Feasibility study for establishment of the most efficient solutions for regular maritime services connecting Black Sea and Danube ports

Final Report

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1. BACKGROUND

The general objective of the project is:

to contribute to the economic development of the area by supporting improved access and better connections of the European and Asian economy among ports within the Danube-Black Sea area,
with the following specific objectives:

1. To improve the capacity of the stakeholders to develop improved or new freight eco-friendly water transport routes as a connection between European and Asian economy;
2. To advocate the use of the alternatives routes to connect Black Sea and Danube, as a contribution to the decreasing of the pollution caused by different type of transport coming to coastal areas;
3. To promote the maritime and inland water transport as a source for sustainable economic and social development of the area.

As outlined in our proposal, the project objectives are in line with the White Paper Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, COM(2011) 144 final, which states the following 3 goals related to freight transport from a total of 10 goals aiming for a competitive and resource efficient transport system: benchmarks for achieving the 60% GHG emission reduction target.

Optimising the performance of multimodal logistic chains, including by making greater use of more energy-efficient modes

(3) 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. To meet this goal will also require appropriate infrastructure to be developed.

(5) A fully functional and EU-wide multimodal TEN-T 'core network' by 2030, with a high quality and capacity network by 2050 and a corresponding set of information services.

(6) By 2050, connect all core network airports to the rail network, preferably high-speed; ensure that all core seaports are sufficiently connected to the rail freight and, where possible, inland waterway system.

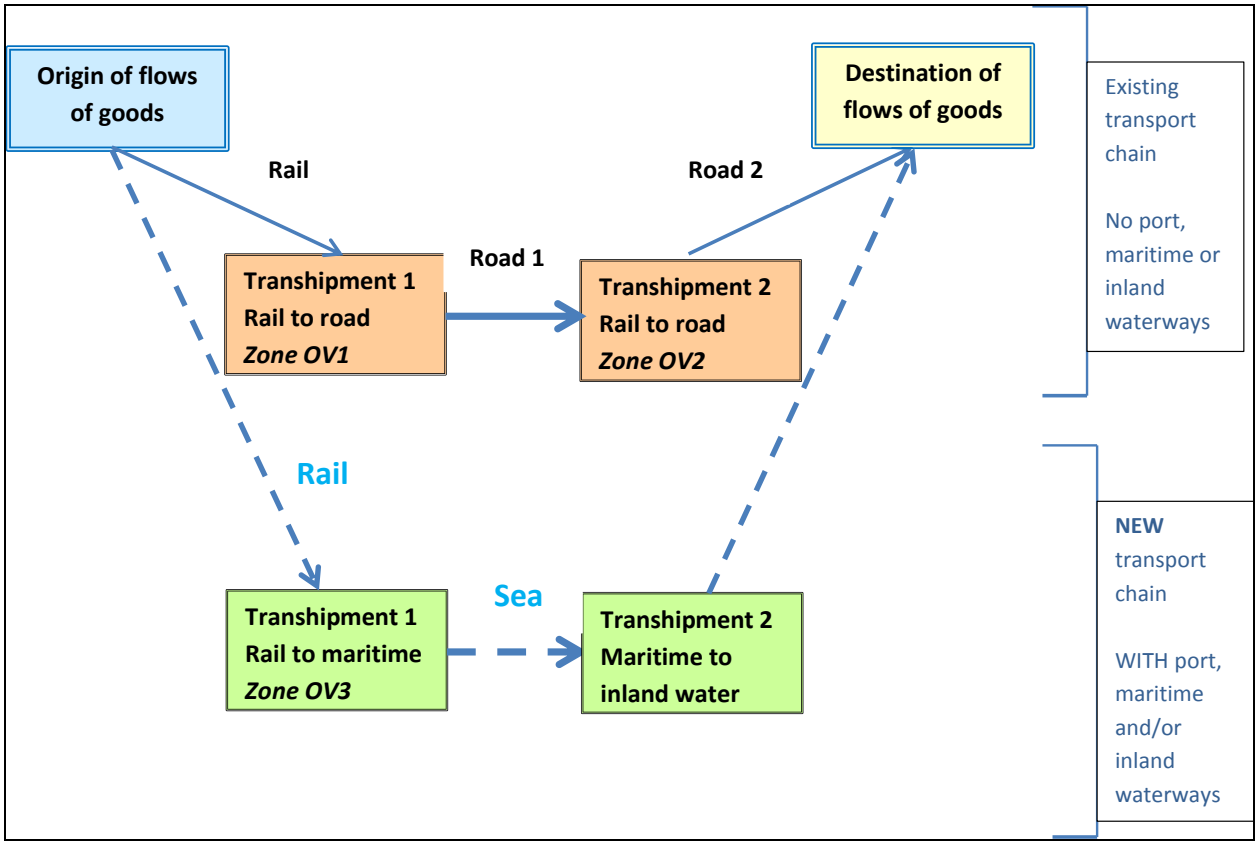
The following issues have been addressed in detail for achieving the objectives of the contract, namely:

- Freight volumes by category of goods and transport chain organization(s) for the OD's suitable to be attracted by the Black Sea – Danube maritime lines;
- Total cost of the transport by category of goods and transport chain organization(s) for existing routes and for the new possible routes to consider the new maritime lines Black Sea – Danube
- Incentives and measures necessary to attract transport flows on the new maritime lines connecting Black Sea and Danube

The basic idea for the identification of the potential freight exchanges suitable to be transported on the Black Sea and Danube ports is the analysis of existing and likely future generalised costs of the different routes. This analysis has been carried out by category of goods and separately for the containerised cargo. The following items have been considered:

- Include the DABS ports in the identified route
- Interconnection of the countries participating in the project and setting-up the connexion with the Danube macro-region
- Maximum use of the existing potential of the involved ports and identification, if necessary, of the needed investments for integrating them in the selected routes
- Analysis and modelling of at least 3 alternative routes from the perspective of the benefits and of the risks

The basic approach considered is the identification of the potential to attract transport flows on the transport chains that include maritime, inland waterways and rail transport modes, thus to transfer the transport flows that are currently using direct road transport on a new transport chain using maritime line(s), inland waterway and rail transport, as illustrated in the figure hereunder.



For this, the expected transport costs has been assessed and compared with the transport costs on the existing transport chains. For making the new transport chains / routes attractive and competitive with the existing one, both infrastructure up-grading and transport policies will be considered.

2. PROJECT APPROACH AND ACTIVITIES

Following our accepted offer, the following Tasks have been considered for the realization of the Feasibility Study:

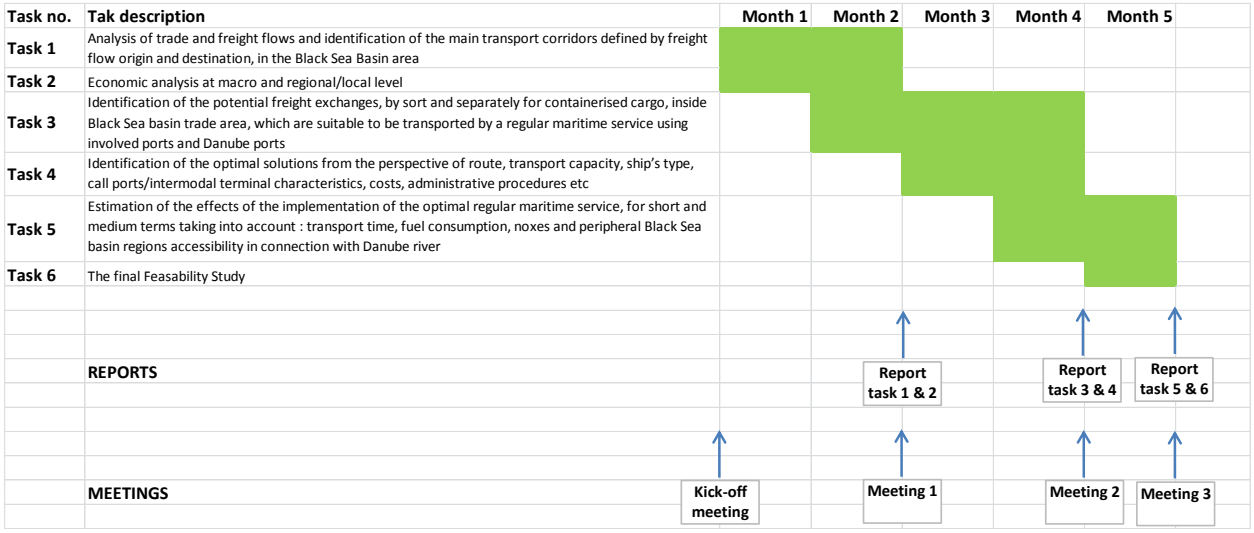
Task 1	Analysis of trade and freight flows and identification of the main transport corridors defined by freight flow origin and destination, in the Black Sea Basin area
Task 2	Economic analysis at macro and regional/local level
Task 3	Identification of the potential freight exchanges, by sort and separately for containerised cargo, inside Black Sea basin trade area, which are suitable to be transported by a regular maritime service using involved ports and Danube ports
Task 4	Identification of the optimal solutions from the perspective of route, transport capacity, ship's type, call ports/intermodal terminal characteristics, costs, administrative procedures etc
Task 5	Estimation of the effects of the implementation of the optimal regular maritime service, for short and medium terms taking into account : transport time, fuel consumption, noxes and peripheral Black Sea basin regions accessibility in connection with Danube river
Task 6	The final Feasibility Study

All tasks have been realised, the activities of each tasks have been carried out and the final results have been included in Phase 1, Phase 2 and Phase 3 reports.

The current report in the Final Report of the project and includes the results of all activities and the final conclusions and recommendations.

3. PROJECT PLANNING

The planning of the project as considered in the technical offer is shown hereunder:



All project activities have been carried out in time and no delays have occurred, excepting the a longer period on receiving the feedback on the freight flows and related transport costs survey from the DABS countries and also from the logistic industry in Romania – the latest one being the input from the market study that is carried out separately.

Beside the activities specified in our technical offer, the team of the feasibility study has participated to the DABS workshops as follows:

- Tbilisi in the period 5-7 November 2013,
- Varna in the period 24-25 November 2013,
- Thessaloniki on 29 and 30 January 2014, and
- Cahul on 24 March 2014.

At each workshops have been presented the approach of the feasibility study, the questionnaires for the data collection from the DABS countries and the work progress with examples from the analysis of the databases considered in the current project.

4. EXECUTIVE SUMMARY: NEW MARITIME LINES CONNECTING THE BLACK SEA AND THE DANUBE

Based on the analysis of transport demand flows of the trade and freight transport corridors identified in the project, and on the analysis of specific transport costs on direct road and on the routes that include the new maritime lines connecting the Black Sea and the Danube, the following new maritime lines have been identified:

DABS Maritime Line 1 ***Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati***
(Line1 includes Line 1b)
Characteristics: five 600 TEU vessels every week.
Load: 560 TEU for one vessel on the busiest direction.
Duration roundtrip: 300 hours, equalling two weeks.
Results: 225.000 TEU per year shifted to the new service (including line 1).

If the service from Port Said will be not considered, then Line 1 becomes Line 1b as follows:
DABS Maritime Line 1b ***Piraeus – Istanbul – Galati***
Characteristics: one 600 TEU vessel every two weeks.
Load: 500 TEU for one vessel.
Duration roundtrip: 200 hours.
Results: 25.000 TEU per year shifted every year from road to the new service.

DABS Maritime Line 2 ***Poti (Georgia) – Samsun – Galati***
With feeder services that can be organised from Inebolu to Samsun
Characteristics: four 600 TEU vessels every week.
Load: 512 TEU for one vessel on the busiest direction.
Duration roundtrip: 168 hours, equalling one week.
Results: 180.000 TEU per year shifted to the new service.

Maritime line 1 Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati (*including also maritime line 1b*)

- The Maritime Service to Port Said is very feasible, with a potential of minimum 2.25 million tonnes of cargo per year to be transhipped to the Port of Galati (30% of the maximum 7.4 million tonnes). This Service will stop in Izmir, Thessaloniki and Istanbul. By making this extra stops, another 2.0 million tonnes of cargo can be collected. In Izmir and Thessaloniki, 800.000 tons will be transhipped per port and in Istanbul 400.000 tons of additional cargo can be collected.

- Under the assumption that 30% of the total cargo can be shifted to the new services, and a net weight of container of 10 tons (excluding 3.5 tons own weight), 225.000 TEU can be transported from Egypt via Turkey and Greece to Galati. This means 4.500 TEU per week (2.800 on the busiest direction, from Galati to Port Said). A roundtrip of this service will require about 300 hours, equalling two weeks. In order to transport all the cargo (based on the 2.800 TEU per week from Galati to Egypt), five vessels should depart per week and thus 10 vessels can be put into service on this line.

- If the service to/from Port Said will be not considered, then for **line 1b Piraeus – Istanbul – Galati** would possibly attract almost 500.000 – 600.000 tonnes of freight through the Danube Romanian ports from road and other sea – road or sea – rail existing routes. This potential represents (46% of the actual maritime traffic of Galati port of 1.750.000 tonnes in 2012, or 1.5% of the maritime traffic of Constanta port of 53.000.000 tonnes in 2012. The estimated potential is represented by imports and exports of Romania and also by transit flows.

Maritime line 2 Poti (Georgia) – Samsun – Galati

- For the service to Poti, 180.000 TEU can be transported, using the same assumptions. This means 3.600 TEU per week, and 2.150 TEU in the busiest direction (Poti to Galati). A roundtrip to Poti takes a week for a vessel, and thus 4 vessels should be put into operation to transport this cargo.

- A feeder service might be considered from Inebolu to Samsun for the service to Poti

The hinterlands of each of the two lines are presented hereunder.

Line 1:	Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati

Hinterlands:

Port Said: Egypt

Izmir: Turkey 3, Greece 3, Greece 4

Thessaloniki: Greece 2

Istanbul: Greece 1, Turkey 4

Galati: Romania, Hungary, Austria, Poland, Czech Republic, Slovakia, Germany, Baltic countries

Specific hinterlands connections could be considered from Galati to Cahul in Moldova

Line 2:	Poti (Georgia) – Samsun – Galati

Hinterlands

Poti: Georgia, Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

Samsun: Turkey 1, Turkey 2, Turkey 5

Galati: Romania, Hungary, Austria, Poland, Czech Republic, Slovakia, Germany, Baltic countries

A feeder service might be considered from Inebolu to Samsun

The hinterlands considered above are described in Phase 2 report as follows:

Figure 1 hereunder illustrate the hinterlands defined for Turkey (5 hinterlands), Figure 2 the hinterlands of Greece (4 hinterlands) and Figure 3 the hinterlands of Romania (6 hinterlands).

Figure 1 Hinterlands Turkey

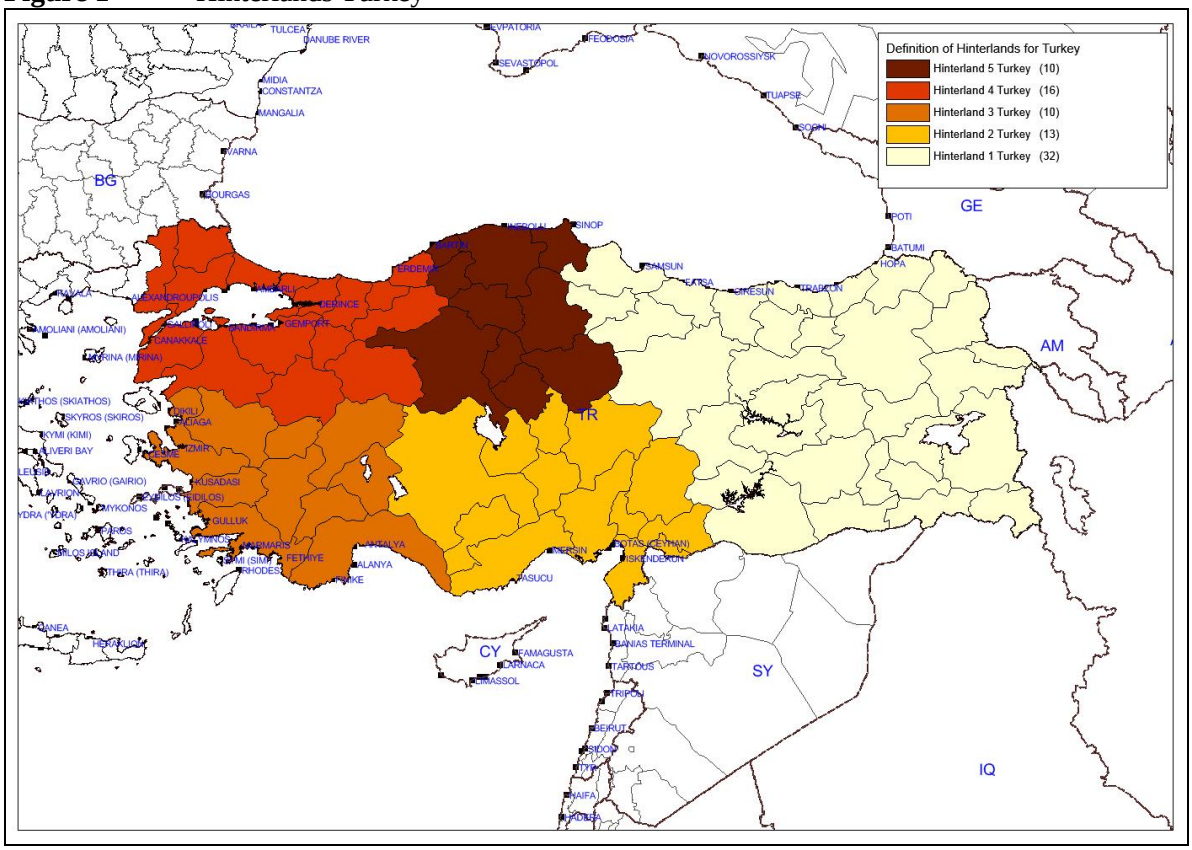


Figure 2 Hinterlands Greece

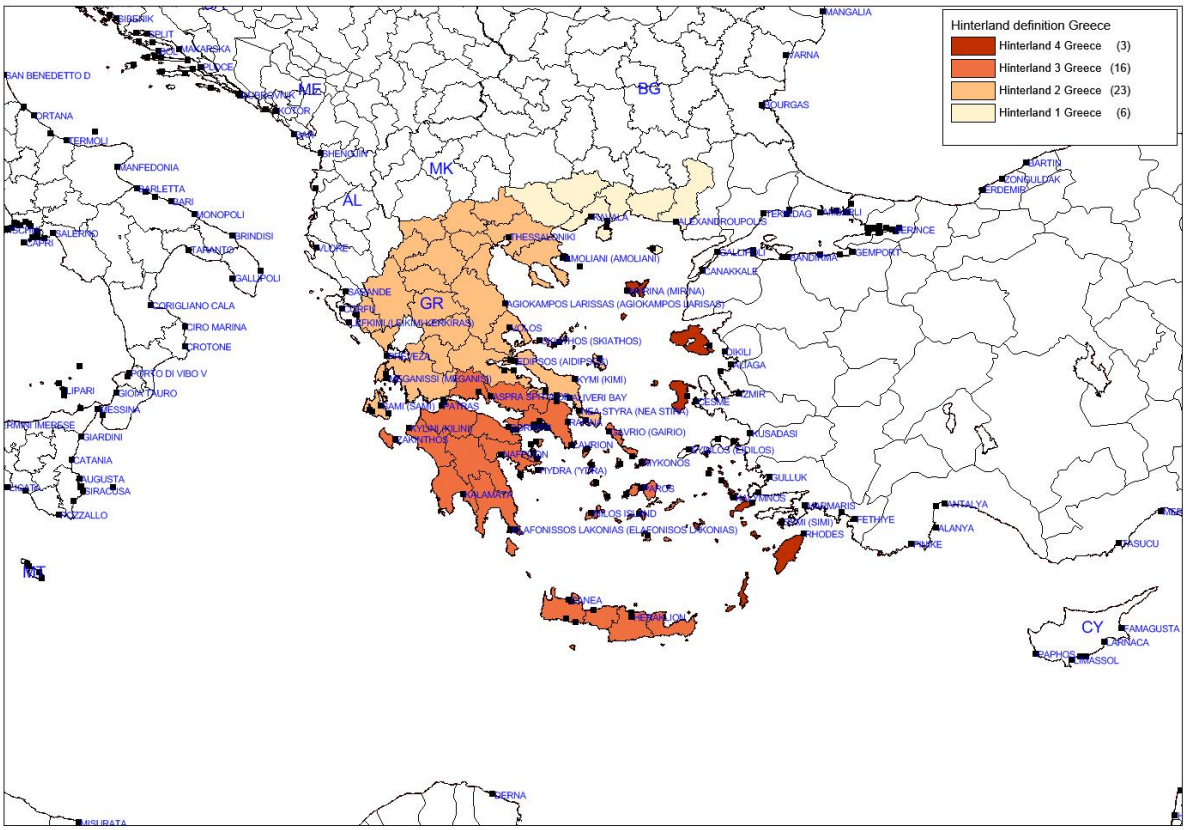
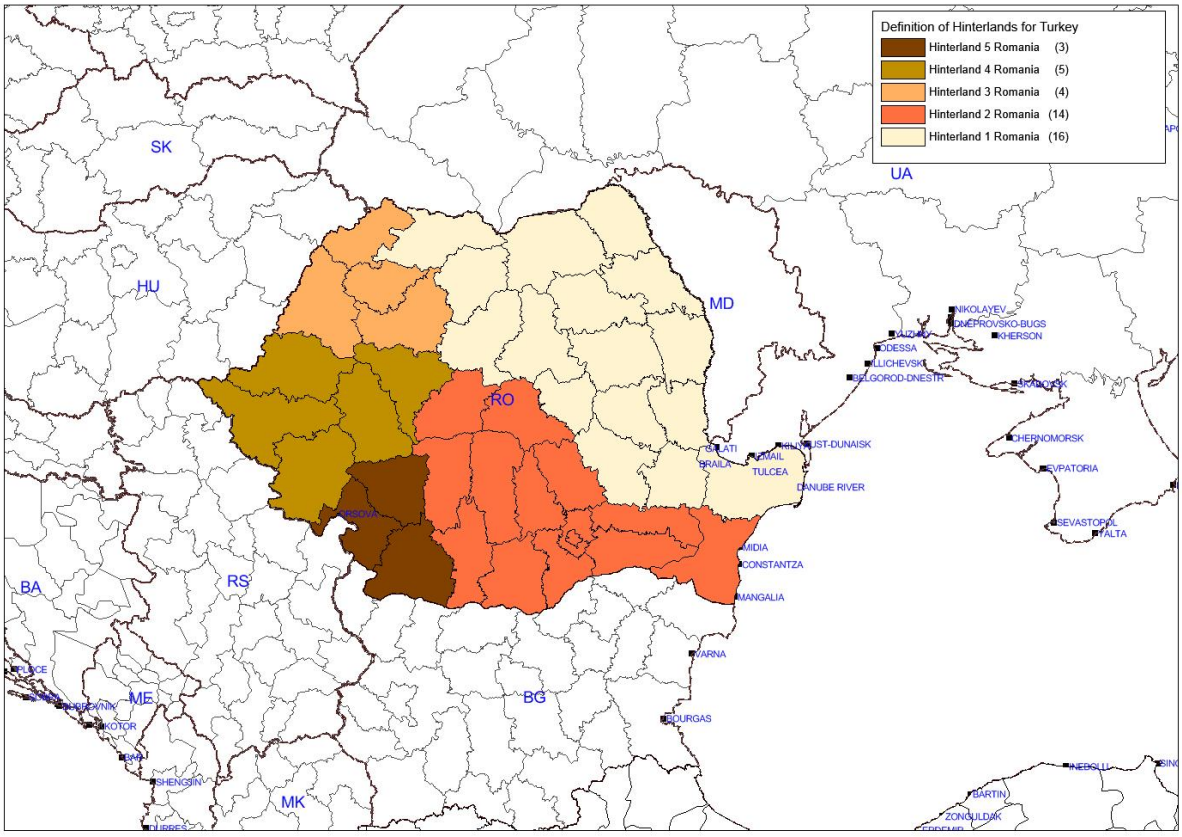
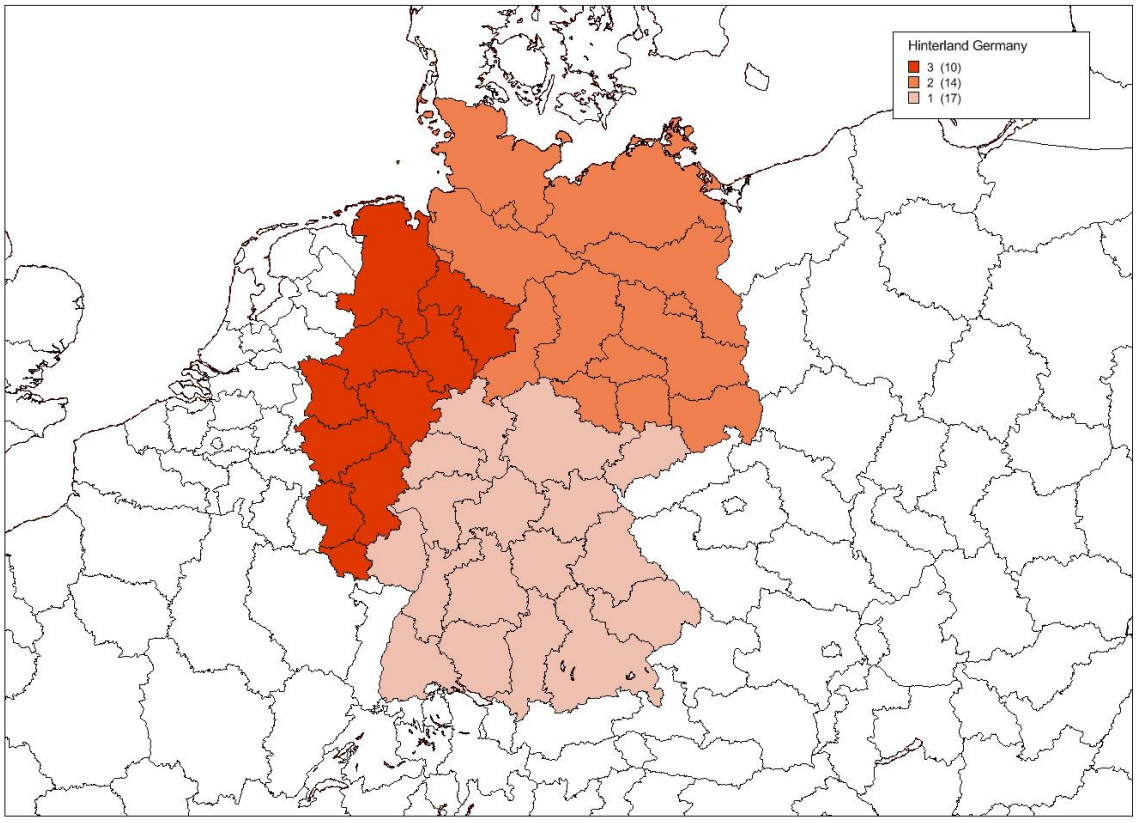


Figure 3 Hinterlands Romania



Further on, the hinterlands for Germany have been considered as shown in Figure 4 hereunder.

Figure 4 Hinterlands Germany



Further on, hinterlands in Central and Eastern Europe have been considered at the country level for:

- Hungary
- Austria
- Czech Republic
- Slovakia
- Poland
- Baltic countries

CONDITIONS

There are certain conditions to be satisfied in order to secure that a high percentage of the estimated potential would be attracted by the new maritime lines:

- The hinterland connections of Galati / Romania with Germany, especially by rail, will be improved in the near future. The condition here is to finalise the up-grading of the rail links that are part of the Trans European network as shown in the previous chapter.

- The responsible authorities shall ensure the minimum navigation depth of 2.5 meters in all seasons of the year in order to secure the hinterland connection of the port of Galati with Hungary and Austria by inland waterway.

- Last but not least, a maritime line is set-up by a ship owner and a forwarder who has the possibility to "CONTROL" all the freight packages identified on both directions (import and export). The Port Administration and the Port Operator can offer a set of facilities in order to help making the maritime line feasible from economic perspective, and they both need to promote these facilities. Starting from this facilities the forwarder can establish the final route, the freight volumes depending of the transport periodicity and the type of vessel.

5. PHASE 1: TRADE, TRANSPORT AND ECONOMY IN THE DABS COUNTRIES

Phase 1 of the project has included tasks 1 and 2, as shown hereunder:

Phase 1

Task no.	Task description
Task 1	Analysis of trade and freight flows and identification of the main transport corridors defined by freight flow origin and destination, in the Black Sea Basin area
Task 2	Economic analysis at macro and regional/local level

All project activities have been carried out in time and no delays have occurred, excepting the delay on receiving the feedback on the freight flows and related transport costs survey from the DABS countries and also from the logistic industry in Romania – the latest one being the input from the market study that is carried out separately.

Beside the activities specified for tasks 1 and 2, the team of the feasibility study has participated to the DABS workshops in Tbilisi in the period 5-7 November 2013 and in Varna in the period 24-25 November 2013. At each workshops have been presented the approach of the feasibility study, the questionnaires for the data collection from the DABS countries and the work progress with examples from the analysis of the databases considered in the current project.

5.1. Approach Phase 1

The following activities have been considered in Phase 1 of the project.

1. **Analysis of trade and freight flows and identification of the main transport corridors defined by freight flow origin and destination, in the Black Sea Basin area**

The key issue of the analysis of trade and freight flows will be the transport chain approach, who gives a real and complete picture of the transport of goods from Origin to the Destination. Further on, for the scope of the project a detailed and comprehensive trade and transport database will be built: **the DABS trade and transport database**.

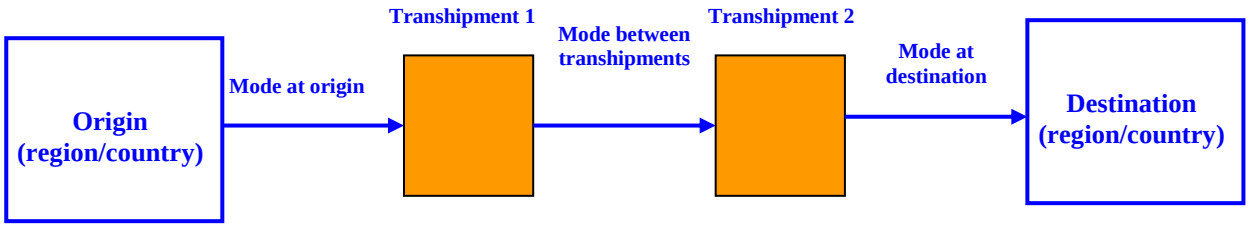
The structure of the DABS trade and transport database will be built by considering the following elements:

- Origin of transport flows
- Transport mode at origin
- Transhipment location no. 1 (region of the port/terminal)
- Transport mode between transhipments
- Transhipment location no. 2 (region of the port/terminal)
- Transport mode at destination
- Destination of the transport flow

as shown in the figure hereunder.

The main gap that has to be covered in the transport database is represented by port/terminal information, which is very difficult to be obtained and when it is available it is not detailed enough for a proper representation of the transport flows.

Overview transport chain in the trade and transport DABS database



The following commodity groups will be included in the trade and transport DABS database:

Commodity groups 1 digit (NSTR with crude oil separate) in the trade and transport DABS database

Code	Commodity group
0	Agricultural products
1	Foodstuffs
2	Solid mineral fuels
3	Crude oil
4	Ores, metal waste
5	Metal products
6	Building minerals & material
7	Fertilisers
8	Chemicals
9	Machinery & other manufacturing
10	Petroleum products

The following transport modes will be included in the trade and transport database:

Transport Modes in the DABS trade and transport database

Code	Mode
1	Road
2	Rail
3	Inland Waterways
4	Sea
8	Other
9	Unknown

Input information consists of trade and transport flows from the following sources:

- Recent international projects that have developed similar databases;
- ETIS plus data for year 2010;
- TRANSTOOLS European model and database
- Local information from DABS countries and partners
- Information from the market study carried out in the DABS project

Regional detail has been considered at minimum NUTS 2 level for the core area of the study, at the NUTS 2 or NUTS 1 level outside the core area.

The information has been analysed, compared and worked out in order to get the final trade and transport DABS database. The output information consists of the Transport chain database for the Black Sea area, on the structure previously presented.

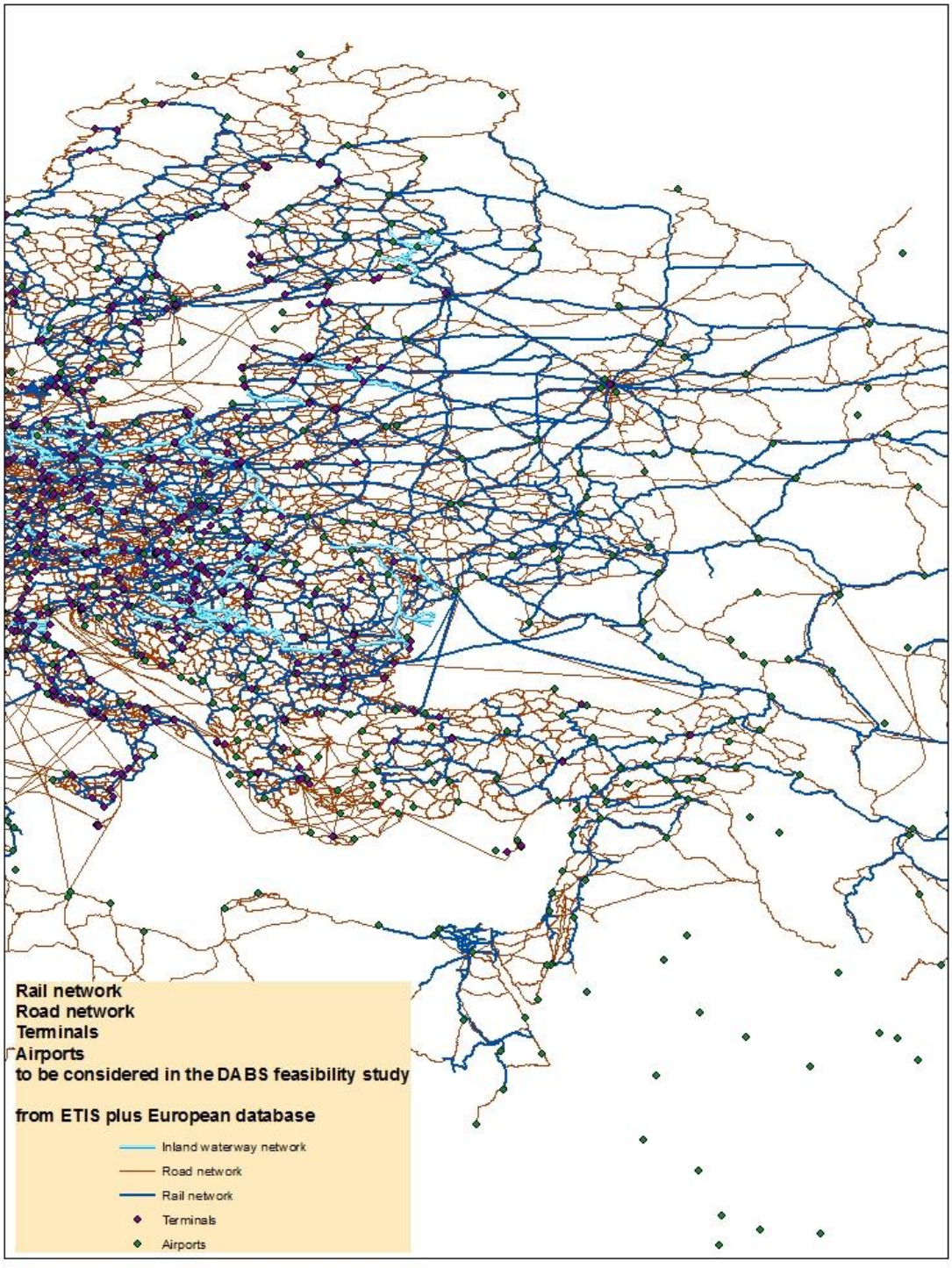
Regarding the transport infrastructure networks, the following networks have considered:

- Road network
- Rail network
- Inland waterways network

- Existing maritime connections
- Ports and terminals

The networks mentioned above have been considered from the ETIS plus database. The above networks of ETIS plus database are shown in Figure 1 hereunder.

Figure 1 Transport infrastructure networks considered in the DABS feasibility study



2. Economic analysis at macro and regional / local level related to:

- **economic development perspective of the Black Sea basin and Danube macroregion**
- **economic development trends at macro-national and international level for short and medium terms**

The economic analysis has been carried out at the regional level considered for the analysis of the trade and transport flows.

The exchange of a specific commodity between two regions is given by the interaction between the *production sector* of one region and the *attraction (or consumption) sector* of the partner region. To simulate this relation between transport and economy, the following sectors will be considered:

- Agriculture,
- Mining and quarrying,
- Basic metal,
- Construction,
- Chemicals, petroleum,
- Metal products,
- Food consumption,
- Residential construction,
- Private final consumption.

The input information consists of the base year socio-economic data by region, as far as possible detailed be the production and consumption sectors mentioned above. The input data will be considered from ETIS PLUS 2010, EUN-STAT, TINA Turkey project database and from the local information to be collected during the project. Forecasts of the socio-economic data will be considered from the official sources, as European Commission and National Forecasting Commissions of each country in the study area.

The output information consists of the consolidated information on the production and consumption sectors for both base year and time horizons 2016 and 2020.

5.2. Analyse of Trade and Freight Flows and Identification of the main Transport Corridors defined by Freight Flow Origin and Destination in the Black Sea area

5.2.1. Data sources

As specified before, the basic data sources considered for the current project are as follows:

- Recent international projects that have developed similar databases;
- ETIS plus data for year 2010;
- TRANSTOOLS European model and database
- Local information from DABS countries and partners
- Information from the market study carried out in the DABS project

First indications and recommendations indicate the ETIS PLUS 2010 database as the most recent and most comprehensive database to be considered in the current project.

TRANSTOOLS 2005 it is considered for filling in data gaps if these are identified in ETIS PLUS 2010 data.

Information from DABS countries and project partners collected in the project is / will be considered for up-dating and up-grading the ETIS PLUS 2010 databases.

Information from the market study is used as follows:

- To up-date and up-grade the ETIS PLUS database if possible;
- To provide specific cost and tariff related data for Phase 2 of the project.

5.2.2. ETIS PLUS 2010 database analysis

The analysis of the ETIS PLUS database has been carried out for the core DABS countries, as follows:

- Romania
- Bulgaria
- Turkey
- Greece
- Georgia
- Russian Federation
- Ukraine
- Moldova

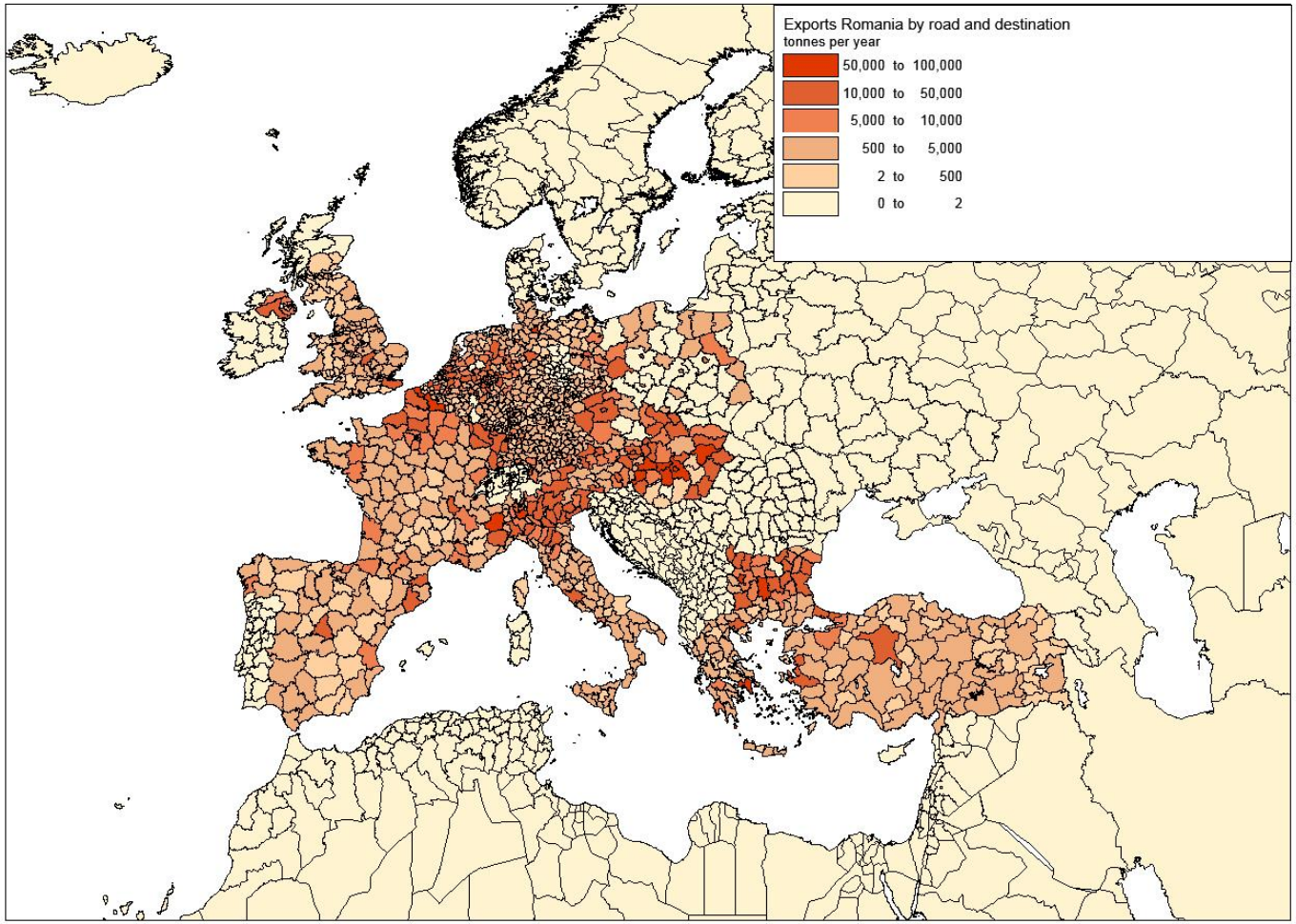
The analysis has been focused on the imports and exports of each of the core DABS country in relation with all other DABS countries and all other European countries by *direct road* is considered, as the modal shift from road to alternative transport modes shall be addressed.

For Moldova and Georgia no direct road flows have been considered in ETIS PLUS 2010 database. Data from TRANSTOOLS 2005 will be considered for this missing information in ETIS PLUS.

The figures hereunder shows the related import and export flows by direct road and region of the partner country at NUTS 3 level. The figures gives a good image and offer a good guideline for identifying the most suitable corridors to be addressed for the modal shift from road to alternative transport modes in the Danube – Black Sea area. Specific detailed analysis will be carried out in Phase 2 of the project for this.

All maps hereunder illustrates the results of the analysis carried out in Phase 1 of the project by using the ETIS PLUS 2010 databases. All maps have been produced in Phase 1 of the project using the results of the database analysis, the definition of zones and the MapInfo and ArcGIS software tools the Consortium have under licence.

