



**D3 - FINAL REPORT SCENARIOS, TRAFFIC
FORECASTS AND ANALYSIS OF TRAFFIC
FLOWS INCLUDING COUNTRIES
NEIGHBOURING THE EUROPEAN UNION**



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1 INTRODUCTION

This is the final report of the project “Scenarios, traffic forecasts and analysis of traffic flows including countries neighbouring the European Union: (EUN STAT). This report contains first a overview of the main assumptions considered for the estimation of year 2020 trade volumes and transport demand, mainly the socio-economic trends and development of transport infrastructure, including a critical assessment of the completeness and reliability of data. Secondly, the report contains the forecasts results for year 2020, based on two scenarios: reference scenario and break-up economic trends.

The following countries and regions are considered in relation with European Union: Albania, Algeria, Armenia, Palestinian authority, Azerbaijan, Belarus, Bosnia & Herzegovina, Croatia, Egypt, FYROM, Georgia, Israel, Jordania, Lebanon, Libya, Morocco, Moldova, Norway, Russia, Serbia and Montenegro, Switzerland, Syria, Tunisia, Turkey, Ukraine.

The countries in the scope of the study are subdivided into three “country groups” as follows:

Country group I: Countries, which have been considered in previous studies and for which the status of data availability (e.g. networks, traffic count data) and transport modelling is at the same level as for EU countries: Switzerland, Norway.

Country group II: Countries, for which the status of data availability is lower than for EU countries, but – for representing important transit links between EU countries – their transport flows were in the scope of transport modelling for previous EU studies like TEN-STAC: Albania, Belarus, Bosnia and Herzegovina, Croatia, FYROM, Moldova, Russia (Western part), Serbia and Montenegro, Ukraine, as well as the European part of Turkey.

Country group III: Countries, which have not been in the scope of the consortium’s transport modelling system to the extension of countries belonging to group I or group II.

As it has been specified in the Inception report, following the kick-off meeting of 13 January 2005, the scope of the project has been detailed by identifying the main focus of the assessment of analysis, as follows:

1. Scope of the project: priority transport axes EU – neighbouring countries.
2. There are 5 (five) target regions:
 - a. N-E Europe
 - b. Russia, Ukraine, Belarus, Moldova
 - c. Eastern Mediterranean
 - d. Western Mediterranean
 - e. S-E Europe and Turkey
3. The EUN-STAT project is focused more on **a**, **b** and **e**. The Mediterranean area is extensively treated in MEDA projects.

2 TRADE AND TRANSPORT DATA

2.1 Description of the territorial units / zoning system

Territorial units considered in the project are one of the basic elements for the description of the socio-economic information, of the trade and of the transport data, and, consequently, for the traffic flows forecasted on the infrastructure networks.

The socio-economic, trade and transport data are associated to the territorial units. Assignment of the traffic flows on the infrastructure networks is based on the transport OD's by transport mode and on the model infrastructure networks.

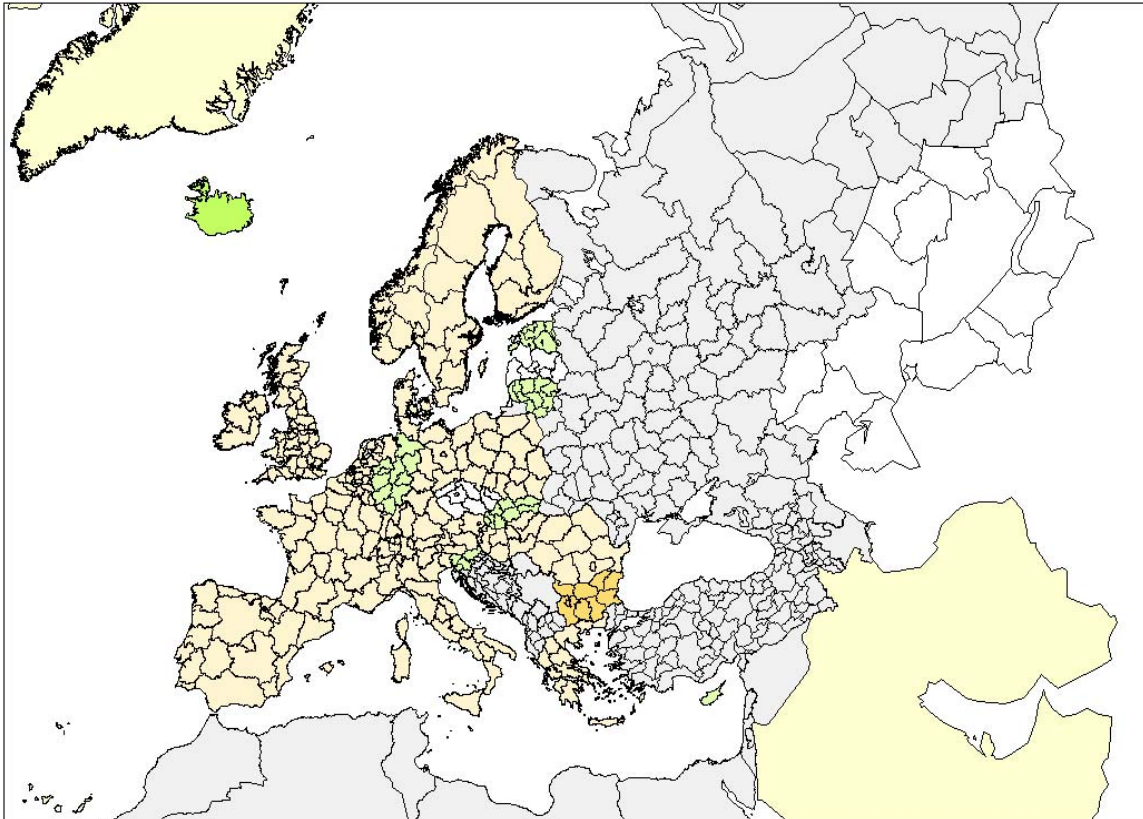
The idea was to find the most appropriate match between the available socio-economic data, forecasting model structure and infrastructure networks in order to have a high sensitivity and reliability of the final results.

In most of the EU Neighbouring countries, no detailed regional information of the international freight flows is available. This regional information is needed in order to make good traffic assignments. In order to obtain this regional information, population information and GDP information is used. Table 2.1 present the source of information considered to add the regional detail in the EU Neighbouring countries. In Figure 2.1, the regions are presented graphically.

Table 2.1 *Number of regions in the EU Neighbouring Countries*

Country	Number of regions	Source of regional information
Albania	7	NEAC
Armenia	11	Population (TRACECA study)
Azerbaijan	3	Population (http://www.world-gazetteer.com)
Belarus	6	Population (source NESTEAR)
Bosnia & Herzegovina	10	NEAC
Croatia	20	Population (source NESTEAR)
FYROM	5	NEAC
Georgia	11	Population (TRACECA study)
Israel	1	Country level
Kazakhstan	16	NEAC
Lebanon	1	Country level
Moldova	2	Population (http://www.world-gazetteer.com)
Russia	89	NEAC
Serbia & Montenegro	4	Population (source NESTEAR)
Syria	1	Country level
Turkey	89	National data
Turkmenistan	1	Country level
Ukraine	25	Population (TRACECA study)
Uzbekistan	1	Country level

Figure 2.1 Regional detail EU29 and Neighbouring Countries



2.2 Description of the trade and transport data

The EUN-STAT database is based upon the NEAC database. The improvements and additional information obtained in the ETIS BASE project has been added to the NEAC database. In the NEAC database all freight flows for the EU25 countries, including Norway and Switzerland are described on a regional detail. In addition to this information, additional national data has been used for the non-EU25 countries, to update the EUN-STAT database. Also information from the TRACECA study has been considered. The TRACECA database includes detailed international freight flows in the EU neighbouring countries. Finally UN Comtrade data has been considered for all countries which still are not covered.

