sect.3 and a description of the latest updates in Sect.4. Besides the Conclusions in Sect.5, two Appendices and some online References complement the information provided in the main text.

### 3. Feedback critical assessment

Previous GUTTA deliverable D.5.1.1. concluded that external feedback on GV was quite positive and the evidence of malfunctioning was very limited. Aiming to a continuous improvement, the GUTTA consortium made use of this feedback for realizing an update of GV. In this respect, while all suggestion items collected via both D.5.1.1. and the project-internal feedback were considered with care, not all of them were relevant or feasible. Therefore, a first step in making GV more fit-for-use was a critical assessment of the information collected. In the following, it is distinguished between project-internal (Sect.3.1) and project-external feedback (Sect.3.2). Upon comparing them to both the mission of GV (cf. Appendix A.1) and the residual resources available within the project lifetime, some items had to be rejected (Sect.3.3) and the remaining ones implemented into a new version.

#### 3.1 Internal feedback

Having worked for months across the technical details of the GV web app, the developers are the first source of suggestions to be considered to improve the service. The recommended improvements were the following ones:

11. Have sub-urls for the three sections of Help page
12. manage banners via md files for informing about disruptions and updates on About and Help pages

13. both About and Help: replace “CMEMS” with “Copernicus Marine Service”
14. embed GUTTA project final video
15. Help: various corrections of technical info
16. Feedback: mv “Follow us” to a dedicated section, where just Twitter is available and previewed
17. DVT: Avoid periodicity in the timestep selection arrows. Use a solid stop at the min and max timestep
18. DM: add names of ports in the tooltips, as in DVP (eg.: “Zadar (HRZAD)”)
19. DD: activate route selection even when not ALL
110. Portability: test how long string like “Igoumenitsa” would look like on mobile

### 3.2 External feedback

The non-project related feedback was collected as documented in GUTTA deliverable D.5.1.1. Those providing this feedback are warmly thanked by the GUTTA project team. Their suggestions are verbatim reported in the following:

- E1. better left bar menu hiding and app for mobile phone
- E2. You could provide explanation for abbreviations (example: CG DIST [g/ton-mile], EEOI [g/pax-mile], etc.)
- E3. [Add] Calculation of voyage with exact time of arrival
- E4. Meaning of WEST and EAST from Port selection not really clear (?) Any particular reason to use WEST and EAST instead Port names?
- E5. Sea Currents and Waves not accessible and can't be shown on the map during the test. Message received: msLoadMap(): Unable to access file. (/var/www/html/cache/\_VISIR-GUTTA/OUTPUT/mapfiles/AdriaticSea\_nu04\_inv012\_T07\_ITAOI\_HRSPU\_20211213\_0300\_curr\_085.map)
- E6. DATE AND TIME – Time settings every three hours or ALL. However departure could be at 01:45 UTC; however from drop menu user shall select time 00:00 or 03:00 UTC). Suggestion to add period from 00-00 to 23:59 in drop menu)
- E7. As per Help, all times are shown in UTC. It is clear after reading the Help menu; however, to be more user-friendly, suggestion to add word (UTC) after DATE AND TIME in Visualization Settings screen.
- E8. On the Map, suggestion to implement the distance scale or some features to measure the distance between the various points.
- E9. Name of Ports are shown as abbreviations on the Map. To avoid any confusion, suggestion to include same abbreviations to Port names for Route selection in main screen.