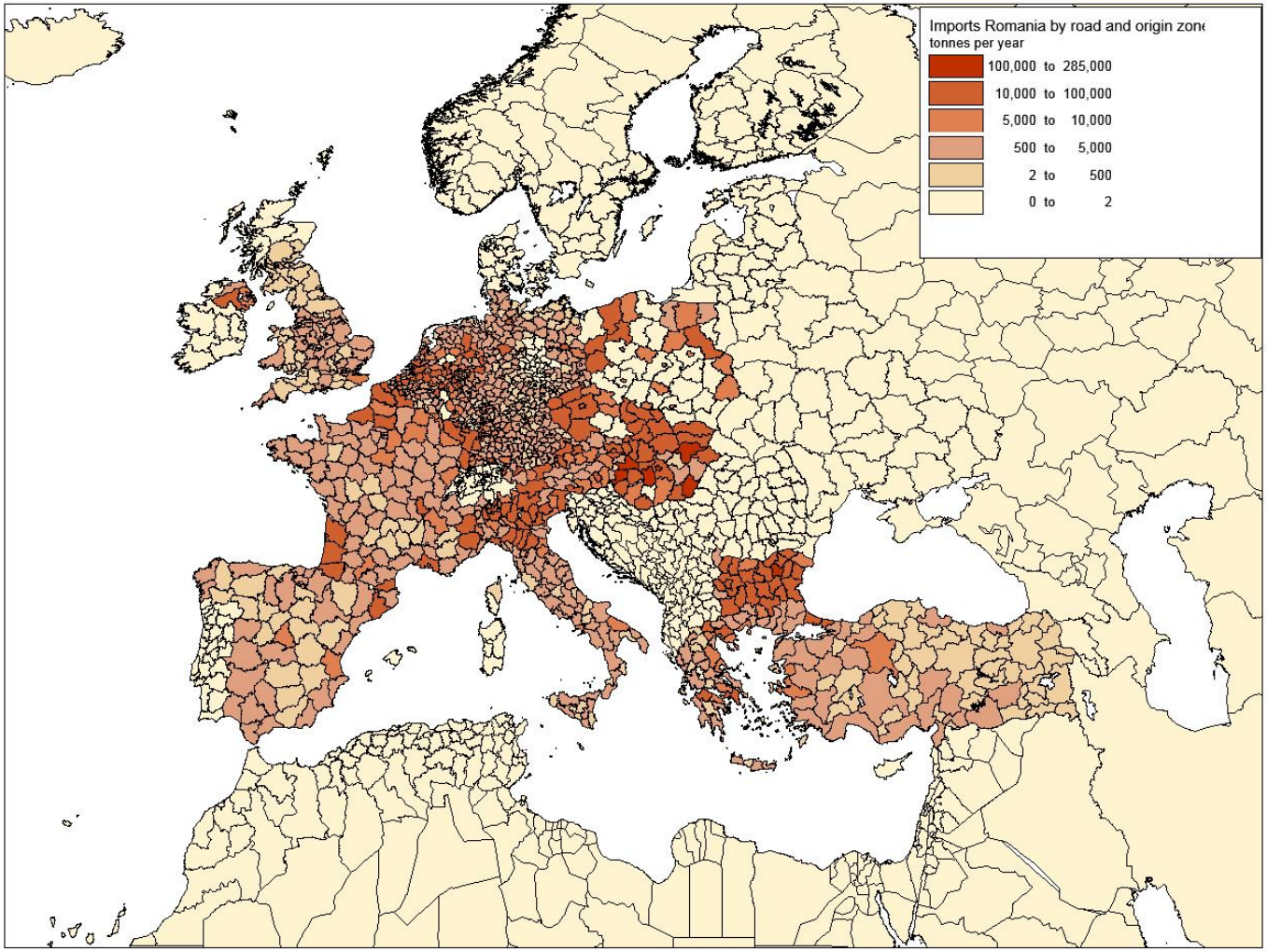
Figure 2 Exports Romania by direct road and destination region, tonnes per year, 2010



In the map nearby it is observed that possible corridors of interest for DABS could be those defined by Romanian exports to Greece and to Turkey. Direct road flows of Romanian exports to the two countries are above 5,000 tonnes per year for selected regions in Turkey and Greece.

Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

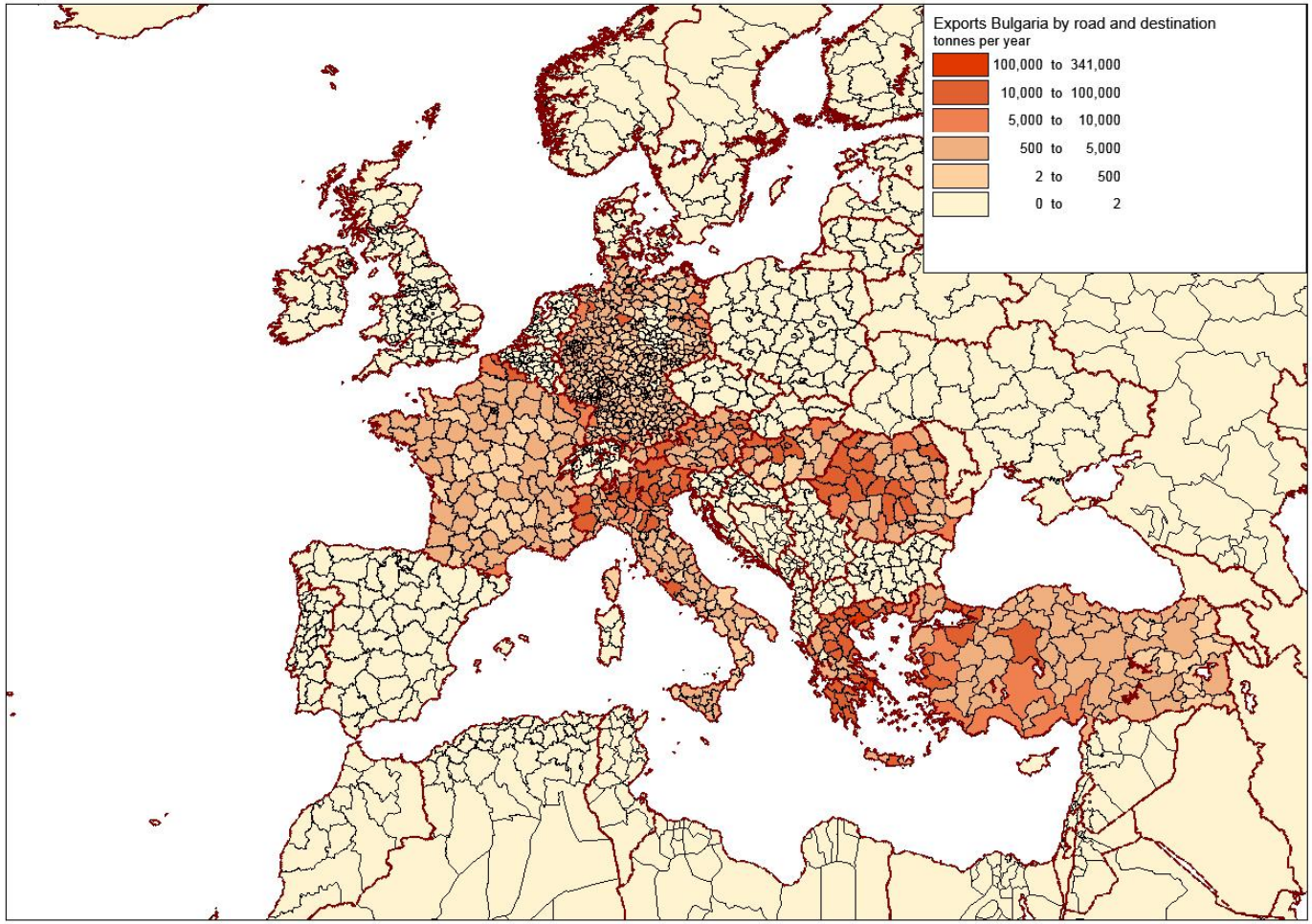
Figure 3 Imports Romania by direct road and destination region, tonnes per year, 2010



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

In the map nearby it is observed that possible corridors of interest for DABS could be those defined by Romanian imports from Greece and Turkey. Direct road flows of Romanian exports to the two countries are above 5,000 tonnes per year for selected regions in Turkey and Greece.

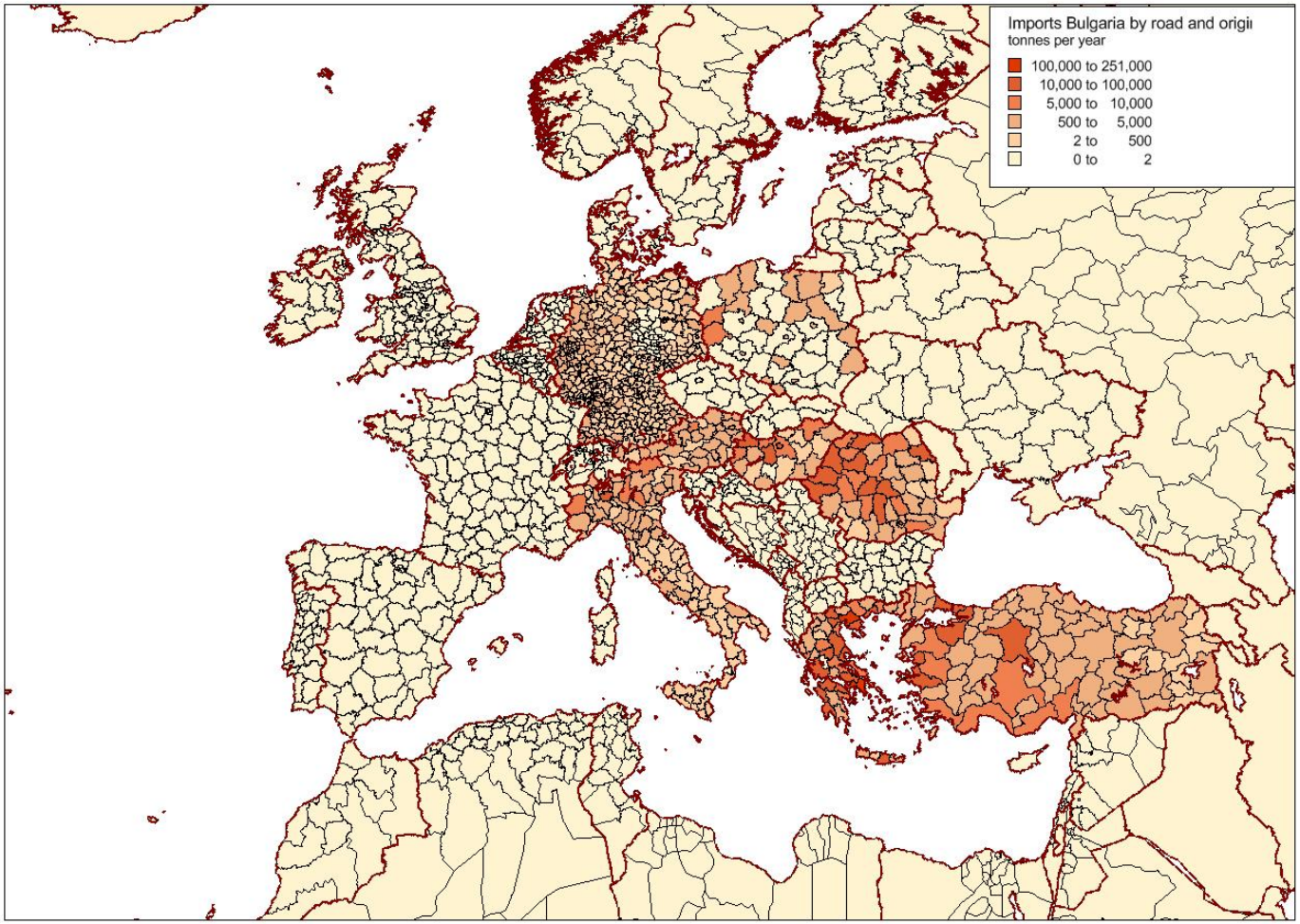
Figure 4 Exports Bulgaria by direct road and destination region, tonnes per year, 2010



In the map nearby it is observed that possible corridors of interest for DABS could be those defined by Bulgarian exports to Greece and to Turkey. Direct road flows of Bulgarian exports to the two countries are above 5,000 tonnes per year for selected regions in Turkey and Greece.

Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

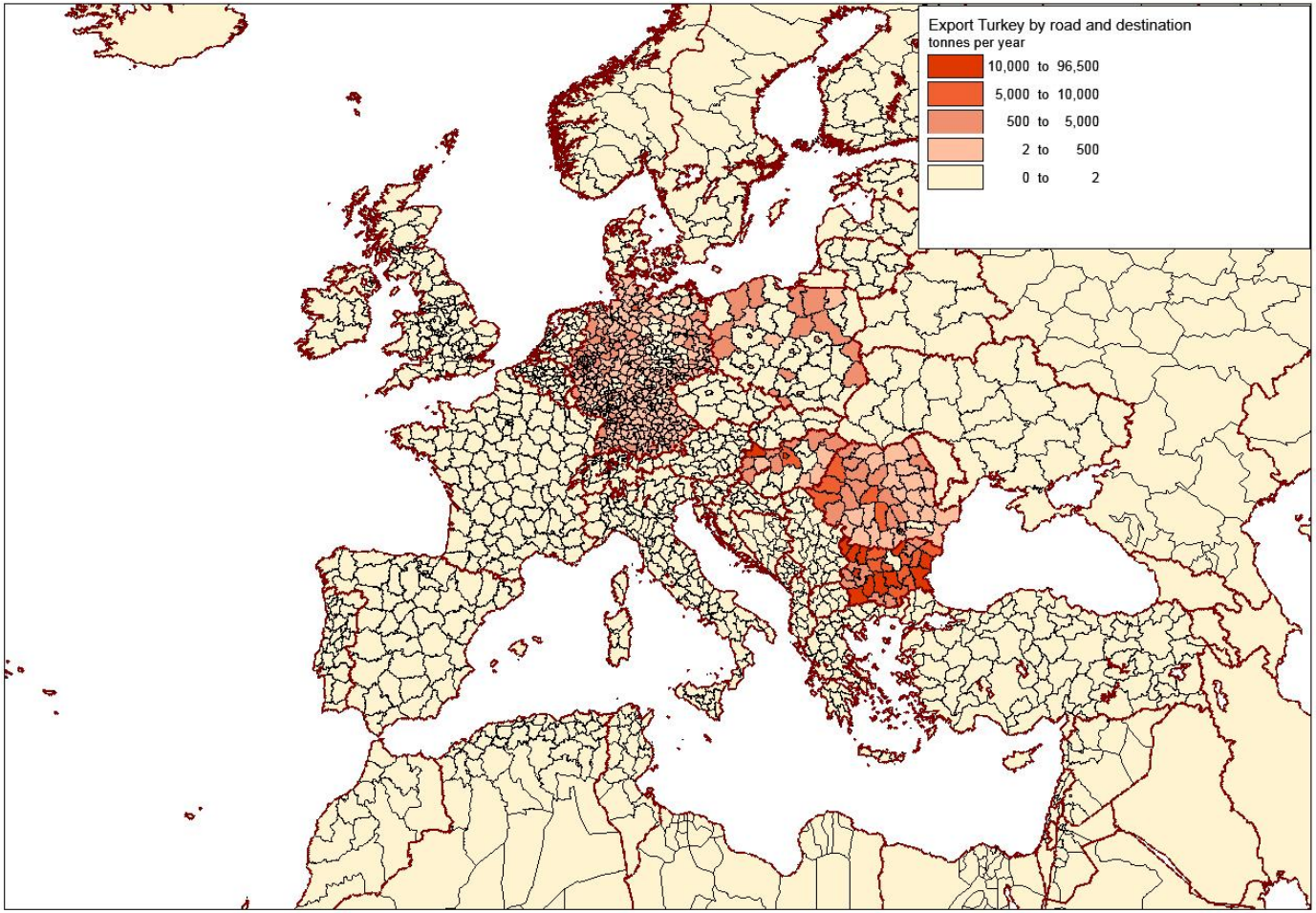
Figure 5 Imports Bulgaria by direct road and destination region, tonnes per year, 2010



In the map nearby it is observed that possible corridors of interest for DABS could be those defined by Bulgarian imports from Greece and Turkey. Direct road flows of Bulgarian imports from the two countries are above 5,000 tonnes per year for selected regions in Turkey and Greece.

Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

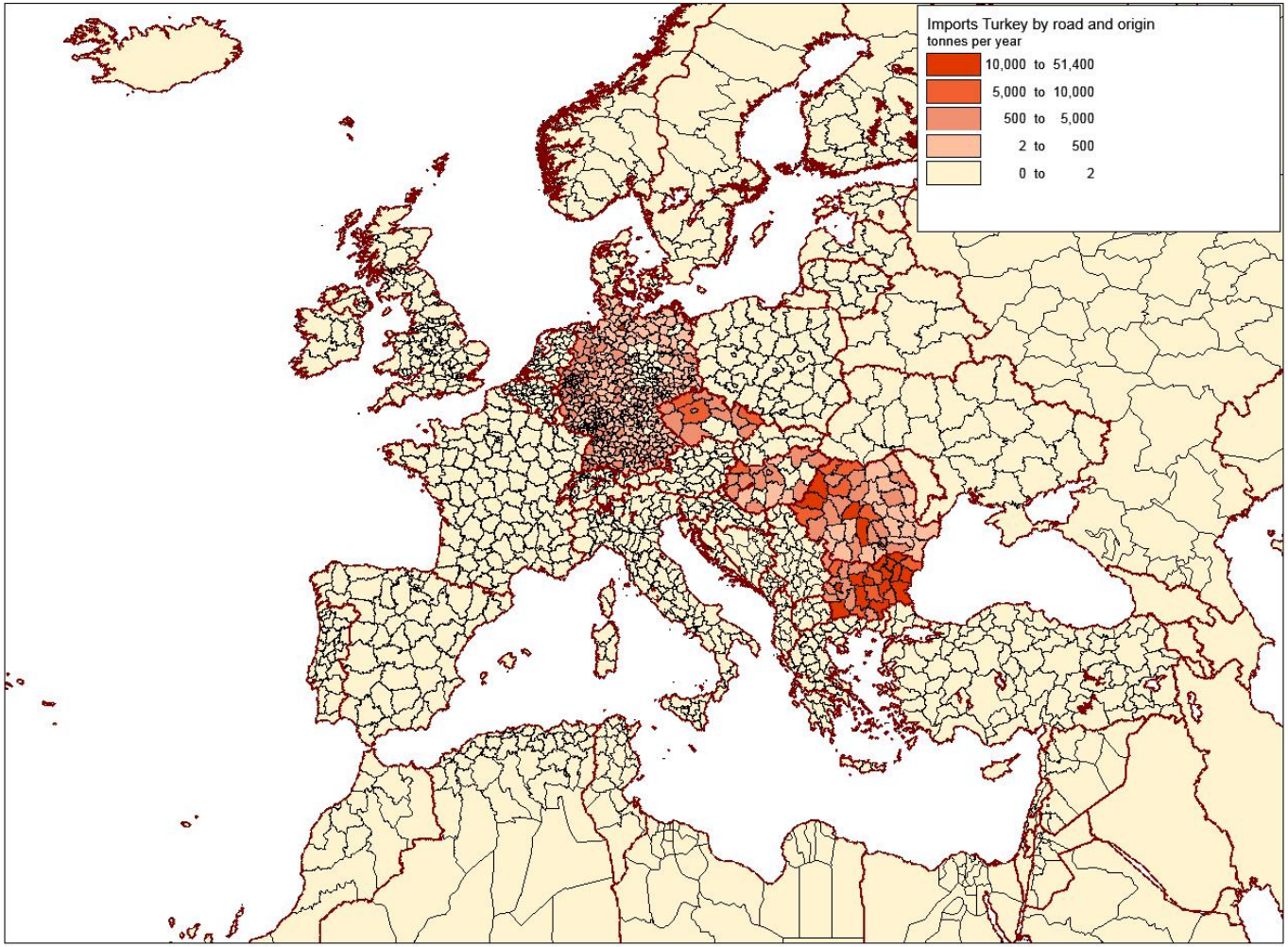
Figure 6 Exports Turkey by direct road and destination region, tonnes per year, 2010



In the map nearby it is observed that possible corridors of interest for DABS could be those defined by Turkish exports to Romania, Bulgaria, Hungary and Poland. Direct road flows of Turkish exports to the above mentioned countries are above 5,000 tonnes per year for selected regions.

Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

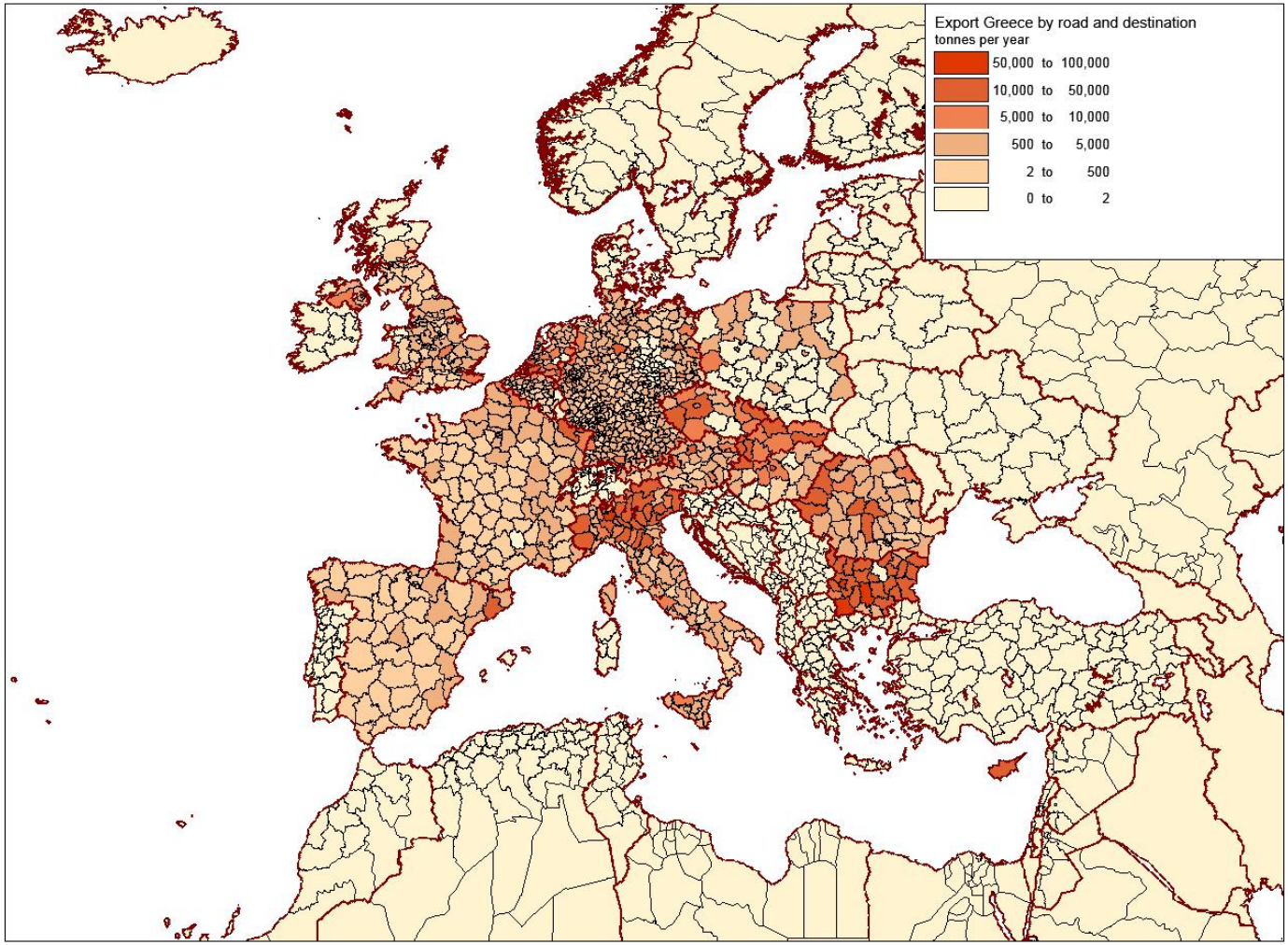
Figure 7 Imports Turkey by direct road and destination region, tonnes per year, 2010



In the map nearby it is observed that possible corridors of interest for DABS could be those defined by Turkish imports from Bulgaria, Romania, Hungary, Austria and Czech Republic. Direct road flows of Turkish imports from the above mentioned countries are close to and above 5,000 tonnes per year for selected regions.

Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Figure 8 Exports Greece by direct road and destination region, tonnes per year, 2010

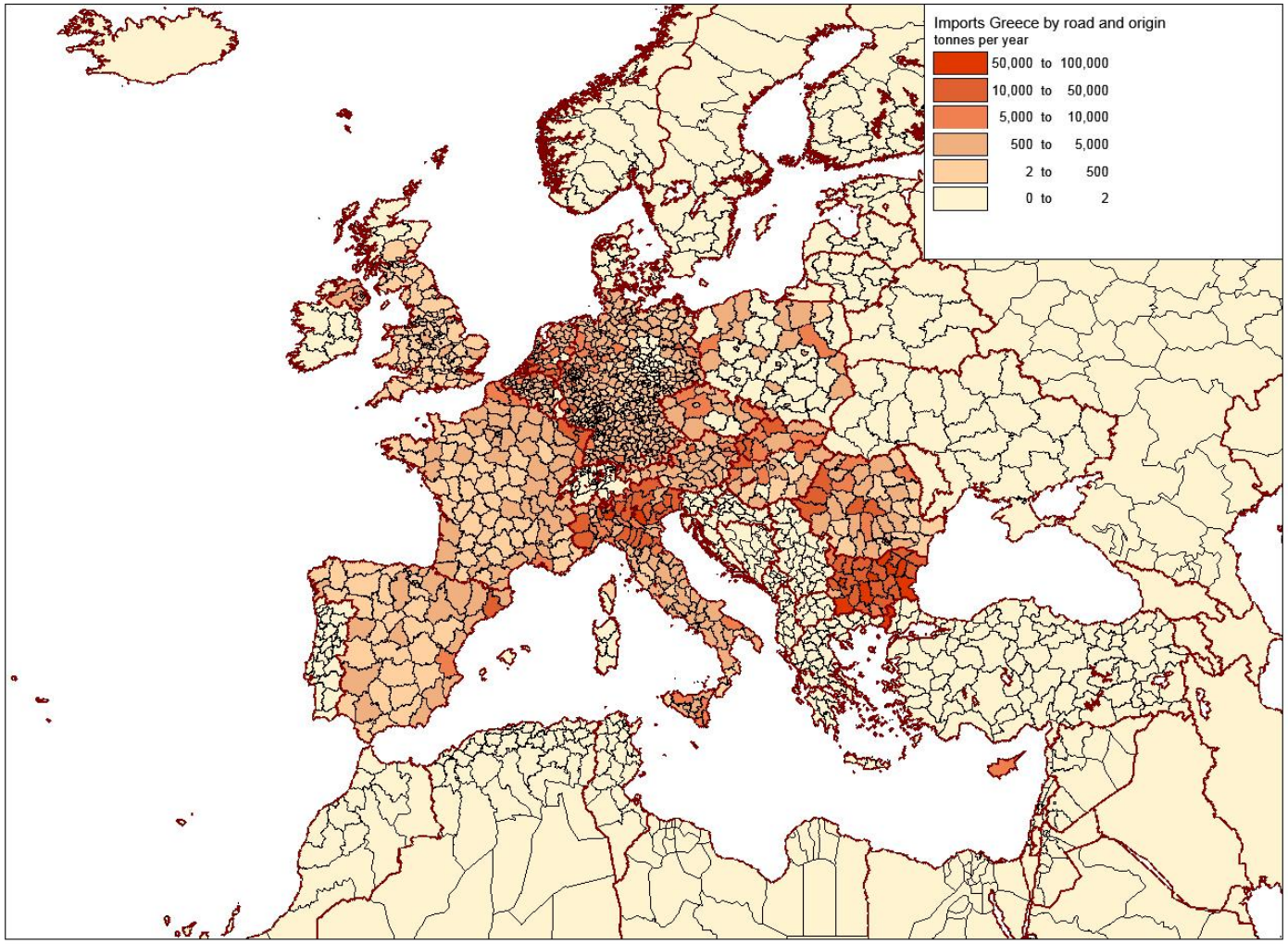


Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

In the map nearby it is observed that possible corridors of interest for DABS could be those defined by exports from Greece to Romania, Bulgaria, Hungary and Poland. Direct road flows of exports from Greece to the above mentioned countries are almost equal to or above 5,000 tonnes per year for selected regions.

Direct road flows from Greece to North of Italy are not of interest for the DABS corridors, but for a possible maritime link between Greece and North of Italy.

Figure 9 Imports Greece by direct road and destination region, tonnes per year, 2010

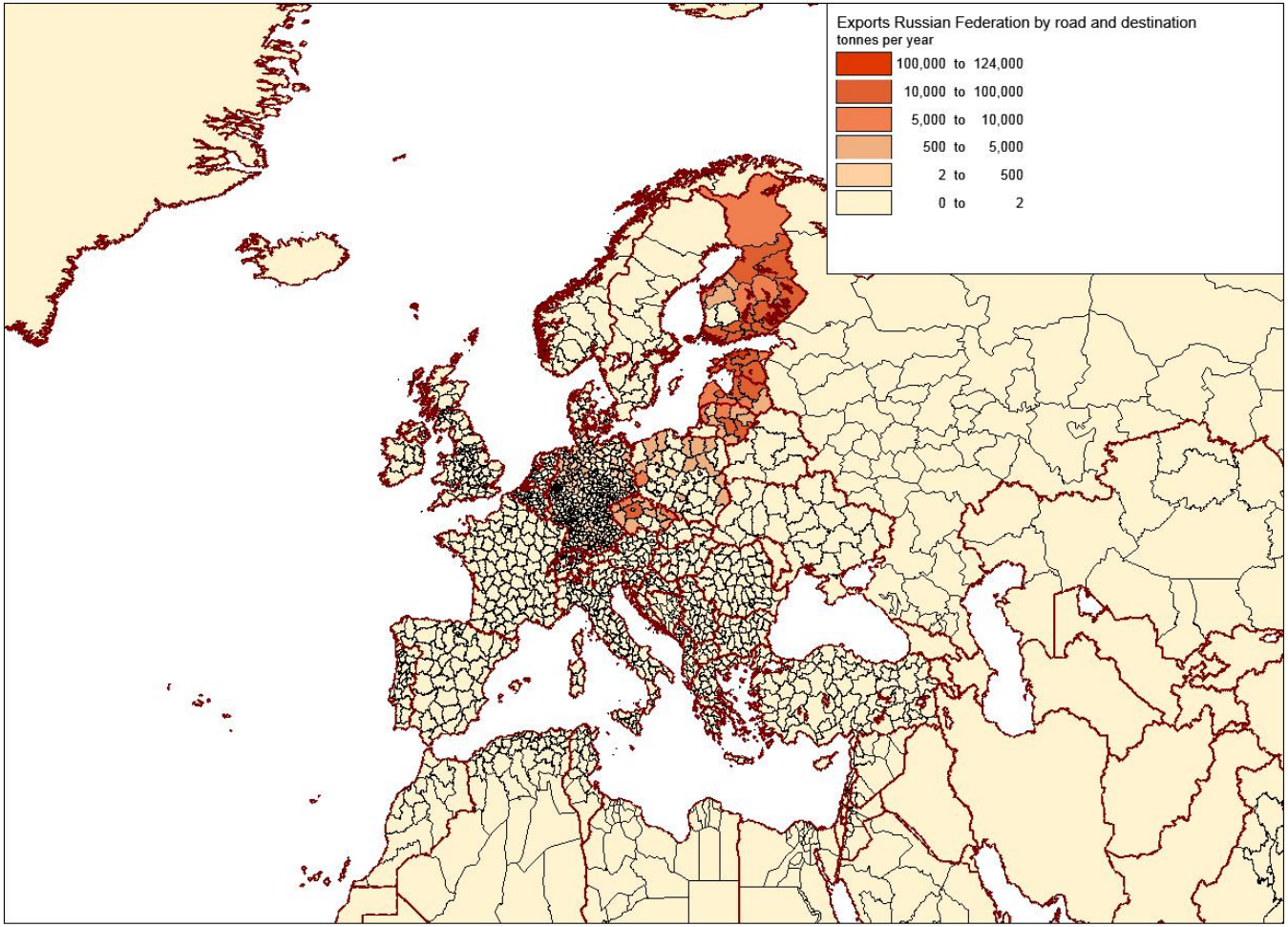


Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

In the map nearby it is observed that possible corridors of interest for DABS could be those defined by imports of Greece from Romania, Bulgaria, Hungary and Poland. Direct road flows of imports of Greece from the above mentioned countries are almost equal to or above 5,000 tonnes per year for selected regions.

Direct road flows to Greece from North of Italy are not of interest for the DABS corridors, but for a possible maritime link between Greece and North of Italy.

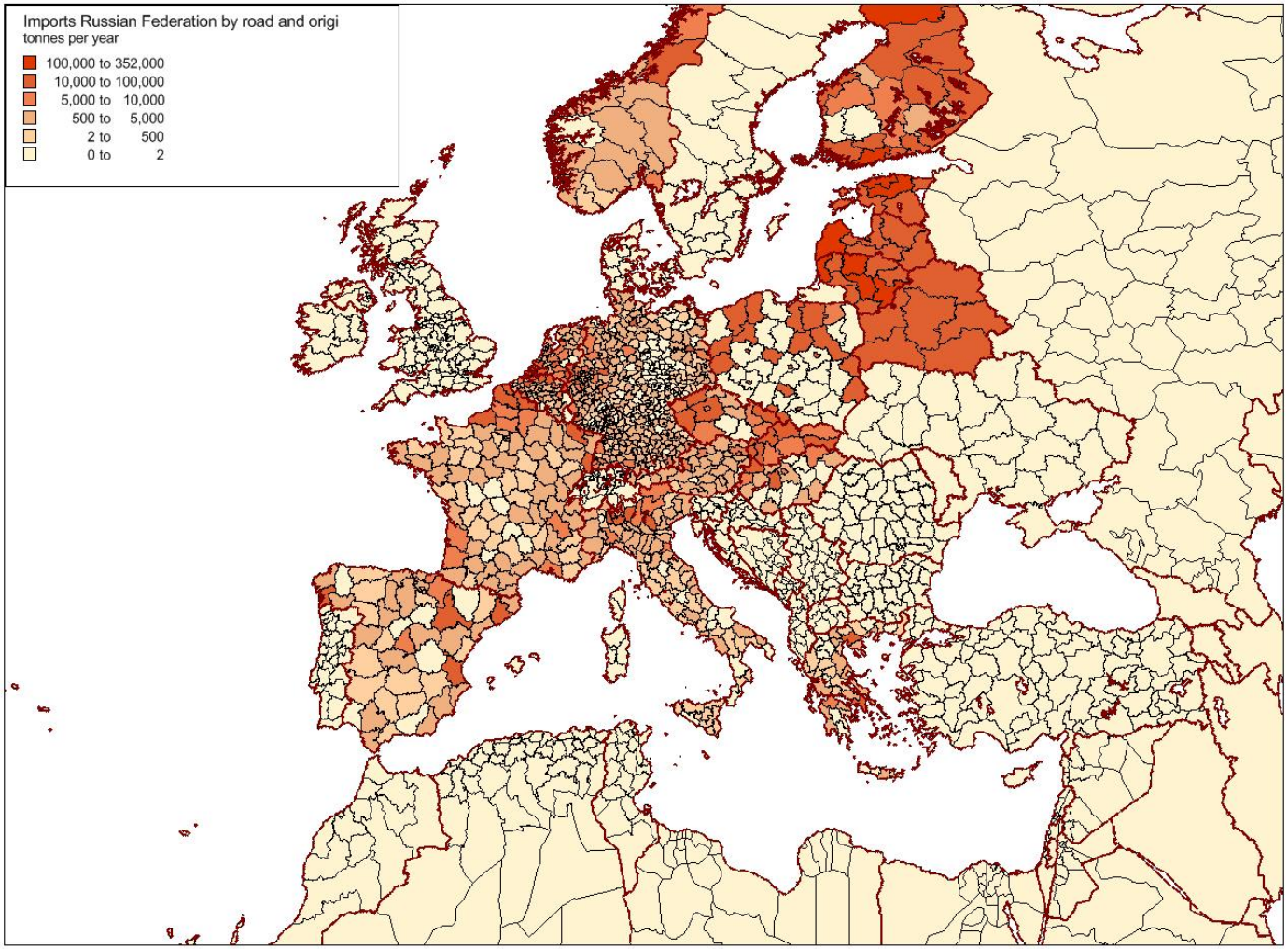
Figure 10 Exports Russian Federation by direct road and destination region, tonnes per year, 2010



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

In the map nearby it is observed that possible corridors of interest for DABS could be eventually those defined by exports of Russian Federation to Czech Republic, but this depends of the partner regions in Russian Federation. Direct road flows of exports to the Czech Republic are almost equal to or above 5,000 tonnes per year for selected regions.

Figure 11 Imports Russian Federation by direct road and destination region, tonnes per year, 2010

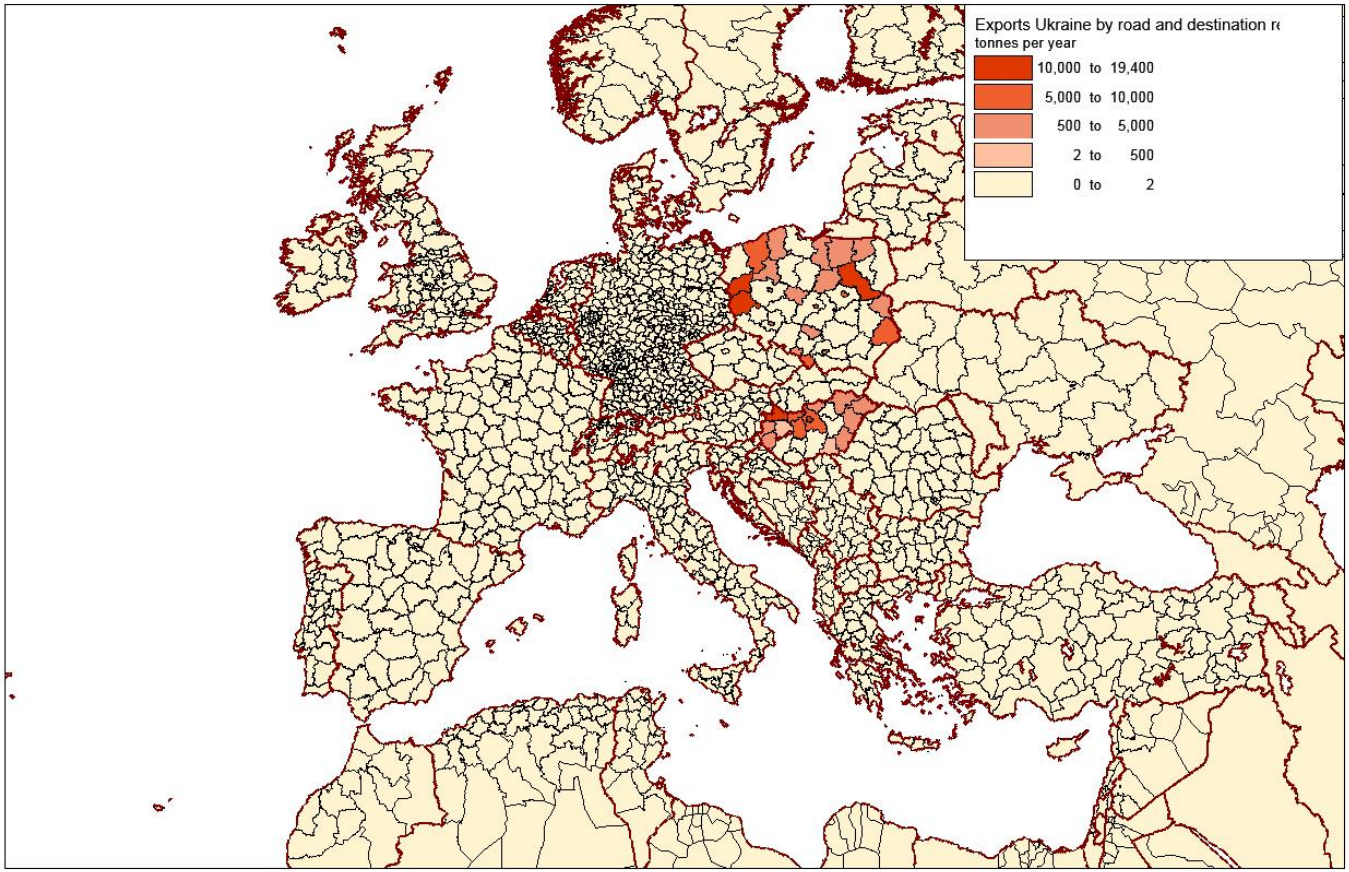


Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

In the map nearby it is observed that possible corridors of interest for DABS could be those defined by imports of Russian Federation from Hungary, Austria, Czech Republic, North of Italy and part of France and Germany. Direct road flows of imports of Russian Federation from the above mentioned countries / regions are almost equal to or above 5,000 tonnes per year for selected regions.

Rail links to the Danube ports with further short sea connection to Ukrainian and / or Russian ports will be analysed in the second phase of the project.

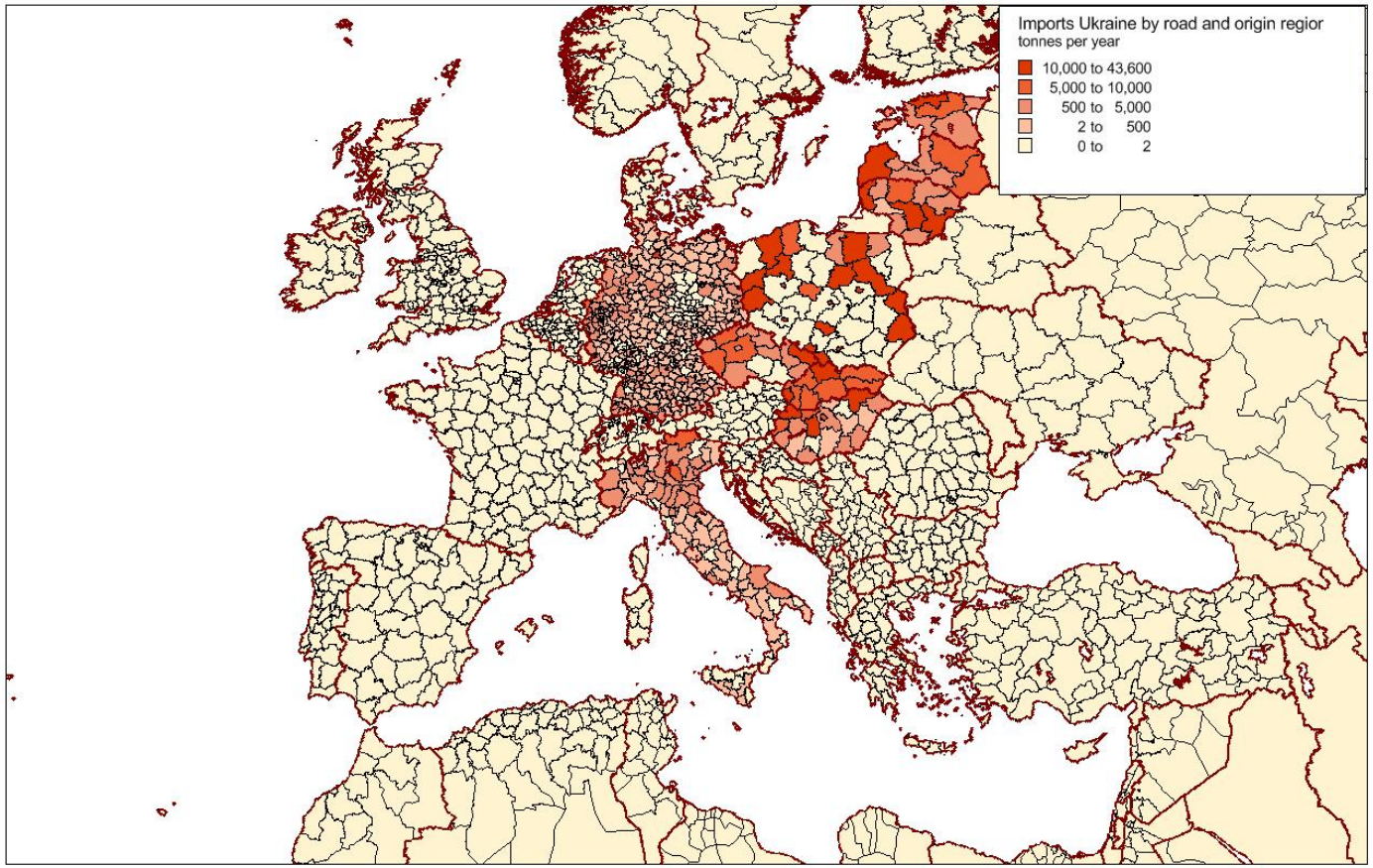
Figure 12 Exports Ukraine by direct road and destination region, tonnes per year, 2010



In the map nearby it is observed that it is less probable for Ukraine exports by road to be of interest for the DABS corridors.

Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Figure 13 Imports Ukraine by direct road and destination region, tonnes per year, 2010



In the map nearby it is observed that possible corridors of interest for DABS could be those defined by imports of Ukraine from Hungary, Austria, Czech Republic and North of Italy. Direct road flows of imports of Ukraine from the above mentioned countries / regions are almost equal to or above 5,000 tonnes per year for selected regions.

Rail links to the Danube ports with further short sea connection to Ukrainian and / or Russian ports will be analysed in the second phase of the project.

Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Exports and imports of the DABS countries have been also analysed considering the type of goods by NST2007 classification.

The NST2007 classification is in use since year 2007 and is replacing the previous NSTR classification of goods. However, there is not any freight model at this moment that considers the NST2007 classification. The existing few European freight transport models consider the NSTR1 classification of goods.

The NST2007 classification, as considered in the ETIS PLUS 2010 also, is presented hereunder:

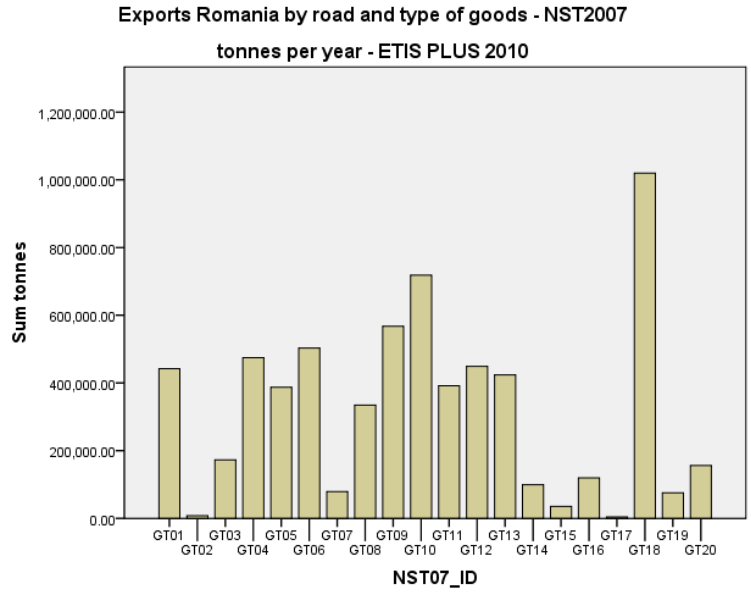
ID	Name
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products
GT02	Coal and lignite; crude petroleum and natural gas
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium
GT04	Food products, beverages and tobacco
GT05	Textiles and textile products; leather and leather products
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;
GT07	Coke and refined petroleum products
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel
GT09	Other non-metallic mineral products
GT10	Basic metals; fabricated metal products, except machinery and equipment
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks
GT12	Transport equipment
GT13	Furniture; other manufactured goods n.e.c.
GT14	Secondary raw materials; municipal wastes and other wastes
GT15	Mail, parcels
GT16	Equipment and material utilized in the transport of goods
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.
GT18	Grouped goods: a mixture of types of goods which are transported
GT19	Unidentifiable goods: goods which for any reason cannot be identified
GT20	Other goods n.e.c.
GT200	Other goods not elsewhere classified
NAP	Not applicable
TOTAL	Total transported goods
UNK	Unknown

In the following figures are shown the exports and imports by direct road for each of the core DABS countries, by type of goods. This analysis complements the analysis of imports and exports of the DABS countries by road an gives an indication on the main categories of goods that might be considered for the new transport chains operations to be proposed in Phase 2.

Romania

Figure 14 Exports Romania by road and type of goods – NST2007, tonnes per year

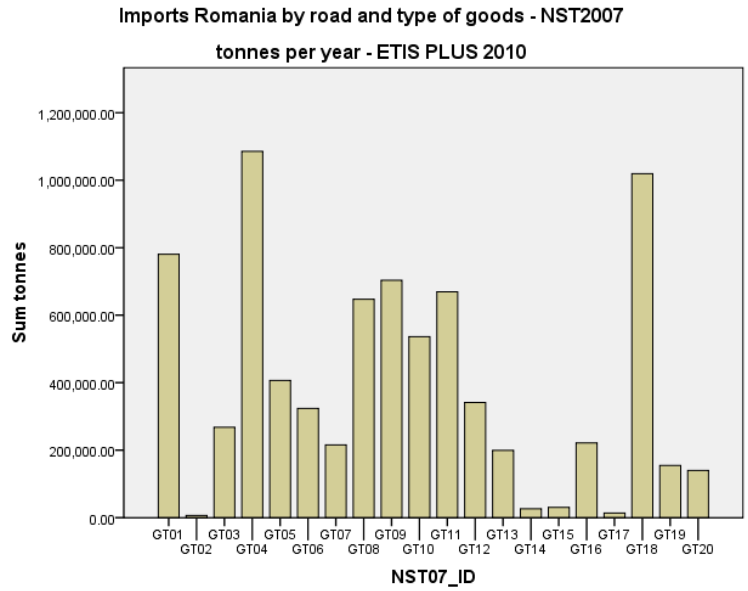
Total exports by road:6.463.057 tonnes – in ETIS PLUS 2010.



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

Figure 15 Imports Romania by road and type of goods – NST2007, tonnes per year

Total imports by road: 7.790.461 tonnes – in ETIS PLUS 2010.



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

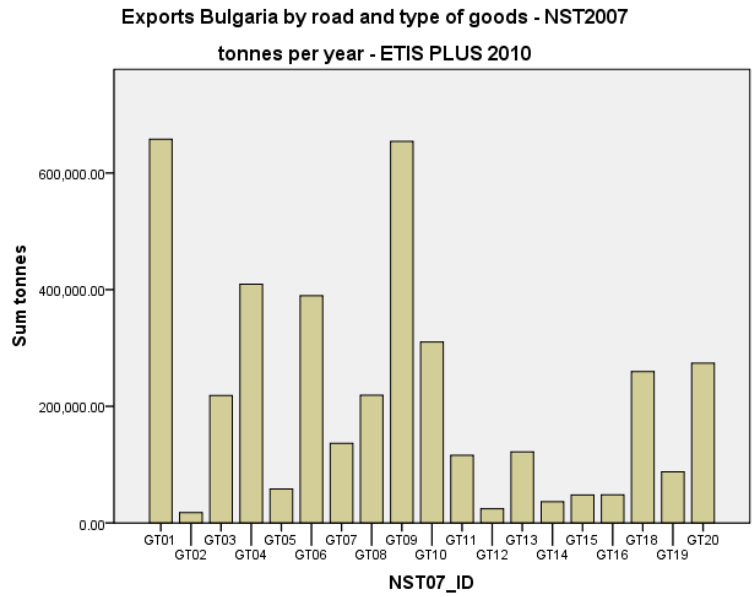
It is observed that the GT18 - Grouped goods: a mixture of types of goods which are transported together, counts for the highest volume exported from Romania by road, with 1 mln tonnes per year,

followed by GT10 – Basic metals; fabricated metal products, except machinery and equipment, with almost 800 thousand tonnes per year.

GT18 is well represented also in case of imports of Romania by road with 1 mln tonnes per year. The highest volume of imported goods by road is represented by GT04 - Food products, beverages and tobacco.

Bulgaria

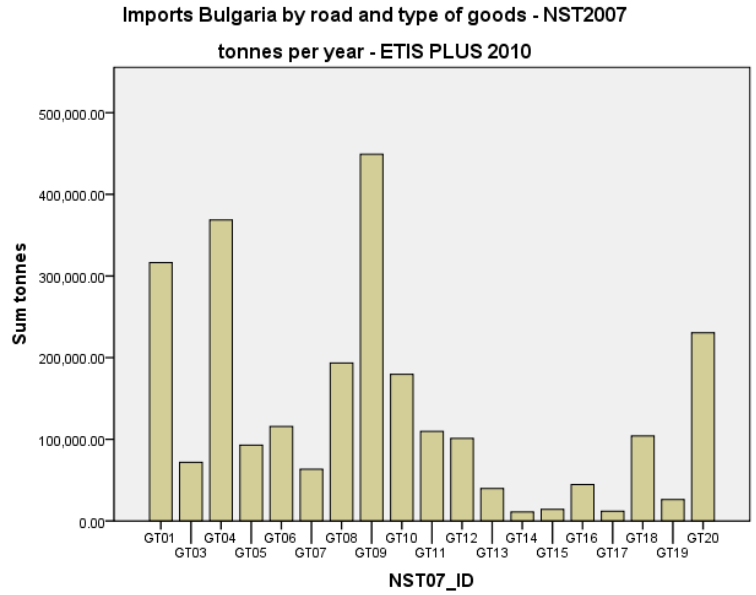
Figure 16 Exports Bulgaria by road and type of goods – NST2007, tonnes per year
Total exports by road: 4.088.277 tonnes – in ETIS PLUS 2010.



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

It is observed that the GT01 - Products of agriculture, hunting, and forestry; fish and other fishing products, counts for the highest volume exported from Bulgaria by road, with almost 700 thousand tonnes per year, followed by GT09 – Other non-metallic mineral products, with almost 700 thousand tonnes per year also.

Figure 17 Imports Bulgaria by road and type of goods – NST2007, tonnes per year
Total imports by road: 2.544.093 tonnes – in ETIS PLUS 2010.



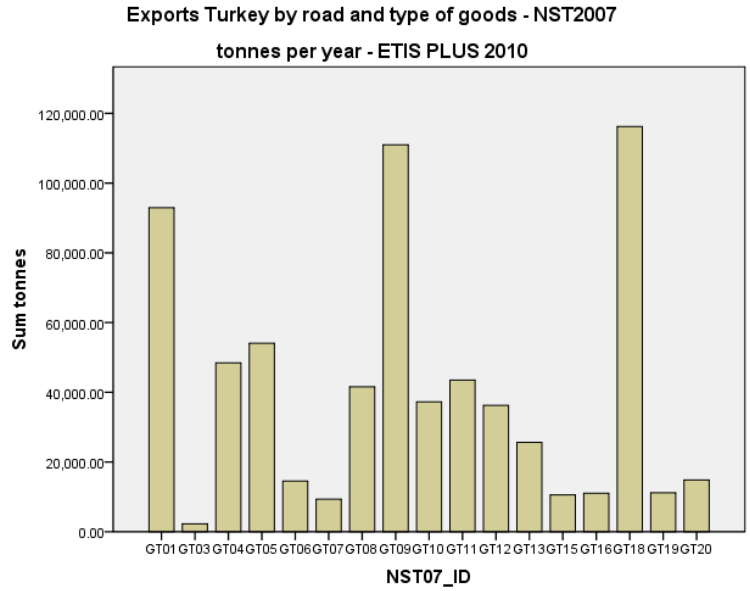
Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

The highest volume of imported goods by road is represented by GT09 - Other non-metallic mineral products, with almost 450 thousand tonnes per year, followed by GT04 with 350 thousand tonnes, and by GT01 with some 300 thousand tonnes per year.

Turkey

Figure 18 Exports Turkey by road and type of goods – NST2007, tonnes per year

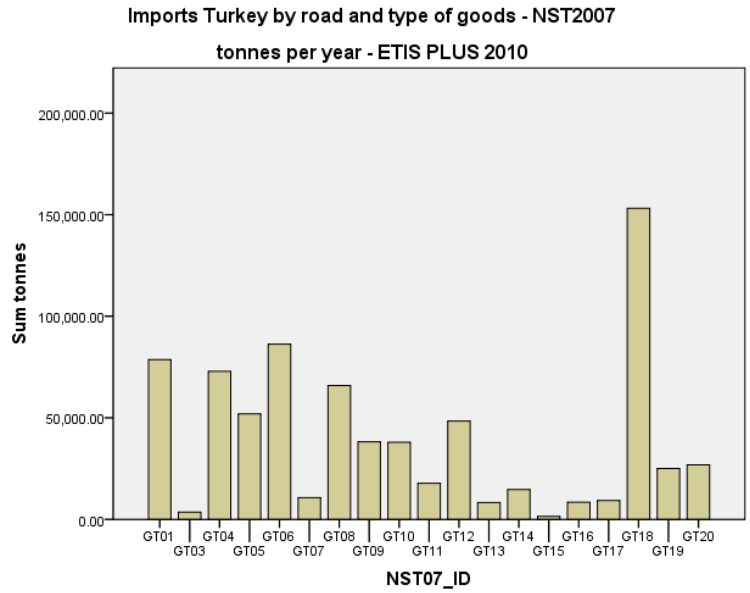
Total exports by road: 680.570 tonnes – in ETIS PLUS 2010.



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

Figure 19 Imports Turkey by road and type of goods – NST2007, tonnes per year

Total imports by road: 759.457 tonnes – in ETIS PLUS 2010.



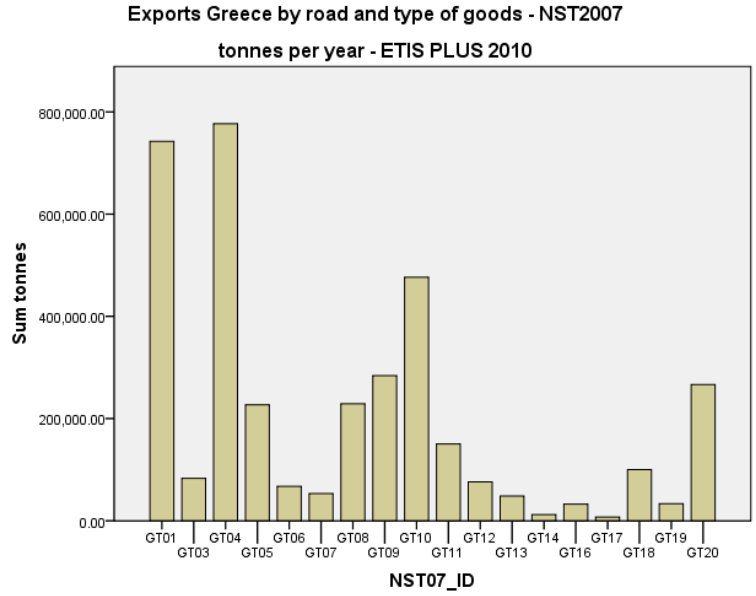
Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

It is observed that the GT18 - Grouped goods: a mixture of types of goods which are transported together, counts for the highest volume exported from Turkey by road, with 120 thousand tonnes per year, followed by GT09 – Other non-metallic mineral products, with almost 110 thousand tonnes per year.

GT18 is well represented also in case of imports of Turkey by road with 150 thousand tonnes per year.

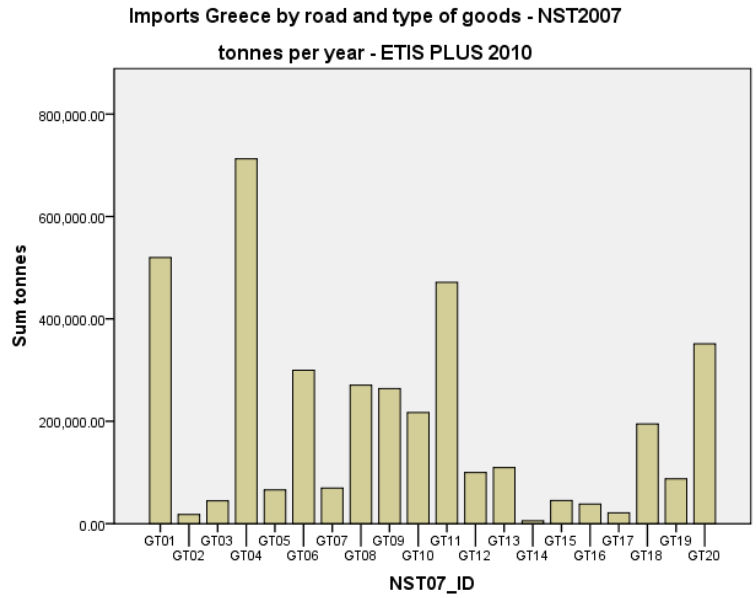
Greece

Figure 20 Exports Greece by road and type of goods – NST2007, tonnes per year
Total exports by road: 3.666.831 tonnes – in ETIS PLUS 2010.



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

Figure 21 Imports Greece by road and type of goods – NST2007, tonnes per year
Total imports by road: 3,905,900 tonnes – in ETIS PLUS 2010.



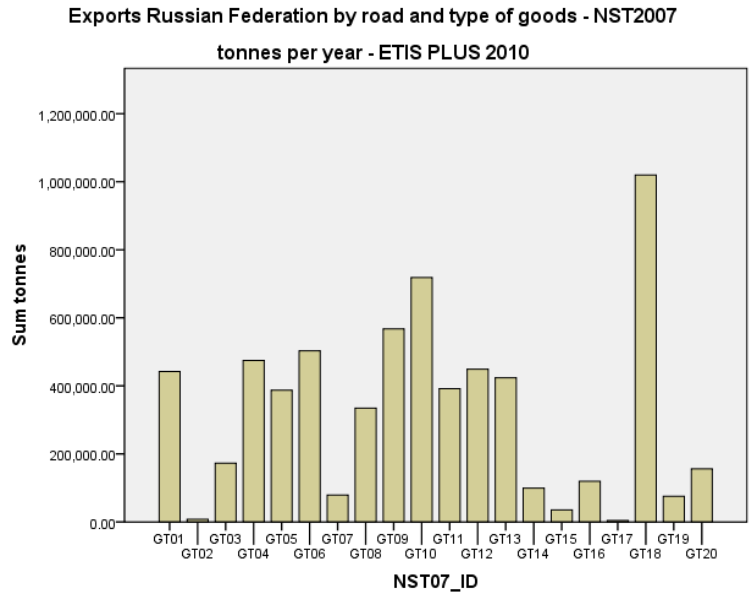
Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

The highest volumes of exported goods from Greece are observed for GT04 - Food products, beverages and tobacco with almost 800 thousand tonnes per year, and by the GT01 - Products of agriculture, hunting, and forestry; fish and other fishing products, with some 750 thousand tonnes per year.

The imports by road shows a similar picture, with the highest imported volumes of GT04 with some 700 thousand tonnes, followed by GT01 with some 520 thousand tonnes per year.

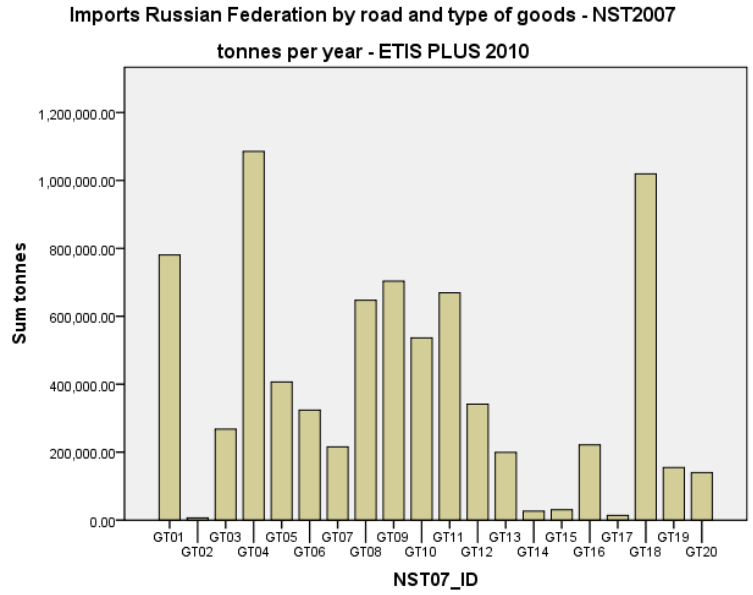
Russian Federation

Figure 22 Exports Russian Federation by road and type of goods – NST2007, tonnes per year
Total exports by road: 6.463.057 tonnes – in ETIS PLUS 2010



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

Figure 23 Imports Russian Federation by road and type of goods – NST2007, tonnes per year
Total imports by road: 7.790.461 tonnes – in ETIS PLUS 2010.



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

The highest volumes of exported goods from Russian Federation are observed for GT18 - Grouped goods: a mixture of types of goods which are transported together, with 1 mln tonnes per year, and by

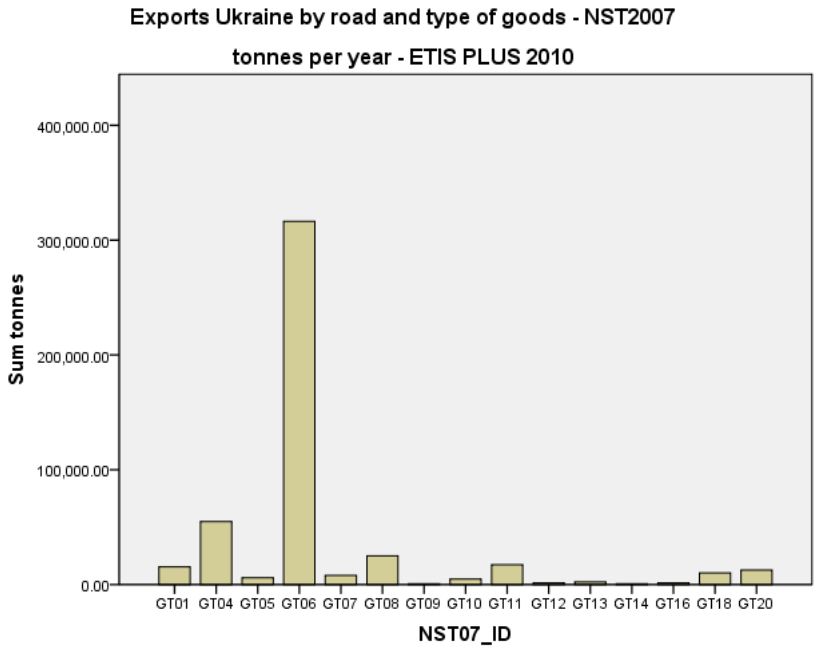
the GT10 - Products of agriculture, hunting, and forestry; fish and other fishing products, with almost 800 thousand tonnes per year.

The highest imports of Russian Federation by road are represented by GT04 - Food products, beverages and tobacco with 1.1 mln tonnes per year, followed by GT18 - Grouped goods: a mixture of types of goods which are transported together, with 1 mln tonnes per year.

Ukraine

Figure 24 Exports Ukraine by road and type of goods – NST2007, tonnes per year

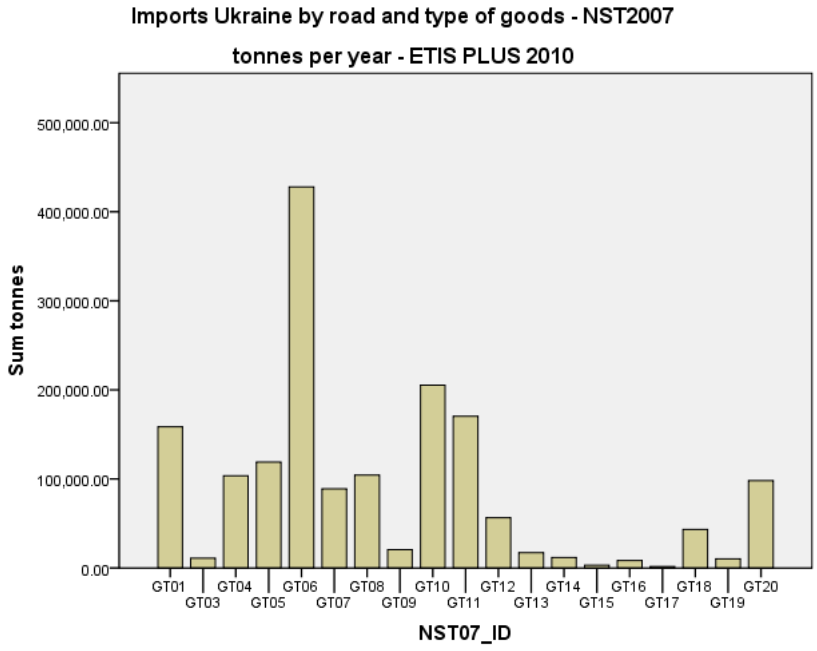
Total exports by road: 477.317 tonnes – in ETIS PLUS 2010



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

Figure 25 Imports Ukraine by road and type of goods – NST2007, tonnes per year

Total imports by road: 1.659.677 tonnes – in ETIS PLUS 2010



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

The highest volumes of exported goods from Ukraine are observed for GT06 - Wood and products of wood and cork (except furniture); articles of straw and plaiting materials, with 300 thousand tonnes per year.

The highest imports of Ukraine by road are represented also by GT06 - Wood and products of wood and cork (except furniture); articles of straw and plaiting materials, with 420 thousand tonnes per year.

The above analysis shows the differentiation by country of road related trade: exports and imports, and will be considered in the detailed corridor analysis in Phase 2. The above information is based on ETIS 2010 data. This information will be up-dated in the detailed analysis of Phase 2, if this will be considered necessary in case of high differences between different data sources.

5.2.3. TRANSTOOLS database analysis

Transtools model and database is available for year 2005. Even if the data is not more recent, the information is valuable as it considers the full transport chain approach.

The database is analysed for the DABS countries, and in the current report are outlined the direct road related flows that might be eventually transferred to the alternative transport chains on the Black Sea – Danube corridor.

In the following table the country to country direct road transport flows are shown:

	Romania	**Turkey**	**Greece**	**Bulgaria**	**Georgia**	**Ukraine**	**Russian Federation**	**Moldova**	**Total**
Romania		836	278	1,542	0	292	89	730	**3,766**
Turkey	137		43	360	56	6	45	9	**656**
Greece	236	44		497	0	0	0.42	0	**777**
Bulgaria	951	1,321	804		0	29	42	21	**3,169**
Georgia	0	37	0	0		0	15	0	**52**
Ukraine	2,083	90	2	793	0		12,804	1,895	**17,668**
Russian Federation	2,370	512	1,200	342	133	22,256		1,108	**27,921**
Moldova	266	4	2	23	0	515	506		**1,316**
Total	**6,044**	**2,843**	**2,329**	**3,556**	**189**	**23,098**	**13,502**	**3,763**	**55,325**

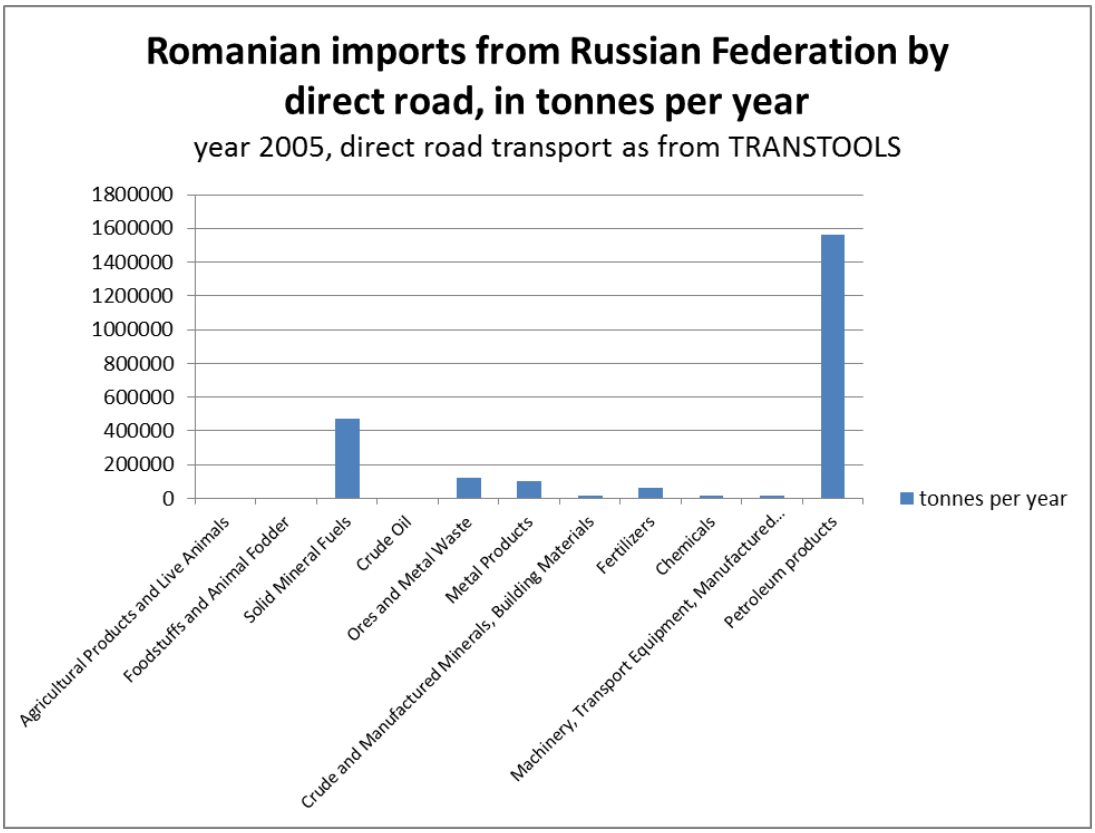
Source: AV TRANSPORT PLANNING SRL with TRANSTOOLS 2005 data.

From the above table it is observed that 55 million tonnes have been transported by road between the DABS core countries. Most important flows are generated and attracted by Ukraine: almost 18 million tonnes for exports and 23 million tonnes for imports by road. However, the highest share of both imports and exports are in relation of Ukraine exchanges with Russian Federation, and these flows are not of interest for the Danube – Black Sea connections.

Flows of interest for the Danube – Black Sea connection could be:

- Romania – Turkey, and here we outline the Romanian exports to Turkey by direct road of 836 thousand tonnes, all goods;
- Romania – Russian Federation, especially for Romanian imports from the Russian Federation that counts 2.4 million tonnes. A detailed analysis of these flows by category of goods is shown in Figure 26 hereunder;
- Russian Federation – Greece, especially imports of Greece from Russian Federation, counting 1.2 million tonnes per year at the level of year 2005.

Figure 26 Romanian imports from Russian Federation, direct road, in tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data.

5.2.4. *Data from the DABS countries*

A specific form has been designed and has been distributed to the DABS countries at the workshops that took place in Tbilisi (8-9 November 2013) and Varna (24-25 November 2013).

Data collection by the DABS countries would be finalised at the end of December 2013, as it has been concluded at the workshop in Varna. Considering this, it has been concluded that the information will be considered for the up-date and up-grade of the DABS database in Phase 2 of the project.
Current DABS database consists of the ETIS PLUS 2010 and TRANSTOOLS information, as presented and analysed in the previous chapters.

The survey form is presented in Annex 1.

5.2.5. Data and information from the market study

The status of the data and information from the market study has been received from the market study is as follows – at the end of the day on Friday 13.12.2013:

No.	RO / Foreign	Industry	Industry branch	Received file
1	Foreign		medicines	Waiting approval
2	Romanian		cosmetics	Yes
3	Romanian	5	house roof	Yes
4	Foreign	5	pipes	Answer expected before 16/12
5	Romanian	Distribution /production	electrical	Yes
6	Foreign	5	automotive	Yes
7	Foreign	Services	Water	Answer expected before 16/12
8	Foreign	Services	energy	Yes
9	Foreign	Industrial production	Glass	Yes
10	Foreign	6	cement	Yes – not complete
11	Foreign	6	cement	
12	Romanian	1 / 0 / 7	oil / grains	Answer expected before 15/12
13	Romanian	1 / 0 / 7	Grains	Answer expected before 16/12
14	Foreign	5	Equipment	Yes
15	Romanian		Protection equipment	Yes
16	Foreign	5	House roof	Answer expected before 16/12
17	Foreign		Confection	Answer expected before 16/12
18	Foreign		confection	Answer expected before 13/12
19	Foreign		electrice	Yes
20	Foreign	1 / 0	oil / grains	Answer expected before 13/12
21	Foreign	5	Equipment	Answer expected before 16/12
22	Foreign	1	Fresh drinks	Answer expected before 16/12
23	Foreign	8	Paint	Answer expected before 16/12
24	Foreign	0 / 7	…	Answer expected before 13/12
25	Foreign	5	automotive	Answer expected before 15/12
26	Foreign	6	Bricks	Refusal
27	Foreign	6	Sanitary equipment	week 15-20
28	Foreign	5		Not possible
29	Romanian	1	meet	Yes
30	Foreign		Palets	Not possible
31	Foreign	5	Shelters	monday 16
32	Foreign	8	Pharmaceutical	yes
33	Foreign	8	cosmetics	friday 13
34	Foreign	6	Adhesive substances	Yes incomplete

35	Foreign		Paper	Friday 13
36	Foreign	1	Food	Waiting approval
37	Foreign	8	rubber	Waiting approval
38	Romanian	1	Food	Thursday 12
39	Foreign	1	bauturi racoritoare	Monday 16
40	Foreign		Wood	Yes - partial refusal
41	Romanian	1	Meet	Thursday 12
42	Foreign			Not approved
43	Romanian		Electronics	Monday 16
44	Foreign		Electronics	Waiting approval
45	Foreign	8	Pharmaceutical	Waiting approval
46	Romanian		IT	Monday 16
47	Foreign	5	tools	Beginning jan2014
48	Foreign	5	Welding	Monday 16
50	Foreign		…	
51	Romanian		IT waste	Monday 16
52	Foreign	1	Meet	Waiting approval
53	Foreign	5	Pipes	Monday 16
54	Romanian	1	Grains	Wednesday 18
55	Romanian		House electrical equipment	Friday 13
56	Foreign	5	Steel	Waiting approval
57	Romanian	8	pharmacy	Yes
58	Foreign		Cigarettes	Waiting approval
59	Foreign		3PL	Monday 16
60	Romanian		3PL	Friday 13
61	Foreign	5	automotive	Monday 16
62	Foreign		3PL	Tuesday 17
63	Foreign		3PL	Saturday 14
64	Foreign		3PL	Yes
65	Romanian		paper	LUNI 16
66	Foreign	1	lactate	Friday 13
67	Foreign	5	Generators	Wednesday 18
68	Foreign	1	Fresh drinks	Wednesday 18
69	Foreign	1	Fresh drinks	Waiting approval
70	Romanian		IT	Sunday 15
71	Romanian	0 / 1 / 7	Grains	Monday 16
72	Foreign		Confections	Sunday 15
73	Romanian		Furniture	Friday 13
74	Foreign		3PL	Wednesday 18
75	Romanian		3PL	Yes
76	Romanian		equipment	Monday 16
77	Foreign		automotive	Monday 16
78	Foreign		automotive	Wednesday 18
79	Foreign		food	Wednesday 18
80	Romanian		3PL	Monday 16

As data from 16 surveyed company has been received before Friday, and from 26 surveyed company just before Tuesday evening – 17/12/2013, and as part of the information has been received shortly before the submission of the current report, it was no time for analysing it.

As it has been decided in the project meeting of Friday 06.12.2013, the information of the full market study survey will be considered for the up-dating and up-grading of the DABS database in the Phase 2 of the project.

5.3. Identification of the main transport corridors defined by freight flow origin and destination in the Black Sea Basin area

Identification of the main transport corridors at this stage is based on the findings of the databases analysis as presented in the previous chapters, and it is based on the road related trade and transport analysis.

Based on this, the following main transport corridors have been identified and will be analysed in detail in Phase 2:

Corridor 1 Turkey – Romania Bulgaria – Hungary – Austria - Czech Republic – Poland

Corridor 2 Greece – Romania - Hungary – Austria - Czech Republic – Poland

Corridor 3 Ukraine & Russian Federation – Romania – Austria – Hungary – North of Italy

Beside the above mentioned corridors, new corridors will be considered if these will be identified based on the recent information expected to provided by the DABS countries before middle of January 2014.

5.4. Economic Analysis at Macro and Regional/Local level

The Black Sea basin and Danube region show development potential according to the trade and freight flow analysis. The current trade and freight flow are in line with the socio-economic climate. The area shows a dynamic development path that leads to economic activities that in its turn generate and attract transport. The countries geographically around the Black Sea region and the neighbouring countries are chosen for the analysis. The country list is visible in the tables and figures below. First general economies are considered, followed by regional information and the analysis per sector.

The study area shows a mixed set of economies, European Union ones that have been struggling over the years but are highly developed and growing economies, also in the European Union, but more so towards the Black Sea basin. The state of the economies is show in the table below:

- Azerbaijan has shown a lot of economic growth over the past years. The oil boom is over, Government debt is low. Growth will slow down over the period towards 2020.

- Russia is the largest economy in the area in terms of GDP. However the regional impact in the study area is smaller. The years up to 2016 show more growth than 2016-2020.

- The economic outlook in the long term for Ukraine is positive especially when compared to its EU neighbours. However in this long term perspective the year 2013 was not too strong, nor will 2014 be.

- The EU countries show a slower pace of growth towards 2020, the GDP in absolute terms is already high.

- Romania, Poland and Bulgaria have more room for development over the period of 2016. Greece is the only country stagnating and deteriorating. It has suffered for years under its debts and with the high unemployment and low consumption will continue to do so.

- Serbia shows mixed growth. Up to 2016 it's doing well. After that period there is modest growth. Accession to the EU is also a medium term process and is still uncertain.

- Turkey has a high budget deficit and has struggled over the year 2013. However it is expected to increase its position as a major economic player. Accession to the EU is still under discussion with no certain outcome yet.

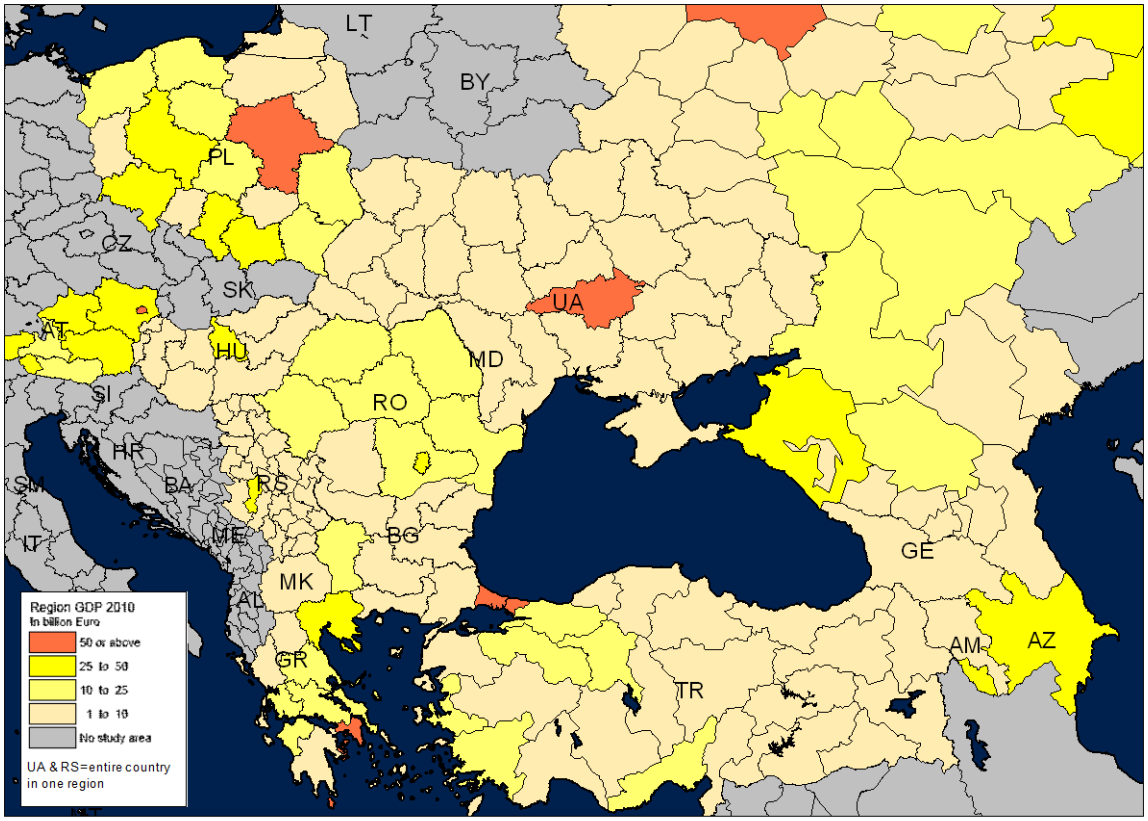
Table 5.1 **Economic Outlook per country in Gross Domestic Product for the Black Sea – Danube region. Current prices in billion of euros.**

Country	2010	2016	2020
GDP			
Armenia	6,979	8,785	9,874
Austria	285,165	364,825	398,752
Azerbaijan	39,877	81,188	106,531
Bulgaria	36,052	44,961	50,271
Georgia	8,771	14,667	18,250
Greece	222,151	207,816	194,721
Hungary	96,433	115,838	121,556
FYR Macedonia	7,057	7,539	9,447
Moldova	4,381	10,103	11,768
Poland	354,059	461,553	520,628
Romania	124,194	160,500	176,353
Russia	1149,236	1934,835	2413,001
Serbia	27,641	38,620	42,596
Turkey	551,019	785,881	950,249
Ukraine	102,809	156,526	182,456
Total	**3015,824**	**4393,639**	**5206,453**

Source: Panteia / IMF November 2013.

The outlook for the Black Sea - Danube region is positive. Fourteen countries out of the fifteen will increase their GDP significantly. This will lead to an increase of transport.

Figure 27 Regional distribution of GDP for the Black Sea - Danube region. Current prices in Million Euros.



Source: Panteia / ETIS, Eurostat, National Sources. It should be noted that Ukraine and Serbia had no regional data available and therefore the GDP of the entire country is assigned to one region.

Figure 27 makes clear the regional distribution. The maps show that the urban capital areas dominate. Here is the majority of the population that consumes and produces, in urban areas mainly services. In port regions such as Thessaloniki, Krasnodar and Istanbul there is also industry.

- The Russian area near the Black Sea is active up to Moscow. Significant consumption and production takes place. Moscow is the most active GDP region of the study area. In the North east of the map, the regions of Tatarstan and Samara are located. These are industrial areas of which the majority of international production is shipped via the Krasnodar region.

- Major natural resources are bundled in the region of Azerbaijan and therefore this region is notable. Since the entire country is one region, the difference in GDP between the capital and the other neighbouring areas is masked. The neighbouring regions are rural at the moment and do not have the high GDP contribution when compared to the capital.
- For Poland the Black Sea has a potential for multiple transport modes and the fact that it brings the connection with the Baltic Sea. Poland had a modest GDP per capita for an EU country, but the strong internal market helped the country through the Euro crisis. This brings it to a high level in the capital region. Also the region around Katowice, Slaskie (or Upper Silesia) is heavily industrialized with mining activities, metal production, construction, chemicals and energy.

- Austria has strong economic regions. Despite the fact that in general EU countries grow slower than the others, there is enough economic activity. The multimodal network available in Austria shows again potential for transport in the Black See region. Austria is the gateway to Central and Eastern Europe. This is demonstrated by the fact that international companies use Vienna as their Eastern-European base. The central regions of Austria (west of Vienna) have highly developed industry.

- For Turkey the major regions are around Istanbul. Further sea-connected regions of Adana and Izmir. Izmir has ports (trade), tourism and industry in the region. Population dense Bursa and Ankara also are important, relatively nearby the port of Istanbul. Kocaeli Province, the region between Istanbul and Ankara, has large petroleum facilities and transportation activities.

