



## **iTREN-2030**

**Integrated transport and energy baseline until 2030**

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## **iTREN-2030**

**Integrated transport and energy baseline until 2030**

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## Integrated transport and energy baseline until 2030

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## **List of Abbreviations**

ASTRA	Assessment of Transport Strategies, iTREN-2030 model
BBL	Barrel of oil
CNG	Compressed Natural Gas
CO <sub>2</sub>	Carbon dioxide
DoW	Description of Work
eeccf	Equivalent energy content of conventional fuel per liter
EET	European Energy and Transport - Trends to 2030, report
ETiF	EU Energy and Transport in Figures – Statistical pocketbook 2009
ETS	Emission Trading System
EU	European Union
EU12	Member states that joined the European Union after 2003
EU15	Member states that joined the European Union before 2004
EU27	All member states of the European Union as of today (2008)
EU27+2	EU27 countries plus Norway and Switzerland
€ct	Eurocent
€ <sub>2005</sub>	Euro at the value of year 2005.
GDP	Gross domestic product
GHG	Greenhouse gases
GIS	Geographical Information System
HGV, HDT	Heavy Goods Vehicle (>3.5 ton gross vehicle weight)
ICAO	International Civil Aviation Organization
INT	Integrated Scenario of iTREN-2030
LDV, LDT	Light Duty Vehicles (<3.5 ton gross vehicle weight)
LPG	Liquefied Petroleum Gas
Km	Kilometre
NAP	National Allocation Plan
NEC	National Emissions Ceilings
NH <sub>3</sub>	Ammonia
NO <sub>x</sub>	Nitrogen Oxide
NSTR	Nomenclature uniforme des marchandises pour les Statistiques de Transport, Révisée
NUTS	Nomenclature of Territorial Statistical Unit
OD, O/D	Origin-destination (OD-pair, OD-matrix]
Pass-km, pkm	Passenger-kilometre, 1 person transported over 1 km distance = 1 pkm
PM	Particulate Matter



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POLES	Prospective Outlook on Long term Energy Systems, iTREN-2030 model
REF	Reference Scenario of iTREN-2030
RoW	Rest-of-the-world region
SO <sub>2</sub>	Sulphur dioxide
TEN-T	Transport projects belonging to the Trans European Transport Network
TiF, TiF-2007	Energy and Transport in figures 2007 (European Commission 2007)
Tonnes-km, tkm	Tonnes-kilometre, 1 ton transported over 1 km distance = 1 tkm
TRANS-TOOLS, TTv1	TOOLS for TRansport Forecasting AND Scenario testing, iTREN-2030 model
TTv2	TRANS-TOOLS model version developed in the TEN-Connect project
UIC	Union International de Chemin de fer
VAT	Value-added tax
Veh-km, vkm	Vehicle-kilometre, 1 vehicle that drives a distance of 1 km = 1 vkm
VOC	Volatile Organic Compound
WP	Work package



## Executive summary

The basic objective of iTREN-2030 is to extend the forecasting and assessment capabilities of the TRANS-TOOLS transport model to the new policy issues arising from the technology, environment and energy fields. This is achieved in iTREN-2030 by coupling the TRANS-TOOLS model with three other models, ASTRA, POLES and TREMOVE that cover these new policy issues.

The TRANS-TOOLS transport network model has been developed to constitute the reference tool for supporting transport policy in the EU and is currently being developed in several European projects, amongst them TEN-Connect, WorldNet, TRANSvisions and iTREN-2030. Although some significant work has been carried out within iTREN-2030 to improve the TRANS-TOOLS model, the version of TRANS-TOOLS developed in the TEN-Connect project (called TTv2) is used in iTREN-2030, at the request of the European Commission. Thus the scenario set-up to be developed in iTREN-2030 has been modified, so that the project develops:

- A **Reference Scenario**, which is described in this deliverable.
- An **Integrated Scenario**, which will be explained in deliverable D5 of iTREN-2030.

Both scenarios will be delivered by quantified indicators for energy, transport, vehicle fleets, environment and economic development in Europe until 2030.

For the Reference Scenario, the three other modelling tools are harmonised with TRANS-TOOLS and made consistent with each other. This results in a **coherent scenario for Europe until 2030** for technology, transport, energy, environment and economic development that can be compared with results of previous studies. The basic concept of the Reference Scenario is **Frozen Policy 2008**, i.e. the scenario considers only policies that were decided by the EU Council and/or EU parliament by mid 2008.

The Integrated Scenario will consider the **changing framework conditions until 2030**, in particular the policy pressure that comes from climate policy and the increasing scarcity of fossil fuels, as well as the impact of the financial and economic crisis. The starting point of the development of the Integrated Scenario will be the Reference Scenario, i.e. a situation in which the four models applied in iTREN-2030 have been made consistent. Due to the limitations of TRANS-TOOLS version 2 (TTv2), only the ASTRA, POLES and TREMOVE models will be consistently applied for this scenario. The Integrated Scenario will support policy analysis and can be compared with previous studies. In particular, it will provide an indication of how transport may fit into European climate policy.

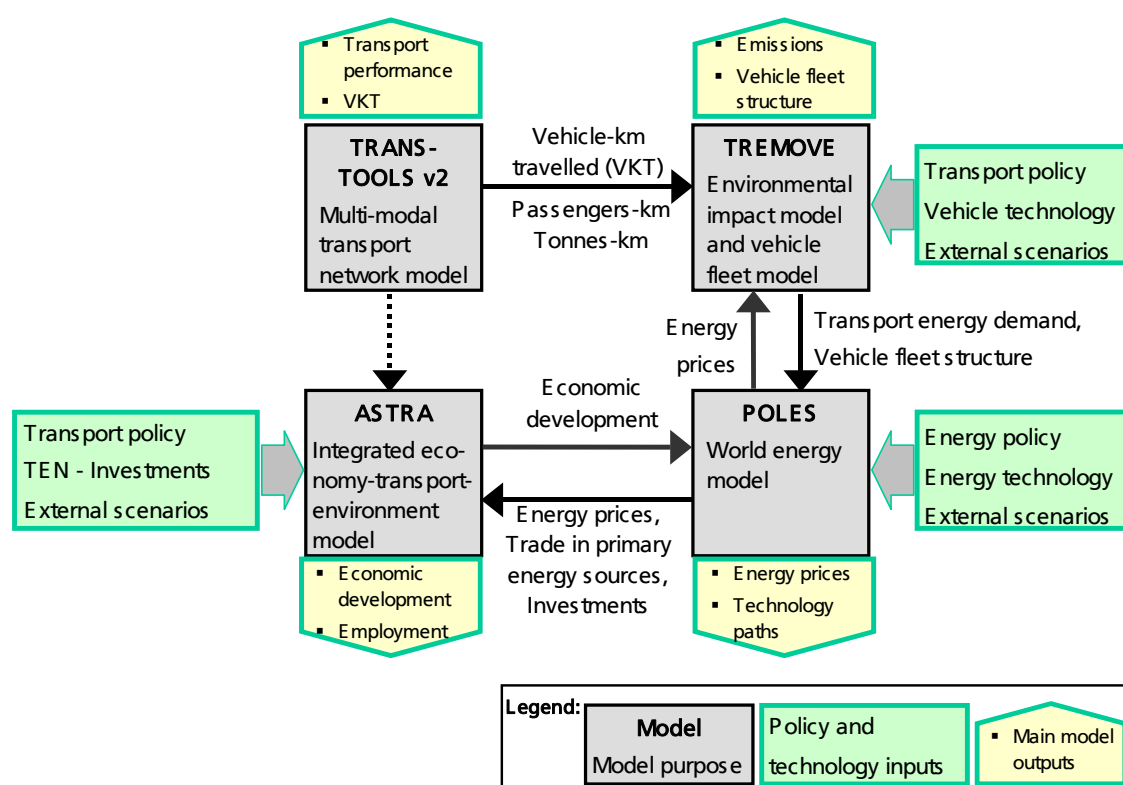
Within the iTREN-2030 project, the overall objective of Work Package 4 (WP4) producing this deliverable is to develop the Reference Scenario for the quantitative projections using the four modelling tools involved in the project. In brief, the main aims of the Work Package are to:

- define a consistent framework for using the different tools in an integrated way
- calibrate models with exchanged input to a coherent joint reference
- implement external input from WP3 and running models for projections and
- produce output procedures and templates to facilitate assessment in WP5.

Deliverable 4 is dedicated to the presentation of the main outcome of WP4, i.e. the iTREN-2030 Reference Scenario. The Reference Scenario is the result of the integration and harmonisation of the four iTREN-2030 models that use common or comparable external assumptions (e.g. population growth rates) and consider a common set of policies. In particular, the Reference Scenario is based on the transport demand projections coming from the TRANS-TOOLS version developed in the TEN-Connect project (TTv2). The other models used or adapted their endogenous transport demand forecasts to those of TRANS-TOOLS (with some adjustments due to unconvincing data, which is reported in iTREN-2030 Deliverable D2, Newton et al. 2009) to produce projections for energy, emissions, fleet and so on.

## **I. Models integration**

The concept of integration in iTREN-2030 is developed in terms of linkages between the four modelling tools: TRANS-TOOLS, ASTRA, POLES and TREMOVE. Since the development of TRANS-TOOLS occurred also outside iTREN-2030, the role of this model has partially changed with respect to what was originally envisaged. Basically, the TRANS-TOOLS transport demand projections developed in the TEN-Connect project are taken as the reference scenario for iTREN-2030. One major implication is that TRANS-TOOLS is used without including input from the other models, but just providing data to them. Therefore, the integration between the four models is reflected in figure 1. The dotted line linking TRANS-TOOLS to ASTRA indicates that demand data is not actually transferred from the former to the latter, rather ASTRA demand projections have been re-calibrated to be harmonised with TRANS-TOOLS forecasts.



Source: iTREN-2030

Figure 1: Linkages activated between the iTREN-2030 models

Although some linkages could not be achieved, the iTREN-2030 methodology is still based on the integration across domains (energy, transport, environment and economy) and modeling tools. Integration is put in practice in two ways: **data exchange** and **data harmonisation** across models.

The following data is **exchanged** between models:

- GDP growth rates for the period 2005-2030 are estimated in ASTRA and sent to POLES and TREMOVE;
- Population growth rates for the period 2005-2030 are estimated in ASTRA and sent to POLES and TREMOVE;
- Pure fuel prices for the period 2005-2030 are estimated in POLES and sent to ASTRA and TREMOVE;
- Fuel taxes for the period 2005-2030 are estimated in POLES and sent to ASTRA and TREMOVE;

- Transport demand for the years 2005, 2020 and 2030 according to the TRANS-TOOLS model as developed in the TEN-Connect project<sup>1</sup> is sent to TREMOVE;
- Travel times by mode of transport for the years 2005, 2020 and 2030 according to the TRANS-TOOLS model as developed in the TEN-Connect project are sent to TREMOVE;
- Air trips by classes of distance for the years 2005, 2020 and 2030 according to the TRANS-TOOLS model as developed in the TEN-Connect project are sent to TREMOVE;
- Transport energy demand by fuel type is estimated in ASTRA and sent to POLES.

Transport demand data from TRANS-TOOLS is translated into the TREMOVE segmentation using the interface procedure initially developed in the REFIT project. The procedure provides data for three years, 2005, 2020 and 2030. Since TREMOVE needs yearly data for the whole period 2005-2030, data for intermediate years is estimated by interpolation.

The procedure has been adapted to the new structure of TRANS-TOOLS (new zoning system, different set of trip purposes, different set of passenger transport modes) in order to produce input for TREMOVE automatically, using the TRANS-TOOLS standard output. Therefore, through this interface, TRANS-TOOLS replaces SCENES as the source of transport demand reference data for TREMOVE.

Data harmonisation means that each model uses its own parameters and is recalibrated in order to produce common modelling results in line with the other models. For instance, both ASTRA and TREMOVE estimate vehicle fleet development, the target of the harmonisation is that the estimations of the two models are consistent.

Harmonisation is used instead of data exchange for complex variables that are key results of different models and therefore cannot be merely replaced by external data, because otherwise the internal endogenous reactions of the models would be blocked.

Although elements to be harmonised are produced by more models, since each tool has a specialisation in a given domain of analysis, the “leader model” for each element is generally defined and harmonisation means that the other tools adapt to the leader model. Vehicle fleet is an exception because ASTRA and TREMOVE are at the same

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<sup>1</sup> All TRANS-TOOLS data and parameters have been drawn from the version of TRANS-TOOLS developed in the TEN-Connect project, using model files available on the FTP site [ftp://192.38.81.33/pub/ten\\_connect/NyTT/Result5/ZipAfter2Assignment/](ftp://192.38.81.33/pub/ten_connect/NyTT/Result5/ZipAfter2Assignment/) and making reference to the directories: Basis\_2005\_I; Basis\_2020\_M and Basis\_2030\_J.

level of leadership because of their complementariness: TREMOVE is the reference model for vehicle fleet, but ASTRA includes new technologies, which are not available in TREMOVE. Thus the reference fleet development to which both models have been harmonised is different from the original results of both ASTRA and TREMOVE. Further, TREMOVE has used much higher GDP growth rates in the past, leading also to higher levels of fleet growth, while ASTRA used lower GDP levels obtaining slower vehicle fleet growth. Since TREMOVE in iTREN-2030 had to apply the lower GDP growth, it was also brought in line with the lower vehicle fleet growth trends of ASTRA.

The following elements have been **harmonised**:

- transport demand growth rates by mode of transport between TRANS-TOOLS (leader model), ASTRA and POLES;
- energy consumption between POLES (leader model) ASTRA and TREMOVE;
- CO<sub>2</sub> emissions between TREMOVE (leader model), ASTRA and POLES;
- vehicle fleet between ASTRA and TREMOVE.

TRANS-TOOLS was part of the integration only as a data provider, for it could neither use external input nor harmonise its assumptions. The assumptions behind TRANS-TOOLS results are sometimes dissimilar to those adopted in iTREN-2030 for the other models, however, the differences are largely in a range that assumptions are compatible with TRANS-TOOLS transport reference demand.

In a different respect, since iTREN-2030 models have been developed independently and for specific objectives, cost parameters are different and are used in different ways (e.g. with a diverse level of detail, with diverse type of functions, etc.). For that reason, it was impossible to achieve a full harmonisation across models. Nonetheless, it is advisable that models used in an integrated fashion use at least comparable assumptions concerning transport cost, because they are among the most relevant variables in modelling tools. For that reason a consistency check was carried out for the cost parameters used in the models. The analysis demonstrated that in most cases, at the aggregated level for which comparison is possible, the models use comparable cost parameters. The only exceptions concern bus and air, where ASTRA and TREMOVE costs are slightly different across demand segments, especially maritime, where TRANS-TOOLS costs are very low in comparison to ASTRA and to available references.

The integration of tools in the sense explained above led to different (and improved) results compared to what might have been achieved by running the individual models independently. Three main improvements can be identified.

First, the integration between the models allowed us to improve assumptions and parameters which were originally part of the single tools. To provide some examples:

- The finalisation of the interface between TRANS-TOOLS and TREMOVE allowed the old transport demand baseline in TREMOVE to be replaced.
- The harmonisation of the ASTRA demand trend with the TRANS-TOOLS resulted in a significant change of transport demand projections in ASTRA.
- The linkage with ASTRA (calibrated on TRANS-TOOLS) changed the economy and transport demand growth assumptions in POLES, and the harmonisation of the fleet development with ASTRA and TREMOVE improved the forecasts concerning the penetration of innovative vehicles in the market. These changes, in turn, provided a more detailed description of transport demand feedback on energy price.
- The harmonisation with POLES led to a revision of the assumptions concerning the energy efficiency improvements originally envisaged in ASTRA.
- Harmonisation between ASTRA and TREMOVE allowed the car fleet trend in ASTRA and in TREMOVE to be revised.

Second, the integration of the models provided a set of results belonging to different domains with a common set of assumptions. In the annex of this deliverable several indicators are provided for each country, describing the iTREN-2030 Reference Scenario in terms of transport demand, energy consumption, economy, emissions, and vehicle fleet. All these indicators could have not been obtained at the same level of detail using only one of the models and, without the integration achieved in this work package, even if indicators were extracted from different models, their comparability would have been at least questionable.

Third, even when some indicators are provided by more than one model, each tool has specific strengths that are used to provide the more reliable results for iTREN-2030. For instance, even if POLES can provide fleet data, TREMOVE and ASTRA are much more sophisticated and their results are therefore more robust.

Finally, the simulation of a consistent scenario with the four modelling tools allows us to represent complex impacts of the policies. For instance, with a model like ASTRA or TREMOVE it can be shown that a higher gasoline price relative to diesel has a negative impact on the share of gasoline cars in the fleet, while a model like POLES can



simulate that less gasoline cars in the fleet can mean less demand for gasoline and therefore a lower pressure on gasoline prices. The integrated use of all models provides both impacts: from the price to the fleet and vice-versa, in a consistent manner.

In brief, the iTREN-2030 Reference Scenario is more than just the collection of results from individual models and the activities carried out in Work Package 4 represent a clear value-added with respect to the use of each tool separately.

## **II. The iTREN-2030 Reference Scenario**

### **Assumptions for the Reference Scenario**

All iTREN-2030 models use some assumptions on fundamental socio-economic variables that are among the main determinants of transport demand, energy consumption, etc. Three main elements have to be mentioned: population growth, GDP growth and fuel prices.

Population projections are based on UN population projections to 2050 that are incorporated in the ASTRA model. Population is essentially projected to be stagnant in the EU up to 2030, with only a very small net growth. While low birth rates in the EU15 may be compensated by immigration, part of this immigration may come from the EU12 countries. This, together with a decreasing birth rate with rapidly increasing prosperity is projected to lead to a decline in population in the EU12.

Overall GDP growth in western Europe is based on historically long-term growth rates of around 1.5% per year, which is the main determinant of the overall EU rate. The EU12 countries are expected to successfully enter into an economic catching-up process, which implies that their growth rates are higher than the rates of western Europe. It should be noted that the global economic crisis that started in 2008 is not reflected in the iTREN-2030 Reference Scenario. It is implicitly assumed that the economic downturn is a temporary event while the scenario concerns a 25 year period until the year 2030. The possible impact of even a relatively short crisis on the future trends will be considered in the iTREN-2030 Integrated Scenario developed in WP5.

World demand for oil-based fuels is expected to continue to grow in the medium term, so that prices can be expected to at least regain the levels of 2007/2008.

In terms of policies, the Reference Scenario can be briefly characterised as follows: in terms of pricing and taxation, the scattered and unbalanced level of charges and taxes across countries and modes is maintained, the opportunities for harmonisation pro-

vided by the several EC directives are not taken by most Member States. The TEN-T networks are slowly implemented following the TEN-Connect project framework. No acceleration of implementation is expected. Climate gas emission trading is not extended to transport sectors and for others remains at the level of the emission cap of the Kyoto Protocol. The regulation in road emission standards is not transferred to other modes, in particular to rail and air. Although the development of LPG and CNG vehicles and fuel supply will increase, new vehicle concepts will not enter the market by and large.

Table 1 below summarises the policy measures included in the Reference Scenario.

Table 1: Policy measures considered in the iTREN-2030 Reference Scenario

	Road	Rail	Aviation	Shipping
<b>Transport pricing and taxation</b>	Distance-based motorway charges for HGVs	-	-	-
<b>Transport Investment</b>	TEN network as implemented in TEN-Connect project			
<b>Energy</b>	CO2 emission targets agreed by Kyoto Protocol and implemented in national allocation plans (NAP I + II). Existing national regulations e.g. phasing-out of nuclear energy for some countries and quotas for renewables incl. biofuels. Share of renewable energy in the electricity production. Energy efficiency improvements, reduction of final energy consumption e.g. in buildings.			
<b>Environment, Fleet</b>	Voluntary CO2 reduction target for cars LPG / CNG / E85 adaptation and infrastructure Euro-V for HGVs / Euro-IV for cars	Emission standards for diesel trains (UIC Stage IIIA)	ICAO Chapters 3 (emissions) and 4 (noise)	-

Source: iTREN-2030

The iTREN-2030 **Reference Scenario** should **not** be regarded as a **forecast of the most likely future until 2030**. It is a set of projections under the given assumption of stability concerning both the socio-economic environment and the policy environment. From this point of view, in the Reference Scenario, just the policies approved at mid 2008 are included. The Integrated Scenario will explore the impact of a richer set of policies.

## **The iTREN-2030 Reference Scenario in summary**

Table 2 below provides a summary of the iTREN-2030 Reference Scenario by means of a set of key indicators belonging to the different domains of analysis, while table 3 compares the main trends between EU15 and EU12 countries.

Table 2: Key indicators for the iTREN-2030 Reference Scenario (EU27)

Indicator	Absolute values		Aver.% change per year
	2005	2030	
Population total (1,000 persons)	488,594	494,331	0.0
GDP (billion euros 2005)	8,734	13,029	1.6
Oil price (euro 2005 per bbl)	44	90	2.9
Freight transport activity (billion tkms)	6,875	10,193	1.6
<i>Road</i>	2,073	3,056	1.6
<i>Rail</i>	447	798	2.3
<i>Inland navigation</i>	192	335	2.2
<i>Maritime</i>	4,162	6,004	1.5
Passenger transport activity (billion pkms)	6,457	7,873	0.8
<i>Car</i>	4,665	5,633	0.8
<i>Bus</i>	615	585	-0.2
<i>Rail</i>	477	695	1.5
<i>Air</i>	442	628	1.4
<i>Slow</i>	259	333	1.0
Gross Inland Energy Consumption (ktoe per year)	1,821,472	2,149,186	0.7
<i>Oil</i>	669,119	646,031	-0.1
<i>Gas</i>	442,979	551,031	0.9
<i>Coal, Nuclear</i>	582,937	641,535	0.4
<i>Renewables</i>	126,437	310,589	3.7
Share of renewables in final energy demand	8.3%	16.1%	2.7
Share of biofuels in transport demand	1.0%	9.9%	9.6
Car fleet size (1,000 vehicles)	211,062	294,212	1.3
<i>Gasoline</i>	149,304	148,788	0.0
<i>Diesel</i>	57,588	135,371	3.5
<i>LPG/CNG</i>	3,229	2,016	-1.9
<i>Innovative</i>	941	8,037	9.0
CO2 Transport emissions (million tonnes)	1,268	1,485	0.6

Source: iTREN-2030

Table 3: Comparison of EU15 and EU12 in the iTREN-2030 Reference Scenario for some key indicators

Indicator	EU15	EU12
Population growth rate	0.1	-0.3
GDP growth rate	1.5	2.9
Freight transport activity growth rate	1.2	3.5
<i>Road</i>	1.1	3.2
<i>Rail</i>	1.0	4.0
Passenger transport activity growth rate	0.8	1.1
<i>Road</i>	0.7	1.4
<i>Rail</i>	1.6	1.2
<i>Air</i>	1.4	1.9
Gross Inland Energy Consumption growth rate	0.5	1.6
Renewables in final energy demand (year 2030)	15.8	17.2
Biofuels in transport demand (year 2030)	10.2	8.6
Total car fleet size growth rate	1.1	2.7
Share of innovative cars (year 2030)	3.0	1.7
CO2 transport emissions growth rate	0.5	1.3

Source: iTREN-2030

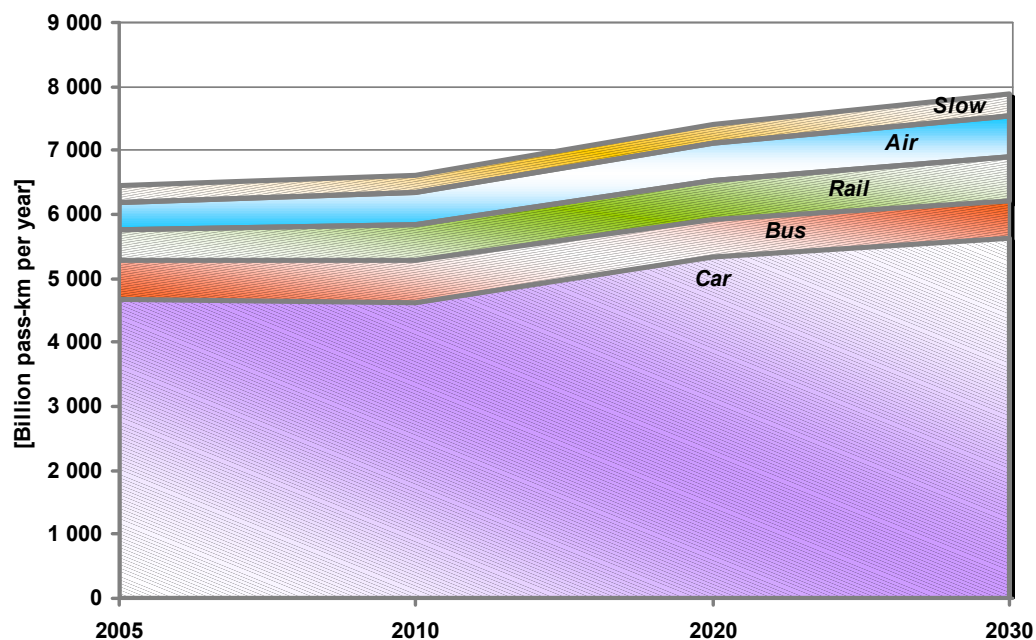
The iTREN-2030 Reference Scenario shows that transport demand will increase until 2030, especially freight demand, which is projected to be 50% larger in the year 2030 than in the year 2005, while passenger demand should grow more slowly. Therefore, for the EU27 as a whole, some relative decoupling between economic growth and transport demand is expected, only for passengers but not for freight. Freight demand should increase especially in the EU12 countries, driven by the stronger economic growth. Actually, freight transport performance is expected to grow even faster than GDP because of the increment of average distances. Instead, in the EU15 both passenger and freight growth rates are below GDP.

While the economy of the EU27 is expected to grow on average at 1.5% per year until 2030 (but with a decreasing level of employment), and transport increases at a slightly lower rate, final energy demand is expected to grow less than 1% per year, which means that the EU27 should become slightly more energy-efficient with the contribution of all aggregate sectors (industry, transport, residential and services). Higher costs for energy should provide an incentive for the efficiency gains and also for some penetration of renewable sources, which are forecast to satisfy 16% of demand (26% of electricity production).

In the transport sector, the penetration of renewable sources is reflected in innovative technologies entering the car fleet, even if with a small share: 8 millions cars - mainly bioethanol and hybrid cars - equivalent to 2.5% of the whole fleet in the year 2030. Energy efficiency and renewable sources (biofuels) in the transport sector will not be sufficient to stop the growth of CO<sub>2</sub> emissions, which are expected to be 17% over the level of the year 2005. However, polluting emissions should substantially decrease. Some more details on specific domains are provided in the following paragraphs.

