

# WORLDNET Revisited – Part 1



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## Background

WORLDNET was a study [1] carried out between 2007 and 2009 by consultants NEA, Ocean Shipping Consultants, IWW-Karlsruhe University (KIT), MKmetric, TINA Vienna and DEMIS, looking at long-distance freight flows between the EU and the rest of the world.



One of the aims was to update the freight flow databases which had been set up in the ETIS-BASE[3] project, and to develop modelling techniques which could be used in the EC's main transport model, Transtools[4]. The policy context was the enlarging European Union, and the need to broaden policy perspectives to incorporate a better understanding of the relationship and dependencies between Europe, the global economy, and the significant external impacts of increasingly globalised trade.

As part of this work we carried out an analysis of trade flows, and made a forecast from our 2005 base year up to 2025, broken down by world areas. In 2005, around three quarters of exports (by weight) from EU countries were going to other EU countries, and close to half of imports were also intra-EU, but there was an expectation that external trade would grow faster in the next decades, and that trade could be developed along designated trans-national axes e.g. in North Africa and via Turkey towards Central Asia.

The aim here is to revisit these trade forecasts, and to compare current traffic levels (2019) with the forecasts made for 2025, based on results from the iTREN-2030 project [5]. Eurostat COMEXT data has been used to make the comparison, as this was the source used in WORLDNET.

## Method

A new trade matrix has been constructed from 2019 COMEXT data, using the same commodity categories and definitions of world regions as before. Trade volumes are measured in millions of tonnes. The world regions are defined as follows:

- EU28
- Other Europe –includes Norway, Switzerland, and neighbouring European countries (mainly towards the South and East, including former Yugoslavia and Turkey)
- North Africa –Mediterranean African countries
- Other Africa –the rest of Africa
- Middle East –the region South East of Turkey, including the Arabian peninsula and Iraq
- Central Asia –including the countries bordering the East of the Caspian Sea, Iran, Pakistan and Afghanistan
- East Asia –including China, India, ASEAN and Japan
- Russian Federation
- North America –USA, Canada and Mexico
- Latin America –the rest of the Americas, including the Caribbean
- Oceania –including Australia, New Zealand and other Pacific countries.

The minor difference in 2019 is that the EU includes Croatia, whereas previously the EU27 (excluding Croatia) was used.

## Results

In the following tables, the data for 2019 is inserted into the original tables published in WORLDNET's final report. We analyse EU exports and imports in turn, showing the forecasts made in 2007 for the 2025 (in red) and the actual growth up to 2019 (in blue). After the 2005-2019 comparison, a set of more detailed tables are shown showing the profile of trade in 2019 by world area and by product.

## EU Exports

Table 1 shows EU exports by world areas.

Table 1: EU exports by world areas, millions of tonnes per annum.

<b>Destination</b>	<b>1995</b>	<b>2005</b>	<b>2019</b>	<b>2025</b>	<b>Gr:05-19</b>	<b>Gr:05-25</b>
EU28	1,099	1,619	1,834	2,246	0.89%	1.65%
Other Europe	93	150	166	251	0.72%	2.61%
North Africa	29	42	66	123	3.25%	5.52%
Other Africa	21	34	57	80	3.71%	4.37%
Middle East	30	38	53	70	2.45%	3.10%
Central Asia	5	11	8	26	-2.44%	4.39%
East Asia	47	71	126	145	4.17%	3.63%
Russian Federation	11	19	17	82	-0.93%	7.59%
North America	79	157	98	163	-3.31%	0.19%
Latin America	20	23	32	41	2.45%	2.93%
Oceania	4	5	8	6	3.42%	0.92%
<b>TOTAL</b>	<b>1,438</b>	<b>2,169</b>	<b>2,464</b>	<b>3,233</b>	<b>0.91%</b>	<b>2.02%</b>

Source: WORLDNET study, Eurostat.

In 2019 EU28 countries exported a total of 2.4 billion tonnes, meaning that the average growth rate since 2005 (0.91% per annum) has been roughly half the rate that was originally forecast (2.02%). This is mainly due to lower than expected growth within the EU (exports from EU countries to other EU countries), and with other European countries.

Exports to North America have actually fallen since 2005, and so have exports to Central Asia and the Russian Federation. Amongst the other world areas, forecast growth rates were generally more accurate, e.g. to Africa, Middle East, East Asia (including China) and Latin America. Exports to East Asia and Oceania have grown faster than forecast.

