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Deliverable D3.1

Documentation: Input Database for the HIGH-TOOL Model

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Glossary

1000COUNT	Thousands of entities indicated by parameter
ACEA	European Automobile Manufacturer's Association
BAU	Business As Usual
BIO_PKM	Billions of Passenger-kilometre
CARE	European database on road accidents
CBS	Central agency for statistics in the Netherlands
CH	Switzerland
CO_2	Carbon Dioxide
COPERT	Computer Programme to calculate Emissions from Road Transport
COUNT	Number of entities indicated by parameter
CREEA	Compiling and Refining Environmental and Economic Accounts
CSV	Comma-Separated Values
DG ECFIN	European Commission's Directorate-General for Economic and Financial Affairs
DG MOVE	European Commission's Directorate-General for Mobility & Transport
DG TREN	European Commission's Directorate-General for Transport and Energy; predecessor of DG MOVE
DIM	Dimension
EC	European Commission
EPC	Economic Policy Committee
ETISplus	European Transport Policy Information System
EU	European Union
EU27/EU28	27/28 Member States of the European Union
EU COMEXT	Eurostat's reference database for external trade
EUR	Euro (2010 values)
EUR_CAP	Euro per Capita (2010 values)
EUR_G	Euro per Gram (2010 values)
EUR_H	Euro per Hour (2010 values)
EUR_L	Euro per Litre (2010 values)
EUR_PKM	Euro per Passenger-kilometre (2010 values)
EUR_T	Euro per Tonne (2010 values)
EUR_TKM	Euro per Tonne-kilometre (2010 values)
EUR_VKH	Euro per Vehicle Hour (2010 values)
EUR_VKM	Euro per Vehicle-kilometre (2010 values)
EUROPOP2010	Eurostat's Population Projections 2010-based
Eurostat	Statistical Office of the European Union
EXIOBASE	A global, detailed Multi-Regional Environmentally Extended Supply and Use/Input Output Database
G_KM	Gram per Kilometre
GDP	Gross Domestic Product

GHG	Greenhouse Gas
GVA	Gross Value Added
HAB	Inhabitants, Persons, Capita
HI	Historical Input Parameter
IenM	Dutch Ministry of Infrastructure and the Environment
IF	Input Factor
IM	Intermediate Parameter
IOT	Input Output Table
JRC-IPTS	Institute for Prospective Technological Studies of the European Commission's Joint Research Centre
KM	Kilometre
KMH	Kilometre per Hour
KM2	Square Kilometre
MB	Megabyte
MIN	Minute
MIO_EUR	Millions of Euro (2010 values)
MIO_HAB	Millions of Inhabitants
MIO_VKM	Millions of Vehicle-kilometre
MOVEET	Analytical tool to address the policy problems related to transport and climate change.
MR EE IOT	Multi-Regional Environmentally Extended Input Output Table
MR EE SUT	Multi-Regional Environmentally Extended Supply and Use Table
NO	Norway
NO_x	Nitrogen Oxides
NST	Eurostat' Standard Goods Classification for Transport Statistics
NUTS	Nomenclature of Territorial Units for Statistics; A number assigned to it defines the level of granularity, such as 0 for the country level.
O/D	Origin/Destination; Used to describe a relation between two regions.
OECD	Organisation for Economic Co-operation and Development
OP	Output Parameter
P/A	Production/Attraction; Used to describe a relation between two regions.
PI	Projected Input Parameter
PAT	Parameter Type
pkm	Passenger-kilometre
PM	Particulate Matter
SCENES	European transport forecasting model and appended module
SO_2	Sulphur Dioxide
SQL	Structured Query Language
SUT	Supply and Use Table
SWOV NL	Survey on passenger mobility in the Netherlands
T	Tonne

TEN-STAC	Scenarios, Traffic Forecasts and Analysis of Corridors on the Trans-European Network
TFR	Total Fertility Rate
tkm	Tonne-kilometre
TOE	Tonne of Oil Equivalent
TRACCS	Transport data collection supporting the quantitative analysis of measures relating to transport and climate change.
TRANS-TOOLS	Network-based European Transport Model
TREMOVE	Economic transport and emissions model
TRENDS	TRansport and ENvironment Database System
UN COMTRADE	United Nations Commodity Trade Statistics Database
V1000H	Vehicles per Thousand Inhabitants
VACLAV	European transport network model
vkm	Vehicle-kilometre
WP	Work Package

Executive Summary

HIGH-TOOL deals with the development of a strategic transport model for (pre-) assessing economic, social, transport and environmental impacts of transport-related policy measures.

The present report documents the outcomes of *Work Package 3: Basic Input Data*, up to month 9 of the project, and represents the work related to the development of the prototype version of the HIGH-TOOL model. The current report provides information on the compilation of data for the different HIGH-TOOL modules (including data parameters definition, sources and units) and the definition of the data exchange mechanism, which will be used to download and upload data. In order to affiliate the reader with the model's features, the Deliverable presents a quick overview of the different modules of the HIGH-TOOL prototype version, which is the basis for developing the different modules, identifying the input and output parameters.

The main focus of the Data Stock at this time has been the identification of the necessary input and output data, their definition, dimensions and sources. For each module, data requirements have been identified, and the set of input and output variables have been elaborated, together with data dimensions. Specifically for the input parameters, the developers have provided the input data in Microsoft Access format (or alternatively in CSV format), in case the source of information was not publicly available or they were already in possession of the input datasets. All input variables were consolidated in one sole Access file: the Data Stock. The results of this exercise are documented in the present Deliverable.

Finally, in the context of this Work Package, the methodology for the prototype Data Exchange Mechanism for importing input files and exporting output files has been developed. At the current stage, the mechanism uses Microsoft Access, due to the fact that Microsoft Access delivers already a functionality to import and export data to and from many different formats.

1 Introduction

1.1 Objectives of HIGH-TOOL

The HIGH-TOOL project is developing a free and open high-level strategic transport model to (pre-) assess economic, social and environmental impacts of transport policy. It should be a means to support policy-makers in assessing policy measures. In a first step, user requirements were identified. Based on the outcomes of this exercise, the HIGH-TOOL consortium started to develop the actual prototype, after elaborating the structure of the model as a whole and its sub-modules, defining input and output data, as well as elasticities and equations in order to calculate the output data.

1.2 Objectives of the Deliverable

The HIGH-TOOL consortium is developing a transport model that addresses different types of impacts of EU transport policy. In order to cover this wide spectrum of impacts, the model is comprised of several modules. Each module is defined by a set of input parameters, its equations and intermediate parameters and its output parameters. While the specifics of the calculation step are presented in *Work Package 4: Elasticities and Equations*, this Work Package is focussed on the input and output parameters, the data sources, the compatibility with other models and possibilities for a data exchange interface. More specifically, the WP3 objectives are summarised as follows:

Identification and compilation of data sources (Data Stock): Based on the user requirements (Vanherle et al., 2014) concerning output indicators, as well as the structure of the HIGH-TOOL model itself (Mandel et al., 2013), data sources are identified, collected and processed, composing the Data Stock. This task is substantially facilitated by data sources such as the Eurostat, ETISplus and other databases as indicated in the definition of the input variables.

Development of the Data Exchange Mechanism: The Data Exchange Mechanism prepares an up- and download functionality of the basic dataset used in the HIGH-TOOL model, creating a communication channel with the user for downloading project results as well as feeding in their own data, always conforming with the HIGH-TOOL data definition.

1.3 Interdependencies with other Deliverables

Work Package 3 interacts continuously with the other HIGH-TOOL work packages; whereas WP3 functions as a data repository, WP1 and WP2 define the prerequisites of the model, i.e. what type of data are part of the model, WP4 identifies how these data are linked, WP5 presents how the data are modelled and so on. More specifically:

- WP2 defines the parameters, which are stored in the Data Stock (Mandel et al., 2013)
- WP4 depicts how the information stored in the Data Stock are used in the model (Van Grol et al., 2014)
- WP5 depicts – among other – the interaction of the modules with the Data Stock (Larrea and Biosca, 2014)
- WP3 is also indirectly linked to WP1, which presents the user requirements in terms of transport policies and impact indicators, which are fed into WP2 (Vanherle et al., 2014)

1.4 Content of this Deliverable

The present Deliverable is the documentation of the achievements of these two tasks for the HIGH-TOOL prototype and is structured as follows:

Chapter 2 presents in short the different modules and their input and output requirements as well as the Data Exchange Mechanism, the mean to interact with the input and output data in HIGH-TOOL. **Chapter 3** describes the methodology for the data collection and the setup of the HIGH-TOOL Data Stock. **Chapter 4** elaborates on the prototype data parameters, their definition and the sources they are retrieved from. **Chapter 5** presents the dimensions for the data parameters. The identified structure of the data parameters and their dimensions is used to store the data in the Data Stock. The detailed description of the dimensions used in the prototype is mentioned in the **Annex**.

This Deliverable is the first version of the Data Stock for the prototype development. As the (next) pre-final model is expected to be more detailed and cover more elements, the current Data Stock version will be accordingly revised to reflect the changes. These will be documented in a follow-up WP3 deliverable.

2 HIGH-TOOL Input and Output

2.1 Introduction to the Prototype

The HIGH-TOOL prototype is composed by six different modules and the Data Stock (see Mandel et al., 2013). These six modules (Demography, Economy & Resources, Freight Demand, Passenger Demand, Environment & Vehicle Stock, Safety), take as input exogenous or calculated data parameters from other modules and calculate their output data up to 2050. For example, historic data on serious injuries or fuel prices are exogenously fed into the Safety and Environment & Vehicle Stock modules respectively, whereas GDP is calculated within the Economy & Resources module and fed into the Freight Demand and Passenger Demand modules. In this first phase of development, the prototype phase, for simplicity reasons the different modules work independently, i.e. they are not strictly linked to the outcomes of other modules. In the following paragraphs the main input and output data parameters of the different modules, are shown in order to present the main elements of the modules.