## Transport projections

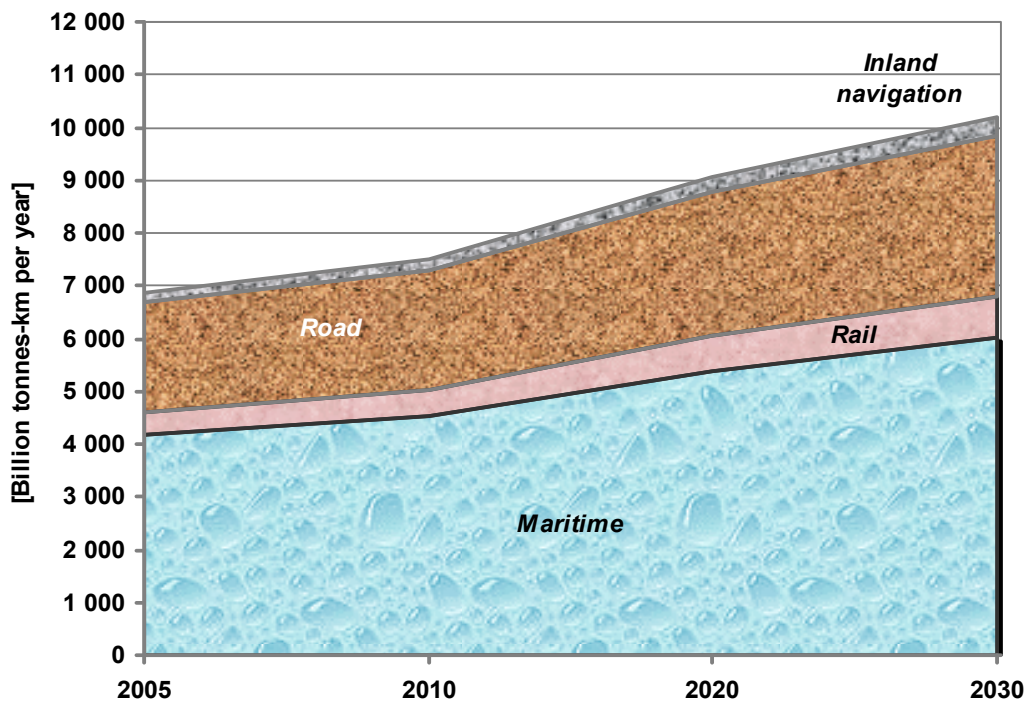
The passenger transport volume (measured in number of trips) is forecast to develop at a moderate pace, with slightly higher growth rates in the EU15 countries than in the country group of EU12 countries. This difference is mainly due to the demographic trends. The growth rates of passenger-kms are considerably above the growth rates for passenger transport volume. Clearly, the highest dynamics is expected in the country group of the New Member States (EU12), where motorization and personal income is expected to develop more dynamically than in the EU15 countries, and where the current level of mobility is further away from saturation levels than in the former EU Member States. In the period of 2005-2030, total passenger transport demand is forecast to increase by 23.2% in the EU15 countries, and by 32.8% in the country group of EU12.



Source: iTREN-2030 – ASTRA model

Figure 2: Passenger-kms in EU27 by mode of transport

In the iTREN-2030 Reference Scenario, freight demand is expected to grow faster than passenger demand. The increase of tonnes lifted is largely expected in the EU12 countries, because of their faster economic growth, while in the EU15 countries only a limited increment of tonnes transported is forecast. A faster growth is forecast in terms of freight transport performance, which means longer average transport distances. All modes are expected to grow, so that mode shares are not significantly changed even if rail freight has the largest growth rate and its share is forecast to reach 8% in 2030 compared to 6.5% in the year 2005. Again, the trend in the EU12 explains much of the expected change. The average distance of freight transport in the EU12 is forecast to grow significantly, which indicates that especially long-distance transport (i.e. import-export) will drive the growth of freight traffic.



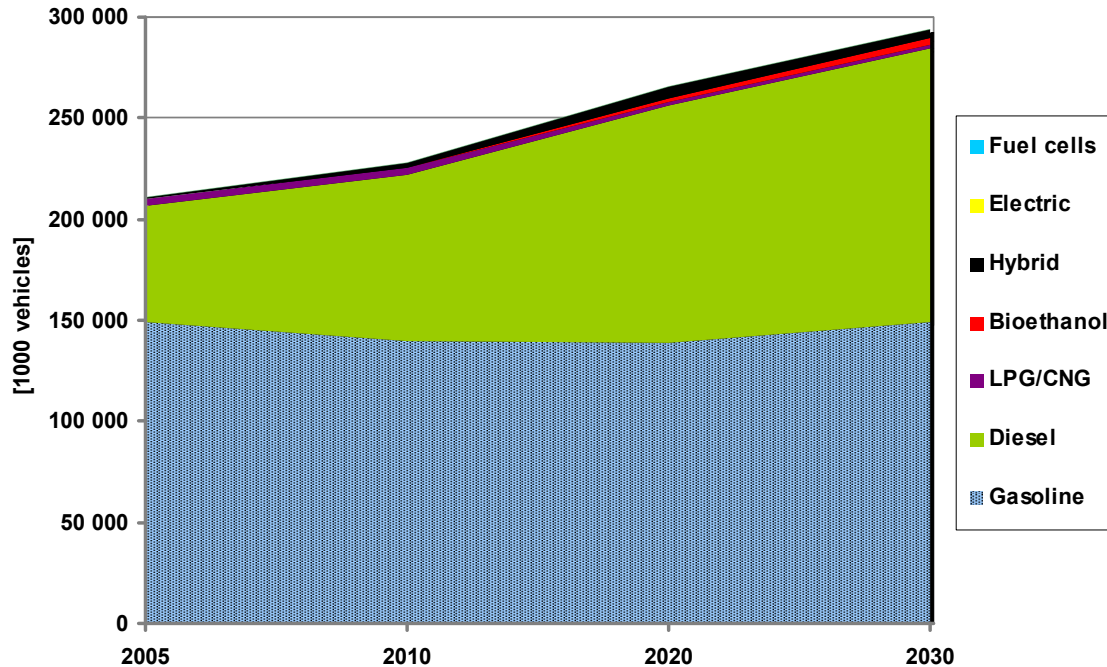
Source: iTREN-2030 elaboration on TEN-Connect data – TRANS-TOOLS model

Figure 3: Tonnes-km in EU27 by mode of transport

## Vehicle fleet projections

The EU27 car fleet is expected to reach almost 300 million vehicles in the year 2030. In particular, the car fleet in the EU12 countries should almost double, while in the EU15 the growth should be of nearly 30% over the period considered. In both macro-regions of Europe, the number of diesel cars is expected to grow faster than the number of gasoline cars. In the EU15 this different trend leads diesel cars to be the majority in the car fleet, overtaking gasoline cars before the year 2020 (with gasoline cars in the EU15 being less in 2030 than in 2005). Instead, in the EU12 gasoline cars continue to have the largest share of the fleet. Alternative technologies are expected to have a limited penetration in the EU27 car fleet. Only 8 out of 293 million cars are expected to be hybrid cars or use bioethanol (almost entirely in the EU15). Part of these cars would replace LPG/CNG vehicles. The number of electric cars is expected to be negligible, while no fuel cell cars are foreseen until the year 2030.

Also the duty vehicle fleet is expected to grow significantly in almost all its components. In the EU12 the share of heavy trucks should increase, consistent with the growth of long distance freight transport.



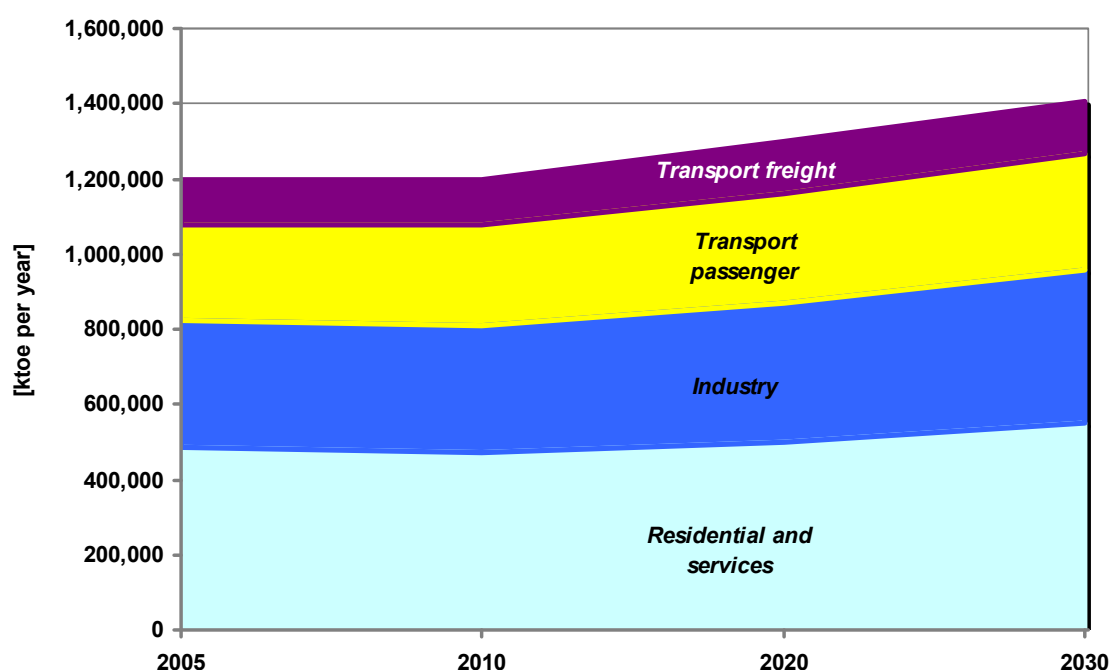
Source: iTREN-2030 – TREMOVE model

Figure 4: Car fleet in EU27 countries by technology



## Energy projections

The increase of final energy demand is assumed to continue, but at a slower pace than in the past. For the residential and service (including agriculture) sectors, we foresee a growth around 13% between 2005 and 2030, considering lower trends observed (around 2% per year) in the past decades and the implemented policies to improve energy efficiency. The increase in the industrial sector might be somewhat higher at +21%. For the transport sector, the final energy demand is expected to increase in EU27 by around 0.8% per year, i.e. 20% as a whole over the time period considered. Therefore, the energy consumption of the transport sector is in line with other sectors.



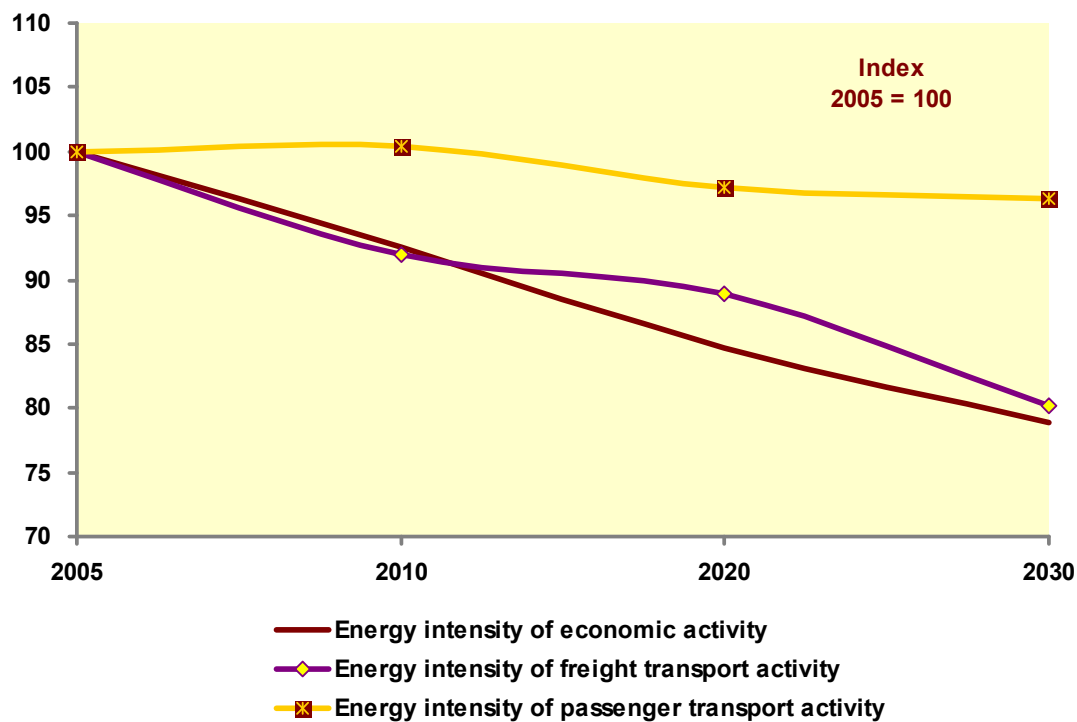
Source: iTREN-2030 – POLES model

Figure 5: Final energy demand by consumer sector in EU27 countries

Among the fossil fuels a shift from oil and coal towards gas is foreseen, so that the share of gas on gross inland consumption might increase from 24% to 26% in 2030. Remarkable is also the increase of the share of biomass and of renewables to gross inland consumption, from 5% respectively 2% in 2005 to almost 10% respectively 5% in 2030. Under the given conditions for biofuels, their share is expected to increase. However, we assume that in 2010 the biofuels share will be around 3.4%, falling short of the 5.75% target of the Biofuels Directive. Nevertheless, we expect biofuels consumption to increase to 6.6% in 2020 and to almost 10% in 2030. The increase of biofuels consumption is driven by the high oil prices and by a decrease in the production

cost of biofuels, whose price is however ultimately forecast to increase under demand pressure.

Energy consumption factors are decreasing between -0.2 and -0.8% per year. As already mentioned, in the transport sector the largest gains of efficiency are expected for freight, while the amount of energy per passenger moved is even expected to grow in the EU12 because of the increasing motorization.



Source: iTREN-2030 – Elaboration on data from ASTRA and POLES model

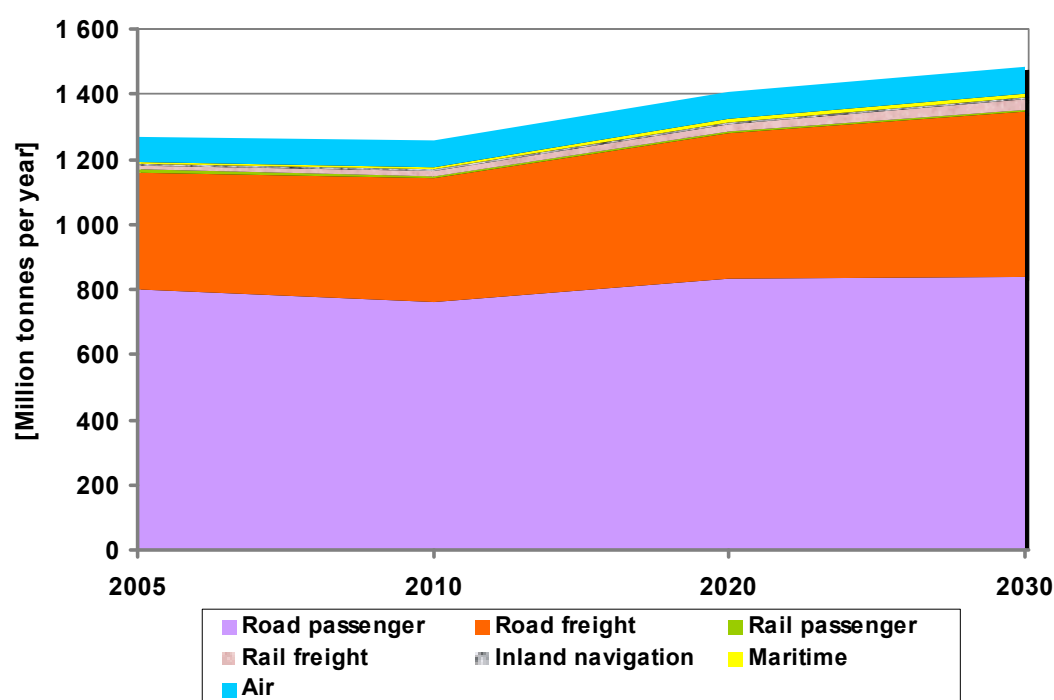
Figure 6: Energy intensity of transport and economy in EU27 countries (2005 = 100)

## Transport emissions projections

CO<sub>2</sub> transport emissions in the EU27 countries will slightly increase between 2005 and 2030 in the iTREN-2030 Reference Scenario. This forecast is in line with the projections of the European Energy and Transport – Trends to 2030 (European Commission, 2008a), where an increase of transport CO<sub>2</sub> emissions is envisaged as well.

The bulk of emissions comes from road passenger mode followed by road freight and air modes. The road passenger emissions are basically stable and the share of this mode in total emissions decreases slightly from 63% to 57%. Road freight emissions increase by an average of 0.8% between 2005 and 2010, then by an average of 1.5% between 2010 and 2030. The share of this mode's emissions increases from around 29% in 2005 to 34% in 2030. Emission share of air mode remains relatively constant at around 6% during the 25-year period. It has to be taken into account that air transport emissions here only include domestic and intra-EU flights, but excludes the intercontinental flights, which is the demand segment with the highest growth rate.

It is worth noting that rail freight is the mode that has the highest growth rate of CO<sub>2</sub> emissions: it increases by an average of 5.4% between 2005 and 2010 and by an average of 3.9% between 2010 and 2030 due to the highest demand growth rates of rail mode plus the shift towards faster rail transport, which consumes more energy and causes higher emissions. The share of rail freight CO<sub>2</sub> emissions increases from around 1% in 2005 to around 2% in 2030.



Source: iTREN-2030 – ASTRA model

Figure 7: CO<sub>2</sub> transport emissions in EU27 countries by mode of transport

CO<sub>2</sub> transport intensity of road freight remains unchanged during the 25-year period, while limited progress is expected from inland navigation (-7%) and maritime (-13%).

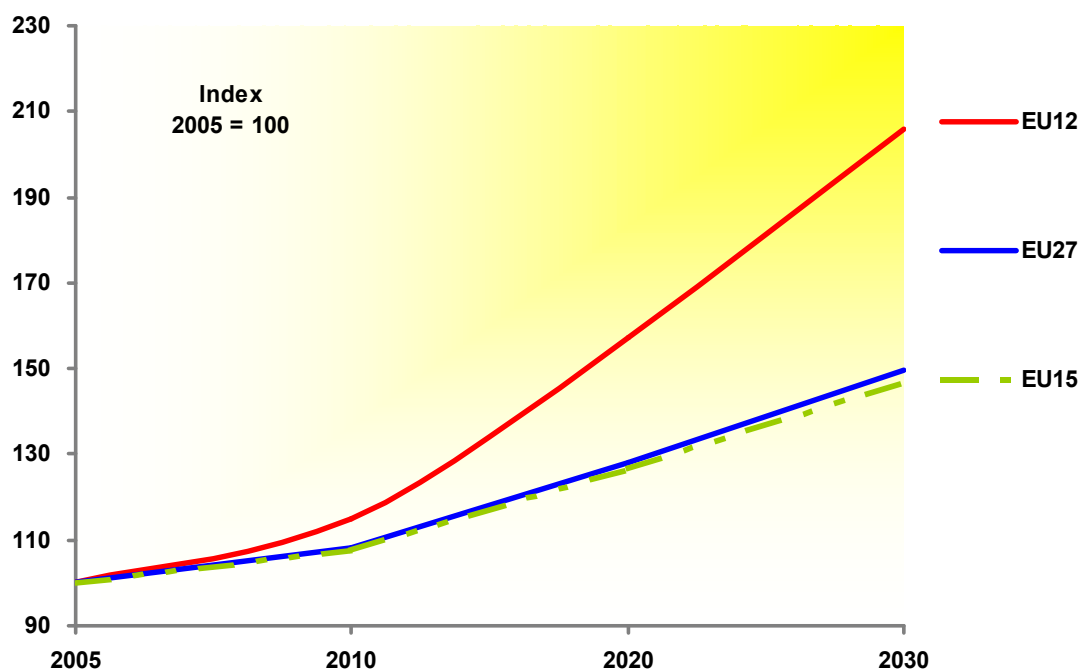
Rail freight, on the contrary, shows a more than 50% increase during the same period. This increase in the CO<sub>2</sub> intensity of rail freight seems to be one of the main causes of the increase of CO<sub>2</sub> emissions from this mode, as shown at the beginning of this subsection. Nevertheless, rail freight remains largely more 'CO<sub>2</sub>-efficient' than road freight.

Concerning passenger transport, between 2005 and 2030, all three modes show a decrease in CO<sub>2</sub> emission intensity: more than 15% from road passenger modes, nearly 10% for rail and around 20% from air.

Total NO<sub>x</sub> and PM<sub>10</sub> emissions are expected to decrease sharply during the 25-year period, mainly due to improved combustion engines and catalytic converters.

## **Economic projections**

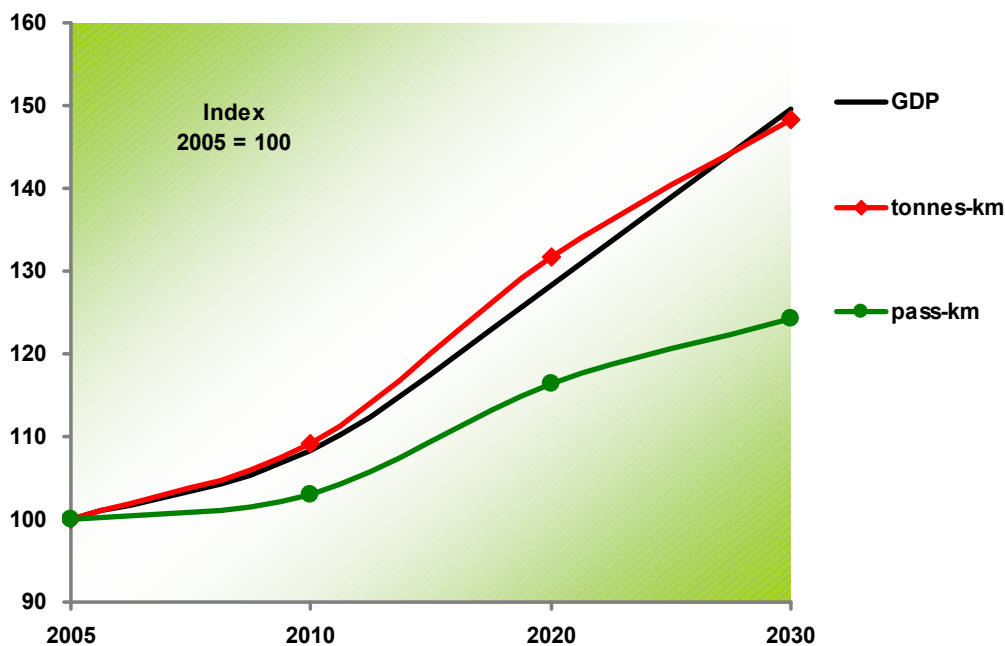
As already mentioned among the assumptions, in the iTREN-2030 Reference Scenario a moderate economic growth is expected in the EU, with a significantly faster development in EU12 (nearly 3% per year) than in EU15 (nearly 1.5% per year). The one expected is a jobless growth, i.e. the number of employed persons is expected to fall from 217 million in the year 2005 to 203 million at the horizon of the year 2030. This trend is partially explained by demographic reasons, because the labour force will also be shrinking (assuming a stable age of retirement), but the reduction of employment would be slightly faster, due to the continuous growth of labour productivity. The energy sector is one of the few where employment is forecast to increase (another is construction).



Source: iTREN-2030 –ASTRA model

Figure 8: GDP growth (2005 = 100)

Since the iTREN-2030 Reference Scenario shows that transport demand will increase until 2030, especially freight demand, which is projected to be 50% greater in the year 2030 than in the year 2005, for the EU27 as a whole, decoupling between economic growth and transport demand is expected only for passengers but not for freight.



Source: iTREN-2030 elaboration on TRANS-TOOLS and ASTRA data

Figure 9: Transport demand trend compared to economic trend for EU27 countries

A specific economic impact of the transformations expected in the Reference Scenario is the partial modification of the sources of transport taxation revenues. Because of the improvements on the energy efficiency side and the slow introduction of alternative fuels, the share of revenues from fuel taxes on total transport taxation revenues is expected to fall slightly from 74% in 2005 to 68% in 2030. A larger share is instead foreseen for road charges due to the introduction of road pricing for heavy duty vehicles. As a whole, transport taxation and transport toll revenues are expected to increase.

## 0. Introduction

The basic objective of iTREN-2030 is to extend the forecasting and assessment capabilities of the TRANS-TOOLS transport model to the new policy issues arising from the technology, environment and energy fields. The TRANS-TOOLS transport network model was developed to constitute the reference tool for supporting transport policy in the EU in the 6<sup>th</sup> RTD Framework Programme (Burgess et al. 2006) and is currently being developed in several European projects. The version of TRANS-TOOLS developed in the TEN-Connect project (Rich 2008, Rich et al. 2009) was used at the request of the European Commission.

The other three modelling tools, ASTRA, POLES and TREMOVE, are harmonised with TRANS-TOOLS and made consistent with each other. This results in a coherent scenario for technology, transport, energy, environment and economic development for the EU27+2 until 2030 that can be compared with results of previous studies. The role of each of the four models can be briefly summarised as:

- ASTRA: provides the demographic and economic framework conditions for EU27+2 as well as scenario results for transport energy demand, selected items of vehicle fleets (e.g. new technology vehicles) and of transport demand (e.g. slow modes). The model also supports the consistency check as, besides non-transport energy issues, it includes all relevant transport and energy indicators on an aggregated and integrated manner.
- POLES: estimates energy prices including carbon prices and changes of fuel taxes as well as energy demand of sectors other than transport and the rest of the world.
- TRANS-TOOLS: provides the transport demand by mode on a link-based network level for EU27 plus neighbouring countries.
- TREMOVE: calculates vehicle fleets of conventional vehicles with a detailed technology classification, transport energy demand and transport emissions EU27+4.

Within the iTREN-2030 project, the overall objective of Work Package 4 is to produce the Reference Scenario for the quantitative projections using the four modelling tools involved in the project. In brief, the main aims of the Work Package are to:

- define a consistent framework for using the different tools in an integrated way
- calibrate models with exchanged input to a coherent reference
- implement external input from WP3 and running models for projections and
- produce output procedures and templates to facilitate assessment in WP5.

Deliverable 4 is dedicated to the presentation of the main outcome of WP4, i.e. the iTREN-2030 Reference Scenario. The Reference Scenario is the result of the integration and harmonisation of the four iTREN-2030 models that use common or comparable external assumptions (e.g. population growth rates) and consider a common set of policies. In particular, the Reference Scenario is based on the transport demand projections coming from the TRANS-TOOLS version developed in the TEN-Connect project (TTv2). The other models have used or adapted their endogenous transport demand forecasts to those of TRANS-TOOLS (with some adjustments due to unconvincing data, see Newton et al. 2009) to produce projections for energy, emissions, fleet and so on. The Reference Scenario is not the final outcome of iTREN-2030. In WP5 the harmonised models will be used to build and simulate the Integrated Scenario based on the trends of the Reference Scenario and on an adapted policy framework until 2030. This Integrated Scenario will represent the main result of iTREN-2030.

