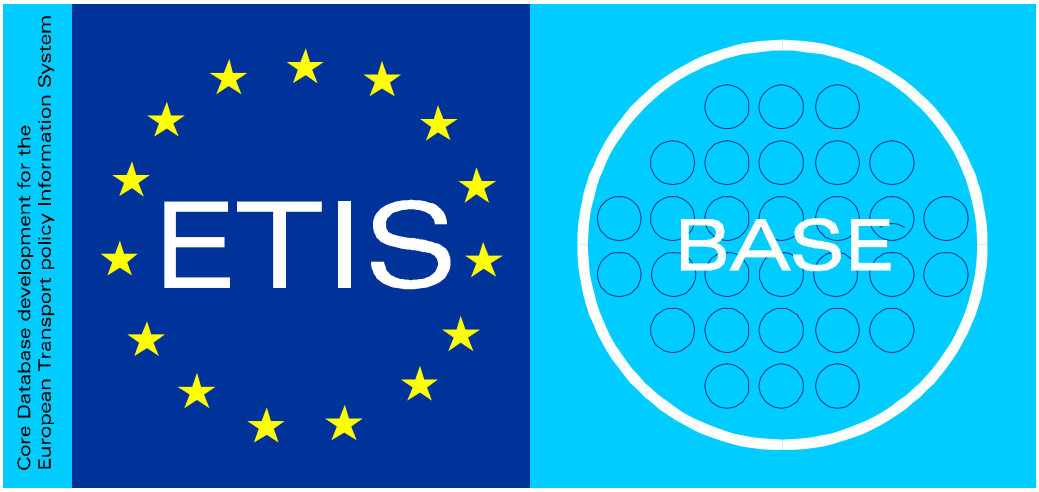
D9: Final technical report v1



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TITLE : Core Database Development for the European Transport policy Information System (ETIS)

PROJECT CO-ORDINATOR : NEA Transport research and training BV

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1 EXECUTIVE PUBLISHABLE SUMMARY

ETIS stands for European Transport policy Information System. As the name says, the ambition is to develop an information system that is related to transport policy formulation in the EU, with a special accent on the TEN (Transport European Network) policies. *Why ETIS?* Because of the need to do ex ante assessment of projects. ETIS, once complete, will offer the Commission a user-friendly tool, based on consistent and complete information, for carrying out assessments of projects and for monitoring policy.

The Commission has updated in the TEN-STAC study - the definition of the Trans European Networks, with the help of external data providers. The absence of an ETIS system was felt as a lacuna. When ready, the pan-European **ETIS database** will become the **reference** database the European Commission will use in the future for their TEN policy issues and more generally for European strategic modelling. The scope of ETIS is the EU countries, the candidate EU countries and other neighbouring countries. Additionally in order to avoid a one-time exercise, a requirement is that the methodology supporting this database should allow its regular updating in a consistent way.

ETIS is a challenging process and his success is the condition sine qua non for the Commission to assess in the future changes in transport policies and infrastructure needs. No need to say that with the enlargement of the EU up to 25 countries, ETIS will hopefully be quite welcomed.

A process like ETIS is complex and it is particularly relevant to test a prototype at the constitution of the system. Is the system adapted to the policy questions it has to deal with? Has the user an efficient and comprehensive access to the information? The first question is related to the success of data collection and manipulation, and we know that it is not an easy task. The second question is politically important.

This progress report is addressing the data base development, validation and forecasting, which have to lead to the **ETIS reference database**, the base for calculating the policy oriented indicators and answering the policy queries of the Commission.

The concept of ETIS and the process are quite innovative and challenging. One has to ensure a wide acceptance which, on its turn, opens the door for an active participation of all potential data providers and policy users. Accompanying the construction of the Reference database, a team of experts is especially in charge of the promotion of the concept. A sine qua non condition for acceptation is the quality and accessibility of the ETIS tool. This part of the work cannot be seen separately from the database: no database, tool is empty, no tool, no access and interest from policy makers. In addition a Steering Group of high level experts has provided feed-back and creative discussion to help solving problems and making the strategic choices: which data to collect (limits of costs), which indicators to include at this stage (fortunately we can refer strongly to the Commission projects INDICATORS and TEN-STAC). Policy making is a dynamic process and with the guidance of the Steering Group, the prototype and test users,

one has decided about the feasibility, the relevancy of indicators, their number and their coverage in the reference database.

ETIS reference database[1] part of the work is organised under the umbrella of key action 2 of the fifth Framework program of the European Commission, 'Sustainable Mobility and Inter-modality', objective 2.1 'Socio-economic scenarios for mobility of people and goods' and task 2.1.1/9, 'Development of a European Transport policy Information System (ETIS) as a basis for transport planning and policy formulation'.

The characteristics of current policies possibly assessed by ETIS are a guideline for the kind of information the reference database has to provide; these are:

- Measuring the extent of Community interest of infrastructure and others projects
- Dealing with the enlargement of the EU
- Addressing sections or corridors confronted with severe congestion problems
- Related to the planning of new infrastructure
- Making Europe close to the citizen

Two examples illustrate the path policy → ETIS reference database:

- How to measure the infrastructure needs with a European interest? The Commission is willing to encourage the development of a European infrastructure. One possible criterion of choice for the projects to be financed might be the percentage of international traffic on that specific link. To obtain in ETIS the percentage of international traffic on a road, we need to identify the origin and destination of the traffic, and this necessitates on its turn an origin/destination matrix of flows on a detailed scale and on a European base. This matrix does not exist and ETIS has been requested as priority to construct it.
- How to measure the environmental effects of a policy? Emissions and other nuisances are generally derived from the vehicles-kilometres performance in a country. On the other hand the Kyoto protocol requests from each country to reduce their emissions to a lower level. The policy question in this context will be for example: how can transport contribute to this objective? A correct knowledge of the source of these vehicles-kilometres is a prerequisite: where does the vehicle come from? Is going to? And which share of the trip is on the territory of the country? What is the role of sea motorways? Without knowledge of the full transport chain it is impossible to look for shifts, not only among modes, but also among routes. There is no public transport chain database yet, and

[1] The full title of the reference database part of ETIS project is ETIS-BASE - `Core Database Development for the European Transport policy Information System (ETIS)'
Other parts of the work are covered by: ETIS-LINK (promotion) and ETIS-AGENT (tool)

even the concept of transport chain is lacking in statistics. ETIS has been requested to provide an answer to both points.

The ETIS reference database work is structured along a logical path that extends from policies issues to questions about indicators to measure the effects of policies and finally the basic variables to derive the indicators: Which policies? Which indicators and variables? Which data to collect, which methods have to be defined, how to fill the gaps?

This challenging work had a duration of 33 months, starting at December 2002 and ending August 2005. This Final technical Report provides a complete overview of the activities undertaken and results achieved.

The most important written output of the work (and Deliverables where this information can be found) is listed below:

- List of performance and supporting indicators required for monitoring TEN-T policies. (D2)
- List of European models and their data needs (D2)
- Description of the supporting indicators in terms of methodology, required method variables, required models and corresponding required model input. (D3 internal and D5)
- Identification of data needs and data gaps (D3 internal and D5, D6 and D7)
- Description of methodologies to collect, combine, estimate and/or model data in order to come to a first reference database (D3 internal and D5, D6 and D7)
- List of data sources to be approached to cover these data needs. (D3 internal and D5, D6 and D7)
- Description of the data collection (D5)
- Description of the testing phase (D5)
- Validation process (D6 and D7)
- Inclusion of 2020 forecasts for freight and passenger demand (D10)
- Data files on CD with user guide (D8)
- Statistical handbook (separate book as part of D8)

In addition the ETIS reference database team has actively participated to the promotion work of ETIS in workshops and a conference, and provided in-depth expertise for the construction of the skeleton of the tool.

2 OBJECTIVES AND STRATEGIC ASPECTS

The **ETIS reference database**[2] work responds to key action 2, 'Sustainable Mobility and Inter-modality', objective 2.1 'Socio-economic scenarios for mobility of people and goods', task 2.1.1/9, 'Development of a European Transport policy Information System (ETIS) as a basis for transport planning and policy formulation'. The task is separated into three sub-tasks. ETIS-BASE addresses sub-task 2, 'the development of a reference database for the modelling element'.

The objectives of ETIS reference database are:

1. To contribute to the building of a consensus view of the reference pan European transport modelling data set.
2. To develop an open methodology to generate a version of such a set from existing international and national sources.
3. To produce a first compilation of the data set by applying the methodology mentioned above, as on-line database.

During the kick-off of the project it has been decided by the European Commission that within this project the work should focus on:

1. the development of an ETIS for TEN-T policies,
2. the procedures and data should face especially a monitoring of the TEN-T corridors,
3. the geographic scope has to be adjusted to the forthcoming 10 new members,
4. the PAN European scope has to be defined along the geographic hemispheres,
5. the degree of detail in general can be reduced including a concentration upon a few indicators mentioned in the white paper,
6. the results have to be available for further use within the GETIS system,
7. the work tasks and responsibilities have to be adjusted in respect of the new focus and the limited budget.

The Reference database of ETIS serves a various series of TEN-T policy issues: the level of detail and the variables will be appropriate for this purpose. It allows obtaining in an accurate way the performance and the impacts (environmental, economic) of transport, as well as the traffic at specific nodes or links of the networks. But the internal structure of the database allows proceeding easily to any aggregation in order to get a compact view of transport performance (vehicle-kms etc) and effects (emissions level, energy consumption by mode etc).

[2] The full title of the reference database part of ETIS project is ETIS-BASE - `Core Database Development for the European Transport policy Information System (ETIS)'

The work organisation of ETIS reference database is established in close co-operation with the external promotion[3] and contacts of ETIS. As part of this external promotion, support to the development of the ETIS reference database is an essential element.

There are several aspects on which synchronisation of the two projects has taken place:

- 4 workshops specifically related to the development of the ETIS reference database
- Open Conferences in which dissemination of results takes place
- Participation to the ETIS Steering group
- Testing of the system with pilot users, i.e. also testing of results of the development of the ETIS reference database
- Dealing with specific issues like legal and organisational aspects.

In addition the ETIS reference database development is incorporated in the ETIS software tool[4]. The two most important outputs of the reference database development that serve as input to the system tools being developed are:

1. The metadata concerning indicators and data sources serve.
2. The final reference ETIS database (including forecasts)

Furthermore in order to make it possible for the software tool developers to continue their work while the reference database was being developed working material was delivered which has also been used in the TEN-STAC project. Intermediate results from the reference database development have been delivered as soon as the came available. The ETIS reference database construction has, where possible, used the results of GETIS (GIS data) and TEN-STAC (indicator definitions and use of a selection of the input data) and found co-operation where possible.

The ETIS reference database development project, the ETIS promotion and external contacts project and the ETIS software tools project[5] have come up with a common and better harmonised focus in the course of the projects in order to be able to come up at the end of the three projects with one consistent and unique ETIS product. This product is a pilot and it is expected that one will continue to maintain and to develop the ETIS tool to the interest of the European transport policy.

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3 Promotion work is covered by ETIS-LINK project

4 ETIS software tools are covered by ETIS-AGENT project

5 respectively ETIS-BASE, ETIS-LINK and ETIS-AGENT, the trilogy of ETIS projects

3 SCIENTIFIC AND TECHNICAL DESCRIPTION OF THE RESULTS

The following sections provide an overview of the technical achievements of ETIS-BASE throughout the project. The chapter has been divided into 10 section corresponding to the work packages (WPs) of the ETIS-BASE project. Section 3.2. covers the activities that are common for WP 2 – 8.

3.1 WP 1 State of the art

In WP 1 the project was initialised by collecting all information from previous projects and structuring this in a useful and convenient way to be used as input for ETIS-BASE.

The tasks performed in the framework of WP1 are described in the following:

A: Identification of indicators

- The kick-off meeting of WP1 was held on December 17th 2002. This meeting allowed identifying in common the past RTD projects being likely to contain the most valuable feedback in terms of indicators, models and scenarios identification;

- A workshop was organised in Brussels on March 27th 2003 by ETIS-LINK (with the participation of EUROSTAT). A preliminary set of indicators needed to answer policy questions was submitted to the experts attending this workshop. This list was derived from the INDICATORS project and from the detailed assessment of about 20 relevant past RTD projects;

- An updated list of indicators was prepared, taking into account the written comments and suggestions received from these experts after the workshop, the recent information received about the variables used in the STAC project, as well as WERD's SG-TERN information. This list provides information about the level of detail required for each variable (NUTS level, geographic scope, modes,….);

- This revised list was then presented at the ETIS-BASE intermediate project meeting on June 25th, 2003 and modified according to comments ;

- Finally, this list was discussed again after inclusion of new information coming from the indicator list of TEN-STAC phase 2 at the ETIS-BASE project meeting on 22nd and 23rd October and some minor comments from participants were included again.

B: Data availability

A detailed description of the relevant sources of information available for each indicator was prepared, by interviewing directly the deciders in charge of statistics development in each source and by valorising past RTD projects as BRIDGES, SCENES, UNITE,...

C: Review of European models

- Preparation of a thematic list of existing models. Particular attention was paid at models dealing with the elaboration of indicators defined in A: Both forecasting models and models for the appraisal of investments are considered;

- Short description of each model: field of application, spatial scale, geographic field, experience acquired. The starting point of this description was the input from SPOTLIGHTS and ATOM projects;

- Identification of the input data being necessary for modelling (for a set of relevant models). This identification was performed by using the feedback from past RTD projects (COMMUTE, …).

D: Organisational, legal and contractual aspects.

- Preparation of a working note examining the organisational and legal aspects of the construction of ETIS,
- Animation of the ETIS-LINK workshop held on June 18th in Brussels.

E: Collection of public data (sources) from previous projects

A preliminary screening of finalised projects performed by order of the European Commission has allowed identifying some projects which developed data publicly available. These sources have been collected in order to provide input for the other WP's.

As a synthesis of Parts A, B and C, an interactive information system was prepared (under EXCEL) gathering the whole information dealing with policy and supporting indicators, sources and models. This information system constitutes a comprehensive and consensual framework for the next WP's.

The work of WP 1 is reported in Deliverable D2 which consists of a report and a CD.

3.2 Development of the data sets; WP 2 – WP 8

WP 2 – 8 in which the different data sets were developed, have worked in parallel and exchanged information where appropriate. The data sets covered by these work packages are:
WP 2: socio-economic data
WP 3: freight demand data

WP 4: passenger demand data
WP 5: network data
WP 6: freight services and costs data
WP 7: passenger services and costs data
WP 8: external effects data

On many points the work on the different data sets was interrelated. In some cases data of one WP is input to another WP and in other cases common methods and inputs were used. Several meetings were necessary to identify these aspects and to ensure that the work of the WP's was interconnected properly. The coordination, synergy and synthesis of the work was stimulated by WP 9 (synthesis of the results of WP 2 – 8) and WP 0 (co-ordination).

The work of these WP's was reported in common deliverables. The reporting of these deliverable D3, D5, D6 and D7 has been organised in such a way that each WP makes its own report in a structure as defined by WP 9. These reports are annex reports and the synthesis report, made by WP 9 in co-operation with the co-ordinator (WP 0), is the main report.

A set of standard templates relating to the methodology for the indicators has been supplied for the D3 and D5 report**.**

During the project it was decided by the Steering group that it would be useful to include forecasts in ETIS based on the data generated in ETIS-BASE and using the forecasting method developed in the TEN-STAC project. The commission agreed on a budget shift in the project that has made this possible. This work has been performed within WP 3 (freight demand), WP 4 (passenger demand) and WP 5 (networks) and is reported in a separate deliverable D10.

The data resulting from these WPs is delivered on CD in deliverable D8. The data are also included in the ETIS tool developed in ETIS-AGENT. In a statistical handbook which is also part of D8 some examples (approximately 170 pages of maps and tables) of information that can be extracted from the data sets have been included.

In the following sections each WP of these WP's is discussed for WP specific progress.