DEMOGRAPHY depicts the projected population up to 2050 for the EU28 countries, Switzerland and Norway. The module makes use of historic birth and mortality values as well as the demographic assumptions of the to the EUROPOP2010 projections of Eurostat[1] (Eurostat, 2011). These cover all the EU28 countries as well as Norway and Switzerland.

ECONOMY & RESOURCES estimates the economic trends up to 2050 for the EU28, Switzerland, Norway and the rest of the world. As input, it uses, among others, time series data of GDP, capital and labour, and employment from different sources depending on the data availability and completeness; for example, the OECD database is used for Norway and Switzerland, whereas for the rest of the world EXIOBASE 2007 is used. Moreover, the module uses the projected demographic indicators, the future transport volumes and costs and the modal split from Passenger Demand and Freight Demand modules. Its output comprises GDP and GDP per capita, GVA per sector (agriculture, industry, service), trade import and export trends and household income.

[1] The EUROPOP2010 projections (Eurostat, 2011) are used in the EPC/DG ECFIN Ageing Report 2012 (EC, 2012), which is the source of the macroeconomic assumptions for the EU Reference Scenario (EC, 2013a).

FREIGHT DEMAND produces the freight transport trends up to 2050 within the EU28 countries, as well as Switzerland and Norway. It uses two types of input, exogenous parameters such as trade for 2010, impedance matrices, historic load factors and module outputs such as the GDP and GVA provided by the Economy & Resources module and the number of vehicles from the Environment & Vehicle Stock module. The output of the Freight Demand module includes the modal split, the transport volumes, mileage and transport performance per mode, the load factors, and the freight transport costs.

PASSENGER DEMAND produces the passenger transport trends up to 2050 within the EU28 countries, Switzerland and Norway. Similarly to Freight Demand, it uses two types of input, the exogenously defined input, such as the Value of Time and the impedances, as well as output from other HIGH-TOOL modules such as population from Demography and GVA and household income from Economy & Resources. The main results of the Passenger Demand module are the projections of passenger demand, mileage and performance per mode and passenger transport costs.

ENVIRONMENT & VEHICLE STOCK has two main products: the vehicle stock trends and the environment trends up to 2050 for the EU28, Switzerland and Norway. This module as well retrieves its input from both exogenous sources and HIGH-TOOL outputs. For instance, whereas the historic values for vehicle composition and emission factors are selected exogenously, transport performance are outcomes of the HIGH-TOOL modules. The outputs of this module are transport emissions and the vehicle stock parameters.

SAFETY calculates the impacts on fatalities and serious injuries from road for the EU28, Switzerland and Norway by 2050. These are calculated based on time series data of transport performance, road injuries and fatality statistics as well as on the projected passenger and freight mileage and transport performance. This module, differently from the other also simulates the effects of speed, alcohol level and seat belt use based on changes to causal variables.

Figure 1 depicts the HIGH-TOOL modules rationale, including their structural components and how these are interlinked (source: Mandel et al., 2013). This Deliverable elaborates only on the input and output data requirements for the modules described above. It does not consider the interrelations between the different modules as at this stage the modules are executed largely independently.

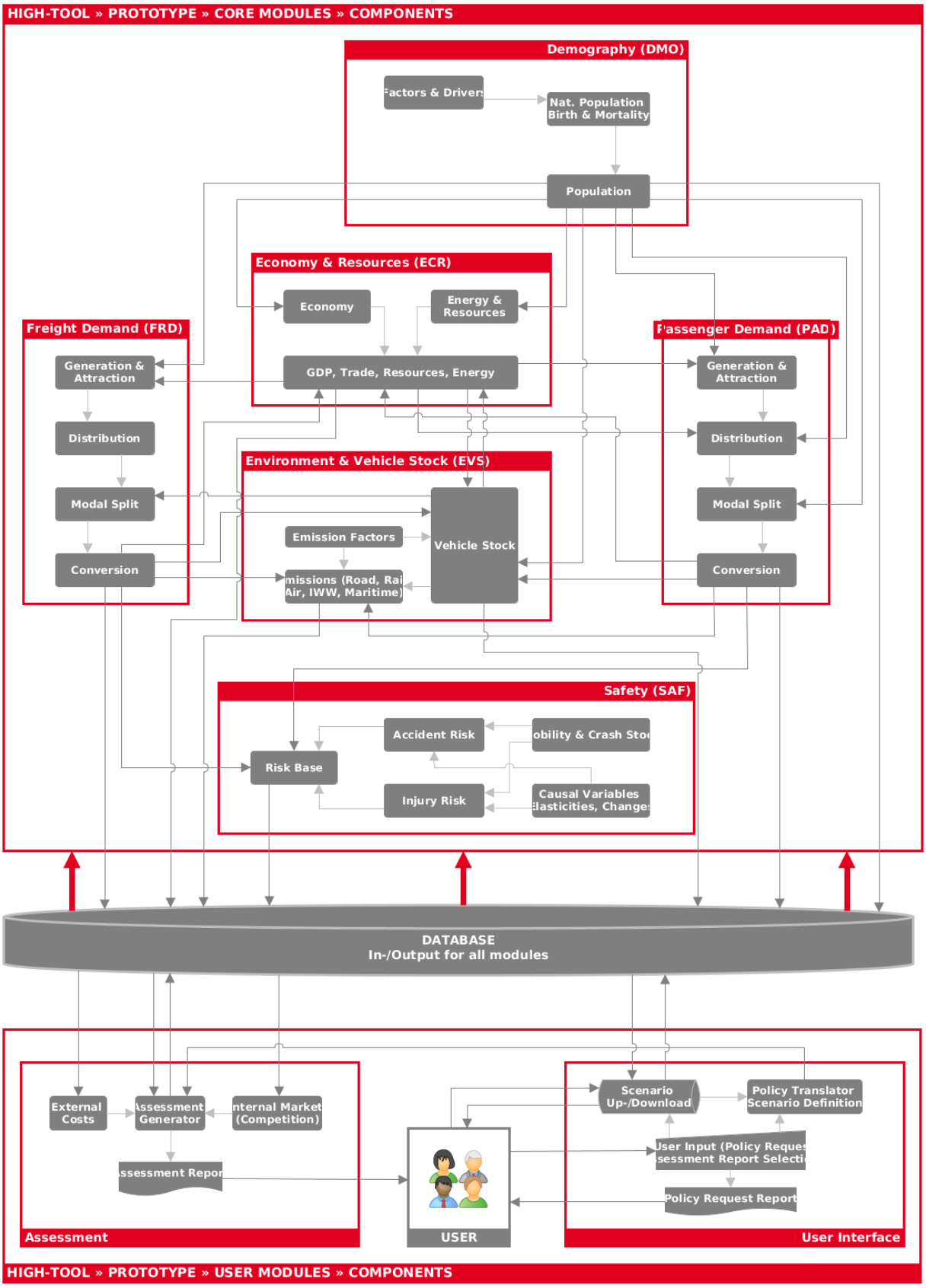

Figure 1: Structure of the HIGH-TOOL prototype model with its components

2.2 Data Stock Input and Output

The data parameters briefly introduced in the previous chapter are stored in the Data Stock. The Data Stock is a separate module of the HIGH-TOOL model, which provides access to the input and output parameters of each module.

2.2.1 External Input Sources for HIGH-TOOL

2.2.1.1 Types of input

The HIGH-TOOL model uses two types of input parameters. The first type describes historical data up to 2010 and the second type, projection inputs, describes assumptions up to 2050. For example, whereas the historical population figures are used to derive existing trends for the Demography module (first type of input), the EUROPOP2010 scenario assumptions are used to calibrate the population projections to the European reference scenario (second type of input).

2.2.1.2 Types of input sources

The Data Stock content is based on external sources, which come from either public sources (such as Eurostat or ETISplus) or private sources. A specific type of public source are the sources for projections, such as the EU Reference Scenario 2013 presenting the Energy, Transport and GHG trends to 2050 (EC, 2013a) or the population projections in the EUROPOP2010 scenario (Eurostat, 2011). The following external input sources are used in HIGH-TOOL[2].

2.2.1.3 Historical data databases

The **EUROSTAT DATABASE** provides the EU with statistics at European level that enable comparisons between countries and regions. This source provides a harmonised methodology for data collection among EU Member States (for historical data) giving a sound basis for the modules development. The Eurostat database is used in the Demography, Economy & Resources and Safety modules.

The **EXIOBASE DATABASE** 2.0 provides global, detailed MR EE SUT/IOT. They have been developed by harmonising and detailing SUTs for a large number of countries, estimating emissions and resource extractions by industry, linking the country EE SUT via trade to an MR EE SUT and producing an MR EE IOT from this.

[2] References of databases are provided in chapter 7.

The international IOT that can be used for the analysis of the environmental impacts associated with the final consumption of product groups. This database is used in HIGH-TOOL as it consists of SUTs for the 43 main economies including the EU28 countries. Moreover, from the SUTs we can derive various economic data at a detailed sectoral level. Also SUTs can be converted into IOTs from which we can obtain the input output coefficients or the Leontief Inverse. The projection for 2010 was done based on the version of 2007.

The **OECD DATABASE** includes data and metadata for OECD countries and selected non-member economies for main economic indicators at country level (i.e. GDP, household income, and population). This source is used supplementary to the EU Reference Scenario 2013 for the baseline scenario of Switzerland and Norway[3], since these countries are not covered by the EU Reference Scenario 2013.

The **ETISPLUS DATABASE** is a European Transport policy Information System, combining data and analytical modelling with maps. It provides a bridge between official statistics and applications within the transport policy theme. ETISplus is used by the Freight Demand and Passenger Demand modules as it is the state of the art data set for transport related data.

The **EU COMEXT** database represents International Trade Historic Statistical Figures provided by Eurostat. EU COMEXT covers the values and volumes of exports and imports of products by type of product, reporting Member State as well as source and destination of the flow. The data is compiled according to EU guidelines and therefore offers a consistent dataset. This source is combined with data sourced from UN COMTRADE and used in the Freight Demand module.

