

Profile calculators set up

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Summary

Work Package 4 - Smart logistics pilot and test of profiles calculators	4
Activity 4.1 - TRANSPOGOOD profiles calculator	5
Deliverable D4.1.1 – Profile calculators set up.....	6
Introduction	6
Profile calculators set up	7
Routing Algorithm - Routing Engine	7
Time Tables.....	10
Cost Simulation.....	14
Environmental footprint calculation - CO2 emission	17
Comparing the different footprint calculators	22
Conclusion	34

Work Package 4 - Smart logistics pilot and test of profiles calculators

A significant share of the companies that deal with transport and supply chain management in Europe recognise interoperability and information exchange as a relevant challenge. Information exchange implementations have so far mostly taken place at an individual mode level, often triggered by traffic management needs. To achieve higher efficiency levels, large companies have significant costs in making sure that their supply chains are connected. Many SMEs lack the capability and resources to properly interoperate and collaborate with other companies.

In this context, WP4 aims at showing the benefits brought by the TRANSPOGOOD platform developed in WP3.

The platform is implemented as a set of collaborative information services that are feasible (technically and economically) and will be tested by a pilot application in private as well as public scenarios representing the Programme Area.

The main expected outputs of WP4 are the following:

- To deploy a connectivity infrastructure that supports low-cost / easy to use solutions. The project will setup this connectivity infrastructure that consists in the TRANSPOGOOD platform, building on the expertise and the technologies developed in INTERMODADRIA IPA project;
- Enhanced supply chain planning: the TRANSPOGOOD platform (specifically on the basis of profile calculators and MOS e-procurement tool, designed in WP3) will provide tools to plan and manage transport and supply chain services on a multi-provider and door-to-door context. It will be tested in port as well as in intermodal transport mission scenarios;
- Analysis of “as is” and “to be” situation to verify the benefits brought by the implementation of TRANSPOGOOD platform to port authorities, transport operators and SMEs;
- Pilot demonstration and performance assessment in order to verify how the stakeholders and users requirements are met;
- Cost savings;
- Environmental benefits from using fewer resources in terms of reduction of carbon footprint;
- Improved reporting in terms of KPIs available on the use of resources.

Activity 4.1 - TRANSPOGOOD profiles calculator

Activity 4.1 focuses on a set of simple and low cost applications for logistic operators and related companies. These applications will be available also for SMEs and can help stakeholders to save time, money, and resources and reduce carbon footprint.

The calculators give indication of specific profiles on the basis of data inserted by the users and of data available through the TRANSPOGOOD platform.

The platform is enriched by innovative profile calculators to allow logistics and transport stakeholders and users to optimise and select the best option very quickly and easily in terms of: best price of the combined transport, lower emissions of the entire chain, higher load factor in both directions and total transit time.

The expected outputs of these applications are related to: cost savings - due to a more transparent

intermodal transport market where it will be possible to buy services through an MOS e-procurement module that will allow different operators to compete in order to obtain the flow - reduction of carbon footprint, improved management control and information flow and improved reporting.

Deliverable D4.1.1 – Profile calculators set up

Introduction

TRANSPOGOOD platform, as an IT platform enhanced by online applications for intermodal traffic, should enable transport operators, SMEs, port authorities, terminals, logistic stakeholders, users, shippers, freight forwarders, to increase efficiency in operations and administrative functions, decrease costs and optimize transport route, maximize space utilization and reduce congestion on streets and nodes.

The platform is enriched by innovative profile calculators to allow logistics and transport stakeholders and users to optimise and select the best option very quickly and easily in terms of: best price of the combined transport, lower emissions of the entire chain, higher load factor in both directions and total transit time.

The Platform intends to facilitate forwarders and truck transportation companies in identifying the best trip solution, considering mainly intermodal opportunities.

The general approach is to create an “umbrella tool” that will be able in the future to connect and share information with existing business platform and providers. It is like a “Trivago” or “Kayak” portal that on the basis of specific request will look up in different existing platform. In this way the Transpogood platform, overcome all the issues related with state aids, business, incomes, and so on.

The platform do not sell any service but will just forward to the “open” market, letting business operation to privates and letting the market open to all the interested private bodies.

The platform will provide 4 level of services:

- Informative: it will provide information about costs and intermodal services on the basis of standard tables provided by shipping lines. It is similar to the google maps path-finding algorithm but calibrated for truck users and considering intermodality;
- strategic procurement: user will be informed that is possible to use specific business platforms to obtain a price quotation of desired transport services. Links to several platforms will be provided. As pilot application, for the project’s duration, real market data will be used as test bed. This will also allow to get a benchmark of real market costs related to connections between Italy and Croatia;
- spot market: users will be informed that is possible to use a specific platform to make spot transport requests and obtain price quotations. Links to the platforms will be displayed;
- connection with PCS: as pilot application, real time data from Ploce PCS will be displayed. Data will be mainly regarding parking availability. Data will be sent through xml format.

Profile calculators set up

Routing Algorithm - Routing Engine

Routing algorithm should be designed as follows.

User will enter **Origin** and **Destination** points (limited to Croatia and Italy areas) and **departure date**.

- A) For each Origin and Destination point the system will then calculate the distance with ports that have ferry services:
 - if Origin/Destination point is in Italy
 - the distance with ports of Venice, Ravenna, Ancona, Bari, Brindisi is calculated;
 - if Origin/Destination point is in Croatia
 - the distance with ports of Zadar, Split, Dubrovnik is calculated.
- B) If the road distance between Origin and Destination is shorter than the distance between Origin and closest port, only the all-road solution will be calculated; similarly, if the road distance between Origin and Destination is shorter than the distance between Destination and closest port, only all-road solution will be calculated. A message will then tell user that distance is too short for multimodal transport solutions and skip to D).
- C) In all other cases, for each port in the Country of Origin, the availability of ferries connection with the Country of Destination will be checked and for each found ferry service, total distance, transit time, ferry ticket cost will be obtained.
- D) The system will calculate the all-road option (distance in km and transit time, cost based on average data we will provide). Calculation of road distances and itineraries must take into consideration that transport is carried out with heavy goods vehicles. Therefore, routing will only provide roads that are fit for those. If an external tool will be used for street routing, please make sure it can calculate itinerary for heavy goods vehicles and not just normal cars or vans.
- E) Finally, all possible solutions will be presented,
- F) Intermodal results first.
Each alternative will include: itinerary on map, total distance, total transit time, ETA, ferry boarding/deboarding times at ports, estimated total cost, carbon footprint calculation (CO2 and PM10).
- G) Links to intermodal services providers and freight exchanges will be provided.