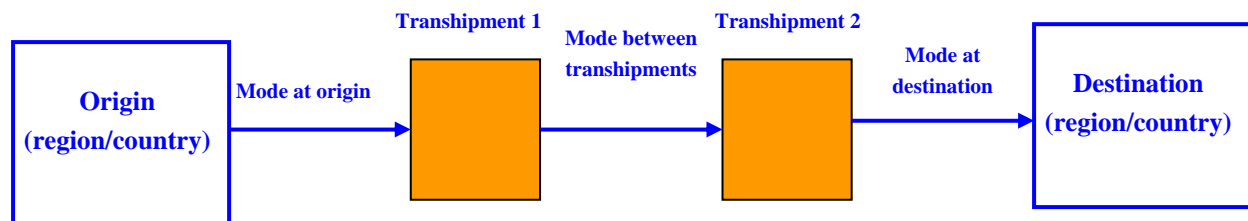
The structure of the transport database is built by considering the following elements:

- Origin of transport flows
- Transport mode at origin
- Transshipment location no. 1 (region of the port/terminal)
- Transport mode between transshipments
- Transshipment 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 had 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. Through modelling gaps have been partly covered, but still improvements could be made in the future if proper information could be obtained.

Figure 2.2 Overview transport chain in the EUN-STAT database



The following commodity groups are included in the EUN-STAT database:

Table 2.2 Commodity groups 1 digit (NSTR with crude oil separate) in the EUN-STAT 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 are included in the EUN-STAT database:

Table 2.3 *Transport Modes in the EUN-STAT database*

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

The base year of the EUN-STAT freight database is the year 2000. The EUN-STAT database includes all freight flows from the EU25 and Norway, Switzerland, Bulgaria and Romania towards the EU Neighbouring Countries. The Mediterranean area is extensively treated in MEDA projects. The EUN-STAT project is not focus on these countries. However, it will be helpful if EUN-STAT could offer some more information on this area. The following EU Neighbouring Countries are included in the EUN-STAT database.

- Albania, Bosnia & Herzegovina, Croatia, FYROM, Serbia & Montenegro
- Georgia, Armenia, Azerbaijan
- Belarus, Ukraine, Moldova, Russia, Kazakhstan, Turkmenistan, Uzbekistan
- Turkey, Israel, Lebanon, Syria

The EUN-STAT database is based upon the NEAC database. However, the ETIS project results in improvement and additional information which has been used to update the EUN-STAT database. The base year 2000 of the ETIS project is currently final. ETIS reference database is focused on EU25 countries, and the NEAC database considered for EUN-STAT considers also the accession countries Romania and Bulgaria, at NUTS2 territorial level, and the Neighbouring countries at regional level as it is shown in Table 2.1.

The results presented in this chapter are final results.

Total volume of goods imported by the EUN countries from/to EU29 is shown in the tables hereunder, by transport mode at destination/origin.

Table 2.4 *Total imports EUN from EU29, by transport mode at destination, base year 2000, thousand tonnes*

EUN country	Road	Rail	Inland waterways	Sea	Other	Unknown	Total
Albania	707	29	0	1,753	3	0	2,492
Russia	4,655	5,518	491	10	2,953	0	13,627
Ukraine	1,680	3,046	59	535	258	247	5,825
Belarus	678	1,075	3	40	32	91	1,919
FYROM	1,557	1,122	0	92	95	124	2,991
Bosnia & Hercegowina	989	100	13	177	83	0	1,363
Croatia	3,341	1,332	55	1,426	46	0	6,200
Serbia and Montenegro	1,476	762	93	655	1,105	0	4,090
Moldavia	204	83	3	4	545	11	849
Turkey	3,471	848	0	17,036	85	0	21,441
Rest Europe	2,001	326	13	4,535	99	0	6,973
Morocco	331	26	91	7,459	125	0	8,032
Algeria	192	55	16	6,730	245	0	7,238
Tunisia	242	68	29	6,749	214	0	7,303
Libia	50	28	143	4,139	30	0	4,391
Egypt	227	60	26	6,303	1,015	0	7,631
Syria	106	34	3	2,100	206	1	2,450
Lebanon	104	34	10	2,846	116	0	3,110
Israel	358	131	83	6,310	465	0	7,348
Georgia	49	14	0	246	279	0	589
Armenia	10	41	0	181	1	0	232
Azerbaijan	22	20	0	97	4	0	143
ALL EUN countries	22,452	14,751	1,131	69,426	8,002	476	116,237

Table 2.5 Total exports EUN to EU29, by transport mode at origin, base year 2000, thousand tonnes

EUN country	Road	Rail	Inland waterways	Sea	Other	Unknown	Total
Albania	58	0	0	120	0	0	179
Russia	17,346	108,963	17,892	1,121	83,592	0	228,914
Ukraine	6,517	17,940	941	3,463	2,036	0	30,897
Belarus	1,082	3,239	31	405	88	136	4,981
FYROM	432	118	16	1	14	334	915
Bosnia & Hercegowina	443	5	10	105	40	0	603
Croatia	3,641	1,745	115	3,884	13	0	9,399
Serbia and Montenegro	505	200	136	274	241	0	1,357
Moldavia	145	30	13	20	338	159	705
Turkey	2,849	359	0	15,038	70	0	18,315
Rest Europe	992	37	1	334	12	0	1,376
Morocco	451	20	151	8,847	246	0	9,714
Algeria	1,062	18	34	42,418	10,990	0	54,522
Tunisia	257	4	2	4,165	184	0	4,613
Libia	1,747	8	21	49,426	9,537	0	60,739
Egypt	89	109	7	9,789	156	0	10,150
Syria	17	2	14	8,192	7,299	0	15,525
Lebanon	10	1	0	624	3	0	638
Israel	198	29	45	5,119	106	0	5,496
Georgia	20	2	0	815	5	0	843
Armenia	4	0	0	29	0	0	33
Azerbaijan	10	57	0	2,858	1,153	0	4,078
ALL EUN countries	37,877	132,887	19,430	157,047	116,122	630	463,993

The total trade of the base year 2000 from the EU25 + NO + CH + BU +RO (EU29) towards EU Neighbouring countries and vice versa is shown in Figure 2.3. The traffic flows on the rail and road networks from the EU25 + NO + CH + BU +RO (EU29) towards EU Neighbouring countries and vice versa are shown in the Figure 2.4 and Figure 2.5 hereunder.

Figure 2.3 EU29 in relation with EU neighbouring countries transport mode: road, rail, sea; all trade flows, base year 2000