The **EU STATISTICAL POCKETBOOK 2014** provides an overview of the most pertinent transport-related statistics in Europe (EC, 2013b). Its content is based on a range of sources including Eurostat, international organisations and national statistics. This source provides complete and recent annual statistics on transportation for the EU27. It is consistent with various sources, notably Eurostat and is used in the Safety module.

[3] The detailed data sources for each module parameter are presented in Chapter 4.

The **UN COMTRADE** database contains detailed import and export statistics as collected by statistical authorities of close to 200 countries or areas and standardized by the United Nations Statistics Division. This source provides a source of data with broader scope than EU COMEXT and is combined with EU COMEXT and used in the Freight Demand module.

The **CARE DATABASE** is the European centralised database on road accidents, which result in death or injury across the EU. Each country produces its own road accident statistics. CARE pulls together non-confidential data from across the EU Member States into one central database. The CARE database provides the most complete and detailed data on road safety statistics available for the EU. Disaggregated fatality and injury statistics are provided based on a large number of variables.

CBS/IENM embraces passenger mobility in the Netherlands measured by means of a continuous survey on travel behaviour among a representative part of the population. The SWOV NL database is a detailed source on disaggregated person-kilometres travelled for different modes, age- and gender-groups. The Safety module relates this data on mobility to the demographic data of Euro-stat to obtain insight into the travel behaviour of different age-gender groups.

2.2.1.4 Projected input databases

The **EUROPOP2010 SCENARIO DATABASE** is developed by Eurostat and estimates the population growth for the EU27 up to 2060 (Eurostat, 2011). The projections of EUROPOP2010 are also used in the EU Reference Scenario 2013 (EC, 2013a). This database is used by the Demography module as the baseline scenario for the population growth.

The **EU REFERENCE SCENARIO 2013** provides projections on transport activity, energy and emissions up to 2050 for the EU28 based on current trends on population and economic development, taking into account the highly volatile energy import prices environment of recent years, in the framework of concrete national and EU policies and measures adopted until spring 2012 and which are or will be implemented over the next years (EC, 2013a). It is an integrated scenario, which is used as the Baseline scenario for HIGH-TOOL. It is used by the Economy & Resources module and indirectly by the Demography module.

MOVEET is a system dynamics-based analytical tool to address the policy problems related to transport and climate change (Purwanto, 2013). The tool is capable of estimating transport demand and emissions, as well as forecasting the impacts of policy and technological measures in transport related sectors, covering all transport modes from the different regions in the world up to 2050. The database of MOVEET is used especially in freight maritime transport modes and passenger air transport modes since these modes are not covered completely in the TREMOVE model/database. Transport fuel prices of the MOVEET database are especially used since the model covers not only data up to 2010 but also contains estimations up to 2050.

TREMOVE[4] is a policy assessment model and database to study the effects of different transport and environment policies on the emissions of the transport sector (De Ceuster et al., 2007). The model estimates the transport demand, modal shifts, vehicle stock renewal and scrappage decisions as well as the emissions of air pollutants and the welfare level, for policies as road pricing, public transport pricing, emission standards, subsidies for cleaner cars etc. The model covers passenger and freight transport in 31 countries and covers the period 1995–2030. The TREMOVE database (TREMOVE v3.1.1) is being used in HIGH-TOOL as it gathers country-specific data and parameters necessary to model in detail vehicle dynamics and emissions from transport up to 2030. It covers different modes: passenger cars, passenger vans, heavy and light duty vehicles, motorcycle and mopeds, freight and passenger rail modes, and inland navigation. Passenger air transport and freight maritime modes are covered by MOVEET.

The **VACLAV MODEL** is a European transport network model which has been developed at KIT and which has been applied and further developed in several EU funded projects such as TEN-STAC, ETIS and ETISplus (Szimba and Kraft, 2011). VACLAV is used by the Passenger Demand module for the computation of impedances, ensuring consistency between the approach in HIGH-TOOL and ETISplus.

[4] For EU15 countries except for Belgium, market shares data in TREMOVE are based from the ACEA website, the CO_2 voluntary agreement monitoring report and Smokers et al. (2006). For Belgium, fleet statistics have been derived by TML using Belgian datasets in collaboration with the Belgian government and the Belgian car federation. For the rest of the countries, data has been derived from national and Eurostat statistics. Other data sources used in TREMOVE are: Data from TRENDS Project finalised in October 2002. The road transport module developed in the framework of the TRENDS Project produces both analytical and aggregated results for the EU15 countries and for a timespan of 50 years (1970–2020). More specifically, the road transport module calculates various transport-related parameters, such as the annual mileage, vehicle population, average age, vehicle emissions and fuel balance, for all vehicle categories considered by COPERT. Additionally, temporal and spatial disaggregation of the estimated vehicle emissions was conducted for the base year 1995. Another source is the SCENES Project (2000). All TREMOVE sources can be retrieved from De Ceuster et al. (2007).

The **TRANS-TOOLS MODEL** is a European transport network model for transport generation and assignment, economic activity, trade, logistics, regional development and environmental impacts, that has been developed in collaborative projects funded by JRC-IPTS and DG TREN (DG MOVE). The Passenger Demand Freight modules use TRANS-TOOLS as it is a validated data source and used in several related projects. With regard to the Freight Demand module, TRANS-TOOLS provides the modal split determinants[5].

Here, it should be mentioned, that several of the projected inputs are used also as historical inputs as they include historical data (for example 2010 data).

2.2.2 Output Data and Intermediate Results

The output data for the prototype are products of the executed modules. At this stage of the project, the modules deliver their input and output datasets to the Data Stock, with the exception of a set of intermediate parameters for the Economy & Resources module. The intermediate variables in the prototype are the variables which are only used to support the module calculations in every time step; these are defined in the Data Stock for 2010 and are overwritten in every time step with new estimated values. In a later stage of the project, the Data Stock will be also accommodating all intermediate results of the modules as well as the Assessment report, the impedance and socio-economic data upload and policy-related parameters.

2.3 HIGH-TOOL Data Exchange Mechanism

In the prototype version of the HIGH-TOOL model the Data Stock is formed by a Microsoft Access database. This database contains all input data, and has reserved spaces for output data. To facilitate ease of use, the final HIGH-TOOL model will have a dedicated Data Exchange facility that allows users to conveniently export outputs and deliver their own inputs.

Due to the fact that Microsoft Access delivers excellent functionality to import and export data to and from many different formats, we simply advise users to make use of those facilities (to be found under the EXTERNAL DATA tab in Microsoft Access 2010). Later versions of the HIGH-TOOL model will make use of a full database system due to the requirements that HIGH-TOOL poses. As of this time, no final decision has been made as to the exact type of database software that will be chosen. However, database systems generally allow for importing and exporting through file types as CSV and Excel.

[5] The original source for the TRANS-TOOLS freight-related information is van der Leest (2005).

There are a number of requirements that can be defined for the final data exchange system:

- It must **allow importing and exporting** of CSV files. This format is human-readable and widely used and understood.
- It must **enforce constraints** as defined in the Data Stock on imported and exported data. This ensures correctness of the data in the sense that only defined dimension entities can be used.
- It must **allow easy conversion** to the original data set, i.e. it must be possible for the user to return to the original data.

3 HIGH-TOOL Data Stock

3.1 Data Structure

The HIGH-TOOL Data Stock stores the input and output data parameters of all modules of the HIGH-TOOL model. To decide on an appropriate medium to store this data, an initial indication of expected data size was made. This estimation pointed to a dataset, which would exceed 100 MB when implemented in Microsoft Excel, with some tables exceeding one million records. This ruled out Microsoft Excel as a viable option. Due to the fact, that the dataset for the prototype would likely not exceed appropriate sizes for Microsoft Access, and the fact that Microsoft Access would not violate other requirements like requiring a separate license or requiring specialist knowledge, Microsoft Access was chosen as a vessel for the HIGH-TOOL Data Stock.

The choice for Microsoft Access also means that the Data Stock can be queried using standard SQL (a programming language for managing data held in relational database management systems) and that much of the technical approach applied during the ETISplus project could be used. Based on the database requirements of the pre-final model, Microsoft Access could be replaced by another type of database management system.

The Data Stock contains 111 parameters expressed through 26 dimensions, spanning some 35 MB of data. The Data Stock is defined for the input and output parameters of the different HIGH-TOOL modules. As the different parameters share parts of their dimensions, for example, the time and geography dimension, it is necessary to define a methodology for the Data Stock. The methodology followed for preparing the Data Stock is the methodology, developed in the ETISplus project to build multidimensional models so that they are self-explanatory. This methodology identifies a set of rules for processing multidimensional data, as needed in HIGH-TOOL.

The first step was to identify all the dimensions needed. For each dimension a NAME and a DESCRIPTION field was defined. For example, for the dimension which described the 5-year time steps for the projections, the name Time and the range [2010, 2015, …, 2050] were indicated. The description of each dimension used in the HIGH-TOOL prototype is provided in Chapter 6, the dimensions are shown in the Annex. For each dimension, e.g., TIME, a table was defined (e.g., _TIME) to store the elements for that dimension. The definition of the dimensions were indicated either by the module developers (in case they provided the parameters), the data definition from publicly available data parameters (e.g., from the EU Reference Scenario 2013) and the model requirements, for example, measuring passenger demand performance in passenger-kilometre. Due to the fact, that this version of the Data Stock is prepared for the prototype, the definition of the dimensions is expected to change so as to cover the needs of the final model.

For example, the geographical coverage of the prototype (_COUNTRY DIMENSION) is now defined at NUTS-0 level (country level), whereas in the final model this is expected to be at NUTS-2 region level. The second step was to define all the parameters. The parameters are sets of numerical factors representing the input and output data of the modules. For example, the economic activity per country and per year is described using GDP. Together all the GDP values per year and country form the GDP PARAMETER[6]. The parameters are complemented by their unit and their source of information. As expected, they are also defined in terms of dimensions. For example, the GDP HIGH-TOOL output parameter was defined by time and country; hence it used the TIME and ZONE dimensions (to be found in the tables _TIME and _ZONE). The unit of the value is in million euros and the source is the Economy & Resources module of HIGH-TOOL. The Data Stock incorporates these two types of information and presents the parameters in table form. Table 1 shows exemplarily how the information for GDP is stored in the Data Stock.