Examples for multimodal solutions

ITALY>CROATIA

point of departure Italy – port of Ancona (road) km + time

Ancona – Zadar (sea) km + travel time, ferry boarding/deboarding times

Zadar – point of arrival Croatia (road) km + time

itinerary map, total distance, total transit time, estimated time of arrival, estimated total cost, carbon footprint

ITALY>CROATIA (2)

point of departure Italy – port of Bari (road) km + time

Bari – Dubrovnik (sea) km + travel time, ferry boarding/deboarding times

Dubrovnik – point of arrival in Croatia (road) km + time

itinerary map, total distance, total transit time, estimated time of arrival, estimated total cost, carbon footprint

CROATIA>ITALY

point of departure in Croatia – port of Zadar (road) km + time

Zadar – Ancona (sea) km + travel time, ferry boarding/deboarding times

Ancona – point of arrival in Italy (road) km + time

itinerary map, total distance, total transit time, estimated time of arrival, estimated total cost, carbon footprint

CROATIA>ITALY (2)

point of departure in Croatia – port of Dubrovnik (road) km + time

Dubrovnik – Bari (sea) km + travel time, ferry boarding/deboarding times

Bari – point of arrival in Italy (road) km + time

itinerary map, total distance, total transit time, estimated time of arrival, estimated total cost, carbon footprint

ITALY>ITALY via national cabotage

point of departure Italy – port of Bari (road) km + time

Bari – Venice (sea) km + travel time, ferry boarding/deboarding times

Venice – point of arrival in Italy (road) km + time

itinerary map, total distance, total transit time, estimated time of arrival, estimated total cost, carbon footprint

ITALY>ITALY via national cabotage (2)

point of departure Italy – port of Brindisi (road) km + time

Brindisi – Ravenna (sea) km + travel time, ferry boarding/deboarding times

Ravenna – point of arrival in Italy (road) km + time

itinerary map, total distance, total transit time, estimated time of arrival, estimated total cost, carbon footprint

ITALY>CROATIA via Italian national cabotage

point of departure Italy – port of Bari (road) km + time

Bari – Venice (sea) km + travel time, ferry boarding/deboarding times

Venice – point of arrival in Zagreb (road) km + time

itinerary map, total distance, total transit time, estimated time of arrival, estimated total cost, carbon footprint

CROATIA>ITALY via Italian national cabotage

point of departure Zagreb - Venice (road) km + time

Venice - Bari (sea) km + travel time, ferry boarding/deboarding times

Bari – point of arrival in Bari (road) km + time

itinerary map, total distance, total transit time, estimated time of arrival, estimated total cost, carbon footprint

Note: for boarding and de-boarding operations in ports, extra time should be added in between arrival at port and actual boarding time on the ferry. This should take into account possible gate transit times, custom checks, etc.

Time Tables

The tables below summarize the routes schedule of the shipping companies operating the connection in the Adriatic Sea and between Italy and Croatia.

Jadrolinija's Italy – Croatia routes schedule (2019)

Lines 51		Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Zadar - Ancona	03/06 - 02/07	22.00				22.00		
	03/07 - 11/07	22.00		22.00		22.00		
	12/07 - 25/07	22.00		22.00		11.30	11.30	
	26/07 - 29/08	22.00		22.00		11.30	8.00	
	30/08 - 05/09	22.00		22.00		22.00		
	06/09 - 21/09	22.00				22.00		
								23.45
Ancona - Zadar	03/06 - 02/07		22.00				22.00	
	03/07 - 11/07		22.00		22.00		22.00	
	12/07 - 25/07		22.00		22.00	22.00	22.00	
	26/07 - 29/08		22.00		22.00	22.00		22.00
	30/08 - 05/09		22.00		22.00		22.00	
	06/09 - 21/09		22.00				22.00	
								16.00
Linea 53		Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Split - Ancona * through Stari Grad	01/01 - 29/03			20:00				20:00
	31/03 - 01/08		20:00		20:00			20:00
	02/08 - 16/08 *		22:00		20:00		14:30	20:00
	17/08 - 25/08		20:00		20:00		21:30	21:30
	26/08 - 01/11		20:00		20:00			20:00
	03/11 - 31/12			20:00				20:00
Ancona - Split * through Stari Grad	01/01 - 29/03		19:45			19:45		
	31/03 - 01/08	19:45		19:45		19:45		
	02/08 - 16/08 *	19:45		19:45		19:45 *	23:59	
	17/08 - 25/08	19:45		19:45		19:45		10:30
	26/08 - 01/11	19:45		19:45		19:45		
	03/11 - 31/12		19:45			19:45		

Linea 54		Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Dubrovnik - Bari	15/04 - 20/05	22:00		22:00				
	23/05 - 08/06	22:00				22:00		
	09/06 - 11/07	22:00				22:00		12:00
	12/07 - 23/07	22:00				22:00		12:00
	24/07/ - 18/08	22:00			12:00		12:00	12:00
	19/08 - 20/08	12:00						
	21/08 - 06/09			22:00		22:00	22:00	22:00
	07/09 - 05/10	22:00				22:00		
	07/10 - 02/11	22:00				22:00		
	03/11 - 28/11							22:00
Bari - Dubrovnik	15/04 - 20/05		21:00		21:00			
	23/05 - 08/06				21:00		21:00	
	09/06 - 11/07				21:00		21:00	22:00
	12/07 - 23/07				21:00		22:00	22:00
	24/07/ - 18/08			22:00		22:00	22:00	22:00
	19/08 - 20/08		22:00					
	21/08 - 06/09		21:00			12:00	12:00	12:00
	07/09 - 05/10				21:00		21:00	22:00
	07/10 - 02/11				21:00		21:00	
	03/11 - 28/11				21:00			

(Source: Jadrolinija Website_ <https://www.jadrolinija.hr/it/itinerario/me%C4%91unarodne-linije-2019->)

Snav's Italy – Croatia routes schedule (2019)

		Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Ancona - Spalato	15/04 - 31/07	20:00		20:00		20:00		
	22/07 - 27/07						22:00	
	30/07 - 14/08		22:00	22:00	22:00	22:00		
	04/08 - 08/09							11:00
	18/08 - 27/08	11:00	11:00	11:00	11:00			
	30/08 - 31/08					11:00	11:00	
	05/08 - 12/08	20:00						
	16/08 - 23/08					20:00		
	28-ago			20:00				
	02/09 - 05/10	20:00		20:00		20:00		
Spalato - Ancona	16/04 - 30/07		20:00		20:00			20:00
	22/06 - 27/07						11:00	
	30/07 - 14/08		11:00	11:00	11:00	11:00		
	03/08 - 07/09						20:00	
	15/08 e 29/08				20:00			
	04/08 - 08/09							22:00
	18/08 - 27/08	22:00	22:00	22:00	22:00			22:00
	30/08 - 31/08					22:00	22:00	
	03/09 - 12/09		20:00		20:00		20:00	
	15/09 - 03/10		20:00		20:00			20:00
05-ott						20:00		

(Source: Snav website_ <https://www.snav.it/wp-content/uploads/2018/11/Depliant-SNAV-2019.pdf>)

Grimaldi Lines' schedule for Italian cabotage (2019)

		Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Ravenna - Brindisi	01/01 - 31/12		19:30		22:00			12:00
Brindisi - Ravenna	01/01 - 31/12	12:00		15:00		18:30		
Venezia - Bari	01/01 - 31/12	19:00			07:00		12:00	
Bari - Venezia	01/01 - 31/12		21:00			06:00		08:00

(Source: Grimaldi Lines website_ <http://cargo.grimaldi-lines.com/it/orari-e-itinerari/linee-adriatico>)

Minoan Lines' schedule for Italian cabotage (2019)

		Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Venice - Ancona	01/01 - 31/12			04:30	04:30			
Ancona - Venice	01/01 - 30/06		15:30	15:30				
	01/07 - 08/09		17:00	16:30				
	09/09 - 31/12		15:30	15:30				

(Source_ Minoan Lines website)

Cost Simulation

The tables below summarize the price list of the shipping companies operating the connection in the Adriatic Sea and between Italy and Croatia.