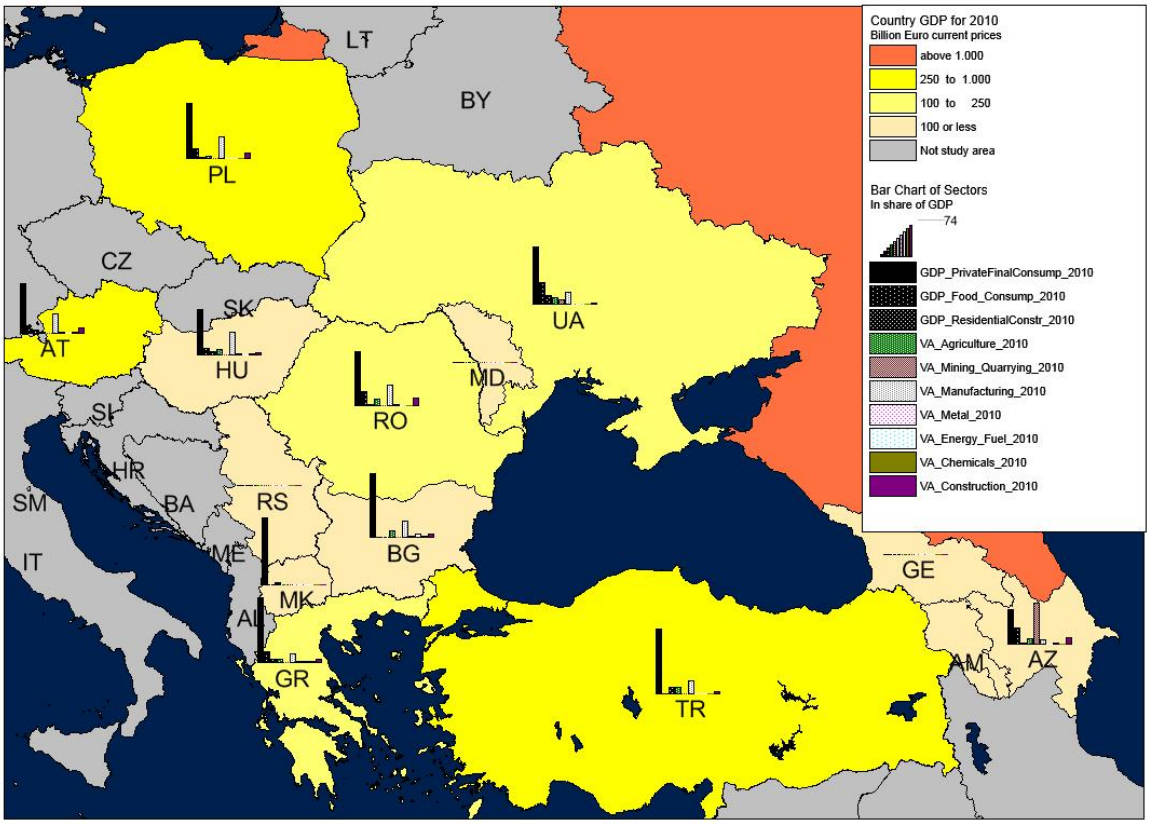
Besides analysing the general GDP growth we also investigate the sectorial data. Certain economic sectors do have link with commodity types that are transported. The table below shows the sectors that are analysed.

Table 5.2 Sector definition

Name	Definition
Consumption	
Private final consumption	
Food consumption	Food & non-alcoholic beverages
Residential construction	Expenditure on residential construction
Production	
Agriculture	Including forestry & fishing
Mining and quarrying	
Metal	Basic metal + Metal products
Construction	Construction activities
Chemicals	Chemical industry
Energy	Coal, Petroleum & Nuclear Fuels

Sectorial data give insight if production is dominant or consumption of a certain commodity group. The figure below shows per country the sectorial share in GDP for 2010.

Figure 28 Sector distribution of 2010 on the Black Sea – Danube region



Source: Panteia / ETIS, Eurostat, National Sources

The following observations can be made:

- Private consumption is relatively low in Azerbaijan, Hungary, Austria and Russia as share of GDP.
- Azerbaijan also has the most divergent type of consumption. Food consumption is 19% of GDP (the highest) and residential construction expenditure, 2% (the lowest).
- Romania, Ukraine and Poland have medium private consumption. Poland and Romania have around 3% residential construction expenditure, while Ukraine has more than 10%.
- High private consumption is in the other countries: Turkey, Serbia, FYROM, Greece and Bulgaria. For the largest part this is due to high food expenditure. Serbia has the lowest construction expenditure of 2%.

The volume of production is best seen in perspective of the absolute GDP. Russia and Azerbaijan have a large Mining and Quarrying-sector. Metal production is relatively highest in Austria. Construction and agriculture is high in Romania, Bulgaria and Greece. Hungary manufactures a lot of products in the ”other” goods commodity group (NSTR1 group 9).

Table 3 Sector breakdown in GDP. Million Euros, current prices.

Sector\Country	AT	AZ	BG	EL	HU	RO	RU	Sector Total
Manufacturing	63279	2392	6815	22696	24657	28548	265540	413928
Mining and Quarrying	1298	18351	386	976	211	1628	88433	111284
Agriculture, Forestry and Fishing	5005	2528	2711	8820	6621	10807	17692	54185
Basic metal, metal products	9669	80	609	2654	2410	2777	47444	65641
Chemicals	4779	64	548	2353	1844	1511	19263	30363
Coke, Petroleum & Nuclear fuel	1934	1119	1609	2842	999	802	57125	66430
Construction	19449	3106	1596	9617	4062	11896	51690	101416
Country Total	**105412**	**27642**	**14274**	**49957**	**40805**	**57970**	**547188**	**843247**

Source: Panteia / ETIS, Eurostat, National Sources. Nations without complete results were omitted in this table.

The table below shows the growth per country and per sector. To predict commodity type transport trends the following tables shows the forecasts for 2016 and 2020.

Table 4 Share of GDP medium term growth. Per country per sector (2010=100)

	2016 growth GDP	2020 growth GDP
Austria total all sectors	**128**	**140**
Manufacturing	128	138
Mining and Quarrying	122	131
Agriculture, Forestry and Fishing	120	128
Basic metal, metal products	128	138
Chemicals	131	144
Coke, Petroleum & Nuclear fuel	122	129
Construction	122	131
Bulgaria total all sectors	**125**	**139**
Manufacturing	121	135
Mining and Quarrying	101	106
Agriculture, Forestry and Fishing	111	110
Basic metal, metal products	122	138
Chemicals	128	146
Coke, Petroleum & Nuclear fuel	121	135
Construction	111	125
Greece total all sectors	**94**	**88**
Manufacturing	94	86
Mining and Quarrying	89	78
Agriculture, Forestry and Fishing	91	74
Basic metal, metal products	93	85
Chemicals	95	88
Coke, Petroleum & Nuclear fuel	97	91
Construction	86	81
Hungary total all sectors	**120**	**126**

Manufacturing	120	126
Mining and Quarrying	116	114
Agriculture, Forestry and Fishing	112	111
Basic metal, metal products	118	123
Chemicals	121	127
Coke, Petroleum & Nuclear fuel	114	112
Construction	116	121
Poland total all sectors	**130**	**147**
Manufacturing	130	146
Mining and Quarrying	111	111
Agriculture, Forestry and Fishing	118	124
Construction	126	141
Romania total all sectors	**129**	**142**
Manufacturing	129	139
Mining and Quarrying	117	107
Agriculture, Forestry and Fishing	116	122
Basic metal, metal products	129	142
Chemicals	136	149
Coke, Petroleum & Nuclear fuel	127	136
Construction	115	130
Turkey total all sectors	**143**	**172**
Manufacturing	144	174
Mining and Quarrying	144	174
Agriculture, Forestry and Fishing	138	167
Construction	144	174
Ukraine total all sectors	**152**	**177**
Manufacturing	152	177
Mining and Quarrying	152	171
Agriculture, Forestry and Fishing	105	122
Construction	152	171

Source: Panteia \ DABS database

The general economic trends are described below:

- Agriculture is in relative decline for almost all countries. Relative prices drop for a number of commodities, leading to a lower GDP. Overall the innovation techniques in agriculture lead to more efficiency, not to an ever increasing output for the finite amount of land. A transition is observed in the Black Area in terms of conserving and preparation for food products. Where in the past productions patters were seasonally driven, now conservation and glasshouse techniques are applied, this will have a more constant flow over the year as a result.

- Azerbaijan and Russia have high growth over all sectors for the medium term. Growth from Azerbaijan is largely a result of further urbanisation as the country is very rural. The non-energy sector will allow the initial growth. As oil production increases gradually over the years this will complete the economic growth. Russia is developing its economy over the years. The country's natural resources have been managed such that these sheltered the county from the worst effects of the global financial crisis and also continue to boost the economy on the medium term. Consumption will also help Russia towards 2020. The regional building activities in around Sochi are near complete. Therefore the regional construction is

looking at lower growth. However on a country level this is offset. The infrastructure of the Krasnodar region does receive permanent infrastructure benefits on the medium term.

- Austria realizes its growth in industry by advanced manufacturing. The increased production per employee benefits the chemical sector most. Agriculture has no such benefits and grows relatively slow in terms of GDP.

- Bulgaria has many elements impeding economic growth. Budget deficits, corruption and depopulation. Therefore it is currently a small economy, that makes it viable for growth as any However it is currently a small economy and has EU support, also in infrastructure, and also has room for growth as any small improvement will lead to a relative big growth rate. Agriculture and mining will be overrun by increased efficiency per employee in manufacturing. Especially in the chemical sector.

- On medium term the total GDP of Greece decreases, therefor sectors do as well. Energy (coke, petroleum) performs above average. Construction is mainly originating from national demand. This sector is expected to decrease more than other sectors.

- The world competitiveness report[1] classifies Hungary as an economy in transition from an efficiency driven to an innovation driven economy. This means that the manufacturing industry was strong and is becoming stronger on the medium term. Recently the automotive industry has kept the GDP up. Agriculture and energy form a similar pattern as neighbouring countries. The agriculture and energy sectors will lose its relative positions.

- Turkish growth is over all sectors and with a positive outlook, despite the mentioned high budget deficit and investment uncertainty. Competitiveness and innovation is to be increased, boosted by education. Labour force increases by inclusion of females. This also results in higher consumption. Steel industries have performed well due to domestic demand. International improving condition will drive the growth towards 2020. Both in supply of raw materials and demand. Polish unemployment is substantial now, but will get better to be one of the lowest in the EU in 2020. This is true for the manufacturing sector. In general, EU membership and structural funds have boosted economic development and will continue to do so. The country realizes growth from an educated workforce and large internal market.

- Romania grows over all sectors. The mining & quarrying activities of Romania are under pressure in the future. One of sources of income is related to gold mining. As the gold price went up in the world financial crisis years revenues increased, but this trend is not likely to continue. Also worldwide coal energy is cheaper on the short term. This means that the income of mining will decline. Other industries for example the metal industry will become more important for Romania.

- The following years industrial economic activities will grow in Ukraine. This helps the country as financial sector results are expected to lag. After 2016 industry growth will decline slightly. Mining activities are backed by government initiative. Over the forecast period growth is expected. Agricultural potential is very high in Ukraine. It could even be a key

[1] http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf

element in contributing to global food security. This sector has not been fully exploited however. Main reason is the lack of modernization both technical and administrative wise. As a result agriculture will be declining for Ukraine and follows the trend of the Black Sea Danube region.

6. PHASE 2: IDENTIFICATION OF THE POTENTIAL FREIGHT EXCHANGES AND OF THE OPTIMAL SOLUTION FROM THE LINE SERVICE CHARACTERISTICS

6.1. Background

In phase 1 several corridors have been identified based on the analysis of trade and freight transport flows on specific relations between countries located in the Black Sea basin, on one side, and in the central and Eastern Europe, on the other side.

Based on the freight transport demand flows the following corridors have been identified in Phase 1:

Corridor 1 Turkey – Romania Bulgaria – Hungary – Austria - Czech Republic – Poland

Corridor 2 Greece – Romania - Hungary – Austria - Czech Republic – Poland

Corridor 3 Ukraine & Russian Federation – Romania – Austria – Hungary – North of Italy

In Phase 2, the detailed analysis of transport demand flows of the above trade and freight transport corridors has been carried out, as well as the analysis of specific transport costs on direct road and on the routes that include the new maritime lines connecting the Black Sea and the Danube. Based on this analysis the following new maritime lines have been identified:

DABS Maritime Line 1 ***Piraeus – Istanbul – Galati***
Characteristics: one 600 TEU vessel every two weeks.
Load: 500 TEU for one vessel.
Duration roundtrip: 200 hours.
Results: 25.000 TEU shifted every year from road to the new service.

DABS Maritime Line 2 ***Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati***
(Line 2 includes Line 1)
Characteristics: five 600 TEU vessels every week.
Load: 560 TEU for one vessel on the busiest direction.
Duration roundtrip: 300 hours, equalling two weeks.
Results: 225.000 TEU shifted to the new service (including line 1).

DABS Maritime Line 3 ***Poti (Georgia) – Samsun – Galati***
With feeder services that can be organised from Inebolu to Samsun
Characteristics: four 600 TEU vessels every week.
Load: 512 TEU for one vessel on the busiest direction.
Duration roundtrip: 168 hours, equalling one week.
Results: 180.000 TEU shifted to the new service.

Phase 2 of the project has consisted of tasks 3 and 4, as shown hereunder:

Task 3	Identification of the potential freight exchanges, by sort and separately for containerised cargo, inside Black Sea basin trade area, which are suitable to be transported by a regular maritime service using involved ports and Danube ports. The analysis will cover the reference year and short and medium terms 2016, 2020
Task 4	Identification of the optimal solutions from the perspective of route, transport capacity, ship's type, call ports/intermodal terminal characteristics, costs, administrative procedures etc.

The basic idea for the identification of the potential freight exchanges suitable to be transported on the Black Sea and Danube ports is the analysis of existing and likely future generalised costs of the different routes. This analysis has been carried out by category of goods and separately for the containerised cargo.

The following items have been considered:

- Include the DABS ports in the identified route
- Interconnection of the countries participating in the project and setting-up the connexion with the Danube macro-region
- Maximum use of the existing potential of the involved ports and identification, if necessary, of the needed investments for integrating them in the selected routes
- Analysis and modelling of at least 3 alternative routes from the perspective of the benefits and of the risks

All project activities have been carried out in time and no delays have occurred, excepting the delay on receiving the feedback on the freight flows and related transport costs survey from the DABS countries and also from the logistic industry in Romania – the latest one being the input from the market study that is carried out separately.

Beside the activities specified for tasks 1 and 2, the team of the feasibility study has participated to the following DABS workshops:

- in Tbilisi in the period 5-7 November 2013,
- in Varna in the period 24-25 November 2013,
- in Thessaloniki on 29 and 30 January 2014, and
- in Cahul on 24 March 2014.

At each workshop the team has presented the progress and results of the feasibility study.

6.2. Identification of the potential freight exchanges, by sort and separately for containerised cargo, inside Black Sea basin trade area, which are suitable to be transported by a regular maritime service using involved ports and Danube ports

The following main transport corridors have been identified in Phase 1:

Corridor 1 Turkey – Romania Bulgaria – Hungary – Austria - Czech Republic – Poland

Corridor 2 Greece – Romania - Hungary – Austria - Czech Republic – Poland

Corridor 3 Ukraine & Russian Federation – Romania – Austria – Hungary – North of Italy

The detailed analysis of the above corridors is focused on the detailed Origin, Destination and category of goods for the exports and imports of Greece and Turkey by road in relation with: Romania, Hungary, Austria, Germany, Czech Republic, Slovakia, Poland, Latvia, Lithuania and Estonia.

For **Corridor 1 and 2** ETIS PLUS 2010 database has been considered for the detailed analysis and identification of the potential freight exchanges.

The detailed analysis of Corridor 1 and 2 is focused on the detailed Origin, Destination and category of goods for the exports of Greece and Turkey by road to: Romania, Hungary, Austria, Czech Republic, Slovakia, Poland, Latvia, Lithuania and Estonia.

Regional detail has been considered at minimum NUTS 3 level for the core area of the study and at the NUTS 2 or NUTS 1 level outside the core area, as far as the data sources allows this.

Categories of goods are considered at the level of the NST2007 classification, as considered in the ETIS PLUS 2010 also, as shown hereunder:

ID	Name
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products
GT02	Coal and lignite; crude petroleum and natural gas
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium
GT04	Food products, beverages and tobacco
GT05	Textiles and textile products; leather and leather products
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;
GT07	Coke and refined petroleum products
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel
GT09	Other non-metallic mineral products
GT10	Basic metals; fabricated metal products, except machinery and equipment
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks

GT12	Transport equipment
GT13	Furniture; other manufactured goods n.e.c.
GT14	Secondary raw materials; municipal wastes and other wastes
GT15	Mail, parcels
GT16	Equipment and material utilized in the transport of goods
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.
GT18	Grouped goods: a mixture of types of goods which are transported
GT19	Unidentifiable goods: goods which for any reason cannot be identified
GT20	Other goods n.e.c.
GT200	Other goods not elsewhere classified
NAP	Not applicable
TOTAL	Total transported goods
UNK	Unknown

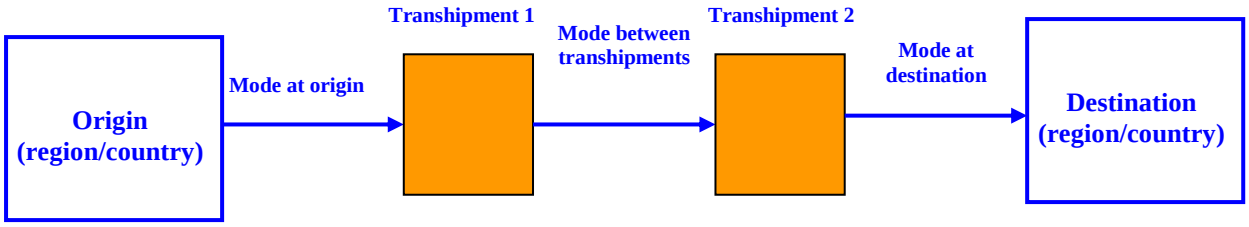
For **Corridor 3** the Trans-tools 2005 database has been considered for the detailed analysis of flows of goods.

Further on, the detailed analysis has considered the elements of the transport chain approach as follows:

- Origin of transport flows
- Transport mode at origin
- Transhipment location no. 1 (region of the port/terminal)
- Transport mode between transhipments
- Transhipment location no. 2 (region of the port/terminal)
- Transport mode at destination
- Destination of the transport flow

as shown in the figure hereunder.

Overview transport chain in the trade and transport DABS database



The main gap that has to be covered in the transport database is represented by port/terminal information, which is very difficult to be obtained and when it is available it is not detailed enough for a proper representation of the transport flows.

The following transport modes are considered in the analysis:

Code	Mode
1	Road
2	Rail
3	Inland Waterways
4	Sea
8	Other
9	Unknown

In the next step hinterlands have been defined for each country considered in the detailed analysis of transport flows if goods in order to allocate these hinterlands to the ports to be considered on the new maritime lines.

Figure 29 hereunder illustrate the hinterlands defined for Turkey (5 hinterlands), Figure 30 the hinterlands of Greece (4 hinterlands) and Figure 31 the hinterlands of Romania (6 hinterlands).

Figure 29 Hinterlands Turkey

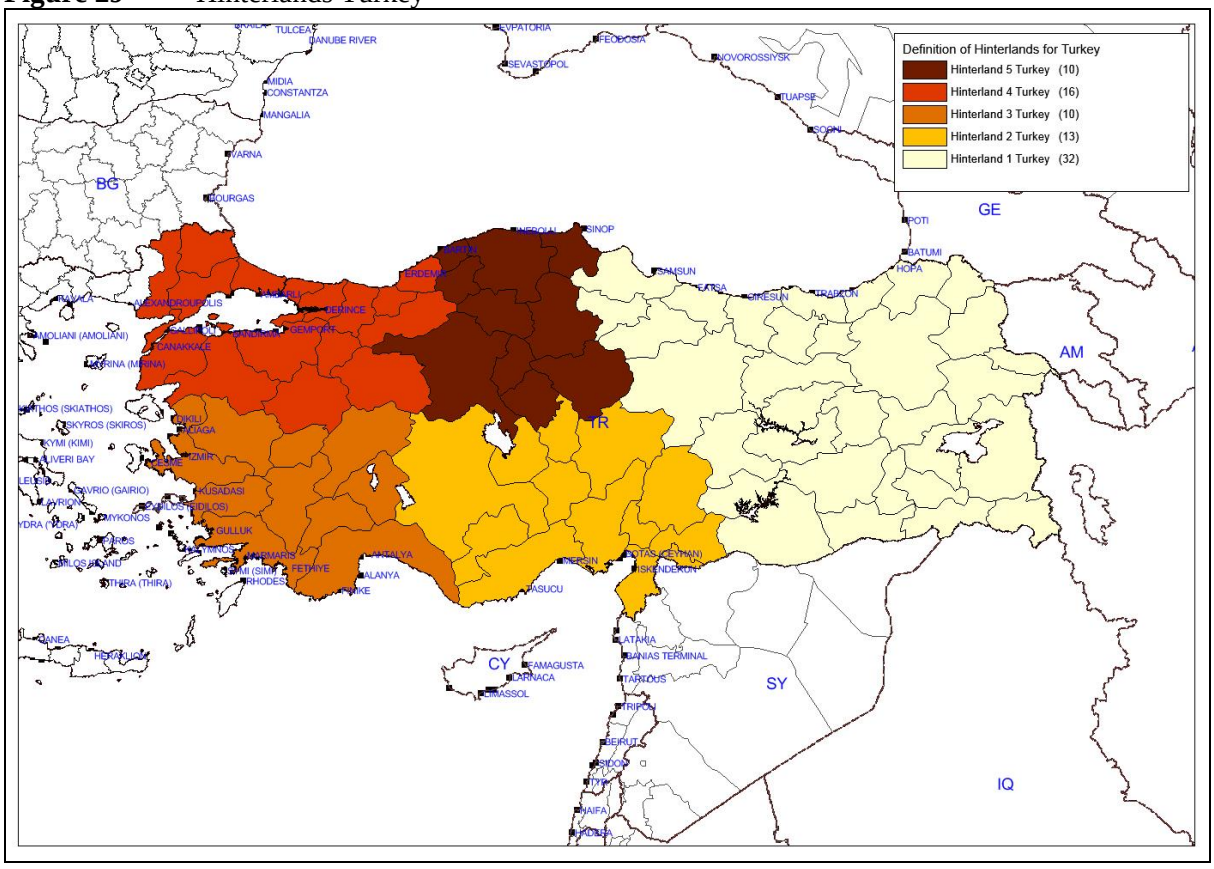


Figure 30 Hinterlands Greece

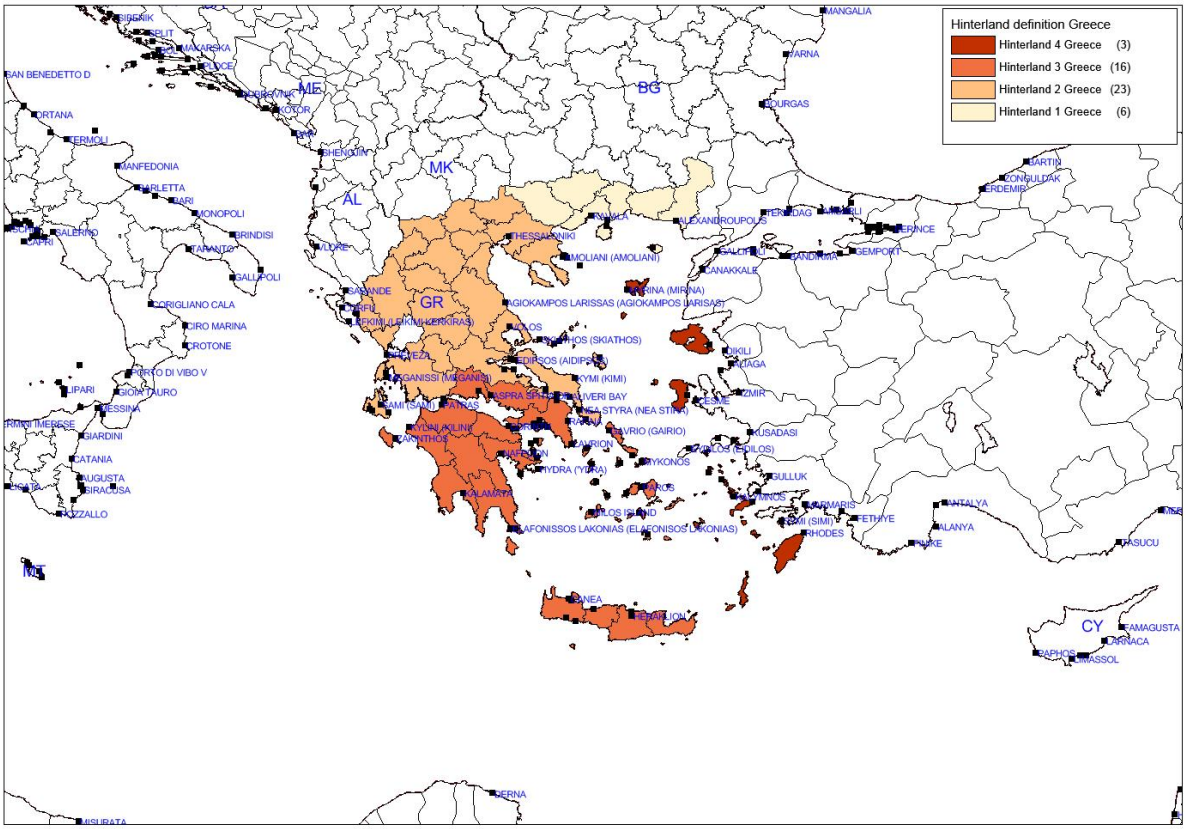
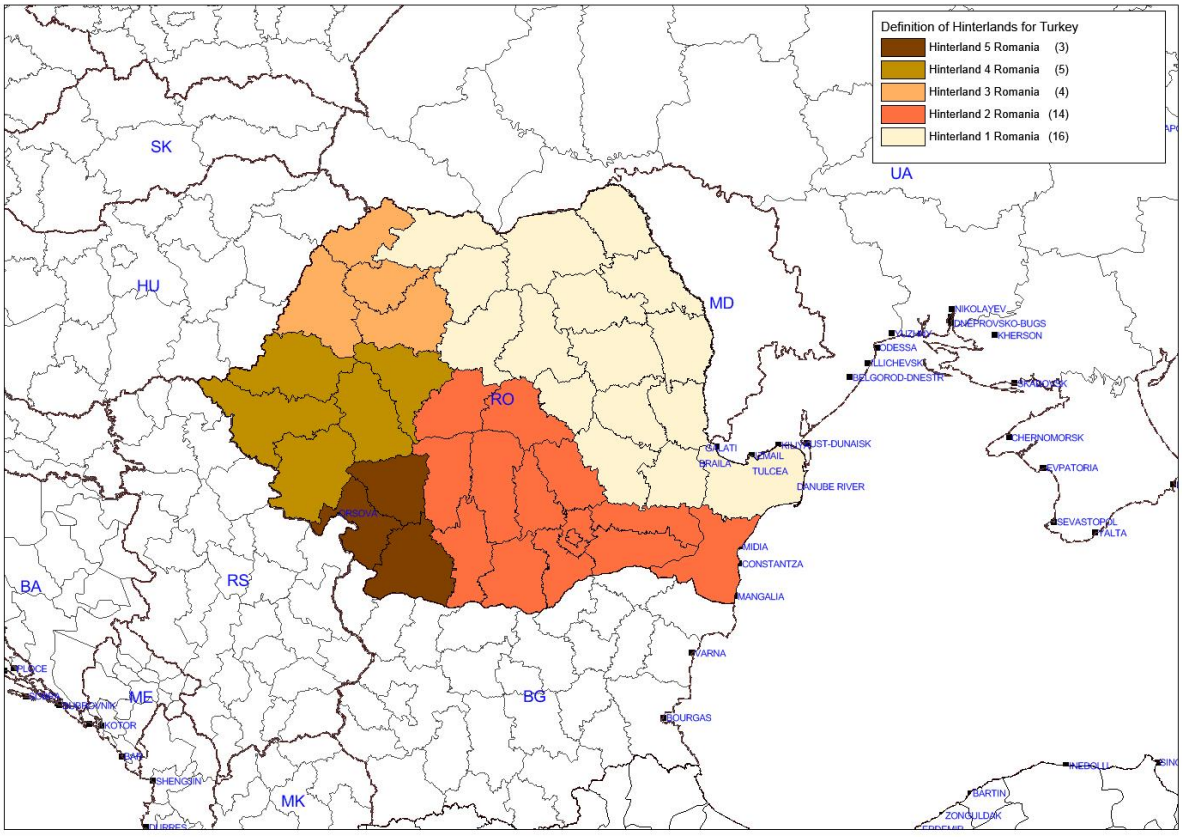
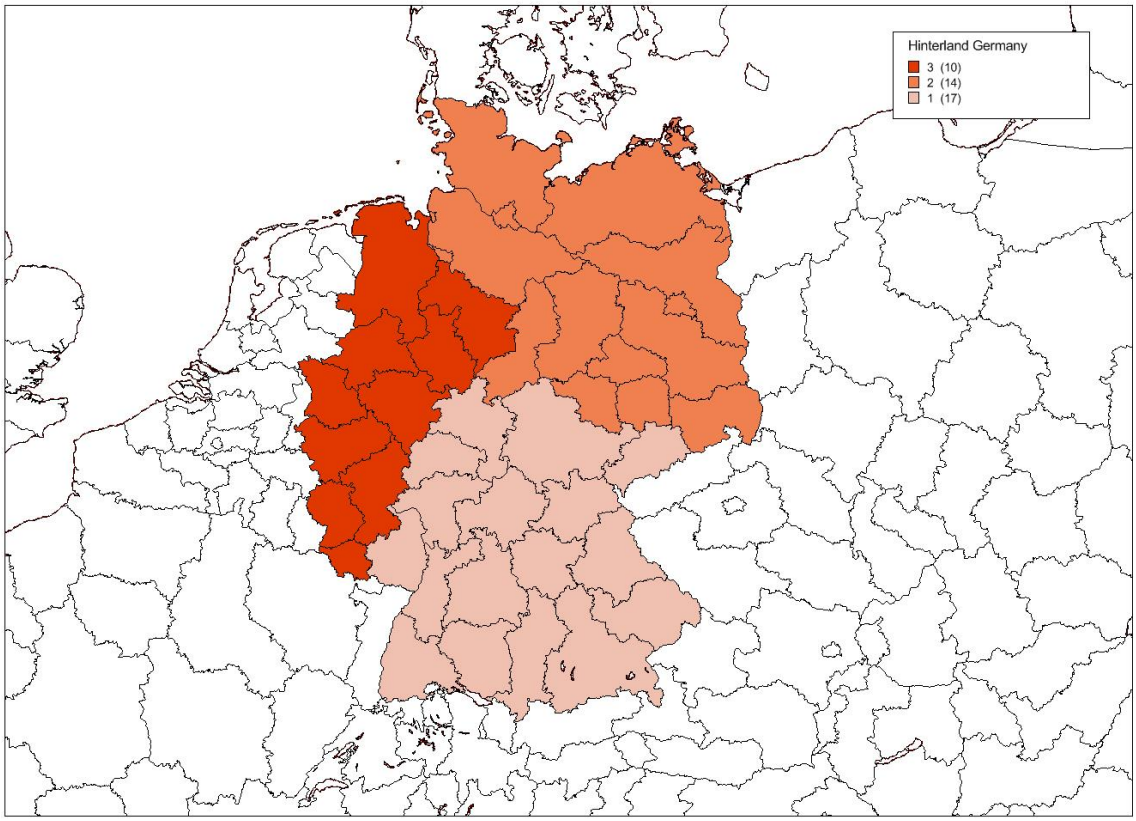


Figure 31 Hinterlands Romania



Further on, the hinterlands for Germany have been considered as shown in Figure 32 hereunder.

Figure 32 Hinterlands Germany



Further on, hinterlands in Central and Eastern Europe have been considered at the country level for:

- Hungary
- Austria
- Czech Republic
- Slovakia
- Poland
- Baltic countries

For North of Africa the hinterland has been considered at the country level for Egypt.

For countries at the Eastern part of Black Sea the hinterland has been considered at the country level for Georgia.

For countries located around the Caspian Sea the hinterlands have been defined by group of countries as follows:

Far East 1: Kazakhstan and Azerbaijan

Far East 2: Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

6.3. Detailed Analysis of Corridor 1 and 2

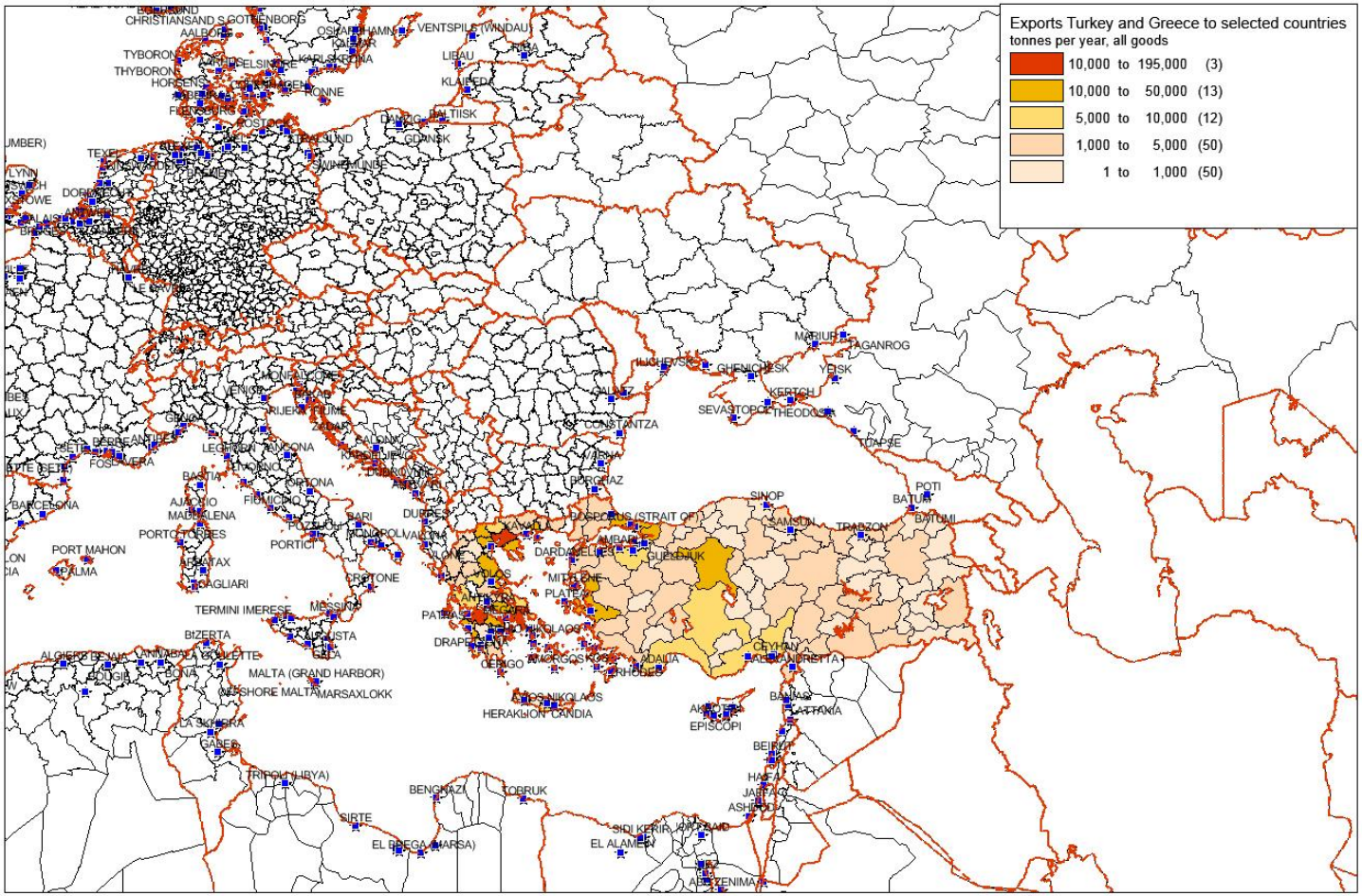
6.3.1. Exports by road from Turkey and Greece to Central and Eastern Europe

The global picture shows that all exports mentioned above counts 964656.9 tonnes, distributed as follows by commodity – NST07:

Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	164781.8
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	7694.9
GT04	Food products, beverages and tobacco	145254.3
GT05	Textiles and textile products; leather and leather products	55243.8
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	16081.7
GT07	Coke and refined petroleum products	5072.6
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	127457.5
GT09	Other non-metallic mineral products	42011.8
GT10	Basic metals; fabricated metal products, except machinery and equipment	126997.7
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	65722.9
GT12	Transport equipment	31544.1
GT13	Furniture; other manufactured goods n.e.c.	27976.2
GT14	Secondary raw materials; municipal wastes and other wastes	5968.1
GT15	Mail, parcels	
GT16	Equipment and material utilized in the transport of goods	11050.0
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	101282.0
GT19	Unidentifiable goods: goods which for any reason cannot be identified	10346.6
GT20	Other goods n.e.c.	20170.9
Total	**ALL GOODS**	**964656.9**

At the generation / export side, the distribution by export regions is shown in the picture hereunder.

Figure 33 Exports Turkey and Greece by road to selected countries, ETIS PLUS 2010



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

In the above picture it is observed that 3 origin / exporting regions register more than 10.000 tonnes per year for exports by road each, and 13 regions register between 10.000 and 50.000 tonnes per year for exports by road each, all in relation with the above mentioned destinations.

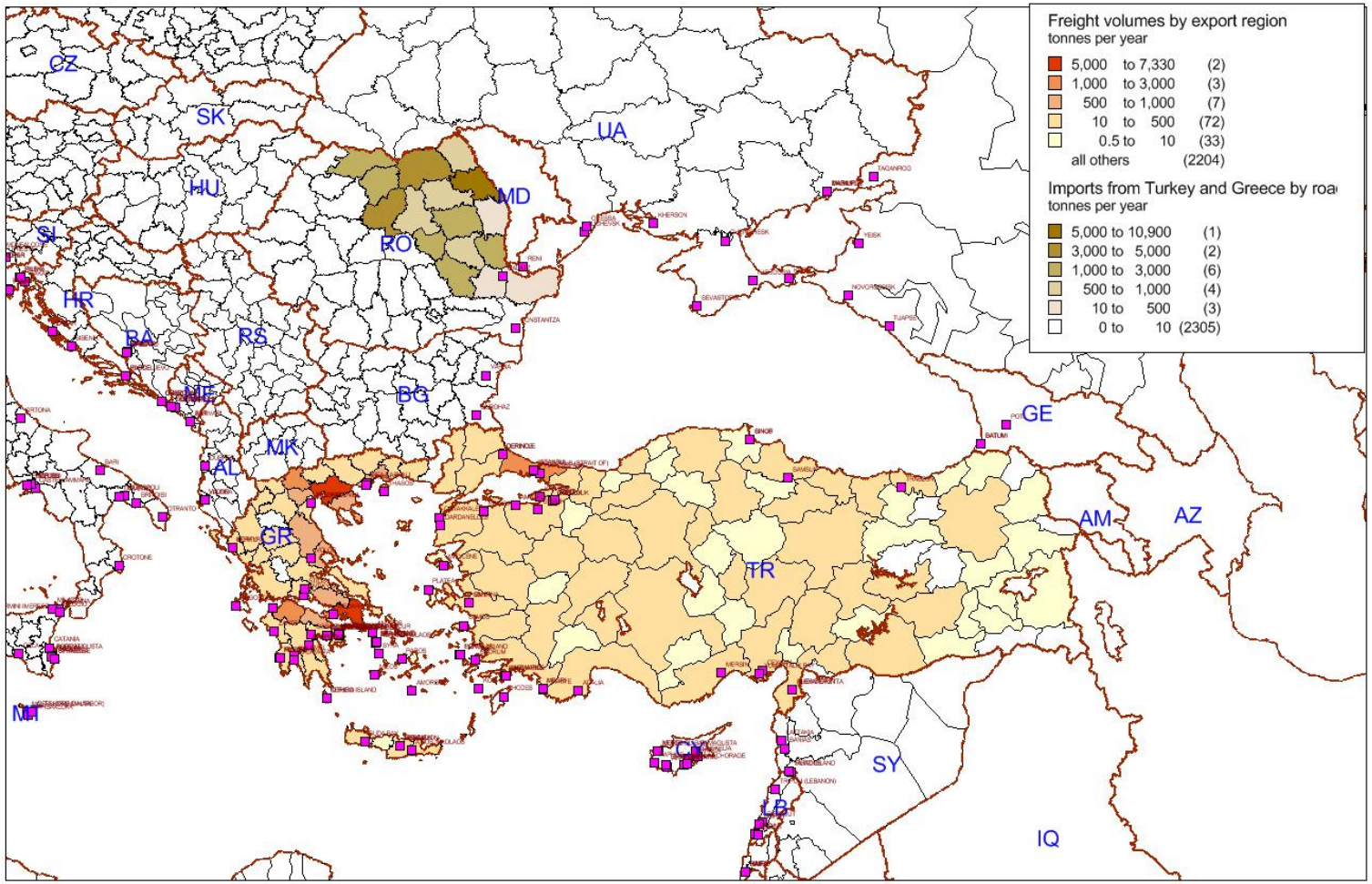
Hinterland 1 Galati

Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	3096.2
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	777.0
GT04	Food products, beverages and tobacco	4152.0
GT05	Textiles and textile products; leather and leather products	827.9
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	189.0
GT07	Coke and refined petroleum products	357.1
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	4703.5
GT09	Other non-metallic mineral products	2181.7
GT10	Basic metals; fabricated metal products, except machinery and equipment	2402.1
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	2467.1
GT12	Transport equipment	259.7
GT13	Furniture; other manufactured goods n.e.c.	773.9
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	667.8
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	5463.7
GT19	Unidentifiable goods: goods which for any reason cannot be identified	1556.4
GT20	Other goods n.e.c.	989.0
Total	**ALL GOODS**	**30864.1**

The related imports and exports by region for all goods is shown in Figure 34 hereunder.

The freight volumes imported by the regions of hinterland 1 are not very high, counting 31 thousand tonnes per year, but there is a high probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 1. More detailed estimations of the total flows that can be transferred to the new route/service will be presented in the final report of Phase 2.