- E10. From navigational perspective, offered Routes (CO<sub>2</sub>, Time or Dist) shall include and indicate the WP data (long/long and names) on the Map."
- E11. the plots of CII are displaying all the points regarding the three engine load values not the selected value (70% or 85% or 100%)
- E12. [Add] The ship weight parameter (input) maybe? because it may differ the case when a container surfs lightweight or fully loaded.. so for the ship weight was it chosen like a standard one or doesn't it have an important influence on the results, and thus neglected? -- Another feature that might be helpful is giving the user the ability to choose their current position (from inside the sea) and a destination port, then let the simulator pick the closest "calculated point" and closest "time of the day" to suggest them a best route to follow..
- E13. When choosing from WEST to EAST (or the opposite), it becomes not possible to select a feature from the legend to visualise, it only shows CO<sub>2</sub>. Is it overlapping? I think overlapping issue can be fixed by using a transparency value (for example 0.8 instead of 1) for the features on the map, which can help distinguish better the routes of each parameter.
- E14. Just a slight latency when choosing EAST <--> WEST, but I suppose it's because of the heavy amount of data that's being communicated for the display
- E15. [Add export into] CSV or Excel [format]
- E16. [Add] Weather forecast window.
- E17. "Linechart not displaying the right data if the ALL option is selected from the left menu, see screenshot attached."
- E18. Unusually route selection regardless of the actual weather condition. E.g Zadar – Ancona selected route. (possibility to navigate with shortest route considering the actual weather condition prevailing in the navigation area). Generally, application is user friendly with easy accessible to all relevant parameters for optimal route calculating

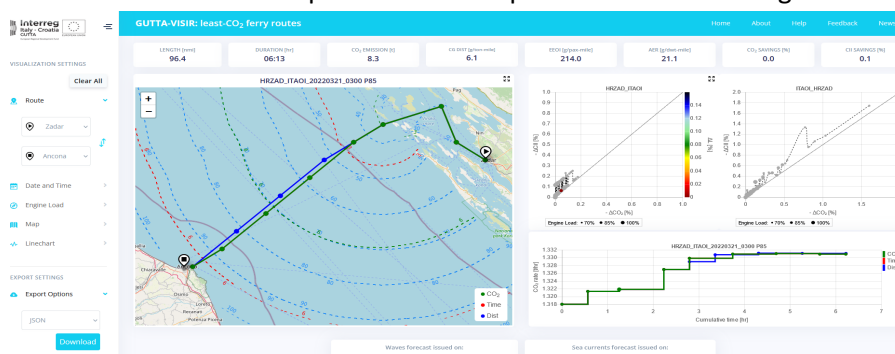


Figure 1 Screenshot attached by the GV user making comment E18.

For sake of completeness, also a few appreciations for GV by the external users are here reported:

- A1. GUI is fantastic!!!
- A2. [any new feature to recommend?] no for now
- A3. everything is working good and user interface is friendly

### 3.3 Rejected feedback

In the following, all rejected suggestions on GV are listed, with reason for rejection. This does not automatically imply that these suggestions are not valuable. Suggestions which are both reasonable and technical feasible are stored for being used if additional resource for further developing the GV service will be available in the future. The not rejected suggestions were implemented in version 1.3.0., as documented in subsequent Sect.4.

#### Internal

- I1. Lack of resources for this development
- I6. Lack of resources for this development
- I7. Technical staff does not recommend it
- I9. Technically not consistent with the logic of the service

#### External

- E1. GV is primarily meant for use on desktop computers
- E3. There are three times of arrival, one for each optimization objective. The one related to the least-CO2 route is already available in the downloadable voyage plan. Displaying additional information in a tooltip on the map is discouraged from the technical team
- E4. Please see <https://www.gutta-visir.eu/other/help#general> for explanation
- E5. Temporary malfunctioning, please follow @visirnavi on Twitter (<https://twitter.com/VISIRnavi>) for real-time information, see Fig.2 . Furthermore, since version v.1.2.3 (s. Appendix A.2), a full-screen banner automatically activates in case of malfunctioning of GV, see Fig.3.

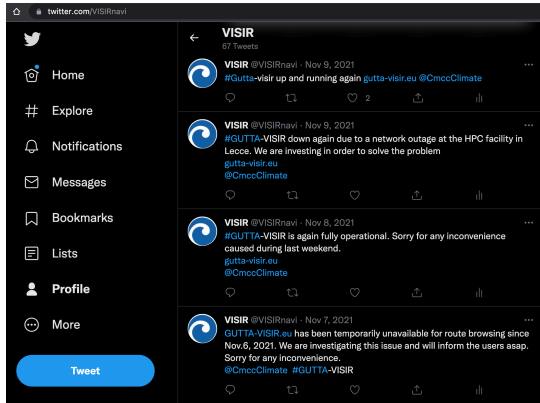


Figure 2 Twitts of the @visirnavi account informing the GV users about temporary malfunctioning and subsequent restoration of operations.