Jadrolinija's Italy-Croatia price list (2019)

Jadrolinija	Trucks, cargo vans	
All international lines	Length	€
	0 - 5,00 m	130
	5,01 - 7,00 m	144
	7,01 - 9,00 m	186
	9,01 - 12,00 m	225,5
	12,01 - 14,00 m	268,5
	14,01 - 16,50 m	309
	16,51 - 18,00 m	350,5
	18,01 - 20,00 m	380
	Truck trailer (without towing vehicle)	
	Length	€
	9 - 13,00 m	242
	13,01 - 18,00 m	282
	18,01 - 25,00 m	402

* Taxes

per driver/second driver **	15,00 €
per vehicle up to 7 m	25,00 €
per vehicle from 7,01 - 12,00 m	45,00 €
per vehicle over 12,00 m	50,00 €

** for truck dimensions from 12 up to 25 m, the second driver is entitled to 50% discount on deck ticket, free berth in cabin or seat, as well as, free breakfast and dinner on night voyages or free lunch on day voyages.

Notes:

1. Transport of trucks or vans without driver, the fare of transport increases for 50%
2. For vehicles (truck) over 20m of length or width over 2,60m and for special vehicles, a special rate is agreed

(Source: Jadrolinija)

Snav's price list for Italy – Croatia's route (2019)

Snav		
	Lenght	€ *
	9 mt	244,72
	10 mt	261,8
	11 mt	278,88
	12 mt	295, 96
	13 mt	313,04
	14 mt	330,12

* free berth in cabin, as well as, free breakfast and dinner for the driver.
! NO extra taxes for referee

(source: Snav)

Grimaldi Lines' price list for Italian Cabotage (2019)

Grimaldi Lines			
	Lenght	Departure	€
Venice - Bari	from 9,1 mt to 13,6 mt	Saturday	550 € + iva
		all other days	500 € + iva
	from 13,61 mt to 16,5 mt	Saturday	700 € + iva
		all other days	650 € + iva
	from 16,51 mt to 18 mt	Saturday	800 € + iva
		all other days	750 € + iva
from 18,1 mt to 18,75 mt	all days	850 € + iva	
	from 18,76 mt to 22 mt	all days	1000 € + iva
Ravenna - Brindisi	from 9,1 mt to 13,6 mt	all days	500 € + iva
	from 13,61 mt to 16,5 mt	all days	650 € + iva
	from 16,51 mt to 18 mt	all days	750 € + iva
	from 18,1 mt to 18,75 mt	all days	850 € + iva
	from 18,76 mt to 22 mt	all days	1000 € + iva

* Taxes
per driver 50€ + iva

(source: Grimaldi Lines)

Minoan Lines' price list for Italian Cabotage (2019)

Minoan Lines		€	
Venice - Ancona *	Length	Wed.	Thu.
	up to 5 m	560	580
	from 5 to 7 m	685	700
	from 7 to 9 m	760	775
	from 9 to 13,5 m	765	800
	trailers (without towing vehicle)	970	1010
	from 13,5 to 16,5 m	870	890
	from 16,5 to 18 m	910	925

		€	
Ancona - Venice *	Length	Tue.	Wed.
	up to 5 m	645	630
	from 5 to 7 m	700	740
	from 7 to 9 m	830	780
	from 9 to 13,5 m	880	900
	trailers (without towing vehicle)	1025	945
	from 13,5 to 16,5 m	940	920
	from 16,5to 18 m	1010	935

* Taxes

Refeer: € 80/unit

Second driver: € 50

(Source: Minoan Lines website)

Environmental footprint calculation - CO2 emission

DHL Carbon Calculator

<https://www.dhl-carboncalculator.com/#/scenarios>

The DHL Carbon Calculator is a web-application able to calculate carbon footprint in a specific transport scenario. The user can plan different shipping scenarios, using multimodal solutions too.

For planning the scenario, the user has to choose the transport mode he needs, specifying origin and

destination of the shipment and its dimensions (weight and volume). The user can see the planned scenario in a map, with the specific route and transport mode for each leg of the scenario.

The results can be seen in a summary: for each leg of the scenario and for all the scenarios.