Figure 34 Exports Turkey and Greece by road to Hinterland 1 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 2 Galati

Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	7967.4
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	936.4
GT04	Food products, beverages and tobacco	15639.5
GT05	Textiles and textile products; leather and leather products	6620.2
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	694.3
GT07	Coke and refined petroleum products	1495.4
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	23729.8
GT09	Other non-metallic mineral products	15543.5
GT10	Basic metals; fabricated metal products, except machinery and equipment	21829.0
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	20671.6
GT12	Transport equipment	7153.0
GT13	Furniture; other manufactured goods n.e.c.	6663.1
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	4122.3
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	32038.6
GT19	Unidentifiable goods: goods which for any reason cannot be identified	1675.6
GT20	Other goods n.e.c.	666.0
Total	**ALL GOODS**	**167445.7**

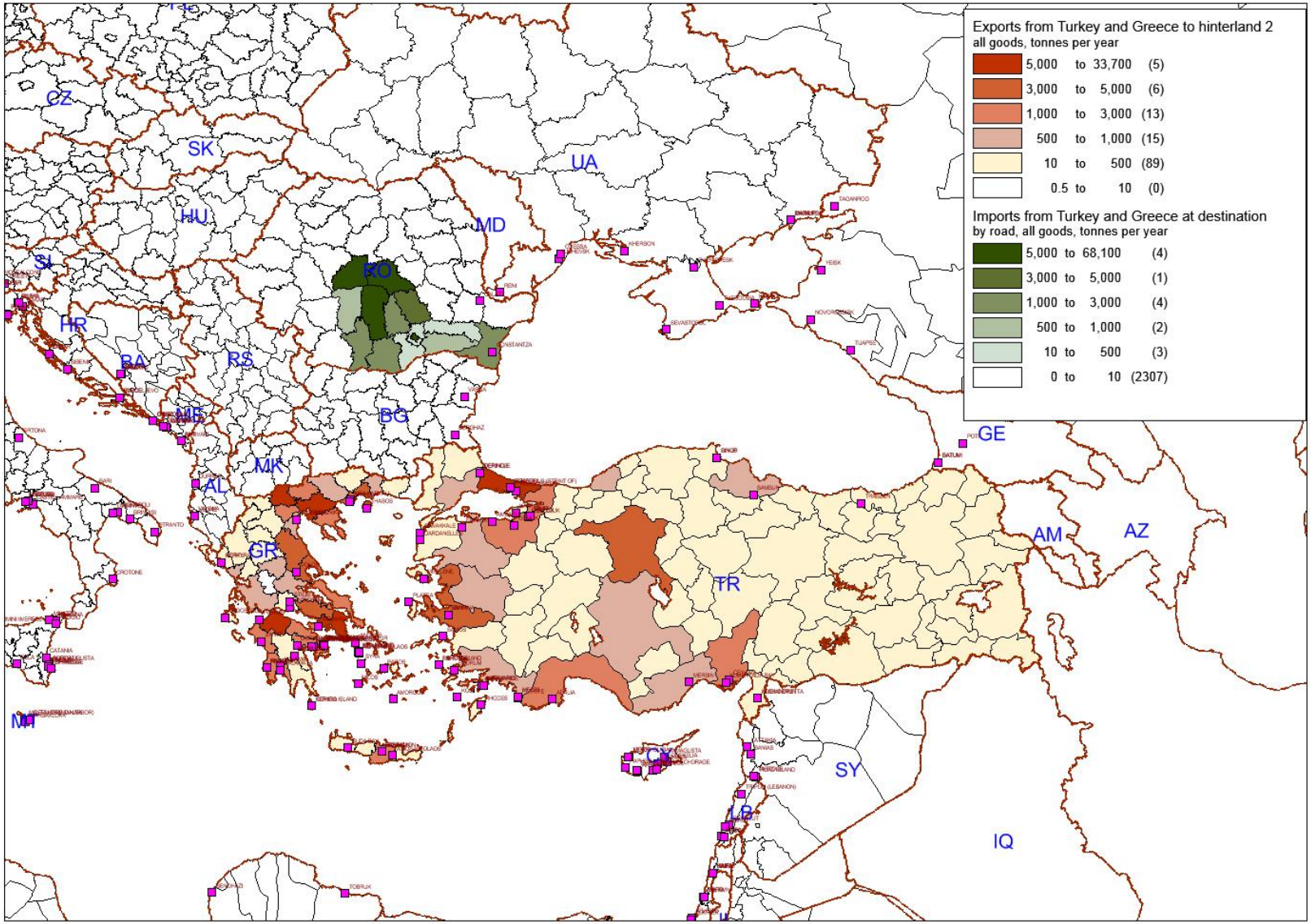
The related imports and exports by region for all goods is shown in Figure 35 hereunder.

The total freight volumes imported by road by the regions of hinterland 2 from Turkey and Greece are quite high, counting 167 thousand tonnes per year .

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 2 is higher for the regions located in the north of hinterland 2.

One item to be considered here is the competition with Constanta port, which has good connections on road and rail with Bucharest & Ilfov, Prahova and Argeș counties.

Figure 35 Exports Turkey and Greece by road to Hinterland 2 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 3 Galati

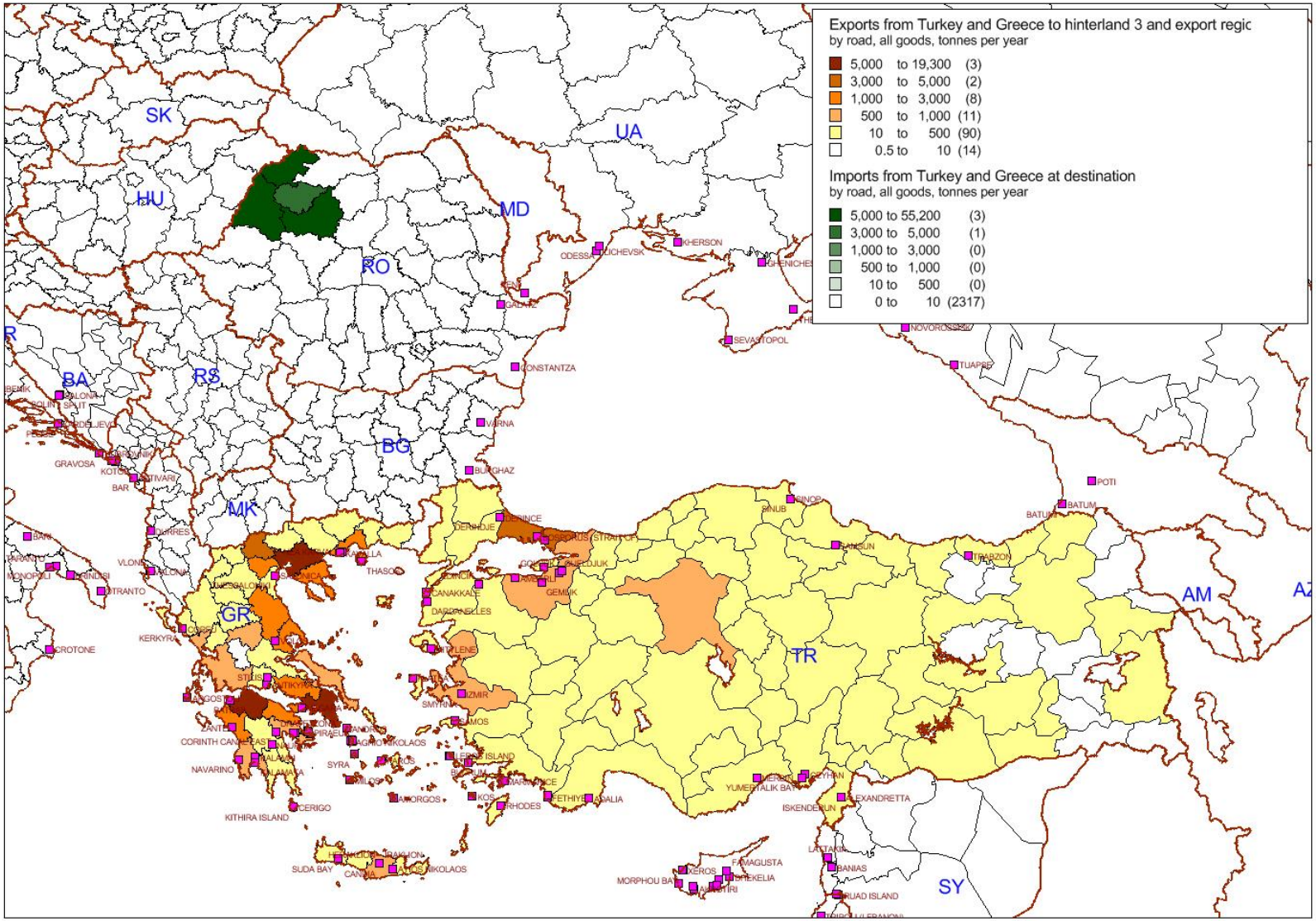
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	13270.2
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	2799.6
GT04	Food products, beverages and tobacco	12149.6
GT05	Textiles and textile products; leather and leather products	3890.1
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	920.9
GT07	Coke and refined petroleum products	1561.4
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	13631.8
GT09	Other non-metallic mineral products	5261.9
GT10	Basic metals; fabricated metal products, except machinery and equipment	5372.0
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	5430.0
GT12	Transport equipment	639.5
GT13	Furniture; other manufactured goods n.e.c.	2171.9
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	2872.5
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	13262.0
GT19	Unidentifiable goods: goods which for any reason cannot be identified	2348.8
GT20	Other goods n.e.c.	311.3
Total	**ALL GOODS**	**85893.5**

The related imports and exports by region for all goods is shown in Figure 36 hereunder.

The total freight volumes imported by road by the regions of hinterland 3 from Turkey and Greece are relatively high, counting 86 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 2 is higher for the imports from Turkey and eventually from the regions located in the South of Greece.

Figure 36 Exports Turkey and Greece by road to Hinterland 3 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 4 Galati

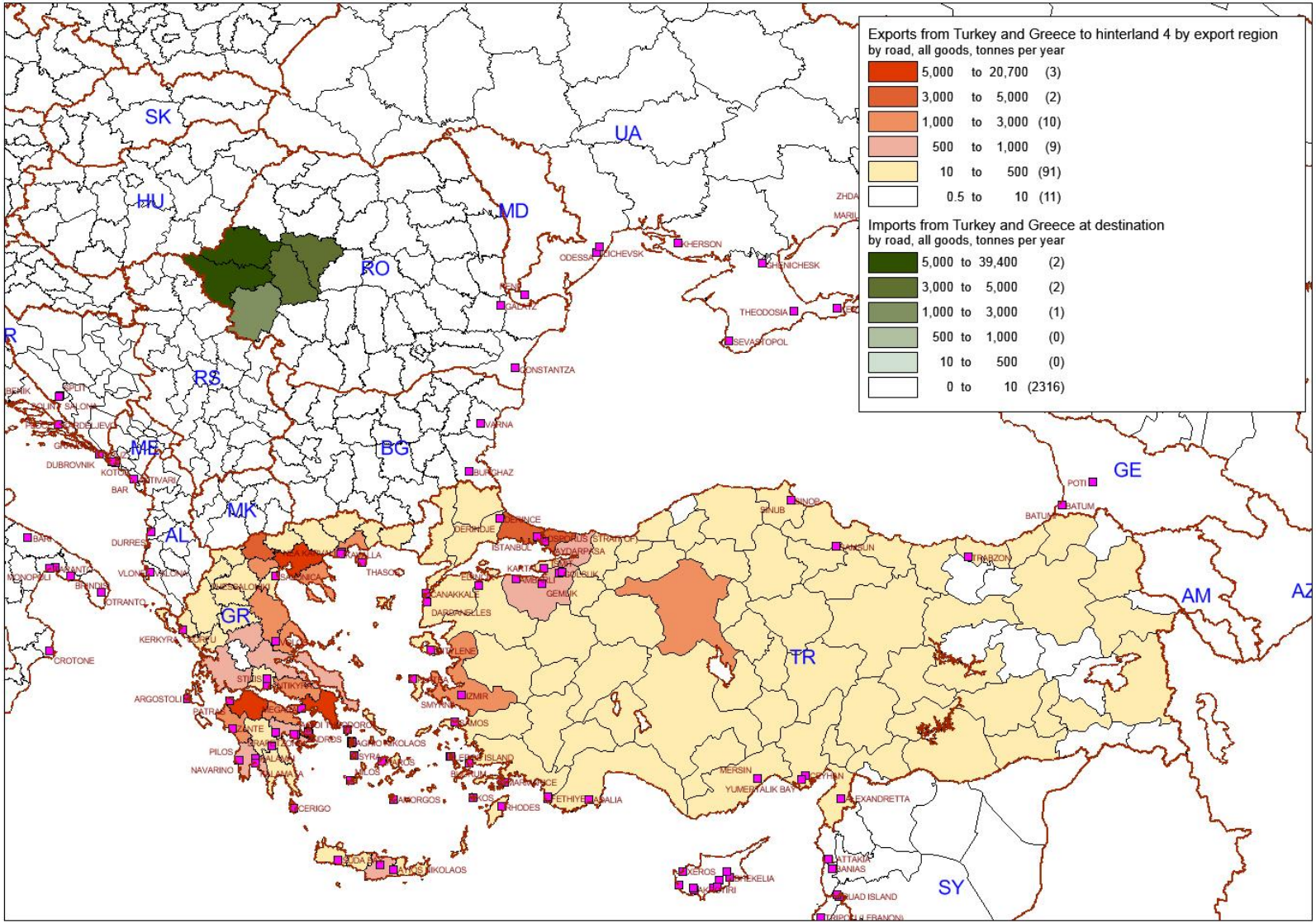
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	6800.7
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	2221.5
GT04	Food products, beverages and tobacco	7994.1
GT05	Textiles and textile products; leather and leather products	2159.6
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	468.0
GT07	Coke and refined petroleum products	1628.9
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	19165.8
GT09	Other non-metallic mineral products	8360.5
GT10	Basic metals; fabricated metal products, except machinery and equipment	6723.8
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	8222.4
GT12	Transport equipment	2474.3
GT13	Furniture; other manufactured goods n.e.c.	2497.9
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	3265.9
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	10531.8
GT19	Unidentifiable goods: goods which for any reason cannot be identified	4642.6
GT20	Other goods n.e.c.	1178.5
Total	**ALL GOODS**	**88336.3**

The related imports and exports by region for all goods is shown in Figure 37 hereunder.

The total freight volumes imported by road by the regions of hinterland 4 from Turkey and Greece are relatively high, counting 88 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 2 is higher for the imports from Turkey and eventually from the regions located in the South of Greece.

Figure 37 Exports Turkey and Greece by road to Hinterland 4 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

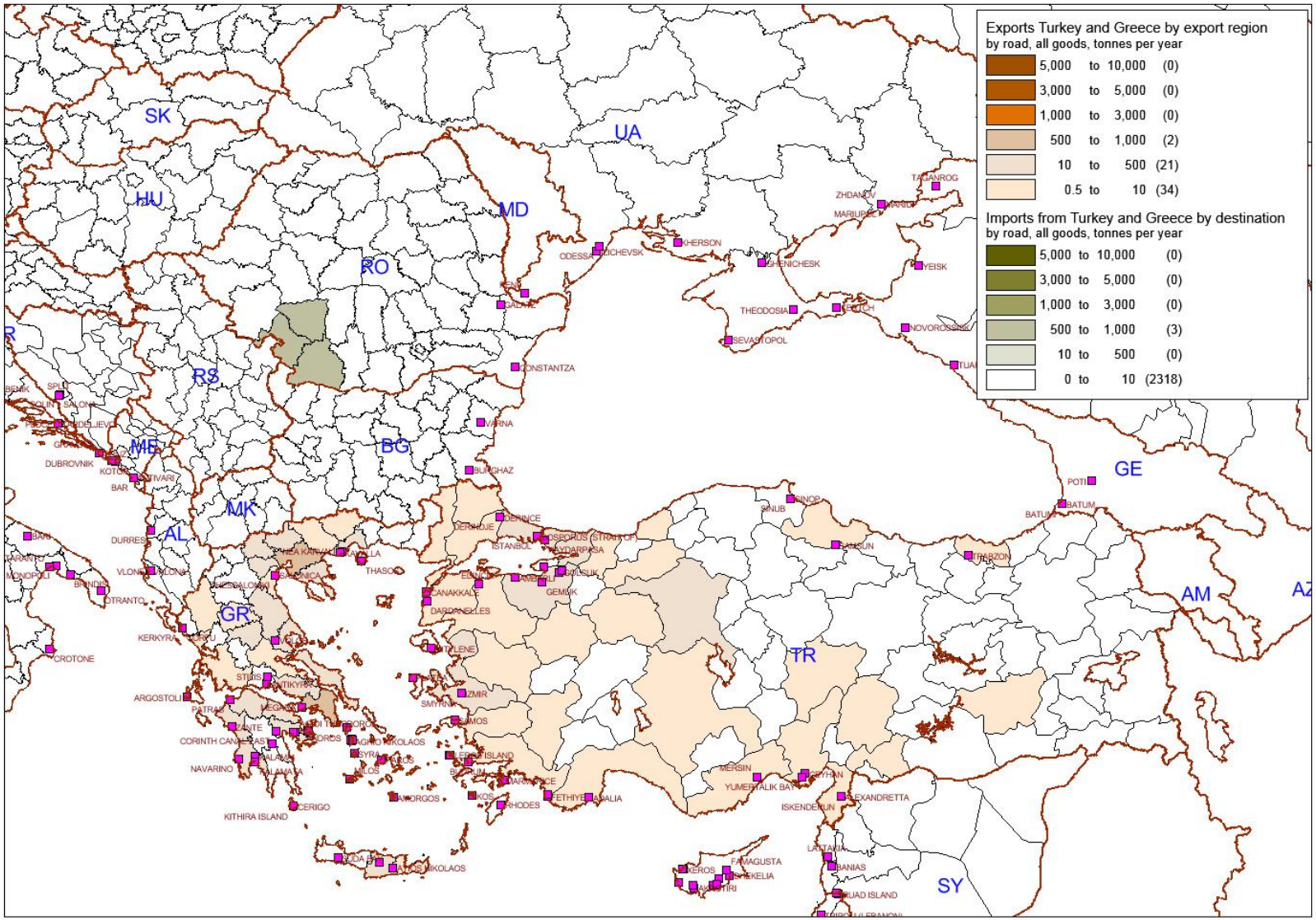
Hinterland 5 Galati

Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	157.2
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	17.5
GT04	Food products, beverages and tobacco	340.5
GT05	Textiles and textile products; leather and leather products	10.1
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	0
GT07	Coke and refined petroleum products	29.8
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	841.5
GT09	Other non-metallic mineral products	162.0
GT10	Basic metals; fabricated metal products, except machinery and equipment	235.9
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	245.8
GT12	Transport equipment	33.6
GT13	Furniture; other manufactured goods n.e.c.	38.6
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	273.7
GT19	Unidentifiable goods: goods which for any reason cannot be identified	123.2
GT20	Other goods n.e.c.	5.0
Total	**ALL GOODS**	**2635.9**

The related imports and exports by region for all goods is shown in Figure 38 hereunder.

The total freight volumes imported by road by the regions of hinterland 5 from Turkey and Greece are very low, counting almost 3 thousand tonnes per year. Due to the low volumes, these flows are not considered further for a possible modal shift to the new route/service.

Figure 38 Exports Turkey and Greece by road to Hinterland 5 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 6 Hungary

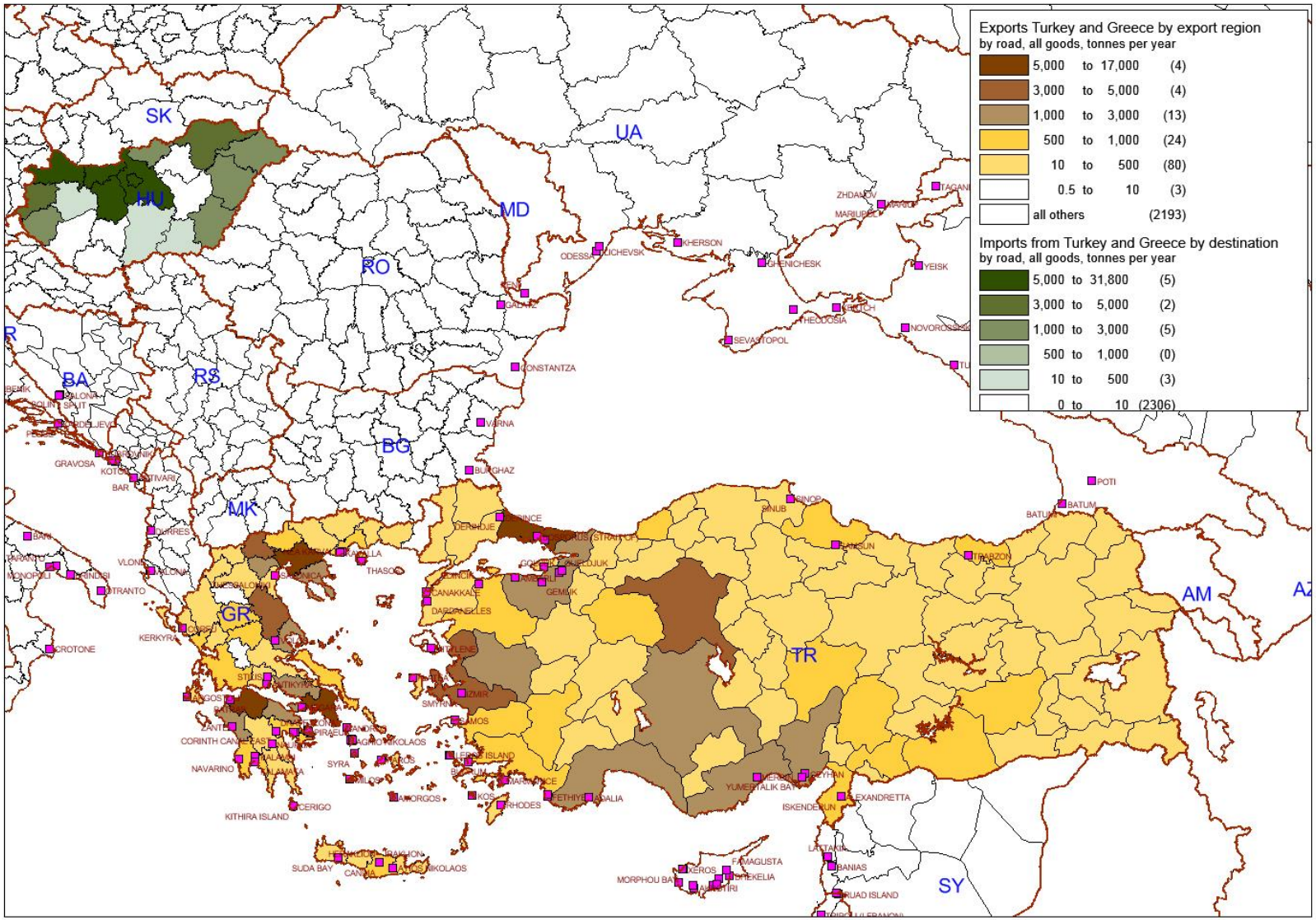
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	20793.0
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	942.9
GT04	Food products, beverages and tobacco	25230.8
GT05	Textiles and textile products; leather and leather products	2359.4
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	0
GT07	Coke and refined petroleum products	0
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	5816.1
GT09	Other non-metallic mineral products	4883.3
GT10	Basic metals; fabricated metal products, except machinery and equipment	25111.8
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	2374.1
GT12	Transport equipment	2352.5
GT13	Furniture; other manufactured goods n.e.c.	0
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	0
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	
GT18	Grouped goods: a mixture of types of goods which are transported	25881.3
GT19	Unidentifiable goods: goods which for any reason cannot be identified	0
GT20	Other goods n.e.c.	0
Total	**ALL GOODS**	**115745.2**

The related imports and exports by region for all goods is shown in Figure 39 hereunder.

The total freight volumes imported by road by the regions of hinterland 6 Hungary from Turkey and Greece are relatively high, counting almost 116 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 6 is higher for the imports from Turkey and eventually from the regions located in the South of Greece.

Figure 39 Exports Turkey and Greece by road to Hinterland 6 Hungary, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 7 Austria

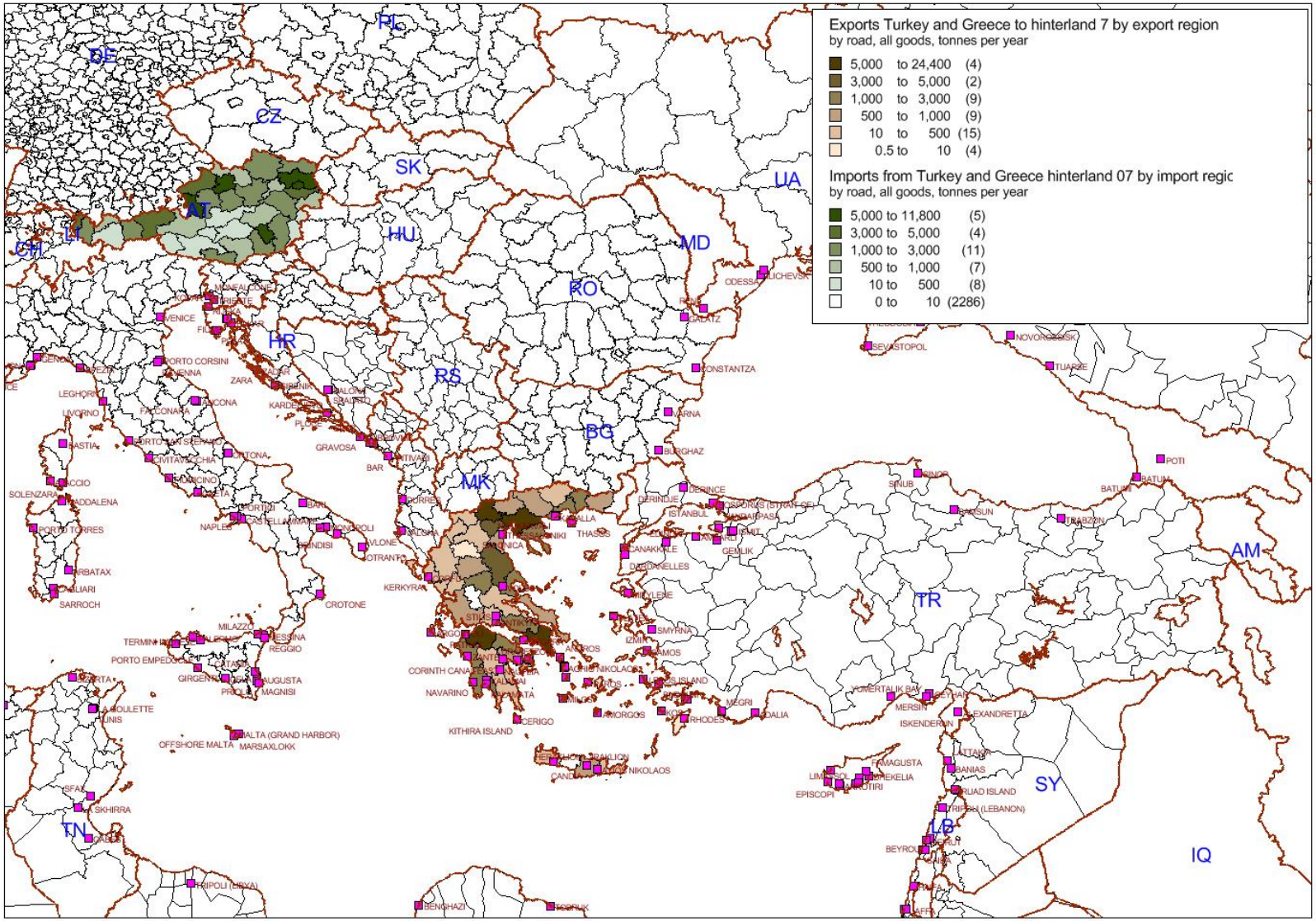
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	14580.6
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	0
GT04	Food products, beverages and tobacco	16830.7
GT05	Textiles and textile products; leather and leather products	15845.2
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	4298.1
GT07	Coke and refined petroleum products	0
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	9911.9
GT09	Other non-metallic mineral products	0
GT10	Basic metals; fabricated metal products, except machinery and equipment	2077.9
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	12238.2
GT12	Transport equipment	0
GT13	Furniture; other manufactured goods n.e.c.	4398.2
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	0
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	3264.6
GT19	Unidentifiable goods: goods which for any reason cannot be identified	0
GT20	Other goods n.e.c.	4303.8
Total	**ALL GOODS**	**87749.2**

The related imports and exports by region for all goods is shown in Figure 40 hereunder.

The total freight volumes imported by road by the regions of hinterland 7 Austria from Greece are relatively high, counting almost 88 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 7 Austria is quite low as the direct road route from Greece to Austria is much shorter, and there is a possible alternative route considering the maritime links of Adriatic Sea.

Figure 40 Exports Turkey and Greece by road to Hinterland 7 Austria, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 8 Czech Republic

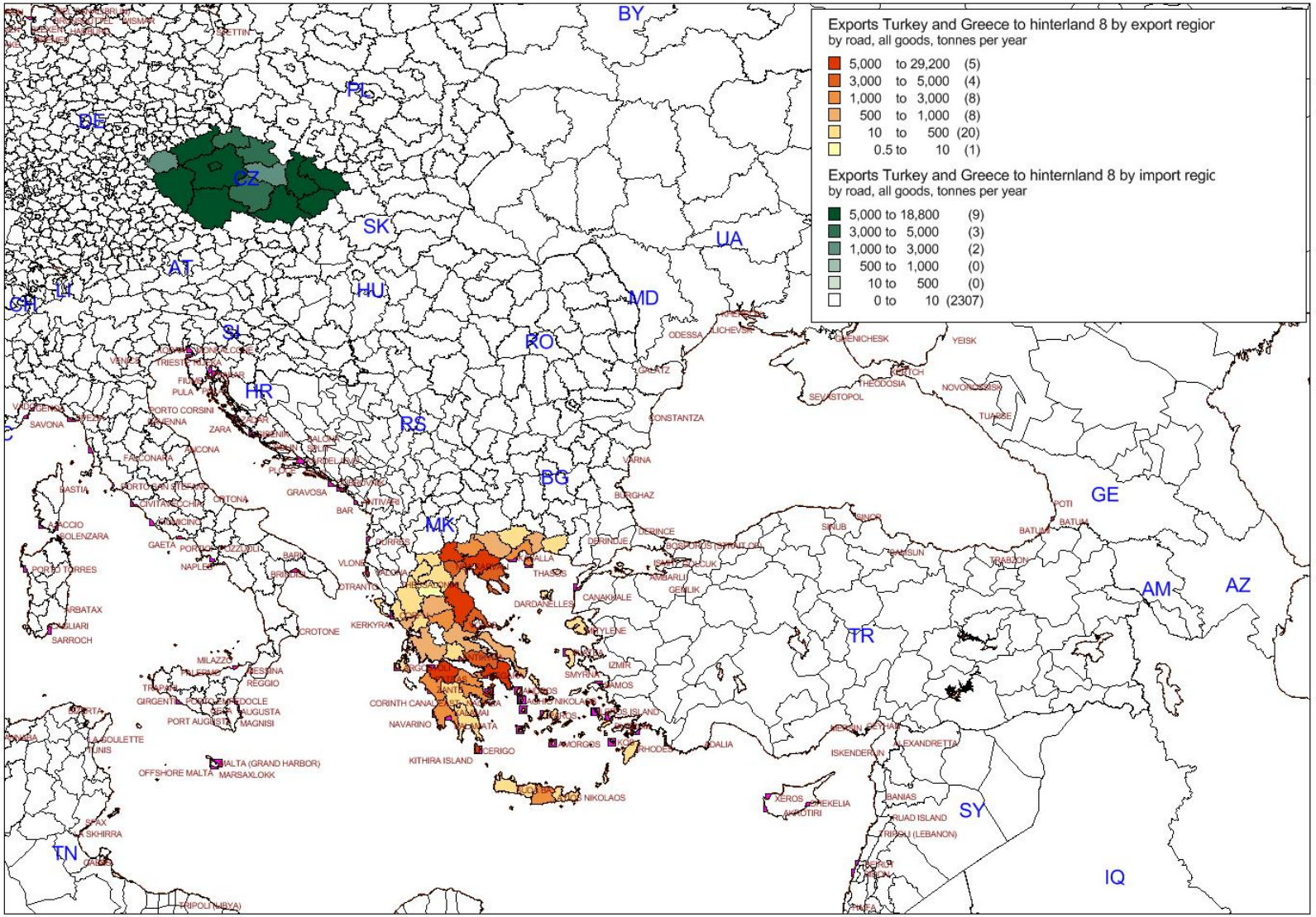
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	27783.3
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	0
GT04	Food products, beverages and tobacco	13421.4
GT05	Textiles and textile products; leather and leather products	5892.0
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	7486.0
GT07	Coke and refined petroleum products	0
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	9910.0
GT09	Other non-metallic mineral products	3259.3
GT10	Basic metals; fabricated metal products, except machinery and equipment	41347.3
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	2410.3
GT12	Transport equipment	0
GT13	Furniture; other manufactured goods n.e.c.	2465.6
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	0
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	0
GT19	Unidentifiable goods: goods which for any reason cannot be identified	0
GT20	Other goods n.e.c.	0
Total	**ALL GOODS**	**113975.2**

The related imports and exports by region for all goods is shown in Figure 41 hereunder.

The total freight volumes imported by road by the regions of hinterland 8 Czech Republic from Greece are relatively high, counting almost 114 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 8 Czech Republic is quite low as the direct road route from Greece to Czech Republic is much shorter, and there is a possible alternative route considering the maritime links of Adriatic Sea.

Figure 41 Exports Turkey and Greece by road to Hinterland 8 Czech Republic, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 9 Slovakia and Hinterland 11 Baltic countries

There are not direct road flows registered in the databases for exports of Turkey and Greece.

Hinterland 10 Poland

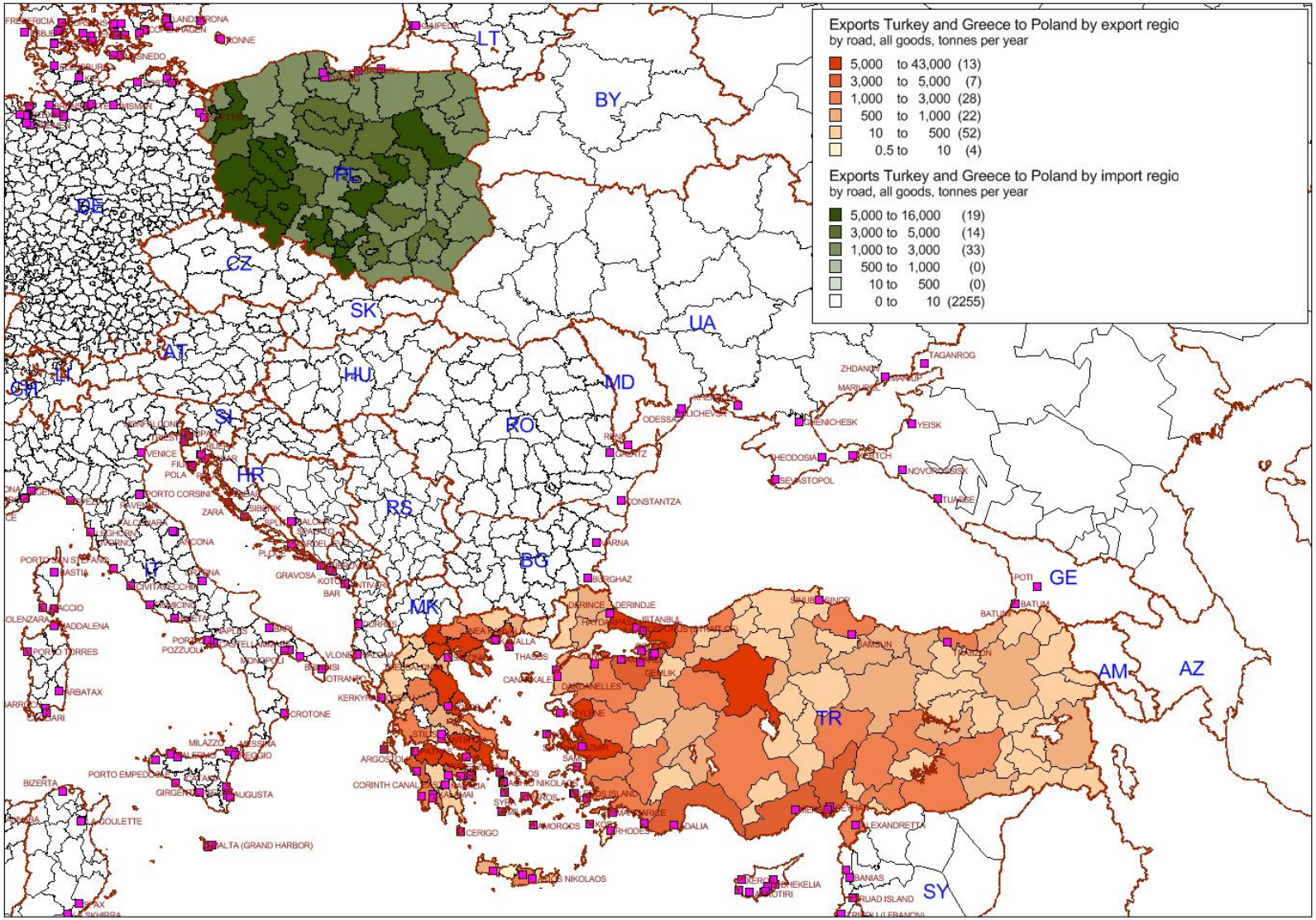
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	70333.2
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	0
GT04	Food products, beverages and tobacco	49495.7
GT05	Textiles and textile products; leather and leather products	17639.3
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	2025.4
GT07	Coke and refined petroleum products	0
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	39747.1
GT09	Other non-metallic mineral products	2359.6
GT10	Basic metals; fabricated metal products, except machinery and equipment	21897.9
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	11663.4
GT12	Transport equipment	18631.5
GT13	Furniture; other manufactured goods n.e.c.	8967.0
GT14	Secondary raw materials; municipal wastes and other wastes	5968.1
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	0
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	10566.3
GT19	Unidentifiable goods: goods which for any reason cannot be identified	0
GT20	Other goods n.e.c.	12717.3
Total	**ALL GOODS**	**272011.8**

The related imports and exports by region for all goods is shown in Figure 42 hereunder.

The total freight volumes imported by road by the regions of hinterland 10 Poland from Greece are quite high, counting almost 272 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 10 Poland is quite high especially for imports from Turkey and South of Greece.

Figure 42 Exports Turkey and Greece by road to Hinterland 10 Poland, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

6.3.2. *Imports by road of Turkey and Greece to Central and Eastern Europe*

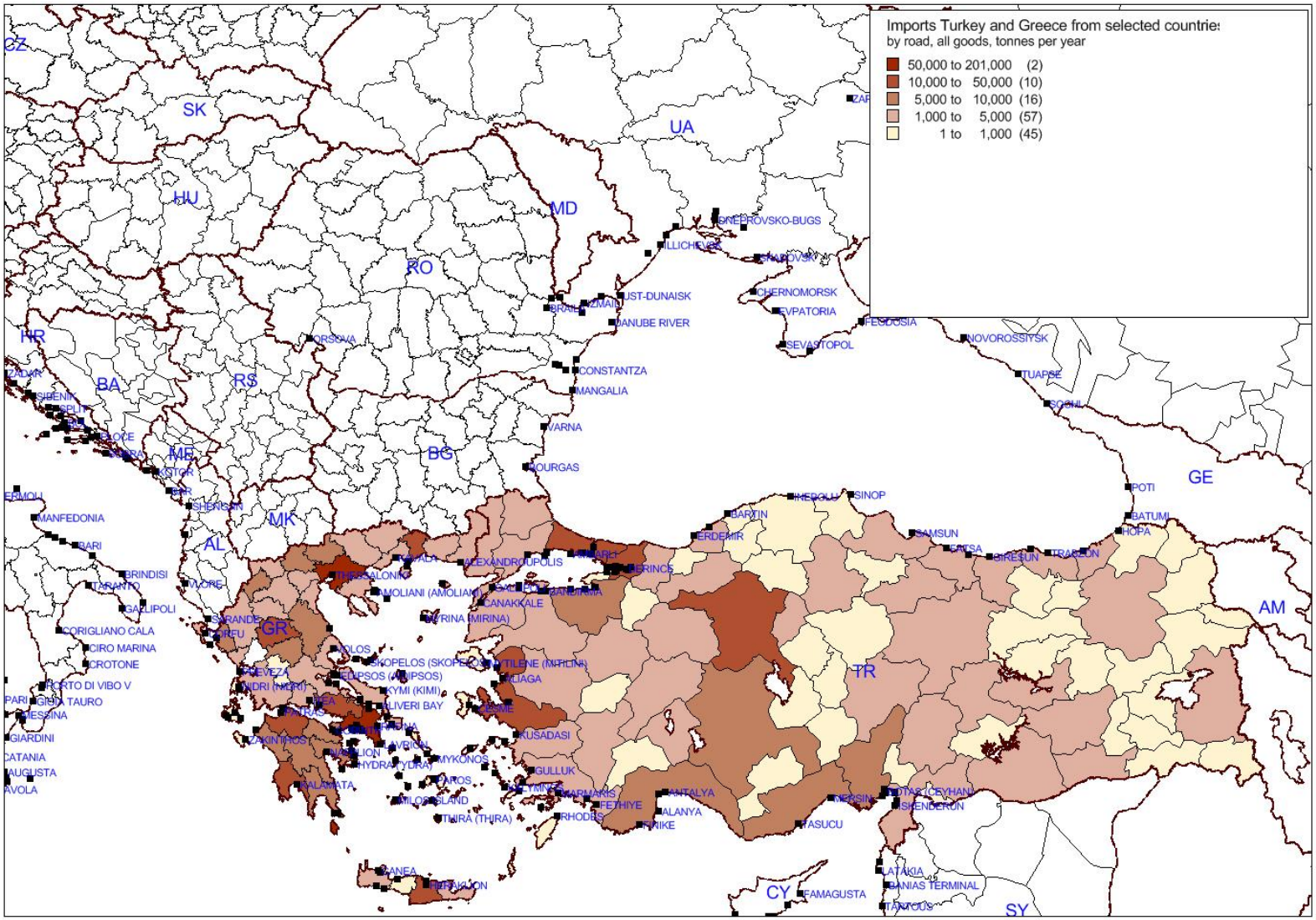
The global picture shows that all exports mentioned above counts 727 thousand tonnes, distributed as follows by commodity – NST07:

Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	101413.7
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	8514.7
GT04	Food products, beverages and tobacco	78317.4
GT05	Textiles and textile products; leather and leather products	30602.2
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	44347.8
GT07	Coke and refined petroleum products	6729.7
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	51712.8
GT09	Other non-metallic mineral products	99202.1
GT10	Basic metals; fabricated metal products, except machinery and equipment	36341.9
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	60430.6
GT12	Transport equipment	38472.6
GT13	Furniture; other manufactured goods n.e.c.	22687.8
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	1491.2
GT16	Equipment and material utilized in the transport of goods	19174.7
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.	1104.0
GT18	Grouped goods: a mixture of types of goods which are transported	110413.4
GT19	Unidentifiable goods: goods which for any reason cannot be identified	10337.7
GT20	Other goods n.e.c.	5534.5
Total	**ALL GOODS**	**726828.8**

At the generation / export side, the distribution by export regions is shown in the picture hereunder.

In the above picture it is observed that 2 regions register between 50.000 and 200.000 tonnes per year for imports by road each, and 10 regions register between 10.000 and 50.000 tonnes per year for exports by road each, all in relation with the above mentioned destinations.