The Reference Scenario is presented in this deliverable D4 both in terms of its methodological background and, especially, of its quantitative content. The deliverable includes six main sections plus references and an annex providing the detailed quantitative results of the Reference Scenario.

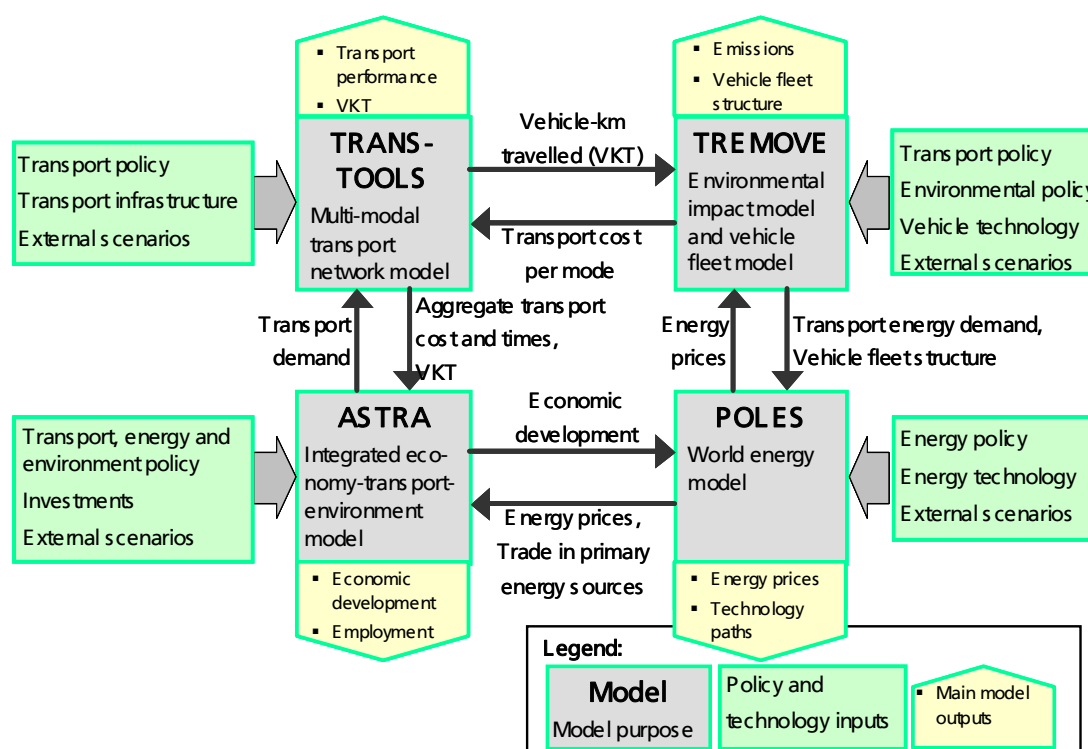
In section 1, the concept of the integration of models from different research domains, which is the core objective of iTREN-2030, is recalled and its translation into practical terms for building the Reference Scenario using the four modelling tools is explained. In section 2 the main features of the modelling tools are briefly introduced. In section 3 the work done for the harmonisation of the models is explained. Section 4 reports about the interface between TRANS-TOOLS and TREMOVE, which has been adapted to the most recent version of TRANS-TOOLS.

The Reference Scenario is extensively presented in section 5, where projections are shown and discussed. Detailed results for a set of key indicators are provided for the EU27, EU15, EU12, the individual EU27 Member States, Norway and Switzerland in the annex. In section 6 some conclusions concerning the work in WP4 are drawn. References complete the main text of this deliverable D4 “*The iTREN-2030 reference scenario until 2030*”.



# 1 Building a consistent Reference Scenario

The concept of integration in iTREN-2030 is developed in terms of linkages between the four modelling tools: TRANS-TOOLS, ASTRA, POLES and TREMOVE. Figure 1-1 shows the linkages originally envisaged between the four models.

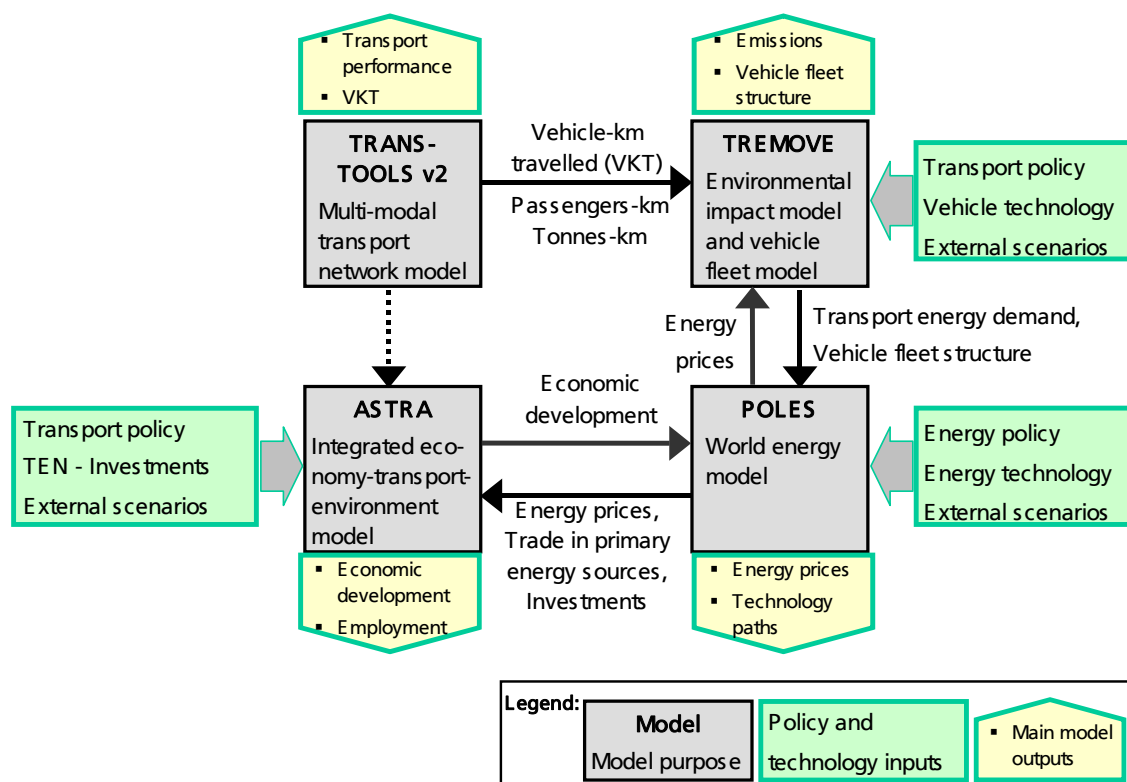


Source: iTREN-2030 DoW

Figure 1-1: Models linkages originally envisaged between the iTREN-2030 models

With respect to the data flows shown in the picture, since the development of TRANS-TOOLS occurred also outside iTREN-2030, the role of this model has partially changed. Basically, the TRANS-TOOLS transport demand projections developed in the TEN-Connect project (see downloads from <http://energy.irc.ec.europa.eu/transtools>, Rich et al. 2009) are taken as reference scenario for iTREN-2030. One major implication is that TRANS-TOOLS is used without including input from the other models as depicted in Figure 1-1, but just providing data to other models. Furthermore, since TRANS-TOOLS model version developed in TEN-Connect (TTv2) cannot be integrated within the iTREN-2030 modelling runs because of incompatibility problems in the freight model and of insufficient documentation, also the Integrated Scenario will not exploit bi-directional linkages between TRANS-TOOLS and other models. In the end, the integration between the four models looks like in Figure 1-2.

The dotted line linking TRANS-TOOLS to ASTRA indicates that demand data is not actually transferred from the former to the latter, rather ASTRA transport demand projections have been re-calibrated to be harmonised with TRANS-TOOLS forecasts.



Source: iTREN-2030

Figure 1-2: Models linkages activated between the iTREN-2030 models

Despite some linkages could not be achieved, the iTREN-2030 methodology is still based on the integration of analysis domains and tools for energy, transport and technology. Integration is put in practice in two ways: **data exchange** and **data harmonisation** across models.

## 1.1 Data exchange between models

Data exchange means that one model uses as input the output of another model. In this way, the perfect consistency between the tools is guaranteed. The following data is exchanged between models:

- GDP growth rates for the period 2005-2030 are estimated in ASTRA and sent to POLES and TREMOVE;
- Population growth rates for the period 2005-2030 are estimated in ASTRA and sent to POLES and TREMOVE;
- Pure fuel prices for the period 2005-2030 are estimated in POLES and sent to ASTRA and TREMOVE;
- Fuel taxes for the period 2005-2030 are estimated in POLES and sent to ASTRA and TREMOVE;
- Transport demand for the years 2005, 2020 and 2030 according to the TRANS-TOOLS model as developed in the TEN-Connect project<sup>2</sup> is sent to TREMOVE;
- Travel times by mode of transport for the years 2005, 2020 and 2030 according to the TRANS-TOOLS model as developed in the TEN-Connect project are sent to TREMOVE;
- Air trips by classes of distance for the years 2005, 2020 and 2030 according to the TRANS-TOOLS model as developed in the TEN-Connect project are sent to TREMOVE.
- Transport energy demand by fuel type is estimated in ASTRA and sent to POLES.

Transport demand data from TRANS-TOOLS is translated into the TREMOVE segmentation using the interface procedure initially developed in the REFIT project. The procedure provides data for three years, 2005, 2020 and 2030. Since TREMOVE needs yearly data for the whole period 2005-2030, data for intermediate years is estimated by interpolation.

The procedure has been adapted to the new structure of TRANS-TOOLS (new zoning system, different set of trip purposes, different set of passenger transport modes) in order to produce input for TREMOVE automatically, using the TRANS-TOOLS standard output. Therefore, through this interface, TRANS-TOOLS replaces SCENES as source of transport demand reference data for TREMOVE.

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<sup>2</sup> All TRANS-TOOLS data and parameters have been drawn from the version of TRANS-TOOLS developed in the TEN-Connect project, using models files available on the FTP site [ftp://192.38.81.33/pub/ten\\_connect/NyTT/Result5/ZipAfter2Assignment/](ftp://192.38.81.33/pub/ten_connect/NyTT/Result5/ZipAfter2Assignment/) and making reference to the directories: Basis\_2005\_I; Basis\_2020\_M and Basis\_2030\_J.

## 1.2 Data harmonisation between models

Data harmonisation means that each model uses its own parameters and are re-calibrated in order to produce common modelling results in line with the other models. For instance, both ASTRA and TREMOVE estimate vehicle fleet development, the target of the harmonisation work is that the estimations of the two models are in line.

Harmonisation is used instead of data exchange for complex variables that are key results of different models and therefore cannot be merely replaced by external data.

Despite elements to be harmonised are produced by more models, since each tool has a specialisation in a given domain of analysis, the “leader model” for each element is generally defined and harmonisation means that the other tools adapt to the leader. Vehicle fleet is an exception because ASTRA and TREMOVE are at the same level of leadership because of their complementariness: TREMOVE is the reference model for vehicle fleet, but ASTRA includes new technologies, which are not available in TREMOVE. Thus, the reference fleet development to which both models have been harmonised is different from the original results of both ASTRA and TREMOVE.

The following elements have been harmonised:

- Transport demand growth rates by mode of transport between TRANS-TOOLS (leader model), ASTRA and POLES;
- Energy consumption between POLES (leader model) ASTRA and TREMOVE;
- CO<sub>2</sub> emissions between TREMOVE (leader model), ASTRA and POLES;
- Vehicle fleet between ASTRA and TREMOVE.

Additionally, fuel taxes trend has been harmonised in POLES and TREMOVE according to the assumption applied in TRANS-TOOLS (in the TEN-Connect project) given that TRANS-TOOLS could not have been adapted to POLES. Namely, TRANS-TOOLS, as used in TEN-CONNECT runs, assumes stable fuel taxes for both gasoline and diesel from 2005 to 2030 and this assumption has been included in the other models.

## 1.3 Differences with TRANS-TOOLS assumptions

TRANS-TOOLS has been part of the integration only as data provider, while it could not use external input nor harmonise its assumptions. TRANS-TOOLS should have been used Population and GDP growth rates from ASTRA as well as fuel price from POLES (via TREMOVE, where fuel price in Euro per litre is translated into a price of

Euro per vehicle-km taking into account the fleet composition). Since this could not be the case, it is useful to look at differences between the assumptions used in TRANS-TOOLS and those in the other models.

About pure fuel prices (i.e. net of taxes), TRANS-TOOLS, as used in TEN-CONNECT runs, assumed a yearly growth rate of about 0.45% in period 2005-2020. From 2020 to 2030 no growth of fuel cost was assumed. In iTREN-2030 the growth rate is a bit higher: about 1.7% until 2020 and about 1.3% from 2020 to 2030. One should remember that the iTREN-2030 assumption is an endogenous result of the POLES model rather than an exogenous assumption.

Despite fuel price is obviously a determinant of transport, this difference between the assumptions concerning the growth of fuel price in iTREN-2030 and in TRANS-TOOLS is not really significant for the Reference Scenario, because in the latter the demand trend is calibrated to reproduce the TRANS-TOOLS results as explained in section 1.2 above. Nevertheless, the inconsistency might introduce some bias when the iTREN-2030 models are used to simulate other scenarios.

In theory, if the fuel price development of TRANS-TOOLS had been used in iTREN-2030, the values of the calibration parameters needed in the other models to achieve consistency with the TRANS-TOOLS demand trend would have been different. As far as these parameters affect model results under different assumptions, the outcome of simulations of other scenarios might be biased. In particular, since fuel cost affects mainly car and truck demand, in order to achieve the reference trend with higher fuel price, road modes are modelled as less sensitive to travel costs. Therefore, the response of the models when policies like e.g. road pricing or carbon taxes on fuels are simulated can be somewhat underestimated.

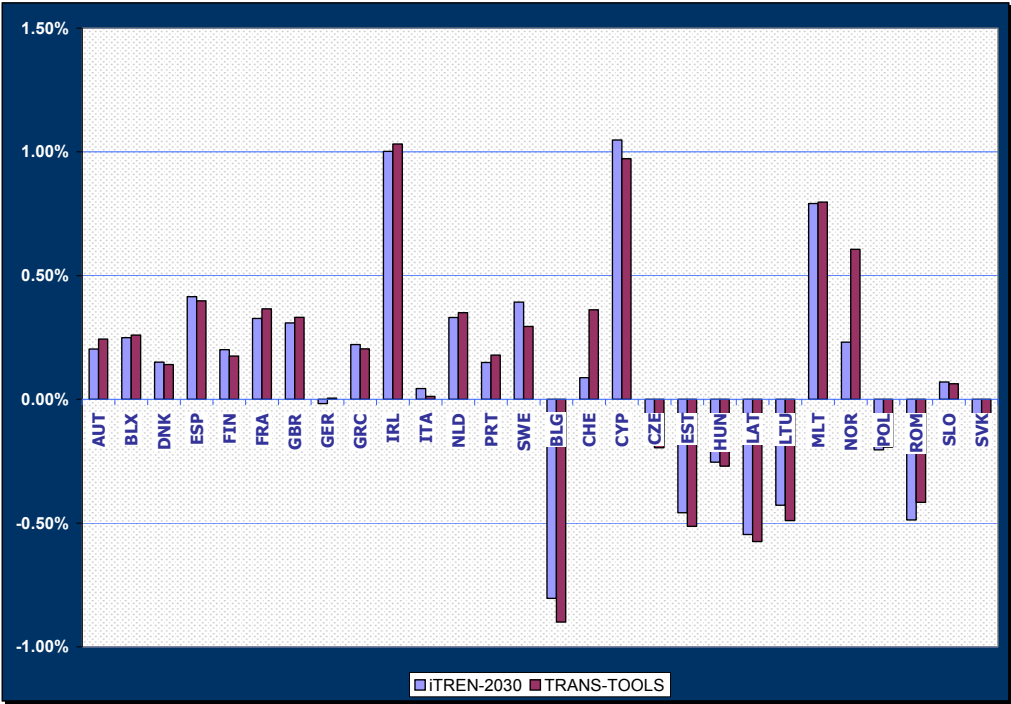
In practical terms, however, demand elasticity with respect to travel costs plays a very limited role in the calibration of the reference trend. Other variables, like economic growth, population, motorisation, average distance growth are much more influential and explain why, for instance, transport demand is growing despite also fuel price is increasing. Basically, the calibration of the reference scenario is one thing and the calibration of the sensitivity of the models is another thing. For that reason, it can be stated that the bias theoretically induced by the different assumptions concerning the fuel price development is most likely very small and negligible in practice. It can further be argued that implicitly efficiency improvements in TRANS-TOOLS have been lower than in the iTREN-2030 models, which then compensates for the higher fuel prices in iTREN-2030 as the variable cost are a function of both fuel prices and vehicle efficiency.

As far as the other variables are concerned, the following figures show the comparison between the assumptions in TRANS-TOOLS and in the other models. It can be seen that in most cases population growth rates are very comparable, with some exceptions concerning Bulgaria and Romania for the last part of the forecasting period (2020-2030). More differences are visible about economic growth assumptions. TRANS-TOOLS average growth rates for the period 2005-2030 are higher than those assumed for the iTREN-2030 Reference Scenario (ASTRA model). Nevertheless, for the period 2020-2030, assumptions are largely comparable.

Like the fuel price, also the differences concerning the economic growth are not really influencing the result of the reference scenario but can affect the responsiveness of the models when other scenarios are simulated. The theoretical reason is the same introduced above: transport demand trend depends, in the models, on various elements. If the reference trend is assumed as well as some of its determinants, the influence of other explanatory variables is calibrated accordingly. Thus, in theory, if a faster economic growth was assumed, different calibrated parameters would have been used.

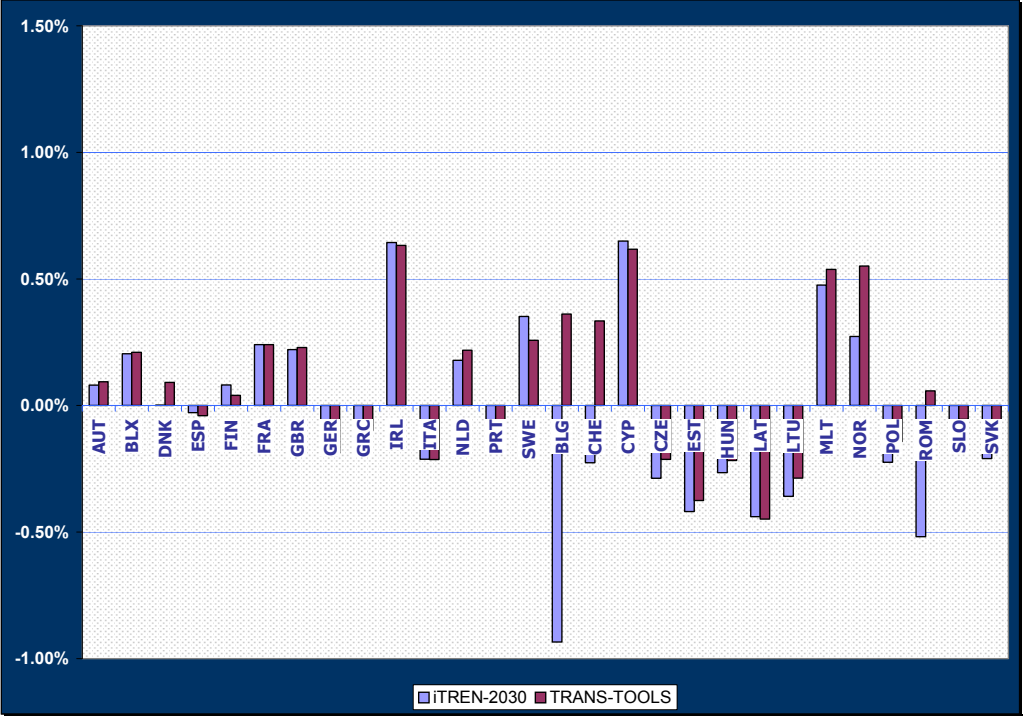
However, also in this case the possible inconsistency is irrelevant in practice, for the same reason given before: the calibration of the trend is not the same as the calibration of models sensitiveness. When a different assumption concerning economic growth is used, the model will react to this difference whatever the value of other parameters. When some policies are simulated, the model will react to e.g. larger costs whatever the assumption about the economic growth.

In conclusion, the assumptions behind TRANS-TOOLS results are sometimes dissimilar to those adopted in iTREN-2030 for the other models. The two main differences concern fuel prices and GDP growth until 2020. In both cases, TRANS-TOOLS is more optimistic. However, such differences do not affect the reference scenario but the elasticities that can be derived from looking at the pure TRANS-TOOLS model compared with looking at the TRANS-TOOLS model in the context of the iTREN-2030 modeling suite and its Reference Scenario. TRANS-TOOLS transport demand trends are now combined with lower GDP growth indicating a slightly higher elasticity to GDP growth. Further, given the small size of differences it is expected that the impact on models responsiveness when alternative scenarios are modelled remains small.



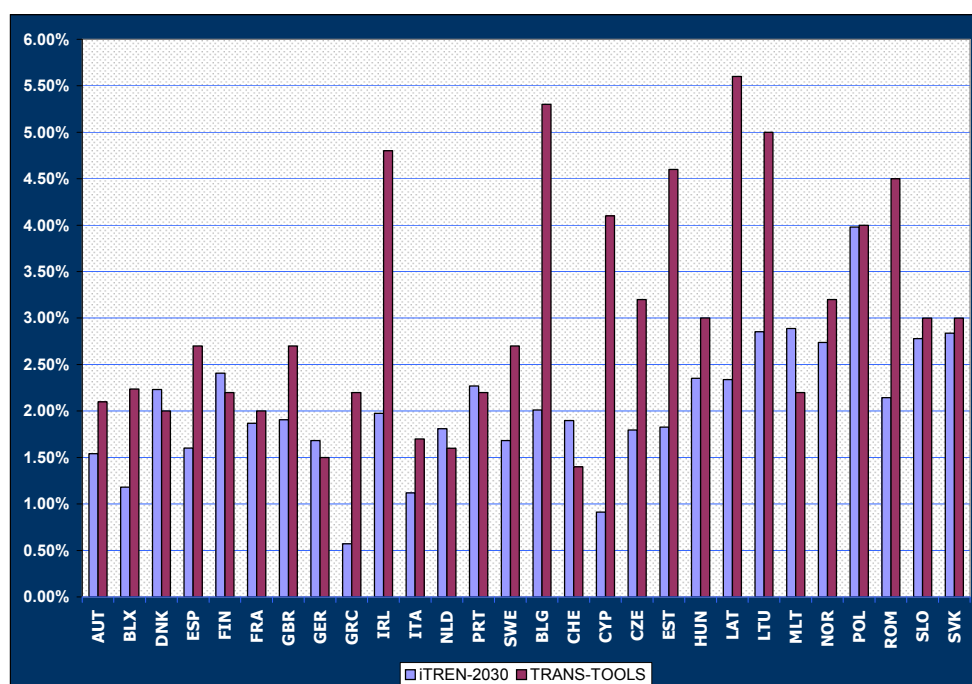
Source: iTREN-2030 elaboration on ASTRA and TEN-Connect data

Figure 1-3: Population growth rates 2005-2020 in TRANS-TOOLS and iTREN-2030



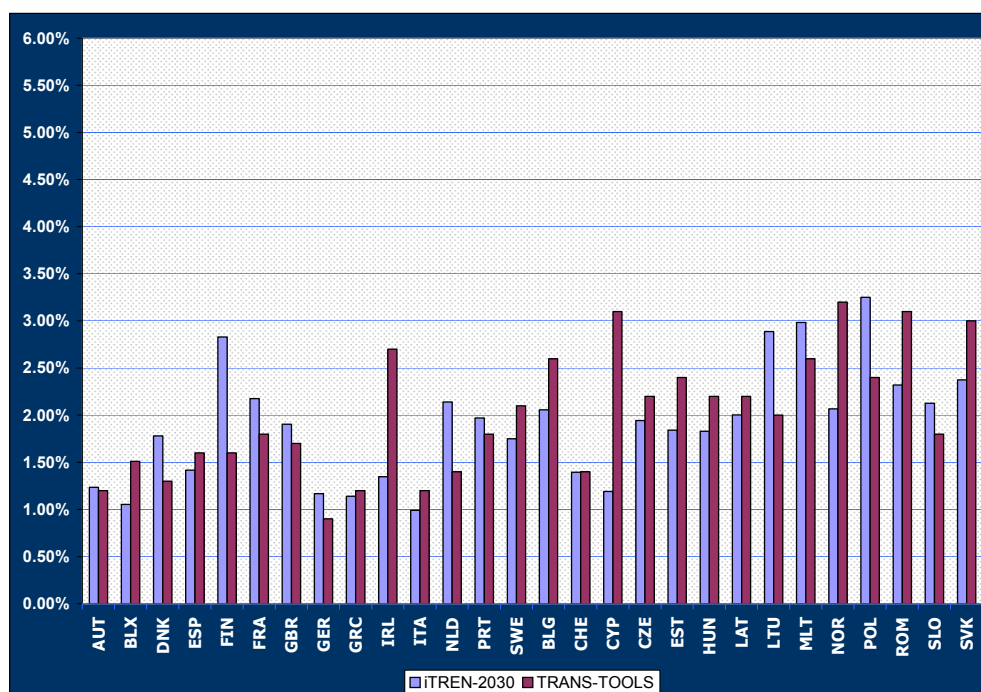
Source: iTREN-2030 elaboration on ASTRA and TEN-Connect data

Figure 1-4: Population growth rates 2020-2030 in TRANS-TOOLS and iTREN-2030



Source: iTREN-2030 elaboration on ASTRA and TEN-Connect data

Figure 1-5: GDP growth rates 2005-2020 in TRANS-TOOLS and iTREN-2030



Source: iTREN-2030 elaboration on ASTRA and TEN-Connect data

Figure 1-6: GDP growth rates 2020-2030 in TRANS-TOOLS and iTREN-2030



## 1.4 Producing the integrated iTREN-2030 Reference Scenario

In iTREN-2030 report 4.1, the sequence of steps to produce the Reference Scenario was tentatively described (sub-section 4.1, Fiorello/Martino 2008). Since TRANS-TOOLS could not be the recipient of external data, the actual sequence is partially different, as follows:

- a) The TRANS-TOOLS reference demand (and other data, e.g. travel times) is transferred to TREMOVE;
- b) The ASTRA transport model reference is revised to get growth rates of transport demand by mode in line with TRANS-TOOLS;
- c) The TRANS-TOOLS reference demand growth rates are transferred to POLES for an initial revision of fuel prices development;
- d) The ASTRA/POLES models are iterated to refine the reference fuels price (pure fuels price and fuel taxes) forecasts. Given steps b) and c), convergence is achieved with few iterations;
- e) The ASTRA and TREMOVE fleet baseline are harmonised as much as possible using POLES reference fuels prices and a common GDP path;
- f) Energy consumptions and emissions are harmonised as much as possible between ASTRA, POLES and TREMOVE.