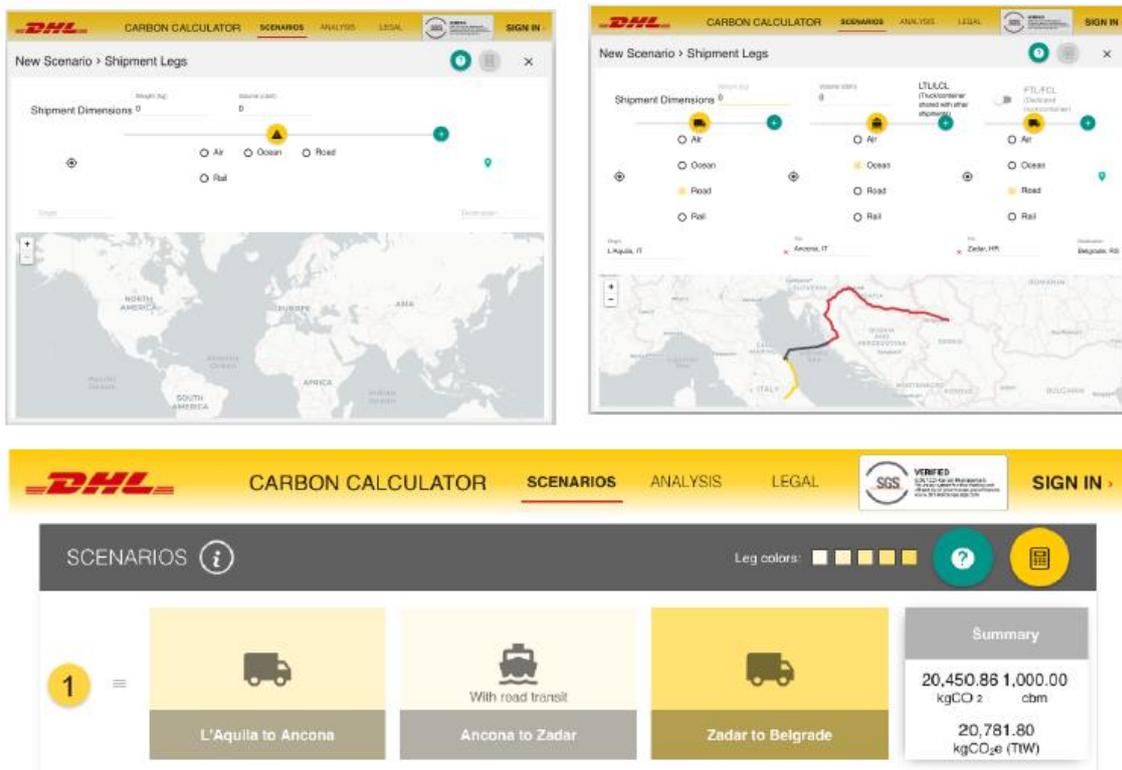


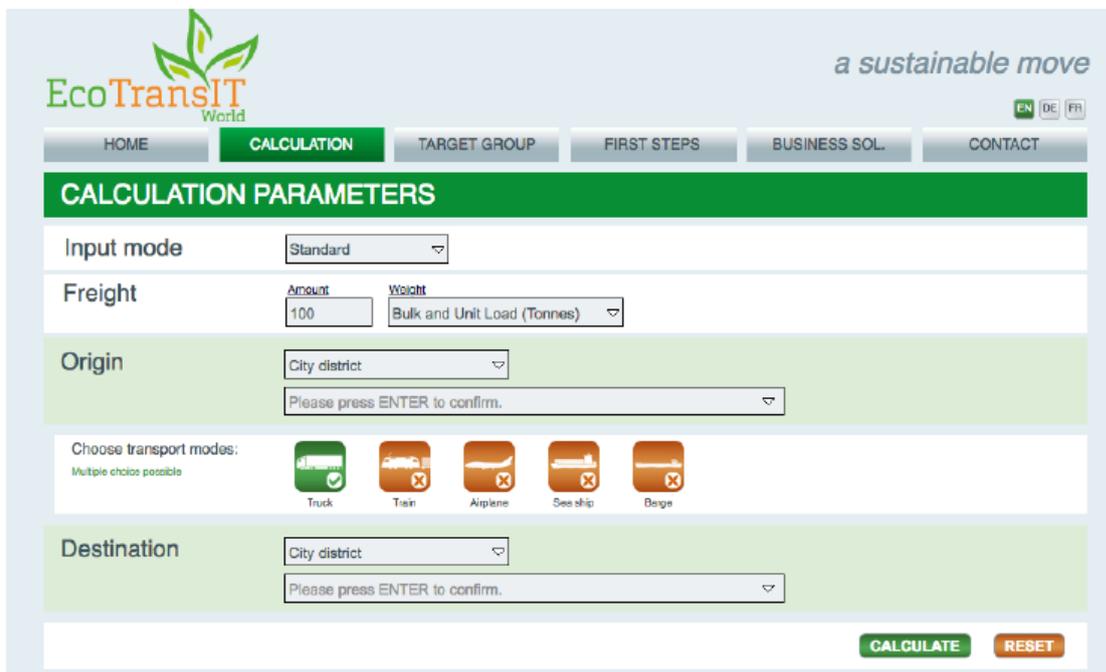
Figure 1: DHL Carbon Calculator website

EcoTransIT World

<https://www.ecotransit.org/calculation.en.html>

EcoTransIT is a web-application, that calculates environmental impacts of any freight transport (such as carbon footprint). It's possible to estimate carbon emissions caused by rail, road, ship and aircraft, in any combination (to combine different transport mode per route). This tool is free of charge for any noncommercial use and it's available in different languages. The user has to specify different and specific parameters, such as the route, the transport mode,

dimensions and type of the freight, the origin and the destination, adding more than one transport service and intermediate destinations.



The screenshot shows the EcoTransIT website interface. At the top left is the logo 'EcoTransIT World' with a green leaf icon. To the right is the slogan 'a sustainable move' and language selection buttons for EN, DE, and FR. Below this is a navigation menu with buttons for HOME, CALCULATION (highlighted in green), TARGET GROUP, FIRST STEPS, BUSINESS SOL., and CONTACT. The main section is titled 'CALCULATION PARAMETERS' in a green header. It contains several input fields: 'Input mode' with a dropdown menu set to 'Standard'; 'Freight' with 'Amount' (input: 100) and 'Weight' (dropdown: Bulk and Unit Load (Tonnes)); 'Origin' with a 'City district' dropdown and a confirmation prompt 'Please press ENTER to confirm.'; 'Choose transport modes:' with icons for Truck (checked), Train, Airplane, Sea ship, and Barge (all unchecked); and 'Destination' with a 'City district' dropdown and a confirmation prompt. At the bottom right are 'CALCULATE' and 'RESET' buttons.

Figure 2: Eco TransIT website

Carbon Footprint

<https://www.carbonfootprint.com/tracker.html>

Carbon Footprint software is a tool to help raising awareness, measure emissions, reduce costs and engage staff in the carbon management programme.

This software is the leading and authoritative calculation package that is also one of easiest to use – so much so that it has well over 1,000,000 users worldwide.

The software is checked regularly as part of the Quality Assurance Scheme, so it can be assured that this software is always up to date and accurate (unlike stand-alone off-line systems).

This Carbon Footprint software has options to provide:

- Full integration into your intranet / extranet / web-site
- Multi-user option (no limit on number of users)
- Automatic updating
- Fully Customisable - to fit with your needs & branding
- Multi-lingual
- DECC assessed methodology
- BEIS and other international metrics used
- Manage your account on-line
- Carbon reporting options – help understand use and manage emissions and costs
- Free, online carbon footprint calculator (tools for website <https://www.carbonfootprint.com/integrate.html>)
 - Small Business
 - Easy to use online calculator
 - Large Business
 - Advanced tools and Expert help
 - Products
 - Understand lifecycle impacts

Eco-comparateur

http://www.tibus.fr/presentation/?rub_code=73

This French website expresses the parameters for calculating the carbon footprint for passenger transport.

It uses the estimated average coefficient of CO₂ emitted by the different transport modes, multiplying it by the distance between the start and end point (an estimate). For the different modes of transports this platform adds the previous evaluations.

Sustainable Freight

<http://www.sustainablefreight.com.au/tools-and-programs/emission-calculators>

This Program has different tools to calculate the emission and in particular:

- Track fuel, emissions and cost calculator and comparison tool (<http://www.sustainablefreight.com.au/tools-and-programs/emission-calculators/truck-fuelemissions-and-cost-calculator-and-comparison-tool>);
- Full supply chain emissions calculator (<http://www.sustainablefreight.com.au/tools-and-programs/emission-calculators/full-supply-chain-emissions-calculator>);
- Ship type carbon emissions calculator (<http://www.sustainablefreight.com.au/tools-and-programs/emission-calculators/ship-type-carbon-emissions-calculator>).

This program consists in different xls sheets that can be combined.

Carbon Footprint Accounting

<https://www.dnvgl.it/services/carbon-footprint-accounting-53443>

DNV GL has developed a scheme for reporting greenhouse gas emissions and managing of CO₂ emissions.

The methodology applied by DNV GL is based on international norms and on the technical requirements (ISO 14040 and ISO TS 14067), in order to have reliable results of the analysed service.

The activities that qualify the process of accounting can be identified in the following phases:

- development of a document called PCR (Product Category Rules) of product, if eventually if it is not already existing;
- mapping of the product life cycle;
- harvest of the primary data related to the identified trials;
- data processing and quantification of the carbon footprint of the product;
- drawing up the report document of the product life cycle;

PTV xIntermodal server

PTV xIntermodal server is a software that calculates intermodal routes, optimizing travel times and CO₂ emissions cost. The software compares cost and CO₂ emissions of different transport mode, in particular road and ship. Thank to this software, it will be possible to include in transport cost also environmental costs of CO₂ emissions.