3.3 WP 2 Socio-economic data set

Concerning WP 2 it is important to stress that this WP is in a particular position within ETIS BASE. During the meeting in Brussels it was stressed that in the list of performances indicators the socio economic dimension is not the focus and the Commission wants to concentrate on the transport sector.

But on the other hand it appeared clearly from the discussion that the socio-economic context, the "non transport" objectives of present transport policies take more and more importance: a

transport database cannot be elaborated without reference to socio-economic context, evolution of attitudes, changes in institutional framework and introduction of few supplementary performances socio-economic indicators has been analysed.

Furthermore it was stressed that many data gaps will occur, as already pointed out in the kick off meeting of other work packages; socio-economic indicators have to be available for filling these gaps using modelling tools, as expected in the project methodology.

In order to reorganise WP 2 in accordance with these remarks a discussion took place about the new role of socio-economic indicators in the development of the project.

- Need for model assessment for passenger and freight demand, and maybe for some evolutions of the transport services supply: effects of new needs or attitudes for passengers or industries, impact of new technologies, analysis of the motorisation phenomenon which is linked to mobility evolution and modal choice
- Role in the definition of scenarios built according to different socio economic contexts in order to test transport policies
- And sometimes use of socio economic indicators or “proxies” data when corresponding available transport indicators are not available: for example population for traffic distribution or for calculation of performance indicators.

Furthermore, the geographic context of opening to the East beyond the CEEC countries and the context of opening to Mediterranean regions is important for the development of the TEN: for these countries a relevant collection of socio economic indicators might be of particular importance.

There was already an urgent need expressed concerning access to data of Cronos; the Commission has allowed access to Cronos data.

After an inventory of all the requirements of the other work packages concerning socio economic data the structure of the socio economic database has been defined putting forward the geographic scale (European, national, regional, local levels) and the geographic scope (EU 15 countries, EU 25, candidate countries, “new neighbouring” countries) so that the database organisation will directly correspond to different types of policy makers (and policy tools) as well as to recent objectives of the Commission: after the definition of new European guidelines in 2004, and the stress put on harmonisation of evaluation procedures for different types of stakeholders, the European transport policy is now concentrating on the improvement of connections with “neighbouring countries”; these countries are CIS countries, Balkans countries and Mediterranean countries.

The second dimension of analysis points out differences of structures of production at national, regional (Nuts II), local (Nuts III) levels: more details are available at Nuts II than at Nuts III

but the presentation of the database is done in such a way that Nuts III data are “embedded” in Nuts II data.

In doing so it is also easier to define default values (values which are available at a higher level of aggregation). The estimation of default values is indeed not a topic for WP2 because it will require choice of a type of economic model: from this point of view ETIS remains “neutral” as regards sectors which are not transport sector and choice of default values for socio economic data is made in a simple, fully transparent way (even though it can appear sometimes as fairly simplistic).

Concerning passenger transport it appeared relevant to detail households information, motorisation data and information about age structures: these are important as regards mobility pattern.

The strategic importance of demographic factors is due to

- important differences in population rate per country
- important differences in the rate of increase or decrease of population reaching the age of employment or retirement
- importance of generation factor for mobility and motorisation rate.

Therefore two structural effects had to be taken into account

- the pyramidal structure of population and the changes occurring in this structure
- the detailed regional populations.

This second level of desegregation of population is indeed also required in transport modelling for proper assignment of traffic in the transport network because:

- it is not possible to have an accurate view of importance of corridor if we remain at the level of countries even when these countries are non EU countries
- the only regional information available with most neighbouring countries are in general population data.

Therefore distribution of activity will be distributed according to distribution of populations, which required in WP 2 a definition of regions to which correspond information of population.

Socio economic data is selected in a consistent way, avoiding picking them in independent sources because there are often interrelations between these socio economic data: they must remain consistent even though the central objective of ETIS is not the presentation of such interrelations.

New possible developments have also been presented with what was called a bottom up approach of socio economic data: more detailed GIS information about population or geographic characteristics make it possible to build by using “raster” or “buffer” techniques new

indicators per zones, and in particular for indicators describing the geographic environment. Such indicators require the use of detailed GIS database such as CORINE LAND COVER.

Finally general information about societal characteristics were also collected when available as for example revenue per capita and per zone since they are required for mobility of passengers.

The collected data has been transmitted in three parts (three CD) relative to demography, economic indicators, households and motorisation information. The access to the data has been conceived in order to be fairly easy to use.

The last part of the WP 2 was the validation phase with questions raised by national validations. The questions were mainly concerning the level of detail which was available keeping in mind that the global outputs for WP2 had to be homogenous as regards country inputs even though more details were sometimes available.

Furthermore it was stressed that during ETIS process progresses in access to EUROSTAT did occur with free access (when it was not the case before) so that updating can become easier in the years to come.

3.4 WP 3 freight demand data set

Besides the OD matrix, which is considered as one of the most important elements of the reference database, only aggregate time-series data for terminal and port figures are needed as can be concluded from the indicator descriptions. Due to the complexity of the construction of the OD-matrix it is only possible to develop a base year 2000 OD matrix. For the ports and terminals aggregate time series data could not be made available in this project due the fragmented availability.

In the initial method development the knowledge of the partners on databases from previous work has been used extensively. This was possible due to recent projects in which data had been collected and analysed. The list of required variables within the OD-matrix is extensive and as a result the list of methods to be applied to obtain all this information is also impressive. In the testing phase it was analysed which of the methods should be applied within ETIS-BASE taking into account the data and budgetary restrictions and as a result which of the variables can be obtained.

After the general method development the focus of the work was on the data collection and the testing phase. As was expected the data collection has taken up a lot of time. This is because of the fact that quite detailed data is requested and the data suppliers often need to be convinced to supply it. The testing phase of WP 3 has had as main objective the set up of methodological approaches in order to cope with several critical aspects, e.g. transhipments, region-to-region

flows, etc, and to verify the feasibility of their estimation. Furthermore an important aspect of the testing phase was the combination of methods of MDS and NEA.

In the testing phase the methodologies in general were proved to be feasible in the context of the ETIS purposes, even if some minor changes have been taken into account, e.g. the difficulty to estimate intermodal transport, the need to make adjustments for accession countries data.

During the test phase of the development of a freight O/D matrix two things have become clear in relation with the transhipment at inland terminals:

- The required data is not available for inland terminals (this conclusion has already been drawn in other projects and it also became clear during the data collection in the ETIS project);
- Methods can be applied to fill the above mentioned data gap by estimating the data. These methods are too complex and too time consuming to fit in the scope of the ETIS project.

As a result, it has been decided to leave information about transhipment at inland terminals out of the freight O/D matrix. Information about transhipment included in the freight O/D database concerns solely transhipment at seaports. In the mean time this gap has been communicated to the ongoing project TRANS-TOOLS where a model for DGTREN will be developed to determine the inland transhipment.

For the accession countries it was decided in the testing phase that a different method should be applied. The reason for this is that after entering the EU in May 2004 the data collection methods will change on important aspects in order to come in line with the EU-15 countries. Available data from – amongst others – the INTERMODA project, NEAC and TEN-STAC are used for these countries. Once the accession countries have become member of the EU and an update of the ETIS reference database will be made in the future, the same methodology can be applied for the accession countries as it is now applied for the current EU countries.

The methods proposed have been applied and therewith the required database constructed. The resulting OD matrixes are very detailed and require caution in their use. In case the most detailed level is used the reliability of the figures is in some cases relatively low due to the fact that some elements have been estimated. The user therefore has to be guided. The solution chosen is to provide only sub-matrices that do not contain all the variables in one matrix, to be used by the common users. The complete matrix can be used by expert users only which need to be trained to make the proper selections and interpretations. The simplified matrices have been sent out to the validators. The remarks received back in most cases are a result of a misunderstanding of the definitions in the matrices. In the final product this has been partly solved by the automatic provision of meta data in the software tool developed in ETIS-AGENT. The complexity of the definitions will remain however. It therefore was decided to also deliver

simplified data sets for the normal user. The more detailed matrices are then to be used for trained users.

In the validation process also remarks of another type have been received where it turned out that the coding system applied was not precise enough. This was adjusted in order to show more clearly which information is known and which is unknown.

Furthermore based on the comments received back from the country experts and TRANS-TOOLS that had started using the draft data, improvements have been made on the methods. When making the improvements the opportunity was observed to combine some of the activities together with EUN-STAT. In EUN-STAT more recent data was collected for the 10 New Member States. Originally in ETIS-BASE it was agreed to include already existing data for the New Member States in order to focus on a repeatable methodology for the EU 15 since the data situation for the New Member States was changing. Now in cooperation with EUN-STAT the data for the 10 New Member States have been renewed where possible.

The forecast of the 2020 freight matrix was done by using the TEN STAC scenarios. Due to some differences in regionalisation and data structure some adaptations have been made where needed.

3.5 WP 4 Passenger demand data set

The most important result of WP 4 is the passenger OD-matrix. Therefore the focus was on filling all elements of the matrix with the required information to a maximum extent. As the matrix size was extended from the existing 15 European member states plus Switzerland and Norway by the 10 new accession countries the effort concentrates on filling gaps due to missing information in many countries. In the light of this task it was decided to incorporate to a maximum extent the different countries. In addition the effect was that the countries will be more interested in the ETIS idea than without incorporating them.

Due to the complexity of the construction of the OD-matrix it is only possible to develop a base year 2000 OD matrix. To do so the most appropriate information as close as possible to the year 2000 has been used, e.g. sometimes this will be information from 1998 and sometimes from 2003. In addition existing harmonised material has been extracted from UN and EUROSTAT describing other passenger demand relevant variables and diverse external data sources.

The working sequence used in WP4 to create a matrix is based on the partners experience during previous work. To face the challenge in creating an European passenger flow matrix we performed the following steps in a first Phase:
First a synthetic trip purpose specific passenger flow matrix was computed by using the available in-house models (VACLAV, VIA). These models used in house socio-economic data

as neither indicators provided by WP2 were available at that time, nor complete impedances for the modes rail and air were fully available at that time from WP7.
The second step was a first validation of the generation and distribution reflected by the synthetic matrix using the DATELINE mobility.
In a third working step the passenger flows of the synthetic matrix were assigned to the mode specific networks, whereby again the in-house model (VACLAV) was used and the route choice results for the air mode were incorporated. This step was undertaken in close co-operation with WP5.

This procedure was different from the approach originally planned, as some data were not available at the time were we needed them for the foreseen approach. In addition it came out, that it is quite difficult to receive the national matrices due to the fact that they are mostly treated confidential and not commercially available. Therefore the team decided to be progressive within Phase 2 and use the synthetic matrix (test matrix) of phase one, even when not all requested information was already available from WP2, WP5 and WP7. This especially holds for attractivity indicators different from the standard variables GDP, population, households, motorization and GVA, travel impedances for rail and partly for air transport (tariffs). Another point is the EURCONTROL flight data, for which a MoU between EC and EUROCONTROL is required.

27 sub-matrices were extracted out of this synthetic matrix, one for each core country with convenient aggregations of its surrounding countries. In addition to these matrices we produced country-specific assignment maps for all main modes (rail, road and air) and a brief summary of these results. This procedure targeted in confronting the representatives of the core countries by providing the national synthetic matrices for a critical evaluation within the very beginning of Phase 3.

These “country-packages” offered consisted of

- domestic flows of the country
- international flows originating / destinating in the country
- transit flows touching the country

All flows mentioned above were separated by three modes

- road,
- rail and
- air

focussing on the main mode, meaning trips, where more than one mode is involved are dedicated to the core mode of this trip.

These flows were presented in different levels of regionalisation focussing on the grade of detailedness which might be available in the transport information existing in each country.

Therefore the matrix is shown on the

- NUTS3-level for regions for the country itself
- NUTS1-level for bordering countries
- NUTS0-level for other countries

The feedback to the provision of these "country-packages" consisting of matrix and assignments was – depending on the specific country – quite different. While there were some countries providing "national matrices" or actual link loads of the national networks others made an evaluation of the key figures concerning the passenger flows and the assignment or offered access to the results of national transport surveys or at least mentioned sources where data to validate the matrix is available. Information concerning link loads was redirected to WP5, to improve the results of the assignment of passenger flows to the networks. From some countries – although their representatives were asked for that by the WP leader and/or the co-ordinator – no reply reached us.

All the data, information and comments given as a feedback to this second phase were collected and adjusted where necessary, as in some cases some figures offered from different countries were in contradiction to each other. So additional queries concerning the definition or the way some figures were calculated / estimated / derived from other sources were necessary.

With this harmonised data as a feedback from the second phase the calibration of the synthetic matrix was done. Together with the mode specific impedances delivered by WP7 and the basic socio-economic data from WP2 the whole process of trip generation, distribution, mode choice and matrix bounding could be repeated. Unfortunately attractivity indicators different from the standard variables which originally planned to get from WP2 were not available for this final model run. This process is almost finalised and will be finished within 2004 allowing to offer the final matrix concerning passenger flows by three modes.

With harmonised data as a feedback from the second phase the calibration of the synthetic matrix was done. (Using the mode specific impedances delivered by WP7 and the basic socio-economic data from WP2 the whole process of trip generation, distribution, mode choice and matrix bounding is repeatable.) The results of the assignment procedures run by WP5 and comparing their results to the assignments offered by some countries some minor changes to the matrix delivered were necessary. WP4 provided an update of the matrix with respect to the findings of the assignment procedures. In addition some information announced later by some countries led to another update which were included in the final update.

Concerning the indicators assigned to WP4 it can be stated that all variables calculated within WP5 to produce these indicators are just the passenger flows forming the matrix.. Therefore all indicators assigned to WP4 were delivered on the same date.

This matrix projection was done by adapting growth factors from the STAC project which dealt with transport demand in 2000 and 2020 on the ETIS matrix for the base year 2000. The result of this procedure was checked for plausibility concerning the topics: mode choice, trip generation, trip distribution and additionally assignment by an iterative process involving IWW and their network models. This allowed to produce a passenger flow matrix for 2020 very quickly (finished in April 2005) which is consistent to the finding for the base year matrix produced within ETIS.

The direct use of the 2020 passenger flows from the STAC project was (is) not possible due to the incompatibility of the flow patterns for the year 2000 of both projects.

3.6 WP 5 Network data set

The work for WP 5 has embraced intense data collecting tasks, as well as the further development of methodologies and performing assignments.

Different data sources have been analysed:

- UNECE traffic counts
- UIC rail traffic data
- GISCO data

Different network data have been analysed:

- available network data, especially the Eurogeographic data
- GETIS-System, a geographical database,

A lot of time was needed for the analysis of necessary and available data for the TEN policy indicators (documented in the annex report WP5: “ETIS-Database methodology development network data input”).

The intention of GETIS was to provide the European Commission with a system, which integrates and manages different network related data for presentation and spatial analysis purposes. The spatial database system developed by GETIS serves as a reference for the maintenance of spatial data within DG TREN. Due to this fact the co-operation with GETIS had a high relevance for ETIS-BASE. The main focus of GETIS is on the TEN-network. The data was used as a topographic map where all available data-sources were linked to (TEN-Invest, UIC, UNECE etc.).

WP5 has attempted to link the transportation networks, which are part of the GETIS database with the networks, which are used in ETIS-BASE for assignment calculation. The GETIS spatial database turned out not to be suitable for network modeling. There is a problem with the included nodes. If a road crosses another road (e.g. on a bridge: traffic cannot change the roads)

the Eurogeographic dataset treats this situation like a junction (The Eurogeographic data uses for this crossing a node). For this reason the TEN-STAC model is used. For the usage of the TEN-STAC model in the ETIS-BASE project several time intensive changes were made. These networks that have also been used in TEN-STAC have been delivered to GETIS by NEA and IWW for inclusion when GHETIS was still an ongoing project.

Assignments have been made by using the transport flows for freight and passengers as generated by WP 3 and WP 4. Assignments were made for the modes road, rail and inland navigation by using the same assignment models as in TEN-STAC and EUN-STAT. Since these models had already been applied in these projects where comments were given, it was decided not to be necessary to have a dedicated validation round in ETIS-BASE. The data have been presented in the ETIS-AGENT tool and during the ETIS-LINK training workshop and final conference where no comments have been received. Due to changes made on the freight matrix in WP 3 it was necessary to make an extra round of assignments.