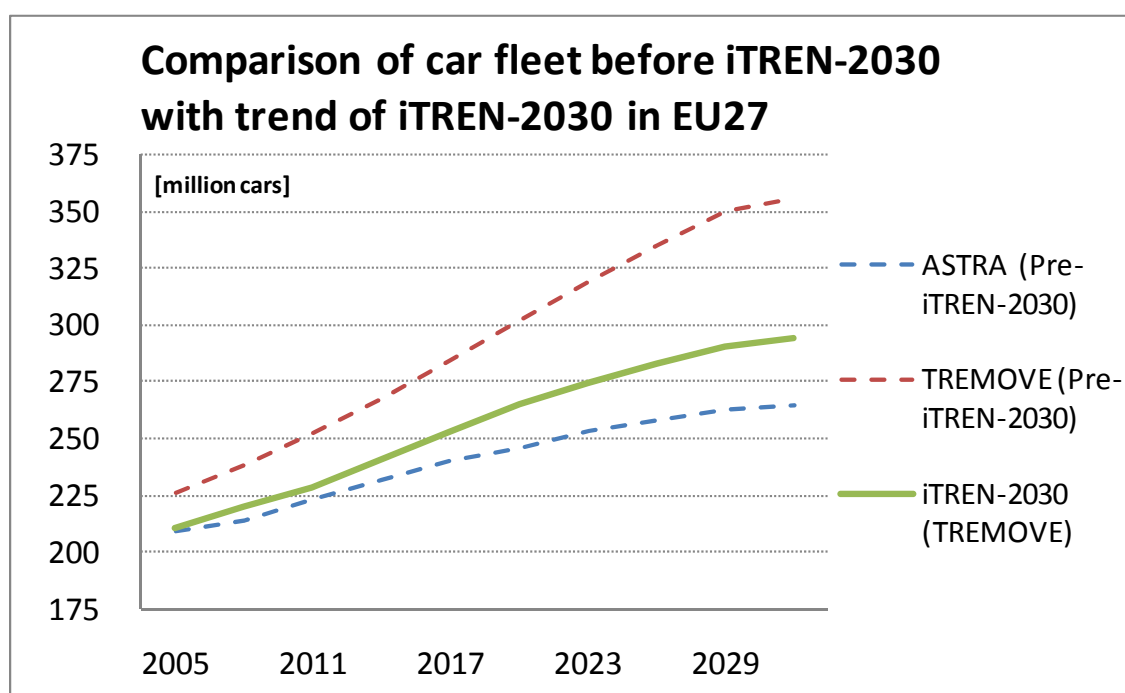
Basically, the main difference with respect to the sequence anticipated in report 4.1 is that the feed-back from the output of ASTRA/POLES iterations and TREMOVE fleet to TRANS-TOOLS could not be implemented, the following section provide some more detail on this issue.

It should be highlighted that the procedure above has led to different (and improved) results in comparison to what might have been achieved by running the individual models independently. Three main improvements can be identified.

First, the integration between the models allowed to improve assumptions and parameters originally part of the single tools. To provide some examples:

- The finalisation of the interface between TRANS-TOOLS and TREMOVE allowed to replace the old transport demand baseline in TREMOVE.
- The harmonisation of the ASTRA demand trend with the TRANS-TOOLS results resulted in a significant change of transport demand projections in ASTRA

- The linkage with ASTRA (calibrated on TRANS-TOOLS) changed the economy and transport demand growth assumptions in POLES and the harmonisation of the fleet development with ASTRA and TREMOVE improved the forecasts concerning the car fleet growth and the penetration of innovative vehicles in the market; these changes, in turn, provided a more detailed description of transport demand feed-back on energy price.
- The harmonisation with POLES brought to a revision of the assumptions concerning the energy efficiency improvements originally envisaged in ASTRA.
- the harmonisation between ASTRA and TREMOVE as well as the adaptation of economic trends allowed the revision of the car fleet trend in both models (see Figure 1-7), where the trend of the car fleet in iTREN-2030 Reference Scenario is compared to the trends both models projected before the adaptations made in the iTREN-2030 project.



Source: iTREN-2030 elaboration on ASTRA and TREMOVE data

Figure 1-7: Trend of car fleet in iTREN-2030 compared to the trend of ASTRA and TREMOVE models before harmonisation by iTREN-2030 project

Second, the integration of the models provided a set of results belonging to different domains with a common set of assumptions. In the annex of this deliverable several indicators are quantified for each country, describing the iTREN-2030 Reference Scenario in terms of transport demand, energy consumption, economy, emissions, vehicle fleet. All these indicators could have not been obtained at the same level of detail using only one of the models and, without the integration achieved in this work package, even if indicators are extracted from different models, their comparability would have been at least questionable.

Third, even when some indicators are provided by more than one model, each tool has specific strengths that are used to provide the more reliable results for iTREN-2030. For instance, even if POLES can provide fleet data, TREMOVE and ASTRA are much more sophisticated and their results are therefore more robust.

Finally, the simulation of a consistent scenario with the four modelling tools allows to represent complex impacts of the policies. For instance, with a model like ASTRA or TREMOVE it can be represented that a higher gasoline price relatively to diesel has a negative impact on the share of gasoline cars in the fleet, while a model like POLES allows to simulate that less gasoline cars in the fleet can mean less demand for gasoline and therefore a lower pressure on gasoline price. The integrated use of all models provides both impacts: from the price to the fleet and vice-versa, in a consistent manner.

In brief, the iTREN-2030 Reference Scenario is more than just the collection of results from individual models and the activities carried out in work package 4 represent a clear value added with respect to the use of each tool separately.

## **1.5 Feedback from other models to TRANS-TOOLS**

In iTREN-2030, the interface between TRANS-TOOLS and TREMOVE initially developed in the REFIT project has been revised according to the new features of TRANS-TOOLS. This interface provides an automated procedure to transfer TRANS-TOOLS output to TREMOVE in the required format. As specified in Report 4.1, it was expected also that the TRANS-TOOLS model received back some data from other models, i.e.:

- GDP growth rate forecasts by EU country from ASTRA;
- Population growth rate forecasts by EU country from ASTRA;
- Average fuel price from TREMOVE (The main source of fuels prices is POLES, but POLES provides costs in Euro per litre of each different type of fuel, while TRANS-TOOLS need the average cost across engine and vehicle type/size expressed in

per vehicle-km. This average cost is computed in TREMOVE given the composition of vehicle fleet and the fuel consumption factors);

- Transport mode costs from TREMOVE (TRANS-TOOLS has internal cost parameters but those in TREMOVE are generally more detailed with the only exception of toll costs);
- Trades of major industry goods from POLES (The industry sector is one of the economic sectors simulated in the economic module of TRANS-TOOLS, but the level of detail in POLES is higher).

Actually, the procedures to transfer these data items to TRANS-TOOLS have not been developed in WP4. The reason for skipping this activity was that despite the data item has been identified since the early stage of the project, the implementation of an interface requires the definition of several details concerning the content of the data, its format, its level of segmentation, etc. In most of the cases, the data is simple enough that in principle even a very simple Excel sheet can be used to transfer data (see an example in report 4.1) but it is important that the sheet include exactly the data needed. In other cases, data might be required under form of ACCESS tables, which should enter in one of the databases included in the TRANS-TOOLS structure.

In order to actually prepare the feedback data in the correct format, information on how TRANS-TOOLS uses it would have been needed. Unfortunately, still at the time this deliverable is written, there is a lack of documentation concerning the version 2 of the TRANS-TOOLS model developed in the TEN-Connect project. Missing information concerns essentially:

- *The correct definition of data* (e.g. unit of measurement, level of segmentation). For instance, in section 3.4 below a comparison between costs in TRANS-TOOLS and the other models is provided. Even if costs are largely comparable, they are not identical even as averages. This can be due to different estimations but also to different definitions. Before to transfer costs from another models back to TRANS-TOOLS it should be needed to be sure of the cost components considered.
- *The format of the data*. Even if just a table is enough, one should know the exact content of this table: which fields are included, if the order of the fields matters, which numeric data format is needed, etc.
- *The location of the input data within TRANS-TOOLS*. The procedure to feed data back into TRANS-TOOLS would not be completed until the table is loaded in the correct ACCESS database, with the correct table name, or at least in the correct directory.

In summary, the procedures to prepare the data that TRANS-TOOLS would receive from other models have not been finalised because of missing information on how to arrange the data in a way that it is actually useful for the TRANS-TOOLS model in the TTV2 version. Since this arrangement is the real content of the work, producing just tables of data would have been useless.

## 2 The modelling tools

In the following paragraphs, the four modelling tools used in TRANS-TOOLS are described. The role of the models have been explained in the previous section, here the main features of each tool are presented.

### 2.1 The ASTRA model

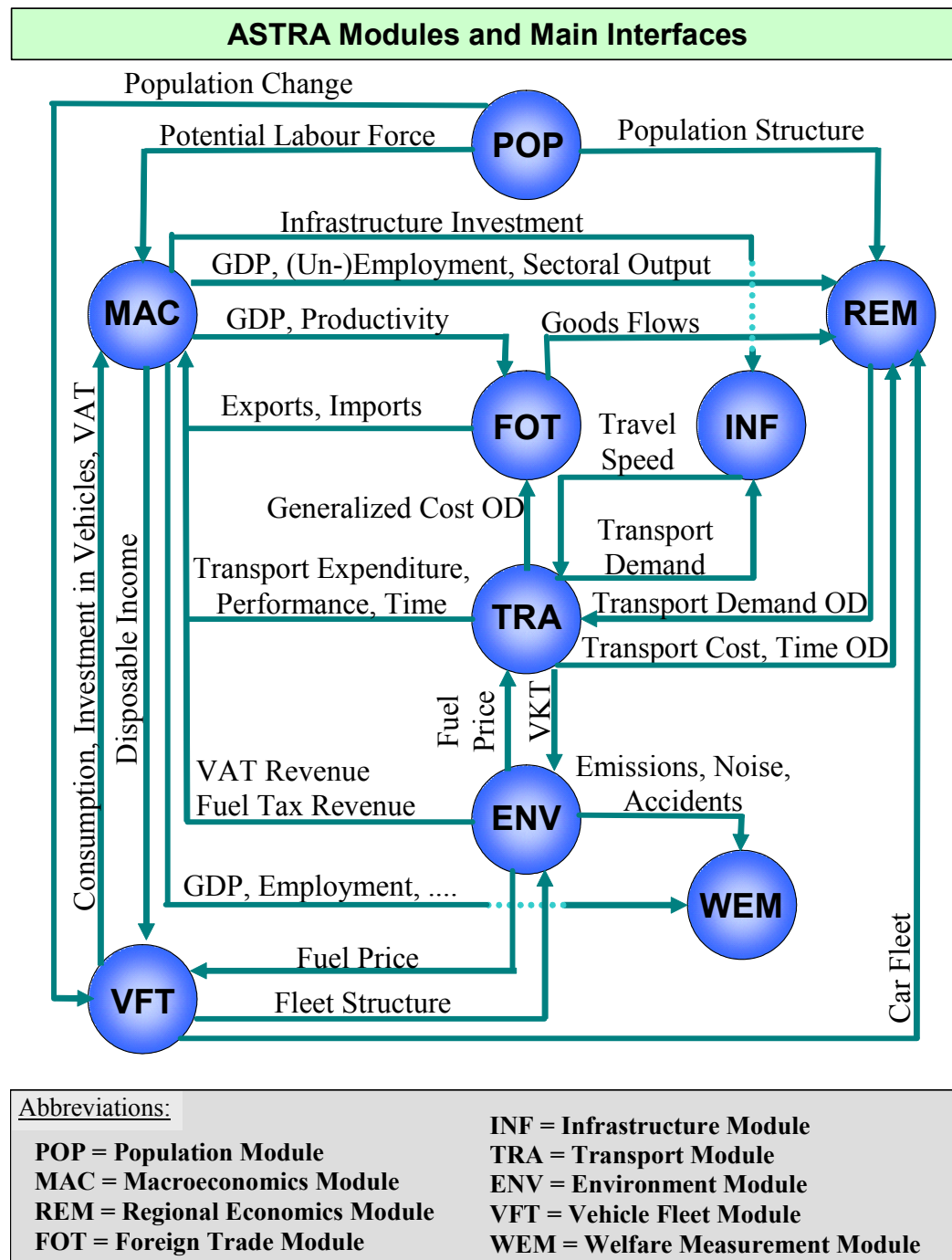
ASTRA (Assessment of Transport Strategies) is applied for Integrated Assessment of policy strategies. The model is implemented as System Dynamics model. The ASTRA model has been developed and applied in a sequence of European research and consultancy projects for more than 10 years now by three Institutions: Fraunhofer-ISI, IWW and TRT. Applications included analysis of transport policy (e.g. TIPMAC, TRIAS), climate policy (e.g. ADAM project) or renewables policy (e.g. Employ-RES project).

The ASTRA model consists of nine modules that are all implemented within one Vensim® system dynamics software file:

- Population module (POP),
- Macro-economic module (MAC),
- Regional economic module (REM),
- Foreign trade module (FOT),
- Infrastructure module (INF),
- Transport module (TRA),
- Environment module (ENV),
- Vehicle fleet module (VFT) and
- Welfare measurement module (WEM).

An overview on the nine modules and their main interfaces is presented in Figure 2-1.

The Population Module (POP) provides the population development for the 29 European countries with one-year age cohorts. The model depends on fertility rates, death rates and immigration of the EU27+2 countries. Based on the age structure, given by the one-year-age cohorts, important information is provided for other modules like the number of persons in the working age or the number of persons in age classes that permit to acquire a driving licence. POP is calibrated to EUROSTAT and UN population predictions.



Source: Schade/Fiorello/Beckmann et. al. (2008)

Figure 2-1: Overview on the structure of the ASTRA modules

The MAC provides the national economic framework, which imbeds the other modules. The MAC could not be categorised explicitly into one economic category of models for instance a neo-classical model. Instead it incorporates neo-classical elements like production functions. Keynesian elements are considered like the dependency of invest-

ments on consumption, which are extended by some further influences on investments like exports or government debt. Further elements of endogenous growth theory are incorporated like the implementation of endogenous technical progress (e.g. depending on sectoral investment) as one important driver for the overall economic development.

Six major elements constitute the functionality of the macroeconomics module. The first is the sectoral interchange model that reflects the economic interactions between 25 economic sectors of the national economies. Demand-supply interactions are considered by the second and third element. The second element, the demand side model depicts the four major components of final demand: consumption, investments, exports-imports and the government consumption. The supply side model reflects influences of three production factors: capital stock, labour and natural resources as well as the influence of technological progress that is modelled as total factor productivity. Endogenised total factor productivity depends on investments, freight transport times and labour productivity changes. The fourth element of MAC is constituted by the employment model that is based on value-added as output from input-output table calculations and labour productivity. Employment is differentiated into full-time equivalent employment and total employment to be able to reflect the growing importance of part-time employment. In combination with the population module unemployment was estimated. The fifth element of MAC describes government behaviour. As far as possible government revenues and expenditures are differentiated into categories that can be modelled endogenously by ASTRA and one category covering other revenues or other expenditures. Categories that are endogenised comprise VAT and fuel tax revenues, direct taxes, import taxes, social contributions and revenues of transport charges on the revenue side as well as unemployment payments, transfers to retired and children, transport investments, interest payments for government debt and government consumption on the expenditure side. Sixth and final of the elements constituting the MAC are the micro-macro bridges. These link micro- and meso-level models, for instance the transport module or the vehicle fleet module to components of the macroeconomics module. That means, that expenditures for bus transport or rail transport of one origin-destination pair (OD) become part of final demand of the economic sector for inland transport within the sectoral interchange model. The macroeconomics module provides several important outputs to other modules. The most important one is, for sure, Gross Domestic Product (GDP). This is for instance required to calculate sectoral trade flows between the European countries. Other examples are employment and unemployment representing two influencing factors for passenger transport generation. Sectoral production value is driving national freight transport generation. Disposable income exerting a major influence on car purchase affecting finally the vehicle fleet module and even passenger transport emissions.



The Regional Economic Module (REM) mainly calculates the generation and spatial distribution of freight transport volume and passenger trips. The number of passenger trips is driven by employment situation, car-ownership development and number of people in different age classes. Trip generation is performed individually for each of the 76 zones of the ASTRA model. Distribution splits trips of each zone into three distance categories of trips within the zone and two distance categories crossing the zonal borders and generating OD-trip matrices with 76x76 elements for three trip purposes. Freight transport is driven by two mechanisms: Firstly, national transport depends on sectoral production value of the 15 goods producing sectors where the monetary output of the input-output table calculations are transferred into volume of tons by means of value-to-volume ratios. For freight distribution and the further calculations in the transport module the 15 goods sectors are aggregated into three goods categories. Secondly, international freight transport i.e. freight transport flows that are crossing national borders are generated from monetary Intra-European trade flows of the 15 goods producing sectors. Again transfer into volume of tons is performed by applying value-to-volume ratios that are different from the ones applied for national transport. In that sense the export model provides generation and distribution of international transport flows within one step on the base of monetary flows.

The Foreign Trade Module (FOT) is divided into two parts: trade between the EU27+2 European countries (INTRA-EU model) and trade between the EU27+2 European countries and the rest-of-the world (RoW) that is divided into nine regions (EU-RoW model with Oceania, China, East Asia, India, Japan, Latin America, North America, Turkey, Rest-of-the-World). Both models are differentiated into bilateral relationships by country pair by sector. The INTRA-EU trade model depends on three endogenous and one exogenous factor. World GDP growth exerts an exogenous influence on trade. Endogenous influences are provided by GDP growth of the importing country of each country pair relation, by relative change of sectoral labour productivity between the countries and by averaged generalised cost of passenger and freight transport between the countries. The latter is chosen to represent an accessibility indicator for transport between the countries. The EU-RoW trade model is mainly driven by relative productivity between the European countries and the rest-of-the-world regions. Productivity changes together with GDP growth of the importing RoW-country and world GDP growth drive the export-import relationships between the countries. Since, transport cost and time are not modelled for transport relations outside EU27+2 transport is not considered in the EU-RoW model. The resulting sectoral export-import flows of the two trade models are fed back into the macroeconomics module as part of final demand and national final use respectively. Secondly, the INTRA-EU model provides the input for international freight generation and distribution within the REM module.

The Infrastructure Module (INF) provides the network capacity for the different transport modes. Infrastructure investments derived both from the economic development provided by the MAC and from infrastructure investment policies alter the infrastructure capacity. Using speed flow curves for the different infrastructure types and aggregate transport demand the changes of average travel speeds over time are estimated and transferred to the TRA where they affect the modal choice.

Major input of the Transport Module (TRA) constitutes the demand for passenger and freight transport that is provided by the REM in form of OD-matrices (i.e. matrices linking origin and destination of transport activities). Using transport cost and transport time matrices the transport module performs the modal-split for five passenger modes and three freight modes. The cost and time matrices depend on influencing factors like infrastructure capacity and travel speeds both coming from the INF module, structure of vehicle fleets, transport charges, fuel price or fuel tax changes. Depending on the modal choices, transport expenditures are calculated and provided to the macroeconomics module. Changes in transport times are transferred to the macroeconomics module such that they influence total factor productivity. Considering load factors and occupancy rates respectively, vehicle-km are calculated.

Major outputs of the TRA provided to the Environment Module (ENV) are the vehicles-km travelled (VKT) per mode and per distance band and traffic situation respectively. Based on these traffic flows and the information from the vehicle fleet model on the national composition of the vehicle fleets and hence on the emission factors, the environmental module calculates the emissions from transport. Besides emissions, fuel consumption and, based on this, fuel tax revenues from transport are estimated by the ENV. Traffic flows and accident rates for each mode form the input to calculate the number of accidents in the European countries. Expenditures for fuel, revenues from fuel taxes and value-added-tax (VAT) on fuel consumption are transferred to the macroeconomics module and provide input to the economic sectors producing fuel products and to the government model.

The Vehicle Fleet Module (VFT) describes the vehicle fleet composition for all road modes. Vehicle fleets are differentiated into different age classes based on one-year-age cohorts and into different emission standard categories. The car vehicle fleet is developing according to income changes, development of population, fuel prices, fuel taxes, maintenance and purchase cost of vehicles, mileage and the density of filling stations for the different type of fuels. Considered car vehicle technologies include conventional vehicles (3 gasoline types, two diesel types), CNG, LPG, bioethanol, hybrid, battery electric and hydrogen fuel cell cars. Vehicle fleet composition of buses, light-duty vehicles and heavy-duty vehicles mainly depends on travelled kilometres and the

development of average annual mileages per vehicle of these modes. The purchase of vehicles is translated into value terms and forms an input of the economic sectors in the MAC that cover the vehicle production.

Finally, in the Welfare Measurement Module (WEM) major macro-economic, environmental and social indicators can be compared and analysed. Also different assessment schemes that combine indicators into aggregated welfare indicators for instance an investment multiplier are provided in the WEM. In some cases, e.g. to undertake a CBA, the functionality is implemented in separate tools.

For more details on ASTRA, the most comprehensive description of the model can be found in Schade, 2005.

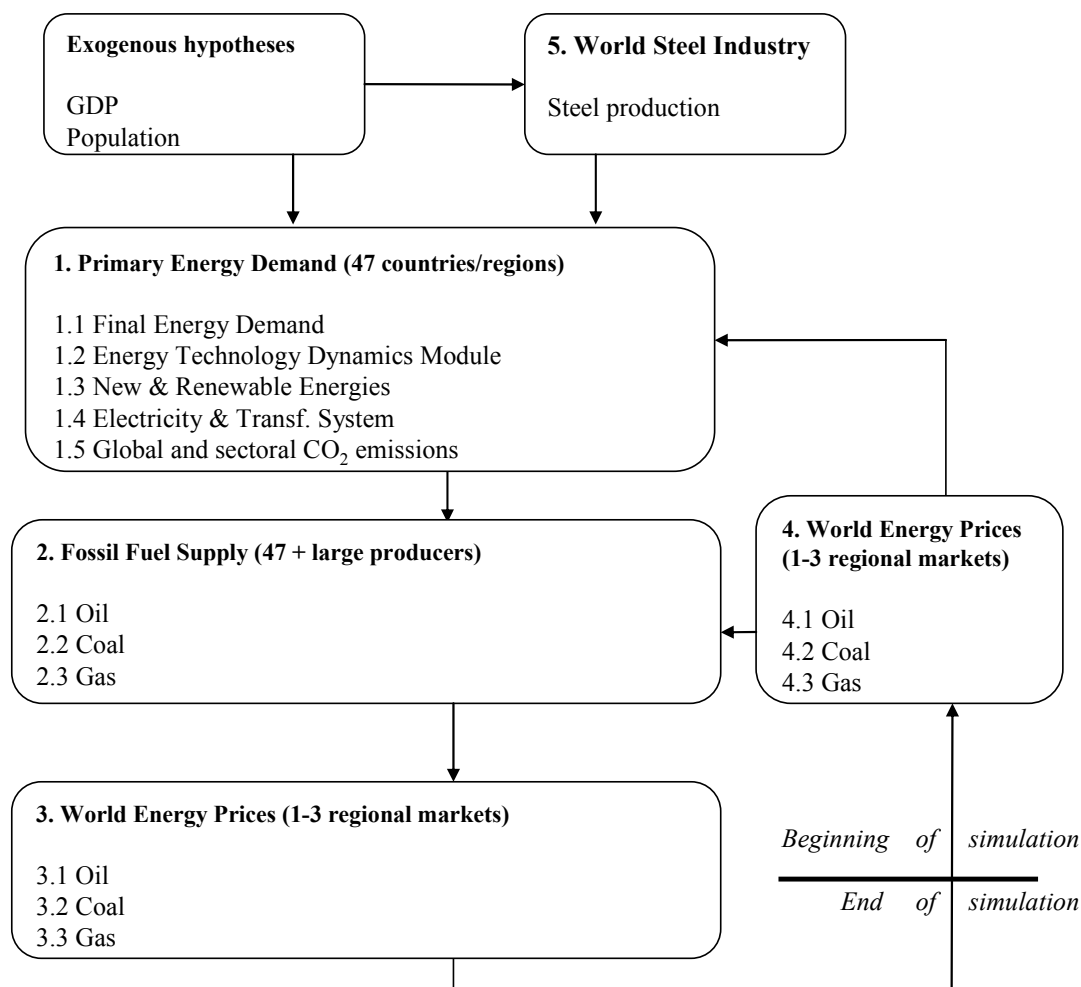
## **2.2 The POLES model**

The POLES model is a simulation model for the development of long-term (2050) energy supply and demand scenarios for the different regions of the world (Figure 2-2). POLES has been developed and applied in a variety of EU projects, e.g. the WETO, WETO-H2, TRIAS, HOP! and GRP project.

The model structure corresponds to a hierarchical system of interconnected modules and articulates three level of analysis:

- international energy markets;
- regional energy balances;
- national energy demand, new technologies, electricity production, primary energy production systems and CO2 sector emissions.

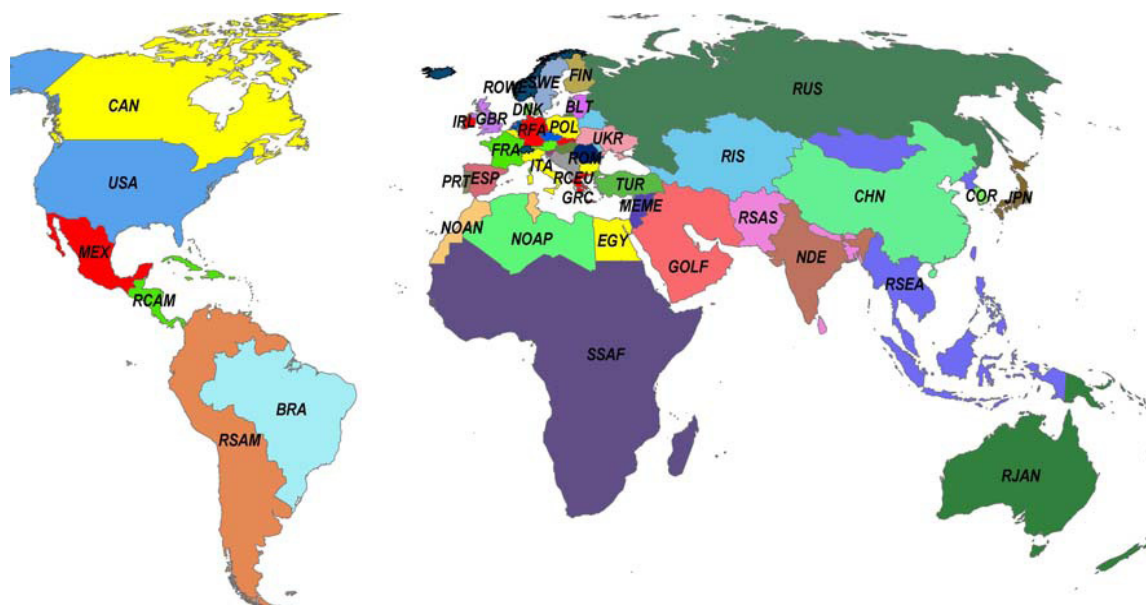
The main exogenous variables are the population and GDP (which in iTREN-2030 are derived iteratively with ASTRA), for each country / region, the price of energy being endogenised in the international energy market modules. The dynamics of the model corresponds to a recursive simulation process, common to most applied models of the international energy markets, in which energy demand and supply in each national / regional module respond with different lag structures to international prices variations in the preceding periods. In each module, behavioural equations take into account the combination of price effects and of techno-economic constraints, time lags or trends.