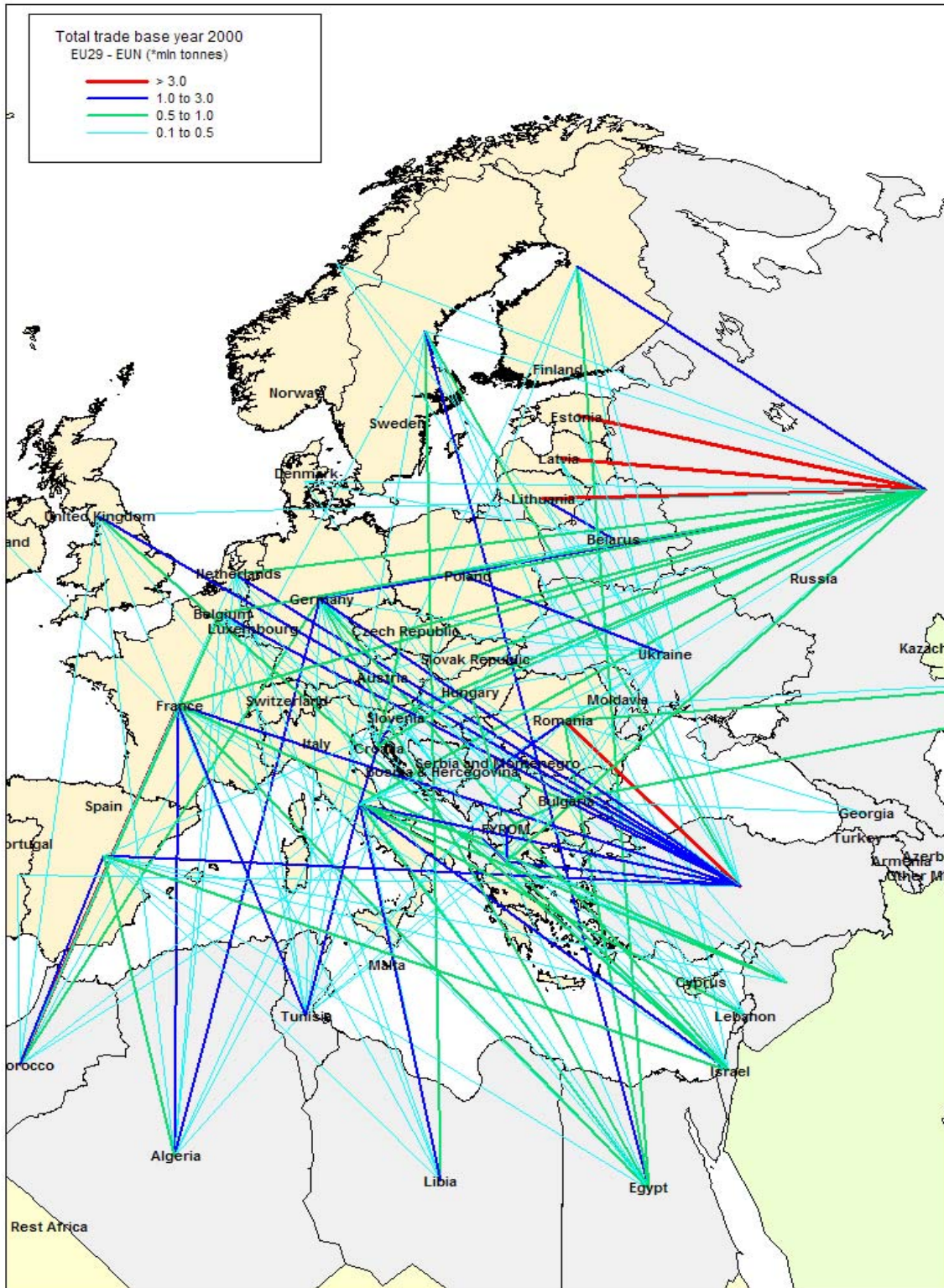


Figure 2.4 International Rail freight flows in 2000 between EU29 and EUN

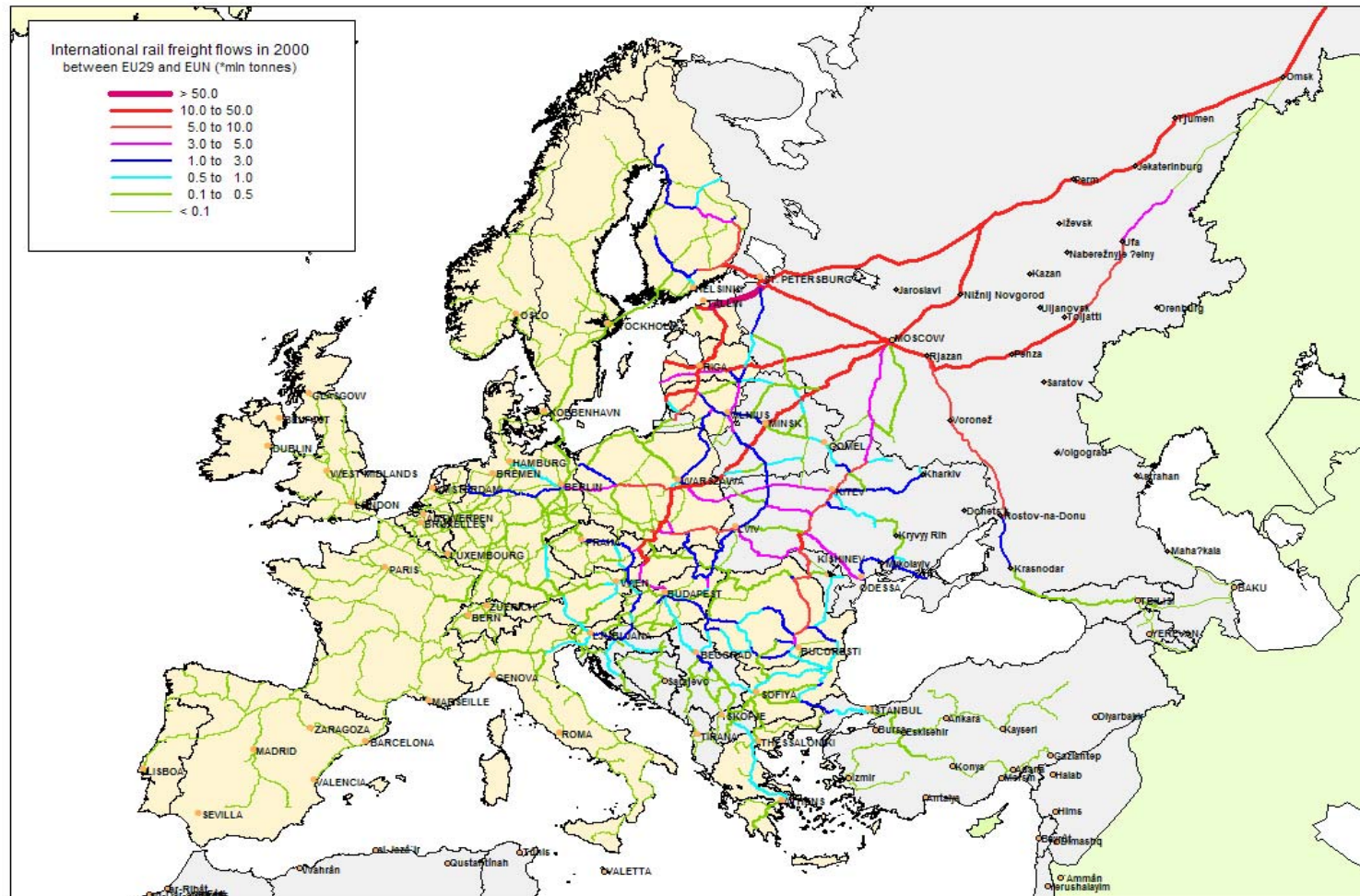
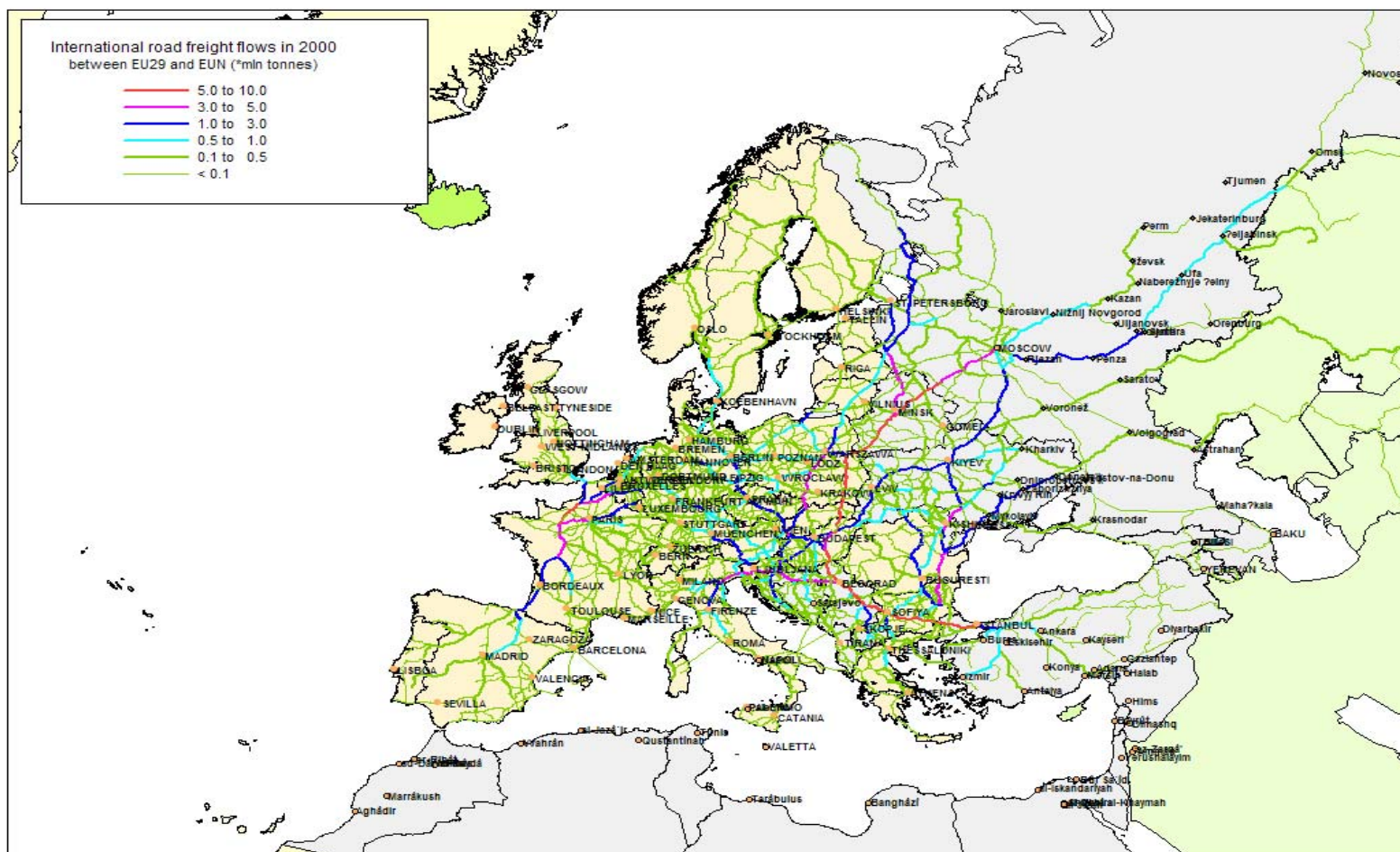