PTV is a logistics solutions company based in Germany. Their xIntermodal software tool includes an

advanced routing system for intermodal transport missions as well as a carbon footprint calculator that accounts for all different means of transportation.

Intermodal Door-to-Door Routing

Basic Approach:

- **Link and merge road and time-table networks**
- Linking: Nearest Neighbor search
- Merging: handle distinct attribute sets
- **Run augmented *Dijkstra***
- Optional: suppress unwanted routes, e.g. car-train-car-train-car

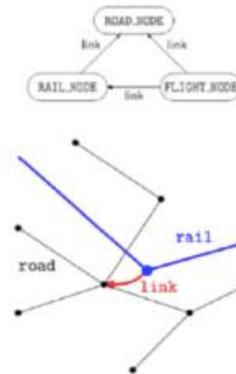


Figure 3: PTV Intermodal Door-to-Door Routing

Emissions are estimated upon a set base values that emerged after research, to which the previously

mentioned EcoTransIT consortium has also participated.

The following are the base values for CO₂ emissions for each transport methods, standardized to 1 TEU.

RAIL	176g CO ₂ / TEU / Km
AIR	5582g CO ₂ / TEU / Km
BARGE	470g CO ₂ / TEU / Km
SHORTSEA	470g CO ₂ / TEU / Km
DEEPSEA	84g CO ₂ / TEU / Km
ROAD	3100g CO ₂ / TEU / Km

Comparing the different footprint calculators

All examined calculators represent valid tools, offering the necessary depth and details that we are going to need for the development of the Transpogood online platform.

One main difference is that some tools are offered as commercial services, with business in mind as end users (e.g. Sustrax Carbon Tracking, DHL Carbon Calculator). Other tools instead appear as the result of a collaboration among several private and public services operators are offered free of charge (Tibus ecocomparateur, EcoTransIT).

Another axis along which carbon footprint calculators can be differentiated is the way they are designed: many services calculate the result after having gathered the necessary user input, others are offered as precalculated spreadsheet data so that users can pick out and use for their own calculations (e.g. the Australiabased Sustainable Freight).

One question would be: how is this given data updated and when? Enhancements in technology are

expected to make emissions change for the better even in the near future.

Committing to a data sheets might mean having to update it manually in order to keep up with transport vehicles.

On the other end, spreadsheet data can easily be imported and integrated in the online platform without having to resort to an external website for each interrogation.

The availability of online services can vary, it may not be guaranteed to work every time and if a service happens to be unreachable due to network issues (or go offline because provider's single-handed decisions) this would impact the Transpogood platform, that would be then be missing an essential link to the data chain needed to calculate solutions for its users.

In our opinion, when developing the platform, attention should be given into choosing the right carbon calculator tools. Either by understanding how it works and coding it directly into the platform (by means of combining user-given data with some pre-calculated constants and factors) or resort to an externally hosted tool that however needs to be reliable and possibly free of charge in order not to use programme funding towards a single commercial company. In that sense EcoTransit appears to be a viable solutions. This is however a mere indication from our

experience in using the tools we had access to and other solutions could also be taking into account,

following review and approval from the project's committee.

Incentives for Intermodality¹

In March 2011, the European Commission adopted the White Paper 2011 "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system"², defining a long-term strategy to make European Union transport system more efficient, safe and secure. The 2011 White Paper identifies ten goals for a competitive and resource-efficient transport system, which serve as benchmarks for achieving the 60% GHG emissions reduction target.

1 Deliverable 3.1.1

2 WHITE PAPER Roadmap to a Single European Transport Area – Towards a competitive and resource efficient system/COM/2011/0144 (<http://eurlex.europa.eu/legalcontent/EN/ALL/?uri=CELEX:52011DC0144>).

Among its goals, the White Paper sets that 30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors.

In order to achieve this objective, various initiatives have been implementing at European level: e.g. the strengthening of the high speed railways and completion of the TEN-T³ infrastructure network; the motorways of the sea initiative⁴; the Marco Polo Programme⁵, closed programme fostering intermodal alternative solutions.

Despite the efforts and actions undertaken at both European and national level in favour of “sustainable transport”, in the European Union the road mode is still largely predominant (48% of total transported freight⁶).

In this context, Regional and National Authorities often set up incentive schemes to encourage a rebalance in the modes of transporting goods, by supporting the utilisation of less polluting modes of transport - different from the all-road one (modal shift).

Incentives in Croatia: Closed Measures

National Level - Incentives for combined (intermodal) transport

Legal basis

Law on combined transport (O.G. 124/2009) (Cro. Zakon o kombiniranom prometu, NN 124/2009)

Objective

Definition of basic terms and distances, and introduction of incentives for combined transport.

Harmonization of regulatory framework with relevant EU directives.

Beneficiaries

Domestic carriers and carriers established in the EU Member States with a Community license for the carriage of cargo and carriers from third countries provided that it is regulated by an international agreement.

Description

The following incentives were envisaged by law:

- Release of the annual fee for the use of public roads.
Owners or users of motor vehicles and trailer vehicles registered in the Republic of Croatia, which make at least 80 previous or subsequent transports to or from the railway combined terminal or the transshipment station during 12 months from the date of the last technical validation of the vehicle, are exempt from the obligation to pay annual fee for the use of public roads payable on the registration of motor and trailer vehicles, as determined by a special regulation
- Release of quotas and permits.

3 Programme established by the European Commission in 2004 to support the construction and upgrade of transport infrastructure across the European Union (s. <https://ec.europa.eu/inea/en/ten-t>).

4 Concept introduced with the 2001 Transport White Paper, aiming at introducing new intermodal maritime based logistics chains (s. https://ec.europa.eu/transport/modes/maritime/motorways_sea_en).

5 see. <http://ec.europa.eu/transport/marcopolo/>.

6 data from Eurostat 2016.

The Minister shall prescribe the roadways where the previous and subsequent transport is exempt from all quotas and permits established by international multilateral and bilateral agreements.

- Release of road traffic limits.

Traffic bans that are specified by a special regulation do not relate to the previous and subsequent transport.

Financial allocation

Information not available. Funding was envisaged from state budget.

Regional Level

There are no closed incentive measures on regional level.

Incentives In Croatia: Active Measures

National Level - Incentives for combined (intermodal) transport of cargo

Legal basis

Law on combined transport of cargo (O.G. 120/2016) (Cro. Zakon o kombiniranom prijevozu tereta, NN 120/2016); Ordinance on incentives in combined transport of cargo (O.G. 5/2018) (Cro. Pravilnik o poticajima u kombiniranom prijevozu terete, NN 5/2018)

Objective

Additional definition and correction of basic terms and distances, and introduction of incentives for combined transport. Further harmonization of regulatory framework with relevant EU directives.

Beneficiaries

The transport organizer, the railway operator and the owner or user of motor vehicles and trailer vehicles registered in the Republic of Croatia are entitled to incentives.