Source: Schade/Fiorello/Beckmann et. al. (2008)

Figure 2-2: POLES modules and simulation process

In POLES, the world is divided into 47 zones (see Figure 2-3). In most of these regions the larger countries are identified and treated, as concerns energy demand, with a detailed model. In this version these countries are the G7 countries plus the countries of the rest of the European Union and five key developing countries: Mexico, Brazil, India, South Korea and China. The countries forming the rest of the 14 above-mentioned regions are dealt with more compact but homogeneous models.



Source: iTREN-2030

Figure 2-3: POLES country and region coverage

For each region, the model articulates four main modules dealing with:

- Final Energy Demand by main sectors;
- New and Renewable Energy technologies;
- The Electricity and conventional energy and Transformation System;
- The Primary Energy Supply.

This structure allows for the simulation of a complete energy balance for each region, from which import demand / export capacities by region are estimated. At the same time the horizontal integration is ensured in the energy markets module of which the main inputs are the import demands and export capacities of the different regions. Only one world market is considered for the oil market (the "one great pool" concept), while three regional markets (America, Europe, Asia) are distinguished for coal and gas, in order to take into account for different cost, market and technical structures.

According to the principle of recursive simulation, the comparison of imports and exports capacities for each market allows for the determination of the variation of the price for the following period of the model. Combined with the different lag structure of demand and supply in the regional modules, this feature of the model allows for the simulation of under- or over-capacity situations, with the possibility of price shocks or

counter-shocks similar to those that occurred on the oil market in the seventies and eighties.

In the final energy demand module, the consumption of energy is divided into 11 different sectors, which are homogenous from the point of view of prices, activity variables, consumer behaviour and technological change. Each of such sector belongs to one of the three 'blocks': Industry, Transport and Residential-Tertiary-Agriculture. In each sector, the energy consumption is calculated separately for substitutable technologies and for electricity, with a taking into account of specific energy consumption (electricity in electrical processes and coke for the other processes in the steel-making, feedstock in the chemical sector, electricity for heat and for specific uses in the residential and service sectors).

The POLES model calculates oil production for every key producing country or region, based on oil reserves. This is performed in three steps. Firstly, the model estimates the cumulative amount of oil discovered as a function of the Ultimate Recoverable Resources (URR) and the cumulative drilling effort in each region. The amount of URR is not held constant but is calculated by revising the value for the base year, based on a recovery ratio that improves over time and increases with the price of the resource. According to WETO-H2, while the recovery rate is differentiated across regions, the world average accounts for 35% today and, due to the price-driven technology improvements, increases to around 50% in 2050.

Secondly, the model calculates remaining reserves as equal to the difference between the cumulative discoveries and the cumulative production for the previous period. The accounting is described by the formula:  $R_{t+1} = R_t + DIS_t - P_t$  (where  $R$  = reserves,  $DIS$  = discoveries,  $P$  = production, subscript  $t$  = year of account).

Finally, the model calculates the production, which differs among regions of the world. In the "price-taker" regions (i.e. Non-OPEC) it is resulting from an endogenous Reserves-to-Production ratio that decreases over time and the calculated remaining reserves in the region; the production from "swing-producers" (i.e. OPEC) is assumed to be that amount needed to balance the world oil market (OPEC total oil production = total oil demand – Non-OPEC total oil production). Thus, the model calculates a single world price, which depends in the short-term on variations in the rate of utilisation of capacity in the OPEC Gulf countries and in the medium and long-term on the world R/P ratio (including unconventional oil). The unconventional oil enters in the composition of the world oil supply when the oil international price makes it competitive against the conventional oil, that is when the world oil price exceeds the cost of an unconventional source of oil.

The gas discoveries and reserves dynamics are modelled in a way that is similar to that used for oil; whereas the gas trade and production are simulated in a more complex process that accounts for the constraints introduced by gas transport routes to the different markets; The production of gas in each key producing country is derived from the combination of the demand forecast and of the projected supply infrastructures in each region (pipelines and LNG facilities). Three main regional markets are considered for gas price determination, but the gas trade flows are studied with more detail for 14 sub-regional markets, 18 key exporters and a set of smaller gas producers. The price of gas is calculated for each regional market; the price depends on the demand, domestic production and supply capacity in each market. There is some linkage to oil prices in the short-term, but in the long-term, the main driver of price is the variation in the average Reserve-to-Production ratio of the core suppliers of each main regional market. As this ratio decreases for natural gas as well as for oil, gas prices follow an upward trend that is similar in the long-term to that of oil.

A recent module developed in POLES is the Biofuels model. It has improved the capability of POLES to deal with a potentially relevant alternative source of energy for the transport sector. The biofuels model is based on the production costs of biofuels and those of the fossil alternative they substitute, taking into account the biomass potential of each region. In addition, the model considers the 1<sup>st</sup> and 2<sup>nd</sup> generation of biofuels and as well the use of biomass for electricity and the direct use of biomass in the residential and the industrial sector.

With other modules, POLES simulates global transport demand. However, in iTREN-2030 European transport demand is provided to POLES by ASTRA taking into account the TRANS-TOOLS transport demand from TTv2.

## **2.3 The TRANS-TOOLS model**

The TRANS-TOOLS Model is an IPR free European wide network-based transport planning tool. The model covers both passenger and freight transport with interactions to an economic model and impacts models. The aim of the TRANS-TOOLS Model is to serve as tool for strategic transport policy analysis at EU level. The TRANS-TOOLS model has been developed by a 6<sup>th</sup> Framework Research Project called TRANS-TOOLS (Burgess et al. 2006), which developed the so-called TRANS-TOOLS version 1 (TTv1). It has been updated by the TEN-Connect project (Rich 2008, Rich et al. 2009), which developed the so-called TRANS-TOOLS version 2 (TTv2). The model is continuously maintained by the European Commission DG JRC, IPTS in Seville, and most recent information on the TRANS-TOOLS model is provided via the official website:

<http://energy.jrc.ec.europa.eu/transtools/>

Transport policies which may be assessed by the TRANS-TOOLS Model include, for instance:

- Construction and improvement of the infrastructure e.g. Trans-European Networks to eliminate bottlenecks, promote mode shifts, improve quality of service etc.
- Implementation of infrastructure charging systems.
- Change of transport costs due to policy interventions, increases in fuel prices etc.

The geographical scope of the model includes all European countries and the zoning system is based on NUTS3, consisting of 1441 zones in the most recent version. Separate networks for road transport, rail passenger and freight transport, inland waterways transport, and passenger transport by air are modelled.

The TRANS-TOOLS Model is similar to a traditional four step model including freight and passenger modelling. The main sub-models are:

- Freight demand model
- Passenger demand model
- Assignment model

The TRANS-TOOLS Model computes transport flows (passenger, vehicles and tonnes) at link level or zonal level, and transport performance (travel distance, cost, times, passenger-km, tonne-km etc). In additions to these main elements of the model system, the TRANS-TOOLS Model also includes an economic model and impact models. The economic model CGEurope predicts future developments by NSTR related sector of the economy of each region of the EU and assesses the feed-back effect of transport policies on the sectors in monetary terms. The outputs of the impact models include calculation of energy consumption, emissions, external costs, and safety.

The different models are linked applying a number of conversion routines. All model components are integrated into ArcGIS which allow the user to edit, operate and illustrate results from the same common GIS-based platform.

Being an integral sub-model of the TRANS-TOOLS Freight model, the trade model calculates a future freight demand per commodity per O/D relation, regardless the mode of transport. A two-stage method, predicting origin and destination totals first and applying the doubly constrained model next, is used in the trade model. In calculation of origin and destination totals, money flows are converted into tonnes used in freight



modelling. To reduce the uncertainty a pivot-point procedure relative to the totals of ETIS 2000 base year matrix is used for all relevant regions within the core area of the TRANS-TOOLS model. The output of the trade model is a forecast O/D matrix for freight including origin region, between transshipments and destination region, commodity group and tonnes.

In the modal split model the market shares of the different modes of transport are estimated for every O/D relation and commodity group from the trade model. The purpose of the mode split model is to relate changes in the relative costs of multi-modal paths into traffic shares: Within the model there are four main modes of transport available (Road, rail, inland waterway, sea). For each combination of origin and destination, the model searches for available multimodal paths (extracted from the base year set of paths), and by comparing the level of service (i.e. cost) of each base year path with each scenario year path, it calculates changes in the resulting shares. Choice probabilities of the available modes per commodity group for every O/D relation are determined by using a multinomial logit model. Output of the TRANS-TOOLS modal split model is a freight matrix, which consists of a forecast O/D matrix including forecast modal split.

The working of the TRANS-TOOLS logistic module is based on SLAM, which is a module developed in the SCENES project. This module makes it possible to evaluate the impacts of changes in the logistic and transport systems within Europe on the spatial patterns of freight transport flows, through changes in the number and location of warehouses for the distribution of goods. The logistic module produces output that is to be used in the assignment model as well as in the economic model. For the assignment model the logistic module produces unimodal transport matrices (origin, destination, mode, tonnes, vehicles). The economic model needs generalized and monetary costs per origin, destination and commodity type. These costs can be computed from the assigning process. The monetary costs (payment to the public budget e.g. toll, fuel taxes) can be separated out if input on these costs is available.

The passenger model, as developed in the TEN-Connect project, is based on the Generation-Attraction (GA) approach (the person that conducts the trip). If change in GDP, occupation, migration etc. correctly should reflect demand for transport it is important that socio-economic drivers can be related to the person that is conducting the trip – regardless whether the trip is outward or backward. Generally, the approach for transforming matrices to GA is different for different trip purposes. The TRANS-TOOLS model uses four trip purposes: Business, Private, Commuting and Tourism.

- Business trips are based on GDP and work place in the zone of origin and destination respectively

- Commuting is part of private trips in the TRANS-TOOLS model. Based on assumptions on trip lengths, commuting is separated from private trips, assuming commuting to be mainly short distance (yet several metropolitan regions in TRANS-TOOLS have 3-6 NUTS3 zones, and therefore between NUTS3 commuting). The separated OD is transformed to GA based on population, workplaces and GDP.
- The remaining private trips are transferred from OD to GS based on GDP and population in the zone of origin and destination respectively
- Tourism is based on population, GDP and a tourist attractiveness measure in the zone of origin and destination

Travel costs, travel time and information about the trip itself like frequencies and number of transfers are used to split the trips between the modes. Subsequently, for each origin-destination pair the modal split model calculates the probability of selecting a modal alternative out of a set of available modes. A non-linear logit function is used in order to calculate the choice probability. The explanatory variables represent the transport service level between two zones e.g. in the dimensions travel costs and travel time. Output of TRANS-TOOLS passenger demand model to assignment model are unimodal passenger O/D transport matrices at NUTS3 level in number of passengers per mode (rail, road, air) and trip purpose as well as unimodal passenger O/D transport matrices at NUTS3 level in number of vehicles for road relations per trip purpose.

The network assignment module produces the direct output from the TRANS-TOOLS Model. However, the models also generate level-of-service data (LOS) as input to passenger, freight, and logistic models in a feed back loop. Four independent assignment models are developed within the TRANS-TOOLS Model:

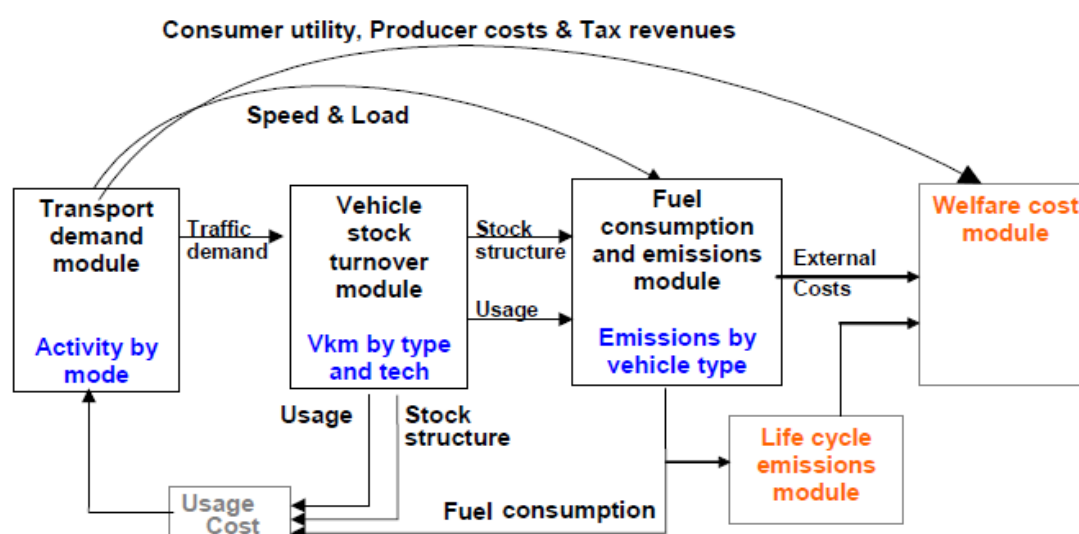
- Road network (passenger and freight)
- Rail network (passenger and freight)
- Inland waterway (freight)
- Air network (passenger).

Passengers by rail and air and freight by rail and inland waterways are assigned based on an average day, since congestion is not considered and information on service data differentiated by time and day is not available. LOS in the road assignment is calculated by time period. In TRANS-TOOLS, a stochastic assignment procedure is applied being founded on probit-based models.

## 2.4 The TREMOVE model

TREMOVE is a policy assessment model to study the effects of different transport and environment policies on the emissions of the transport sector. It is an integrated simulation model developed for the strategic analysis of the costs and effects of a wide range of policy instruments and measures applicable to local, regional and European transport markets. The model has been developed by the Catholic University of Leuven and Transport & Mobility Leuven.

TREMOVE models both passenger and freight transport in 31 countries (EU27 plus CH, NOR, HR, TR), and covers the period 1995-2030 providing yearly results. The TREMOVE model consists of separate country models. While the numeric values of the model differ from country to country, the model code is identical across countries, figure 2.4 maps the modular structure of TREMOVE. Each country model describes transport flows and emissions in three model regions: one metropolitan area, an aggregate of all other urban areas and an aggregate of all nonurban areas. Trips in the non-urban areas are further separated in short (<500 km) and long (> 500 km) distance trips. The model explicitly takes into account that, depending on the area taken into consideration, the relevant modes and network types differ.



Source: iTREN-2030

Figure 2-4: Modular Structure of TREMOVE

The transport demand module represents, for a given year and transport mode, the number of passenger-kilometres or ton-kilometres that will be performed in each “model region” of the country considered. Three freight categories are distinguished

(bulk, unitised and general cargo) as well as three passenger trip purposes (non-work, commuting and business). Also, transport flows are allocated to peak and off-peak periods. With this demand module, the impact of policy measures on the transport quantity of all transport modes is calculated. Transport modes for passenger trips include slow modes, mopeds, motorcycles, cars, vans, bus, metro/tram, train and plane. Freight modes are inland waterways, freight trains, light duty trucks and heavy duty trucks (disaggregated to four weight classes). Four road types are distinguished. TREMOVE models the transport activities within these areas without explicit network disaggregation. This simplification allows to calibrate a simple but complete policy simulation model starting from an exogenous baseline transport forecast. Since the iTREN-2030 project, the exogenous baseline is taken from TRANS-TOOLS.

The demand for private transport (non-work and commuting passenger trips) is the result of the decision processes of all households in a country assuming that, within the constraints of their available budget, households choose the combination of goods that maximizes their utility. The decision processes of households are modelled using nested Constant Elasticity of Substitution (CES) utility functions. Knowing the substitution elasticities between the different transport options, it is possible to model the change in consumed quantities in policy simulations.

The demand for business transport (freight transport and business passenger trips) is modelled as a result of the decision processes within firms. The business transport demand is determined by generalized prices, desired production quantities and substitution possibilities with other production factors. For a given production level, profit maximization then is equivalent with cost minimization. The cost-minimizing substitution processes are represented again by a nested CES production function.

The demand module produces aggregate transport quantities by mode. The vehicle stock module disaggregates these into detailed vehicle-kilometer figures by vehicle type, vehicle technology and vehicle age. This requires a detailed modelling and forecasting of the vehicle fleet structures for each mode. Road and rail vehicle fleet evolution is modelled using a classic scrap-and-sales approach. Each year scrap rates are applied to estimate the number of scrapped vehicles. Total vehicle sales by mode then can be derived by comparing remaining vehicle stock to the stock needed to fulfil transport demands. The following step then is to disaggregate total sales by mode into sales by vehicle type and technology. For cars, motorcycles, vans, light duty trucks and buses the disaggregation by vehicle type is performed using a discrete choice (multinomial) logit model. For road vehicles, the vehicle types are further split up according to their technology. The technologies modelled in the baseline correspond with the EU emission standards. They are directly linked to the vintage of the vehicle.

In the fuel consumption and emissions module fuel consumption and exhaust and evaporative emissions are calculated for all modes. Emission factors have been derived consistently from EU sources, thus might deviate from national estimates. For road vehicles, TREMOVE emission factors are based upon (a preliminary version of) the COPERT IV emission calculation methodology, to which following additions have been made:

- Disaggregation of COPERT diesel car fuel consumption factor into three factors according to engine displacement, based upon EU CO<sub>2</sub> monitoring data;
- Upward scaling of COPERT fuel consumption factors for 2002 cars, based upon EU test-cycle monitoring data and information on the difference between test-cycle and real-world fuel consumption<sup>3</sup>;
- Introduction of fuel efficiency improvement factors up to 2009. For cars these are based upon the voluntary agreements between EU and the car industry. For other road vehicles predictions are derived from the Auto Oil II Programme;
- Update of moped and motorcycle emission factors based on recent information<sup>4</sup>
- Emission factors for CNG vehicles.

Fuel consumption and emission factors for diesel trains and aircrafts<sup>12</sup> (by distance class) have been derived from the TRENDS database. For electric trains, trams and metros only total energy consumption (kWh) is calculated in this module. The fuel consumption and emission factors for inland waterway vessels have been calculated following the first version of the approach developed within the ARTEMIS<sup>5</sup> project. Factors have been estimated using data on vessel characteristics for the 21 types included in TREMOVE and using estimates on waterway characteristics.

To evaluate policies in TREMOVE, a welfare assessment module has been constructed. Differences in welfare between the baseline and the simulated policy scenarios are calculated. Based on the utility functions for the private transport demand, the aggregate utility level of households is quantified. The modelling of business decisions leads to an aggregate measure for the change in production costs of firms. Additionally, welfare changes stemming from changes in tax revenues are incorporated by using the marginal cost of public funds. This latter approach accounts for the options of the gov-

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<sup>3</sup> Van den Brink and Van Wee (2001) and TNO (2006).

<sup>4</sup> Ntziachristos et. al. (2004).

<sup>5</sup> Georgakaki (2003).

ernment to beneficially use additional tax revenues from the transportation sector to lower taxes in other sectors. Emissions to air are calculated in detail as explained in the next section. The external costs of these emissions are also incorporated in the welfare evaluation of policy measures.

### **3 The harmonisation of the modelling tools**

One requirement for the production of integrating different models to produce a consistent scenario is that common elements across models are comparable. As explained above, in some cases this comparability has been guaranteed by means of data exchanges. However, the models remain independent tools, with autonomous methodologies and algorithms. Therefore, even with some common parameters, they may provide different results and forecasts. For that reason, a further activity part of WP4 has been the re-calibration of models, aiming at improving their reciprocal consistency.

Two elements have represented the starting point for the re-calibration process. The first one is transport demand projections from TRANS-TOOLS. As TRANS-TOOLS results from TEN-Connect had to be used as such (with the correction to the rail passenger trend, see Newton et al. 2009) they have been adopted as starting point for re-calibration of ASTRA, POLES and TREMOVE. Secondly, GDP and population projections of ASTRA have been used. Starting from these two variables, the models have been re-calibrated exchanging input in the course of the process.

#### **3.1 Re-calibration of the ASTRA model**

The ASTRA model has been recalibrated in various parts in order to achieve a better harmonisation between the four models and to consider feedbacks from the iTREN-2030 stakeholder workshops. This concerned:

- The GDP development has been slightly revised since the preliminary results contained some outliers (see Schade/Fiorello/Herbruggen et al. 2008). GDP trends have been oriented at the ADAM scenario framework (Schade/Jochem et al. 2009).
- The transport module has been revised in order to adapt the transport demand results to the TRANS-TOOLS projections.
- The car fleet module has been adapted such that in the Reference Scenario without ambitious climate policy and limited technological progress no electric vehicles or hydrogen fuel cell vehicles enter the market.
- The transport energy demand projection after 2008 has been revised such that it fits to the POLES projections (after both models transport demand had been aligned to the TRANS-TOOLS projections).

##### **3.1.1 Recalibration of transport demand in ASTRA**

The transport module of the ASTRA model has been re-calibrated according to transport trends forecasted until 2030 by the TRANS-TOOLS model version 2 (TTv2) delivered by the TEN-Connect project. In advance to the trend adjustment, however, also a

re-calibration of the absolute values at 2005 has been completed. For this re-calibration, the data from “Energy and Transport in figure 2007” (TiF-2007) (European Commission 2007), has been taken as a reference rather than the TRANS-TOOLS results. Even if in most cases the traffic performance modelled by TRANS-TOOLS is close to the TiF-2007 values, there are some discrepancies and it has been decided to consider the latter as the main reference.

For the base year, the re-calibration concerned transport performance by mode for each country expressed in passengers-km (pkm) or tonnes-km (tkm), which is the type of information available from TiF-2007. For the projections, the harmonisation with TRANS-TOOLS has concerned the growth rates of passengers-km or tonnes-km of each transport mode. As explained in section 1, the growth rates of demand resulting from the TEN-Connect project have been partially corrected (rail passenger demand trend has been revised downwards), therefore the re-calibration of growth rates of ASTRA has been based on this revised data.

The transport modes in ASTRA are more detailed than in TRANS-TOOLS, whereas in turns TiF-2007 distinguishes some modes that in ASTRA are aggregated (although TiF-2007 does not provide data for slow modes that are instead modelled in ASTRA). Therefore the comparison between reference data and ASTRA results required some aggregation of either model outcomes or statistics. The correspondence between modes is reported in Table 3-1.

Table 3-1: Mode correspondence for calibration of the ASTRA transport module

ASTRA Mode	TiF-2007 mode	TRANS-TOOLS mode
Passenger mode		
Car	Cars	Road
	Powered Two-wheelers	
Bus	Bus and coach	
Train	Railways	Rail
	Tram and metro	
Air	Air	Air
Slow	n.a.	n.a.
Freight mode		
Road	Road	Road
Rail	Inland waterways	Inland waterways
	Rail	Rail
Maritime	n.a.	Ship

Source: iTREN-2030



The re-calibration of transport performances for passenger and freight has been achieved through the revision of two parts of the module:

- the distribution among distance band, in particular the trend to increase the distance travelled per person,
- the mode split for each distance band.

The first process has been revised for modifying both the absolute value of the indicators at 2005 and their trend until 2030, while the re-calibration of the second aspect has been implemented mainly with the purpose of reproducing data in line with the observed performance at 2005.

In particular, the distribution among distance band has been revised in terms of influence of the trend in transport cost on the increase of distance travelled. In fact, it is assumed that during the time a larger share of demand is expected to increase the distance travelled: part of this process is driven by the trend of transport cost, part of it depends more on social aspects and relocation. The latter is obviously a country-related aspect, which justifies the calibration of specific function for explaining this process.

The mode split process for each distance band is described in ASTRA by logit structure. Then, for re-calibrating the modal distribution, the modal constants have been updated according to the observed data, in order to better reflect into the mathematical function all the aspects influencing mode choice not related to cost or duration of the trip.

Those changes have been applied only where requested, when the absolute value at 2005 was not in line with the data from TiF-2007 or the trend had a different shape with respect to TTV2 forecasts.

In addition, for air passenger mode two more revisions have been implemented in order to drive the development of average air transport generalized cost for better reproducing the trend of performance with this mode:

- a revision of the share of low cost air trips,
- a recalibration of the improvement in terms of time saving as a result of better organization of the airports.

### **3.1.2 Recalibration of transport energy demand in ASTRA**

In the comparison of transport energy demand projections it was identified that POLES and TREMOVE reveal a congruent development with a continuous and slight increase of energy consumption. However, ASTRA projected a decline of transport energy demand after 2010 followed by a stabilisation around 2025. The reason was that the efficiency improvement between Euro 4 and Euro 5 road vehicles seemed to be too ambitious, i.e. rather reflecting a strong climate policy scenario than a Reference Scenario without significant policy after 2008.

Therefore the ASTRA model was adapted to be in line with the slight energy demand growth rates of POLES and TREMOVE. For this purpose the efficiency improvement between Euro 4 and Euro 5 was cut to roughly one third of the original ASTRA values. Euro 6 and Euro 7 fuel consumption factors were adapted accordingly in ASTRA.

## **3.2 Re-calibration of the POLES model**

The POLES model has been re-calibrated by the input of the other iTREN-2030 models in three aspects:

- GDP, which is based on GDP estimate delivered by the ASTRA Model.
- the transport vehicle fleet, which has been determined by ASTRA and TREMOVE models.
- Transport demand, which is based on TRANS-TOOLS baseline transport demand.

In iTREN-2030 the GDP projections stem from ASTRA and replace the GDP projections of POLES. However, it has to be mentioned that ASTRA considers GDP in real terms while POLES applies the power purchase parity principle. To overcome the discrepancy POLES takes only the yearly growth rates of ASTRA into account and applies it to the GDP values of the base year in POLES. The new GDP development of iTREN-2030 in POLES is slightly lower than the previous one of POLES.

POLES determines a vehicle fleet only for road transport. Fuel Prices, car prices and technological trends have an impact on the vehicle choice. The purchased cars are added to the stock of vehicle, depreciation and scrapping of vehicles is considered with a scrapping function. In iTREN-2030 POLES meets the vehicle fleet projection of ASTRA/TREMOVE. The high number of categories of the vehicle fleet from ASTRA/TREMOVE has been shrunk to a subset of vehicles types including diesel, gasoline, electric, hybrid, gas, hydrogen and biofuel cars.