Table 1: Example of GDP in the Data Stock

TIME	ZONE	VALUE (MIO_EUR)
2010	AT	…
2010	BE	…
…	…	…

Notes: AT means Austria; BE stands for Belgium

The data parameters of each module are presented in Chapter 4 together with their sources, while their dimensions are presented in Chapter 5.

3.2 Data Stock Preparation Process

The Data Stock preparation process for the prototype has been a dynamic process as the it has been evolving together with the prototype itself. The fist step was to define all necessary input and output parameters for the prototype development, together with their dimensions. This process resulted to a "shell" database for the prototype. The second step was to "fill in" the database the input parameter tables using various external sources. As a third step, the outcomes of the modules, i.e. the output parameters, would be copied to the Data Stock. Due to changes in the modelling process, this exercise was iterated several times.

[6] The reasoning behind the parameters used in the HIGH-TOOL prototype is beyond the scope of this Deliverable. More information on modules and their description can be found in Mandel et al. (2013) or in Van Grol et al. (2014).

As a final step of the prototype preparation, the Data Stock has been coupled to the actual prototype, feeding the input parameters, storing intermediate results and output parameters This step was necessary in order to integrate the modules and present the results in the most efficient way. It also allowed to run different scenarios and compare the outcomes to the HIGH-TOOL baseline scenario, by copying and modifying a new version of the Data Stock (Larrea and Biosca, 2014). However, the more elaborate integration of modules into the prototype required, given the time constraints, more freedom to module developers in defining their respective parts of the structure. Therefore, the final Data Stock does not rigidly adhere to the principles of Data Stock definition. However, this exercise has allowed us to fine-tune and optimise our approach for the pre- and final models. This deliverable presents the last version of the Data Stock.

3.3 Software Solution for Data Stock

To create the database structure required for the HIGH-TOOL Data Stock, the approach used during the ETISplus project was applied (ETISplus, 2012). This means that definitions of data parameters and dimensions were collected from module developers and used to feed a custom-built software solution that generates a database in Microsoft SQL Server. This solution conforms with the HIGH-TOOL Data Stock requirements and is specified according to the format set out in ETISplus. Input data supplied by module developers have then been imported and the complete database has been exported to Microsoft Access, guaranteeing a consistent and repeatable process. Having this approach available means that the same infrastructure can be applied to the final HIGH-TOOL Data Stock.

4 Identification of Data Parameters

Each module identifies its necessary input data parameters, which together with the elasticities and equations, intermediate data parameters and indices, estimate the output data parameters. For example, using fuel costs, the number of vehicles and the emissions factors parameters, the Environment & Vehicle Stock module estimates – among others – the fuel consumption by 2050. This section presents the input and output parameters for the six modules.

HIGH-TOOL prototype database (i.e. the Data Stock) counts in total 111 unique parameters; 60 are input data parameters (29 historical input, 29 projected input and two input factors), six are intermediate and 45 are output data parameters. Demography counts in total eleven parameters of which nine are input parameters and two are output. Economy & Resources has 34 parameters of which 19 are input, six are intermediate and nine are output ones. Freight Demand and Passenger Demand modules have respectively 27 and 16 parameters of which 25 and six are input ones. Finally, Safety and Environment & Vehicle Stock have eleven and twelve data parameters. The following table classifies the HIGH-TOOL parameters per module and parameter type.

Table 2: Number of parameters per module and parameter type

Module	HI	PI	IF	IM	OP	Total
Demography	4	5			2	**11**
Economy & Resources	14	3	2	6	9	**34**
Passenger Demand	1	5			10	**16**
Freight Demand	4	11			12	**27**
Safety	4	3			4	**11**
Environment & Vehicle Stock	2	2			8	**12**
Total	**29**	**29**	**2**	**6**	**45**	**111**

The distinction between input, intermediate and output parameters is as follows. Parameters starting with "i_" are **input data parameters**, broken down in:

- historical input parameters (up to 2010)
- projected input parameters (from 2010 up to 2050) and
- input factors (parameters without time dimension).

Parameters starting with anything else than "i_" are output data parameters. There is a specific category of parameters, defined only for the Economy & Resources module using the PARA_ prefix.

These parameters could be either input or intermediate parameters[7]. The **output data parameters** indicate the module they come from as follows:

- "d_": for Demography;
- "e_": for Economy & Resources;
- "p_": for Passenger Demand;
- "f_": for Freight Demand;
- "s_": for Safety;
- "v_": for Environment & Vehicle Stock.

For example, "d_POP" is the population data parameter being an output of the Demography module. Next to the parameter, the unit is indicated, as well as a short description and the data source.

The following sections present the exogenously defined input and output data parameters per module. The external input data sources are presented in detail in paragraph 2.2. For each one of the parameters presented in the coming sections, there is an additional attribute, the PARAMETER TYPE; this attribute explains whether this is an input (historical, projected and input factors), intermediate or output parameter.

4.1 Demography

The Demography module comprises of nine parameters (eight input parameters). The main source for input information is Eurostat for historical data. EUROPOP2010 projections (Eurostat, 2011) are used as assumptions for the BAU scenario. Table 3 summarises the data parameters used in the Demography module.

Table 3: Demography input/output data parameters

Abbreviation	Unit	Description	Data Source	Parameter Type
i_POPEUROSTAT	COUNT[8]	Historic population (1995–2010) by age and gender cohort	Eurostat, Population on 1 January by five years age groups and sex (demo_pjangroup)	Historical input
i_BIRTH	COUNT	Historic values number of births per mother age cohort	Eurostat, Live births by mother's age at last birthday and legal marital status (demo_fagec)	Historical input

[7] In all cases, the intermediate parameters are also input parameters, as they consist of input data for 2010, which are overwritten by the estimated values in the next time steps.

[8] COUNT represents a discrete number; in the case of i_POPEUROSTAT, COUNT is the number of people; for i_BIRTH, COUNT is the number of births per mother's age cohort.

Table 3: Demography input/output data parameters (cont.)

Abbreviation	Unit	Description	Data Source	Parameter Type
i_DEATH	COUNT	Historic values number of deaths per country per age and gender cohort	Eurostat, Deaths by age at last birthday and sex (demo_magec)	Historical input
i_DLABOUR	%	Percentage of activity rates per age, sex and nationality in quarters, averaged for the year 2010	Eurostat, activity rates per age, sex and nationality (%), (lfsq_argan)	Historical input
i_POP_EUREF	COUNT	Population for EU27+CH+NO from 2010–2050 (5-year time step) per age and gender cohort	EUROPOP2010 (proj_10c2150p)	Projected input
i_LIFE_MEN	COUNT	Projected for EU27+CH+NO from 2010–2050 (5-year time step) life expectancy for men at birth	Assumptions of the EUROPOP2010 on men life expectancy (at birth) from 2010–2050 (proj_10c2150a)	Projected input
i_LIFE_WOMEN	COUNT	Projected for EU27+CH+NO from 2010–2050 (5-year time step) life expectancy for women at birth	Assumptions of the EUROPOP2010 on women life expectancy (at birth) from 2010–2050 (proj_10c2150a)	Projected input
i_NET_MIGR	COUNT	Projected for EU27+CH+NO from 2010–2050 (5-year time step) net migration (emigration-immigration)	Assumptions of the EUROPOP2010 on fertility rate from 2010–2050 (proj_10c2150a)	Projected input
i_TOTAL_FERT	COUNT	Projected for EU27+CH+NO from 2010–2050 (5-year time step) total fertility rate	Assumptions of the EUROPOP2010 on fertility rate from 2010–2050 (proj_10c2150a)	Projected input
d_POP	COUNT	Modelled Population for EU28+CH +NO from 2010–2050 (5-year time step) per age and gender cohort	HIGH-TOOL Demography module	Output
d_LABOUR	COUNT	Labour force for EU28+CH+NO from 2010–2050 (5-year time step) by gender and age cohort	HIGH-TOOL Demography module	Output

4.2 Economy & Resources

The Economy & Resources module comprises 36 parameters (27 input parameters). The main external input sources are EXIOBASE 2.0[9], Eurostat for historic economic data as well as the EU Reference Scenario 2013 (EC, 2013a) for assumptions used for the baseline scenario[10]. For historic population trends, he Economy & Resources module uses the Eurostat and the OECD databases. Table 4 describes the parameters used in the Economy & Resources module.

[9] The external data for the BAU scenario are adjusted to the level of 2010 on the basis of the EXIOBASE 2.0 database. The base year of the database is 2007. EXIOBASE 2.0 is developed in CREEA project. The database itself is not published yet, but an introduction can be found at www.creea.eu.

[10] The Economy & Resources module does not use the output from the Demography module for the prototype. The Demography module will be used as input in the pre-final and final versions. For the prototype, the population of EU28 are sourced from EU Reference Scenario 2013. Norway and Switzerland figures are sourced from OECD, with a projection based on average EU28 population growth estimated by EU Reference Scenario 2013.