Figure 2.5 International Road freight flows in 2000 between EU29 and EUN



3 DESCRIPTION OF SCENARIOS

3.1 General description of scenarios

There are two scenarios considered for estimating the trade, transport and traffic flows for year 2020. The main assumptions for scenarios are as follows:

A. Reference scenario:

- basic socio-economic trends as considered in the TEN-STAC study, and as recommended by the PRIMES project;
- full implementation of infrastructure projects, as provided by DG-TREN.

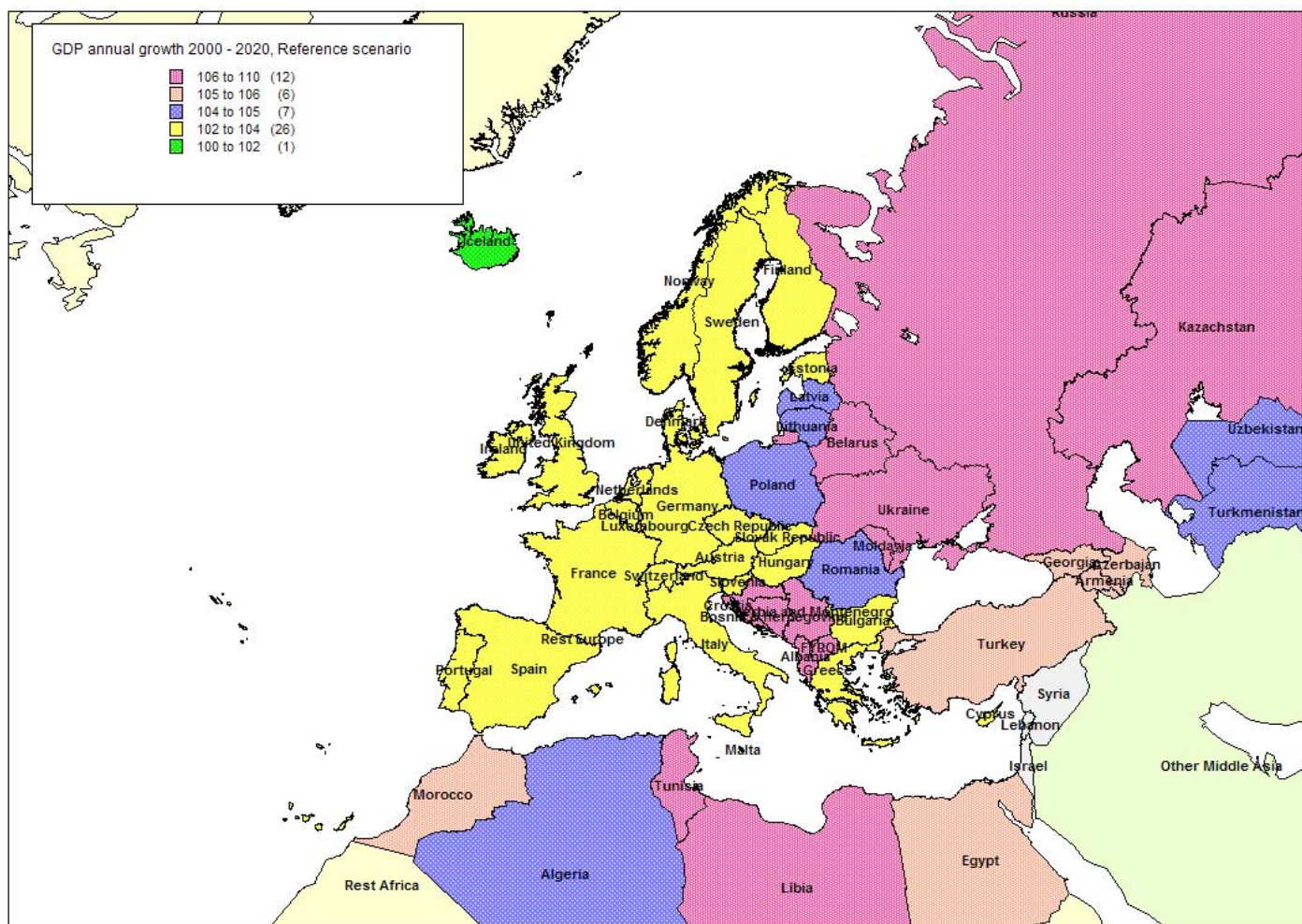
B. Scenario 2:

- extra economic growth for the Neighbouring countries, up to maximum 6% annual growth of the GDP;
- full implementation of infrastructure projects, as provided by DG-TREN.

3.2 Socio-economic development

The socio-economic trends of both EU29 and Neighbouring countries are considered for estimating the expected trade demand for year 2020. The Reference scenario considers the basic socio-economic trends as described by TEN-STAC / PRIMES studies, as shown in the figure hereunder.

Figure 3.1 GDP annual growth 2000 – 2020, Reference scenario



3.3 Infrastructure assessment

Consideration of infrastructure projects submitted to the European Commission in the EUN-STAT rail and road network models

Scope of the infrastructure projects

The EUN-STAT consortia has been provided by the European Commission with infrastructure projects by following countries in the scope of the EUN-STAT study:

- Armenia (AM)
- Azerbaijan (AZ)
- Belarus (BY)
- Bosnia-Herzegovina (BA)
- Croatia (HR)
- Macedonia (MK)
- Russia (RU)
- Serbia (YU)/(CS)
- Ukraine (UA)
- Turkey (TR)

The type of infrastructure measures submitted to the European Commission embraces rail and road infrastructure, as well as investments in ports.

Documentation of infrastructure projects in the network models

The EUN-STAT network models for rail and road have been appended by two additional columns, “country_code” and “proj_no”. Each priority project submitted was labelled in the column “country_code” by its country code, that submitted the infrastructure measure to the European Commission. In the column “proj_no” the projects submitted by each country were numbered.

The allocation of numbers to projects as well as the scope of infrastructure measurements implemented into the EUN-STAT network models are corresponding to the description of the projects as it has been agreed with the European Commission.

4 TRADE AND TRANSPORT FORECASTS 2020

4.1 Trade forecasts 2020

Trade forecasts for year 2020, for the Reference scenario and for Scenario 2, have considered the basic elements as described in chapter 3. Total volumes of goods imported/exported by the EUN countries from/to EU29 are shown in the tables hereunder, by transport mode at destination/origin.