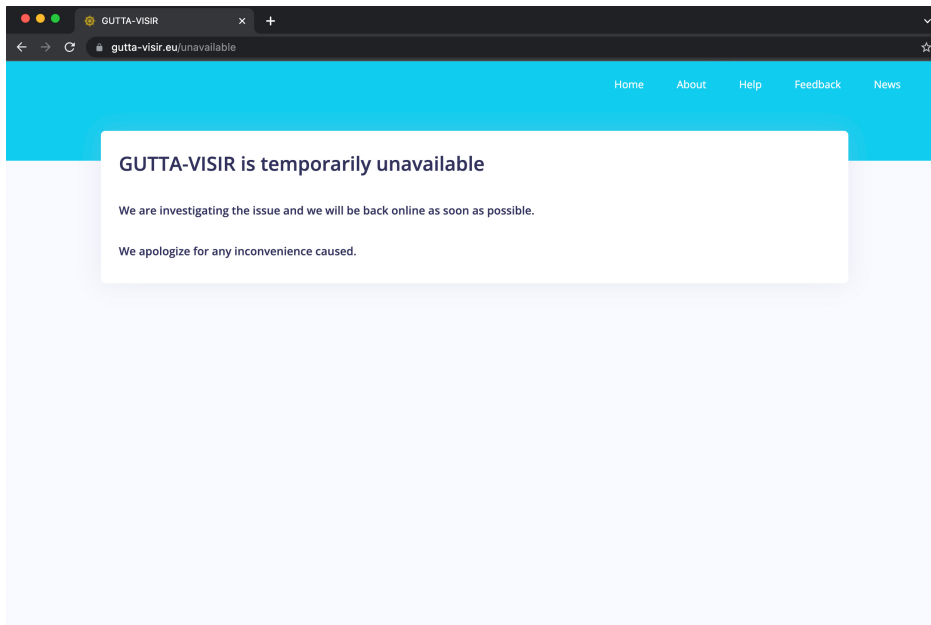


Figure 3 Appearance of GV in case of temporary malfunctioning.

E6. Routes are precomputed. Three-hourly departures implies a total of more 7,000 routes computations per day. We presently cannot afford devoting more computational resources to GV.

E10. already available feature

E11. The savings relative to the selected engine load values are displayed as colored markers

E12. GV is meant for a specific ferry. Its parameters are provided in <https://www.gutta-visir.eu/other/help#background>. However, we did not perform any seakeeping computation for the vessel, as it was obtained from a ship simulator. The re-routing service is out of the scope of GV.

E13. Upon choosing WEST of EAST, it is still possible to select from the left menu (from “Map” block) to display either least-CO2 (default) or least-time (option) routes. They are portrayed in different colors, as in the legend available within the map.

E14. Yes, this may occasionally happen, as about 3,600 routes are loaded for this purpose.

E15. Route storing is expensive for us and we maintain a public archive of all historical routes at <https://dds.cmcc.it/#/dataset/gutta-visir/routes>. Furthermore, online converters from either JSON or XML exist: <https://data.page/json/csv> , <https://www.convertcsv.com/xml-to-csv.htm>

E16. Not clear what is meant with this comment. GV can display either wave or sea current forecast maps (see the left menu, “Map” block). These are the sole dynamic environmental fields used for GV.

E17. Linechart is not supposed to display any data if ALL selected from the left menu, “Date and Time” block. The reason is that the Linechart logic is designed to display single-route information.

E18. It is not clear from the message and the attached screenshot in what sense the route is unusual. The used forecast sea state is probably quite calm, as seen from both negligible route diversions and CII savings. It should be recalled that forecast fields used in VISIR are from the Copernicus Marine Service, and may differ from analogous products by other providers and from the actual, observed conditions at sea.

## 4. Implementation of the changes

The process described in Sect.3 lead to selection of a few items, which are both feasible and urgent, to improve GV fitness-for-use. They can be found in Fig.4, where the correspondence with the feedback items is also provided.