The transport model in POLES is more detailed for passenger transport than for other modes. Road freight, rail freight, rail passenger and air transport are determined in a simplified manner and, therefore, a vehicle stock is not considered for these modes.

The transport demand has been calibrated according the TRANS-TOOLS baseline (section 5.5). The values for freight transport and also for road passenger transport are now much higher, while the values for rail passenger and air transport are lower due to the new calibration. This affects of course the final energy demand which reaches now higher levels especially for road transport.

Besides, these re-calibration on GDP, the vehicle stock and the transport demand minor updates have been undertaken for the fuel prices and energy consumption factors. The fuel prices are aligned with empirical data on fuel prices published by IEA and the energy consumption factors have been re-calibrated according to trends which have been observed in the past.

### **3.3 Re-calibration of the TREMOVE model**

TREMOVE Model undergoes main re-calibration on three aspects:

- Transport demand, which is based on TRANS-TOOLS baseline transport demand.
- GDP, which is based on GDP estimate delivered by ASTRA Model.
- Fuel prices (with all of their components), which is based on fuel prices estimates delivered by POLES Energy Model.

TRANS-TOOLS transport demand has replaced the previous transport reference input produced by the SCENES model (ASSESS Project). A more detailed explanation on this transport demand re-calibration is given in the section 4.

GDP per capita provided by the ASTRA Model and fuel prices estimated by POLES Energy Model have replaced respectively the GDP values and fuel prices in the initial TREMOVE model. These replacements allowed to update the assumptions and, above all, to improve the consistency between models

In addition to these three main updates also some further minor re-calibration work has been carried out on TREMOVE model concerning several variables and parameters like population, air transport distance classes, travel speed of road and non-road modes. All the new values have been derived from TRANS-TOOLS and have replaced in TREMOVE the corresponding values originally taken from the SCENES Model (ASSESS Project).

### 3.4 Comparison of transport costs across models

Transport costs are among the most relevant variables in transport modelling tools. Since iTREN-2030 models have been developed independently and for specific objectives, cost parameters are different and are used in different ways (e.g. with a diverse level of detail, with diverse type of functions, etc.). For that reason, a full harmonisation across models is impossible to achieve. Nonetheless, it is advisable that models used in an integrated fashion use at least comparable assumptions concerning cost.

In this paragraph, a comparison between the base year transport costs implemented in the iTREN-2030 modelling tools ASTRA, TRANS-TOOLS and TREMOVE is presented. Given the differences now mentioned, the comparison between the model makes sense only at an aggregate level. Therefore, in the following demand segments are analysed separately only if significant cost differences between segments exist for at least one model and segments are comparable between at least two models. Otherwise average values or ranges of values are used. In any case, average values are considered when costs depend on country.

The sources used for the analysis are the following:

- For ASTRA information come directly from the model;
- For TRANS-TOOLS passenger model, average costs data has been extracted directly from the model.
- For TRANS-TOOLS freight model costs have been drawn from the NEA technical note “Description of the cost and time functions for the TRANS TOOLS freight modal-split model.doc”. This note makes reference to the version of TRANS-TOOLS, used in the TEN-Connect project whereby the results of the same model runs were used in iTREN-2030.
- for TREMOVE the costs have been extracted from the database available in <http://www.tremove.org/documentation/index.htm> - v2.7 basecase pivots.

Data reported in the Annex 1 of the final report of the COMPETE project<sup>6</sup> has been also used for further comparisons.

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<sup>6</sup> Maibach et. al. (2006).

### 3.4.1 Passenger car

TRANS-TOOLS uses directly perceived cost, which is essentially fuel cost, estimated according to fuels price (gasoline and diesel), average consumption and fleet composition. Occupancy rates per trip purpose are used to derive the cost per passenger-km. Tolls are taken into account at the link level.

In the ASTRA model two car costs are used: total cost per vehicle-km is calculated as sum of investment costs, maintenance costs, fuel costs and tolls while perceived costs per passenger-km are calculated as fuel costs plus toll costs divided by the average occupancy rates (which is different by trip purpose).

TREMOVE uses vehicle cost components that can be compared to those defined in ASTRA.

Table 3.2 reports the comparison of car costs for the three models.

Table 3-2: Comparison of car costs

Item	ASTRA	TRANS-TOOLS	TREMOVE
Investment costs	0.35	n.a	0.14
Maintenance costs	0.05	n.a	0.19
Fuel costs	0.06	0.06-0.11	0.09
<i>Total costs (€/vkm)</i>	<i>0.46</i>	<i>n.a.</i>	<i>0.42</i>
<i>Perceived costs (€/pkm)</i>	<i>0.030-0.070</i>	<i>0.023-0.075</i>	<i>0.040-0.080</i>

Source: iTREN-2030

Total costs in ASTRA and TREMOVE are very similar and also perceived costs are largely comparable across all models. Tolls are not accounted in the table for TRANS-TOOLS, but this component, that affects only part of demand, should not change significantly the comparison.

The operating costs of road transport according to COMPETE are of 0.42 euro/vehicle-km. They include seven cost components: costs for wear and tear, capital costs, personnel costs, fuel (energy) costs, insurance costs, taxes and charges, additional costs (overhead, etc.). The COMPETE estimation is therefore perfectly comparable with ASTRA and TREMOVE costs.

In the end, the three models use very comparable cost for passenger car transport.

### 3.4.2 Bus

Bus is modelled in ASTRA and TREMOVE only. In ASTRA the bus cost is the result of production cost minus subsidies and of an average vehicle occupancy; a specific parameter is used to reconcile the estimation with observed tariffs<sup>7</sup>. In TREMOVE average tariffs are considered. The table below reports the average values distinguished between urban and non urban services.

Table 3-3: Comparison of bus costs

Item	ASTRA	TRANS-TOOLS	TREMOVE
Urban (€/pkm)	0.160	n.a.	0.050
Non urban (€/pkm)	0.130	n.a.	0.090

Source: iTREN-2030

The table shows that ASTRA costs are larger especially for urban trips. Furthermore, while in ASTRA urban bus is the most expensive, in TREMOVE the urban trips are cheaper than non urban.

It is difficult to identify the reason for the differences. Most likely they depend on the different assumptions used as well as on the sources available. Bus user costs are actually quite differentiated and depend on several elements that can be properly considered only at a detailed level (e.g. subsidies, season tickets, etc.). At the very aggregated level of the models differences are likely to arise. So it is difficult to indicated which estimations is most reliable.

The COMPETE estimation of cost for bus and coach can be compared with the estimations of ASTRA and TREMOVE for urban and non-urban busses. COMPETE estimates the following values: 0.11 euro/pkm for urban bus and 0.09 euro/pkm for non-urban bus (coach). So, as in ASTRA, costs for urban bus are higher than for non-urban but the absolute value of the former is closer to the TREMOVE estimate.

In the end, bus costs are different between ASTRA and TREMOVE but not to a large extent.

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<sup>7</sup> See more details in the TRIAS project note “NT10-TRT splitting transport costs-v2.doc” available in the repository

### 3.4.3 Passenger train

Passenger train costs are computed in ASTRA in the same way as bus costs, i.e. from production costs minus subsidies with a specific parameter used to make the estimation comparable to observed tariffs.

The original version of TRANS-TOOLS used a very detailed set of polynomial cost functions where trip distances is the main independent variable. It is not known whether these functions have been retained in the model version delivered by TEN-Connect (TTv2). Furthermore, since transport cost per Origin-Destination pair is not available within model outputs, costs per km cannot be estimated 'ex-post'. Therefore, for the comparison below the original costs of TRANS-TOOLS are considered.

In TREMOVE average tariffs are considered.

The table below reports the average values distinguished between business and non business demand.

Table 3-4: Comparison of passenger train costs [€/pkm]

Item	ASTRA	TRANS-TOOLS*	TREMOVE
<i>Business</i>	0.09	0.12	0.110
<i>Non-Business</i>	0.09	0.08	0.189

\* Cost of TRANS-TOOLS version 1. Costs of TRANS-TOOLS version 2 are not available

Source: iTREN-2030

The differences between the three models for passenger trains costs are very limited even if the sources and the methodologies applied are quite diverse. Of course, if the comparison is extended to specific demand segments or countries or zone type, larger difference could emerge, but the consistency of the models for passenger rail costs seems very good.

### 3.4.4 Passenger air

Air costs in ASTRA are basically averages of observed sample tariffs, but with a separate dynamic of the fuel cost component. Different values are used for business and non business trips.

TRANS-TOOLS has specific air tariffs coded on each airport-to-airport link.

In TREMOVE average tariffs are considered.

The table below reports the average values distinguished between business and non business demand.

Table 3-5: Comparison of air passenger costs [€/pkm]

Item	ASTRA	TRANS-TOOLS	TREMOVE
<i>Business</i>	0.260	0.287	0.139
<i>Non-business</i>	0.140	0.132	0.097

Source: iTREN-2030

Average costs compare very well between ASTRA and TRANS-TOOLS whereas TREMOVE shows lower air user costs especially for business trips. In the real world air fares are highly differentiated and so the definition of an average value is quite a demanding task. Many assumptions are required and just the choice of a different observed sample of tariffs can lead to different conclusions. The low-cost services have introduced a further difficulty as they can offer very cheap fares but these are generally limited while a model should be representative of the whole demand (segment). In brief, the differences between TREMOVE and the other two models are probably due to the inputs and hypotheses used and it is difficult to identify the most reliable one.

### 3.4.5 Trucks

In the ASTRA model truck cost per vehicle-km is calculated as sum of investment costs, maintenance costs, driving costs, fuel costs and tolls. Costs per ton-km are calculated by means of an average load factor (which is different by freight type).

TRANS-TOOLS considers two separate cost components. One concerns transport costs and include some fixed costs, some distance-dependent cost and some time-dependent costs. The second component account for loading and unloading costs, which depend on the time needed for these operations. Cost per ton-km is computed according to average load factors.

TREMOVE uses vehicle cost components that can be compared to those defined in ASTRA with the exception of driving costs. Cost per ton-km is not available

The table below reports the comparison for vehicle cost components (where available and comparable<sup>8</sup>) and for the cost per ton-km.

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<sup>8</sup> TRANS-TOOLS distinguishes between fixed and variable costs rather than between investments, maintenance and labour so a direct comparison for these items is not available.



Table 3-6: Comparison of truck costs

Item	ASTRA	TRANS-TOOLS	TREMOVE
Investment costs	0.279	n.a	0.06-0.17
Maintenance costs	0.142	n.a	0.08-0.23
Labour costs	0.385	n.a	n.a.
Fuel costs	0.157	0.19-0.2	0.09-0.30
<i>Total vehicle costs (€/vkm)</i>	<i>0.963</i>	<i>0.84-0.93</i>	<i>0.22-0.70</i>
<i>Total freight costs (€/tkm)</i>	<i>0.11-0.12</i>	<i>0.053-0.090</i>	<i>n.a.</i>

Source: iTREN-2030

The table shows that the total vehicle cost is very similar in ASTRA and TRANS-TOOLS. In TREMOVE values are lower but they do not include labour costs, this item may explain the difference given its size.

It should be considered that in TRANS-TOOLS an additional fixed cost per tons (around 7€/ton) is applied due to loading/unloading and waiting time. Impact on cost per tkm is therefore different for each O/D pair depending on the total distance. For short trips the truck cost in TRANS-TOOLS may therefore be quite higher than in the other models.

When costs per ton-km are considered, the difference between ASTRA and TRANS-TOOLS becomes larger. The main reason seems to be the load factors applied in the two models. In TRANS-TOOLS average load depends on: carrying capacity, share of capacity used, number of loaded trips. These elements are different according to commodity type, but on average the load factor is about 10 tonnes/vehicle. In ASTRA factors are significantly lower: 11 tons/vehicle is the very maximum, but most of the flows use lower factors.

In COMPETE a value of 0.14 Euros/tkm is estimated for heavy duty vehicles, thus more similar to ASTRA costs.

In the end, costs per vehicle-km, which are the most widely used in the models, are very comparable across the three tools. Costs per tonne-km are different due to another parameter.

### 3.4.6 Freight train

In the ASTRA model, freight cost per ton-km is calculated starting from production costs (including the usage of infrastructures).

As for truck, TRANS-TOOLS considers transport costs plus loading and unloading costs. For rail the later components play a larger role than for truck, so the cost is very dependent on the distance. Cost per ton-km is computed according to average load factors.

TREMOVE uses average tariffs.

The table below reports the average values distinguished in three distance bands based on the classification used in ASTRA. The loading/unloading costs in TRANS-TOOLS per tons have been translated into average cost per tons-km using the following average distances: 100 km, 600 km and 1,000 km.

Table 3-7: Comparison of freight train costs

Item	ASTRA	TRANS-TOOLS	TREMOVE
<150 km (€/tkm)	0.19-0.22	0.045-1.30	0.10
150-700 km (€/tkm)	0.08-0.10	0.025-0.27	0.10
>700 km (€/tkm)	0.07-0.09	0.020-0.19	0.10

Source: iTREN-2030

The range of costs for TRANS-TOOLS is quite wide because loading/unloading times as well as average load factors are much variable across demand segments. At the same time, TREMOVE cost is not distance-dependent and therefore only one average value can be used. The comparison is therefore problematic, notwithstanding, costs look reasonably similar in the three models, especially if the distance bands over 150 km (which are the most significant in the real world) are considered.

COMPETE reports an average cost for freight train for all Europe without distance segmentation. This value is 0.11 Euros/tkm, which is in line with the average value in TREMOVE and support the conclusion that the three tools are reasonably in line.

### 3.4.7 Inland navigation

Inland navigation is modelled in TRANS-TOOLS and TREMOVE.

The cost function in TRANS-TOOLS has the same form already described for trucks and freight train. For TREMOVE an average fare is used.

The table below reports the average cost values in the two models. Costs due to loading/unloading and waiting time have been computed for three arbitrary average distances: 50, 200 and 500 km.

Table 3-8: Comparison of inland navigation costs

Item	ASTRA	TRANS-TOOLS	TREMOVE
Av. Dist. 50 km (€/tkm)	<i>n.a.</i>	0.050-0.150	0.070
Av. Dist. 200 km (€/tkm)	<i>n.a.</i>	0.020-0.060	0.070
Av. Dist. 500 km (€/tkm)	<i>n.a.</i>	0.015-0.030	0.070

Source: iTREN-2030

TRANS-TOOLS costs are similar to the TREMOVE costs for shorter distances while for larger distances TRANS-TOOLS costs are lower, but given the difficulties of identifying average user costs for inland navigation, the comparison looks not bad.

### 3.4.8 Maritime

Maritime freight transport is modelled in TRANS-TOOLS and ASTRA.

The cost function in TRANS-TOOLS has the same form already described for other freight modes. In ASTRA average rates estimated on an Italian study about international freight transport are used.

The table below reports the average values distinguished in three distance bands based on the classification used in ASTRA. The loading/unloading costs in TRANS-TOOLS per tons have been translated into average cost per tons-km using the following average distances: 600 km and 2,500 km.

Table 3-9: Comparison of maritime costs [€/tkm]

Item	ASTRA	TRANS-TOOLS	TREMOVE
<700 km	0.08-0.10	0.007-0.013	<i>n.a.</i>
>700 km	0.02-0.03	0.005-0.010	<i>n.a.</i>

Source: iTREN-2030

TRANS-TOOLS costs are about one tenth or less than ASTRA costs. The discrepancy is significant and it is hardly explainable. The most recent update of the Italian study<sup>9</sup>

<sup>9</sup> TRT, 2008, *Indagine campionaria sui trasporti internazionali riferita al triennio 2005-2007*, on behalf of Bank of Italy.

used as source for ASTRA, confirm the size of costs in the table. For instance, making reference to the European market and considering an average distance of 2000 km, rates are of about 0.01-0.15 Euros/ton for bulk, 0.02-0.03 Euro/ton for containers and 0.02-0.15 Euros/ton for general cargo. As well, the COMPETE project is more in line with the ASTRA costs, giving an average value for Europe of 0.08 Euros/tkm.

In the end, this is the only mode of transport for which cost parameters used in different models do not compare well.

## 4 The TRANS-TOOLS/TREMOVE interface

As explained in section 1, the integration between the different modelling tools used in iTREN-2030 has been often based on harmonisation of assumptions and trends. One relevant exception is the tighter linkage between TRANS-TOOLS and TREMOVE. Namely, the former has become the provider of the reference transport demand data required by the latter. This linkage had been started in the REFIT project, where it was not completed due to a shift of the objectives of the project requested by the Commission<sup>10</sup>. More precisely, two activities have been carried out in the WP4 of iTREN-2030:

- the interface initially developed in REFIT has been revised to take into account the modifications of TRANS-TOOLS occurred meanwhile (i.e. the development of a new version of the model in the TEN-Connect project) and,
- the TREMOVE model has been recalibrated using the new TRANS-TOOLS input to produce a new transport demand Reference Scenario.

These first of the two activities is documented below in this section while the recalibration of TREMOVE has been described in section 2.4.

The objective of the interface is to use the output of TRANS-TOOLS to produce the transport data needed for the TREMOVE model: *Q<sub>lownew</sub>* table (i.e. data in pkm/year or tkm/year) and *Q<sub>vlownew</sub>* table (i.e. data in vkm/year). Basically, the interface provide a translation of the transport demand data according to a different segmentation: sometimes the TRANS-TOOLS data needs to be aggregated to fit the TREMOVE structure, whereas sometimes a break-down into more detailed segments is needed. TRANS-TOOLS model does not provide transport demand data for all years up to 2030 as needed by TREMOVE. In this project, TRANS-TOOLS model is run only to deliver data for the years 2005, 2020, and 2030. An extrapolation work is needed to obtain the values of transport demand for all the years between 2005 and 2030. After the extrapolation, a linear regression is performed based on the values 2005-2030 previously obtained, to fill the transport demand values for the period of 1995 to 2005.

The interface consists of a number of Microsoft Access databases, each performing a part of the operations required. The need of several databases instead on just one comes from the huge amount of data to be processed. The transformation of data occurs by means of a sequence of queries. Macros are used to automate as much as possible the procedure.

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<sup>10</sup> See De Stasio et. al., 2008.

It should be noted that the linkage established between TRANS-TOOLS and TREMOVE has a general validity rather than being just an intermediate result for the iTREN-2030 project. In particular, the interface will allow to adapt the TREMOVE demand reference when TRANS-TOOLS produces a new transport baseline scenario, at least until the model is not deeply revised. As long as the TRANS-TOOLS model has the same structure (i.e. same zoning system, same trip purposes and modes, etc.) and use the same codes and criteria, the interface can be fed with the outcome of new runs to update the demand reference.

The dimensions that have to be addressed for the conversion of TRANS-TOOLS outputs into the TREMOVE inputs, are related to:

- countries and regions types;
- passenger trip purposes and commodity types;
- peak and off-peak values;
- passenger and freight transport modes;
- short and long-distance traffic;
- motorways and non-motorways roads.

Furthermore specific assumptions are needed to integrate TRANS-TOOLS demand data for local traffic using external sources of information. All these aspects are examined below.

## **4.1 Countries and regions types**

TRANS-TOOLS covers 42 countries while TREMOVE simulates 31 different countries: the EU27 plus Switzerland, Norway, Croatia and Turkey. All the 31 TREMOVE countries are included in the TRANS-TOOLS zoning system and therefore the correspondence is not problematic.

For each country, transport demand in TREMOVE is allocated to three region types:

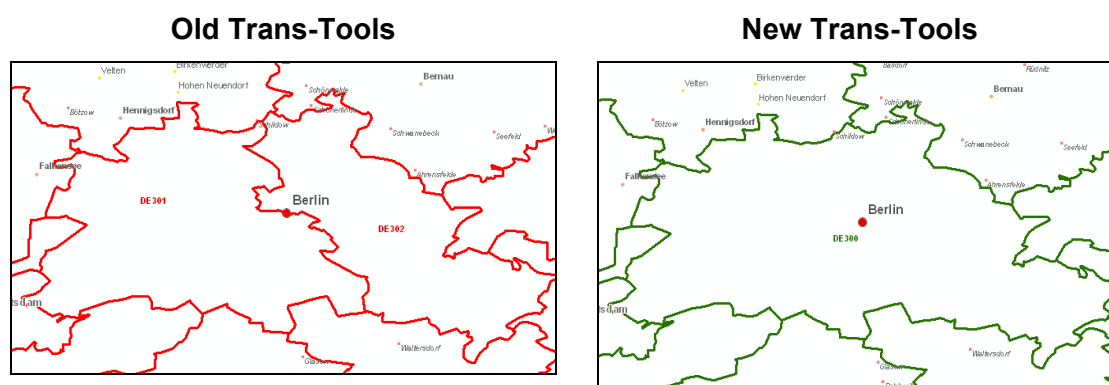
- metropolitan,
- other urban areas
- non-urban areas.

TRANS-TOOLS provides matrices according to NUTS3 regions (passengers) or NUTS2 regions (freight), then an aggregation into the three TREMOVE region types is

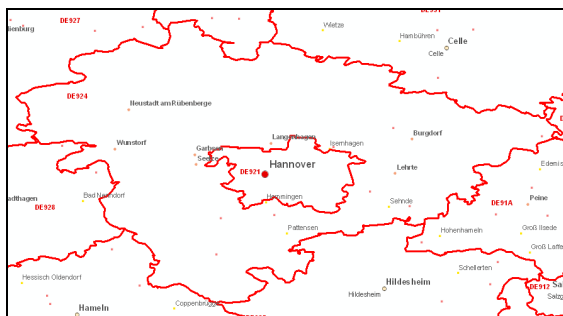
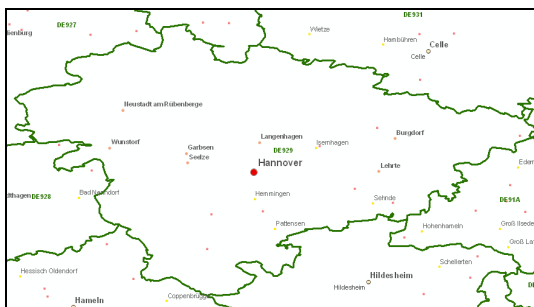
needed. For this purpose a correspondence between NUTS3 zones and TREMOVE region types has been defined. Each NUTS3 zone has been classified as metropolitan (one only region in each country, e.g. Paris in France or London in UK) or partly urban and partly non urban. The shares of urban and non-urban areas are based on demographic data.

The part of the interface dealing with this aggregation has been updated since the TRANS-TOOLS model version developed in TEN-Connect is base on a more detailed zoning system than the model version used in the REFIT project. Namely, the new zoning system (1441 zones) includes the division of some countries (i.e. Romania, Croatia and Bulgaria.) in more than one zone, but also the changes of the boundaries of some other country zones (i.e. zones of Poland, Germany and Latvia) as follows:

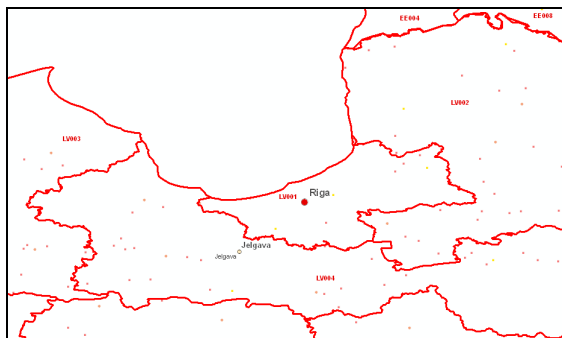
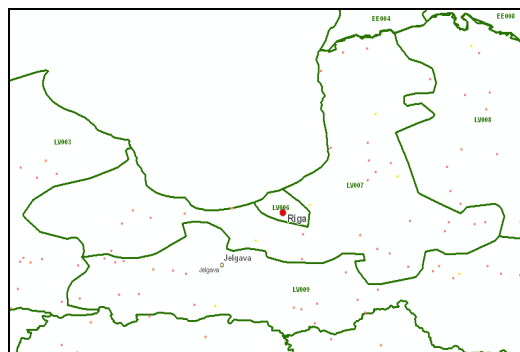
- German zones DE301 and DE302 (Berlin) have been grouped into one zone DE300 in the new TRANS-TOOLS zoning system.



- German zones DE921 and DE924 (Hannover) have been grouped into one zone DE929 in the new TRANS-TOOLS zoning system.

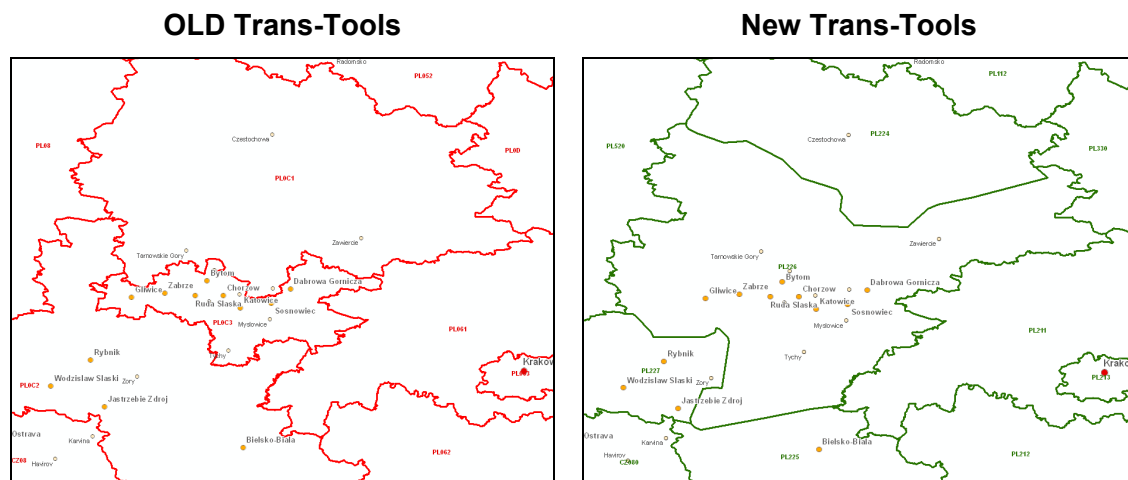
**Old Trans-Tools****New Trans-Tools**

- In the new zoning system the boundary of Pieriga Region (Latvia) has been heavily changed and has reshaped the old zones : LV001, LV004 and LV002.

**Old Trans-Tools****New Trans-Tools**

- In Poland the new zone PL226 (Centralny slaski) has reshaped the old zones PL0C1, PL0C2 and PL0C3.





For the new zones, the shares of Urban and Non-Urban demand has been computed using the same criteria already adopted for the initial version of the interface. A list of the cities with their population combined with a city location map have been used. Each zone was assigned an “urban population” equal to the sum of the populations of cities in the zone exceeding a certain number of inhabitants. The fraction of population in each zone living in these cities is then defines as:

$$p_{urban}[\mu_z] = \frac{\sum citypop}{total\ population\ of\ the\ NUTS\ zone}$$

According to the classification of the specific NUTS3 zone, this proportion of urban population has provided the share of either urban or metropolitan demand. The remaining share is that used for non-urban demand. The outcome of this procedure is reported in the table 4.1 below.