Figure 43 Imports Turkey and Greece by road from selected countries, ETIS PLUS 2010



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

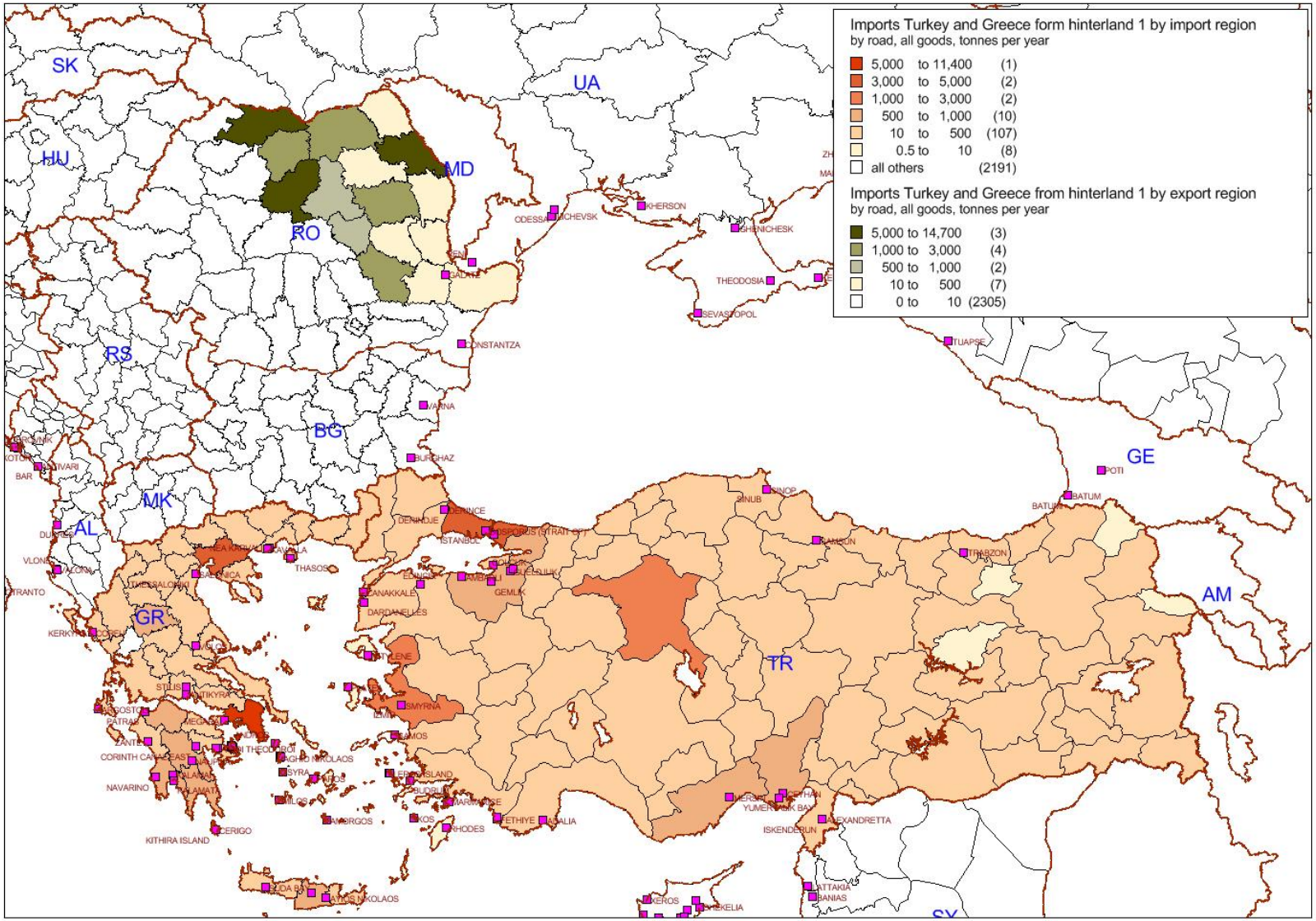
Hinterland 1 Galati

Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	2120.2
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	2060.3
GT04	Food products, beverages and tobacco	1741.7
GT05	Textiles and textile products; leather and leather products	2500.8
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	6123.7
GT07	Coke and refined petroleum products	153.3
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	1156.2
GT09	Other non-metallic mineral products	5252.1
GT10	Basic metals; fabricated metal products, except machinery and equipment	1932.6
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	1941.7
GT12	Transport equipment	1882.1
GT13	Furniture; other manufactured goods n.e.c.	1501.7
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	3135.1
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	10772.5
GT19	Unidentifiable goods: goods which for any reason cannot be identified	828.6
GT20	Other goods n.e.c.	0
Total	**ALL GOODS**	**43102.6**

The related imports and exports by region for all goods is shown in Figure 44 hereunder.

The freight volumes exported by the regions of hinterland 1 are not very high, counting 43 thousand tonnes per year, but there is a high probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 1. More detailed estimations of the total flows that can be transferred to the new route/service will be presented in the final report of Phase 2.

Figure 44 Exports Turkey and Greece by road to Hinterland 1 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 2 Galati

Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	5578.4
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	4870.1
GT04	Food products, beverages and tobacco	4484.9
GT05	Textiles and textile products; leather and leather products	13317.1
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	4763.5
GT07	Coke and refined petroleum products	1535.3
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	3845.9
GT09	Other non-metallic mineral products	18360.4
GT10	Basic metals; fabricated metal products, except machinery and equipment	12913.7
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	9917.3
GT12	Transport equipment	16589.2
GT13	Furniture; other manufactured goods n.e.c.	5981.7
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	7123.5
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	31702.5
GT19	Unidentifiable goods: goods which for any reason cannot be identified	1733.3
GT20	Other goods n.e.c.	0
Total	**ALL GOODS**	**142716.8**

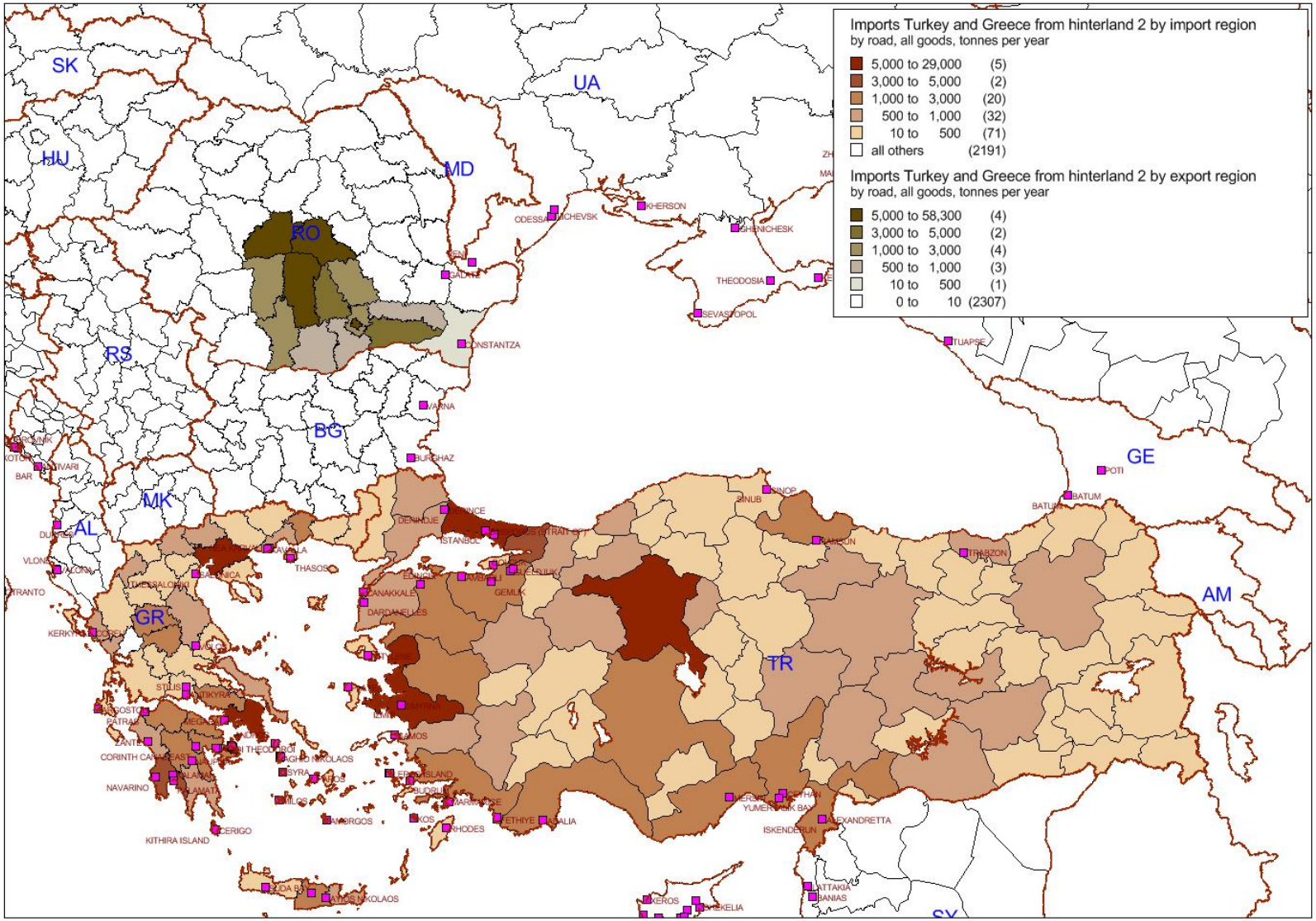
The related imports and exports by region for all goods is shown in Figure 45 hereunder.

The total freight volumes imported by road from the regions of hinterland 2 by Turkey and Greece are quite high, counting 143 thousand tonnes per year .

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 2 is higher for the regions located in the north of hinterland 2.

One item to be considered here is the competition with Constanta port, which has good connections on road and rail with Bucharest & Ilfov, Prahova and Argeș counties.

Figure 45 Imports Turkey and Greece by road from Hinterland 2 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 3 Galati

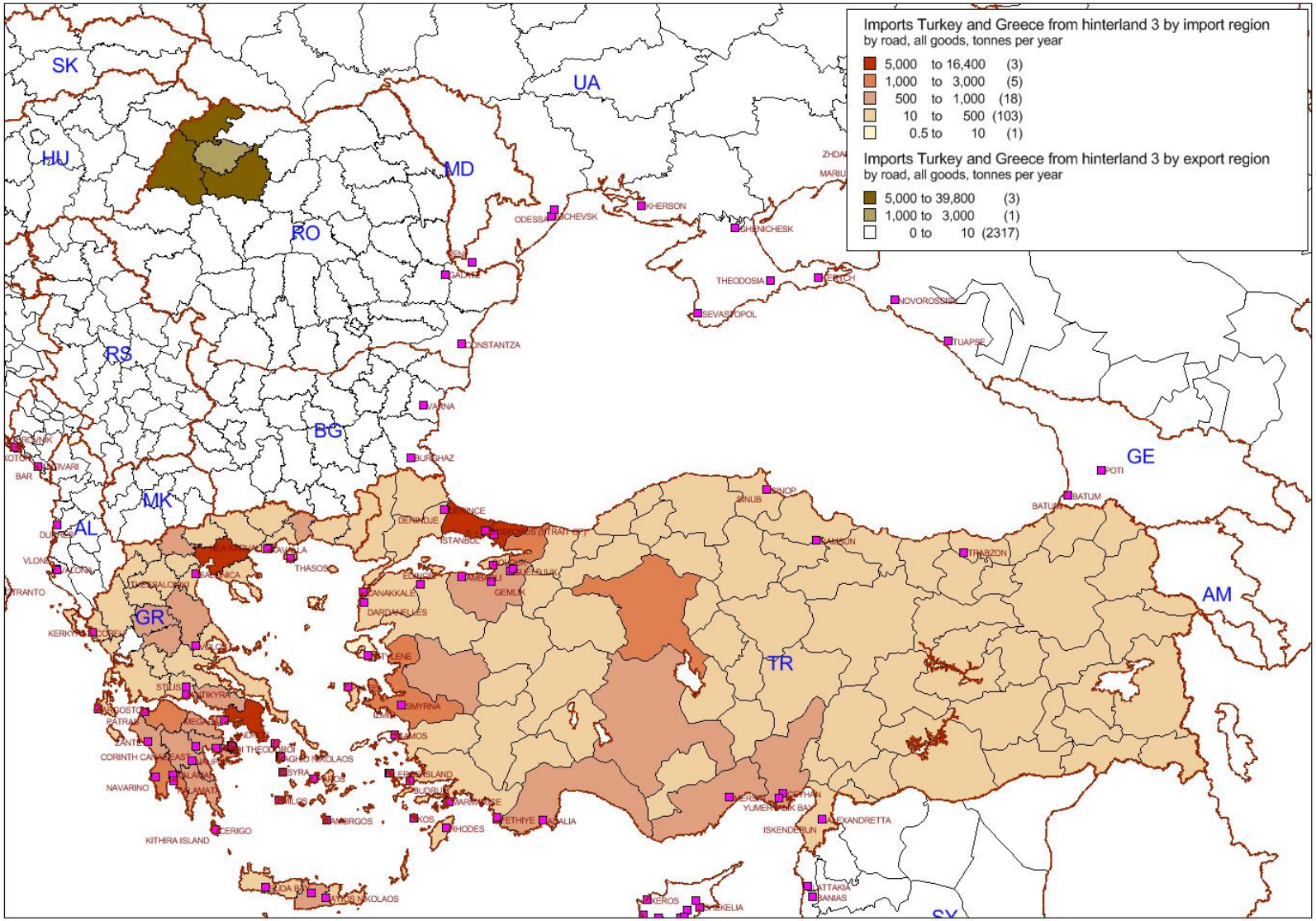
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	5392.4
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	742.0
GT04	Food products, beverages and tobacco	4328.7
GT05	Textiles and textile products; leather and leather products	6106.1
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	7611.9
GT07	Coke and refined petroleum products	621.3
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	1929.5
GT09	Other non-metallic mineral products	8566.4
GT10	Basic metals; fabricated metal products, except machinery and equipment	3440.2
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	2944.6
GT12	Transport equipment	2040.1
GT13	Furniture; other manufactured goods n.e.c.	1708.6
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	2096.4
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	16140.0
GT19	Unidentifiable goods: goods which for any reason cannot be identified	1371.7
GT20	Other goods n.e.c.	0
Total	**ALL GOODS**	**65039.9**

The related imports and exports by region for all goods is shown in Figure 46 hereunder.

The total freight volumes exported by road by the regions of hinterland 3 to Turkey and Greece are relatively high, counting 65 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 2 is higher for the imports from Turkey and eventually from the regions located in the South of Greece.

Figure 46 Imports Turkey and Greece by road from Hinterland 3 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 4 Galati

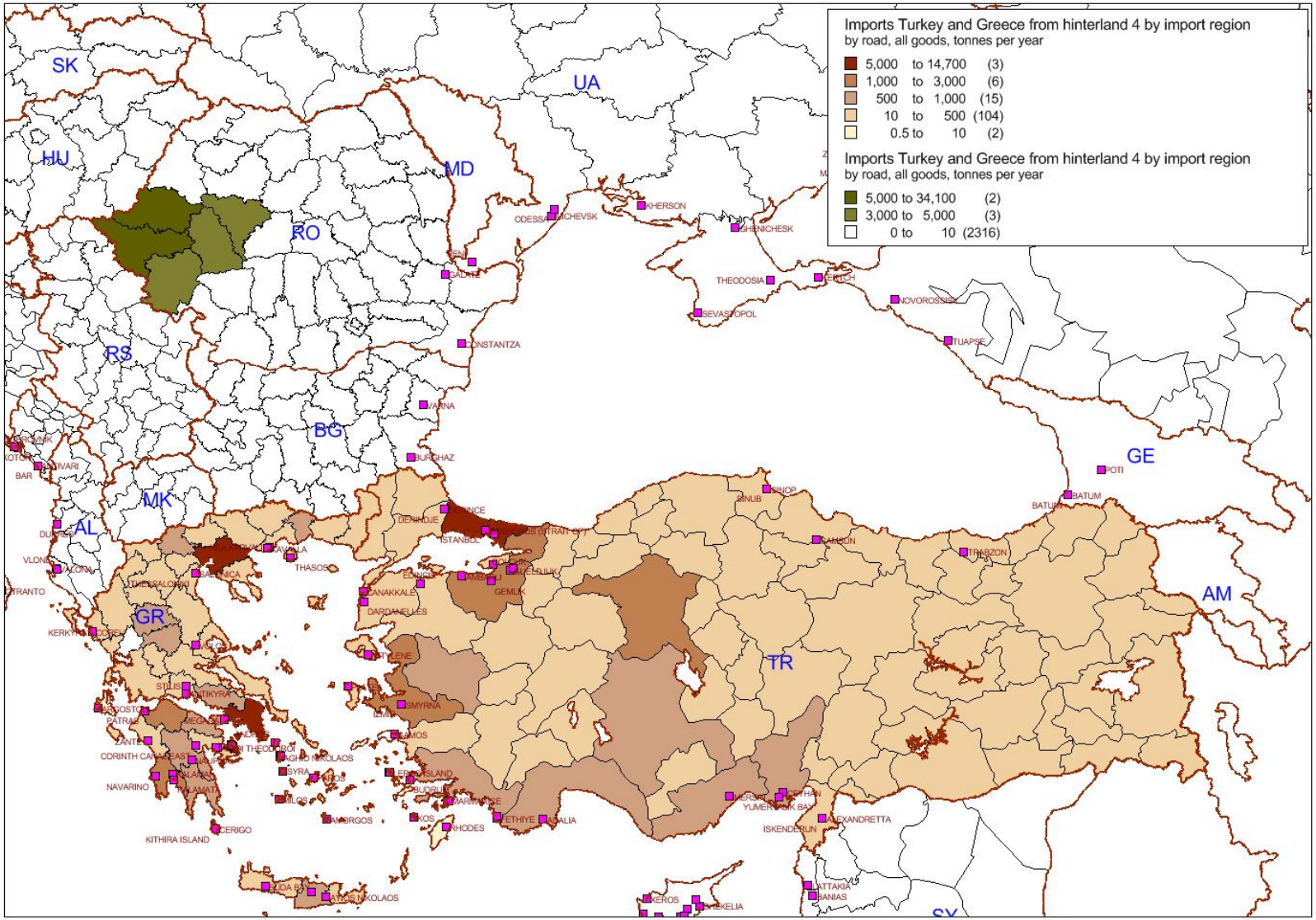
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	2926.3
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	828.2
GT04	Food products, beverages and tobacco	2026.8
GT05	Textiles and textile products; leather and leather products	3543.1
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	3656.6
GT07	Coke and refined petroleum products	843.2
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	3650.1
GT09	Other non-metallic mineral products	10308.7
GT10	Basic metals; fabricated metal products, except machinery and equipment	3326.4
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	2623.1
GT12	Transport equipment	14330.3
GT13	Furniture; other manufactured goods n.e.c.	2245.8
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	2009.5
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	10268.2
GT19	Unidentifiable goods: goods which for any reason cannot be identified	1995.6
GT20	Other goods n.e.c.	0
Total	**ALL GOODS**	**64581.9**

The related imports and exports by region for all goods is shown in Figure 47 hereunder.

The total freight volumes exported by road from the regions of hinterland 4 to Turkey and Greece are relatively high, counting 65 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 2 is higher for the imports from Turkey and eventually from the regions located in the South of Greece.

Figure 47 Imports Turkey and Greece by road from Hinterland 4 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

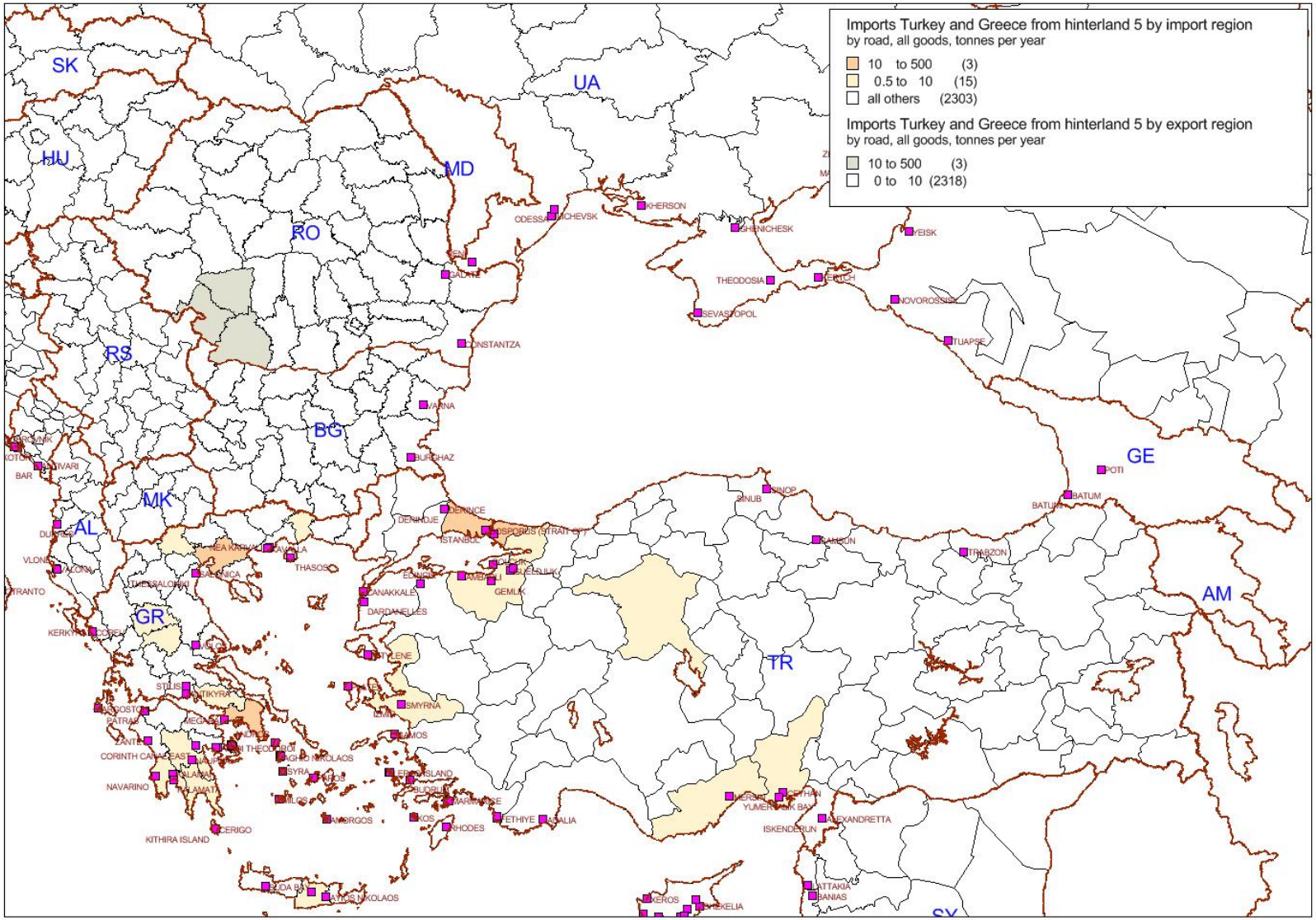
Hinterland 5 Galati

Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	14.0
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	14.1
GT04	Food products, beverages and tobacco	19.7
GT05	Textiles and textile products; leather and leather products	6.9
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	12.5
GT07	Coke and refined petroleum products	2.5
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	39.3
GT09	Other non-metallic mineral products	50.4
GT10	Basic metals; fabricated metal products, except machinery and equipment	11.7
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	21.9
GT12	Transport equipment	25.8
GT13	Furniture; other manufactured goods n.e.c.	3.8
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	13.2
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	15.5
GT19	Unidentifiable goods: goods which for any reason cannot be identified	21.3
GT20	Other goods n.e.c.	0
Total	**ALL GOODS**	**272.6**

The related imports and exports by region for all goods is shown in Figure 48 hereunder.

The total freight volumes exported by road from the regions of hinterland 5 to Turkey and Greece are very low, counting almost 3 thousand tonnes per year. Due to the low volumes, these flows are not considered further for a possible modal shift to the new route/service.

Figure 48 Imports Turkey and Greece by road from Hinterland 5 Romania, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 6 Hungary

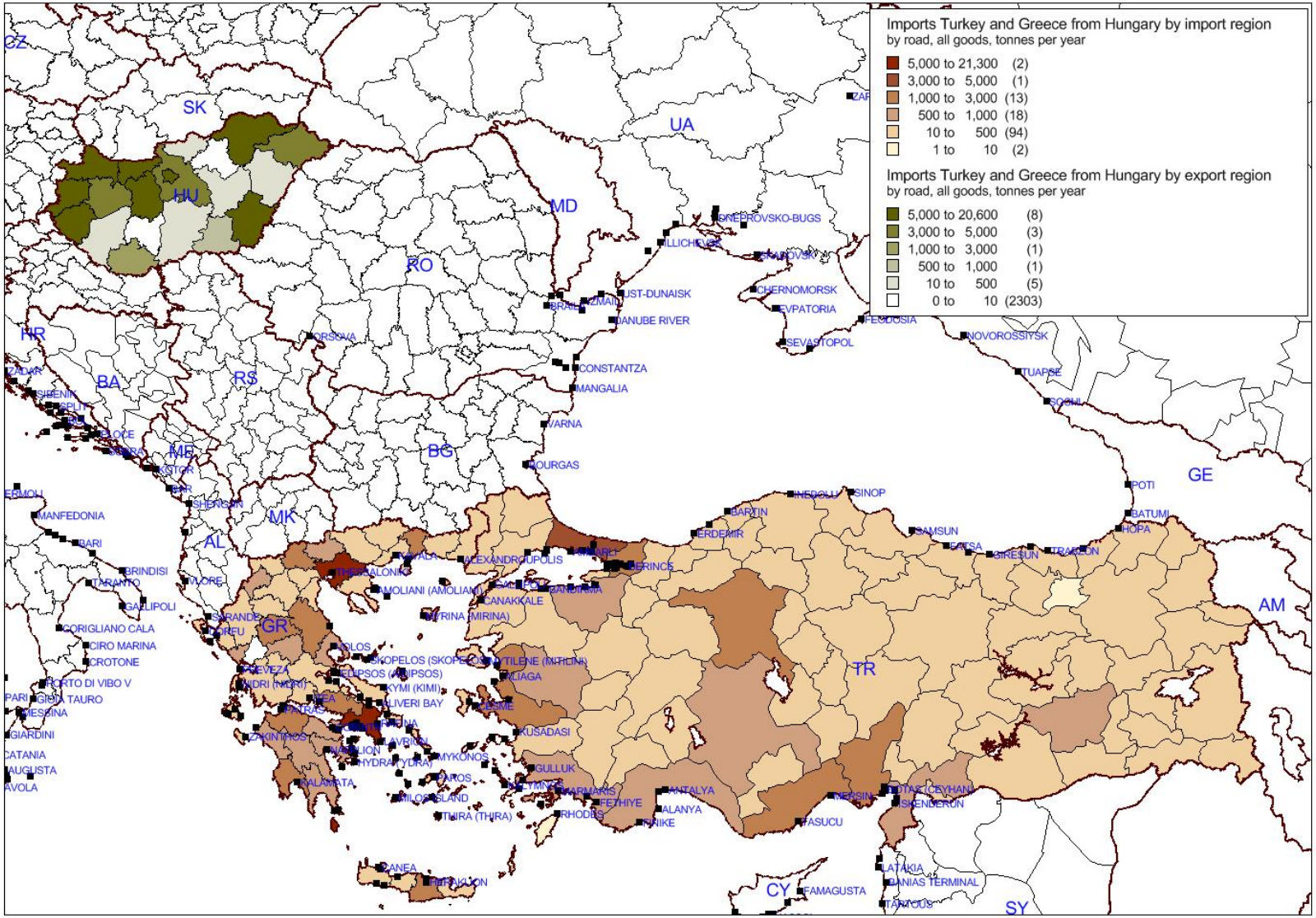
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	25380.1
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	0
GT04	Food products, beverages and tobacco	20116.7
GT05	Textiles and textile products; leather and leather products	
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	2376.7
GT07	Coke and refined petroleum products	0
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	15735.9
GT09	Other non-metallic mineral products	3101.3
GT10	Basic metals; fabricated metal products, except machinery and equipment	693.3
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	9803.4
GT12	Transport equipment	643.9
GT13	Furniture; other manufactured goods n.e.c.	0
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	2448.6
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	9444.2
GT19	Unidentifiable goods: goods which for any reason cannot be identified	0
GT20	Other goods n.e.c.	1546.8
Total	**ALL GOODS**	**91290.9**

The related imports and exports by region for all goods is shown in Figure 49 hereunder.

The total freight volumes exported by road from the regions of hinterland 6 Hungary to Turkey and Greece are relatively high, counting almost 91 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 6 is higher for the imports from Turkey and eventually from the regions located in the South of Greece.

Figure 49 Imports Turkey and Greece by road from Hinterland 6 Hungary, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 7 Austria

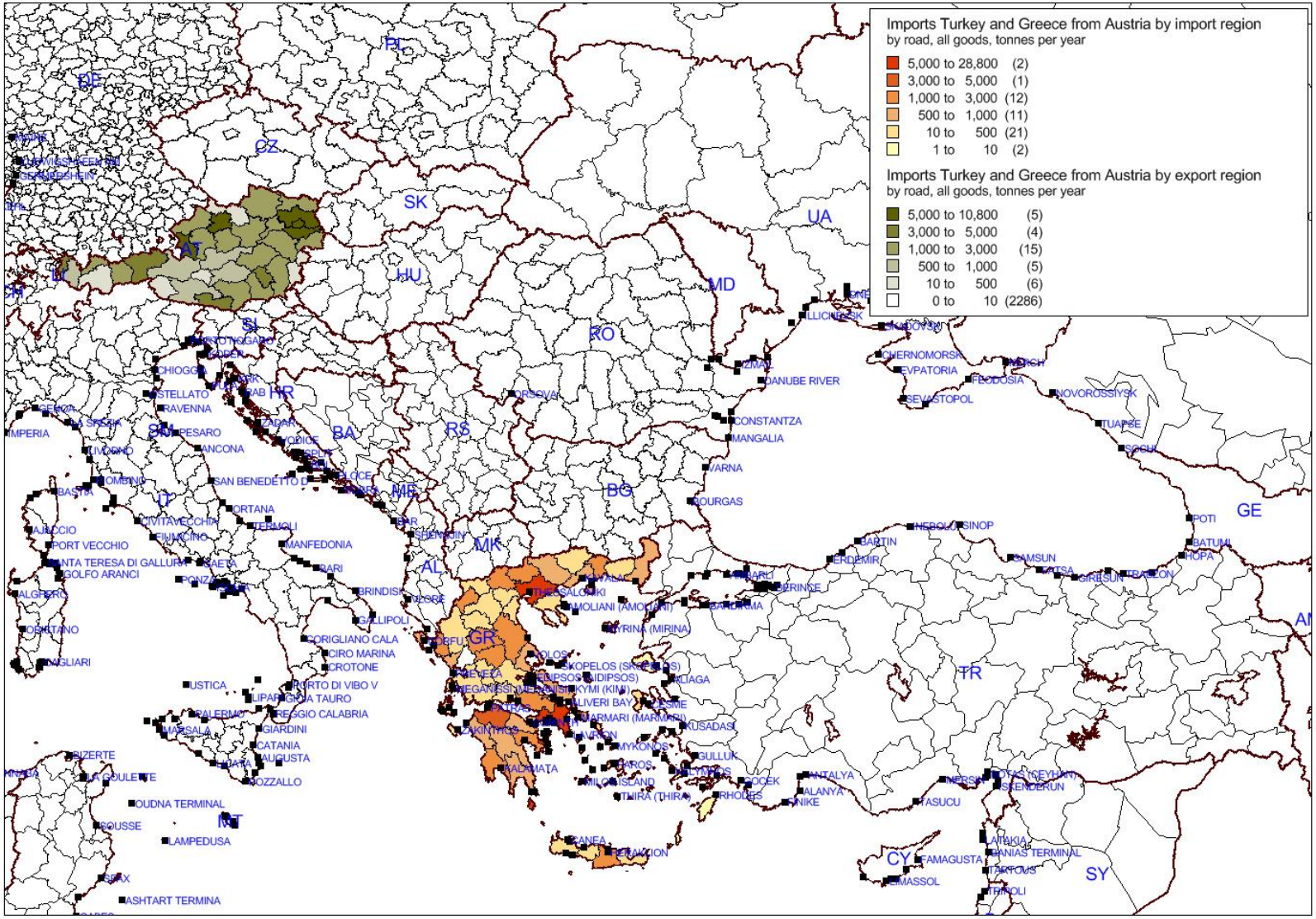
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	9919.2
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	0
GT04	Food products, beverages and tobacco	22575.3
GT05	Textiles and textile products; leather and leather products	3653.6
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	6002.4
GT07	Coke and refined petroleum products	3574.1
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	0
GT09	Other non-metallic mineral products	4762.0
GT10	Basic metals; fabricated metal products, except machinery and equipment	3518.4
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	6038.0
GT12	Transport equipment	0
GT13	Furniture; other manufactured goods n.e.c.	6119.6
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	2348.4
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	1104.0
GT18	Grouped goods: a mixture of types of goods which are transported	16261.2
GT19	Unidentifiable goods: goods which for any reason cannot be identified	1089.7
GT20	Other goods n.e.c.	0
Total	**ALL GOODS**	**86965.9**

The related imports and exports by region for all goods is shown in Figure 50 hereunder.

The total freight volumes exported by road from the regions of hinterland 7 Austria to Greece are relatively high, counting almost 87 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 7 Austria is quite low as the direct road route from Greece to Austria is much shorter, and there is a possible alternative route considering the maritime links of Adriatic Sea.

Figure 50 Imports Turkey and Greece by road from Hinterland 7 Austria, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 8 Czech Republic

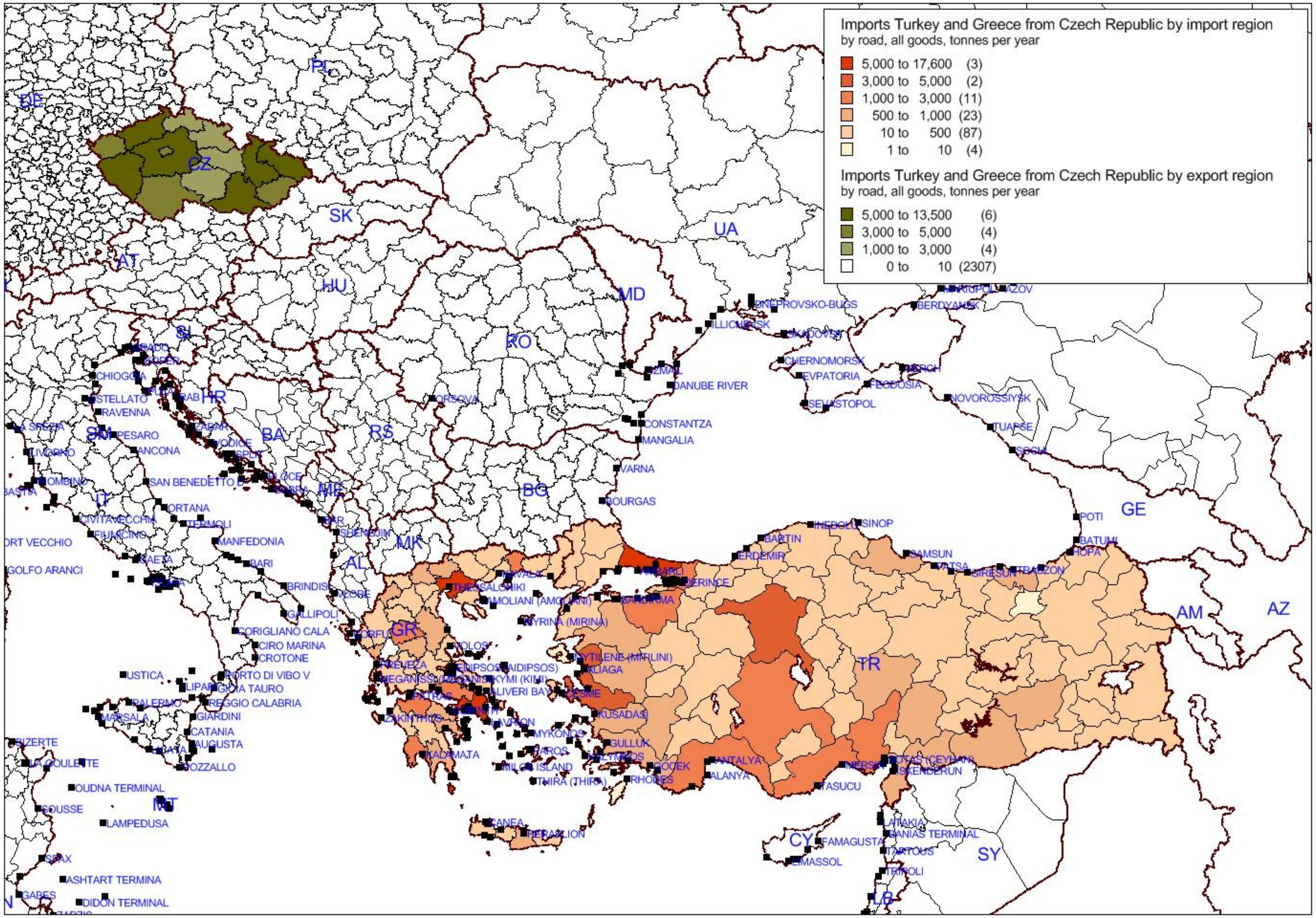
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	7201.0
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	0
GT04	Food products, beverages and tobacco	7171.9
GT05	Textiles and textile products; leather and leather products	1474.6
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	5015.7
GT07	Coke and refined petroleum products	0
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	16511.6
GT09	Other non-metallic mineral products	6804.8
GT10	Basic metals; fabricated metal products, except machinery and equipment	9350.1
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	8808.5
GT12	Transport equipment	2356.8
GT13	Furniture; other manufactured goods n.e.c.	2334.1
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	1491.2
GT16	Equipment and material utilized in the transport of goods	0
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	13757.2
GT19	Unidentifiable goods: goods which for any reason cannot be identified	3297.5
GT20	Other goods n.e.c.	1330.9
Total	**ALL GOODS**	**86905.9**

The related imports and exports by region for all goods is shown in Figure 51 hereunder.

The total freight volumes exported by road from the regions of hinterland 8 Czech Republic to Turkey and Greece are relatively high, counting almost 87 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 8 Czech Republic might be considered for Turkish related flows, but is quite low for the Greek related flows as the direct road route from Greece to Czech Republic is much shorter, and there is a possible alternative route considering the maritime links of Adriatic Sea.

Figure 51 Imports Turkey and Greece by road from Hinterland 8 Czech Republic, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

Hinterland 9 Slovakia and Hinterland 11 Baltic countries

There are not direct road flows registered in the databases for imports of Turkey and Greece from hinterland 9 and 11.

Hinterland 10 Poland

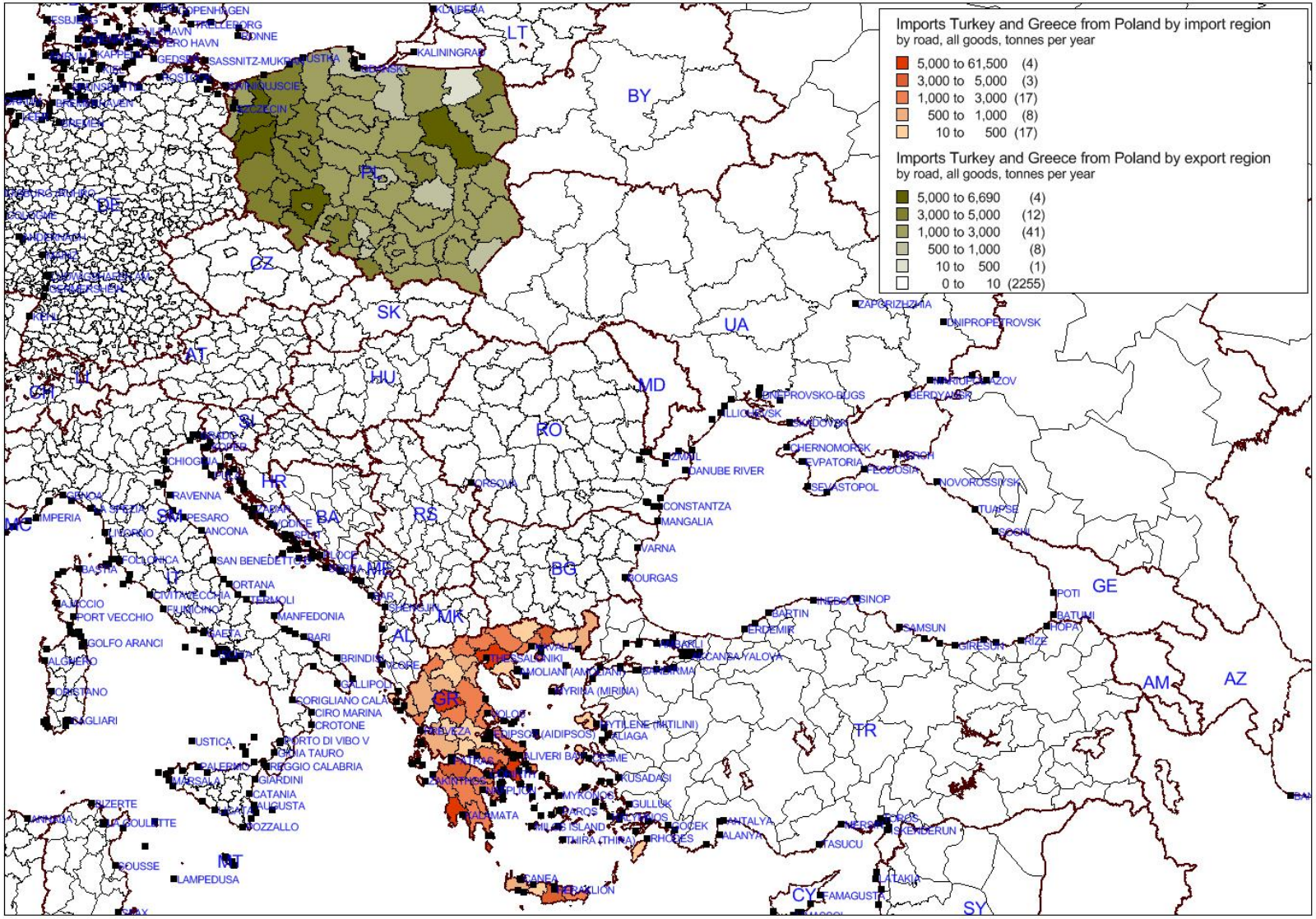
Type of goods, NST07		Tonnes per year by road
GT01	Products of agriculture, hunting, and forestry; fish and other fishing products	42882.1
GT02	Coal and lignite; crude petroleum and natural gas	0
GT03	Metal ores and other mining and quarrying products; peat; uranium and thorium	0
GT04	Food products, beverages and tobacco	15851.7
GT05	Textiles and textile products; leather and leather products	
GT06	Wood and products of wood and cork (except furniture); articles of straw and plaiting materials;	8784.8
GT07	Coke and refined petroleum products	0
GT08	Chemicals, chemical products, and man-made fibers; rubber and plastic products ; nuclear fuel	8844.3
GT09	Other non-metallic mineral products	41996.0
GT10	Basic metals; fabricated metal products, except machinery and equipment	1155.5
GT11	Machinery and equipment n.e.c.; office machinery and computers; electrical machinery and apparatus n.e.c.; radio, television and communication equipment and apparatus; medical, precision and optical instruments; watches and clocks	18332.1
GT12	Transport equipment	604.4
GT13	Furniture; other manufactured goods n.e.c.	2792.5
GT14	Secondary raw materials; municipal wastes and other wastes	0
GT15	Mail, parcels	0
GT16	Equipment and material utilized in the transport of goods	0
GT17	Goods moved in the course of household and office removals; baggage and articles accompanying travellers; motor vehicles being moved for repair; other non-market goods n.e.c.	0
GT18	Grouped goods: a mixture of types of goods which are transported	2052.1
GT19	Unidentifiable goods: goods which for any reason cannot be identified	0
GT20	Other goods n.e.c.	2656.8
Total	**ALL GOODS**	**145952.3**

The related imports and exports by region for all goods is shown in Figure 52 hereunder.

The total freight volumes exported by road from the regions of hinterland 10 Poland to Greece are quite high, counting almost 146 thousand tonnes per year.

The probability to shift the road related flows to the maritime line from the Black Sea ports to Galati for hinterland 10 Poland is relatively low but it will be analysed further in Phase 2.

Figure 52 Imports Turkey and Greece by road from Hinterland 10 Poland, all goods, tonnes per year



Source: AV TRANSPORT PLANNING SRL with ETIS PLUS 2010 data

6.4. Detailed Analysis of Corridor 3

For the detailed analysis of Corridor 3 the TRANSTOOLS information has been considered, as it is more consistent for countries located in East of Europe and West of Asia.

The structure of the database is a bit different of the ETIS PLUS one.

The type of goods are as follows:

Code	Commodity group
0	Agricultural products
1	Foodstuffs
2	Solid mineral fuels
3	Crude oil
4	Ores, metal waste
5	Metal products
6	Building minerals & material
7	Fertilisers
8	Chemicals
9	Machinery & other manufacturing
10	Petroleum products

The zoning system is between NUST2 and NUTS1 level. Countries as Romania and Ukraine are represented at the country level.