These results are translated below into shares.

Table 2: EU exports by world areas, shares (%).

<b>Destination</b>	<b>1995</b>	<b>2005</b>	<b>2019</b>	<b>2025</b>
EU28	76%	75%	74%	69%
Other Europe	6%	7%	7%	8%
North Africa	2%	2%	3%	4%
Other Africa	1%	2%	2%	2%
Middle East	2%	2%	2%	2%
Central Asia	0%	0%	0%	1%
East Asia	3%	3%	5%	4%
Russian Federation	1%	1%	1%	3%
North America	6%	7%	4%	5%
Latin America	1%	1%	1%	1%
Oceania	0%	0%	0%	0%

Source: WORLDNET study, Eurostat.

Table 2 shows that overall shares of EU export trade across world areas have barely changed between 1995, 2005 and 2019. Intra-European trade is falling at a rate of about 1 percentage point per decade, and it is not likely to reach the estimate of 69% forecast in the 2007-09 study. Although the share of trade with East Asia has grown from 3% to 5%, it still represents only a small share of total EU exports. The flows can also be analysed by product group.

Table 3: EU exports by commodity group, millions of tonnes per annum.

<b>Commodity (NST)</b>	<b>1995</b>	<b>2005</b>	<b>2019</b>	<b>2025</b>	<b>Gr:05-19</b>	<b>Gr:05-25</b>
Agricultural Products	135	184	282	265	3.09%	1.84%
Foodstuffs	138	202	281	289	2.39%	1.81%
Solid Fuels	50	61	57	83	-0.51%	1.55%
Petroleum	305	561	457	897	-1.45%	2.37%
Ores and Scrap	75	101	119	146	1.19%	1.86%
Metals	116	163	168	255	0.20%	2.26%
Crude Minerals	212	245	240	348	-0.13%	1.77%
Fertilizers	36	39	44	49	0.95%	1.15%
Chemicals	150	248	339	366	2.26%	1.97%
Misc. Manufactures	222	366	476	535	1.89%	1.92%
TOTAL	1,438	2,169	2,464	3,233	0.91%	2.02%

Source: WORLDNET study, Eurostat.

Table 3 shows that the original forecasts expected positive growth in all sectors, as this had been the experience in the ten years up to 2025. However, it is noticeable that between 2005 and 2019, exports of solid fuels (coal), crude minerals, and especially petroleum products have decreased in volume. Exports of metals have grown but much less than expected. On the other hand, exports of fertilizers, ores, chemicals and manufactured goods have grown in line with predictions, whereas agricultural products and food have grown faster than expected. There has therefore been a shift in favour of non-bulk cargoes.

## EU Imports

Since 1995, EU countries import typically around 1 billion tonnes more goods (by weight) than they export, and while this remains the case in 2019, growth in import tonnes has been much lower than expected, and in fact the total volume of imports in 2019 is only slightly higher than 2005.

Table 4: EU imports by world areas, millions of tonnes per annum.

<i>Origin</i>	<i>1995</i>	<i>2005</i>	<i>2019</i>	<i>2025</i>	<i>Gr:05-19</i>	<i>Gr:05-25</i>
EU28	1,099	1,619	1,834	2,246	0.89%	1.65%
Other Europe	226	335	341	414	0.13%	1.06%
North Africa	145	185	117	228	-3.19%	1.05%
Other Africa	109	146	124	202	-1.16%	1.64%
Middle East	141	127	148	116	1.12%	-0.45%
Central Asia	48	75	45	185	-3.61%	4.62%
East Asia	58	128	151	292	1.18%	4.21%
Russian Federation	254	433	364	796	-1.24%	3.09%
North America	141	112	182	191	3.52%	2.70%
Latin America	148	213	141	234	-2.91%	0.47%
Oceania	49	49	23	40	-5.11%	-1.01%
TOTAL	2,419	3,421	3,470	4,944	0.10%	1.86%

Source: WORLDNET study, Eurostat.