Table 4.1 Total imports EUN from EU29, by transport mode at destination, Reference scenario 2020, thousand tonnes

EUN country	Road	Rail	Inland waterways	Sea	Other	Unknown	Total
Albania	3,310	98	0	5,897	23	0	9,329
Russia	13,176	12,438	1,244	26	6,429	0	33,313
Ukraine	5,384	4,760	165	1,871	558	784	13,523
Belarus	1,801	2,265	7	114	114	244	4,544
FYROM	4,082	2,043	2	290	313	340	7,069
Bosnia & Hercegowina	2,437	251	40	484	325	1	3,538
Croatia	7,312	2,574	94	2,221	125	0	12,326
Serbia and Montenegro	3,587	1,496	226	1,401	2,717	0	9,427
Moldavia	583	220	12	9	1,218	25	2,068
Turkey	9,489	2,366	0	42,547	261	0	54,662
Rest Europe	4,539	818	44	10,148	235	0	15,785
Morocco	689	47	166	12,138	269	0	13,310
Algeria	362	91	31	11,877	448	0	12,809
Tunisia	504	106	54	10,613	427	0	11,704
Libia	91	41	329	6,242	65	0	6,769
Egypt	408	127	52	10,377	1,826	0	12,789
Syria	294	132	13	4,903	639	3	5,984
Lebanon	259	95	31	5,795	292	1	6,473
Israel	985	377	246	15,100	1,401	0	18,110
Georgia	25	9	0	171	3	0	208
Armenia	14	1	0	304	1	0	320
Azerbaijan	33	22	0	89	6	0	150
ALL EUN countries	59,364	30,377	2,756	142,618	17,696	1,399	254,211

Table 4.2 *Total exports EUN to EU29, by transport mode at origin, Reference scenario 2020, thousand tonnes*

EUN country	Road	Rail	Inland waterways	Sea	Other	Unknown	Total
Albania	264	0	0	804	0	0	1,068
Russia	43,189	249,530	43,286	4,849	134,476	0	475,330
Ukraine	31,308	52,041	2,808	9,648	7,654	0	103,459
Belarus	2,099	6,656	101	790	255	411	10,312
FYROM	983	350	109	1	31	1,036	2,511
Bosnia & Hercegowina	937	15	34	275	128	0	1,389
Croatia	6,217	3,088	150	4,565	27	0	14,048
Serbia and Montenegro	895	492	317	572	465	0	2,742
Moldavia	202	54	36	46	492	285	1,114
Turkey	8,345	822	0	31,867	199	0	41,233
Rest Europe	1,644	97	3	536	29	0	2,308
Morocco	919	36	183	12,076	275	0	13,488
Algeria	1,144	18	47	54,171	12,511	0	67,892
Tunisia	380	9	5	5,229	206	0	5,829
Libia	1,763	8	28	53,780	9,641	0	65,220
Egypt	167	113	12	11,954	316	0	12,562
Syria	54	5	19	10,530	7,348	1	17,956
Lebanon	35	3	0	1,313	12	0	1,363
Israel	468	75	104	12,685	282	0	13,614
Georgia	21	4	0	806	5	0	836
Armenia	5	0	1	37	0	0	43
Azerbaijan	17	1	0	3,028	1,147	0	4,194
ALL EUN countries	101,055	313,417	47,245	219,561	175,499	1,733	858,510

Table 4.3 *Total imports EUN from EU29, by transport mode at destination, Scenario 2, 2020, thousand tonnes*

EUN country	Road	Rail	Inland waterways	Sea	Other	Unknown	Total
Albania	3,314	94	0	5,897	23	0	9,329
Russia	17,049	16,873	2,328	39	10,066	0	46,355
Ukraine	6,243	5,112	170	1,928	606	1,165	15,223
Belarus	2,331	2,846	7	114	143	449	5,890
FYROM	4,029	2,096	2	290	313	340	7,069
Bosnia & Hercegowina	2,427	259	42	484	325	1	3,538
Croatia	10,133	3,197	151	3,510	198	0	17,190
Serbia and Montenegro	4,895	1,619	303	2,236	2,781	0	11,833
Moldavia	718	235	14	9	1,222	34	2,233
Turkey	9,662	2,379	0	44,904	266	0	57,211
Rest Europe	4,539	818	44	10,148	235	0	15,785
Morocco	689	47	166	12,138	269	0	13,310
Algeria	362	91	31	11,877	448	0	12,809
Tunisia	504	106	54	10,613	427	0	11,704
Libia	91	41	329	6,242	65	0	6,769
Egypt	408	127	52	10,378	1,826	0	12,790
Syria	308	133	13	5,691	639	3	6,788
Lebanon	297	100	35	6,733	293	1	7,459
Israel	1,035	407	271	17,231	1,407	0	20,352
Georgia	42	13	0	274	5	0	335
Armenia	23	2	0	477	2	0	503
Azerbaijan	56	34	0	143	11	0	244
ALL EUN countries	69,156	36,629	4,013	151,354	21,572	1,993	284,717

Table 4.4 Total exports EUN to EU29, by transport mode at origin, Scenario 2, 2020, thousand tonnes

EUN country	Road	Rail	Inland waterways	Sea	Other	Unknown	Total
Albania	264	0	0	804	0	0	1,068
Russia	48,423	269,112	47,467	5,274	140,190	0	510,467
Ukraine	31,822	52,430	2,810	9,924	7,655	0	104,640
Belarus	2,959	7,032	153	790	256	625	11,815
FYROM	961	348	133	1	31	1,036	2,511
Bosnia & Hercegowina	934	17	35	275	128	0	1,389
Croatia	7,190	3,719	214	5,955	31	0	17,109
Serbia and Montenegro	1,386	690	566	974	465	0	4,082
Moldavia	250	52	37	77	492	501	1,409
Turkey	9,142	859	0	33,915	212	0	44,128
Rest Europe	1,644	97	3	536	29	0	2,308
Morocco	919	36	183	12,076	275	0	13,488
Algeria	1,144	18	47	54,171	12,511	0	67,892
Tunisia	380	9	5	5,229	206	0	5,829
Libia	1,763	8	28	53,780	9,641	0	65,220
Egypt	167	113	12	11,954	316	0	12,562
Syria	67	5	19	10,714	7,349	1	18,155
Lebanon	37	3	0	1,338	12	0	1,391
Israel	576	76	108	13,558	320	0	14,638
Georgia	31	8	0	870	6	0	915
Armenia	6	0	1	50	0	0	58
Azerbaijan	27	3	1	3,177	1,150	0	4,357
ALL EUN countries	110,092	334,635	51,825	225,441	181,274	2,163	905,430

The results of trade forecasts for both imports and exports, are illustrated also in the figures hereunder.

Figure 4.1 Trade flows EU29 in relation with EU neighbouring countries, all transport modes, all goods, Reference scenario 2020