Also the forecasted transport flow data have been assigned in this WP.

3.7 WP 6 Freight services and costs data set

The tasks performed in the framework of WP6 are described in the following.

Based on a list of completed and ongoing research projects it has been identified that although there are few comprehensive sources of freight supply side data, a large amount of work has been carried out regarding techniques for building supply side databases which formed a starting point for WP6.

The process of harmonising the service and cost data is based upon an existing conceptual model developed for DG-TREN within the Bridges project. In essence the use of a standard conceptual model presents the data in the form of inputs for a transport model. This allows indicators based on network paths, such as costs and travel times to be computed.

Three new software components have been constructed to handle the data for WP6: a transport network data model, a generic cost model, and a tool for computing paths through the network based upon the cost model. These harmonise the data inputs and fill the data gaps to provide comprehensive databases with which to compute the supporting indicators.

Data for WP6 can be separated into three categories: GIS data which will be acquired directly and integrated, Cost structures which are essentially methods for computing costs over given paths, and Data on freight services which need to be compiled from industry sources.

During 2004, a large amount of data collection has been carried out. This is largely because there are no "one-stop-shops" for the kind of data required relating to transport services and costs. The data sources are typically the freight operators themselves, so it has been necessary to obtain small quantities of data for a large array of data providers.

Regarding infrastructure data, it has been possible to source the requirements for road and rail from within the WP6 team, but these items have only been available from May 2004 onwards. Therefore there has been a necessity to use alternative sources (e.g. EUROSTAT) in the first half of the year. EUROSTAT data was obtained in March 2004.

There are no infrastructure databases covering maritime corridors for obvious reasons. However, it has been convenient to treat maritime corridors in the same way as land transport corridors within ETIS, so a pseudo-network has been constructed connecting maritime terminals, allowing distances at sea, transit times and distance-based costs (e.g. bunkers) to be calculated, for given ship types.

The GIS data had to be harmonised, so that the structures for road, rail and water can be searched according to the same rules. Essentially this means relating the links and nodes to the NUTS3 regions, removing inconsistencies such as broken or inaccessible links, using a common GIS projection (decimal degrees), and converting the files to the same database format (MapInfo interchange format). IWW, NESTEAR and MDST have worked together on this item.

The cost data has been collected from many different sources, including market research projects, and DG-TREN sources such as RECORDIT. The results from different countries have been harmonised into a common cost model structure, based largely around the UK Department for Transport's National Freight Model, GBFM. AJI-Europe, ISIS, NEA and MDST have worked together on this item.

The freight services data has been compiled from industry sources, typically obtained on the Internet, from the service providers. The data has been harmonised into structures developed by MDST for maritime data, and NESTEAR for rail data. All the loading and unloading points (ports and terminals) have been classified and related to the GIS data, so that the services can be used within a conventional GTF-style link and node network

There has been a need to develop new software to address the need for a processing stage to link the raw data to the indicators required by ETIS, as handled by the AGENT tool. In brief, the AGENT tool, which is a database system rather than a transport modelling system cannot perform network searches, required to estimate short paths through link and node networks. Therefore a new software tool has been developed to fill this gap. It calculates impedances by mode between NUTS3 O/D pairs, and outputs the results into a database. From this point, most of the ETIS indicators can be retrieved by simple SELECT queries.

The testing phase for WP6 ended in the Spring of 2004. However, since many of the required data inputs were only obtained in the Summer, it was only possible to test sub-sets of the system.

Further testing and later, validation, were carried out in the Autumn of 2004, with the help of experts from Austria, the Netherlands, and the UK. Most of the feedback from the validation process has now been implemented within the system. The two main tasks remaining involve updating the cost model for maritime services, and improving the method by which specific traffic regulations (e.g. road user charging in transit countries) are used within the cost model.

3.8 WP 7 Passenger services and costs data set

The tasks performed in the framework of WP 7 are described in the following.

Especially the data retrieval for rail tariffs has proved a time sensitive task, mainly due to the following facts:

- Rail tariff systems differ strongly among different countries and rail operators, and
- a consolidated database for rail tariffs does not exist.

Hence, as input for the generic cost model on passenger rail tariffs, cost data have been retrieved from railway companies' Internet websites, for different demand/supply cross segments and for a sufficient number of links, for each country/ railway company individually. For most railway companies the tariffs had to be retrieved and queried individually for each cross-segment.

In the generic cost model has been developed the supply segments considered have been defined as follows:

- high-speed rail services on high-speed rail infrastructure, e.g. ICE service Frankfurt – Cologne, TGV service Paris – Lyon – Marseille, AVE service Madrid – Sevilla
- high-speed rail on conventional infrastructure, e.g. ICE service Stuttgart – Zurich, TGV service Toulouse – Bordeaux, ES service Torino – La Spezia
- qualified long-distance trains, e.g. trains with EuroCity/ InterCity standard
- other long-distance trains, e.g. direct trains/ inter-regional trains
- regional trains
- special international services, e.g. Thalys/ Eurostar services

Furthermore, the demand side has been segmented along the trip purposes business, private and holiday. Assumptions on the demand segments have been made as follows:

- business travelers use first class, buy a flexible ticket and do not buy the ticket in advance
- private travelers use second class and are able to buy a ticket maximum three days in advance

- holiday travelers represent a price-sensitive market segment, use second class and are able to book tickets up to three weeks in advance

Road charges are an important input for the generation of direct costs for road passenger transport. Also for this a consolidated data base does not exist. Hence the information on road tolls has been collected on the Internet, for each system (country) individually.

Rail tariffs for "combined" supply segments, i.e. prices for itineraries consisting of several supply segments, were taken into account and analysed. The development of the methodology on passenger rail tariffs has revealed some limitations of the approach, especially for rail tariff systems, which correspond strongly with the competitive situation of the rail mode and in which a kind of "skimming" price strategy is applied, like for international services (e.g. Eurostar Paris/ Brussels – London) or for several relations in the UK. Due to the impossibility of transferring rail line information from the Hafas server to the IVT rail line network model, the IVT rail line network had to be updated manually. Hence the rail travel times matrix and the distances are based on a rail line network model, which contains all important rail lines in Europe, but not every rail line. The rail model provides more appropriate algorithms for seeking the shortest path than the Hafas server.

The approach applied for direct costs road presumes the focus on direct ("out-of-pocket") costs. Hence the work on collection of information for link-specific road charges was finalised. Furthermore, the road network links subject to a generic road toll (vignette system) were implemented in the current road network model and a methodology has been developed for the inclusion of generic road tolls for the calculation of direct costs road.

For air impedances the methodology has been refined and adapted to the situation of data availability. The underlying conception of air trips as being a part of an inter-modal trip chain (access region – airport, flight airport – airport, egress airport – region) has been developed further. Travel impedances represent average travel times/ costs between European regions, under consideration of specific modal shares for access to/ egress from airports, as well as different services and routings between airports. Eurocontrol data on flight movements were not available for the calculation of air impedances.

The retrieval of data for ferry links within Greek and from other countries to Greek islands as well as for further links in the Aegean Sea has been an extensive task with respect to passenger ferry level-of-service data. The Internet has proven as the most important medium for the investigation of data for tariffs and the level-of-service for ferry connections on the Aegean Sea.

WP 7's input to the ETIS testing an validation phase embraced the delivery of data and a documentation of the contents and the methodologies for following indicators:

- direct travel costs passenger road,
- travel times passenger road,
- direct travel costs passenger rail,
- travel times passenger rail,
- passenger travel times and frequencies air

Taking into account outcomes of the validation phase the impedance matrices for passenger transport have been processed.

3.9 WP 8 external effects data set

The indicators specified in WP1 were compared to the ones available in different sources. The collection procedures and templates were specified. Rules for data collection and a harmonised methodology were developed

Based on the input from WP1 on the data needs, a common data model (framework) has been developed. It is consistent especially with the structure of WP's 5 (transport networks), 6 (freight transport) and 7 (passenger transport). Specific algorithms for data collection, combination, organisation and forwarding have been developed.

The preliminary test assessments of a selected corridor Gothenburg- Munich was conducted in WP8 in the end of 2003 and beginning of 2004. This test corridor was evaluated using different data sources. The external effects of freight transport was calculated using RECORDIT database, which provided the average values of externalities of intermodal freight transport from evaluations at corridor level through a "bottom up" approach. For passenger transport TEN-STAC, GISCO data and COMMUTE methodology was applied. After the sections of freight evaluation had been selected using RECORDIT corridors, the corresponding TEN- STAC data (the same sections as used for RECORDIT) were selected and used for passenger transport for emission calculations. The GISCO data was used to test a small section part for comparing the results and calculating the safety impacts.

After the test phase, the WP8 methodology was updated according to the findings and new input from other WP's. The main outcome was the adoption of TEN-STAC approach for calculating emissions of road and rail transport for ETIS. It was also decided to leave out noise assessment since data would have been too detailed at the level of concern.

Data templates, detailed explanations and updated documentation of rail, air and road emission and safety were provided for ETIS- Agent in October 2004.

WP8 received the input data for European airport movements in 2003 from WP4. With this data it was possible to analyse which aircraft types were the most common ones. The assessment method was updated to include the emission factors for 95% of the most common aircraft types and defaults of the remaining types in 5 MTOW classes. The assessment of ground emissions of air transport was at a final stage in the end of November 2004.

Updated data templates, further detailed explanations and updated documentation of rail, air and road emissions and safety were provided for ETIS- Agent in the beginning of 2005.

The final assessment of external effects, road and rail emissions and safety and ground emissions of air transport was after having received the final assignment results based on improved freight demand by August 2005. The final calculations and main issues of WP8 were included in the statistical pocket book.

3.10 WP 9 Synthesis and dissemination

At the start of the project a web-site has been made which was regularly updated throughout the project.

The methodological framework for drafting the methodological synthesis report has been set up and has been refined during meetings and working session. The following results have been achieved:

- A list of TEN-T policy indicators has been identified with the aim to address important policy issues for monitoring and evaluating TEN-T projects and policies (update)
- Methods of calculation of indicators and required variables among the different ETIS-BASE data areas have been described in templates which were developed in co-operation with ETIS-AGENT
- A resulting list of variables to be considered and related data sources has been specified in order to provide the basic information for calculating the TEN-T indicators
- Data gaps have been identified
- Methodologies for filling data gaps and generating the data sets have been described in the different annex reports

The methodological framework for drafting the methodological synthesis report has been set up and has been refined during meetings and working sessions. The deliverables D3, D5, D6 and D7 have been produced following the structures set out by WP 9. Furthermore, the synthesis activity has also involved the definition of contents and main issues of the ETIS statistical pocketbook.

The ETIS pocketbook has provided a brief introduction of the several ETIS datasets using tables, graphs and maps about the most important data and indicators. It has shown the main

results of each ETIS datasets including information about contributors, contact list and responsibilities.

The focus on legal aspects in the final stage has been reduced since this topic was covered in ETIS-LINK as well. The material generated by ETIS-BASE in WP 1 on this subject has been used as input in ETIS-LINK.

4 LIST OF DELIVERABLES

In table 4.1 the list of deliverables is given with indication of the references and issue date in comparison with the project planning.

Table 4.1 *Deliverables in ETIS-BASE*

Type / Description	Availability C-R-P	Nature	Responsible Work package reference	Submission Date According to Technical Annex	Submission Date According to inception report D1/mid term assessment D4	Actual Submission
D1 inception report	C	Report	0	Month 2	Month 2	Month 2
D2 State of the Art report	P	Report + CD	1	Month 8	Month 8	Month 8
D3 ETIS database methodology development synthesis (internal report).	R	Report	2-8, 9	Month 11	Month 12/13	December 2003; Month 13
D4 Mid-term assessment report.	P	Report	0	Month 15	Month 15/19	August 2004; Month 19 (delayed on request of PO)
D5 Collected data sources and pilot data on CD + user manual of database access.	P	Report + CD	1,2-8,9	Month 16	Month 16/18	May 2004; Month 18
D6 ETIS database methodology application by data set: socio-economic, networks input data, freight transport service and costs, passenger transport services and costs.	P	Report	2,5,6,7,9	Month 22	Month 23/25	18 January; Month 26
D7 ETIS database methodology application by data set: freight and passenger demand, external effects	P	Report	2,5,6,7,9	Month 27	Month 29/31	31 August 2005; month 33
D8 Complete ETIS database on CD + transport reference information database in electronic and aggregated paper version + user manual of database access	R	CD + statistical handbook	2-8, 9	Month 30	Month 32/32	31 August 2005; month 33
D9 ETIS BASE final technical report	P	Report	0	Month 30	Month 32/32	October 2005; month 35
D10 The Freight and Passenger Matrix Projection 2020	P	Report	0, 3, 4, 5	-	-	31 August 2005; month 33
Input for workshops	P	papers	2-8,0			ETIS-LINK workshops
Input for conference	P	papers	0			ETIS-LINK conferences
website	P	website	9	continuous	continuous	Continuous
C = confidential; R = restricted; P = public						

5 COMPARISON OF PLANNED ACTIVITIES AND ACTUAL WORK ACCOMPLISHED

In this section a comparison of planned activities and actual work accomplished by the partners during the project is described, in terms of technical content.

The deliverables are compared to the planning in the table in chapter 4.

A short delay occurred for D3, caused by the fact that the harmonisation of the reports took more time than expected and at the same time the reorganisation of the project ETIS from three administrative works ETIS-BASE, -LINK and -AGENT to one unique scientific product ETIS. As part of it, the templates used for the description of the indicators have been developed in co-operation with ETIS-AGENT in order to ensure that the output can be used most optimally in ETIS-AGENT. Since these discussion have lasted until end September 2003 the start of the description of the indicators could only start 1 or 2 months later than planned but this delay has for a large part been compensated by speeding up the working pace.

D5 was delivered two months later due to the fact that the data collection process took longer than foreseen for some WP's. Furthermore, because it was already delayed for one month it became possible to review the work in an internal working meeting in that period on basis of which some improvements were found and in the beginning of May the second open conference was held from which also the lessons learned could be implemented. This delay of D5 had no impact on the due date of the following deliverables. D4 was delayed on request of the PO until June 2004 and during the Mid-term assessment meeting of 17 June 2004 where a first draft of this Mid-term assessment report was discussed it was agreed to postpone the final delivery of this D4 until August 2004 in order to be able to included changes resulting from the discussion.

In cooperation with the ETIS-LINK project a validation plan has been set up in order to validate the different data sets being produced in ETIS-BASE. This validation plan was set up in end June 2004 and turned out to have implications for the possible deadlines of two of the deliverables of ETIS-BASE. A delay in the delivery of D6 and D7 was found to be required. The new deadline for D6 was set at 31 December 2004 and for D7 30 June 2005. The deadlines of the other deliverables have been unchanged although it was requested by the PO during a discussion on the new deadlines to set the deadline for D8 and D9 on 30 June 2005.

In December 2004 a letter has been sent to the PO to inform that D6 could not be delivered by the end of December 2005. The reason for this is the difficulties we were confronted with in WP 5 concerning the transfer of the GETIS data which took more time than expected. Due to the importance of the deadlines for the delivery of the software tool by ETIS-AGENT we have concentrated our capacity on the timely delivery of material to and communication with ETIS-AGENT. Since the delivery of D6 to the Commission had no impact on the deadlines of

following deliverables of ETIS-BASE we have given this a lower priority. D6 was eventually delivered in January 2005.

D7, D8 and D10 have been delayed until the end of the project. This delay was also caused by the full attention required on the implementation of the data into the ETIS-AGENT tool also at the final stage and all testing procedures involved. Furthermore due to the coinciding activities of EUN-STAT on the updating of the data for the new member states it was decided in agreement with the PO that after the final conference an update would be made of the freight demand data and other data sets that would receive comments on the final conference. As a result of the updating of the freight demand data also an update of the assignments had to be made and as a consequence of this also an update of the external effects data for which use is made of the assignment results. Eventually the deliverables related to these activities have delivered at the very end of the project.