Table 4: Economy & Resources input/output data parameters

Abbreviation	Unit	Description	Data Source	Parameter Type
para_PK	COUNT	Capital, rent: relative index against PL	Assumed equal to 1	Input factor
para_PL	COUNT	Labour, wage: relative index against PK	Assumed equal to 1	Input factor
para_TRANSMARGIN	%	Transport margin per sector	EXIOBASE 2.0	Historical input
para_IO	COUNT	Input-output matrix	EXIOBASE 2.0	Historical input
para_TC	%	Consumption tax rate	Eurostat	Historical input
para_TY	%	Income tax rate	Eurostat	Historical input
para_TL	%	Labour tax rate	Eurostat	Historical input
para_TK	%	Capital tax rate	Eurostat	Historical input
para_PD	COUNT	Prices per sector	Assumed equal to 1	Projected input
para_ALPHA	COUNT	Household utility parameters	Estimated based on EXIOBASE 2.0	Intermediate parameter
para_ALPHA_CG	COUNT	Government utility parameters	Estimated based on EXIOBASE 2.0	Intermediate parameter
para_ALPHA_K	COUNT	Production function parameters	Estimated based on EXIOBASE 2.0	Intermediate parameter
para_ALPHA_L	COUNT	Production function parameters	Estimated based on EXIOBASE 2.0	Intermediate parameter
para_CONSREF	MIO_EUR	Reference of consumption	Estimated based on EXIOBASE 2.0	Historical input
para_LREF	COUNT	Reference of employment	Estimated based on EXIOBASE 2.0	Historical input
para_KREF	COUNT	Reference of production	Estimated based on EXIOBASE 2.0	Historical input
para_TRREF	COUNT	Reference of trade	Estimated based on EXIOBASE 2.0	Historical input
para_BETA_M	COUNT	Share of import in production	Estimated based on EXIOBASE 2.0	Input factor
para_BETA_E	COUNT	Share of export in production	Estimated based on EXIOBASE 2.0	Input factor
para_GAMMA	COUNT	Simplification variable for the relation between labour and capital input	HIGH-TOOL Economy & Resources module	Intermediate parameter
para_TETAREF	COUNT	Reference of the simplification variable for the composition of transport sector price	HIGH-TOOL Economy & Resources module	Intermediate parameter
para_XDREF	COUNT	Reference of total demand	EXIOBASE 2007	Historical input

Table 4: Economy & Resources input/output data parameters (cont.)

Abbreviation	Unit	Description	Data Source	Parameter Type
para_YREF	MIO_EUR	Reference of total household income per country in 2010	Calculated based on EU-ROPOP2010, and the EU Reference scenario 2013, 2010 population for CH and NO from OECD	Historical input
para_SHARE_EN	%	Share of energy use in production; It is a parameter, not calculated from an IO model.	EXIOBASE 2.0	Historical input
para_POPREF	MIO_HAB	Reference population 2010–2050 per country	EUROPOP2010, 2010 population for CH and NO from OECD and projected based on EU28 average population growth	Projected input
e_GVA	MIO_EUR	GVA by sector	HIGH-TOOL Economy & Resources module, 2010 values projected based on EXIOBASE 2.0	Output
e_GDP	MIO_EUR	GDP	HIGH-TOOL Economy & Resources module, 2010 values from the 2012 Ageing Report	Output
e_GDP_CAP	EUR_CAP	GDP per capita	HIGH-TOOL Economy & Resources module	Output
e_M	MIO_EUR	Import	HIGH-TOOL Economy & Resources module, 2010 values projected based on EXIOBASE 2.0	Output
e_E	MIO_EUR	Export	HIGH-TOOL Economy & Resources module, 2010 values projected based on EXIOBASE 2.0	Output
e_TR	MIO_EUR	Tax revenue	HIGH-TOOL Economy & Resources module, 2010 values projected based on EXIOBASE 2.0	Output
e_EN	MIO_EUR	Resource consumption of energy	HIGH-TOOL Economy & Resources module, 2010 values projected based on EXIOBASE 2.0	Output
e_HH_INCOME_CAP	EUR_CAP	Household income output	HIGH-TOOL Economy & Resources module, 2010 values from EU Reference Scenario 2013	Output
e_L	1000COUNT	Employment	HIGH-TOOL Economy & Resources module, 2010 values projected based on EXIOBASE 2.0	Output

4.3 Passenger Demand

The Passenger Demand module comprises 16 parameters (six input parameters). The main exogenous input sources are the ETISplus, TRANS-TOOLS, as well as VACLAV (Szimba and Kraft, 2011) databases. Table 5 describes the parameters used in the Passenger Demand module.

Table 5: Passenger Demand input/output data parameters

Abbreviation	Unit	Description	Data Source	Parameter Type
i_VOT	EUR_H	Value of time	TRANS-TOOLS v2.5	Projected input
i_OCC	COUNT	Occupancy rates	TRANS-TOOLS v2.5	Projected input
i_USERCOST	EUR_PKM	Direct user cost per PKM	ETISplus	Projected input
i_P_IMP_TIME	MIN	Passenger Impedances: Time	ETISplus	Projected input
i_P_IMP_DIST	KM	Passenger Impedances: Distance	ETISplus	Projected input
i_P_COUNTRYSHARE	%	Country shares by O/D and mode for travelled distance indicating the avg. distance travelled per country. Used for transit traffic.	VACLAV, based on ETISplus	Historical input
p_TRIPSORIG	TRIPS	Trips Origin	HIGH-TOOL Passenger Demand module	Output
p_TRIPSOD	TRIPS	Trips O/D	HIGH-TOOL Passenger Demand module	Output
p_DEMPKM	PKM	PKM travelled in a country including transit (rail, road)	HIGH-TOOL Passenger Demand module	Output
p_DEMVKM	VKM	VKM travelled in a country including transit (rail, road)	HIGH-TOOL Passenger Demand module	Output
p_ORIGPKM	PKM	Originating PKM	HIGH-TOOL Passenger Demand module	Output
p_ORIGVKM	VKM	Originating VKM	HIGH-TOOL Passenger Demand module	Output
p_TOTALCOST	EUR	Total transport cost by origin and mode to Economy	HIGH-TOOL Passenger Demand module	Output
p_DEMPURPPKM	PKM	PKM per country and mode to Economy & Resources	HIGH-TOOL Passenger Demand module	Output
p_DEMVSVKM	VKM	VKM per country and mode to Environment & Vehicle Stock	HIGH-TOOL Passenger Demand module	Output
p_DEMSAFEPKM	PKM	Predicted passenger mobility for 2010–2050 by age group and gender	HIGH-TOOL Passenger Demand module	Output

4.4 Freight Demand

The Freight Demand module comprises 18 parameters (four input parameters). The main exogenous input sources are the ETISplus database for the freight impedances, as well as EU COMEXT and UN COMTRADE for the freight demand in the year 2010. Table 6 provides an overview of the data parameters used in the Freight Demand module.

Table 6: Freight Demand input/output data parameters

Abbreviation	Unit	Description	Data Source	Parameter Type
i_F_IMP_DIST	KM	Freight impedances: Distance	ETISplus	Historical input
i_F_IMP_TIME	MIN	Freight impedances: Time	ETISplus	Historical input
i_F_TRADE	T	Freight demand 2010	EU COMEXT, UN COMTRADE	Historical input
i_F_COUNTRYSHARE	%	The total travelled distance per O/D split in country by mode for distance[11]	ETISplus	Historical input
i_P_F_FIXED_COST	EUR_VKH	Fixed transport costs per mode and commodity	TRANS-TOOLS	Projected input
i_P_F_VAR_COST	EUR_VKM	Variable transport costs per mode and commodity	TRANS-TOOLS	Projected input
i_P_F_FUEL_COST	EUR_VKH	Fuel transport costs per mode and commodity	TRANS-TOOLS	Projected input
i_P_F_LOAD_FACTOR	%	Load factors per mode and commodity	TRANS-TOOLS	Projected input
i_P_F_LOAD_CAPACITY	T	Load capacity per mode and commodity	TRANS-TOOLS	Projected input
i_P_F_SPEED	KMH	Average speed per mode and commodity	TRANS-TOOLS	Projected input
i_P_F_ECON_PARAM	COUNT	Cross-elasticities of sectoral growth & commodity growth	NEAC	Projected input
i_P_F_UTILITIES	COUNT	Mode utility function parameter per commodity	TRANS-TOOLS	Projected input
i_P_F_LOAD_TIME	HOURS	Load time per mode and commodity	TRANS-TOOLS	Projected input
i_P_F_UNLOAD_TIME	HOURS	Unload time per mode and commodity	TRANS-TOOLS	Projected input
i_P_F_WAIT_TIME	HOURS	Waiting time per mode and commodity	TRANS-TOOLS	Projected input
f_VKM	VKM	Predicted freight mobility in VKM per Origin for 2010–2050	HIGH-TOOL Freight Demand module	Output

[11] For example, from Belgium to Austria, the freight unit is estimated to travel 9% of the distance in Belgium, 2% in the Netherlands, 52% in Germany, 31% in Czech Republic and 6% in Austria. Therefore, the country shares are respectively 9%, 2%, 52%, 31%, 6%.

Table 6: Freight Demand input/output data parameters (cont.)

Abbreviation	Unit	Description	Data Source	Parameter Type
f_VKM_EU	VKM	VKM by O/D and mode, from 2010–2050	HIGH-TOOL Freight Demand module	Output
f_TOTAL_VKM_ROAD	VKM	Total VKM in a country including transit for road from 2010–2050	HIGH-TOOL Freight demand module	Output
f_DEMAND_OD	T	Transport demand per O/D mode and commodity from 2010–2050	HIGH-TOOL Freight Demand module	Output
f_TKM_EU	TKM	TKM by O/D, mode and commodity from 2010–2050	HIGH-TOOL Freight Demand module	Output
f_MODAL_SPLIT_OD	%	Modal split per O/D per mode and commodity from 2010–2050	HIGH-TOOL Freight Demand module	Output
f_TOTAL_COST_OD	EUR	Total generalised transport costs of transport by mode, O/D from 2010–2050[12]	HIGH-TOOL Freight Demand module	Output
f_DEMAND	T	Transport demand per origin and mode from 2010–2050	HIGH-TOOL Freight Demand module	Output
f_PA_EU	T	P/A by commodity and origin country from 2010–2050	HIGH-TOOL Freight Demand module	Output
f_DIST_EU	T	O/D ton matrix by commodity and country from 2010–2050	HIGH-TOOL Freight Demand module	Output
f_TOTAL_COST	EUR	Total transport costs of transport per origin from 2010–2050	HIGH-TOOL Freight Demand module	Output
f_MODAL_SPLIT	TKM	Modal split per origin country from 2010–2050	HIGH-TOOL Freight Demand module	Output

4.5 Safety

The Safety module comprises nine parameters (five input parameters). The main exogenous input sources are the CARE database for injury and fatality data, as well as CBS/IenM and the EU Statistical Pocketbook (EC, 2013b) for passenger mobility data[13]. The Safety module also uses user input for policy scenarios[14]. Table 7 summarises the data parameters used in the Safety module.