Sub-urls for the help	(I1)	Topbar	Done
About and Help edits	(I3)	Topbar	Done
Half size of youtube video	(I5)	Topbar	Done
About: embed GUTTA project video	(I4)	Topbar	Done
DM: Add port names in tooltip	(I8, E9)	Product a	Done
DVT: add subtitle "[all times in UTC]" in grey	(E7)	Sidebar	Done
various updates in Help	(E4)	Topbar	Done
DK: add names to tooltip	(E9)	Product b	Done
DM: Add map scale control	(E8)	Product a	Done

Figure 4 Table of accepted changes for the new version of the GV web app.

### 4.1 New features of the web app

The changes introduced into GV along with v.1.3.0 are graphically documented in this subsection. Fig.5 provides an overview of parts of the home page affected by changes. Some zooms are provided in Fig.6, while Fig.7 shows some changes applied in the About and Help pages.

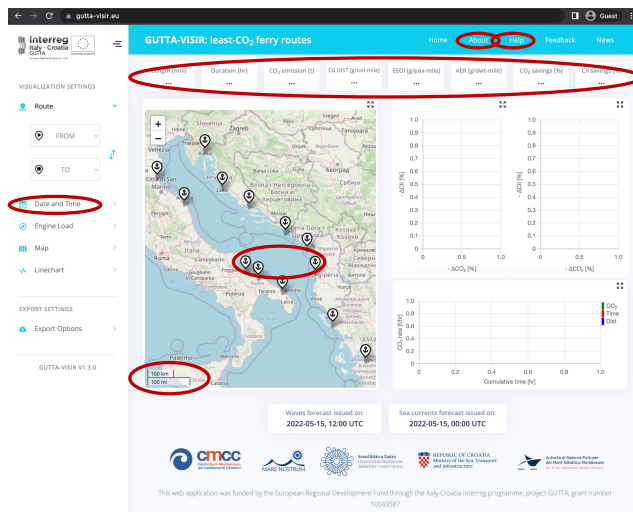


Figure 5 Highlight of changes on GV web app- part1: the red ellipses mark parts affected by updates.



Figure 6 Highlight of changes on GV web app– part2: the red ellipses mark parts affected by updates.

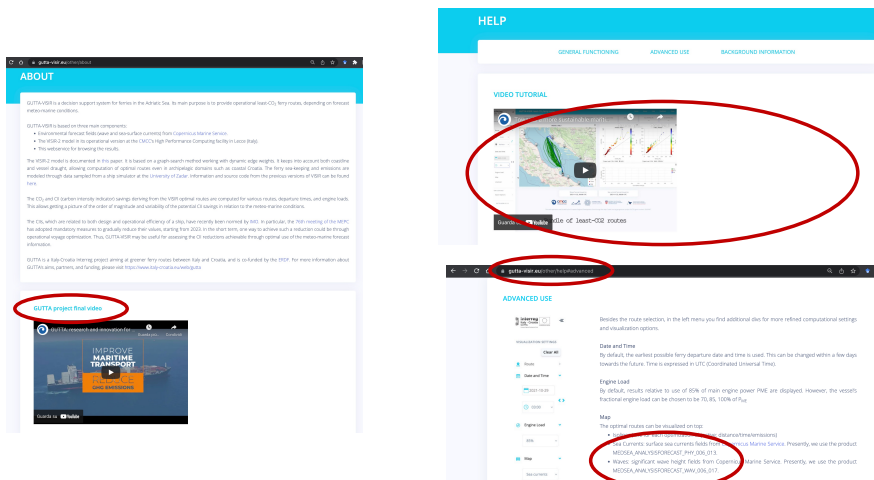


Figure 7 Highlight of changes on GV web app- part3: the red ellipses mark parts affected by updates.

## 5. Conclusions

Through listening to both internal and external users experience, a total of 28 suggestion items for improving GV were collected. While all suggestion items were considered with care, not all of them were relevant or feasible. Therefore, a crucial step in making GV more fit-for-use was a critical assessment of the information collected (Sect.3). Then, the actual implementation of the updates followed, and it was documented in Sect.4. Not yet implemented suggestions which are both reasonable and technical feasible are archived for being used if additional resource for further developing the GV service will be available in the future.