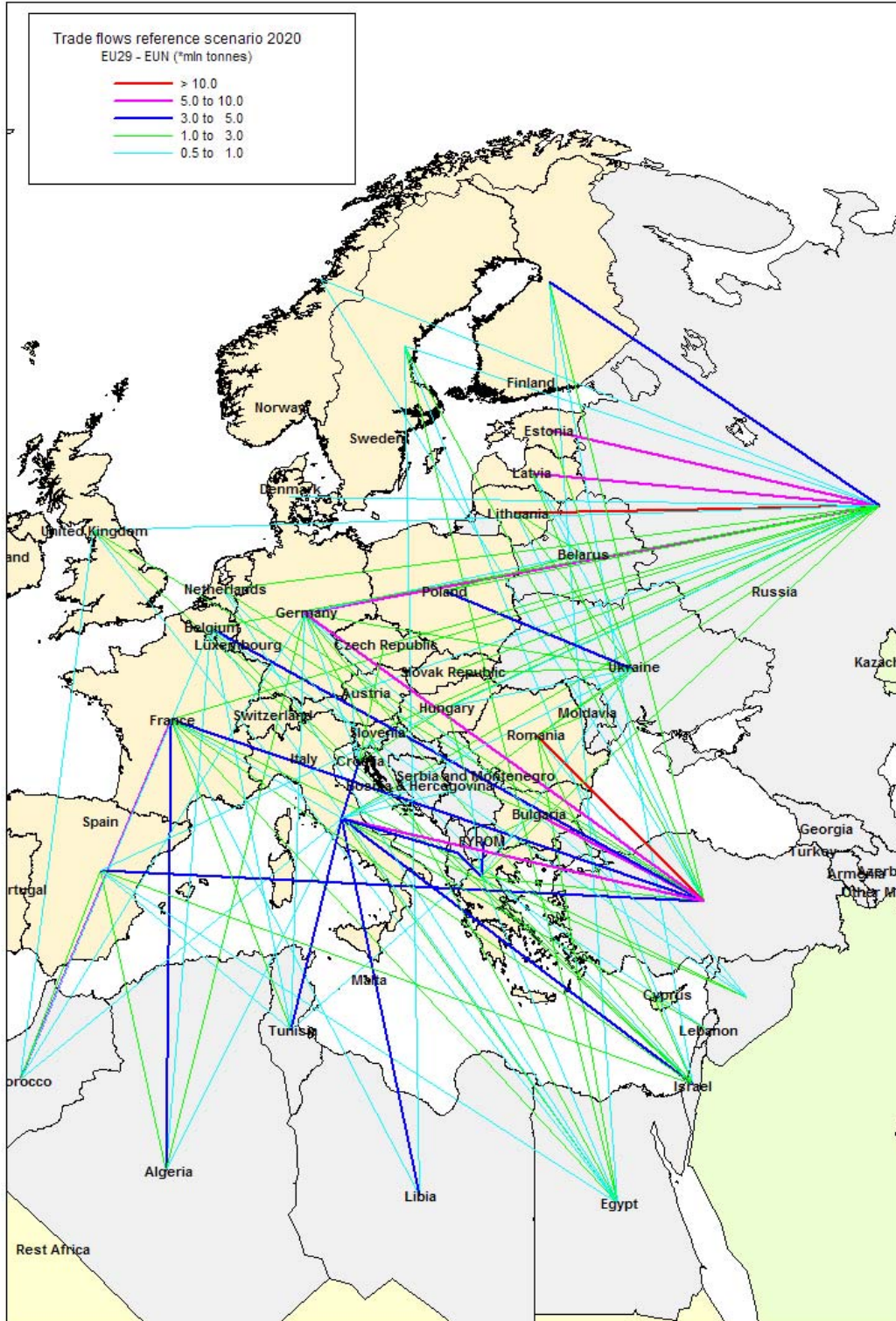
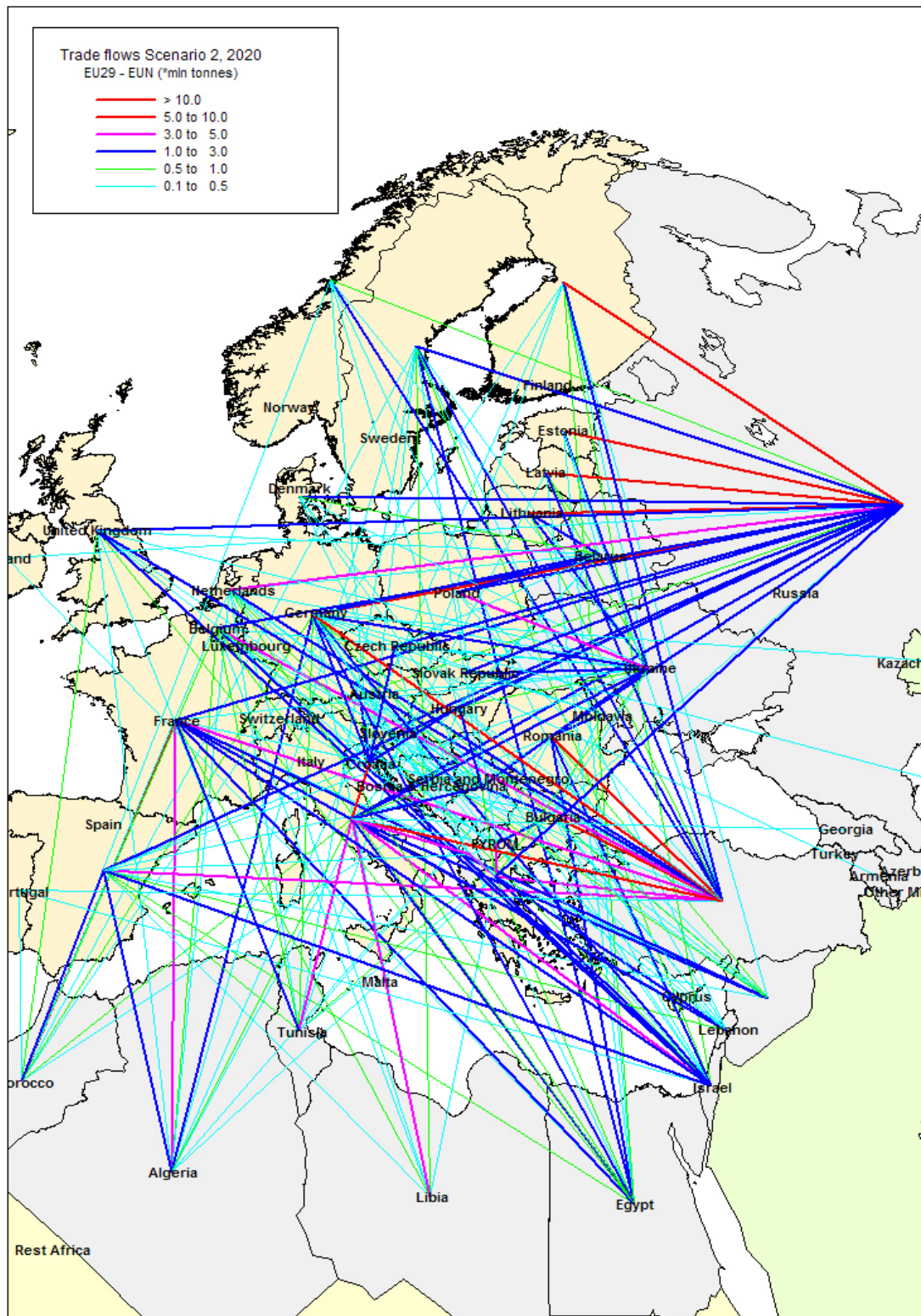


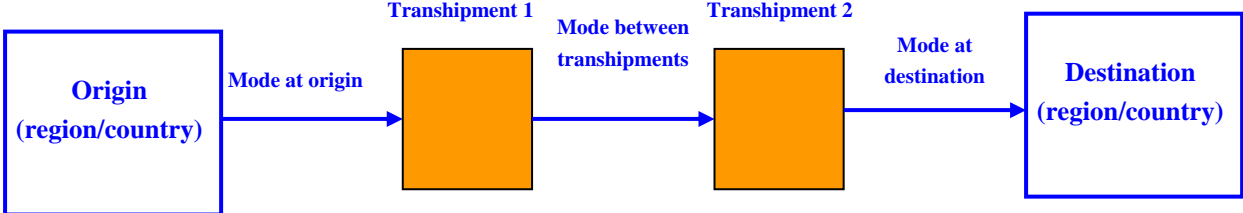
Figure 4.2 Trade flows EU29 in relation with EU neighbouring countries, all transport modes, all goods, Scenario 2, 2020



4.2 Transport and traffic flows forecasts 2020

Transport forecasts for year 2020, both scenarios, are derived from the trade forecasts, considering the transport chain for each OD relation, described by the NEAC 2020 forecasts, as follows:

Figure 4.3 Overview transport chain in the EUN-STAT database



where each leg of the transport chain is translated in an apart OD relation for estimating the transport demand by mode.

Traffic flows forecasts for both scenarios are shown in the figures hereunder.