Deliverables not mentioned were delivered on time.

The focus on legal aspects in the final stage has been reduced since this topic was covered in ETIS-LINK as well. The material generated by ETIS-BASE in WP 1 on this subject has been used as input in ETIS-LINK.

In summary all activities planned have been performed resulting in a repeatable methodology for generating an ETIS reference database and a first version of this database. Furthermore the work of ETIS-BASE has significantly contributed to a consensus view on ETIS.

6 MANAGEMENT AND CO-ORDINATION ASPECTS

6.1 Communication

- The communication with the Project Officer went through the co-ordinator NEA. The communication within WP's was the responsibility of the WP-leader. Communication went well in most cases also in this last period. The meetings held can be found in the annex.
- As also required according to the technical annex a web-site has been made to facilitate the external communication. The web-site has also a member's area for internal use which can be used within the project to communicate the information available.
- An FTP server has been installed for exchange of large data files between partners.
- In principle the main communication channel with the outside world was through ETIS-LINK where news letters have been made and workshops and conferences have been organised. ETIS-BASE has actively participated at the final open conference and has animated two workshops.
- Communication between ETIS-BASE, ETIS-LINK and ETIS-AGENT has been actively continued during this period. In the annex the meetings held for the co-ordination of the ETIS-framework are listed. Besides these meetings also intensive e-mail exchange and ad-hoc phone calls have been made.

6.2 Co-operation with other projects/programmes

- The main co-operation takes place within the ETIS framework with ETIS-LINK and ETIS-AGENT. The meetings can be found in the annex. The joint activities have been scheduled in a common time schedule for the three projects.
- ETIS-BASE, ETIS-LINK and ETIS-AGENT have extended the synchronisation activities; the projects have defined a common work plan in order to come up with one consistent ETIS-pilot at the end of the project and to allocate available budgets in such a way that this became feasible.
- Coordination meetings were held with ETIS-AGENT in order to ensure a proper exchange of data and related information. These good and constructive meetings have been concluded with some refinements in the indicator templates and data sets which improve the connection with the software tool. In addition to these meetings a continuous communication has been organised in order to answer the questions on the data by the AGENT consortium as fast and good as possible.
- GETIS has developed the GIS for DGTREN. A lot of communication has been done to exchange information and to seen whether GETIS can be included in ETIS. Eventually ETIS has been made exchangeable with GETIS.

- Discussion with REALISE (concerted action short sea shipping) have taken place in order to find synergy possibilities. Since REALISE focuses on proposing a medium/long term solution for short sea statistics by proposing a collection methodology the main synergy has been found in the exchange of data needs and a presentation at a REALISE workshops by ETIS-BASE and participation to an ETIS workshop of REALISE.
- There is a transfer of data and knowledge of ETIS-BASE to the TRANS-TOOLS project in order to use the produced data most optimally and to further develop tools for filling data gaps.
- Data have been delivered to some DGTREN projects with approval of the PO.

6.3 Other management and co-ordination issues

- During the Steering Committee meeting on 5/4/4 the idea has been launched to include TEN-STAC forecast data in ETIS-BASE. Since forecast are not part of the ETIS-BASE contract solutions are now being looked for. Budgetary a solution could be found by using part of the data budget for these activities. A proposal has been sent to the PO which has been approved after some discussion and iterations.
- Based on this budget shift also some other budget shifts have been performed in order to improve the focus of the activities.

7 RESULTS AND CONCLUSIONS

7.1 Results

In general it can be observed that the methodological application by data sets has shown the feasibility of the overall approach.

The following remarks can be stressed:

- The process of data collection has been defined, the type of suppliers identified and the procedures for data acquisition tested
- To a great extent the statistical sources are available, even if, e.g. passenger transport dataset, data can be considered as confidential and not commercially available
- The geographical coverage has been defined, together with the specification of the statistical units for the zoning system of data representation. Regional detail will be included at the NUTS 2 level and in some data sets where appropriate NUTS 3.
- Methods for combining data in order to fill the gaps have been designed. They range from the set up of models to the use of surveys and literature review. The creation of new databases encompassing data and information from reports, statistics, projects, has also been conceived
- A general capability to ensure the repeatability of the methodology has been reached. The preconditions range from data availability to the use of transport models
- The validation process has been conducted with positive results. In some cases the remarks from external experts have led to the modification of the methodologies, in other cases it has not been possible to comply with the suggestions, even if the final results can be considered satisfactory.
- Forecasts for the year 2020 have been produced using the ETIS passenger and freight demand data as basis and by applying the material and models developed in TEN-STAC.

The tables and figures in the annexes of the report show examples of results arising from the application of the methodologies in terms of expected results.

7.2 Conclusion

ETIS-BASE has been successfully completed in good cooperation with the projects ETIS-AGENT and ETIS-LINK.

All formal deliverables scheduled have been delivered to the PO.

ETIS-BASE has observed a large interest in the use of ETIS-BASE data. It is recommended that the Commission streamlines the processing of these requests after the end of the ETIS projects.

Disclaimer

The ETIS-BASE partners are not responsible for any consequences from the use of the project results.

8 ACKNOWLEDGEMENTS

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Furthermore, the project partners would like to thank the stakeholders coming from national ministries, statistical offices, research institutions, transport service and infrastructure providers, transport associations, international organisations, and many other public and private entities, who have strongly contributed to the success of the ETIS projects by their input and by their support.

9 REFERENCES HOW TO USE THE DELIVERABLES

In deliverable D2 of ETIS-BASE the selection of the TEN-policies being considered, and resulting Performance indicators, Supporting indicators and data needed for calculation of the indicators are listed:

- D2 State of the Art report

Deliverables D3 and D5 are intermediate results leading to D6 and D7. In D3 and D5 the templates are included describing the definitions and methods of calculation of the indicators considered in ETIS-BASE.

In deliverables D6 and D7 of ETIS-BASE the final data validation and the updated methodological framework for the ETIS data sets are described:

- D6 Synthesis report
- D6 Annex report WP2 Socio-economic data
- D6 Annex report WP5 Network data
- D6 Annex report WP6 Freight services and costs
- D6 Annex report WP7 Passenger services and costs

- D7 Synthesis report
- D7 Annex report WP3 freight demand data
- D7 Annex report WP4 Passenger demand data
- D7 Annex report WP5 Network assignment data
- D7 Annex report WP8 external effects data

The data sets developed in ETIS-BASE are included in deliverable D8 and in the ETIS software tool.

A statistical handbook is produced as part of D8.

ANNEX A MEETINGS, CONFERENCES, WORKSHOPS

DATE	MEETING	LOCATION	ETIS-BASE PARTNERS PRESENT
ETIS-BASE MEETINGS			
16 DECEMBER 2002	**PROJECT KICK-OFF**	**BRUSSELS**	**NEA, MKMETRIC NESTEAR, IWW, ISIS, MDS, VTT, SOFRES**
17 DECEMBER 2002	**WP 1 KICK-OFF**	**BRUSSELS**	**NEA, IWW, ISIS, MDS, VTT, SOFRES**
13 FEBRUARI 2003	**AD-HOC WP 1**	**BRUSSELS**	**NEA, AJI-EUROPE, ISIS, VTT, IWW, MDS**
18 APRIL 2003	**AD-HOC WP 1**	**RIJSWIJK**	**NEA, AJI-EUROPE**
MAY 2003	**AD-HOC WP 4**	**KARLSRUHE**	**MKMETRIC, IWW**
JUNE 2003	**PROJECT REVIEW MEETING**	**BRUSSELS**	**NEA, MKMETRIC NESTEAR, IWW, ISIS, MDS, VTT, IVT**
JUNE 2003	**INTERNAL MANAGEMENT MEETING**	**BRUSSELS**	**NEA, MKMETRIC NESTEAR, IWW, ISIS, MDS, VTT, IVT**
8 OKTOBER 2003	**AD HOC WP 3**	**RIJSWIJK**	**NEA, MDS**
22-23 OKTOBER 2003	**INTERNAL MANAGEMENT MEETING**	**RIJSWIJK**	**NEA, MKMETRIC NESTEAR, IWW, ISIS, MDS, VTT, IVT**
27,28 NOVEMBER 2003	**AD HOC WP 9**	**ROME**	**NEA, ISIS**
MARCH 2004	**GETIS MEETING WITH TU LEUVEN**	**LEUVEN**	**IWW**
30 JANUARY 2004	**INTERNAL MANAGEMENT MEETING**	**RIJSWIJK**	**NEA, MKMETRIC NESTEAR, IWW, ISIS, MDS, VTT, IVT, AJI-EUROPE**
6 FEBRUARY 2004	**AD HOC WP 3 MEETING**	**ATHENS**	**NEA, MDS**
19-20 APRIL 2004	**INTERNAL MANAGEMENT MEETING AND SEPARATE WP MEETINGS**	**CHESTER**	**NEA, MKMETRIC NESTEAR, IWW, ISIS, MDS, VTT, IVT, AJI-EUROPE**
27 APRIL 2004	**AD HOC MEETING WP 4, 5, 7**	**KARLSRUHE**	**IWW, MKMETRIC**
17 JUNE 2004	**MID TERM ASSESSMENT MEETING**	**BRUSSELS**	**NEA, MKMETRIC NESTEAR, IWW, ISIS, MDS, IVT, AJI-EUROPE**
30 JUNE 2004	**AD HOC WP 3 MEETING**	**CHESTER**	**NEA, MDS**
15 OKTOBER 2004	**INTERNAL MANAGEMENT MEETING**	**ROME**	**NEA, MKMETRIC NESTEAR, IWW, ISIS, MDS, VTT, IVT, AJI-EUROPE**
10 JANUARY 2005	**INTERNAL PROJECT MEETING ETIS-BASE**	**RIJSWIJK**	**NEA, MDS**
21 JANUARI 2005	**INTERNAL ETIS-BASE CONSORTIUM MEETING**	**KARLSRUHE**	**NEA, IWW, MKMETRIC, IVT, VTT**
10 FEBRUARY 2005	**TELEPHONE CONFERENCE**	-	**NEA, IWW, MKMETRIC, MOSHE BEN AKIVA**
FEBRUARY 2005	**BILATERAL MEETING**	**KARLSRUHE,**	**IWW, MKMETRIC,**
28 FEBRUARY 2005	**PROJECT REVIEW MEETING WITH PO**	**BRUSSELS**	**NEA, PO**
8 MARCH	**PROJECT REVIEW MEETING WITH PO BY TELEPHONE**	-	**NEA, PO**

STEERING GROUP MEETING			
14 FEBRUARY 2003	**STEERING GROUP MEETING**	**BRUSSELS**	**NEA, MKMETRIC**
18 JULY 2003	**STEERING GROUP MEETING**	**BRUSSELS**	**NEA**
25 NOVEMBER 2003	**STEERING GROUP MEETING**	**BRUSSELS**	**NEA**
5 APRIL 2004	**STEERING GROUP MEETING**	**BRUSSELS**	**NEA**
3 DECEMBER 2004	**STEERING GROUP MEETING**	**BRUSSELS**	**NEA**
4 FEBRUARY 2005	**STEERING GROUP MEETING**	**BRUSSELS**	**NEA, MKMETRIC**
18 MARCH 2005	**STEERING GROUP MEETING**	**BRUSSELS**	**NEA, MKMETRIC, IWW, MDS**
13 MAY 2005	**STEERING GROUP MEETING**	**AMSTERDAM**	**NEA, MKMETRIC**
13 JUNE 2005	**STEERING GROUP MEETING**	**BRUSSELS**	**NEA, MKMETRIC**
28 JUNE 2005	**STEERING GROUP MEETING**	**BRUSSELS**	**NEA, MKMETRIC**
ETIS FRAMEWORK CO-ORDINATION MEETINGS			
6 MARCH 2003	**CO-ORDINATING WP 1 ACTIVITIES WITH ETIS-AGENT**	**RIJSWIJK**	**NEA**
20 MARCH 2003	**CO-ORDINATING ETIS WITH PO, ETIS-AGENT AND ETIS-LINK**	**BRUSSELS**	**NEA**
28 MARCH 2003	**CO-ORDINATING WITH ETIS-AGENT AND ETIS-LINK**	**LUXEMBURG**	**NEA**
26 MAY 2003	**CO-ORDINATION WITH ETIS-AGENT**	**ATHENS**	**NEA, MKMETRIC**
17 JULY 2003	**CO-ORDINATION WITH ETIS-AGENT**	**BRUSSELS**	**NEA, MKMETRIC**
28 AUGUST 2003	**CO-ORDINATING WITH ETIS-AGENT AND ETIS-LINK**	**LEIDEN**	**NEA**
5 NOVEMBER 2003	**CO-ORDINATING WITH ETIS-AGENT AND ETIS-LINK**	**BRUSSELS**	**NEA**
3 DECEMBER 2003	**CO-ORDINATION WITH ETIS-LINK**	**RIJSWIJK**	**NEA**
8 DECEMBER 2003	**CO-ORDINATION WITH ETIS-AGENT AND ETIS-LINK**	**LEIDEN**	**NEA**
12 DECEMBER 2003	**CO-ORDINATION WITH ETIS-AGENT AND ETIS-LINK**	**ATHENS**	**NEA**
6 JANUARY 2004	**CO-ORDINATION WITH ETIS-LINK**	**RIJSWIJK**	**NEA**
6 FEBRUARY 2004	**CO-ORDINATION WITH ETIS-AGENT AND ETIS-LINK**	**ATHENS**	**NEA, MDS**
11 FEBRUARY 2004	**CO-ORDINATION WITH PO, ETIS-AGENT AND ETIS-LINK**	**BRUSSELS**	**NEA**
31 MARCH 2004	**CO-ORDINATION WITH ETIS-LINK**	**RIJSWIJK**	**NEA**
24 JUNE 2004	**COORDINATION WIT ETIS-AGENT**	**BRUSSELS**	**NEA**
15 SEPTEMBER 2004	**GIS INFORMATION FROM DGTREN WITH BASE, AGENT AND LINK**	**BRUSSELS**	**NEA, IWW**
15 SEPTEMBER 2004	**CO-ORDINATION WITH ETIS-LINK AND ETIS-AGENT**	**BRUSSELS**	**NEA**
28 SEPTEMBER 2004	**CO-ORDINATION WITH ETIS-LINK AND ETIS-AGENT**	**BRUSSELS**	**NEA**
14 OKTOBER 2004	**CO-ORDINATION WITH ETIS-LINK AND ETIS-AGENT**	**ROME**	**NEA**