Table 4-1: Classification of new TRANS-TOOLS NUTS3 regions into TREMOVE region types

Country	NUTS3	Region	Metropolitan	Urban	Non-Urban
DE	DE300	Berlin	1	0	0
DE	DE929	Hannover	0	0.46	0.54
LV	LV003	Kurzeme	0	0.28	0.72
LV	LV005	Latgale	0	0.30	0.70
LV	LV007	Pieriga	0	0	1
LV	LV006	Riga	1	0	0
LV	LV008	Vidzeme	0	0	1
LV	LV009	Zemgale	0	0.23	0.77
PL	PL226	Centralny slaski	0	0.15	0.85
PL	PL227	Rybnicko-jastrzebski	0	0	1
PL	PL225	Bielsko-bialski	0	0	1
PL	PL224	Czestochowski	0	0	1
TR	TR05	Ankara	0.67	0.16	0.17
TR	TR06	Antalya	0.14	0.35	0.51
TR	TR04	Bursa	0.24	0.3	0.46
TR	TR02	Edirne	0	0.35	0.65
TR	TR10	Erzurum	0	0.32	0.68
TR	TR01	Istanbul	1	0	0
TR	TR03	Izmir	0.33	0.23	0.45
TR	TR08	Karabuk	0	0.32	0.68
TR	TR12	Kilis	0.43	0.23	0.34
TR	TR07	Kirsehir	0.27	0.17	0.55
TR	TR11	Malatya	0	0.3	0.7
TR	TR09	Ordu	0	0.17	0.83
RO	RO121	Alba	0	0	1
RO	RO421	Arad	0	0.40	0.60
RO	RO311	Arges	0	0.26	0.74
RO	RO211	Bacau	0	0.30	0.70
RO	RO111	Bihor	0	0.35	0.65
RO	RO112	Bistrita-Nasaud	0	0	1
RO	RO212	Botosani	0	0	1
RO	RO221	Braila	0	0.58	0.42

Country	NUTS3	Region	Metropolitan	Urban	Non-Urban
RO	RO122	Brasov	0	0.47	0.53
RO	RO321	Bucuresti	1	0	0
RO	RO222	Buzau	0	0.27	0.73
RO	RO312	Calarasi	0	0	1
RO	RO422	Caras-Severin	0	0.26	0.74
RO	RO113	Cluj	0	0.45	0.55
RO	RO223	Constanta	0	0.77	0.23
RO	RO123	Covasna	0	0	1
RO	RO313	Dambovita	0	0	1
RO	RO411	Dolj	0	0.42	0.58
RO	RO224	Galati	0	0.47	0.53
RO	RO314	Giurgiu	0	0	1
RO	RO412	Gorj	0	0	1
RO	RO124	Harghita	0	0	1
RO	RO423	Hunedoara	0	0.15	0.85
RO	RO315	Ialomita	0	0	1
RO	RO213	Iasi	0	0.39	0.61
RO	RO322	Ilfov	0	0	1
RO	RO114	Maramures	0	0.27	0.73
RO	RO413	Mehedinti	0	0.36	0.64
RO	RO125	Mures	0	0.25	0.75
RO	RO214	Neamt	0	0.19	0.81
RO	RO414	Olt	0	0	1
RO	RO316	Prahova	0	0.28	0.72
RO	RO116	Salaj	0	0	1
RO	RO115	Satu Mare	0	0.31	0.69
RO	RO126	Sibiu	0	0.37	0.63
RO	RO215	Suceava	0	0.15	0.85
RO	RO317	Teleorman	0	0	1
RO	RO424	Timis	0	0.47	0.53
RO	RO225	Tulcea	0	0	1
RO	RO415	Valcea	0	0	1
RO	RO216	Vaslui	0	0.15	0.85
RO	RO226	Vrancea	0	0	1

Country	NUTS3	Region	Metropolitan	Urban	Non-Urban
BG	BG341	Burgas	0	0.55	0.45
BG	BG312	Montana	0	0	1
BG	BG313	Vratsa	0	0	1
BG	BG314	Pleven	0	0.45	0.55
BG	BG315	Lovech	0	0	1
BG	BG321	Veliko Tarnovo	0	0	1
BG	BG322	Gabrovo	0	0	1
BG	BG323	Ruse	0	0.69	0.31
BG	BG324	Razgrad	0	0	1
BG	BG325	Silistra	0	0	1
BG	BG331	Varna	0	0.72	0.28
BG	BG332	Dobrich	0	0.46	0.54
BG	BG311	Vidin	0	0	1
BG	BG334	Targovishte	0	0	1
BG	BG425	Kardzhali	0	0	1
BG	BG342	Sliven	0	0.51	0.49
BG	BG343	Yambol	0	0.59	0.41
BG	BG344	Stara Zagora	0	0.67	0.33
BG	BG411	Sofia (stolitsa)	1	0	0
BG	BG412	Sofia	0	0	1
BG	BG413	Blagoevgrad	0	0	1
BG	BG414	Pernik	0	0.65	0.35
BG	BG415	Kyustendil	0	0	1
BG	BG421	Plovdiv	0	0.49	0.51
BG	BG422	Haskovo	0	0.36	0.64
BG	BG423	Pazardzhik	0	0.32	0.68
BG	BG424	Smolyan	0	0	1
BG	BG333	Shumen	0	0.52	0.48
HR	HR015	Bjelovarsko-bilogorska zupanija	0	0	1
HR	HR044	Brodsko-posavska zupanija	0	0	1
HR	HR037	Dubrovacko-neretvanska zupa-nija	0	0	1
HR	HR021	Grad Zagreb	1	0	0
HR	HR031	Istarska zupanija	0	0	1
HR	HR017	Karlovacka zupanija	0	0	1

Country	NUTS3	Region	Metropolitan	Urban	Non-Urban
HR	HR014	Koprivnicko-krizevacka zupanija	0	0	1
HR	HR011	Krapinsko-zagorska zupanija	0	0	1
HR	HR033	Licko-senjska zupanija	0	0	1
HR	HR013	Medjimurska zupanija	0	0	1
HR	HR042	Osjecko-baranjska zupanija	0	0.35	0.65
HR	HR045	Pozesko-slavonska zupanija	0	0	1
HR	HR032	Primorsko-goranska zupanija	0	0.50	0.50
HR	HR035	Sibensko-kninska zupanija	0	0	1
HR	HR016	Sisacko-moslavacka zupanija	0	0	1
HR	HR036	Splitsko-dalmatinska zupanija	0	0.47	0.53
HR	HR012	Varazdinska zupanija	0	0	1
HR	HR041	Viroviticko-podravska zupanija	0	0	1
HR	HR043	Vukovarsko-srijemska zupanija	0	0	1
HR	HR034	Zadarska zupanija	0	0	1
HR	HR022	Zagrebacka zupanija	0	0	1

Source: iTREN-2030

## 4.2 Trip purposes

The new version of TRANS-TOOLS (TTv2) uses 4 trip purposes for passenger transport, instead of the 3 purposes used previously. Namely, commuting demand has been separated from private demand. The four trip purposes are the following:

- business
- private
- holidays
- commuting

The interface, originally based on 3 trip purpose has been revised accordingly. TREMOVE has 3 trip purposes for passenger transport:

- Commuting trip
- Non-working trip
- Business trip.

Therefore the allocation of TRANS-TOOLS trip purposes into TREMOVE trip purposes is straightforward as follows:

Table 4-2: Correspondence between trans-Tools (TTv2) and TREMOVE passenger trip purposes

<b>Trans-ToolsV2</b>	<b>TREMOVE</b>
Business	Business
Private	Non-Working
Holidays	Non-Working
Commuting	Commuting

Source: iTREN-2030

### 4.3 Commodity types

The TRANS-TOOLS model uses a segmentation of freight flows based on the NSTR 1 chapters with crude oil separated from oil products. This has not been changed in TEN-Connect, therefore the original structure of the interface has been retained. The eleven TRANS-TOOLS flows are:

- Agricultural Products and Live Animals
- Foodstuffs and Animal Fodder
- Solid Mineral Fuels
- Crude oil
- Ores and Metal Waste
- Metal Products
- Crude and Manufactured Minerals, Building Materials
- Fertilizers
- Chemicals
- Machinery, Transport Equipment, Manufactured Articles And Miscellaneous Articles
- Petroleum Products

In TREMOVE there are three freight commodity types:

- bulk;

- general cargo;
- unitised freight.

As the three commodity types used in TREMOVE were derived from the freight flows used in the SCENES model and, in turn, such flows were defined using the NST/R groups, the correspondence is partially direct; however there are some TRANS-TOOLS flows that correspond to more than one TREMOVE commodity type: they are the flows 0, 1, 6, 8 and 9. The correspondence between TRANS-TOOLS and TREMOVE via NST/R 2 digits codes is reported in Table 4-3.

In order to split the TRANS-TOOLS flows between the relevant TREMOVE commodity groups, the composition of each NST/R chapter has been analysed using the more detailed EUROSTAT COMEXT trade data. Through this analysis, for each country, the shares to split the NST/R chapters have been computed. The CN 2-digit classification used in COMEXT is detailed enough to allow a reasonable split.

A different issue about the segmentation of freight demand is that the link based results of TRANS-TOOLS do not give the information concerning the commodity group type carried on the link. The link results are the reference TRANS-TOOLS output because they allow to split the data by zone and period of time. However, since they do not include the detail of the commodity group, the segmentation of link-based data by country into the commodity types has been carried out by applying the shares computed on O/D matrix data. Therefore, demand on the national territory of a given country has been split into different commodity types using the proportion of demand generated on that country. This discrepancy cannot be avoided.

Table 4-3 Partial correspondence between TREMOVE and Trans-Tools

TRANS-TOOLS segment	NSTR 2 digit	SCENES flow	TREMOVE commodity type
0	00	1	general cargo
	01	1	general cargo
	02	2	unitised
	03	3	unitised
	04	1	general cargo
	05	1	general cargo
	06	1	general cargo
	09	1	general cargo
1	11	2	unitised
	12	2	unitised
	131	2	unitised
	132	2	unitised
	133	2	unitised
	134	2	unitised
	135	2	unitised
	136	2	unitised
	139	2	unitised
	14	3	unitised
	16	2	unitised
	17	1	general cargo
	18	1	general cargo
2	21	4	bulk
	22	4	bulk
	23	4	bulk
3	31		bulk
4	41	4	bulk
	45	4	bulk
	46	4	bulk
5	51	6	general cargo
	52	6	general cargo
	53	6	general cargo
	54	6	general cargo
	55	6	general cargo



TRANS-TOOLS segment	NSTR 2 digit	SCENES flow	TREMOVE commodity type
	56	6	general cargo
6	61	8	bulk
	62	8	bulk
	63	8	bulk
	64	7	unitised
	65	8	bulk
	69	7	unitised
7	71	10	general cargo
	72	10	general cargo
8	81	9	bulk
	82	10	general cargo
	83	9	bulk
	84	10	general cargo
	89	10	general cargo
9	91	11	general cargo
	92	11	general cargo
	931	12	unitised
	939	11	general cargo
	94	13	unitised
	95	13	unitised
	96	13	unitised
	971	13	unitised
	972	13	unitised
	973	13	unitised
	974	13	unitised
	975	13	unitised
	976	13	unitised
	979	13	unitised
	99	13	unitised
10	32	5	bulk
	33	5	bulk
	34	5	bulk

Source: iTREN-2030

## 4.4 Transport modes

For passengers demand, the TRANS-TOOLS model covers the following transport modes:

- road
- rail
- air

The TREMOVE model is much more detailed in this respect, since it considers the following modes separately:

- slow
- moped/motorcycle
- car
- vans
- bus
- rail
- tram/metro
- Air

In theory, the new version of TRANS-TOOLS developed in TEN-Connect provides passenger demand on bus. However, the information is only available in terms of an O/D matrix that is not assigned to the network. Therefore, link-based results still reports road demand as a whole. Since it is impossible to distinguish private car, bus, van etc. from TRANS-TOOLS, road demand has been split into car, bus and moped/motorcycle, using the original shares in the TREMOVE baseline.

With the exception of air, others modes considered in TREMOVE do not have a equivalent in TRANS-TOOLS. So, for such modes, the TRANS-TOOLS output has been integrated using different sources. For vans demand the original TREMOVE data has been used for each country, region type, time period and trip purpose. For slow modes (pedestrian and bicycles) and tram/metro demand the integration is part of the addition of local traffic (see section 4.8).

For freight the TRANS-TOOLS model uses the following modes:

- Road freight
- Rail
- Inland navigation
- Maritime.

TREMOVE freight modes are the same, with the exception of maritime, which is not part of the TREMOVE demand module, so the correspondence with TRANS-TOOLS is more direct than for passengers. However, the TREMOVE model requires data for 5 different road freight vehicle types:

- Light Duty Trucks (LDT)
- Heavy Duty Trucks (HDT) <7.5 tonnes
- HDT 7.5-16 tonnes
- HDT 16-32 tonnes
- HDT >32 tonnes

Since TRANS-TOOLS does not provide any segmentation of road freight vehicles, the split of road freight demand has used the shares of the original TREMOVE baseline. Given the strategic level of TRANS-TOOLS, only freight traffic performed by vehicles above 3.5 tonnes is considered (also consistently with EUROSTAT statistics). Therefore, LDT traffic has been added exogenously using again the original TREMOVE baseline data.

## **4.5 Pass-km, Tonnes-km and Veh-km**

For road modes TRANS-TOOLS provides link flows in terms of vehicles. Since TREMOVE needs both vehicles-km and passengers-km or tonnes-km, a conversion between vehicle and passenger /tonnes is needed. This translation make use of occupancy factors (for passenger road vehicles) and load factors (for freight road vehicles). Passenger occupancy factors used in TRANS-TOOLS are reported in Table 4-4 below. For a correct interpretation of the table it is important to take into account that mode 'road' in TRANS-TOOLS does not represent only cars, but also buses and coaches.

Table 4-4 Average occupancy rates used in the TRANS-TOOLS model per trip purpose

Country	Occupancy rates per trip purpose		
	Home-Business Commute	Home-Private	Home-Holiday
Albania	1.45	2.29	2.48
Austria	1.22	1.55	1.69
Bosnia	1.45	2.29	2.48
Belgium	1.22	1.75	1.9
Bulgaria	1.31	2.06	2.23
Belarus	1.45	2.29	2.48
Switzerland	1.22	1.85	2.03
Czech Republic	1.45	2.29	2.48
Germany	1.22	1.55	1.69
Denmark	1.22	1.61	1.76
Estonia	1.45	2.29	2.48
Spain	1.29	2.03	2.48
Finland	1.22	1.8	1.97
France	1.22	1.82	2.23
Greece	1.22	1.74	1.89
Croatia	1.31	2.06	2.23
Hungary	1.31	2.06	2.23
Ireland	1.22	1.69	1.84
Italy	1.22	1.76	1.91
Liechtenstein	1.22	1.67	1.83
Lithuania	1.45	2.29	2.48
Luxembourg	1.22	1.55	1.69
Latvia	1.45	2.29	2.48
Moldavia	1.45	2.29	2.48
Macedonia	1.45	2.29	2.48
Netherlands	1.22	1.36	1.49
Norway	1.22	1.67	1.83
Poland	1.37	2.16	2.48
Portugal	1.22	1.63	1.77
Romania	1.45	2.29	2.48
Russia	1.45	2.29	2.48
Sweden	1.22	1.72	1.87
Slovenia	1.45	2.29	2.48
Slovak Republic	1.45	2.29	2.48
Turkey	1.22	1.74	1.89
Ukraine	1.45	2.29	2.48
United Kingdom	1.22	1.72	1.87
Serbia	1.45	2.29	2.48
Cyprus	1.45	2.29	2.48
Malta	1.45	2.29	2.48
Iceland	1.22	1.67	1.83
Montenegro	1.45	2.29	2.48

Source: TEN-Connect (2008)

As explained above, for road freight TREMOVE requires demand data split into five vehicle categories. What can be computed from TRANS-TOOLS results is the average load factor used for road freight. In fact the road freight matrix is available in terms of both vehicles and tonnes and therefore the average load factors can be readily computed as ratio of Tonnes/Vehicles. This value is of nearly 10 tonnes/vehicles.

In order to derive load factor for the five vehicle categories and to guarantee that road freight veh-km extracted from the TRANS-TOOLS network are translated into the amount of ton-km modelled in the TRANS-TOOLS matrix, two choices have been made:

- To keep unchanged the composition of the road freight traffic according to vehicle size extracted from TREMOVE;
- To start from the original TREMOVE load factors by vehicle size and change them until the average load factor estimated from the TRANS-TOOLS matrix is obtained.

The original load factor used in TREMOVE were derived from SCENES model are reported in Table 4-5.

Table 4-5 Load factors by vehicle size originally used in TREMOVE

Vehicle class	Load factor (tonnes/vehicle)
LDT	0.8
HDT <7.5 tonnes	1.1
HDT 7.5-16 tonnes	3.6
HDT 16-32 tonnes	6.4
HDT >32 tonnes	13.2

Source: iTREN-2030

Given the average load factor of 10 tonnes/vehicle and the composition of road freight demand, the resulting load factors by vehicle class are larger than the original TREMOVE ones. The estimated values are those shown in Table 4-6.

Table 4-6 Load factors by vehicle size originally used in TREMOVE

Vehicle class	Load factor (tonnes/vehicle)
LDT	0.8
HDT <7.5 tonnes	1.6
HDT 7.5-16 tonnes	4.1
HDT 16-32 tonnes	13.3
HDT >32 tonnes	16.8

Source: iTREN-2030

Some of the load factors, namely for HDT heavier than 16 tonnes look very high. However, to use lower values either a different composition of traffic should be assumed or the consistency with both TRANS-TOOLS tonnes-km and veh-km should be abandoned.

## 4.6 Short Distance and Long Distance for non urban trips

The TREMOVE model distinguishes between Short Distance Trips (<500 km) and Long Distance Trips (> 500 km) in non urban areas. TRANS-TOOLS provides the length of the trip for each O/D pair. So this matrix-based information was used to process the link-based data and extract for each country, mode and purpose/commodity type the share of Long Distance and Short Distance demand.

## 4.7 Motorways/ urban roads

TREMOVE requires that road traffic data is separated into three types of road:

- urban road: all roads in the metropolitan area and other urban areas;
- motorway: the tolled and non-tolled motorways (in non-urban areas);
- rural roads: the other roads (in non urban areas).

TRANS-TOOLS road network provides a classification for link types, therefore motorways and rural roads can be readily recognised and related traffic flows can be treated separately.

## 4.8 Integration of TRANS-TOOLS demand

As stated above, TRANS-TOOLS does not cover the whole transport demand considered in TREMOVE. We have mentioned that passenger vans, Light Duty Trucks and slow modes are not present in TRANS-TOOLS. Basically, what is missing in the latter model is short-distance and urban traffic. TRANS-TOOLS include demand within NUTS3 regions, however this is not equivalent to the whole local traffic needed by TREMOVE.

The TRANS-TOOLS data used to feed TREMOVE model is link-based results, since only the network statistics allow for a correct allocation of traffic flows to the territory of countries. Intra-NUTS3 trips are not assigned to the network however, so the link-based results miss that part of demand. Pre-loads are used on the road network links of TRANS-TOOLS but also this additional information is not sufficient, because a significant part of local traffic uses minor roads not included in the TRANS-TOOLS network or occurs in urban areas. Furthermore, non-road local demand is not accounted for in link pre-loads.

Therefore, in order to estimate correctly fuel consumption and emissions the interface provides an integration of TRANS-TOOLS demand data. As already defined in the previous version of the procedure developed in the REFIT project, the source for estimating the local demand is the ASTRA model. ASTRA generates all passenger demand and, even if it does not use a network and a detailed zoning system, demand is split in distance bands, so that local demand can be recognised. In order to estimate the local passenger traffic, the ASTRA traffic on the following distance bands:

- LC (< 3.2 km)
- VS (3.2 – 8 km)
- ST (40 km)

In ASTRA these distance bands only include demand for Business and Personal purposes (tourism is not contemplated), so the demand has been first translated into the TREMOVE trip purposes business, non-working and commuting and then added to each country. Since the ASTRA model does not have a detailed zoning system, the allocation of demand among the TREMOVE region types has been made according to a simple rule as follows:

- Demand in the LC distance band is allocated to the Metropolitan Region of TREMOVE
- Demand in the VS distance band is allocated to the Urban Region of TREMOVE

- Demand in the ST distance band is allocated to the Non-urban Region of TREMOVE (only short distance)

Rail demand for the distance bands VS and ST is also preliminarily split into train and metro/tram modes using the existing TREMOVE shares.

For freight demand it is assumed that the problem of the missing local traffic is largely overlapped to the issue of missing the traffic performed by vehicles below 3.5 tonnes discussed in section 4.4. Therefore, no further addition of local traffic from ASTRA has been carried out.

## 4.9 Peak/off-peak split

In the TREMOVE model, demand is split into a peak period and an off-peak period. For road demand, the assignment module of TRANS-TOOLS provides results for the following time periods:

- AM = morning rush hour on a normal weekday (2 hours)
- PM = afternoon rush hour on an average normal weekday (3 hours).
- OP = off-peak period (15 hours).

So TRANS-TOOLS road output is split in off-peak (OP) and peak (PK) by means of simple formulae:

$$\%PK: ([AM]+[PM])/([AM]+[PM]+[OP]) = 0.456$$

$$\%OP: ([OP])/([AM]+[PM]+[OP]) = 0.544$$

For the other modes, TRANS-TOOLS results concern an average day during the year. Therefore, in order to split demand into peak and off-peak period the same shares derived from the road mode have been used.

## 4.10 Yearly data for TREMOVE

TREMOVE requires demand data on a yearly basis for the period 1990-2030. Instead, each run of the TRANS-TOOLS model makes reference to a specific year. The base year of TRANS-TOOLS in the version developed in TEN-Connect is 2005, then the model can be run for future years. However, due to its complexity and running time, TRANS-TOOLS cannot be run for each future year, only few runs are feasible. Furthermore, the model cannot be executed for years before 2005.



To provide data to TREMOVE, three runs have been considered, for the years 2005, 2020 and 2030. The interface manages the transformations and integrations described in the previous paragraphs for each of these years. Results for the remaining years in the period 1990 – 2030 has been obtained by means of interpolation (and backward extrapolation for the years 1990 – 2005).

## 5 The iTREN-2030 Reference Scenario

The Reference Scenario of iTREN-2030 has two origins: (1) it is grounded in a storyline of the scenario, and (2) it is developed out of the inherent scenarios of the four applied models. In particular, the latter holds for transport demand that comes from the TTv2 version of TRANS-TOOLS.

The storyline of the Reference Scenario is one of overall stagnant population combined with ageing of the population i.e. with a strongly growing share of population being 65 years of age and older. Economic development still sees an increase of income expressed as moderately growing GDP, though the average growth rate is expected to be lower than in the past two decades. In the transport sector the opportunities of introducing and harmonising pricing and taxation are not taken by most Member States, preserving the scattered and unbalanced level of charges and taxes across countries and modes. The TEN-T networks are slowly implemented. Advanced regulation e.g. driven by ambitious climate policy or energy security issues is not implemented such that R&D and innovation efforts lack a stimulus by adequate regulation. Overall, the energy and transport framework can be described as “Frozen Policy in 2008”, i.e. only policies are becoming part of the Reference Scenario that have been decided by the EU Council or the EU parliament by mid of 2008.

This section is structured into four parts. It starts with the socio-economic boundary conditions (section 5.1). Then the policy assumptions (section 5.2) and other relevant assumptions (section 5.3) are explained. Finally, the results of the Reference Scenario are presented (section 5.5 and following sections).

### 5.1 Socio-economic boundary conditions

All iTREN-2030 models use some assumptions on fundamental socio-economic variables that are among the main determinants of transport demand, energy consumption, etc. Three main elements should be mentioned: population, GDP and fuel prices. These variables are sometimes exogenous (e.g. GDP growth rate in TREMOVE) and sometimes endogenous (e.g. GDP growth rate in ASTRA or fuel prices in POLES). Furthermore, sometimes variables are used directly in the models whereas sometimes they are not used as such; for instance oil price is not an input for ASTRA, TREMOVE and TRANS-TOOLS, which use fuel prices instead. Of course, fuel prices depend on oil price and this is modelled in POLES. The assumptions concerning population, GDP, and oil price trend used in the iTREN-2030 Reference Scenario are described below.

Population projections are based on Eurostat and UN population projections to 2050. Population is essentially projected to be stagnant in the EU up to 2030, with only a very

small net growth in population (Table 5-1 below). While low birth rates in the EU15 may be compensated by immigration, part of this immigration may come from the EU12 countries. This, together with a decreasing birth rate with rapidly increasing prosperity is projected to lead to a decline of -6% in population in the EU12 until 2030.