Table 4 shows that between 2005 and 2019, EU import tonnes have only grown by 0.1% per annum on average. This is mainly explained by decreasing volumes imported from North Africa, Other Africa, Central Asia, the Russian Federation, Latin America and Oceania, mostly in the bulk sectors (fuels and raw materials). These decreases are partially offset by higher than expected growth from the Middle East and North America. However the general picture for intra-EU trade, imports from the rest of Europe, and East Asia is lower than expected growth.

As in the case of exports, the overall structure of EU trade has remained fairly constant from 1995 to 2005 and from 2005 to 2019.

Table 5 shows that due to decreasing volumes from North Africa, Central Asia, Russia, Latin America and Oceania, the share of intra-EU imports has actually grown. During the WORLDNET study it had been expected that the intra-EU share would decrease from 47% to 45%, whereas in fact it has increased to 53%.

Table 5: EU imports by world areas, shares (%).

<b>Origin</b>	<b>1995</b>	<b>2005</b>	<b>2019</b>	<b>2025</b>
EU28	45%	47%	53%	45%
Other Europe	9%	10%	10%	8%
North Africa	6%	5%	3%	5%
Other Africa	5%	4%	4%	4%
Middle East	6%	4%	4%	2%
Central Asia	2%	2%	1%	4%
East Asia	2%	4%	4%	6%
Russian Federation	10%	13%	10%	16%
North America	6%	3%	5%	4%
Latin America	6%	6%	4%	5%
Oceania	2%	1%	1%	1%

Source: WORLDNET study, Eurostat.

However, as can be seen below, this outcome has much to do with the reductions in imports of raw materials.

Table 6: EU imports by commodity group, millions of tonnes per annum.

<b>Commodity (NST)</b>	<b>1995</b>	<b>2005</b>	<b>2019</b>	<b>2025</b>	<b>Gr:05-19</b>	<b>Gr:05-25</b>
Agr. Products	149	210	288	291	2.28%	1.64%
Foodstuffs	189	253	325	331	1.81%	1.35%
Solid Fuels	167	272	168	405	-3.37%	2.01%
Petroleum	924	1,313	1127	1,962	-1.09%	2.03%
Ores	238	264	212	314	-1.56%	0.87%
Metals	114	176	194	292	0.70%	2.56%
Crude Minerals	205	266	254	369	-0.32%	1.65%
Fertilizers	50	48	57	65	1.28%	1.53%
Chemicals	154	242	337	334	2.38%	1.62%
Misc. Manuf.	229	376	507	580	2.16%	2.19%
TOTAL	2,419	3,421	3,470	4,944	0.10%	1.86%

Source: WORLDNET study, Eurostat.

Table 6 shows how there have been reductions in imports between 2005 and 2019 for solid fuels, petroleum products, ores and crude minerals, i.e. for most of the bulk cargo sectors. However, for the others, including agricultural products, food, chemicals and manufactures, growth has been in the region of 2% per annum, as forecast.

Therefore, as in the case of exports, there has been a marked shift away from bulks to non-bulk cargo.

## 2019 Trade Profile

A more detailed breakdown of trade in 2019 is provided in Table 7 and Table 8 for EU28 exports and imports. It is not possible to compare these tables against the WORLDNET data for 2005. We have attempted a comparison against the 2005 data reported currently by Eurostat, but the figures are not identical, due, we think, to (a) statistical corrections following the inclusion of 2004 and 2007 new Member States and (b) the presence of suppressed data in the latest results.

The colours in the table indicate whether the commodity and/or region is increasing (yellow) or decreasing (blue), in absolute tonnes.

### Exports

Table 7: EU28 exports by world area and commodity, millions of tonnes, 2019.