Figure 4.4 International Rail freight flows between EU29 and EUN, 2020 reference scenario

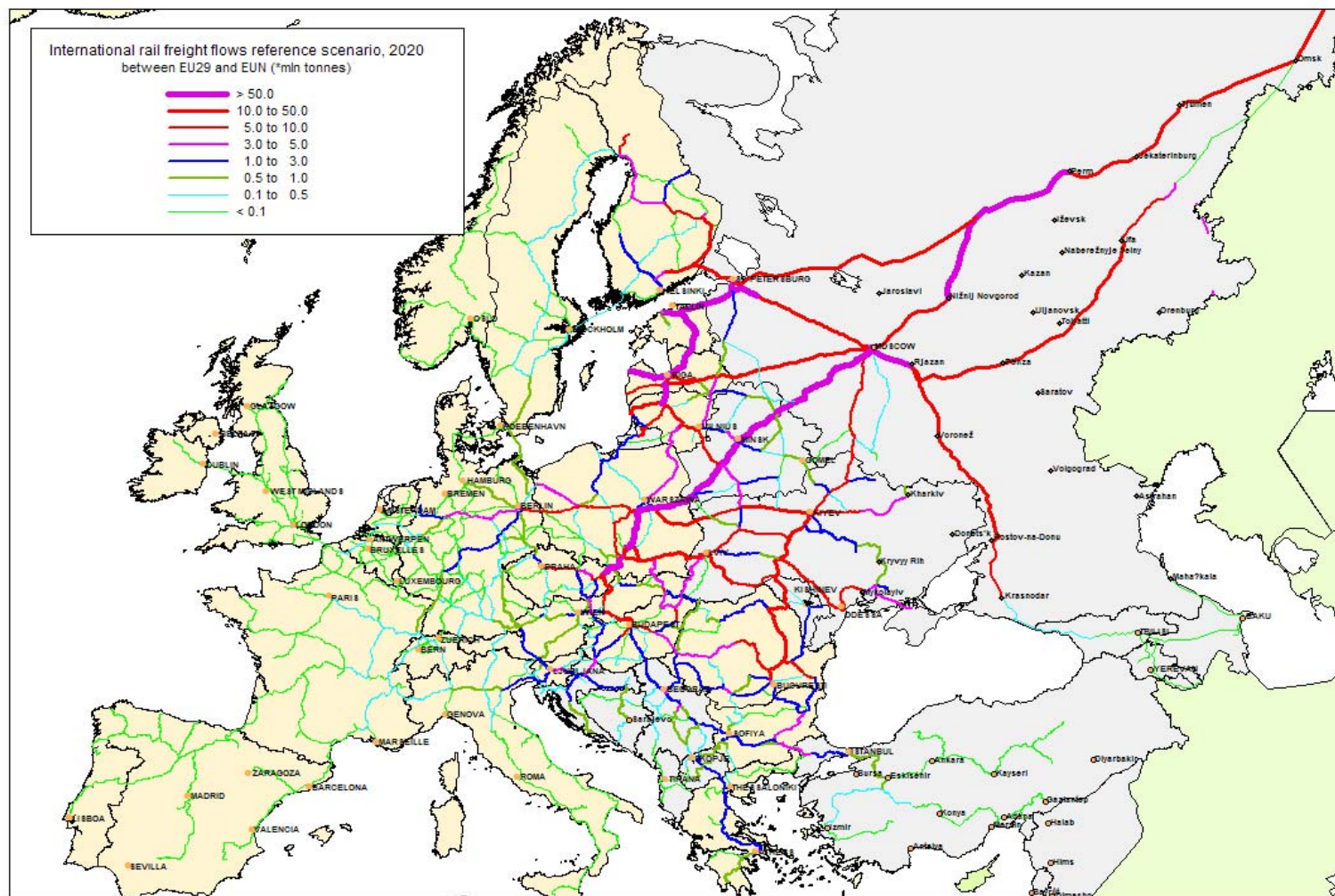


Figure 4.5 International Rail freight flows between EU29 and EUN, 2020 scenario 2

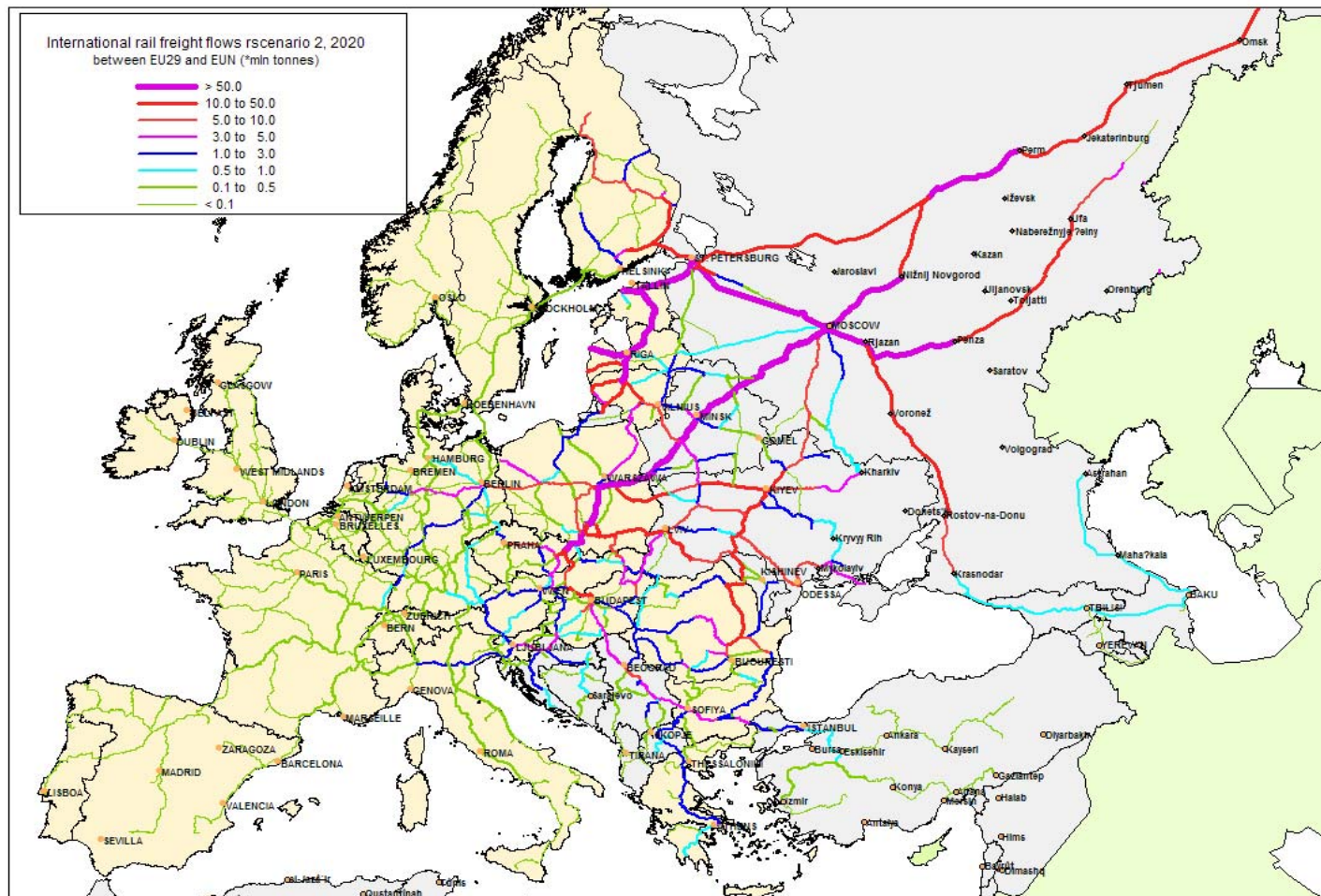


Figure 4.6 International Road freight flows in 2020 reference scenario between EU29 and EUN