8 DECEMBER 2004	TELEPHONE CONFERENCE	-	ETIS-BASE, ETIS-AGENT, ETIS-LINK COORDINATORS, AND NTUA
20/21 DECEMBER 20004	COORDINATION MEETING	ATHENS	ETIS-AGENT AND ETIS-BASE COORDINATOR
28 JANUARY 2005	COORDINATION MEETING	BRUSSELS	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS
3 FEBRUARY 2005	TELEPHONE CONFERENCE	-	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, ICCR
14/15 FEBRUARY 2005	COORDINATION MEETING	ATHENS	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, NTUA
1 MARCH 2005	TELEPHONE CONFERENCE	-	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, NTUA
11, 12 APRIL 2005	COORDINATION MEETING	-	NEA, NTUA
15 APRIL 2005	TELEPHONE CONFERENCE	-	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, ICCR, AGILIS, MKMETRIC
18 APRIL 2005	TELEPHONE CONFERENCE (PILOT DEMO)	-	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, MKMETRIC, NTUA, AGILIS, ICCR
25-28 APRIL 2005	COORDINATION MEETING		NEA, MKMETRIC, NTUA
13 MAY 2005	COORDINATION MEETING FOLLOWING THE STEERING GROUP MEETING	AMSTERDAM	EC, ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, MKMETRIC, ICCR
18 MAY 2005	COORDINATION MEETING	BRUSSELS	EC, ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, MKMETRIC, ICCR, NTUA
1 JUNE 2005	TELEPHONE CONFERENCE	-	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, NTUA, MKMETRIC
10 JUNE 2005	COORDINATION MEETING	ATHENS	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, MKMETRIC AND NTUA
13 JUNE 2005	COORDINATION MEETING	BRUSSELS	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, NTUA AND MKMETRIC
22 JUNE 2005	TELEPHONE CONFERENCE	-	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, NTUA
23 JUNE 2005	TELEPHONE CONFERENCE	-	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, NTUA
24 JUNE 2005	TELEPHONE CONFERENCE	-	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS, NTUA, MKMETRIC
27 JUNE 2005	CONFERENCE PREPARATION MEETING	BRUSSELS	ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS
29 JUNE 2005	COORDINATION MEETING	BRUSSELS	EC, ETIS-AGENT, ETIS-BASE, AND ETIS-LINK COORDINATORS
CONFERENCES AND WORKSHOPS			
13, 14 FEBRUARY 2003	ETIS-LINK CONFERENCE	BRUSSELS	NEA, MKMETRIC NESTEAR, IWW, ISIS, MDS, VTT, AJI-EUROPE
11, 12 MARCH 2003	CCST EUROSTAT	LUXEMBURG	NEA
27 MARCH 2003	ETIS-LINK WORKSHOP 1	LUXEMBURG	NEA, ISIS, MDS, VTT, AJI-EUROPE
8 MAY 2003	INTER INSTITUTIONAL WORKING GROUP WORKSHOP ON TRANSPORT MODELLING AND DATA	SOFIA	NEA

18 JUNE 2003	ETIS-LINK WORKSHOP 2	BRUSSELS	NEA, MDS, MKMETRIC
22 JULY 2003	ETIS-LINK WORKSHOP 3	AMSTERDAM	NEA
29-30 SEPTEMBER 2003	UN-ECE MEETING ON THE ROAD CENSUS 2005	GENEVA	NEA
29, 31 OKTOBER 2003	ISPA TRAINING BY NEA	ROTTERDAM	NEA
4 NOVEMEBR 2003	REALISE (CONCERTED ACTION SHORT SEA SHIPPING)	RIJSWIJK	NEA
23 JANUARY 2004	ETIS-LINK WORKSHOP	SCHEVENINGEN	NEA, MDS, VTT, IWW
5 MARCH 2004	ETIS-LINK WORKSHOP	ROTTERDAM	NEA, MDS, MKMETRIC, IVT, NESTEAR
24 MARCH 2004	TRAINING ALBANIAN HIGH LEVEL EXPERTS	RIJSWIJK	NEA
26 MARCH 2004	REALISE WORKSHOP (THEMATIC NETWORK ON SHORT SEA SHIPPING)	SETUBAL	NEA
11-12 MAY 2004	TRAINING LITHUANIAN HIGH LEVEL EXPERTS	VILNIUS	NEA
14 MAY 2004	ETIS-LINK CONFERENCE	BRUSSELS	NEA, MKMETRIC, IWW, ISIS, MDS
9-11 JUNE 2004	UN WORKSHOP	GENEVA	NEA
31 AUGUST 2004	MEETING WITH EUROSTAT	LUXEMBURG	NEA
11-13 OKTOBER 2004	ADEPT TRAINING OF 50 HIGH LEVEL EXPERTS FROM CEEC AND TURKEY	ROTTERDAM	NEA
12 MAY 2005	WORKSHOP ON ISSUES RELATED TO THE ETIS ROADMAP	AMSTERDAM	NEA, MDS, VTT, IWW, ISIS
28 JUNE 2005	FINAL OPEN CONFERENCE	BRUSSELS	NEA, MDS, MKMETRIC, IVT, NESTEAR
25/26 JULY 2005	USER TRAINING WORKSHOP	ATHENS	NEA, MKMETRIC, MDS, IWW

ANNEX B RESULTS

1 INTRODUCTION

This annex shows a very limited set of examples of information that can be extracted from the ETIS reference database as developed in ETIS-BASE. More examples can be found in the deliverables D6 and D7 where also the applied methodologies can be found per data set. Furthermore even more examples can be found in the statistical handbook which is delivered as separate publication as part of D8.

In deliverable D8 all data sets are delivered to the Commission in full detail and the same data have also been included in the ETIS-AGENT software tool.

2 WP 2 SOCIO ECONOMIC

Figure 2.1 *GDP annual growth rate between 1995 and 2001*

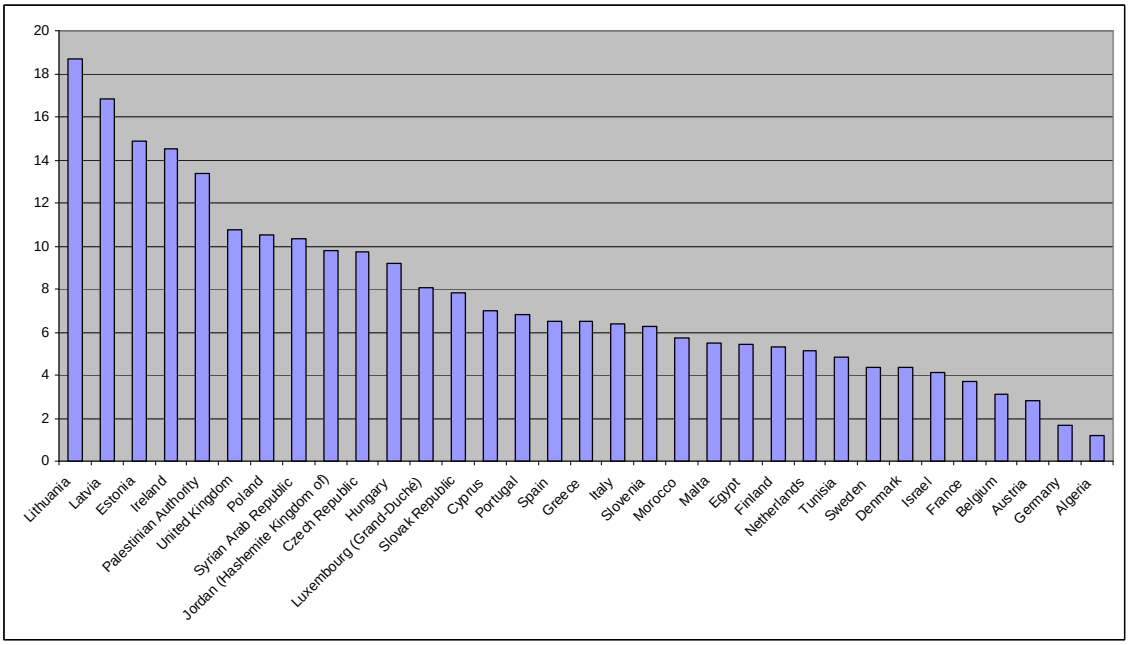


Figure 2.2 *GDP per country (millions €)*

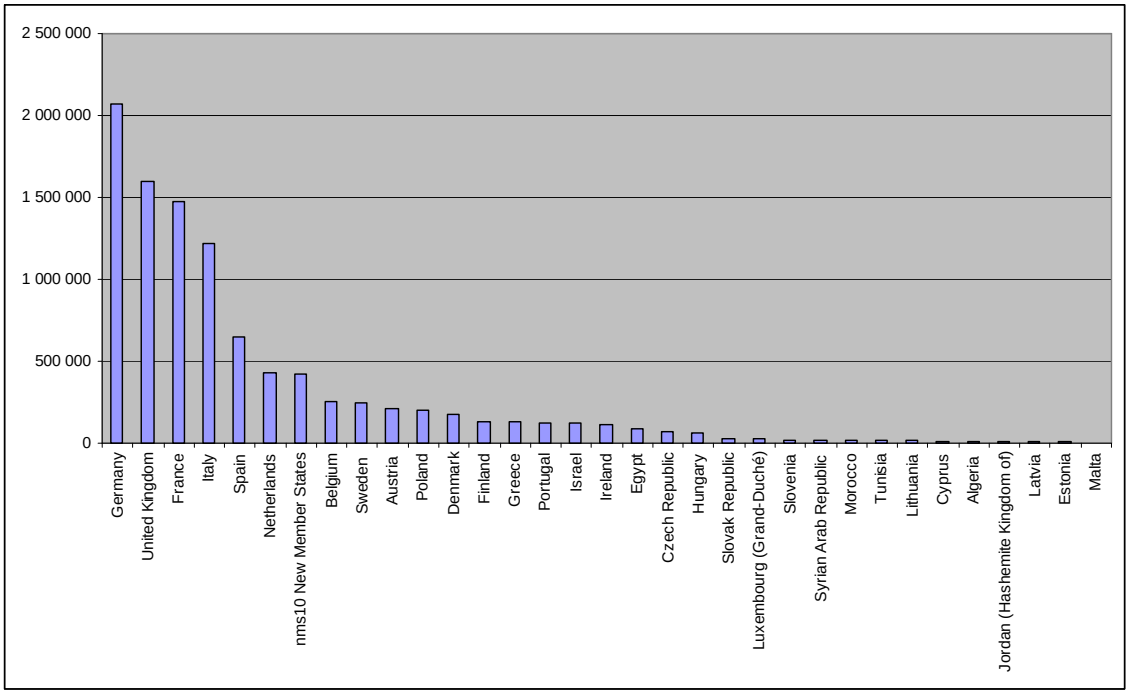


Figure 2.3 *Share of agriculture compared to total added value*

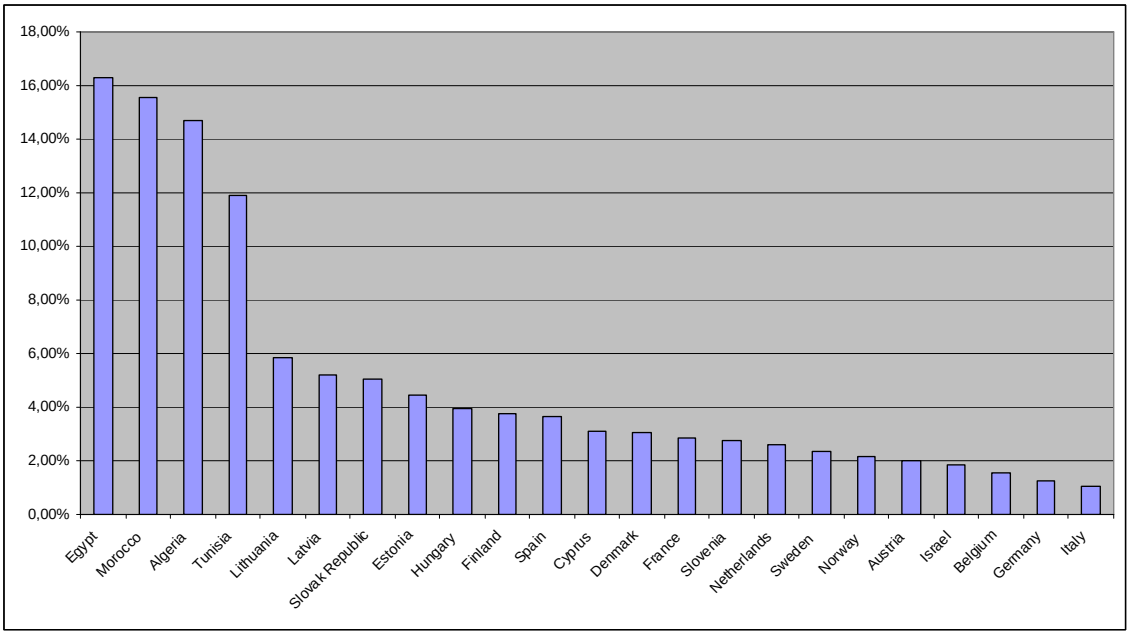
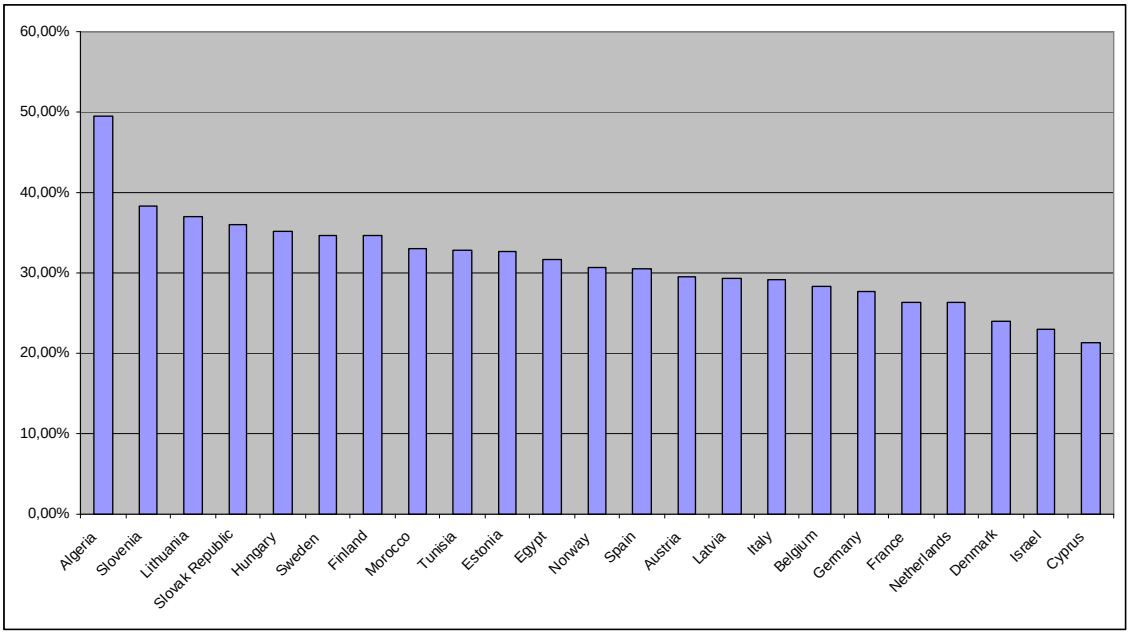


Figure 2.4 *Share of industry compared to total added value*



3 WP 3 FREIGHT DEMAND

Origin of total trade/transport flows by region in 2000 (mln tonnes)

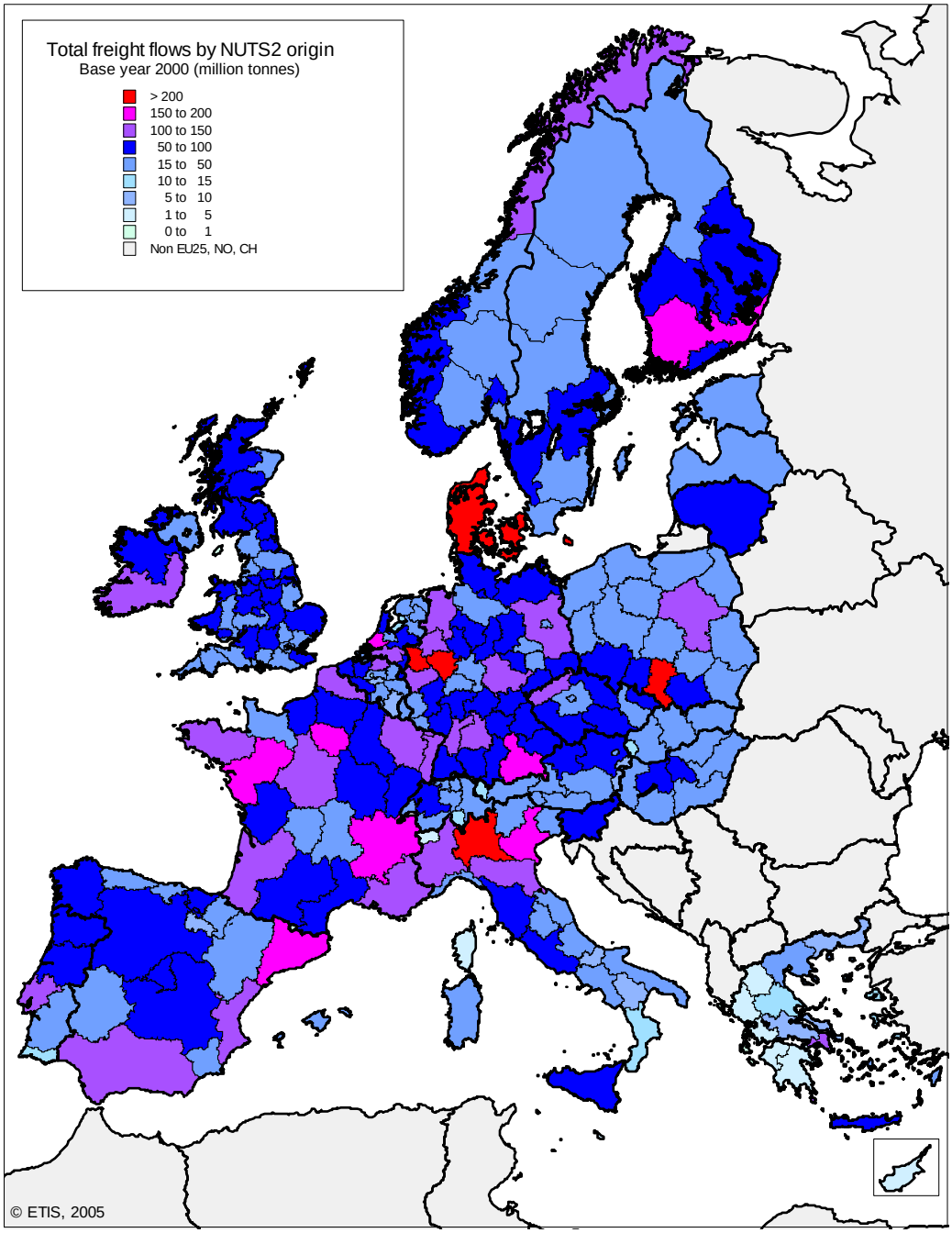


Figure 3.1 shows the amount of outgoing trade flows by NUTS2 region of production for all commodities and all modes including domestic and international flows for the core countries.