Description

The following incentives are envisaged by the law and ordinance:

- Release of quotas and permits.
The combined cargo transport services (which are in line with the definition written in the law) are exempt from all quota and permit systems in the Member States.
- Incentives in combined transport of goods by rail, inland water or sea.
*(1) In the case of combined transport of cargo by rail, inland water or sea, the organizer of the transport shall be entitled to a fee of 150.00 HRK (approx. 20 EUR), per truck, trailer, semi-trailer, with or without tow truck, interchangeable crate or container of 20 feet or more, by which combined transport of cargo was carried out.
(2) A rail freight carrier carrying cargo in combined transport shall be entitled to the incentive in the amount of 2.00 HRK (approx. 0.26 EUR) per train kilometer which is paid as a fee for access to the railway infrastructure in cases where the railway carrier participates in the combined carriage of cargo.*
- Incentives in combined freight transport by road.

(1) The owner or user of motor vehicles and trailer vehicles registered in the Republic of Croatia who, for 12 months from the date of the last validation of the vehicle's technical validity, have carried out cargo transport in the initial and/or the final segment to or from the railway combined terminal or transshipment station, shall be exempted from the obligation to pay the annual fee for the use of public roads up to a maximum of 50% payable on the registration of motor vehicles and motor vehicles, as determined by a special regulation.

The exemption amount is calculated based on the number of realized freight transport in the initial and / or final sections, where 100 and more transports results in maximum exemption (50% of the fee).

Financial allocation

2,000,000.00 HRK (approx. 266 thousand EUR) per year. Funding is envisaged from state budget.

Regional Level

There are no active incentive measures on regional level. Nevertheless, most of the regional development strategies envisage measures of infrastructure and other development which should facilitate further intermodal transport development.

Incentives in Italy: Closed Measures

National Level - Ecobonus

Incentive for shift road to sea

Legal basis

Legge 22 novembre 2002, n. 265

Objective

The incentive aimed at supporting the road haulage companies to make the best possible use of sea routes, in order to transfer larger and larger shares of goods travelling on heavy vehicles from the whole road to the combined sea-road mode.

Beneficiaries

European road haulage companies, also in the form of temporary/permanent groupings or companies of operators, who transport lorries and articulated lorries on Ro Ro and Ro Pax ships.

Description

Temporary subsidy granted to road haulage companies (in the form of reimbursement) who decided to transfer part of their traffic on road to certain sea routes identified by the Government. Companies had to make at least 80 annual trips and to guarantee the maintenance of the same number of trips or the same quantity of goods transported in the following three years.

Financial allocation

€ 240 million between 2007 and 2010

Regional Level - Aids for the establishment of “highway travelling on rail” (Friuli Venezia Giulia Region)

Legal basis

Legge regionale 29 gennaio 2003, n. 1, art. 5 c. 94 Friuli Venezia Giulia

Objective

The incentive aims to facilitate the modal shift of goods traffic from road to railways, by reducing the costs for combined transport services.

Beneficiaries

Logistic companies organizing combined transport services with origin or destination in a railway station or intermodal center located in Friuli Venezia Giulia Region.

Description

The requirement for access to contributions was the organization of single-track rail transport, with a length of at least 100 km, one-direction, carried out with complete intermodal trains with origin or destination in a railway station in Friuli Venezia Giulia.

The amount of the contribution was commensurate with the use of combined transport and is based on the length of the railway line (above or below 150 kilometers) and the utilization coefficient of the railway services.

The coefficient was the ratio between the number of units transported during the reference period,

indicated in the business plan presented, and the capacity produced.

As a consequence, the following contributory measures applied:

- € 33.00 per unit transported, if the utilization coefficient is between 71% and 100% and the length of the journey is greater than 150 km;
- € 30.00 per unit transported, if the coefficient of use is between 71% and 100% and the distance between 100 km and 150 km;
- € 27.00 per unit transported, if the use coefficient is between 51% and 70% and the length of the journey is more than 150 km;
- € 25.00 per unit transported, where the utilization coefficient is between 51% and 70% and the distance between 100 km and 150 km;
- € 22.00 per unit transported, if the coefficient of use is between 25% and 50% and the length of the journey is more than 150 km;
- 20.00 euros per unit transported, if the coefficient of use is between 25% and 50% and the distance between 100 km and 150 km;
- if the coefficient of use is less than 25% with reference to both mileage bands, no contribution can be recognized and the advances already paid must be repaid.

The maximum amount was € 33 per unit transported on a one-way minimum length of 100 km. This figure was calculated based on the Commission's assessment of external costs. The maximum intensity has been set at 30% of transport costs

Financial allocation

€ 3,6 million between 2003 and 2005,

€ 1,5 million between 2007 and 2009,

€ 12 million between 2010 and 2015.

Regional Level - Interventions for the development of intermodality (Friuli Venezia Giulia)

Legal basis

Legge regionale 24 maggio 2004, n. 15. Art. 21 Friuli Venezia Giulia

Objective

The incentive aimed at fostering the transfer of freight traffic from road to rail and sea.

Beneficiaries

- Logistic companies regularly established and having their registered office in one of the EU Member States which organize combined transport (with origin or destination in Friuli Venezia Giulia) between railway and at least one of the other modes (road, sea);
- Shipowners, shipping companies and maritime operators established in one of the EU member States, which establish regular connections with ships specialized for the transport of intermodal and non-intermodal loading units, limited to sea routes for which also road transport is possible.

Description

The contributions were aimed at the establishment, start-up and implementation of maritime and rail transport services, with the following articulation:

- Intermodal rail transport services departing and / or arriving from the logistic and port nodes located in the regional territory, on the national and international transit routes.
- New maritime services for the combined transport of goods arriving and / or departing from ports located in the regional territory.

For intermodal rail transport services:

The basic contribution amount was € 33 per unit transported. This amount could be increased or decreased due to the distance travelled and the coefficient of use. The aid could not exceed 30% of the total costs for transport services.

For maritime services:

the basic contribution amount was € 54 per unit transported. This amount could be increased or decreased due to the distance and the triangulation of the airports. In any case, the aid could not exceed 30% of the total costs for transport services.

Financial allocation

For intermodal rail transport services: € 1,5 million from 2007 to 2009 and € 12 million from 2010 to 2015.

For maritime services: 1,2 2007-2009? Da verificare

Incentives in Italy: Active Measures

National Level - Marebonus – Legge Stabilità 2016

Legal basis

Legge 28 dicembre 2015, n. 208 (legge di stabilità 2016)

Objective

The incentive aimed to develop the combined road-sea mode through the creation of new maritime services and the improvement of existing ones

Beneficiaries

Ship-owning companies presenting three-year projects for the construction of new ro-ro and ro-pax maritime services

Description

The measure provides for the granting of incentives to shipping companies presenting three-year projects for the implementation of new ro-ro and ro-pax maritime services by ships registered in (and flying the flag of) one of the Member States of the European Union or the European economic Space, for the multimodal transport of goods or the improvement of the same services on existing routes, arriving and departing from ports located in Italy, connecting ports located in Italy and in the Member States of the European Union or the European Economic Area. The incentive is calculated on the transport units multiplied by the mileage distances subtracted from the road.