[12] The f_TOTAL_COST_OD are generalised costs (in million euro) per O/D and mode whereas the f_TOTAL_COST are transport costs by mode per origin country.

[13] The CBS/IenM data are used to disaggregate historical passenger-km by simplified age group and gender dimensions,

[14] The i_CHANGES_ parameters are only defined in the Data Stock in order to model the effect of the related parameters. These are by default zero as the baseline scenario does not simulate any policy changes expected from 2010 and on. The policy-related input parameters could be modified by the user and test what would be the effect of a relative change (%) between different years on output safety parameters.

Table 7: Safety input/output data parameters

Abbreviation	Unit	Description	Data Source	Parameter Type
i_FAT_HIST	COUNT	Historic Fatality data per year for 1995–2010	CARE	Historical input
i_SERINJ_HIST	COUNT	Historic Serious injury data per year for 1995–2010	CARE	Historical input
i_PKM_HIST	PKM	Historic Passenger mobility per year for 1995–2010	EU Statistical Pocketbook, disaggregated using CBS/ IenM and Eurostat data	Historical input
i_VKM_HIST	VKM	Historic road freight mobility per year for 1995–2010	EU Statistical Pocketbook, Eurostat	Historical input
i_CHANGES_SPEED	%	Changes to causal variables resulting from modelled safety measure(s); user-defined	User input	Projected input
i_CHANGES_DRUNK	%	Changes to causal variables resulting from modelled safety measure(s); user-defined	User input	Projected input
i_CHANGES_BELT	%	Changes to causal variables resulting from modelled safety measure(s); user-defined	User input	Projected input
s_FAT	COUNT	Predicted fatality data for 2010–2050	HIGH-TOOL Safety module	Output
s_SERINJ	COUNT	Predicted serious injury data for 2010–2050	HIGH-TOOL Safety module	Output
s_FAT_DIFF	%	Predicted relative difference in fatalities of scenario with safety measure(s) compared to base scenario for 2010–2050	HIGH-TOOL Safety module	Output
s_SERINJ_DIFF	%	Predicted relative difference in serious injuries of scenario with safety measure(s) compared to base scenario for 2010–2050	HIGH-TOOL Safety module	Output

4.6 Environment & Vehicle Stock

The Environment & Vehicle Stock module comprises 12 parameters (four input parameters). The main exogenous input sources are the databases by MOVEET (Purwanto, 2013) and TREMOVE[4] (De Ceuster et al., 2007) Table 8 informs on the parameters used in the Environment & Vehicle Stock module.

Table 8: Environment & Vehicle Stock input/output data parameters

Abbreviation	Unit	Description	Data Source	Parameter Type
i_FUELCOST_L	EUR_L	Fuel costs per litre of fuel (2010–2050)	MOVEET	Projected input
i_FUELCOST_G	EUR_G	Fuel costs per gram of fuel (2010–2050)	MOVEET	Projected input
i_VEHICLES	1000COUNT	Historical vehicle stock data, 1000vehicles per type (Year of Built: 1981–2010)	Eurostat and TRACCS database	Historical input
i_EMFACTOR	MIO_VKM	Fuel consumption and emission factors (CO_2, SO_2, NO_x, and PM), 2010–2050	COPERT	Historical input
v_VEH_STOCK	1000COUNT	Vehicle stock, 2010–2050 in thousands of vehicles	HIGH-TOOL Environment & Vehicle Stock module	Output
v_MILVKM	T	Generated vehicle kilometres, 2010–2050 in millions of VKM	HIGH-TOOL Environment & Vehicle Stock module	Output
v_MILVKM_IWW	T	Generated vehicle kilometres IWW, 2010–2050 in millions of VKM	HIGH-TOOL Environment & Vehicle Stock module	Output
v_T_FUEL	T	Fuel consumed in toe, by type of fuel, vehicle size and by mode for passenger/freight, 2010–2050	HIGH-TOOL Environment & Vehicle Stock module	Output
v_T_NOX	T	Tonnes of NO_x emitted, 2010–2050	HIGH-TOOL Environment & Vehicle Stock module	Output
v_T_SO2	T	Tonnes of SO_2 emitted, 2010–2050	HIGH-TOOL Environment & Vehicle Stock module	Output
v_T_CO2	T	Tonnes of CO_2 emitted, 2010–2050	HIGH-TOOL Environment & Vehicle Stock module	Output
v_T_PM	T	Tonnes of PM emitted, 2010–2050	HIGH-TOOL Environment & Vehicle Stock module	Output
v_AVGCOST	EUR_VKM	Average generalised cost at mode level, 2010–2050	HIGH-TOOL Environment & Vehicle Stock module	Output

5 Dimensions Associated to HIGH-TOOL Parameters

5.1 Prototype Dimensions

The dimensions define the segmentations that are used in the Data Stock. The HIGH-TOOL prototype consists of 26 dimensions (without aliases and units); these refer to time, geography, mode, and other module-specific characteristics. Table 9 gives an overview of the dimensions applied for the prototype. The description of the dimensions can be found in the Annex.

Table 9: Dimension descriptions

Abbreviation	Description	Annex Ref.
Agegroup	Detailed age groups running in 5-year steps	Table 1A
Agegroup_Simple	Simplified Age groups	Table 2A
Age group	Alias of Simplified Age groups	Table 2A
Commodity	Commodity in NST1	Table 3A
Zone	Zone dimension: EU28+CH+NO -NUTS-0	Table 4A
Country	Country, alias for Zone dimension	Table 4A
ZoneD	Alias of Zone dimension used for destination zones	Table 4A
ZoneO	Alias of Zone dimension used for origin zones	Table 4A
NUTS0	Alias of Country dimension	Table 4A
Orig	Alias of Zone dimension used for origin zones	Table 4A
Dest	Alias of Zone dimension used for destination zones	Table 4A
DB	Distance bands	Table 5A
DB_IWW	Distance bands for IWW	Table 6A
Em_Type	Emission type	Table 7A
Gender	Gender (Numerical representation)	Table 8A
Gender	Alias of Gender (Text representation)	Table 8A
Mode	Mode of transport that is applicable (Numerical representation)	Table 9A
Mode	Alias of Mode for passenger transport (Text representation)	Table 9A
Mode_Freight	Alias of Mode for freight transport (Numerical representation)	Table 9A
MOA_IWW	Mode of appearance of goods transported by IWW	Table 10A
Mode_Env	Mode of transport for the Environment & Vehicle Stock module; segmented into vehicle types	Table 11A
Mode_Safety	Simplified mode of transport for the Safety module	Table 12A
VSMode	Simplified mode of transport for the Environment & Vehicle Stock module	Table 13A
Number_Zone	Transit country between an origin and a destination	Table 14A
Purpose	Trip purpose (Numerical representation)	Table 15A
Purpose	Alias of Purpose (Text representation)	Table 15A
Sector	Economic sector	Table 16A
Sector_From	Alias of Sector dimension used to indicate the originating sector	Table 16A
Sector_To	Alias of Sector dimension used to indicate the destination sector	Table 16A

Table 9: Dimension descriptions (cont.)

Abbreviation	Description	Annex Ref.
Time	2010–2050 in 5 year steps	Table 17A
Time	Alias of Time	Table 17A
Unit	Units used by all modules	Table 18A
Utility	Utility function index	Table 19A
Veh_Fuel	Fuel type used by Environment & Vehicle Stock	Table 20A
Veh_Tech	Vehicle technology indicated by age of vehicle	Table 21A
Veh_Year_Built	Year in which vehicle was built	Table 22A
Veh_Size	Size of vehicle	Table 23A
Year	1995–2010 in years	Table 24A

5.2 Module Dimensions

This section gives an overview of the dimensions, which are used for each module's parameters. In each table all parameters are listed for a given module and the dimensions applied are itemised. For example, the data parameters of the Demography module are defined in five dimensions (Table 10). For example, "i_POP_EUREF", the EUROPOP2010 population projections are defined per YEAR (2010, 2015, …, 2050), COUNTRY (e.g. AT for Austria, BE for Belgium), AGEGROUP(0–4 years, 5–9 years, etc.) and GENDER (males, females).

5.2.1 Demography

Table 10 summarises the dimensions per data parameter of the Demography module.

Table 10: Dimensions of the Demography module

Abbreviation	PAT	Short description	DIM1	DIM2	DIM3	DIM4
i_BIRTH	HI	Number of births	Year	Country	Agegroup	
i_DEATH	HI	Number of deaths	Year	Country	Agegroup	Gender
i_DLABOUR	HI	Labour force %	Year	Country	Agegroup	Gender
i_LIFE_MEN	PI	Life expectancy men from 2010–2050	Time	Country		
i_LIFE_WOMEN	PI	Life expectancy women from 2010–2050	Time	Country		
i_NET_MIGR	PI	Net migration from 2010–2050	Time	Country		
i_POP_EUREF	PI	Population from 2010–2050	Time	Country	Agegroup	Gender
i_POPEUROSTAT	HI	Population up to 2010	Year	Country	Agegroup	Gender
i_TOTAL_FERT	PI	TFR from 2010–2050	Time	Country		
d_LABOUR	OP	Modelled labour force from 2010–2050	Time	Country	Agegroup	Gender
d_POP	OP	Modelled population from 2010–2050	Year	Country	Agegroup	Gender

5.2.2 Economy & Resources

Table 11 contains the dimensions per data parameter for the Economy & Resources module.