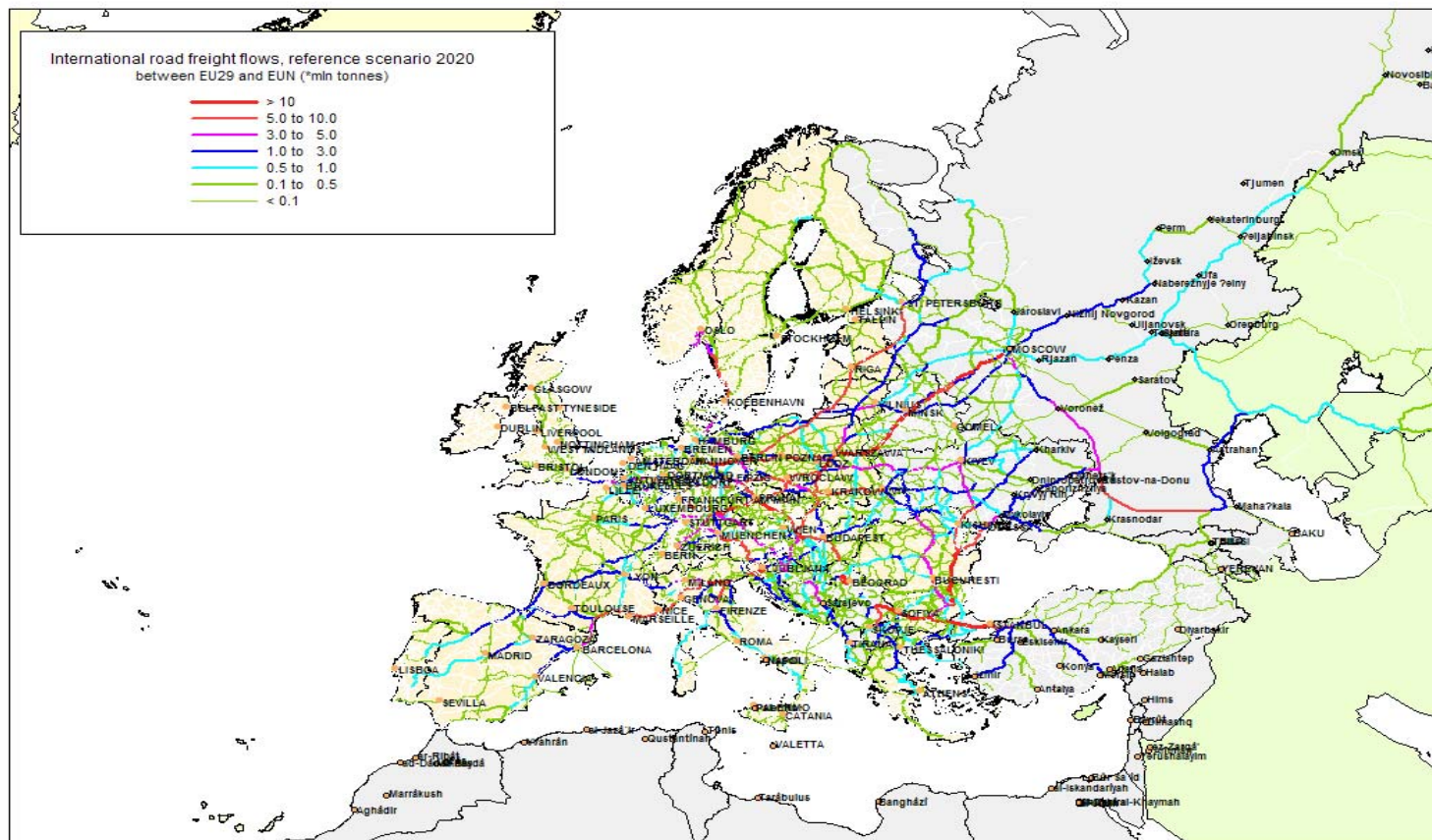
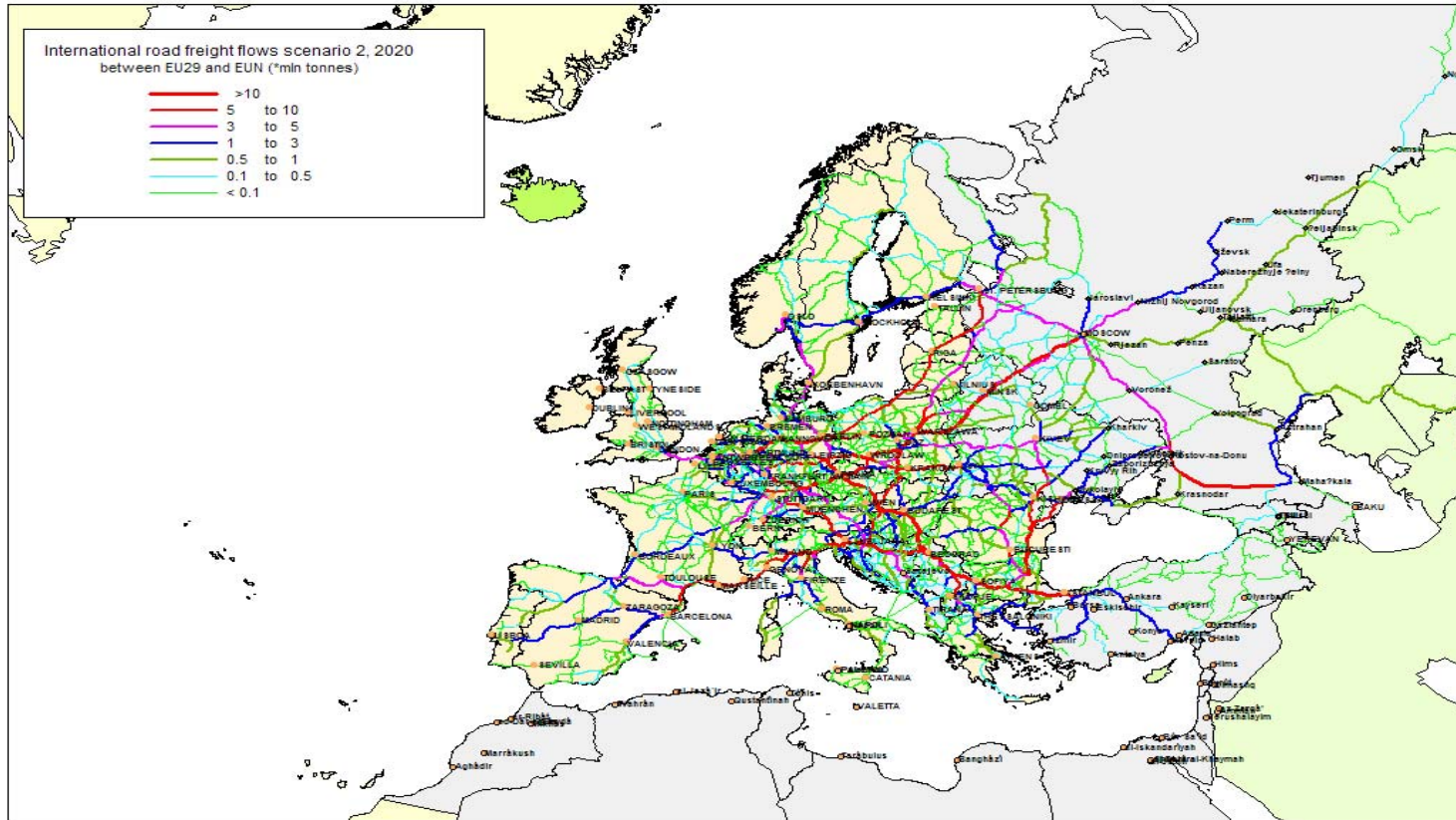


Figure 4.7 International Road freight flows in 2020 scenario 2 between EU29 and EUN



5 CONCLUSIONS AND RECOMMENDATIONS

Main conclusion on the trade flows are as follows:

- Exports and imports of EUN in relation with EU29 are unbalanced, with 116 million tones imported goods and 464 million tones exported ones. This tendency will be the same in the coming years. In year 2020, the total volume of imported good of EUN from EU29 is estimated to 254 million tones (Reference scenario) considering the basic economic growth of EUN countries, and 285 million tones (Scenario 2) considering a supplementary economic growth of EUN countries. The total volume of goods exported by EUN countries to EU29 in year 2020 is estimated to 859 million tones (Reference scenario) and to 905 million tones (Scenario 2).
- There are two main EUN “poles” of trade flows in relation with EU29: Russia and Turkey, as it is illustrated by Figures 2.3, 4.1 and 4.2.
- Trade flows are concentrated on the Eastern border of EU29, where the volumes of goods are higher than at the South border (MEDA countries).

Main conclusion on the traffic flows are as follows:

- There are higher volumes on the rail network compared to road ones, as illustrated by the traffic assignment maps presented in the report.
- Highest rail traffic flows are observed in relation to/from Russia on the following main axes:
 - Hungary – Czech Republic – Poland – Belarus – Russia (Moscow)
 - Baltic countries – Russia (St. Petersburg)
 - Bulgaria – Romania – Ukraine – Russia
- Highest road traffic flows are observed in relation to/from Russia and Turkey on the following main axes:
 - Germany – Poland – Belarus – Russia (Moscow)
 - Germany – Poland – Baltic countries – Russia (St. Petersburg)
 - Turkey - Bulgaria – Balkan Countries – Germany (North-West & South West)
 - Turkey - Bulgaria – Balkan Countries – North Italy – South of France – East of Spain
 - Bulgaria – Romania - Ukraine