A portion of the contribution received have to be reversed in favour of the road haulage companies that have used the maritime services

Financial allocation

€ 138,2 million between 2016 and 2018

Simulation

Using examined calculators and other tools (eg. Google Maps), we have done a simulation, defining

Senigallia (Ancona - Italy) as origin point and Zagreb (Croatia) as destination point.

We have done two different cost and time simulations, both for all road transport and for multimodal transport (road and ship).

For all road transport simulation we have estimated total cost by multiplying 1,4 €/km (estimate cost) for the total distance between Senigallia and Zagreb.

It was possible to estimate the total transit time using Google Maps, which doesn't provide an estimation for the trucks. A more precise estimation will be provided by the Transpogood platform, using the PTV software, mentioned before.

All road simulation:

Point A: Senigallia (Ancona – Italy)

Point B: Zagreb (Croatia)

Itinerary map:

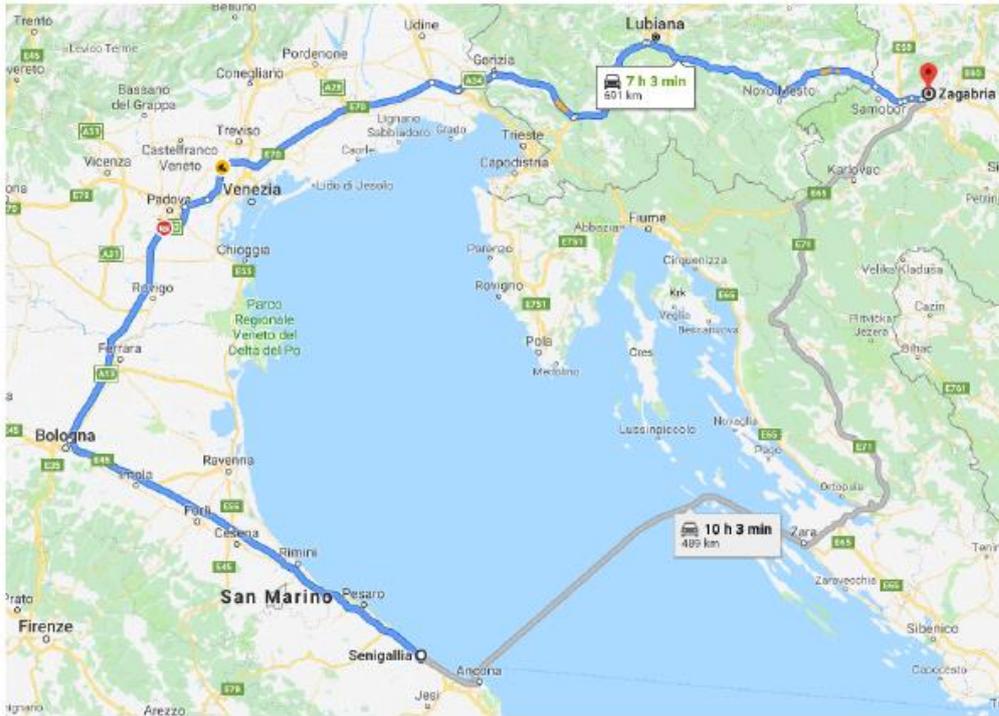


Figure 3: Senigallia – Zagreb itinerary map
 (Source: Google Maps)

total distance: **691 km**
 total transit time: **7h 3 min**
 estimated total cost: **€ 967,4**
 carbon footprint: **1.218,15 kgCO₂**

Multimodal transport (Road – Ship) simulation:

via Ancona - Zadar

Point A : Senigallia

Poin B: Ancona

Point C: Zadar

Point D: Zagreb

Total distance: **489 km**

Itinerary map:

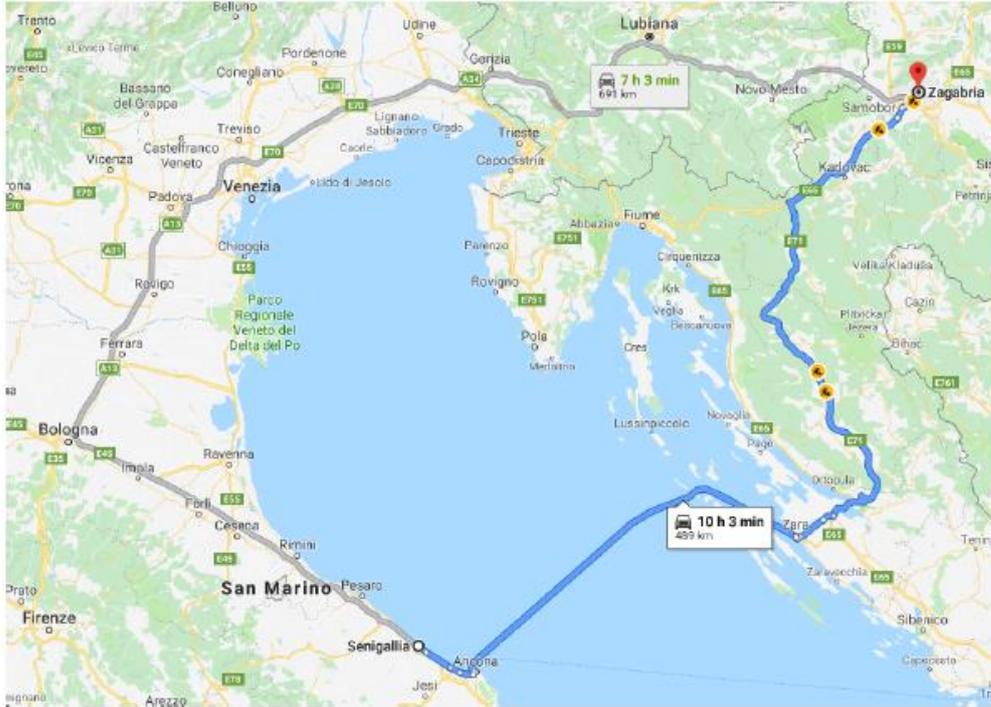


Figure 4: Senigallia – Zagreb itinerary map

(Source: Google Maps)

estimated total cost: € 865,82
carbon footprint: € 656,85 kgCO₂

From Point A to Point B
itinerary map:

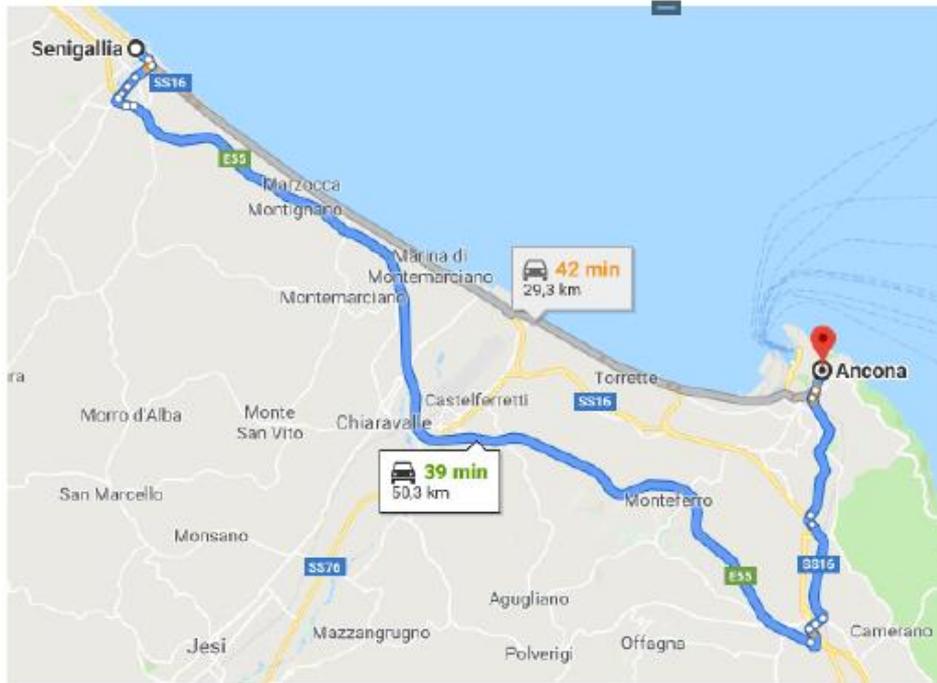


Figure 5: Senigallia – Ancona itinerary map
 (Source: Google Maps)

total distance: **50,3 km**
 total transit time: **39 min**
 estimated total cost: **€ 70,42**
 carbon footprint: **€ 58,02 kgCO₂**

From point B to Point C
 itinerary map:

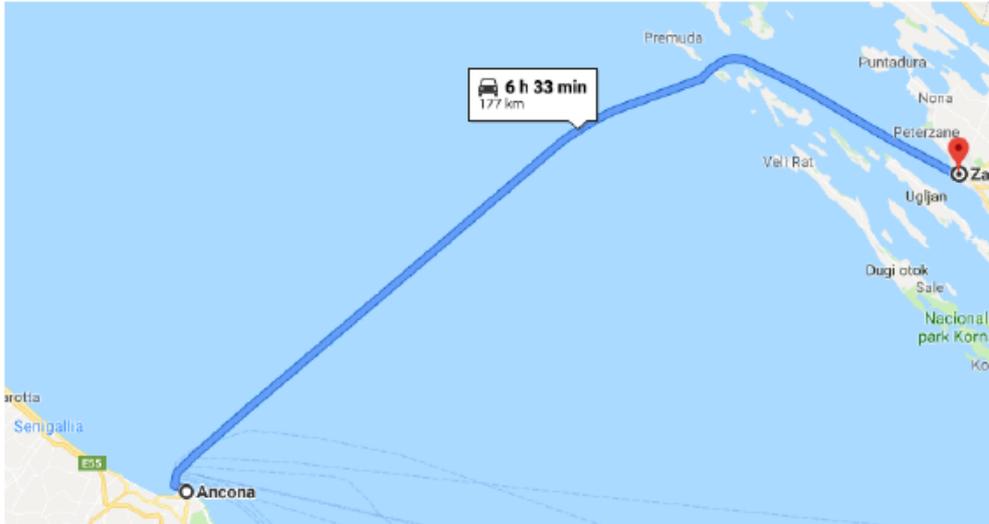


Figure 6: Ancona – Zadar itinerary map

(Source: Google Maps)

total distance: 177 km

estimated journey time: 8 h

estimated cost of the ticket: € 395

carbon footprint: 95,23 kgCO₂

From Point C to Point D

itinerary map:

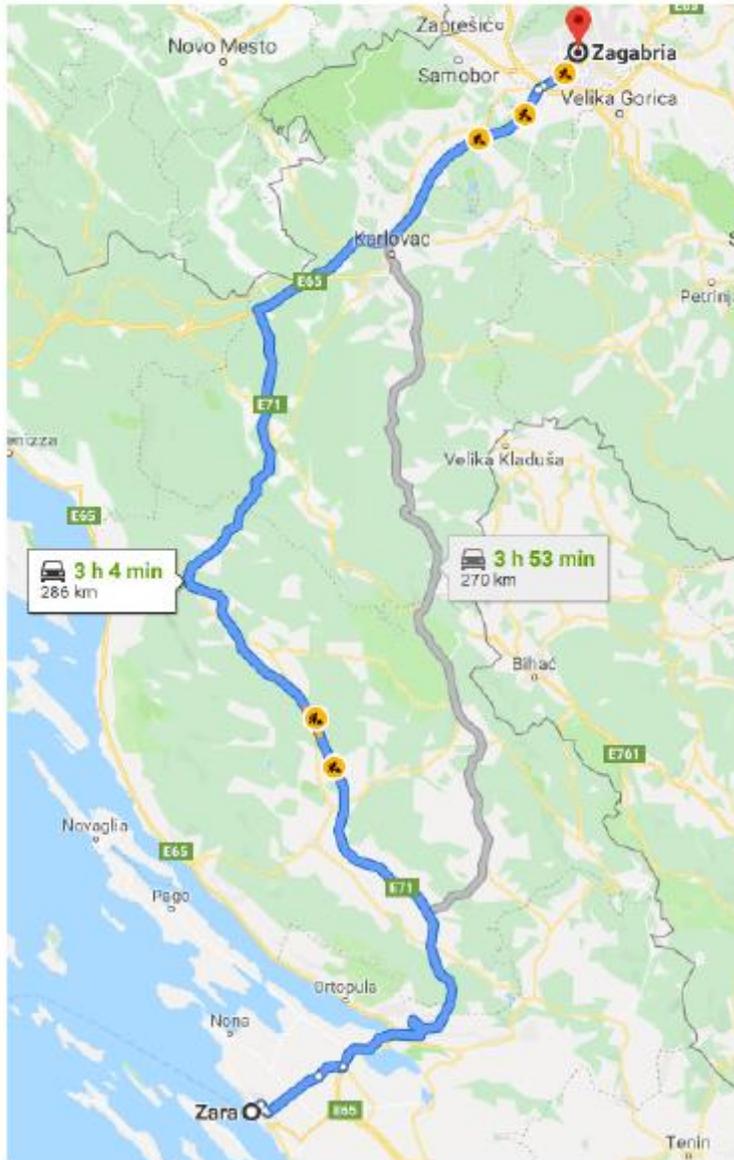


Figure 7: Zadar – Zagreb itinerary map

(Source: Google Maps)

total distance: 286 km
total transit time: 3 h 4 min
estimated total cost: € 400,4
carbon footprint: 503,60 kgCO₂

Conclusion

The main purpose of this document is to provide a set of simple calculators with interoperability capabilities to support the optimization of logistic supply chain in terms of:

- Best price solutions of the combined transport;
- Lower emissions of the entire chain;
- E-procurement tool for intermodal transport services;
- Higher load factor in both directions.

This phase of desk research is an important step in the development of the Transpogood platform, which will be based on this document, in particular for the information regarding the time and cost table of the shipping companies, both for Italy – Croatia connection and Italian cabotage, and in the comparison of different carbon footprint calculator’s software, which will provide the best solution for the platform, in order to offer a complete and efficient service.

Starting from this information, the software developer will build up the Transpogood platform, which will be tested in two different real scenarios: in the terminal of Port of Ploce and in a private sector (delivery of a shipper), in order to evaluate the performance of the platform.