The transport modes are the same as in ETIS PLUS database, as follows:

Code	Mode
1	Road
2	Rail
3	Inland Waterways
4	Sea
8	Other
9	Unknown

The analysis was focused on the following countries: Austria, Poland and Hungary on one side and on the other side Azerbaijan, Kazakhstan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan.

6.4.1. Imports of the Galati hinterland countries from Azerbaijan, Kazakhstan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

AUSTRIA

Austrian imports from Azerbaijan and Kazakhstan counts for 1.889 thousand tonnes in year 2005, following TRANS-TOOLS. Most of the imports counting 1.868 thousand tonnes per year are represented by crude oil. As crude oil is very specialised and requires specific organisation of hinterland transport it is not the case to consider it for potential modal shifts through Galati.

Good	Tonnes per year
0	3,279
3	1,868,019
5	3,699
8	739
9	1,016
10	12,218
Total	**1,888,970**

POLAND

Imports from Azerbaijan and Kazakhstan

The Polish imports from Azerbaijan and Kazakhstan counts almost 1.5 million tonnes in year 2005, following TRANS-TOOLS. Most of the imports counting 1.487 thousand tonnes per year are from Kazakhstan. The distribution of these imports by category of goods is shown in the table hereunder:

Good	Tonnes per year
0	23,377
2	89,109
3	479,156
4	618
5	26,061
8	21,847
10	847,206
Total	**1,487,374**

The analysis will focus further on category of goods 10 Petroleum products, the imports of these goods counting 847 thousand tonne per year.

Mode at Origin is 4 - sea for all the imports of this category of goods. The transhipment location and the hinterland mode at destination are shown in the table hereunder:

Transhipment region/country	Transport mode at destination	Tonnes per year
unknown -1	4 sea	55,203
	Total	55,203
3080000 Germany Mecklenburg-Vorpommern	2 rail	39
	Total	**39**
20000000 Lithuania	1 road	54
	Total	**54**
23001100 Poland Pomeranian	1 road	90,405
	2 rail	21,281
	3 inland water	24,854
	Total	**136,540**
23001600 Poland West Pomeranian	1 road	85,329
	2 rail	64,396
	3 inland water	2,185
	Total	**151,910**
24000000 Slovenia	1 road	12,645
	2 rail	1,867
	Total	**14,512**
33000000 Croatia	1 road	76
	Total	**76**
38000000 Romania	1 road	247
	2 rail	4,588
	Total	**4,835**
39000000 Russian Federation	1 road	21,520
	2 rail	202
	Total	**21,722**
42000000 Ukraine	1 road	169,159
	2 rail	293,156
	Total	**462,315**
Total	1 road	379,435
	2 rail	385,529
	3 inland water	27,039
	4 sea	55,203
	Total	**847,206**

From the above table it is observed that 462 thousand tonnes – more than 50% of Polish imports from Kazakhstan, are transhipped in Ukraine and then goods are transported by road – 169 thousand tonnes, and by rail – 293 thousand tonnes to Poland.

Only 4.8 thousand tonnes are transhipped in Romania and transported mostly by rail to Poland.

From the total imports 288 thousand tonnes are transhipped in Poland and then transported by road, rail and inland waterway to the destination region.

Imports from Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

The Polish imports from Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan counts almost 530 thousand tonnes in year 2005, following TRANS-TOOLS. The distribution of these imports by category of goods is shown in the table hereunder:

Good	Tonnes per year
0	16,403
1	329
5	4,145
8	5,038
9	1,960
10	499,973
Total	**527,848**

The analysis will focus further on category of goods 10 Petroleum products, the imports of these goods counting 500 thousand tonne per year.

Mode at Origin is 4 - sea for all the imports of this category of goods. The transhipment location and the hinterland mode at destination are shown in the table hereunder:

Transhipment region/country	Transport mode at destination	Tonnes per year
-1 unknown	4	9,791
	Total	**9,791**
23001600 Poland West Pomeranian	1	15
	Total	15
38000000 Romania	2 Rail	10,264
	Total	**10,264**
42000000 Ukraine	1 Road	153,779
	2 Rail	326,124
	Total	**479,903**
Total	1	153,794
	2	336,388
	4	9,791
	Total	**499,973**

From the above table it is observed that 480 thousand tonnes – more than 90% of Polish imports from the selected countries, are transhipped in Ukraine and then goods are transported by road – 154 thousand tonnes, and by rail – 326 thousand tonnes to Poland.

Only 10 thousand tonnes are transhipped in Romania and transported by rail to Poland.

HUNGARY

Imports from Azerbaijan and Kazakhstan

The Hungarian imports from Kazakhstan counts 263 thousand tonnes per year. There are no imports registered from Azerbaijan. The distribution of the imports from Kazakhstan by category of goods is shown in the table hereunder:

Good	Tonnes
0	1,080
2	32,608
8	1,276
10	227,712
Total	**262,676**

It is observed that most imports of Hungary from Kazakhstan consist of category of goods 10 Petroleum products.

Mode at Origin is 4 - sea for all the imports of this category of goods. The transhipment location and the hinterland mode at destination are shown in the table hereunder:

Transhipment region/country	Transport mode at destination	Tonnes per year
10030300 Italy Friuli-Venezia Giulia	1 road	240
	Total	**240**
23001100 Poland Pomeranian	1 road	1,078
	2 rail	113
	Total	**1,191**
24000000 Slovenia	1 road	58,581
	2 rail	10,355
	Total	**68,936**
29000000 Bulgaria	1 road	2,247
	Total	**2,247**
33000000 Croatia	1 road	10,702
	2 rail	62
	Total	**10,764**
38000000 Romania	1 road	93,981
	2 rail	686
	Total	**94,667**
39000000 Russian Federation	1 road	31,940
	2 rail	14,757
	Total	**46,697**
42000000 Ukraine	1 road	2,113
	Total	**2,113**
43000000 Serbia & Montenegro	1 road	26
	2 rail	831
	Total	**857**
Total	1 road	200,908
	2 rail	26,804
	Total	**227,712**

From the above table it is observed that almost 50% of this category of goods – 95 thousand tonnes, is transhipped in Romania and then goods are transported by truck to Hungary.

Imports from Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

The Hungarian imports from Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan counts 508 thousand tonnes per year. The distribution of the imports by category of goods is shown in the table hereunder:

Good	Tonnes
0	3,174
5	15,246
10	489,447
Total	**507,867**

It is observed that most imports of Hungary from the selected countries consist of category of goods 10 Petroleum products.

Mode at Origin is 4 - sea for all the imports of this category of goods. The transhipment location and the hinterland mode at destination are shown in the table hereunder:

Transhipment region/country	Transport mode at destination	Tonnes per year
24000000 Slovenia	1 Road	61,859
	2 Rail	15,786
	Total	**77,645**
29000000 Bulgaria	1 Road	3,829
	Total	**3,829**
33000000 Georgia	1 Road	1,238
	Total	**1,238**
38000000 Romania	1 Road	394,666
	2 Rail	3,102
	Total	**397,768**
42000000 Ukraine	1 Road	8,967
	Total	**8,967**
Total	1 Road	470,559
	2 Rail	18,888
	Total	**489,447**

From the above table it is observed that 80% of this category of goods – 398 thousand tonnes, is transhipped in Romania and then 98% of the goods are transported by truck to Hungary.

Conclusions on imports of Hungary and Poland from Azerbaijan, Kazakhstan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan of the category of goods 10 Petroleum products

Regarding the possibility of attracting (part of) these flows through Galati, this would be possible if the oil terminal in Galati would fulfil the following conditions:

- It does has a valid licence;
- It has sufficient storing capacity for the specific petroleum products to be transhipped. For this it is also necessary to make an assessment of the technical state of the actual storing units and an estimation of the costs of the eventual repair or renewal costs in order to make an accurate assessment if a part of the potential traffic can be taken over and what would be the quantity of it.

GERMANY

Imports of Germany from Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

The total imports of Germany from Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan, by category of goods, in tonne per year, are shown in the table hereunder:

Category of goods		**Tonnes per year**
0	Agricultural products	42,142
1	Foodstuffs	12,370
2	Solid mineral fuels	0
3	Crude oil	0
4	Ores, metal waste	84,022
5	Metal products	48,532
6	Building minerals & material	0
7	Fertilizers	0
8	Chemicals	34,843
9	Machinery & other manufacturing	28,653
10	Petroleum products	2,657
Total		253,219

The total imports of Germany to Far East countries are of 253 thousand tonnes in 2005. Most of the exports consists of category of goods 4 Ores, metal waste, which counts for some 30% of the total imports with a volume of 84 thousand tonnes per year.

6.4.2. *Exports of the Galati hinterland countries to Azerbaijan, Kazakhstan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan*

Exports from Estonia, Hungary, Lithuania, Latvia, Poland, Slovenia and Slovakia to Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

The export side on the relation Central Europe – Far East countries has been also analysed. Even if the flows are not very high, there is a specific potential that can be attracted to a new route including the new maritime regular service.

Thus, the total exports from Estonia, Hungary, Lithuania, Latvia, Poland, Slovenia and Slovakia to Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan are shown hereunder by export country, in tonne per year:

Origin country	Tonnes per year
Estonia	19,585
Hungary	38,234
Lithuania	151,996
Latvia	34,741
Poland	318,886
Slovenia	4,289
Slovakia	15,846
Total	**583,577**

The distribution by categories of goods is as follows:

Category of goods		Tonnes per year
0	Agricultural products	2,363
1	Foodstuffs	229,737
2	Solid mineral fuels	13,678
3	Crude oil	0
4	Ores, metal waste	50,477
5	Metal products	9,510
6	Building minerals & material	18,941
7	Fertilizers	0
8	Chemicals	25,864
9	Machinery & other manufacturing	226,257
10	Petroleum products	6,750
Total		**583,577**

The route of the above exports is mostly by a land mode to Ukraine or Russian and the by sea to a port in Georgia, from where the goods are transported by road or rail to destination.

It is considered that part of those goods can be shifted to the new maritime route through Galati.

Exports from Germany to Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

The total exports from Germany to Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan, by category of goods, in tonne per year, are shown in the table hereunder:

Category of goods		Tonnes per year
0	Agricultural products	397,549
1	Foodstuffs	61,312
2	Solid mineral fuels	0
3	Crude oil	0
4	Ores, metal waste	0
5	Metal products	768,496
6	Building minerals & material	15,256
7	Fertilizers	96,739
8	Chemicals	136,195
9	Machinery & other manufacturing	749,037
10	Petroleum products	15,863
Total		**2,240,447**

The total exports of Germany to Far East countries are of 2.2 million tonnes in 2005. Most of the exports consists of category of goods 9 Machinery & other manufacturing, which counts for some 30% of the total exports with a volume of 749 thousand tonnes per year.

The route of the above exports is mostly via German ports (230 thousand tonnes), Italy (almost 300 thousand tonnes), Slovenia (almost 460 thousand tonnes), Bulgaria (200 thousand tonnes), Romania (254 thousand tonnes) and Ukraine (355 thousand tonnes).

It is considered that part of those goods can be shifted to the new maritime route through Galati if the hinterland connections to Germany, especially by rail, will be improved in the near future. The condition here is to finalise the up-grading of the rail links that are part of the Trans European network as shown in the figure hereunder.


TRANS-EUROPEAN TRANSPORT NETWORK
Comprehensive Network: Railways, ports and rail-road terminals (RRT)
Core Network: Railways (freight), ports and rail-road terminals (RRT)
BE BG CZ DK DE EE IE EL ES FR HR IT CY LV LT LU HU MT NL AT PL PT RO SI SK FI SE UK
9
Chisinau
Beograd
Pristina
Skopje
Tirana
Bucuresti
Constanta
Sofia
Plovdiv
Varna
Burgas
Craiova
Timisoara
Cluj-Napoca
Brasov
Sibiu
Galati
Ruse
Giurgiu
Ploiesti
0
95
190
km
Comprehensive
Core
Conventional rail / Completed
Conventional rail / To be upgraded
Conventional rail / Planned
High speed rail / Completed
To be upgraded to high speed rail
High speed rail / Planned
Ports
RRT
TENtec

6.4.3. Data and information from the market study

Data and information from the market study was considered for the specific costs for the hinterland transport and also for the estimation of the direct road cost of transport from Turkey and Greece to the designed hinterlands of Galati.

6.5. Identification of the optimal solutions from the perspective of route, transport capacity, ship's type, call ports/intermodal terminal characteristics, costs, administrative procedures

6.5.1. Background

The following conditions needs to be satisfied by the freight transport:

- Transport means should be available in relation with the frequency of freight delivery and the freight volumes assigned to each transport;
- Transport time should be as short as possible;
- Safety of the transport needs to be as high as possible;
- Price per ton shall be as low as possible.

Considering the above criteria it is concluded that water transport is the most feasible from the perspective of price, safety, and can accommodate large volumes of freight compared with road transport. However, road transport has the advantage from the perspective of transport time and can be considered for small quantities of freight, in most cases for foodstuff.

The organisation of transport has a high importance, beside the cost. As mentioned above, the transport time will increase in the case of water transport. Due to this aspect is also important to evaluate the possibilities to reduce the time of different stages of the transport:

1) Inside transhipment locations (ports):

- Increase the efficiency by implementing intermodal facilities in ports and new technologies mainly focused on reducing the in-out times;
- Elimination of the waiting time during the in-out process by establishing a free operation berth correlated with the vessel arrival and departure schedule;
- Secure a high loading/unloading rate;
- Secure the transport means for the hinterland routes of the port to / from the final destination / beneficiary;
- Ensure the specialised storage spaces;
- Reduce the duration of the administrative checks (especially for containers).

Costs model for Intermodal Transport

In order to determine the competitiveness of the Port of Galati, compared to neighbouring seaports Constanta (RO) and Odessa (UA), a cost model for Intermodal Transport has been developed. Port dues and Pilotage Fees are one of the drivers within this cost model, besides of the basis marine costs such as fuel, capital costs and personnel costs, specific terminal costs for loading/unloading operations.

Based on the existing cargo flows between various hinterlands in Europe (Eastern Europe, the Baltics, Germany, Austria, Hungary, Czech Republic) on one hand, and Greece, Turkey, North Africa and countries around Caspian Sea on the other hand, a comparison has been made between the direct road transport costs (where this is available on the continental network) and the intermodal costs (including maritime services) between these countries.

Furthermore, intermodal connections have been added to Belgrade, Budapest and Vienna on inland waterway and rail, and for Prague, Warsaw, Nürnberg, Duisburg and Hamburg by rail. This way, the attractiveness of intermodal solutions for transport between the various origins and destinations of cargo could be determined.
The model includes two scenarios concerning the hinterland links for the three seaports. In the basis scenario, rail connections to the hinterlands are only available for Galati and IWT connections are only available at the ports of Galati and Constanta. In the other scenario, all three seaports offer the same hinterland connections to the relevant hinterlands.

As port dues and pilotage fees are one of the cost drivers in this model for maritime and intermodal transport, we can vary them in order to determine their effect on the competiveness of the Port of Galati. We have assumed that Galati is able to attract flows between the distinguished hinterlands only if the transhipment costs are lower than:
1) the transhipment via the neighbouring ports and
2) the direct road transport between the origin and destination.
Based on this information, the cargo volume that can be attracted by the port of Galati can be decided and thus, the feasibility of a several maritime cargo lines can be determined. In this model, three maritime lines have been considered:

- Mersin – Piraeus – Istanbul – Galati
- Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati
- Poti (Georgia) – Samsun – Galati

6.5.2. Choice of the vessel and estimation of specific cost components

For the choice of the vessel the current used type of vessels in maritime transport in Europe have been considered. For this, data from the following source has been considered: http://www.schonescheepvaart.nl/downloads/rapporten/doc_1361789985.pdf

Following this analysis the Lo-Lo vessel type has been considered. This vessel is described as: *"Medium to long range ship serving container ports; Carrying capacity between 500 and 700 TEUs"*

In the above mentioned report, the Costs Breakdown of the Lo-Lo vessel is provided, as shown in the Table 6.1 hereunder (Table 4, page 33 of the above mentioned source):

Table 6.1 Cost structure by type of vessel of SSS in Europe

Cost Structure (€/day)				
Ship Type	LoLo	RoRo	RoPax-Small	RoPax-Large
Size (TEUs & Trailers)	600 TEUs	200 Trailers	40 Trailers	290 Trailers
Guide DWT	11,000	10,000	3,000	12,000
Manning	€1,588	€1,901	€3,300	€7,500
Insurance	€313	€443	€300	€1,500
Repairs & Maintenance	€802	€1,382	€1,000	€3,300
Stores & Lube Oil	€351	€328	€3,800	€6,000
Administration	€504	€870	€1,000	€2,700
Capital Repayments	€2,189	€7,960	€3,476	€14,945
Interest	€1,799	€6,543	€2,857	€12,286
Gross Margin	€1,283	€3,302	€2,675	€8,199
Port	€1,200	€3,000	€850	€6,000
Fuel (Ton/day)	28.0	37.9	7.0	53.3
Fuel (€/day)	€8,924	€12,079	€2,231	€16,987
Speed (knots)	14.0	17.5	8.0	22.0
Full Cargo Weight (Ton)	7,200	2,800	1,000	7,250
Total (€/day)	**€18,952**	**€37,807**	**€21,488**	**€79,417**

Source: *COMPASS The COMPetitiveness of EuropeAn Short-sea freight Shipping compared with road and rail transport, Final Report 2010*

Based on the above information, the yearly costs of the vessel have been estimated for the specific cost items of interest for the cost model applied in the current project. This was done by multiplying these by 365. The results are shown in the table below.

Cost structure, € / year for the Lo-Lo vessel type		
Manning	€	579.620
Insurance	€	114.245
Depreciation	€	798.985
Interest	€	656.635
Maintenance	€	420.845
Other	€	652.255
Total	**€**	**3.222.585**

It has been assumed that the vessel would be active at least 5.040 hours a year. In the other hours, it is loading/unloading or repairing. We have assumed half of the maintenance to be due to sailing the vessel and the other 50% to be the result of natural breakdown.

The costs of loading/unloading are thus equal to the sum of all costs components, with the one and only exception of maintenance, which is 50%. We have divided this total costs by the amount of operating hours a year, being about 11 months in general and thus, 8400 hours.

For the costs of sailing, without considering the fuel, we have added another 50% and divided this amount of money by the amount of sailing hours a year. We have estimated that as around 5040 a year. This way, sailing the vessel will cost € 400,34 an hour and loading/unloading will be € 358,59.

Further on, the yearly costs have been estimated as follows:

Navigating costs = number of hours * 400,34

Fuel costs = number of hours * 580 € for oil * 28 tons a day * hours/24

Passing locks costs = number of hours * €458,59

Loading /unloading costs = number of hours * €458,59

Port dues: dependent on rate per port and DWT (11.000), regularity issues and Pilotage costs.
In general, most port dues were 0,155 € per DWT. These have been divided by two, one for the inbound service and one for the outbound service.

Based on the above data, the costs per line are as follows:

Mersin – Piraeus – Istanbul –Galati maritime line

Service

Single trip, based on 60% load.					
		Mersin - Piraeus	**Piraeus - Istanbul**	**Istanbul - Galati**	**Total**
Sailing time	[hours]	59,60	32,20	33,85	125,65
Passage of locks	[hours]	0,00	0,00	2,00	2,00
Unloading	[hours]	13,24	1,76	13,24	28,24
Total time	**[hours]**	**72,84**	**33,96**	**49,09**	**155,89**
Costs navigating	[€]	€ 23.860	€ 12.891	€ 13.552	€ 50.303
Costs fuel	[€]	€ 40.329	€ 21.789	€ 22.905	€ 85.023
Costs locks	[€]	€ -	€-	€ 1.414	€1.414
Costs loading / unloading	[€]	€4.746	€ 633	€ 4.746	€ 10.125
Port dues and pilotage	[€]	€ -	€-	€ 6.252	€6.252
Total costs	**[€]**	**€ 68.936**	**€ 35.312**	**€ 48.869**	**€ 153.118**
Costs per TEU (13,5 t per TEU)	**[€]**	**€ 164,13**	**€ 84,08**	**€ 135,75**	**€ 383,96**

Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati maritime line

Table 6.2 Specific cost structure for the Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati maritime line

Roundtrip (based on 70% loaded)						
		Port Said - Izmir	Izmir - Thessaloniki	hessaloniki - Istanbu	Istanbul - Galati	Totaal
Sailing time	[u]	120,49	48,45	60,51	68,44	177,40
Locks	[u]	0,00	0,00	0,00	4,00	4,00
Loading / unloading	[u]	26,47	8,82	8,82	26,47	44,12
Total time	**[u]**	**146,96**	**57,27**	**69,33**	**98,91**	**299,00**
Sailing costs	[€]	€ 48.237	€ 19.397	€ 24.225	€ 27.399	€ 71.021
Fuel	[€]	€ 81.532	€ 32.785	€ 40.945	€ 46.311	€ 120.041
Locks	[€]	€ -	€ -	€ -	€ 2.828	€ 2.828
Loading / unloading	[€]	€ 9.492	€ 3.164	€ 3.164	€ 9.492	€ 15.820
Port dues / Pilotage	[€]	€ 2.932	€ 2.932	€ 2.932	€ 12.998	€ 18.863
Total costs	**[€]**	**€ 142.193**	**€ 58.277**	**€ 71.266**	**€ 99.029**	**€ 228.573**
Costs per TEU	**[€]**	**€ 169,28**	**€ 69,38**	**€ 84,84**	**€ 117,89**	**€ 272,11**

Where: u = hour

Poti (Georgia) – Samsun – Galati maritime line

Table 6.3 Specific cost structure for the Poti (Georgia) – Samsun – Galati maritime line

Roundtrip (based on 70% load)				
		Poti - Samsun	Samsun - Inebolu	Totaal
Sailing time	[u]	46,10	85,58	131,68
Locks	[u]	0,00	0,00	0,00
Loading / unloading	[u]	26,47	3,53	30,00
Total time	**[u]**	**72,57**	**89,11**	**161,68**
Sailing costs	[€]	€ 18.456	€ 34.261	€ 52.717
Fuel	[€]	€ 31.194	€ 57.909	€ 89.103
Locks	[€]	€ -	€ -	€ -
Loading / unloading	[€]	€ 9.492	€ 1.266	€ 10.758
Port dues / Pilotage	[€]	€ -	€ 12.998	€ 12.998
Total costs	**[€]**	**€ 59.142**	**€ 99.935**	**€ 159.077**
Costs per TEU	**[€]**	**€ 70,41**	**€ 118,97**	**€ 189,38**

Where: u = hour

Further on, the single trip costs by rail and inland waterways from Galati to specific hinterlands are shown hereunder.

Table 6.4 Specific cost structure for the Galati – Warschau and Galati – Prague rail transport

Costs breakdown Rail Transport			Costs breakdown rail transport		
		Galati - Warschau			Galati - Prague
Travel time	[u]	33,97	Travel time	[u]	31,87
(Un)loading time	[u]	2,68	(Un)loading time	[u]	2,68
Totale tijd	**[u]**	**36,66**	**Totale tijd**	**[u]**	**34,56**
Labour	[€]	€ 221	Labour	[€]	€ 256
Capital	[€]	€ 15.879	Capital	[€]	€ 15.098
Energy / Fuel	[€]	€ 8.055	Energy / Fuel	[€]	€ 7.602
Loading / Unloading	[€]	€ 3.600	Loading / Unloading	[€]	€ 3.600
Infrastructure charges	[€]	€ 8.171	Infrastructure charges	[€]	€ 6.902
Total costs	**[€]**	**€ 35.926**	**Total costs**	**[€]**	**€ 33.458**
Costs per TEU	**[€]**	**€ 598,76**	**Costs per TEU**	**[€]**	**€ 557,63**

Where: u = hour, Totale tijd = total time

Table 6.5 Specific cost structure for the Galati – Budapest and Galati – Vienna inland waterway transport

Upstream				
		Galati - Budapest	Budapest - Vienna	Totaal
Sailing time	[u]	182,75	35,75	218,50
Passage of locks	[u]	3,00	3,00	6,00
Loading / unloading	[u]	13,76	13,76	27,53
Totale tijd	**[u]**	**199,51**	**52,51**	**252,03**
Capital costs	[€]	€ 29.366	€ 5.745	€ 35.110
Fuel costs	[€]	€ 29.684	€ 5.807	€ 35.491
Costs locks	[€]	€ 474	€ 474	€ 947
Costs loading/unloading	[€]	€ 2.173	€ 2.173	€ 4.347
Port dues	[€]	€ -	€ -	€ -
Totale kosten	**[€]**	**€ 61.697**	**€ 14.199**	**€ 75.896**
Kosten per TEU	**[€]**	**€ 211,87**	**€ 48,76**	**€ 260,63**
Downstream				
		Galati - Budapest	Budapest - Vienna	Totaal
Sailing time	[u]	91,38	17,88	109,25
Passage of locks	[u]	3,00	3,00	6,00
Loading / unloading	[u]	18,35	18,35	36,71
Totale tijd	**[u]**	**112,73**	**39,23**	**151,96**
Capital costs	[€]	€ 14.683	€ 2.872	€ 17.555
Fuel costs	[€]	€ 6.361	€ 1.244	€ 7.605
Costs locks	[€]	€ 474	€ 474	€ 947
Costs loading/unloading	[€]	€ 2.898	€ 2.898	€ 5.796
Port dues	[€]	€ -	€ -	€ -
Totale kosten	**[€]**	**€ 24.415**	**€ 7.488**	**€ 31.904**
Kosten per TEU	**[€]**	**€ 83,84**	**€ 25,72**	**€ 109,56**

Where: u = hour, Totale tijd = total time

6.5.3. Optimal solutions from the perspective of route, transport capacity, ship's type, call ports/intermodal terminal characteristics, costs, administrative procedures

Optimal solutions from the perspective of route, transport capacity, ship's type, call ports / intermodal terminal characteristics, costs and administrative procedures are as follows.

6.5.3.1. Mersin – Piraeus – Istanbul –Galati maritime line

One first optimal solution for the new maritime line is Mersin – Piraeus – Istanbul – Galati route, and the specified call ports.

The total amount of cargo that could be attracted by Galati is 529.162 tonnes per year considering the port dues in Galati at the current level (100%).

The distribution of the total amount of cargo by country of Origin and/or Destination is shown in Table 6.6 hereunder.

Table 6.6 Amount of cargo that can be attracted by Galati and by the new maritime line service by Origin and Destination country

From (and v.v.)	To (and v.v.)	Flows (tonnes / year)
Austria	Greece	86.965
Czech Republic	Greece	46.829
Hungary	Greece	62.027
Poland	Greece	60.471
Romania	Greece	123.031
Czech Republic	Turkey	36.606
Hungary	Turkey	29.363
Poland	Turkey	0
Romania	Turkey	72,459
Austria	Turkey	0

As seen in Table 6.6, there is not much cargo originating from Turkey. This means it will not be feasible for the vessel to start its service from the port of Mersin (unless cargo from Mersin to Piraeus/Istanbul can be taken on board). A potential of 17.248 tons is lost. Most Turkish cargo can be collected from feeder services on the Southern part of the Black Sea. By not entering in Mersin, an extra, additional stop can be made in Thessaloniki. Further analysis on this will show the feasibility of this extra stop.

Under the assumption of **50% of the total potential** being shifted to the new service and a net weight of a container of 10 tons (excluding 3.5 tons own weight), 25.000 TEU will be collected from Greece and the northern part of Turkey. This means **500 TEU per week**. As a one-way trip from Piraeus to Galati takes 100 hours (90+10 to completely load the ship, as the service will start from Piraeus instead of Mersin), this will mean a large ship (600 TEU) can be exploited once every two weeks, including delays and repairs and a possible extra stop in Thessaloniki. This will be the minimum desired frequency by shippers and forwarders.

The total cost matrix is shown in the figure hereunder. In the cost matrix it is specified the transport cost for one container from Origin to Destination.

6.5.3.2. Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati and Poti (Georgia) – Samsun – Galati maritime lines

The amount of cargo that can be attracted by Galati for the two maritime lines for the current port dues and with or without Odessa / Constanta alternative transport chain are shown in Table 6.7 hereunder.

Table 6.7 Total amount of cargo that can be attracted by Galati from the Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati maritime line

Maritime line	**With hinterland transport Odessa/Constanta**			**Without hinterland transport Odessa / Constanta**		
	To Galati	***From Galati***	***Total***	***To Galati***	***From Galati***	***Total***
PORT SAID - IZMIR - THESSALONIKI - ISTANBUL - GALATI	2.383.375	5.020.224	7.403.599	2.935.772	5.037.195	7.432.967
POTI – SAMSUN - GALATI	291.450	1.965.781	2.257.230	2.213.850	2.622.169	4.836.019
TOTAL 2 Maritime Lines	2.674.825	6.986.005	9.660.829	5.149.622	7.659.364	12.268.986

It is estimated that the maximum potential flows that could be transhipped at the port of Galati is in the range of 9.6 - 12.3 million tons per year. The service to Turkey, Greece and finally Egypt brings 7.4 million tonnes of cargo to the port (no matter the hinterland services offered in the neighbouring ports), and the service to Poti brings in 2.2 – 4.8 million tons. Here, it can be observed that the hinterland connections compared to other ports are crucial in order to attract the cargo.

The distribution of hinterlands for each port of the maritime lines is as follows:

Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati

Port Said: Egypt

Izmir: Turkey 3, Greece 3, Greece 4

Thessaloniki: Greece 2

Istanbul: Greece 1, Turkey 4

Galati: Romania, Hungary, Austria, Poland, Czech Republic, Slovakia, Germany, Baltic countries

Specific hinterlands connections could be considered from Galati to Cahul in Moldova

Poti (Georgia) – Samsun – Galati

Poti: Georgia, Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

Samsun: Turkey 1, Turkey 2, Turkey 5

Galati: Romania, Hungary, Austria, Poland, Czech Republic, Slovakia, Germany, Baltic countries

A feeder service might be considered from Inebolu to Samsun

In Table 6.8 is shown the distribution of potential by Origin – Destination group of regions / countries for the two maritime lines that have been finally selected, considering 100% of the actual port taxes and pilotage taxes for Galati.

Further on, in Table 6.9 is shown the cost difference between direct road transport and the new transport chain including the new maritime lines.

Table 6.8 Distribution of potential by Origin – Destination group of regions / countries, 100% taxes level in Galati

Cargo flows transhipped in the Port of Galati (without hinterland options in Odeassa / Constanta)																								
	North-Africa	Romania1	Romania2	Romania3	Romania4	Romania5	Greece1	Greece2	Greece3	Greece4	Turkey1	Turkey2	Turkey3	Turkey4	Turkey5	Far East1	Far East2	Germany1	Germany2	Germany3	Austria	Czech Republic	Hungary	Poland	Baltic
North-Africa		-	96,047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	397,737	263,855	304,516	15,422	7,025	3,379	8,553	4,575
Romania1	-		-	-	-	-	-	8,205	16,971	23	2,296	2,474	3,216	6,780	1,808	-	-	-	-	-	-	-	-	-	-
Romania2	-	-		-	-	-	-	-	-	-	-	-	13,516	28,070	-	-	-	-	-	-	-	-	-	-	-
Romania3	515,332	-	-		-	-	-	-	-	-	-	-	4,977	10,207	-	-	-	-	-	-	-	-	-	-	-
Romania4	-	-	-	-		-	-	-	-	-	-	-	5,533	11,642	-	-	-	-	-	-	-	-	-	-	-
Romania5	-	-	-	-	-		-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-
Greece1	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	12,602	7,002	9,667	5,363	4,942	2,056	6,646	-
Greece2	-	12,773	-	-	-	-	-		-	-	-	-	-	-	-	-	-	186,030	97,491	134,500	48,454	60,920	34,917	87,732	-
Greece3	-	12,397	-	-	-	-	-	-		-	-	-	-	-	-	-	-	82,387	43,346	70,526	34,173	48,153	29,294	66,789	-
Greece4	-	11	-	-	-	-	-	-	-		-	-	-	-	-	-	-	22	13	45	9	128	76	63	-
Turkey1	-	320	-	-	-	-	-	-	-	-		-	-	-	-	-	-	2,710	2,891	5,120	-	-	-	17,351	-
Turkey2	-	479	-	-	-	-	-	-	-	-	-		-	-	-	-	-	4,670	3,527	6,971	-	-	-	17,902	-
Turkey3	-	815	7,197	2,113	2,426	42	-	-	-	-	-	-		-	-	-	-	6,402	4,502	9,115	-	-	9,319	21,663	-
Turkey4	-	2,444	19,125	5,796	6,454	182	-	-	-	-	-	-	-		-	-	-	13,483	8,765	18,314	-	-	17,322	40,657	-
Turkey5	-	505	-	-	-	-	-	-	-	-	-	-	-	-		-	-	3,603	2,490	4,945	-	-	-	11,685	-
Far East1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	18,757	19,635	18,728	-	4,338	-	12,434	3,462
Far East2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		52,976	64,588	78,535	-	69,434	-	1,541,190	244,603
Germany1	1,864,562	-	-	-	-	-	18,581	165,351	147,659	253	6,568	8,624	11,695	25,104	6,592	724,770	598,575		-	-	-	-	-	-	-
Germany2	375,885	-	-	-	-	-	7,238	69,657	61,470	98	4,498	5,103	6,737	14,142	3,854	104,073	142,839	-		-	-	-	-	-	-
Germany3	488,486	-	-	-	-	-	19,297	155,375	143,277	299	10,405	11,965	15,484	31,392	8,535	179,379	143,423	-	-		-	-	-	-	-
Austria	81,197	-	-	-	-	-	4,953	39,198	42,090	20	-	-	-	-	-	-	-	-	-	-		-	-	-	-
Czech Republic	-	-	-	-	-	-	3,183	17,757	25,710	28	7,414	6,715	7,613	13,491	4,048	-	25,795	-	-	-	-		-	-	-
Hungary	11,927	-	-	-	-	-	4,131	25,711	31,899	49	-	-	5,590	9,314	-	-	-	-	-	-	-	-		-	-
Poland	277,897	-	-	-	-	-	6,859	48,627	90,048	83	-	-	-	-	-	74,737	318,886	-	-	-	-	-	-		-
Baltic	43,299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23,235	206,322	-	-	-	-	-	-	-	

Table 6.9 Cost difference between direct road transport and the new transport chain including the new maritime lines, Euro/TEU

Cost differences new transport chain / road transport (per TEU)	North-Africa	Romania1	Romania2	Romania3	Romania4	Romania5	Greece1	Greece2	Greece3	Greece4	Turkey1	Turkey2	Turkey3	Turkey4	Turkey5	Far East1	Far East2	Germany1	Germany2	Germany3	Austria	Czech Republic	Hungary	Poland	Baltic
North-Africa	€ -3,366	€ 2,248	€ 1,914	€ 1,942	€ 2,007	€ 1,991	€ 1,495	€ 1,977	€ 2,040	€ 1,646	€ -240	€ -444	€ 1,052	€ 1,241	€ 571	€ 4,624	€ 1,864	€ 3,110	€ 3,100	€ 3,455	€ 2,863	€ 2,745	€ 2,552	€ 2,639	€ 2,390
Romania1	€ 2,248						€ -38	€ 89	€ 7	€ 140	€ 362	€ 824	€ 777	€ 392	€ 532	€ 2,578	€ 2,703								
Romania2	€ 1,914						€ -432	€ -297	€ -367	€ -241	€ 29	€ 495	€ 443	€ 44	€ 193	€ 2,756	€ 2,811								
Romania3	€ 1,942						€ -370	€ -403	€ -485	€ -247	€ 54	€ 530	€ 470	€ 91	€ 228	€ 2,297	€ 2,551								
Romania4	€ 2,007						€ -319	€ -520	€ -592	€ -299	€ 119	€ 590	€ 535	€ 155	€ 292	€ 2,775	€ 2,976								
Romania5	€ 1,991						€ -330	€ -496	€ -568	€ -290	€ 105	€ 567	€ 520	€ 136	€ 275	€ 2,774	€ 2,868								
Greece1	€ 1,495	€ -38	€ -432	€ -370	€ -319	€ -330										€ 2,984	€ 1,733	€ 1,728	€ 1,765	€ 2,269	€ 1,373	€ 615	€ 391	€ 574	€ 379
Greece2	€ 1,977	€ 89	€ -297	€ -403	€ -520	€ -496										€ 3,139	€ 2,049	€ 1,501	€ 1,513	€ 2,038	€ 1,154	€ 415	€ 186	€ 601	€ 534
Greece3	€ 2,040	€ 7	€ -367	€ -485	€ -592	€ -568										€ 3,048	€ 1,959	€ 1,235	€ 1,612	€ 2,137	€ 1,183	€ 355	€ 137	€ 564	€ 511
Greece4	€ 1,646	€ 140	€ -241	€ -247	€ -299	€ -290										€ 3,173	€ 1,757	€ 1,838	€ 1,856	€ 2,379	€ 1,447	€ 638	€ 423	€ 765	€ 602
Turkey1	€ -240	€ 362	€ 29	€ 54	€ 119	€ 105										€ 2,679	€ -0	€ 1,640	€ 1,640	€ 2,056	€ 1,324	€ 1,185	€ 925	€ 1,094	€ 932
Turkey2	€ -444	€ 824	€ 495	€ 530	€ 590	€ 567										€ 3,164	€ 405	€ 2,154	€ 2,155	€ 2,571	€ 1,837	€ 1,696	€ 1,440	€ 1,608	€ 1,445
Turkey3	€ 1,052	€ 777	€ 443	€ 470	€ 535	€ 520										€ 3,739	€ 1,382	€ 2,030	€ 2,032	€ 2,448	€ 1,714	€ 1,578	€ 1,316	€ 1,485	€ 1,322
Turkey4	€ 1,241	€ 392	€ 44	€ 91	€ 155	€ 136										€ 3,363	€ 1,514	€ 1,545	€ 1,547	€ 1,963	€ 1,232	€ 1,100	€ 884	€ 1,004	€ 842
Turkey5	€ 571	€ 532	€ 193	€ 228	€ 292	€ 275										€ 3,753	€ 1,217	€ 1,735	€ 1,737	€ 2,152	€ 1,418	€ 1,286	€ 1,041	€ 1,191	€ 1,028
Far East1	€ 4,624	€ 2,578	€ 2,756	€ 2,302	€ 2,779	€ 2,778	€ 2,984	€ 3,139	€ 3,048	€ 3,173	€ 2,679	€ 3,164	€ 3,739	€ 3,363	€ 3,753			€ 2,856	€ 2,350	€ 2,994	€ 2,828	€ 2,402	€ 2,753	€ 1,578	€ 581
Far East2	€ 1,864	€ 2,707	€ 2,815	€ 2,556	€ 2,981	€ 2,873	€ 1,733	€ 2,049	€ 1,959	€ 1,757	€ -0	€ 405	€ 1,382	€ 1,514	€ 1,217			€ 3,602	€ 3,287	€ 3,929	€ 3,555	€ 3,187	€ 3,281	€ 2,692	€ 2,019
Germany1	€ 3,110						€ 1,728	€ 1,501	€ 1,235	€ 1,838	€ 1,640	€ 2,154	€ 2,030	€ 1,545	€ 1,735	€ 2,856	€ 3,602								
Germany2	€ 3,100						€ 1,765	€ 1,513	€ 1,612	€ 1,856	€ 1,640	€ 2,155	€ 2,032	€ 1,547	€ 1,737	€ 2,350	€ 3,287								
Germany3	€ 3,455						€ 2,269	€ 2,038	€ 2,137	€ 2,379	€ 2,056	€ 2,571	€ 2,448	€ 1,963	€ 2,152	€ 2,994	€ 3,929								
Austria	€ 2,863						€ 1,373	€ 1,154	€ 1,183	€ 1,447	€ 1,324	€ 1,837	€ 1,714	€ 1,232	€ 1,418	€ 2,827	€ 3,555								
Czech Republic	€ 2,745						€ 615	€ 415	€ 355	€ 638	€ 1,185	€ 1,696	€ 1,578	€ 1,100	€ 1,286	€ 2,402	€ 3,187								
Hungary	€ 2,552						€ 391	€ 186	€ 137	€ 423	€ 925	€ 1,440	€ 1,316	€ 884	€ 1,041	€ 2,753	€ 3,270								
Poland	€ 2,639						€ 574	€ 601	€ 564	€ 765	€ 1,094	€ 1,608	€ 1,485	€ 1,004	€ 1,191	€ 1,578	€ 2,692								
Baltic	€ 2,390						€ 379	€ 534	€ 511	€ 602	€ 932	€ 1,445	€ 1,322	€ 842	€ 1,028	€ 581	€ 2,019								

6.6. Sensitivity analysis

The sensitivity analysis has been carried out considering:

- different levels of the port dues in Galati, starting from 0% to 100%
- level of competition with of Galati port with Constanta and Odessa ports

In Table 6.10 hereunder is shown the distribution of potential by Origin – Destination group of regions / countries for 0% taxes level in Galati (with green the potential flows that can be attracted due to the reduction of port taxes to 0%)

It must be observed from Tables 6.11 to 6.13 hereunder that Port Dues are not such an important driver for the connection to Istanbul, while it is an important driver for the connection to the Far East. If Port Dues would be minimalized for cargo liners from the Far East, nearly 2.5 million tonnes of cargo can be attracted by the Port of Galati on top of the basic connections.

Table 6.10 Distribution of potential by Origin – Destination group of regions / countries, 0% taxes level in Galati (with green the potential flows that can be attracted due to the reduction of port taxes)

Cargo flows via Port of Galati																								
	North-Africa	Romania1	Romania2	Romania3	Romania4	Romania5	Greece1	Greece2	Greece3	Greece4	Turkey1	Turkey2	Turkey3	Turkey4	Turkey5	Far East1	Far East2	Germany1	Germany2	Germany3	Austria	Czech Republic	Hungary	Poland	Baltic
North-Africa		-	96,047	-	-	-	-	-	-	-	-	-	-	-	-	-	-	397,737	263,855	304,516	15,422	7,025	3,379	8,553	4,575
Romania1	-		-	-	-	-	-	8,205	16,971	23	2,296	2,474	3,216	6,780	1,808	-	-	-	-	-	-	-	-	-	-
Romania2	-	-		-	-	-	-	-	-	-	-	-	13,516	28,070	-	-	-	-	-	-	-	-	-	-	-
Romania3	515,332	-	-		-	-	-	-	-	-	**4,072**	**3,939**	4,977	10,207	**2,861**	**197,696**	**14,377**	-	-	-	-	-	-	-	-
Romania4	-	-	-	-		-	-	-	-	-	**4,386**	**4,319**	5,533	11,642	**3,193**	-	-	-	-	-	-	-	-	-	-
Romania5	-	-	-	-	-		-	-	-	-	**9**	**42**	9	-	-	-	-	-	-	-	-	-	-	-	-
Greece1	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	12,602	7,002	9,667	5,363	4,942	2,056	6,646	-
Greece2	-	12,773	-	-	-	-	-		-	-	-	-	-	-	-	-	-	186,030	97,491	134,500	48,454	60,920	34,917	87,732	-
Greece3	-	12,397	-	-	-	-	-	-		-	-	-	-	-	-	-	-	82,387	43,346	70,526	34,173	48,153	29,294	66,789	-
Greece4	-	11	-	-	-	-	-	-	-		-	-	-	-	-	-	-	22	13	45	9	128	76	63	-
Turkey1	-	320	-	**1,152**	**1,375**	**4**	-	-	-	-		-	-	-	-	-	-	2,710	2,891	5,120	-	-	**8,737**	17,351	-
Turkey2	-	479	-	**1,396**	**1,637**	**14**	-	-	-	-	-		-	-	-	-	-	4,670	3,527	6,971	-	-	**7,933**	17,902	-
Turkey3	-	815	7,197	2,113	2,426	42	-	-	-	-	-	-		-	-	-	-	6,402	4,502	9,115	-	-	9,319	21,663	-
Turkey4	-	2,444	19,125	5,796	6,454	182	-	-	-	-	-	-	-		-	-	-	13,483	8,765	18,314	-	-	17,322	40,657	-
Turkey5	-	505	-	**1,282**	**1,458**	**33**	-	-	-	-	-	-	-	-		-	-	3,603	2,490	4,945	-	-	**5,188**	11,685	-
Far East1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	18,757	19,635	18,728	**4,694**	4,338	**3,539**	12,434	3,462
Far East2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		52,976	64,588	78,535	**81,827**	69,434	**770,543**	1,541,190	244,603
Germany1	1,864,562	-	-	-	-	-	18,581	165,351	147,659	253	6,568	8,624	11,695	25,104	6,592	724,770	598,575		-	-	-	-	-	-	-
Germany2	375,885	-	-	-	-	-	7,238	69,657	61,470	98	4,498	5,103	6,737	14,142	3,854	104,073	142,839	-		-	-	-	-	-	-
Germany3	488,486	-	-	-	-	-	19,297	155,375	143,277	299	10,405	11,965	15,484	31,392	8,535	179,379	143,423	-	-		-	-	-	-	-
Austria	81,197	-	-	-	-	-	4,953	39,198	42,090	20	-	-	-	-	-	**265,754**	**39,837**	-	-	-		-	-	-	-
Czech Republic	-	-	-	-	-	-	3,183	17,757	25,710	28	7,414	6,715	7,613	13,491	4,048	-	25,795	-	-	-	-		-	-	-
Hungary	11,927	-	-	-	-	-	4,131	25,711	31,899	49	**5,718**	**5,071**	5,590	9,314	**2,965**	**6,156**	**38,234**	-	-	-	-	-		-	-
Poland	277,897	-	-	-	-	-	6,859	48,627	90,048	83	-	-	-	-	-	74,737	318,886	-	-	-	-	-	-		-
Baltic	43,299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23,235	206,322	-	-	-	-	-	-	-	

In the tables hereunder are presented the results of the sensitivity analysis based on the above criteria.