Table 11: Dimensions of the Economy & Resources module

Abbreviation	PAT	Short description	DIM1	DIM2	DIM3
para_PK	IF	Capital, rent: relative index against PL	Country		
para_PL	IF	Labour, wage: relative index against PK	Country		
para_PD	PI	Price per sector	Time	Country	Sector
para_TRANSMARGIN	HI	Transport margin per sector	Country	Sector	
para_IO	HI	Input/output matrix	Country	Sector_From	Sector_To
para_TC	HI	Consumption tax rate	Country	Sector	
para_TY	HI	Income tax rate	Country	Sector	
para_TL	HI	Labour tax rate	Country		
para_TK	HI	Capital tax rate	Country		
para_ALPHA	IP	Utility	Country	Sector	
para_ALPHA_CG	IP	Government utility	Country	Sector	
para_ALPHA_K	IP	Production function	Country	Sector	
para_ALPHA_L	IP	Production function	Country	Sector	
para_CONSREF	HI	Consumption reference	Country	Sector	
para_LREF	HI	Employment reference	Country	Sector	
para_KREF	HI	Capital reference	Country	Sector	
para_TRREF	HI	Trade reference	Country	Sector	
para_BETA_M	IF	Share of import in production	Country	Sector	
para_BETA_E	IF	Share of export in production	Country	Sector	
para_GAMMA	IP	Change variable	Country	Sector	
para_TETAREF	IP	Change variable reference	Country	Sector	
para_XDREF	HI	Total demand reference	Country	Sector	
para_YREF	HI	Total household income reference	Country	Sector	
para_SHARE_EN	HI	Share of energy use in production	Country	Sector	
para_POPREF	PI	Reference population	Time	Country	
e_GVA	OP	GVA per sector	Time	Country	Sector
e_GDP	OP	GDP	Time	Country	
e_GDP_CAP	OP	GDP per capita	Time	Country	
e_M	OP	Imports	Time	Country	Sector
e_E	OP	Exports	Time	Country	Sector
e_TR	OP	Tax revenue	Time	Country	
e_EN	OP	Resource consumption of energy	Time	Country	Sector
e_HH_INCOME_CAP	OP	Household income	Time	Country	
e_L	OP	Employment	Time	Zone	Sector

5.2.3 Environment & Vehicle Stock

Table 12 displays the dimensions per data parameter for the Environment & Vehicle Stock module.

Table 12: Dimensions of Environment & Vehicle Stock module

Abbreviation	PAT	Short description	DIM1	DIM2	DIM3	DIM4	DIM5	DIM6	DIM7
i_FUELCOST_L	PI	Fuel cost per litre	Year	Country	Veh_Fuel	Mode_Env			
i_FUELCOST_G	PI	Fuel cost per gram	Year	Country	Veh_Fuel	Mode_Env			
i_VEHICLES	HI	Vehicle stock	Time	Veh_Year_ Built	Mode_Env	Veh_Tech	Veh_Fuel	Country	
i_EMFACTOR	PI	Fuel consumption & emission factors	Time	Veh_Tech	Veh_Size	Veh_Fuel	Em_Type	Mode_Env	
v_VEH_STOCK	OP	Vehicle stock	Time	Country	Veh_Size	Veh_Fuel	Mode_Env		
v_MILVKM	OP	VKM	Time	Country	Veh_Size	Veh_Fuel	Mode_Env	MOA_IWW	DB_IWW
v_MILVKM_IWW	OP	VKM for IWW	Time	Country	Veh_Size	Veh_Fuel	Mode_Env	MOA_IWW	DB_IWW
v_T_FUEL	OP	Fuel consumption	Time	Country	Veh_Size	Veh_Fuel	Mode_Env		
v_T_NOX	OP	NO_x emitted	Time	Country	Veh_Size	Veh_Fuel	Mode_Env		
v_T_SO2	OP	SO_2 emitted	Time	Country	Veh_Size	Veh_Fuel	Mode_Env		
v_T_CO2	OP	CO_2 emitted	Time	Country	Veh_Size	Veh_Fuel	Mode_Env		
v_T_PM	OP	PM emitted	Time	Country	Veh_Size	Veh_Fuel	Mode_Env		

5.2.4 Safety

Table 13 contains the Safety module's dimensions per data parameter.

Table 13: Dimensions of the Safety module

Abbreviation	PAT	Short description	DIM1	DIM2	DIM3	DIM4	DIM5
i_FAT_HIST	HI	Fatalities	Year	Country	Mode_Safety	Agegroup_Simple	Gender
i_SERINJ_HIST	HI	Serious injuries	Year	Country	Mode_Safety	Agegroup_Simple	Gender
i_PKM_HIST	HI	PKM	Year	Country	Agegroup_ Simple	Gender	
i_VKM_HIST	HI	VKM	Year	Country			
i_CHANGES_SPEED	PI	Changes in speed	Time	Country	Mode_Safety	Agegroup_Simple	Gender
i_CHANGES_DRUNK	PI	Changes in alcohol level	Time	Country	Mode_Safety	Agegroup_Simple	Gender
i_CHANGES_BELT	PI	Changes in belt use	Time	Country	Mode_Safety	Agegroup_Simple	Gender
s_FAT	OP	Fatalities	Time	Country	Mode_Safety	Agegroup_Simple	Gender
s_SERINJ	OP	Serious injuries	Time	Country	Mode_Safety	Agegroup_Simple	Gender
s_FAT_DIFF	OP	Relative difference in fatalities	Time	Country	Mode_Safety	Agegroup_Simple	Gender
s_SERINJ_DIFF	OP	Relative difference in serious injuries	Time	Country	Mode_Safety	Agegroup_Simple	Gender

5.2.5 Passenger Demand

Table 14 contains the dimensions per data parameter of the Passenger Demand module.

Table 14: Dimensions of the Passenger Demand module

Abbreviation	PAT	Short description	DIM1	DIM2	DIM3	DIM4	DIM5	DIM6	DIM7
i_VOT	PI	Value of Time	Time	Country	Purpose				
i_OCC	PI	Occupancy rates	Time	Country	Mode	Purpose			
i_USERCOST	PI	User costs	Time	Country	Mode	Purpose			
i_P_IMP_TIME	PI	Time impedance	Time	ZoneO	ZoneD	Mode	DB		
i_P_IMP_DIST	PI	Distance impedance	Time	ZoneO	ZoneD	Mode	DB		
i_P_COUNTRYSHARE	HI	Country shares	Time	ZoneO	ZoneD	Mode	DB	Country	
p_TRIPSORIG	OP	Trips origin	Time	NUTS-0	DB	Mode	Purpose		
p_TRIPSOD	OP	Trips O/D	Time	Orig	Dest	DB	Mode	Purpose	
p_DEMPKM	OP	PKM transit	Time	NUTS-0	DB	Mode			
p_DEMVKM	OP	VKM transit	Time	NUTS-0	DB	Mode			
p_ORIGPKM	OP	PKM origin	Time	NUTS-0	DB	Mode			
p_ORIGVKM	OP	VKM origin	Time	NUTS-0	DB	Mode			
p_TOTALCOST	OP	Total costs origin	Time	Orig	Mode				
p_DEMPURPPKM	OP	PKM to Economy & Resources	Time	Orig	Mode				
p_DEMVSVKM	OP	VKM to Environment & Vehicle Stock	Time	Orig	VSMode	Mode			
p_DEMSAFEPKM	OP	PKM to Safety	Time	NUTS-0	Agegroup_ Simple	Gender			

5.2.6 Freight Demand

Table 15 gives an overview of the dimensions per data parameter of the Freight Demand module.

Table 15: Dimensions of the Freight Demand module

Abbreviation	PAT	Short description	DIM1	DIM2	DIM3	DIM4	DIM5	DIM6	DIM7
i_F_IMP_DIST	HI	Distance impedance	Time	ZoneO	ZoneD	Mode			
i_F_IMP_TIME	HI	Time impedance	Time	ZoneO	ZoneD	Mode			
i_F_TRADE	HI	Freight demand	Time	ZoneO	ZoneD	Com-modity			
i_F_COUNTRYSHARE	HI	Country shares	TimeY	ZoneO	ZoneD	Mode	DB	Number_ Zone	Country
i_P_F_FIXED_COST	PI	Fixed costs	Time	Mode	Com-modity				

Table 15: Dimensions of the Freight Demand module (cont.)

Abbreviation	PAT	Short description	DIM1	DIM2	DIM3	DIM4	DIM5	DIM6	DIM7
i_P_F_VAR_COST	PI	Variable costs	Time	Mode	Com-modity				
i_P_F_FUEL_COST	PI	Fuel costs	Time	Mode	Com-modity				
i_P_F_LOAD_FACTOR	PI	Load factors	Time	Mode	Com-modity				
i_P_F_LOAD_CAPACITY	PI	Load capacity	Time	Mode	Com-modity				
i_P_F_SPEED	PI	Speed	Time	Mode	Com-modity				
i_P_F_ECON_PARAM	IF	Economic parameters	Com-modity	Sector					
i_P_F_UTILITIES	IF	Utility factors	Utility	Com-modity					
i_P_F_LOAD_TIME	PI	Load time	Time	Mode	Com-modity				
i_P_F_UNLOAD_TIME	PI	Unload time	Time	Mode	Com-modity				
i_P_F_WAIT_TIME	PI	Wait time	Time	Mode	Com-modity				
f_VKM	OP	VKM origin	Time	ZoneO	Mode				
f_VKM_EU	OP	VKM O/D	Time	ZoneO	ZoneD	Mode			
f_TOTAL_VKM_ROAD	OP	VKM transit road	Time	Country					
f_PA_EU	OP	P/A country	Time	ZoneO	Com-modity				
f_DIST_EU	OP	Tonnes O/D	Time	ZoneO	ZoneD	Com-modity			
f_TOTAL_COST_OD	OP	Generalised costs O/D	Time	ZoneO	ZoneD	Mode			
f_TKM_EU	OP	TKM O/D	Time	ZoneO	ZoneD	Mode	Com-modity		
f_MODAL_SPLIT	OP	Modal split origin	Time	ZoneO	Mode				
f_DEMAND_OD	OP	Tonnes O/D	Time	ZoneO	ZoneD	Mode			
f_TOTAL_COST	OP	Total transport cost by origin	Time	ZoneO	Mode				
f_MODAL_SPLIT_OD	OP	Modal split O/D	Time	ZoneO	ZoneD	Mode	Com-modity		
f_DEMAND	OP	Tonnes origin	Time	ZoneO	Mode				

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7 Other Project Resources

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ETISplus database. http://www.etisplus.eu.