We believe that, through this reviewing and updating step, GV has been made even closer to the end-user needs and more consistent with its aim. That is, to provide easy-to-access least-CO<sub>2</sub> ferry routes for a ferry sailing in the Adriatic Sea, making use of meteo-oceanographic forecasting products.

## Appendix

### A.1 Purpose of GUTTA-VISIR

The purpose of GV was specified in the AF of GUTTA, in the description of Activity 4.4:

*“This activity will consist in the design and codification of both the back-end (server infrastructure) and front-end (user interface) software of the operational DSS for eco-routes.*

*The technological infrastructure of the DSS will be structured as a multilayer architecture, in order to map the system infrastructure to the physical layers on which the application will be deployed and executed. The application stack will comprise a presentation layer, a business logic layer, and a data layer, following CMCC’s experience in developing the web application [www.VISIR-nav.com](http://www.VISIR-nav.com).*

*The DSS will be accessed through a web application with a georeferenced panel and a menu for setting vessel and voyage parameters. The computations will occur on a remote server, avoiding heavy bandwidth and computational capacity requirements. The user will be able to see the CO<sub>2</sub>-optimized routes both on a map and to export them in tabular format for further analysis or machine-to-machine communication purpose.”*

## A.2 GV version history since October 2021 to April 2022

### V1.3.0 (Prod)

Date: 08-04-2022

- Update help page - video size and text
- Update about page - embed video and text
- Help: Sub-url for subsections
- DM: portnames in tooltip
- DVT: subtitle "all times in UTC"
- DK: tooltip explaining about metrics
- DM: Add scale control

### V1.2.7 (Prod)

Date: 07-02-2022

- Update help page - video and text

### V1.2.6 (Prod)

Date: 06-12-2021

- **Bug** fixed after change of file path name

### V1.2.5 (Prod)

Date: 25-11-2021

- Update help
- Linechart **bug** fix: add last null value
- Linechart **bug** : cum. dist to decimal from hh:mm

### V1.2.4 (Internal)

Date: 23-11-2021

- Update help

### V1.2.3 (Prod)

Date: 16-11-2021

- Unselect waypoint on popup re-click (**bug B1**)
- Disable legend click when DVP/dvt=all (**bug**)
- Include "least" to east/west map title (**bug B3**)
- Stop wp interaction when map/linechart legend active (**bug B2**)
- Map legend re-ordering
- Change linechart legend click behaviour=> select legend on clicking and unselect others
- Blue lines in bundle should not be highlighted (**bug**)

#### V1.2.2 (Internal)

Date: 09-11-2021

- Added service unavailable page

#### V1.2.1 (Prod)

Date: 03-11-2021

- Text Westbound on east-west selection (bug)
- Go to Route functionality for product east/west
- Hover port tooltip with code names

#### V1.2.0 (Prod)

Date: 02-11-2021

- Public version of v1.1.3

#### V1.1.3 (Internal)

Date: 29-10-2021

- Port selection after clear all bug solved
- Safari port selection bug resolved
- Help/about/news page update
- Go to route - button color to grey

#### V1.1.2 (Internal)

Date: 28-10-2021

- Dynamic legend in DL & DM
- DD: triangle black edge
- Go to route - make button not link
- WP tooltip reorder

#### V1.1.1 (Internal)

Date: 21-10-2021

- DK: Duration missing units: [hr]
- if ALL , tooltip of a specific route: replace "Departure" with "Start"
- analytics and cooky policy [to be discussed with [privacy@cmcc.it](mailto:privacy@cmcc.it)]
- Stop time reset in date change
- Remove "dashboard" from URL
- Add MCUR in wp tooltip
- Go to Route link on bundle tooltip to go from product f to a
- Add time back(<) and forward(>) in DVD/DVT

## References

GV service: <https://www.gutta-visir.eu/>

GV video-tutorial: [https://www.youtube.com/watch?v=-qORsU-Jh\\_8&t=2s](https://www.youtube.com/watch?v=-qORsU-Jh_8&t=2s)

GV paper: <https://www.mdpi.com/2077-1312/9/2/115>