Table 6.11 Sensitivity analysis of total amount of cargo that can be attracted by Galati from the Mersin – Piraeus - Istanbul – Galati maritime line

Level of Port Dues and Pilotage Fees	Amount of cargo in Port of Galati (tonnes)
0%	568.393
20%	542.968
40%	530.722
60%	529.982
80%	529.158
100%	529.126

Table 6.12 Sensitivity analysis of total amount of cargo that can be attracted by Galati from the Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati maritime line

SERVICE PORT SAID - IZMIR - THESSALONIKI - ISTANBUL - GALATI						
Level of Port Dues	**With hinterland transport Odessa/Constanta**			**Without hinterland transport Odessa / Constanta**		
	To Galati	***From Galati***	***Total***	***To Galati***	***From Galati***	***Total***
0%	2.395.772	5.037.195	7.432.967	2.935.772	5.037.195	7.432.967
20%	2.395.772	5.037.195	7.432.967	2.935.772	5.037.195	7.432.967
40%	2.395.772	5.037.195	7.432.967	2.935.772	5.037.195	7.432.967
60%	2.395.772	5.037.195	7.432.967	2.935.772	5.037.195	7.432.967
80%	2.383.375	5.020.224	7.403.599	2.935.772	5.037.195	7.432.967
100%	2.383.375	5.020.224	7.403.599	2.935.772	5.037.195	7.432.967

Table 6.13 Sensitivity analysis of the total amount of cargo that can be attracted by Galati from the Poti (Georgia) – Samsun – Galati maritime line

SERVICE POTI - SAMSUN - GALATI						
Level of Port Dues	**With hinterland transport Odessa/Constanta**			**Without hinterland transport Odessa / Constanta**		
	To Galati	***From Galati***	***Total***	***To Galati***	***From Galati***	***Total***
0%	1.182.262	2.564.409	3.746.671	3.104.662	3.220.798	6.325.459
20%	291.450	1.965.781	2.257.230	2.213.850	2.622.169	4.836.019
40%	291.450	1.965.781	2.257.230	2.213.850	2.622.169	4.836.019
60%	291.450	1.965.781	2.257.230	2.213.850	2.622.169	4.836.019
80%	291.450	1.965.781	2.257.230	2.213.850	2.622.169	4.836.019
100%	291.450	1.965.781	2.257.230	2.213.850	2.622.169	4.836.019

Table 6.14 Sensitivity analysis of the total amount of cargo that can be attracted by Galati from the Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati and Poti (Georgia) – Samsun – Galati maritime lines

TOTAL TRANSHIPMENT GALATI		
Level of Port Dues	**With hinterland transport Odessa/Constanta**	**Without hinterland transport Odessa / Constanta**
0%	11.179.638	13.769.189
20%	9.690.197	12.279.749
40%	9.690.197	12.279.749
60%	9.690.197	12.279.749
80%	9.660.829	12.279.749
100%	9.660.829	12.279.749

From the above sensitivity analysis it is observed that the total amount of cargo that could be attracted by Galati from the final two maritime lines is between 9.6 and 11.2 million tonnes per year, depending of the level of the port dues in the situation when competition with Odessa and Constanta is considered.

6.7. Traffic forecast for year 2016 and 2020

Traffic forecast for time horizons 2016 and 2020 has been carried out using the TRANSTOOLS forecasting model. The forecasts have been carried out at the level of OD relations at NUTS 3 level, and the aggregated results at the country – to - country level are shown in Table 6.15 hereunder:

Table 6.15 Growth of the potential flows for 2016 and 2020

From (and v.v.)	**To (and v.v.)**	**Growth 2010 – 2016** (2010 = 100)	**Growth 2010 – 2020** (2010 = 100)
Austria	Greece	115	127
Czech Republic	Greece	112	124
Hungary	Greece	112	121
Poland	Greece	109	115
Romania	Greece	128	152
Czech Republic	Turkey	105	108
Hungary	Turkey	120	136
Poland	Turkey	130	154
Romania	Turkey	140	176
Austria	Turkey	-	-

The future expected potential for time horizons 2016 and 2020 is shown in Table 6.16 hereunder at the country – to – country level.

Table 6.16 Future expected potential 2016 and 2020, tonnes per year

From (and v.v.)	To (and v.v.)	Flows 2016	Flows 2020
Austria	Greece	100,010	110,446
Czech Republic	Greece	52,448	58,068
Hungary	Greece	69,470	75,053
Poland	Greece	65,913	69,542
Romania	Greece	157,480	187,007
Czech Republic	Turkey	38,436	39,534
Hungary	Turkey	35,236	39,934
Poland	Turkey	0	0
Romania	Turkey	101,443	127,528
Austria	Turkey	-	-

Under the assumption of 50% of the total potential being shifted to the new service and a net weight of a container of 10 tons (excluding 3.5 tons own weight), 31.000 TEU will be collected from Greece and the northern part of Turkey in 2016 and 35.000 TEU in 2020.

From the above average it can be considered that the general trends are as follows:

- 19.8% increase of total trade and transport flows in 2016 compared with 2010;
- 36.5% increase of total trade and transport flows in 2020 compared with 2010.

The average growth factors estimated above can be applied for all relations and for all estimated transport volumes to be transferred to the new maritime lines. Considering this, the future estimated flows for the final two maritime lines are shown in Tables 6.17 and 6.18 hereunder.

Table 6.17 Total amount of cargo that can be attracted by Galati from the Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati maritime line: forecast 2016

Maritime line	With hinterland transport Odessa/Constanta			Without hinterland transport Odessa / Constanta		
	To Galati	*From Galati*	*Total*	*To Galati*	*From Galati*	*Total*
PORT SAID - IZMIR - THESSALONIKI - ISTANBUL - GALATI	2.855.283	6.014.228	8.869.512	3.517.055	6.034.560	8.904.694
POTI – SAMSUN - GALATI	349.157	2.355.006	2.704.162	2.652.192	3.141.358	5.793.551
TOTAL 2 Maritime Lines	3.204.440	8.369.234	11.573.673	6.169.247	9.175.918	14.698.245

Table 6.18 Total amount of cargo that can be attracted by Galati from the Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati maritime line: forecast 2020

Maritime line	With hinterland transport Odessa/Constanta			Without hinterland transport Odessa / Constanta		
	To Galati	*From Galati*	*Total*	*To Galati*	*From Galati*	*Total*
PORT SAID - IZMIR - THESSALONIKI - ISTANBUL - GALATI	3.253.307	6.852.606	10.105.913	4.007.329	6.875.771	10.146.000
POTI – SAMSUN - GALATI	397.829	2.683.291	3.081.119	3.021.905	3.579.261	6.601.166
TOTAL 2 Maritime Lines	3.651.136	9.535.897	13.187.032	7.029.234	10.455.032	16.747.166

It is observed that the forecasted potential that can be attracted by Galati is estimated to be between 11.6 and 14.7 million tonnes in 2016 and between 13.2 and 16.7 million tonnes in 2020.

6.8. Conclusions and Recommendations Phase 2

Maritime line 1 Piraeus – Istanbul –Galati

- From the above analysis it is estimated that it would be possible to attract almost 500.000 – 600.000 tonnes of freight through the Danube Romanian ports from road and other sea – road or sea – rail existing routes. This potential represents (46% of the actual maritime traffic of Galati port of 1.750.000 tonnes in 2012, or 1.5% of the maritime traffic of Constanta port of 53.000.000 tonnes in 2012. The estimated potential is represented by imports and exports of Romania and also by transit flows.

Maritime lines 2 and 3

- **Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati (*including also maritime line 1*)**

- **Poti (Georgia) – Samsun – Galati**

- The Maritime Service to Port Said is very feasible, with a potential of minimum 2.25 million tonnes of cargo per year to be transhipped to the Port of Galati (30% of the maximum 7.4 million tonnes). This Service will stop in Izmir, Thessaloniki and Istanbul. By making this extra stops, another 2.0 million tonnes of cargo can be collected. In Izmir and Thessaloniki, 800.000 tons will be transhipped per port and in Istanbul 400.000 tons of additional cargo can be collected.

- Under the assumption that 30% of the total cargo can be shifted to the new services, and a net weight of container of 10 tons (excluding 3.5 tons own weight), 225.000 TEU can be transported from Egypt via Turkey and Greece to Galati. This means 4.500 TEU per week (2.800 on the busiest direction, from Galati to Port Said). A roundtrip of this service will require about 300 hours, equalling two weeks. In order to transport all the cargo (based on the 2.800 TEU per week from Galati to Egypt), five vessels should depart per week and thus 10 vessels can be put into service on this line.

- For the service to Poti, 180.000 TEU can be transported, using the same assumptions. This means 3.600 TEU per week, and 2.150 TEU in the busiest direction (Poti to Galati). A roundtrip to Poti takes a week for a vessel, and thus 4 vessels should be put into operation to transport this cargo.

- A feeder service might be considered from Inebolu to Samsun for the service to Poti

RISK ANALYSIS

A detailed analysis of the risks is not specifically requested, but we have addressed the main risks and the approach to minimise their effects.

The following main risks have been identified:

1. Political and economic risks in the Far East countries and in Egypt. The unstable political climate could lead to a decrease of the demand for cargo and in this case the estimated attracted cargo will decrease. However, even in these conditions, the trade from Greece and Turkey to Central and Eastern Europe would not be affected.

2. The minimum navigation depth of 2.5 meters in all seasons of the year will be not secured. In these conditions it will be needed to secure the rail connections for the related hinterlands of Galati especially to Hungary and Austria.

3. The volatility of the demand. To minimise the effects of the volatility of the demand it is needed, for both the operator and the port authority, to offer flexible tariffs in order to attract a minimum volume of relatively stable volumes of cargo for every month of the year. Further on, the new intermodal terminal in Galati shall offer sufficient storage capacity also for petroleum products.

4. The hinterland connections of Galati / Romania with Germany, especially by rail, will be not improved in the near future. One solution to minimise the effects of this would be to secure specific agreements with rail transport companies to secure a competitive tariff in order to attract a minimum volume on the rail hinterland to Germany.

5. Policy influences on the cost of transport. The policies that are expected to impact transport costs are detailed in the following table.

Policy Heading	Description	Quantified Impact
MARPOL	Cost increase associated with the change to a more expensive fuel type or the installation and utilisation of exhaust scrubber technology. This increase will only impact SSS.	As per fuel prices.
Eurovignette	Once fully implemented by member states this will result in a cost increase for road users. The recent approval of the External Costs amendments to the Eurovignette Directive also opens the doors for rail to be charged under a polluter pays principle.	2%[4]
Emissions Trading Scheme	Though currently exempt it is expected that a Carbon trading scheme will eventually be introduced for the transport sector.	Current carbon prices for member states are €15-€20/ton.
Ballast Water	If implemented this policy will only result in a small cost increase for SSS.	0.2%[5]
eMaritime	The EU eMaritime initiative is aimed at fostering the use of advanced information technologies for working and doing business in the maritime sector. It is expected that this initiative will reduced delays in ports through more efficient documentation submission and review processes, and, improved coordination of inspections by authorities.	Maximal 20% [6]decrease in port cost
NECA	This policy incorporate the cost impact of the application of Tier III standards for ships constructed on or after 1 January 2016 and sailing in the Baltic Sea, North Sea/English Channel and/or Mediterranean Sea applies.	Additional annual cost of about € 166000-297000[7] per ship

Source: *COMPASS The COMPetitiveness of EuropeAn Short-sea freight Shipping compared with road and rail transport, Final Report 2010*

[4] Based on analysis carried out in the Commission study: SKEMA (2010) 'Impact Study of the future requirements of Annex VI of the MARPOL Convention on Short Sea Shipping', Grant Agreement No. TREN/FP7/TR/218565/"SKEMA.

[5] Based on analysis carried out in the Commission study: SKEMA (2010) 'Impact Study of the future requirements of Annex VI of the MARPOL Convention on Short Sea Shipping', Grant Agreement No. TREN/FP7/TR/218565/"SKEMA.

[6] Based on survey carried out for COMPASS

[7] AEAt study(2009)

CONDITIONS

It is important to mention the conditions to be satisfied in order to secure that a high percentage of the estimated potential would be attracted by the new maritime lines:

- The hinterland connections of Galati / Romania with Germany, especially by rail, will be improved in the near future. The condition here is to finalise the up-grading of the rail links that are part of the Trans European network as shown in the previous chapter.

- The responsible authorities shall ensure the minimum navigation depth of 2.5 meters in all seasons of the year in order to secure the hinterland connection of the port of Galati with Hungary and Austria by inland waterway.

- Last but not least, a maritime line is set-up by a ship owner and a forwarder who has the possibility to "CONTROL" all the freight packages identified on both directions (import and export). The Port Administration and the Port Operator can offer a set of facilities in order to help making the maritime line feasible from economic perspective, and they both need to promote these facilities. Starting from this facilities the forwarder can establish the final route, the freight volumes depending of the transport periodicity and the type of vessel.

In order to induce the modal shift from road to water transport the following shall be also considered:

- Road transport can secure a direct transport, while for the water transport at least two supplementary transports are needed (road/rail) in order to transport the goods from the producer to the loading port and from the unloading port to destination. This fact leads to an increase of the freight movements that cab affect the quality of the freight and also the transport time.

- From the analysed categories of goods the following have not been considered to be transferred from road to the new maritime line: crude oil and petroleum products that are transported by specific means and the food products that shall be transported in special conditions and in a short time.

- The identified goods that can be transferred to the new maritime line are often in small quantities, having a specific periodicity of transport. Considering this it is concluded that it would be more efficient to transport these goods in containers.

- The main incentive that can be used to transfer the freight flows from road to the new maritime line is the transport price. Even if in a first instance the price for the water transport is much lower compared with the road one, the number of freight movements and the increase of the transport time lead to a significant increase of the price for the water transport.

- Comparing the port of Galati with Constanta it is observed that a vessel operating in Galati has extra costs – at least two days extra plus the transit fees for Sulina Channel and the pilotage fee.

- The possibility for offering specific facilities can be analysed in order to attract the flows and to encourage the line transport. Currently the Administration of Constanta Port and the Fluvial Administration of Low Danube offer a reduction of 50% of the port tariffs, thus of the transit fee for Sulina Channel for a line regular service. We consider that such facilities can be offered also by the Port of Galati for administrative and pilotage fees.

Beside the above we consider that it will be efficient to organise these transports in the "**door-to-door"** system and the operation to be done in the intermodal terminals.

7. PHASE 3: ESTIMATION OF THE EFFECTS OF THE IMPLEMENTATION OF THE OPTIMAL REGULAR MARITIME SERVICE: FUEL CONSUMPTION AND EMISSIONS

7.1. Background

Phase 3 is addressing Task 5 of the Phase 3 of the project:

Task 5	Estimation of the effects of the implementation of the optimal regular maritime service, for short and medium terms taking into account : transport time, fuel consumption, emissions and peripheral Black Sea basin regions accessibility in connection with Danube river

Task 5 is focusing on the effects of implementing the 2 final selected maritime lines mostly in terms of emissions, fuel consumption and accessibility of the Black Sea regions in connection with the Danube river:

Line 1: Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati

Hinterlands:

Port Said: Egypt

Izmir: Turkey 3, Greece 3, Greece 4

Thessaloniki: Greece 2

Istanbul: Greece 1, Turkey 4

Galati: Romania, Hungary, Austria, Poland, Czech Republic, Slovakia, Germany, Baltic countries

Specific hinterlands connections could be considered from Galati to Cahul in Moldova

Line 2: Poti (Georgia) – Samsun – Galati

Hinterlands

Poti: Georgia, Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

Samsun: Turkey 1, Turkey 2, Turkey 5

Galati: Romania, Hungary, Austria, Poland, Czech Republic, Slovakia, Germany, Baltic countries

A feeder service might be considered from Inebolu to Samsun

The hinterlands considered above are described in Phase 2 report as follows:

Figure 53 hereunder illustrate the hinterlands defined for Turkey (5 hinterlands), Figure 54 the hinterlands of Greece (4 hinterlands) and Figure 55 the hinterlands of Romania (6 hinterlands).

Figure 53 Hinterlands Turkey

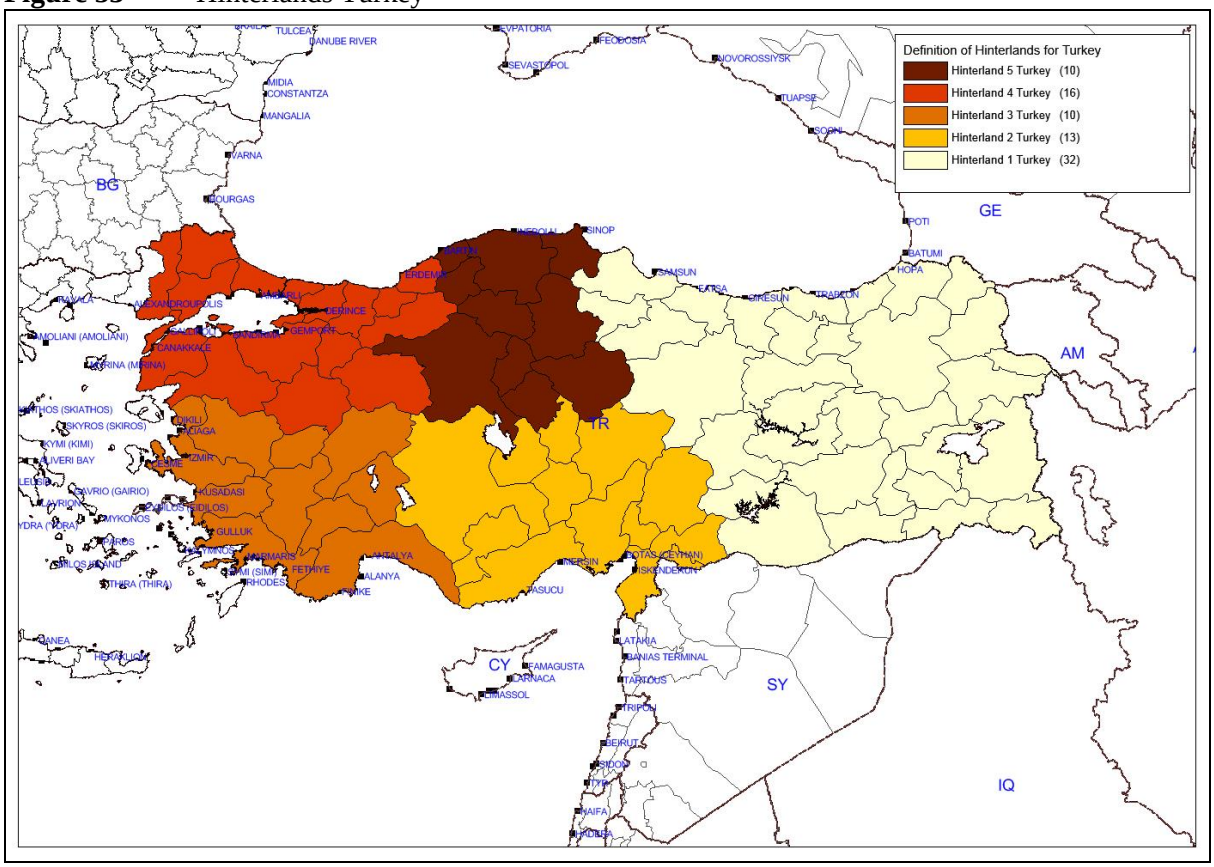


Figure 54 Hinterlands Greece

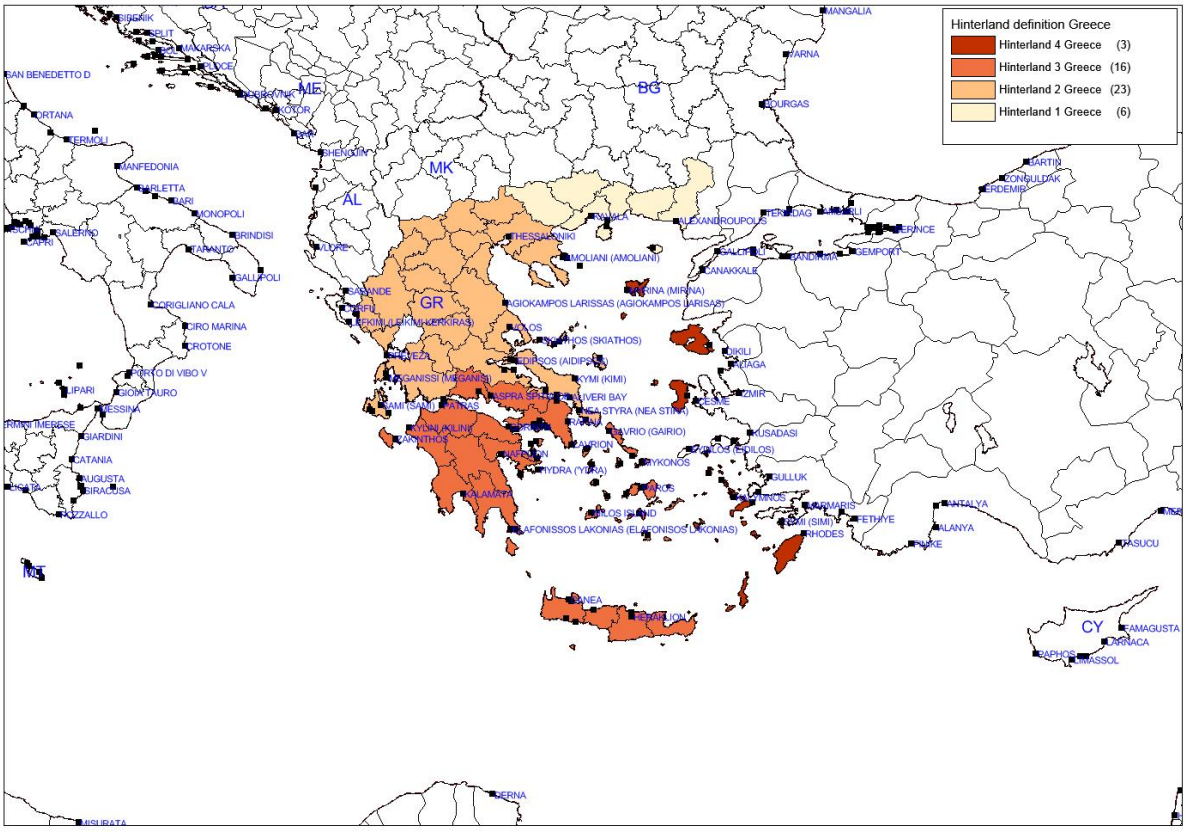
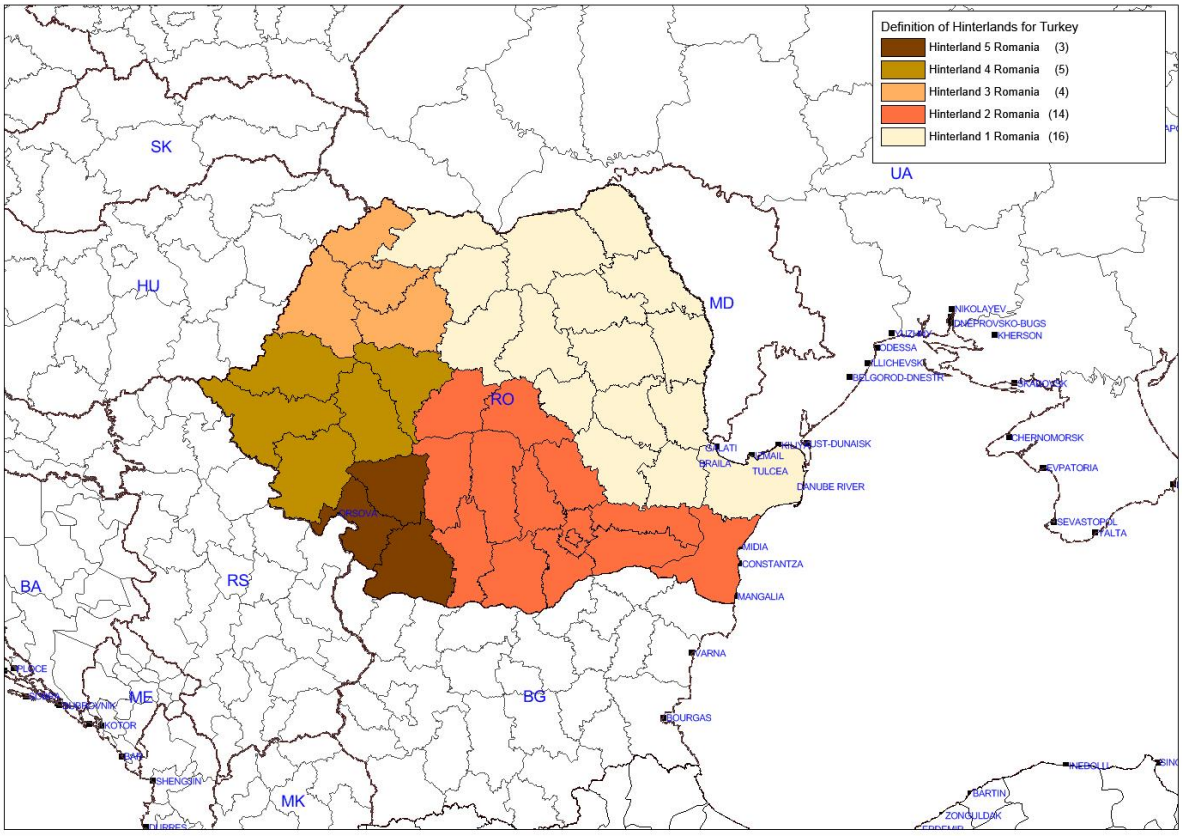
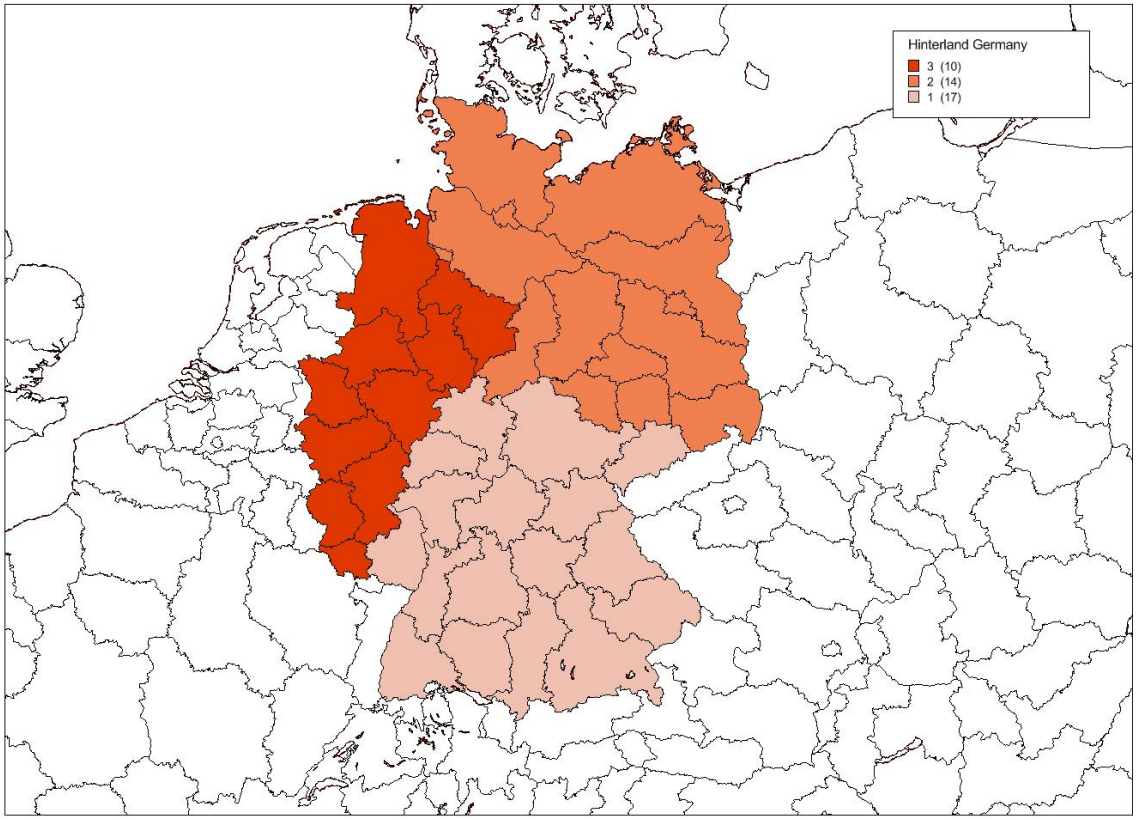


Figure 55 Hinterlands Romania



Further on, the hinterlands for Germany have been considered as shown in Figure 56 hereunder.

Figure 56 Hinterlands Germany



Further on, hinterlands in Central and Eastern Europe have been considered at the country level for:

- Hungary
- Austria
- Czech Republic
- Slovakia
- Poland
- Baltic countries

The following have been estimated:

- Reduction of fuel consumption
- Reduction of transport times
- Reduction of emissions
- Increase of accessibility for peripheral Black Sea regions

For the estimation of effects the following activities have been carried out for each of the 3 selected scenarios:

- Estimation of the transport volumes to be shifted from road to alternative transport chains including maritime and inland waterways transport modes;
- Estimation of the new OD matrices by transport mode;

- Assignment of the new OD matrices by transport mode and estimation of the new traffic flows by type of network
- Estimation of the fuel consumption, transport times and emissions
- Comparison with the Do Nothing scenario and estimation of the expected reduction of fuel consumption, transport times and emissions
- Estimation of the new accessibility and increase of accessibility for freight, by category of goods or groups of categories of goods for the peripheral Black Sea region

The analysis is focused on the effects regarding the road transport on each specific line.

In the following the results of the analysis are presented for each maritime line.

7.2. Line 1:Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati

Line 1: Port Said (Egypt) – Izmir – Thessaloniki – Istanbul – Galati

Hinterlands:

Port Said: Egypt

Izmir: Turkey 3, Greece 3, Greece 4

Thessaloniki: Greece 2

Istanbul: Greece 1, Turkey 4

Galati: Romania, Hungary, Austria, Poland, Czech Republic, Slovakia, Germany, Baltic countries

Specific hinterlands connections could be considered from Galati to Cahul in Moldova

The total road freight flows that can be transferred to the new maritime line are considered, thus the road flows from Greece and Turkey to the Eastern and Central European countries as follows: Romania, Hungary, Austria, Czech Republic, Baltic countries, Slovakia and Germany.

The trade and transport flows from Port Sid to the Eastern and Central European countries are not considered in this analysis because

For the estimation of emissions and fuel consumption the following data sources and models have been considered:

- CORINAIR model for estimation of road emissions
- ARTEMIS model for the estimation of sea transport emissions
- Emissions from inland shipping in Europe for inland waterways emissions

In Table 7.1 hereunder are shown the results of the analysis.

Table 7.1 Fuel consumption and emissions comparison for Maritime Line 1, tonnes /year

Izmir - Galati segment of the line with hinterlands	Maritime segment considering the share on the ship	all hinterlands	ALL Chain	ROAD direct
SFC - Fuel Consumption	9141.98	21923.15	31065.14	88375.67
NO x	583.81	1361.28	1945.09	1627.10
CO	24.94	197.04	221.98	36.00
HC	15.65	121.09	136.74	4.60
PM	9.78	61.45	71.23	7.70
CO2	29254.35	65647.88	94902.23	281330.12

The results of the analysis presented in the above table are based on the flows to Galati. On the opposite direction similar results are expected.

The fuel consumption and emissions on each segment of the maritime line are shown in Table 7.2 hereunder.

Table 7.2 Fuel consumption and emissions on each segment of the maritime line, tonnes / year

	Port Said - Izmir	Izmir - Thessaloniki	Thessaloniki - Istanbul	Istanbul - Galati	Total	Izmir - Galati
SFC - Fuel Consumption	13517	5435	6788	7678	33418	19901
NO x	863	347	433	490	2134	1271
CO	37	15	19	21	91	54
HC	23	9	12	13	57	34
PM	14	6	7	8	36	21
	0	0	0	0	0	0
CO2	43254	17393	21722	24569	106937	63683

Considering the share of the cargo from Greece and Turkey in the total cargo (thus also the cargo from Port Said), the emissions and fuel consumptions are estimated only for the cargo from Greece and Turkey. The results are shown in Table 7.3 hereunder.

Table 7.3 Fuel consumption and emissions on each segment of the maritime line for Greece and Turkey related cargo, tonnes / year

	Port Said - Izmir	Izmir - Thessaloniki	Thessaloniki - Istanbul	Istanbul - Galati	Total
SFC - Fuel Consumption	13.517	1.579	3.414	4.149	9.142
NO x	863	101	218	265	584
CO	37	4	9	11	25
HC	23	3	6	7	16
PM	14	2	4	4	10
	0				
CO2	43.254	5.054	10.923	13.277	29.254

From Table 7.1 it is clear that the transport chain considering the Maritime Line 1 is much more efficient considering the fuel consumption and emissions of CO2. Regarding the NOx, HC, CO and PM emissions these are less on direct road transport due to the following possible reasons:

- The estimation of emissions have considered various emission models and databases considering emission factors;
- For road transport the Euro 4 has been considered for the engine of the truck, and the related engine technology leads to low emissions of NOx, HC, CO and PM compared to Euro 3 and Euro 2.

7.3. Line 2: Poti (Georgia) – Samsun – Galati

Line 2 is described as follows.

Line 2:	Poti (Georgia) – Samsun – Galati

Hinterlands

Poti: Georgia, Kazakhstan, Azerbaijan, Armenia, Turkmenistan, Uzbekistan, Tajikistan and Kyrgyzstan

Samsun: Turkey 1, Turkey 2, Turkey 5

Galati: Romania, Hungary, Austria, Poland, Czech Republic, Slovakia, Germany, Baltic countries

A feeder service might be considered from Inebolu to Samsun

For line 2 there are no direct road flows to be compared with the new maritime line proposed. In these circumstances, the analysis has been focused on the organisation of the transport chain for major flows.

Thus, the exports of Germany to Far East countries are analysed in order to identify the possible environmental benefits of the line. In table 7.4 hereunder are shown the exports from Germany to Far East countries that can be considered for being transferred to the new line.

Table 7.4 Exports Germany hinterland 1 to Far East, tonnes per year

From	Transport mode 1	Transhipment 1	Tonnes per year
Germany 1	***Road***	Antwerp, Belgum	10.832
		Venice, Italy	16.522
		Trieste, Italy	194.589
		Koper, Slovenia	185.402
		Varna/Burgas, Bulgaria	58.558
Germany 1	***Rail***	Venice, Italy	22.641
		Trieste, Italy	43.170
		Koper, Slovenia	111.563
		Varna/Burgas, Bulgaria	22.672
		Constanta, Romania	102.606
		Ukraine	31.904
Germany 2	***Road***	Hamburg	23.519
		Bulgaria	42.909
	Rail	Hamburg	14.689
		Bulgaria	21.519
		Romania, Constanta	113.418
Germany 3	***Road***	Antwerp	37.750
		Bremen	26.974
		Slovenia	100.608
		Bulgaria	49.074
	Rail	Antwerp	21.119
		Bremen	25.095
		Slovenia	58.407
		Romania, Constanta	37.768
		Ukraine	53.668

The main advantage of transferring flows from the current transport chains to the new one could be considered from the transfer of the road hinterland flows to rail hinterland to Galati and further on the new maritime line.

8. CONCLUSIONS AND RECOMMENDATIONS

The main conclusions of the current study are as follows:

- There is a certain potential that has been identified for the new maritime lines connecting the Black Sea and the Danube. Especially **line 1 Port Said – Izmir – Thessaloniki – Istanbul – Galati** has the main advantage that especially on the segments from Izmir to Galati are transferred direct road related flows with a high benefit on the fuel consumption and emissions of CO2.

- **Line 2 Poti – Samsun - Galati** has also a certain potential that could be considered and here the main advantage of transferring transport flows from other existing routes could be the increased use of rail hinterland instead of the road one for specific relations.

- There are certain conditions to be satisfied in order to secure that a high percentage of the estimated potential would be attracted by the new maritime lines:
  - The hinterland connections of Galati / Romania with Germany, especially by rail, will be improved in the near future. The condition here is to finalise the up-grading of the rail links that are part of the Trans European network as shown in the previous chapter.

  - The responsible authorities shall ensure the minimum navigation depth of 2.5 meters in all seasons of the year in order to secure the hinterland connection of the port of Galati with Hungary and Austria by inland waterway.

  - Last but not least, a maritime line is set-up by a ship owner and a forwarder who has the possibility to "CONTROL" all the freight packages identified on both directions (import and export). The Port Administration and the Port Operator can offer a set of facilities in order to help making the maritime line feasible from economic perspective, and they both need to promote these facilities. Starting from this facilities the forwarder can establish the final route, the freight volumes depending of the transport periodicity and the type of vessel.
  - In order also to avoid the risk of low water on the Danube during the dry summer season, it is important to secure rail connections of high quality and low tariffs to replace the inland waterway transport in these conditions.

Specifically for the port of Galati the following are also recommended:

- The modernisation of the intermodal terminal (infrastructure, equipment, facilities)
- Information technology for the port in order to provide the traceability and real time tracking of delivery once these are "approved" in the port, which is one of the keys of success of attracting cargo
- The development of an integrated security system

ANNEX 1 SURVEY FORM FREIGHT FLOWS IN THE BLACK SEA BASIN

0. Identification

Please identify the respondent identification information.

Company name:

Type of organisation: *for instance port authority, port operator, shipper, logistics service provider, maritime transport operator, trucking company, …*

Department:

Respondent name:

Function:

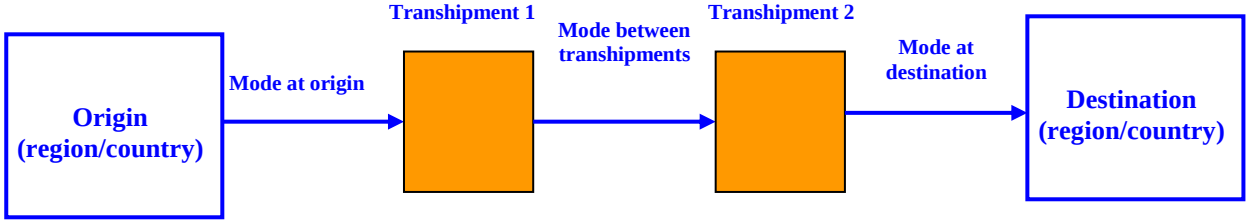
Contact details (email, telephone):

Short description of the company :

Address, Website, description of the location, meanings……. (everything useful to enable analysis of your offer potential for corridors/cargo flows and for a database for future business/projects cooperation. You will have free access to this database)

I. Information on freight flows

Please provide the available information from your organisation in the format of the transport chain structure as illustrated hereunder.



- **Origin of flows of goods:** please mention the city or the region of Origin of the flows of goods (this is not always the loading location of the goods for a specific part of the transport chain)

- **Type and volume of goods**

  Consider the NSTR 1 digit category of goods.

What are the types of goods, in which category do they fall and what are the volumes (tons / per week), how are they transported (pallets, in a trailer, in a container, etc).

Commodity groups 1 digit (NSTR with crude oil separate) in the trade and transport DABS database

Code	Commodity group
0	Agricultural products
1	Foodstuffs
2	Solid mineral fuels
3	Crude oil
4	Ores, metal waste
5	Metal products
6	Building minerals & material
7	Fertilisers
8	Chemicals
9	Machinery & other manufacturing
10	Petroleum products

- **Transport mode at origin**

  Please consider the following transport modes:

  Transport Modes in the DABS trade and transport database

Code	Mode
1	Road
2	Rail
3	Inland Waterways
4	Sea
8	Other
9	Unknown

- **Transhipment location no. 1 (port/terminal)**

  Please mention the port/terminal of the transhipment no. 1

- **Transport mode between transhipments**

  Please consider the following transport modes:

  Transport Modes in the DABS trade and transport database

Code	Mode
1	Road
2	Rail
3	Inland Waterways
4	Sea

8	Other
9	Unknown

- **Transhipment location no. 2 (port/terminal)**

Please mention the port/terminal of the transhipment no. 1

- **Transport mode at destination**

  Please consider the following transport modes:

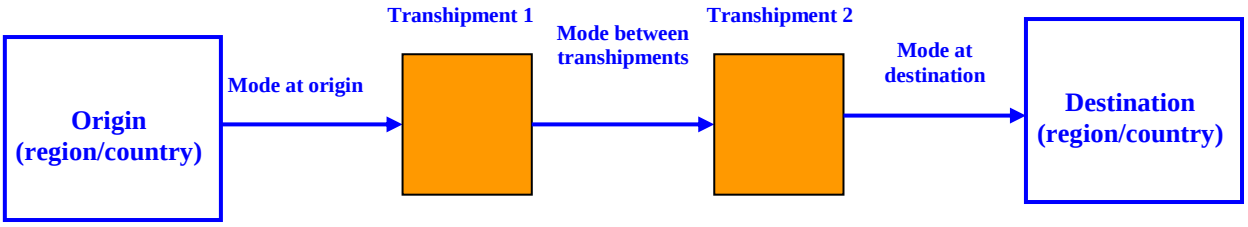
  Transport Modes in the DABS trade and transport database

Code	Mode
1	Road
2	Rail
3	Inland Waterways
4	Sea
8	Other
9	Unknown

- **Destination of flows of goods:** please mention the city or the region of Destination of the flows of goods (this is not always the unloading location of the goods for a specific part of the transport chain)

II. Information on transport cost, time and distance

Please provide the available information from your organisation in the format of the transport chain structure as illustrated hereunder.



Please provide the following information:

- Transport cost, in Euro/ton for each component of the transport chain
- Transport time, for each component of the transport chain – in hours
- Transport distance, for each component of the transport chain – in km

For each transhipment location please provide the following information:

- Cost of the transhipment, in Euro/ton (please specify whether this is the actual cost or market price)
- Additional costs (for instance port dues, temporary storage cost, etc.)
- Time of the transhipment, in hours
- Additional waiting times, in hours and at specific locations – even if these are occasional. Please mention the cause and the responsible entity.

III. Ideas on the new possible routes from your experience

Please provide any suggestion of new routes or transport chain form your current experience.

THANK YOU!