EU COMEXT: EU Database for external trade. http://epp.eurostat.ec.europa.eu/newxtweb/.

Eurostat Statistics database. http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database.

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CBS/IenM: Passenger Mobility Historical data. https://www.swov.nl/NL/Research/cijfers/Cijfers_Mobiliteit.htm.

TRANS-TOOLS: Tools for Transport Forecasting and Scenario Testing, Version 2.5. http://energy.jrc.ec.europa.eu/transtools/.

UN COMTRADE: UN Commodity Trade Statistics Database. http://comtrade.un.org/db/.

Deliverable D3.1 Annex

Prototype Dimensions

Index of Tables

Dimensions

Table 9 of the main document refers to the dimensions for the prototype development. This Annex presents the instances of these dimensions in detail.

Table 1A: Agegroup (Demography module)

ID	Description	ID	Description
0	Age range from 0–4	**40**	Age range from 40–44
5	Age range from 5–9	**45**	Age range from 45–49
10	Age range from 10–14	**50**	Age range from 50–54
15	Age range from 15–19	**55**	Age range from 55–59
20	Age range from 20–24	**60**	Age range from 60–64
25	Age range from 25–29	**65**	Age range from 65–69
30	Age range from 30–34	**70**	Age range from 70–74
35	Age range from 35–39	**75**	Age range from 75 and above

Table 2A: Agegroup_Simple (Passenger Demand and Safety modules)

ID	Description	ID	Description
0	Age range from 0–14	**25**	Age range from 25–64
15	Age range from 15–24	**65**	Age range from 65 and above

Table 3A: Commodity (Freight Demand module)

ID	Description	ID	Description
0	Agricultural products and live animals	**5**	Metal products
1	Foodstuffs and animal fodder	**6**	Crude and manufactures minerals, building materials
2	Solid mineral fuels	**7**	Fertilizers
3	Petroleum products	**8**	Chemicals
4	Ores and metal waste	**9**	Machinery, transport equipment, manufactures and miscellaneous articles

Table 4A: Zone (All modules)

ID	Description	ID	Description
AT	Austria	**IE**	Ireland
BE	Belgium	**IT**	Italy
BG	Bulgaria	**LT**	Lithuania
CH	Switzerland	**LU**	Luxembourg
CY	Cyprus	**LV**	Latvia
CZ	Czech Republic	**MT**	Malta
DE	Germany	**NL**	Netherlands
DK	Denmark	**NO**	Norway
EE	Estonia	**PL**	Poland
EL	Greece	**PT**	Portugal
ES	Spain	**RO**	Romania
FI	Finland	**SE**	Sweden
FR	France	**SI**	Slovenia
HR	Croatia	**SK**	Slovakia
HU	Hungary	**UK**	United Kingdom

Note: Zone, ZoneD, ZoneO, NUTS0, Orig and Dest are aliases to Country

Table 5A: DB (Freight Demand, Passenger Demand and Safety modules)

ID	Description	ID	Description
1	Kilometre range [0–50)	**3**	Kilometre range [300–1000)
2	Kilometre range [50–300)	**4**	Kilometre range [1000+)

Table 6A: DB_IWW (Environment & Vehicle Stock module)

ID	Description	ID	Description
0	Kilometre range [0–500)	**1**	Kilometre range [500+)

Table 7A: Em_Type (Environment & Vehicle Stock module)

ID	Description	ID	Description
Fuel	Fuel consumption	**SO_2**	Sulphur Dioxide
NO_x	Nitrogen Oxides	**PM**	Particulate Matter
CO_2	Carbon Dioxide		

Table 8A: Gender (Demography, Safety and Passenger Demand modules)

ID	Description	ID	Description
0	Males	**1**	Females

Table 9A: Mode (Passenger Demand and Freight Demand modules)

ID	Description	ID	Description
0	Air	**3**	Rail
1	IWW: Inland waterways (only in Freight module)	**4**	Road
2	Sea: Maritime (only in Freight module)		

Note: Mode_Freight is an alias to Mode; Mode has also text representation (Air, IWW, Sea, Rail, Road)

Table 10A: MOA_IWW (Environment & Vehicle Stock module)

ID	Description	ID	Description
UNT	Unitised	**GCG**	General cargo
BULK	Bulk		

Table 11A: Mode_Env (Environmental & Vehicle Stock module)

ID	Description	ID	Description
0	Air passenger	**5**	Buses
1	Inland waterways	**6**	Cars
2	Maritime freight	**7**	Heavy Duty Vehicles
3	Rail freight	**8**	Motorcycles
4	Rail passenger	**9**	Vans

Table 12A: Mode_Safety (Safety module)

ID	Description	ID	Description
0	Passenger	**1**	Freight

Table 13A: VSMode (Passenger Demand module)

ID	Description	ID	Description
Air	Air mode	**Motocp**	Motorcycles
Bus	Buses	**Rail**	Rail
Car	Passenger cars	**Van**	Vans

Table 14A: Number_Zone (Freight Demand module)

ID	Description	ID	Description
A	First transit country	**G**	Seventh transit country
B	Second transit country	**H**	Eighth transit country
C	Third transit country	**I**	Ninth transit country
D	Fourth transit country	**J**	Tenth transit country
E	Fifth transit country	**K**	Eleventh transit country
F	Sixth transit country	**L**	Twelfth transit country

Table 15A: Purpose (Purpose of trip; Passenger Demand module)

ID	Description	ID	Description
0	B: Business	**1**	NB: Non-business

Note: Purpose has also a text representation alias (B and NB)

Table 16A: Sector (Economy & Resources module)

ID	Description	ID	Description
0	Agriculture	**2**	Services
1	Industry		

Note: Sector_From and Sector_To are aliases to Sector

Table 17A: Time (All modules)

IDs	Description
2010; 2015; 2020; 2025; 2030; 2035; 2040; 2045; 2050	The year indicated

Table 18A: Unit (All modules)

ID	Description
BIO_PKM	Billions of passenger-kilometres
1000COUNT	Thousands of entities indicated by parameter
COUNT	Number of entities indicated by parameter
EUR	Euro (2010 values)
EUR_CAP	Euro per capita (2010 values)
EUR_G	Euro per gram (2010 values)
EUR_H	Euro per hour (2010 values)
EUR_L	Euro per litre (2010 values)
EUR_PKM	Euro per passenger-kilometre (2010 values)
EUR_T	Euro per tonne (2010 values)
EUR_TKM	Euro per tonne-kilometre (2010 values)
EUR_VKH	Euro per vehicle hour (2010 values)
EUR_VKM	Euro per vehicle-kilometre (2010 values)
FLIGHT	Flight
G_KM	Gram per kilometre
HAB	Inhabitants, persons, capita
HOURS	Hours
KM	Kilometres
KMH	Kilometre per hour
KM2	Square kilometre
MIN	Minutes
MIO_EUR	Millions of euro (2010 values)
MIO_HAB	Millions of inhabitants
MIO_VKM	Millions of vehicle kilometres
PERCENTAGE	Percentage (%)
PKM	Passenger-kilometre
T	Tonnes
TOE	Tonne of oil equivalent
TKM	Tonne-kilometre
TRIPS	Trips
V1000H	Vehicles per thousand inhabitants
VKM	Vehicle-kilometre

Table 19A: Utility (Freight demand)

ID	Description	ID	Description
11	b_road utility factor	**40**	a_iww utility factor
20	a_rail utility factor	**50**	a_sea utility factor
21	b_rail utility factor	**99**	b_cost utility factor

Table 20A: Veh_Fuel (Environmental & Vehicle Stock module)

ID	Description	ID	Description
D	Diesel	**CNG**	Compressed Natural Gas
G	Gasoline	**E**	Electricity
LNG	Liquefied Natural Gas	**K**	Kerosene (Jet fuel)

Table 21A: Veh_Tech (Environmental & Vehicle Stock module)

IDs	Description
0; 1; 2; 3; …; 29	Age of vehicle (in one-year steps)

Table 22A: Veh_Year_Built (Environmental & Vehicle Stock module)

IDs	Description
1981; 1982; 1983; …; 2010	Building year of vehicle (in one-year steps)

Table 23A: Veh_Size (Environmental & Vehicle Stock module)

ID	Description	ID	Description
Car_Small	Car up to 1,4 l	**HDT2**	Trucks between 7,5 – 16 t
Car_Medium	Car between 1,4 – 2 l	**HDT3**	Trucks between 16 – 32 t
Car_Big	Car over 2 l	**LDTD**	Trucks over 32 t
Mar_TK	Tankers	**LDTG**	freight light duty trucks
Mar_BC	Bulk carrier	**PJJ**	Jumbo jet
Mar_LN	Liner ships	**PJN**	Narrow-body jet
Mar_CS	Containers	**PJW**	Wide-body jet
Mar_NON	Non cargo	**RJ**	Regional jet
IWW_Cargo	Cargo	**SJ**	Supersonic jet
IWW_Pusher	Pusher	**TP**	Regional propeller
IWW_Tanker	Tankers	**TS**	Small propeller
Rail_R	Railcar	**MC1**	Motorcycle under 50 cc
Rail_L	Locomotive	**MC2**	Motorcycle 50 – 250 cc
Rail_H	High speed	**MC3**	Motorcycle 250 – 750 cc
Bus_M	Buses	**MC4**	Motorcycle over 750 cc
van_M	Passenger vans	**MP**	Moped
HDT1	Trucks between 3,5 – 7,5 t		

Table 24A: Year (Safety and Demography modules)

IDs	Description
1995; 1996; 1997; …; 2010	Year (in one-year steps)