Total trade/transport flows (mln tonnes) from EU15 to 10 New Member States in 2000

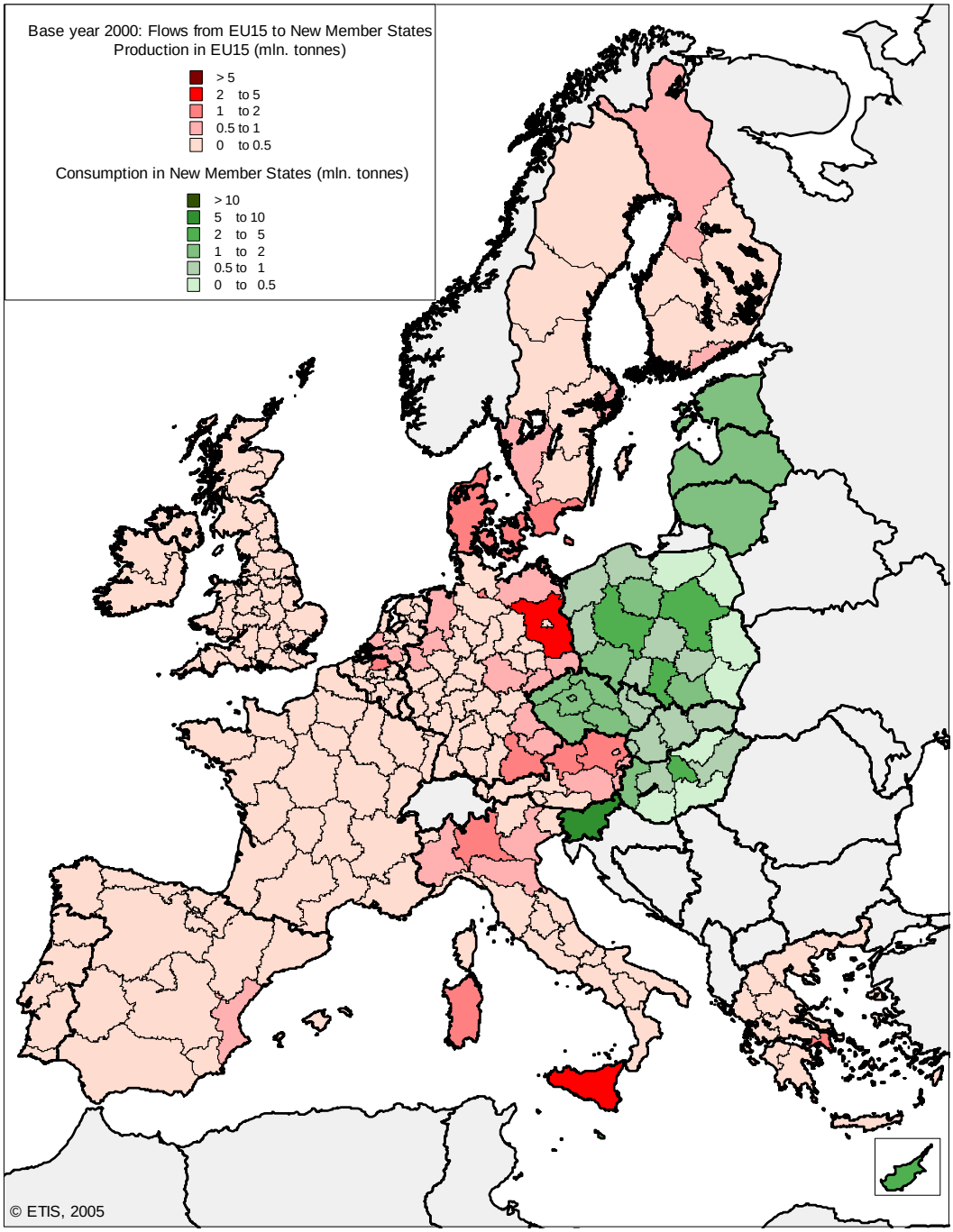
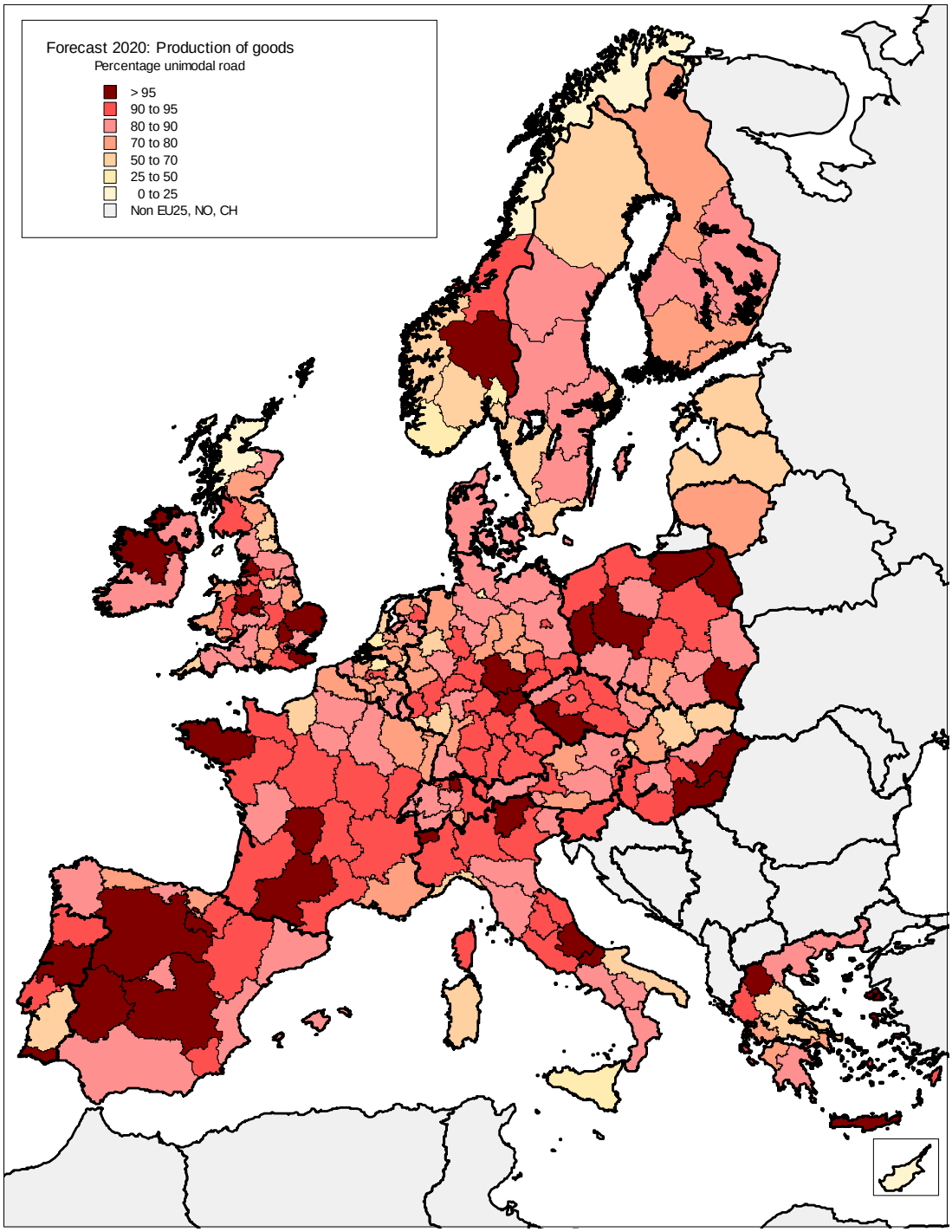


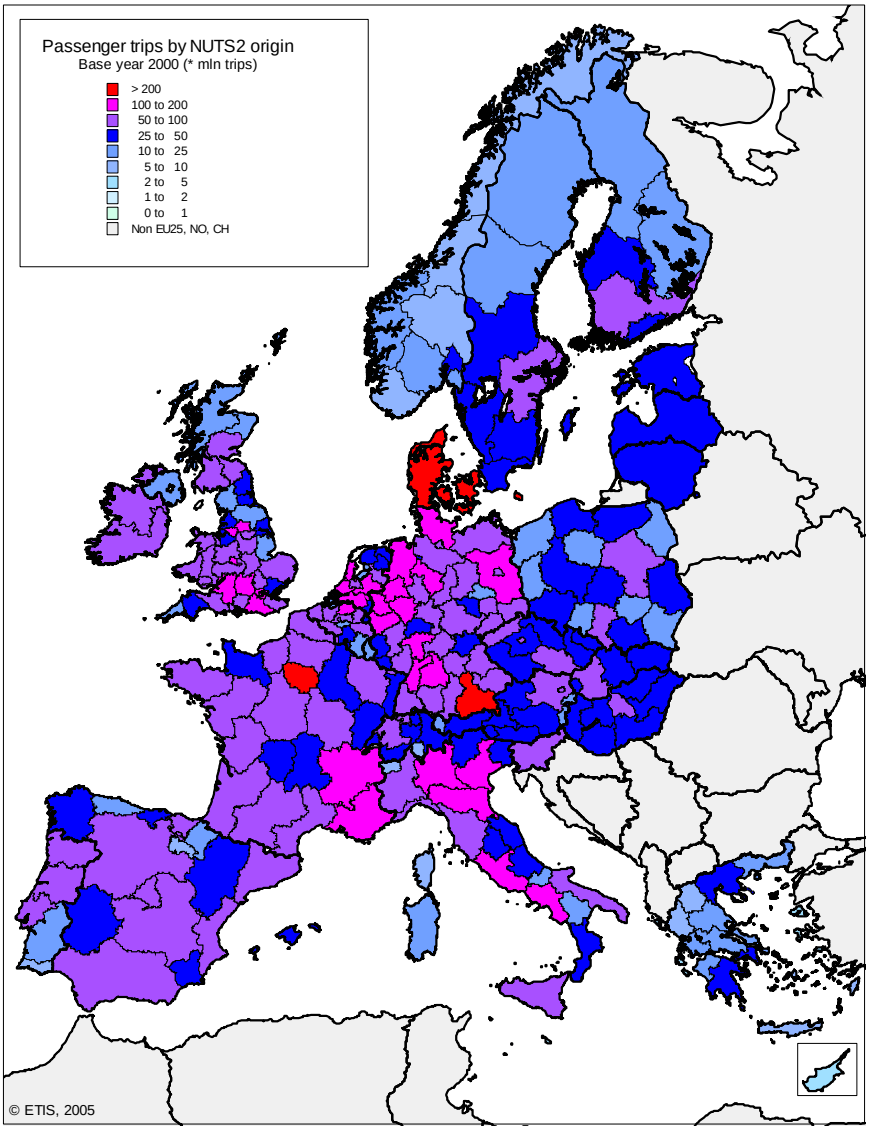
Figure 3.2 shows the trade flows from the EU-15 NUTS2 regions to the NUTS2 regions of the 10 new member states. In this selection all commodities transported by all modes are considered for the year 2000.