EU Exports	Agric.	Foods	Sd Fuel	Pet Prd	Ores	Metals	Minerals	Fert.	Chemicals	Manuf.	TOTAL
EU28	198.8	221.9	50.5	303.6	79.8	135.3	182.5	34.9	254.3	371.9	1,833.6
Oth. Europe	11.3	12.2	2.3	38.3	15.9	10.8	20.9	2.9	23.1	28.1	165.8
North Africa	17.6	3.1	1.3	19.0	3.8	4.1	4.1	0.4	5.0	7.3	65.7
Other Africa	9.0	6.8	0.2	21.7	0.4	0.8	7.5	0.6	3.4	6.2	56.6
Middle East	12.1	6.3	0.3	10.8	6.2	1.6	4.5	0.2	4.5	6.9	53.3
Central Asia	1.7	0.4	0.1	1.1	1.8	0.3	0.2	0.0	0.8	1.4	7.8
East Asia	23.0	15.3	1.3	17.6	9.5	4.5	5.2	1.4	28.7	19.3	125.8
Russian Fed.	0.6	2.5	0.1	0.5	0.1	1.3	1.3	0.1	4.3	6.0	16.7
N. America	4.6	8.5	0.4	36.0	1.5	7.3	10.0	1.4	9.5	18.9	98.1
CS America	2.1	2.7	0.3	7.5	0.3	1.3	3.8	2.4	5.0	6.9	32.3
Oceania	0.9	1.5	0.1	1.1	0.0	0.3	0.4	0.2	0.7	2.6	8.0
TOTAL	281.6	281.3	56.8	457.3	119.3	167.5	240.4	44.5	339.3	475.7	2,463.6



## Imports

Table 8: EU28 imports by world area and commodity, millions of tonnes, 2019.

EU Imports	Agric.	Foods	Sd Fuel	Pet Prd	Ores	Metals	Minerals	Fert.	Chemicals	Manuf.	TOTAL
EU28	198.8	221.9	50.5	303.6	79.8	135.3	182.5	34.9	254.3	371.9	1,833.6
Oth. Europe	33.7	19.0	0.5	136.3	23.6	22.3	53.3	4.1	17.4	30.9	341.0
North Africa	2.7	1.8	0.0	91.7	0.4	1.0	4.8	6.9	3.2	5.0	117.5
Other Africa	4.1	5.6	5.8	67.3	30.1	2.1	1.0	0.7	1.3	6.0	124.1
Middle East	0.5	0.4	0.0	134.4	0.4	1.4	0.5	1.2	7.1	2.4	148.3
Central Asia	0.8	0.7	1.5	39.2	0.0	0.5	0.3	0.2	0.5	1.0	44.8
East Asia	5.6	19.5	3.8	14.7	1.7	14.3	7.2	0.3	17.2	66.7	150.9
Russian Fed.	10.7	4.0	58.1	243.1	6.0	12.8	1.0	7.6	10.2	10.1	363.7
N. America	14.2	14.8	19.9	80.5	26.4	1.1	1.5	0.9	13.7	8.9	181.9
CS America	16.1	34.6	11.8	15.9	41.2	3.0	1.9	0.5	11.6	4.3	140.9
Oceania	0.8	3.0	16.6	0.0	2.0	0.3	0.4	0.0	0.1	0.2	23.5
TOTAL	288.1	325.3	168.4	1,126.7	211.7	194.0	254.5	57.4	336.6	507.4	3,470.1

Note that intra-EU imports and intra-EU exports refer to the same quantities, and since is the largest segment, the resulting patterns in the two tables appear similar. Most of the decreases are in the solid and liquid fuel categories, whereas the increases are amongst agricultural products, foodstuffs, chemicals and manufactures. Most of the gains by geographical area occur in Europe or in East Asia.

## Next Steps

The aim of this paper was to revisit the forecasts made by the WORLDNET project over ten years ago. Overall trade (aggregate of all products and regions) has not grown as much predicted, and this is almost entirely explained by net reductions in volumes of fuels. The modelling approach used (for NEAC, Transtools, iTREN-2030 and others) applied (positive) elasticities to expected rates of economic growth, and since the expectations for economic growth (even split into industries) were positive, so were the forecasts. The method has worked for higher value sectors such as food and manufactures, but not for bulks. Following these studies, new methods for trade forecasting were developed, so these need to be re-examined.

In the next step we will focus on the container market, and then later we will come back to the discussion about trade forecasting methodology.

# References

1. WORLDNET Final Report(D11), 2009, NEA, OSC, IWW, MKMETRIC, TINA Vienna, DEMIS. A study on behalf of the European Commission, DG-TREN, FP6.
2. NEA (1999), The NEAC-Model; 1997-2020, Zoetermeer, Netherlands.
3. NEA et al (2005), ETIS-BASE; European Transport Policy Information System, DG TREN, Zoetermeer, Netherlands.
4. TNO et al, (2008), TRANSTOOLS, Delft, Netherlands.
5. Fraunhofer ISI et al, (2007-2009), iTREN-2030, A study on behalf of the European Commission, DG-TREN, FP6.