Figure 3.1 *Percentage of unimodal road freight transport by NUTS2 region, 2020*



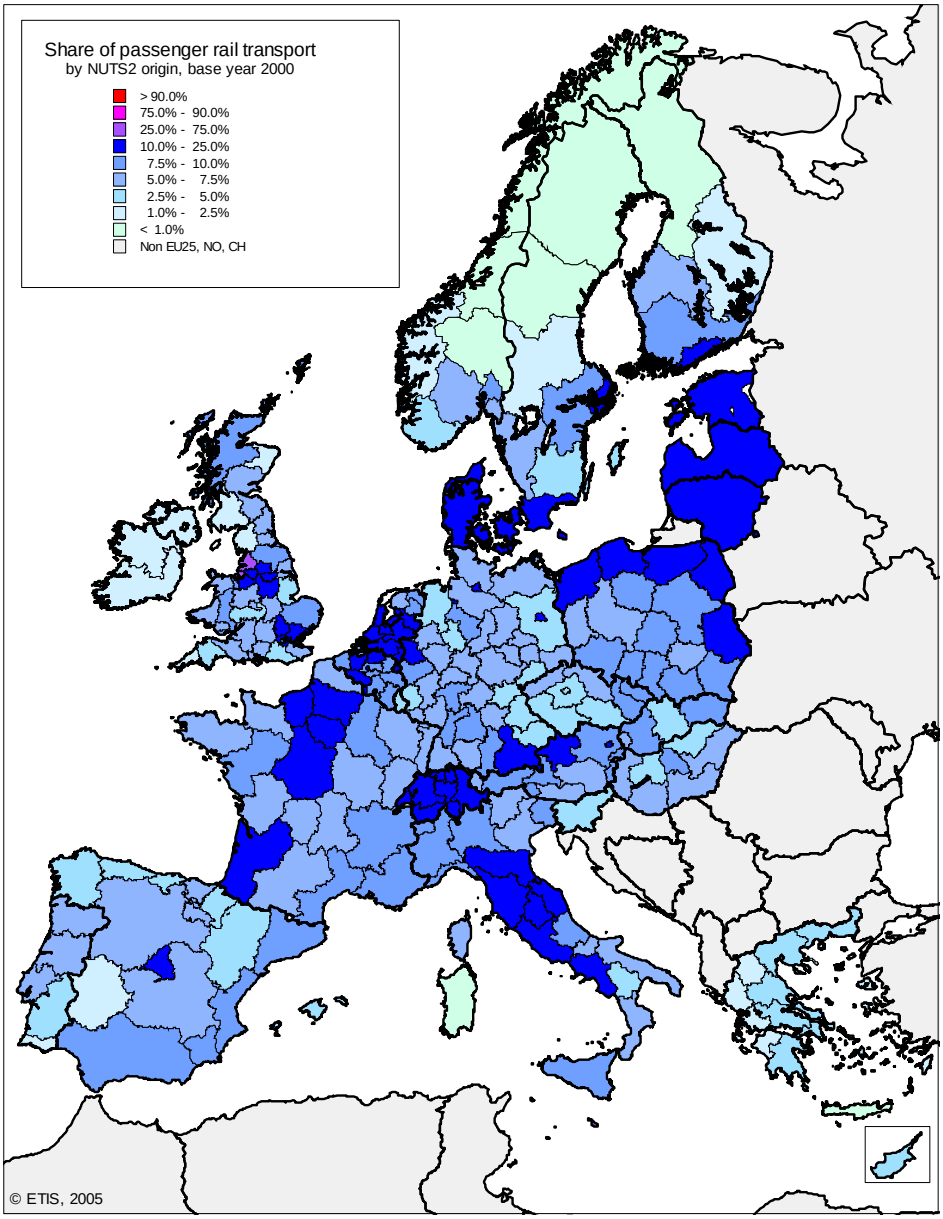
4 WP 4 PASSENGER DEMAND

Passenger trips by origin

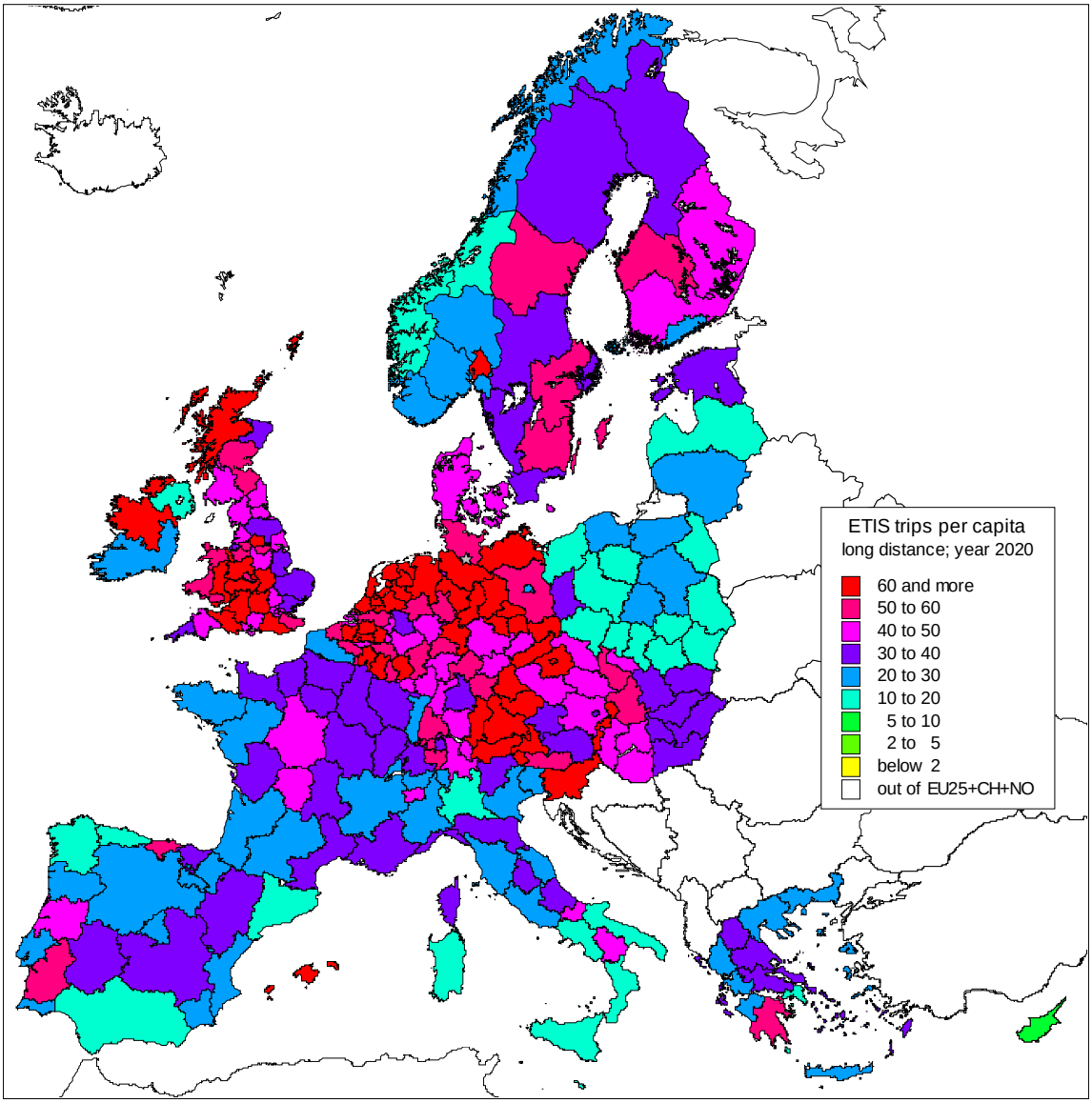


Although the quite different size (by area and population) of NUTS2 regions within the specific countries which make comparison difficult, it yet can be seen, that highest demand occurs in the high populated countries, like Belgium, the Netherlands, most parts of Germany, France, Northern Italy and in the South of the UK.

Share of passenger rail transport

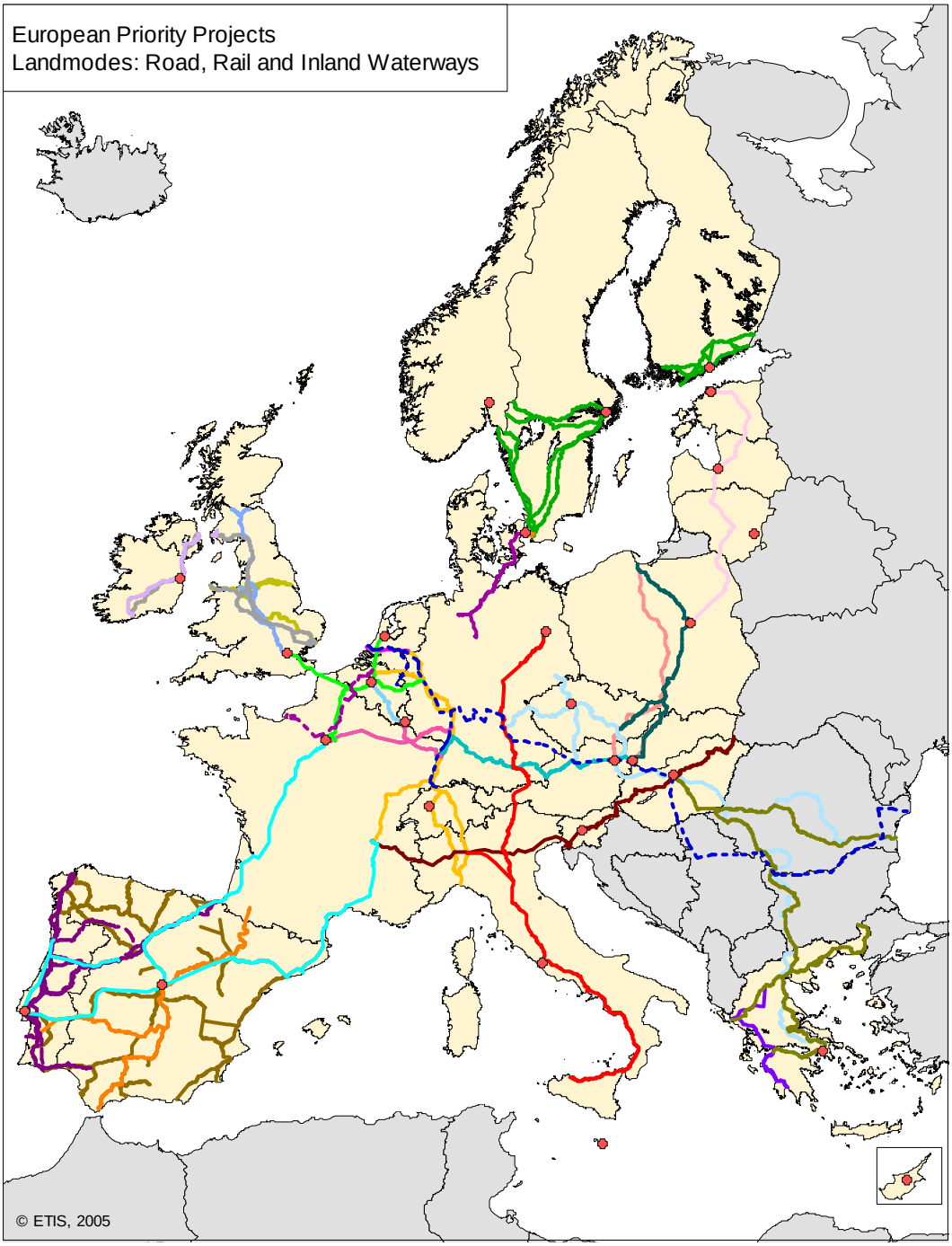


Passenger trips by per capita by NUTS2 region, 2020

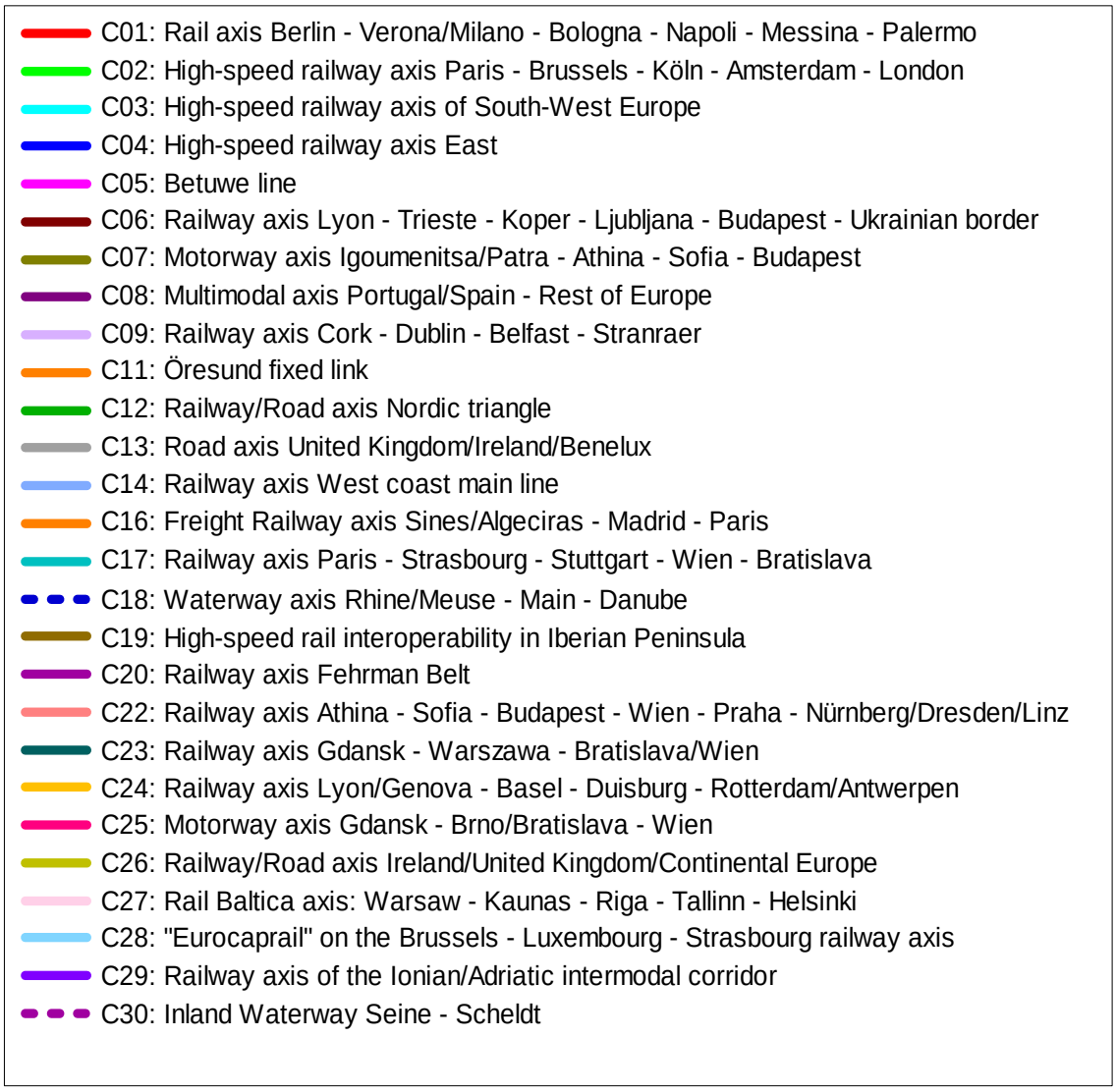


5 WP 5 NETWORKS

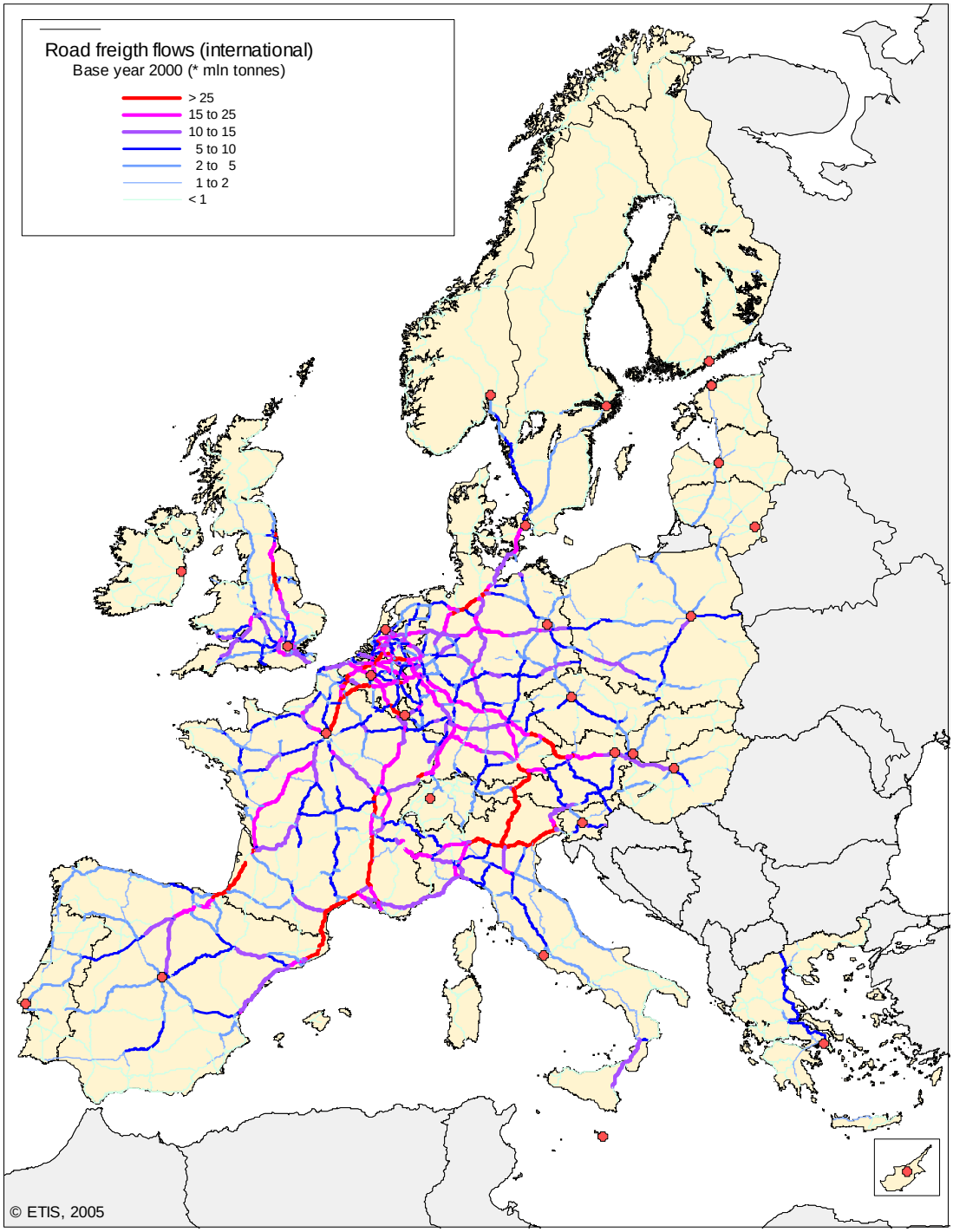
Priority projects for the modes road, rail and inland waterways



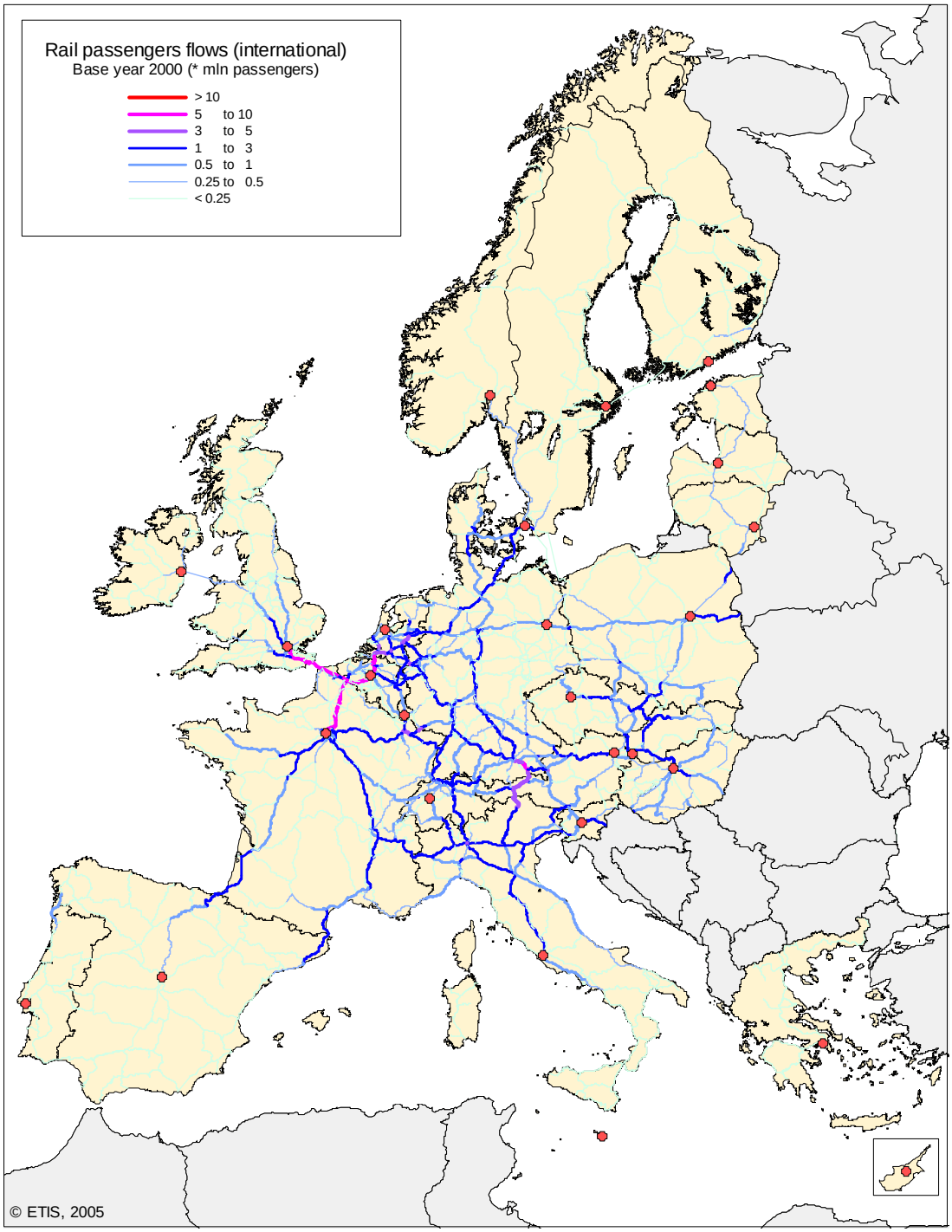
Legend of priority projects



Road international freight flows, Base year 2000

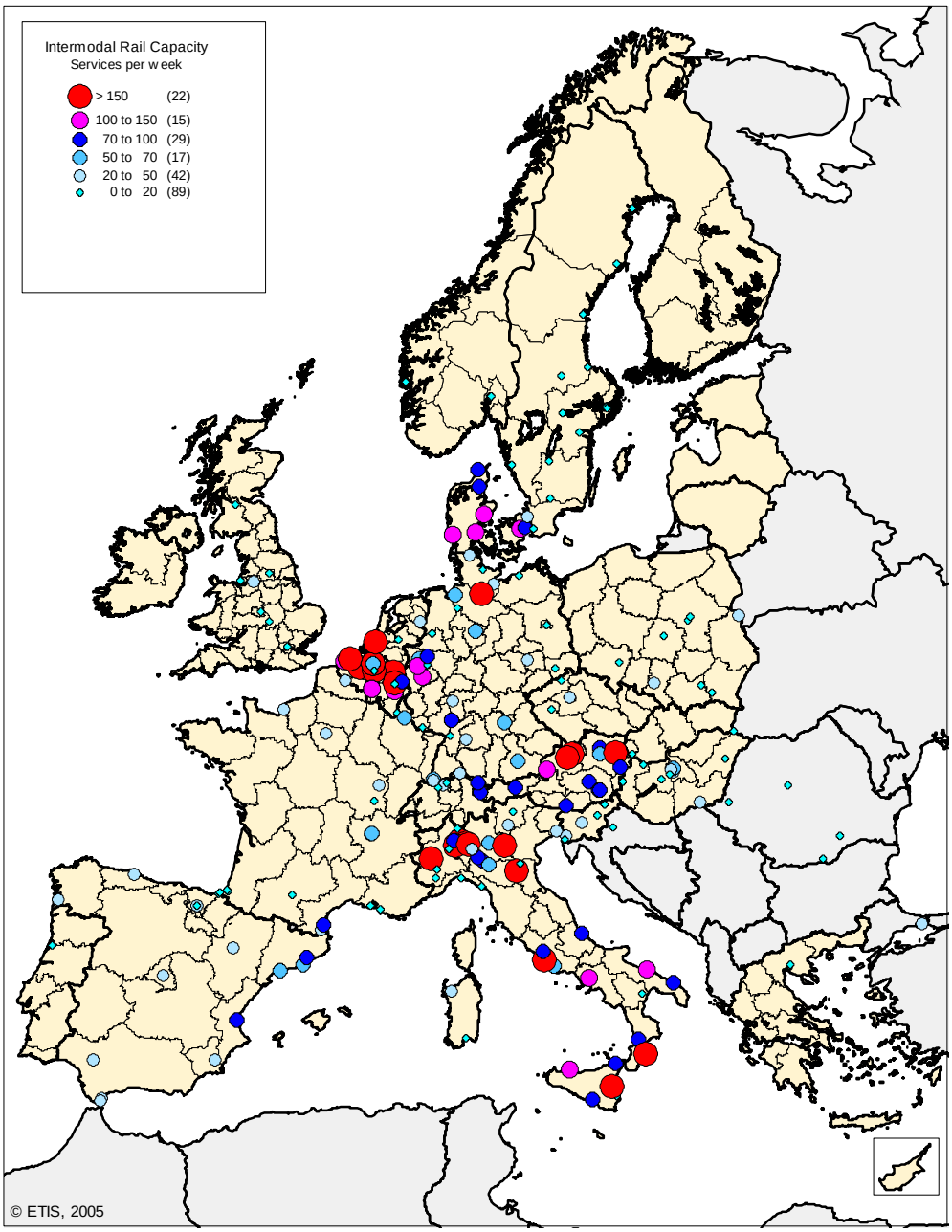


Rail international passenger flows, Base year 2000



6 WP 6 FREIGHT SERVICES AND COSTS

Intermodal Rail Capacity – Service per Week



The map shows the relative size of long-distance intermodal terminals, based upon the number of scheduled departures per week. It is therefore measuring the capacity offered by the rail services, rather than the capacity of the terminals themselves.

7 WP 7 PASSENGER SERVICES AND COSTS

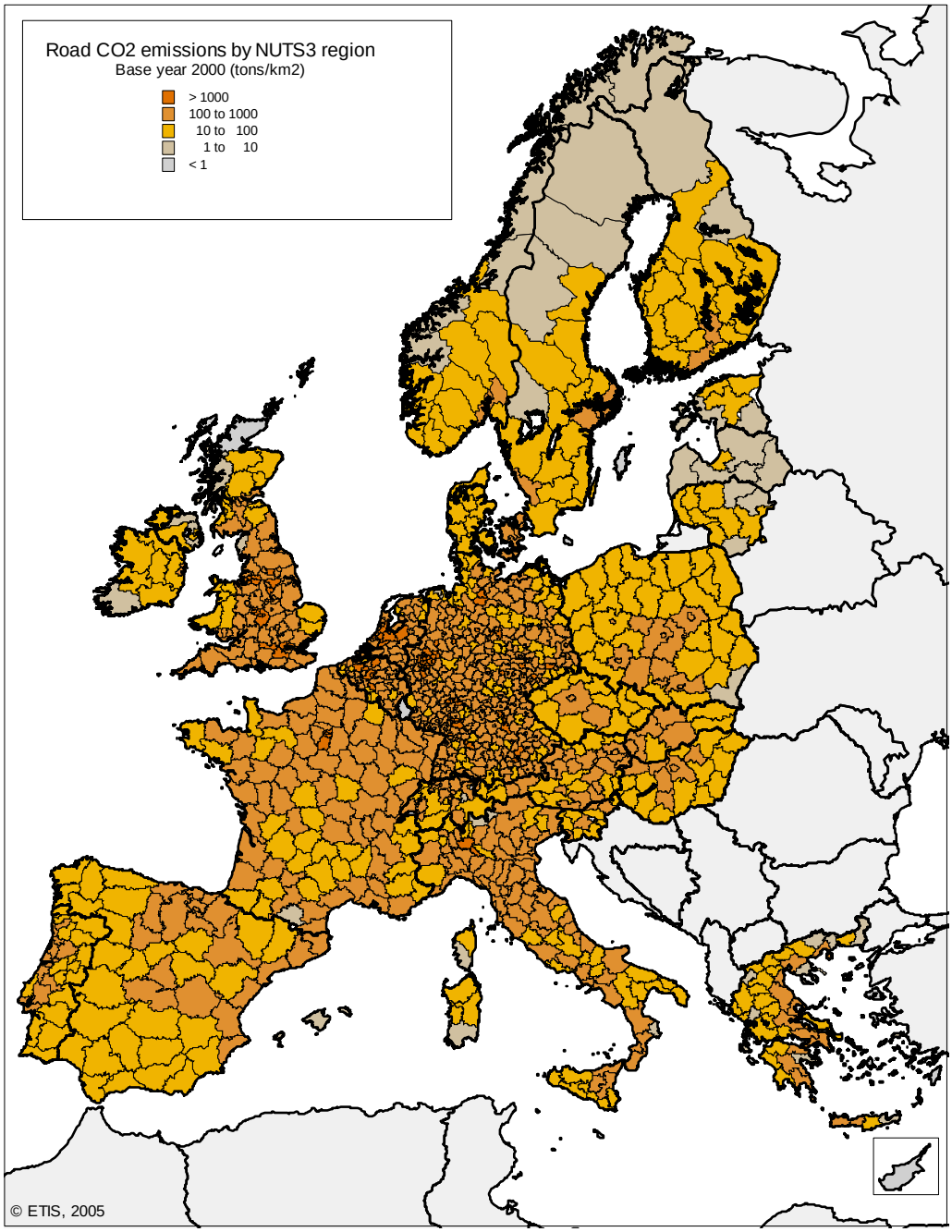
Table 7.1 *Services and costs passengers; impedances for trips with main mode air (average door-to-door time, minimum door-to-door time, frequency, average costs business, average costs non-business) for the 40 intra EU NUTS2 O/D relations with the highest demand, 2003.*

Origin NUTS2		Destination NUTS2		Time door-to-door [minutes]		Frequency	Average travel cost [€ per direction]		Rank by demand 2000
Code	Name	Code	Name	Average	Minimum	[flights/ week]	Business	Leisure	
IE02	Southern and Eastern	UKI2	Outer London	186	170	89	264	100	1
NL32	Noord-Holland	UKI2	Outer London	206	184	94	201	93	2
ES3	Comunidad de Madrid	FR1	Île de France	236	213	72	502	160	3
ES7	Canarias	UKD3	Greater Manchester	378	346	9	1088	246	4
ES7	Canarias	UKJ2	Surrey, East and West Sussex	412	393	14	991	233	5
ES53	Illes Balears	UKD3	Greater Manchester	279	245	36	542	164	6
DE71	Darmstadt	UKI2	Outer London	241	217	81	375	95	7
ES53	Illes Balears	UKJ2	Surrey, East and West Sussex	311	281	45	490	158	8
IE02	Southern and Eastern	UKH3	Essex	202	163	73	242	91	9
FR1	Île de France	IT6	Lazio	264	224	93	512	158	10
IT2	Lombardia	UKI2	Outer London	264	233	46	394	117	11
DK	Danmark	SE01	Stockholm	189	170	83	330	128	12
IT6	Lazio	UKI2	Outer London	307	274	55	517	147	13
ES3	Comunidad de Madrid	UKI2	Outer London	277	241	51	484	148	14
FR1	Île de France	IT2	Lombardia	208	179	55	359	131	15
FR1	Île de France	UKI2	Outer London	227	186	148	267	112	16
DE71	Darmstadt	FR1	Île de France	197	177	99	301	122	17
FR1	Île de France	NL32	Noord-Holland	194	173	95	289	119	18
ES61	Andalucía	UKJ2	Surrey, East and West Sussex	327	308	8	678	185	19
BE24	Prov. Vlaams-Brabant	UKI2	Outer London	219	199	65	217	101	20
ES51	Cataluña	FR1	Île de France	271	253	54	441	150	21
CH04	Zürich	UKI2	Outer London	243	219	55	381	109	22

Origin NUTS2		Destination NUTS2		Time door-to-door [minutes]		Frequency	Average travel cost [€ per direction]		Rank by demand 2000
Code	Name	Code	Name	Average	Minimum	[flights/ week]	Business	Leisure	
IE02	Southern and Eastern	UKJ2	Surrey, East and West Sussex	223	198	76	259	102	23
DK	Danmark	UKI2	Outer London	255	233	51	455	137	24
FI16	Uusima	SE01	Stockholm	185	168	91	293	120	25
SE01	Stockholm	UKI2	Outer London	320	295	68	620	163	26
FR1	Île de France	PT13	Lisboa	238	215	39	493	159	27
DE21	Oberbayern	UKI2	Outer London	294	266	62	281	110	28
DEA1	Düsseldorf	ES53	Illes Balears	228	207	51	392	133	29
ES51	Cataluña	NL32	Noord-Holland	291	260	90	297	124	30
ES3	Comunidad de Madrid	PT13	Lisboa	174	162	86	328	128	31
ES3	Comunidad de Madrid	IT6	Lazio	283	258	59	598	175	32
ES51	Cataluña	UKI2	Outer London	336	299	44	371	126	33
ES61	Andalucía	UKD3	Greater Manchester	419	354	19	678	172	34
ES52	Comunidad Valenciana	UKD3	Greater Manchester	418	354	22	603	161	35
BE24	Prov. Vlaams-Brabant	ES3	Comunidad de Madrid	265	243	73	460	152	36
CH01	Région lémanique	UKI2	Outer London	220	206	39	398	133	37
ES52	Comunidad Valenciana	UKJ2	Surrey, East and West Sussex	328	298	12	592	175	38
ES3	Comunidad de Madrid	IT2	Lombardia	242	208	34	542	167	39
DE71	Darmstadt	ES3	Comunidad de Madrid	273	241	59	559	140	40

8 WP 8 EXTERNAL EFFECTS

CO2 emissions of road transport (tons/km2, year 2000)



NOx emissions of rail transport (kg/km2, year 2000)