Table 5-1: Population projections by country [millions inhabitants]

Country	2006	2010	2020	2030	Growth 2010 to 2030 [%]	Aver. annual growth 2010- 2030 [%]
Austria	8.2	8.3	8.4	8.5	2.7	0.1
Belgium+Luxemburg	10.9	11.0	11.3	11.5	4.7	0.2
Denmark	5.4	5.5	5.5	5.5	1.1	0.1
Spain	43.4	44.4	45.7	45.5	2.5	0.1
Finland	5.2	5.3	5.4	5.4	3.0	0.1
France	60.7	61.5	63.4	65.0	5.6	0.3
United Kingdom	60.2	61.0	62.8	64.2	5.2	0.3
Germany	82.6	82.7	82.4	81.1	-1.9	-0.1
Greece	11.1	11.2	11.4	11.3	0.9	0.0
Ireland	4.1	4.3	4.8	5.1	17.0	0.8
Italy	58.2	58.5	58.4	57.1	-2.3	-0.1
Netherlands	16.4	16.7	17.2	17.5	4.7	0.2
Portugal	10.6	10.7	10.8	10.7	0.2	0.0
Sweden	9.0	9.2	9.6	9.9	8.1	0.4
Bulgaria	7.6	7.4	6.8	6.2	-16.0	-0.9
Switzerland	7.4	7.5	7.5	7.3	-2.4	-0.1
Cyprus	0.7	0.8	0.9	0.9	17.6	0.8
Czech Republic	10.1	10.1	10.0	9.7	-4.1	-0.2
Estonia	1.3	1.3	1.3	1.2	-8.4	-0.4
Hungary	10.1	10.0	9.7	9.5	-4.9	-0.3
Latvia	2.3	2.2	2.1	2.0	-9.1	-0.5
Lithuania	3.4	3.3	3.2	3.1	-7.6	-0.4
Malta	0.4	0.4	0.5	0.5	13.3	0.6
Norway	4.6	4.7	4.8	4.9	4.8	0.2
Poland	38.2	37.9	37.2	36.4	-3.9	-0.2
Romania	21.8	21.4	20.4	19.3	-9.7	-0.5
Slovenia	2.0	2.0	2.0	2.0	-0.6	0.0
Slovakia	5.4	5.3	5.3	5.2	-3.3	-0.2
EU15	386	390	397	398	2.1	0.1
EU12	103	102	99	96	-6.1	-0.3
EU27	490	492	496	494	0.4	0.0

Source: iTREN-2030 – ASTRA model

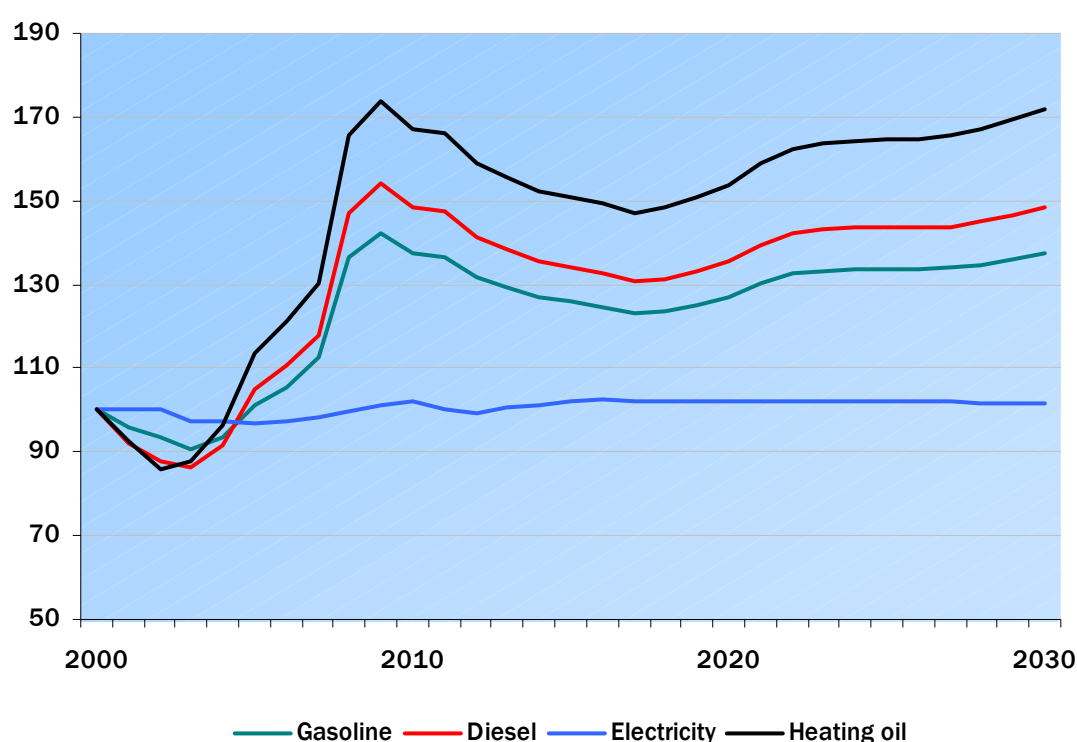
Table 5-2 below shows the development of GDP on country level and for the EU27, EU15 and EU12. Overall GDP growth in Western Europe is based on historical long run growth rates of around 1.5% per year, which is the main determinant of the overall EU rate. The EU12 countries are expected to successfully enter into an economic catch-up process, which implies that their growth rates are higher than the rates of Western Europe and reach an average annual growth rate of about +3% until 2030. In total the GDP in EU27 increases by about 38% between 2010 and 2030.

Table 5-2: Projected GDP growth by country [billion €<sub>2005</sub>]

Country	2006	2010	2020	2030	Growth 2010 to 2030 [%]	Aver. annual growth 2010- 2030 [%]
Austria	272	289	340	386	33.3	1.4
Belgium+Luxemburg	343	359	392	426	18.7	0.9
Denmark	192	215	265	316	46.9	1.9
Spain	735	784	921	1,060	35.2	1.5
Finland	186	201	259	343	70.9	2.7
France	1,816	1,915	2,241	2,681	40.0	1.7
United Kingdom	1,395	1,497	1,816	2,173	45.1	1.9
Germany	2,839	3,034	3,581	4,017	32.4	1.4
Greece	156	161	166	183	14.3	0.7
Ireland	100	112	132	150	34.5	1.5
Italy	1,254	1,303	1,462	1,612	23.7	1.1
Netherlands	507	541	645	761	40.6	1.7
Portugal	145	160	201	245	53.0	2.1
Sweden	319	338	397	470	38.8	1.7
Bulgaria	16	17	21	25	51.3	2.1
Switzerland	352	380	459	527	38.8	1.7
Cyprus	12	12	14	15	22.0	1.0
Czech Republic	68	72	89	110	53.2	2.2
Estonia	6	6	8	9	49.0	2.0
Hungary	58	64	81	98	51.9	2.1
Latvia	9	10	12	15	57.0	2.3
Lithuania	13	14	19	25	76.4	2.9
Malta	5	5	7	9	86.0	3.2
Norway	196	221	290	356	61.2	2.4
Poland	196	230	344	477	107.3	3.7
Romania	35	37	48	60	60.8	2.4
Slovenia	32	36	47	58	63.6	2.5
Slovakia	25	28	37	47	70.4	2.7
EU15	10,260	10,909	12,819	14,823	35.9	1.5
EU12	474	531	725	949	78.8	2.9
EU27	10,733	11,441	13,545	15,773	37.9	1.6

Source: iTREN-2030 – ASTRA model

As a consequence of oil price trend (see sections 5.3.3 and 5.7), in the Reference Scenario fuel prices are expected to develop as shown in Figure 5-1 (where the relative development of prices including taxes, as the unweighted average price index over the EU 27 countries is reported). Oil based fuels increased strongly between 1990 and 2007/2008, where they reached a peak. Current prices have fallen sharply because of the recession in 2008/2009, but world demand for oil-based fuels is expected to continue to grow in the medium term, such that prices can be expected to at least regain the levels of 2007/2008. This is shown in the assumed prices in 2020 and 2030 as being at a similar level to 2010.



Source: iTREN-2030 – POLES model

Figure 5-1: Fuel prices trend in Reference Scenario

## 5.2 Policy assumptions

The Reference Scenario can be briefly characterised as follows: in terms of pricing and taxation the scattered and unbalanced level of charges and taxes across countries and modes is maintained, the opportunities for harmonisation provided by the several EC directives is not taken by most member states. The TEN-T networks are slowly imple-

mented following TEN-Connect project framework. No acceleration of implementation is expected. Climate gas emissions trading is not extended to transport sectors and for others remains at the level of emission caps of the Kyoto Protocol. The regulation in road emission standards is not transferred to other modes, in particular to rail and air. Although the development of LPG and CNG vehicles and fuel supply will increase, new vehicle concepts will not largely enter the market.

Table 5-3 below summarises the policy measures included in the Reference Scenario. In the next sections the policies taken into account within the iTREN-2030 scenarios are presented in more details.

Table 5-3: Policies measures considered in the iTREN-2030 Reference Scenario

	Road	Rail	Aviation	Shipping
<b>Transport pricing and taxation</b>	Distance-based motorway charges for HGVs	-	-	-
<b>Transport Investment</b>	TEN network as implemented in TEN-Connect project			
<b>Energy</b>	CO2 emission targets agreed by Kyoto Protocol and implemented in national allocation plans (NAP I + II). Existing national regulations e.g. phasing-out of nuclear energy for some countries and quotas for renewables incl. biofuels. Share of renewable energy in the electricity production. Energy Efficiency improvements, reduction of final energy consumption e.g. in buildings.			
<b>Environment, Fleet</b>	Voluntary CO2 reduction target for cars LPG / CNG / E85 adaptation and infrastructure Euro-V for HGVs / Euro-IV for cars	Emission standards for diesel trains (UIC Stage IIIA)	ICAO Chapters 3 (emissions) and 4 (noise)	-

Source: iTREN-2030

### 5.2.1 Transport policies

Two transport policy measures are implemented in the Reference Scenario:

- Road user charges for trucks
- TEN network as decided until 2008

Road charging for trucks is assumed on the whole interurban European network (i.e. not only on the motorway network) starting from the year 2020. The rationale for this measure is the revised Eurovignette directive<sup>11</sup>, recommending the adoption of road charges for duty vehicles on interurban roads. More specifically, the quantification of this measure is inspired by the Greening Transport Package proposal (July 2008)<sup>12</sup> where charges are sized according to marginal costs for air pollution (as far as particulate matters and ozone precursors are concerned), noise and congestion (the latter cost item should be applied only on congested links). Marginal costs are supposed to change according to elements like the type of vehicle, the type of road, etc. However, given the scale of iTREN-2030, average (or maximum) values recommended in the Greening Package have been considered to estimate country-based values. Table 5-4 summarises the values estimated<sup>13</sup>.

The second policy measure assumed in the iTREN-2030 Reference Scenario is the development of the TEN network according to the plans decided until 2008 for all modes. More precisely, in modelling terms this means assuming the networks implemented in the TEN-Connect project. It should be considered that since the TRANS-TOOLS results are directly taken from TEN-Connect, the use of the version of the future network defined in such a project is implicit.

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<sup>11</sup> Directive 2006/38/EC

<sup>12</sup> Proposal for a Directive of the European Parliament and of the Council, amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures. COM(2008) 436/3.

<sup>13</sup> Details on the assumptions and the data used for the estimation of truck charges are provided in Schade/Fiorello/Herbruggen et. al. (2008)

Table 5-4: Truck road charges for the iTREN-2030 Reference Scenario (€ct /veh-km)

Country	Pollution	Noise	Congestion	Total
AT	3.6	0.13	4.5	8.2
BE	3.1	0.13	4.5	7.8
BG	5.9	0.13	4.5	10.6
CY	4.7	0.13	4.5	9.4
CZ	4.5	0.13	4.5	9.1
DE	3.4	0.13	4.5	8.1
DK	2.5	0.13	4.5	7.1
EE	4.7	0.13	4.5	9.4
EL	4.3	0.13	4.5	8.9
ES	3.7	0.13	4.5	8.3
FI	3.4	0.13	4.5	8.1
FR	3.3	0.13	4.5	8.0
HU	5.2	0.13	4.5	9.9
IE	4.1	0.13	4.5	8.8
IT	3.4	0.13	4.5	8.0
LT	4.7	0.13	4.5	9.4
LU	2.8	0.13	4.5	7.4
LV	4.9	0.13	4.5	9.5
MT	4.7	0.13	4.5	9.3
NL	2.0	0.13	4.5	6.6
PL	5.1	0.13	4.5	9.7
PT	4.5	0.13	4.5	9.1
RO	5.9	0.13	4.5	10.6
SE	3.2	0.13	4.5	7.9
SI	4.8	0.13	4.5	9.4
SK	4.0	0.13	4.5	8.6
UK	2.7	0.13	4.5	7.4

Source: TRT elaboration on EC Greening Transport Package, TREMOVE and ASSESS data



### 5.2.2 Energy policies

The energy policies implemented in the iTREN-2030 Reference Scenario are the following:

- CO<sub>2</sub> emission targets agreed by Kyoto Protocol and implemented in national allocation plans (NAP I + II).
- Existing national regulations e.g. phasing-out of nuclear energy in some countries and quotas for renewables incl. biofuels.
- Share of renewable energy in the electricity production.
- Improvements in energy efficiency leading to a reduction of final energy consumption (e.g. buildings).

About emission targets, in the Reference Scenario it is assumed that national allocation plans will be continued. Plans are defined country-wise and on a sectoral basis, therefore their translation in modelling input is quite complex. Main policy instrument to reach the CO<sub>2</sub> emission target is the European Emission Trading System (EU-ETS). In POLES ETS is reflected by a carbon value which is applied to energy intensive sectors which are included in the first phases of EU-ETS. The carbon value rises from 5 Euro/t CO<sub>2</sub> in 2010 to 22 Euro/t CO<sub>2</sub> in 2020.

In terms of energy supply, it is assumed that the policy mix (including nuclear and renewables) is mainly driven by prices. However, some countries decided on a phasing-out of nuclear energy. In the iTREN-2030 Reference Scenario the phasing-out of nuclear is considered in the investment model so that in those countries the stock of nuclear powerplants is not renewed. National targets exist about biofuels in transportation. In POLES biofuels enter the market on the basis of their production cost in comparison with conventional fossil fuels.

The increase of electricity from renewable energy sources is considered by the feed-in-tariff. POLES takes into account the existing feed-in-tariffs and the future development as it is fixed in national regulation.

Improvements of energy efficiency and increase of energy savings are considered as well. Member States are supposed to reduce their final energy consumption by 1% per year from 2008 onwards for 9 years (EU Directive 2006/32/EC from 2006). Special focus is set on the reduction of energy consumption for buildings. POLES takes into account the improvements of energy efficiency by the parameters of the energy demand functions.

### 5.2.3 Environmental policy

One only environmental policy is implemented in the iTREN-2030 Reference Scenario, i.e. voluntary CO<sub>2</sub> reduction targets for cars. The fuel efficiency improvements for cars are resulting from voluntary agreements between the European Commission and the car manufacturers (the so-called ACEA, JAMA and KAMA agreements)<sup>14</sup>. The commitment of the manufacturers consists mainly in improving fuel efficiency by technological improvements to reach an average level of 140 g/km by 2008 (ACEA) and 2009 (JAMA and KAMA).

In TREMOVE, it is assumed that this 140 g/km objective is reached in 2009. The related 2002-2009 fuel efficiency improvements by car type, are derived from data and projections reported in the TNO CO<sub>2</sub>CAR Task A study<sup>15</sup>. TNO's % reduction target, per manufacturer scenario has been used as well as the purchase cost increases related to these fuel efficiency improvements.

The ASTRA model, which is applied in parallel to TREMOVE to assess vehicle fleet and energy demand indicators does not expect the achievement of this policy, which was maintained in TREMOVE as it represents a commonly accepted baseline scenario of TREMOVE.

### 5.2.4 Vehicles and technologies related policies

The vehicles and technologies related policies included in the iTREN-2030 Reference Scenario are the following:

- Euro V (2009) for cars and Euro V (2010) for N1:

Target of emission standard in TREMOVE is simplified as follow:

- Diesel LDV, vans, and car (5 mg PM, 200 mg NO<sub>x</sub>)
- Petrol LDV, vans, and car (50 mg VOC, 24 mg NO<sub>x</sub>)

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<sup>14</sup> Three agreements have been made, the full texts can be found in the Official Journal of the European Communities L 350, 28. 12. 1998, 9 58; L 100, 20. 4. 2000, p. 57 and L 100, 20. 4. 2000, p. 55

<sup>15</sup> TNO, IEEP, LAT, Review and analysis of the reduction potential and costs of technical and other measures to reduce CO<sub>2</sub> emissions from passenger cars, final report to the European Commission, DG Enterprise.

This measure changes first the PM and NO<sub>x</sub> emission factors (hot and cold) of the corresponding vehicles in comparison to the Euro IV vehicles. This decrease in emission factors is followed by additional purchase costs and increase in fuel consumption due to the use of PM emission trap.

- Euro VI (2014) for diesel cars and Euro VI (2014) for diesel N1:

In TREMOVE Euro VI step of emission limits would focus on reducing the emissions of NO<sub>x</sub> from diesel cars, vans, and LDV in order to support efforts to achieve European air quality objectives. Main objective of Euro VI is to decrease the NO<sub>x</sub> level from 200 mg in Euro 5 to 75 mg.

It is intended that Euro VI would enter into force 5 years after Euro V: 2014 for the diesel cars and 2015 for the diesel N1. In carrying out the impact assessment, data generated for the Euro V impact assessment was used in order to evaluate the impacts of a second step of emissions limits. These data suggest that on average, to meet the proposed Euro VI limit value for NO<sub>x</sub> it will increase cost<sup>16</sup> compared to Euro V by **€ 213 per diesel vehicle** (or € 590 compared to euro IV).

## 5.3 Other assumptions

### 5.3.1 Transport demand assumptions

As requested by DGTREN, the transport demand for the iTREN-2030 Reference Scenario is the one developed within the TEN-Connect Project. The TRANS-TOOLS runs of the base scenario of the TEN-Connect project<sup>17</sup> have been used for the three time thresholds 2005, 2020 and 2030.

The passenger and freight traffic performance data has been fed into the TREMOVE model and used as benchmark for the re-calibration of the ASTRA model, which then feeds POLES with the recalibrated transport energy demand. In order to produce the input data for TREMOVE, the conversion procedure between TRANS-TOOLS and TREMOVE initially developed in the REFIT project has been implemented. The proce-

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<sup>16</sup> Euros 2005 as given in the European Commission, Impact Assessment for Euro 6 emission limit for light duty vehicles, Commission Staff Working Document, Brussels, 20 September 2006

<sup>17</sup> [ftp://192.38.81.33/pub/ten\\_connect/NyTT/Result5/ZipAfter2Assignment/Basis2005\\_I](ftp://192.38.81.33/pub/ten_connect/NyTT/Result5/ZipAfter2Assignment/Basis2005_I)  
[ftp://192.38.81.33/pub/ten\\_connect/NyTT/Result5/ZipAfter2Assignment/Basis2020\\_M](ftp://192.38.81.33/pub/ten_connect/NyTT/Result5/ZipAfter2Assignment/Basis2020_M)  
[ftp://192.38.81.33/pub/ten\\_connect/NyTT/Result5/ZipAfter2Assignment/Basis2030\\_J](ftp://192.38.81.33/pub/ten_connect/NyTT/Result5/ZipAfter2Assignment/Basis2030_J)

ture is briefly described in deliverable D2 (Newton et al. 2009). The details have been explained in section 4 of this deliverable.

Actually, the reference data for passenger transport in iTREN-2030 is not the pure TRANS-TOOLS output as some integrations and revisions were needed.

The first integration concerns local traffic. The TRANS-TOOLS data used to feed TREMOVE model comes from network flows statistics since only network statistics allow for a correct allocation of traffic flows to country territory as requested by TREMOVE. Network data, however, is not complete because the TRANS-TOOLS model does not assign to the network intra-NUTS trips.

Furthermore, even if intra-NUTS3 trips are included into the TRANS-TOOLS V2 passenger matrix, they are not fully suitable to feed TREMOVE model because of the lack of slow road mode trips *moped, motorcycle, slow* and, concerning rail, *metro/tram mode* is not considered.

Then, in order to estimate the local passenger traffic and the missing modes, the ASTRA traffic on distance bands below 40 km is added to TRANS-TOOLS total traffic. It should be noted that this addition is not specifically required for this application, **but it is a requirement any time TRANS-TOOLS data has to be fed into TREMOVE.**

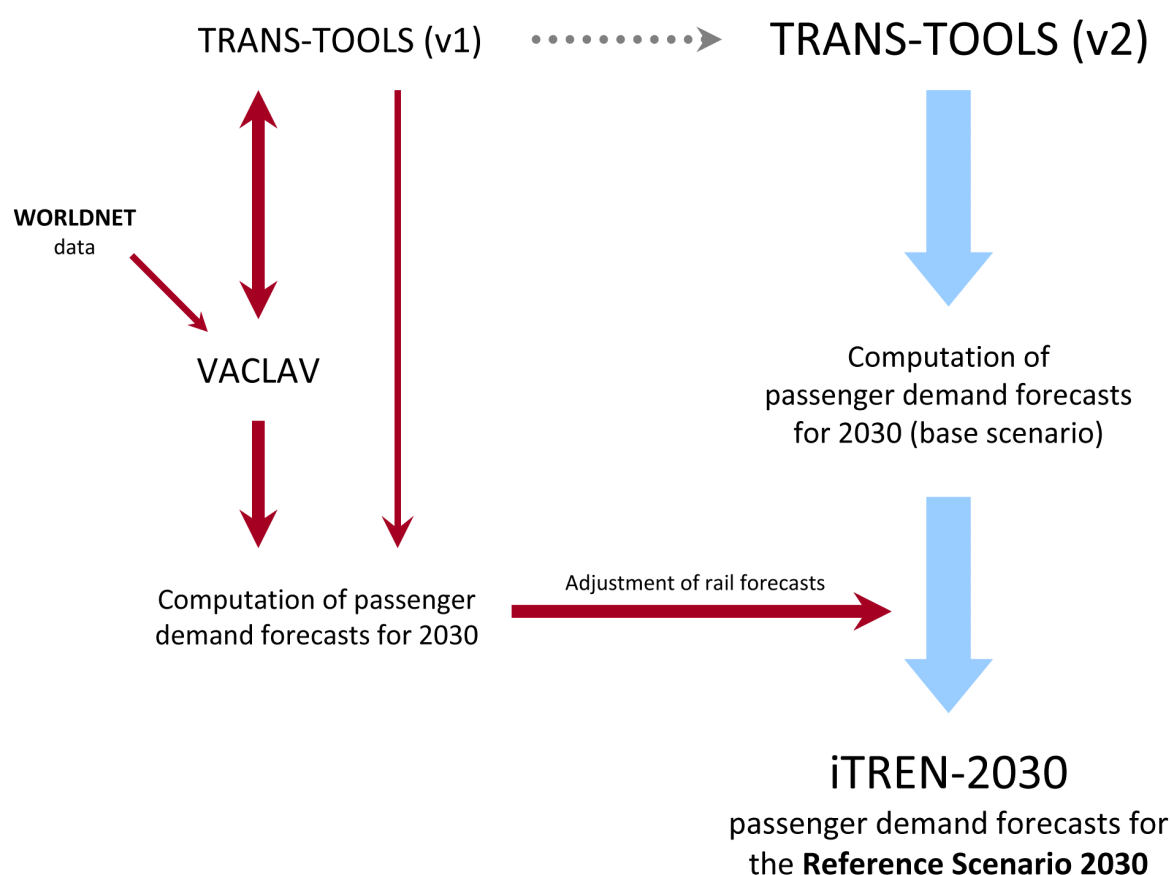
A third correction concerned rail passenger demand. As documented in the iTREN-2030 Deliverable D2 (Newton et al. 2009), TRANS-TOOLS projections for rail passenger demand up to 2030 produced in the TEN-Connect project are extremely high. Rail passenger performance in EU27 (plus Switzerland, Norway and Croatia) is forecasted to grow by 85% (2.5% per year) in the period 2005-2030 in comparison to 36% for air passengers and 22% for road modes. For some links the growth is even higher by an order of magnitude. The iTREN-2030 consortium considers this rail growth as overestimated and not reliable for the production of a consistent reference scenario. Between 1995 and 2006, rail passenger performance in EU27 has grown on average by 0.9% per year<sup>18</sup> while for road demand growth rate has been of 1.5% and for air 4.6%. Even one can argue that future trend can be quite different from the past one (e.g. because of the significant investment into European high speed rail), it is unclear why rail mode should grow much faster and other modes much slower than in the recent decade.

Therefore, for rail passenger traffic, a different growth trend has been assumed based on benchmark assumptions discussed at the second iTREN-2030 workshop (Schade/Fiorello/Herbruggen et al. 2008) and documented in iTREN-2030 deliverable

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<sup>18</sup> EU Energy and Transport in Figures, statistical pocketbook 2007/2008, table 3.3.2 page 120.

D2 (Newton et al. 2009). A model hybrid has been applied, that has been capable of synergetically combining passenger demand forecasts obtained from a further development of TRANS-TOOLS version v1 (Burgess et al. 2006) and from the new TRANS-TOOLS version v2 (see Figure 5-2): by the development branch shown on the left-hand side of the diagram, the TRANS-TOOLS version v1 has been updated to the new base year 2005, and the forecasts inherent to TRANS-TOOLS v1 have been generated iteratively under application of the Vaclav model that has also been used for the joint assignment of the WORLDNET freight O/D matrix. By the development branch on the right hand side of the figure, forecasts by the new model version v2 of the TRANS-TOOLS model have been incorporated in the iTREN-2030 passenger transport demand forecasts. In the end, the passenger forecasts of the iTREN-2030 Reference Scenario are to be based on TRANS-TOOLS v2 for road and air, and on TRANS-TOOLS v1/ Vaclav/ WORLDNET for rail.



Source: iTREN-2030

Figure 5-2: Model hybrid applied for the computation of passenger transport demand for the iTREN-2030 Reference Scenario

### 5.3.2 Vehicle fleet assumptions

In addition to the policy-related assumptions explained in sections 5.2.3 and 5.2.4, TREMOVE adopts other assumption to forecast fleet development, in particular:

#### *LPG and CNG cars*

LPG cars are either 1400-2000 cc or +2000 cc. Small LPG cars exist, but are not common and not modelled in TREMOVE. All LPG cars in TREMOVE are assumed to be retrofitted petrol cars. Hence LPG cars are not included in the logit choice model. However, to account for the share of LPG cars in the vehicles stock, we assume a fixed share of the medium and big petrol cars to be retrofitted. This share is fixed exogenously to the observed 1995 share. LPG cars are only modelled for BE, DK, GR, IT, LU, NL and ES. The other countries did not have LPG cars in the 1995 car stock<sup>19</sup>.

CNG cars are modelled from 2005 onwards. The market share of small, medium and large CNG cars in new car sales is exogenous set at:

- · 0% of the equivalent petrol<sup>20</sup> car market share in 2005 (all countries except Italy)
- · 2% of the equivalent petrol car market share in 2020 and beyond (all countries except Italy)
- · 0% of the equivalent petrol car market share in 2000 in Italy
- · 2% of the equivalent petrol car market share in 2001 and beyond in Italy<sup>21</sup>

With linear evolutions between these years.

The ASTRA model includes a logit choice model for all car types including LPG and CNG cars. In the Reference Scenario diffusion of these cars remains limited, because with missing pressure from climate and innovation policy to increase CO<sub>2</sub> rich fossil fuel prices and to develop the fuelling station network the sales of these type of cars remain at a marginal level as they are 2-4% more expensive than corresponding gasoline and diesel cars.

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<sup>19</sup> Source: TRENDS.

<sup>20</sup> E.g. the market share of medium CNG cars is set at a percentage of the market share of medium conventional and hybrid petrol cars, where the latter shares are determined by the logit model. Then the share of conventional medium and petrol cars then is lowered by the share of medium CNG cars.

<sup>21</sup> There is a positive market share for CNG cars in 2001-2005 to represent that Italy already has a limited CNG vehicle fleet.

*Biofuel use and Bioethanol cars (E85)*

Biofuels in transport are used in two ways:

1. Blended into fossil fuels i.e. in gasoline and diesel (and in future also into CNG).
2. Pure biofuels, which is in particular relevant in the form of bioethanol (E85) used by cars with specific bioethanol engines (and in future also as biogas). Pure biodiesel does not require specific engines, such that it can be used by standard diesel engines (in some cases with minor modifications of fuel feed pipes).

In iTREN-2030 the POLES model estimates both the prices of biofuels in all ways that they are used and the share of blended biofuels into gasoline and diesel. In the Reference Scenario no use of biogas in transport is assumed.

Bioethanol cars are not considered in the TREMOVE model. Their market share is estimated in the choice model of ASTRA. It depends on the bioethanol fuel price (provided by POLES), the additional purchase price of bioethanol cars (+3-5%) and the fuelling station network.

We assume that the sulphur content of the blended fuels are equal to that of the pure diesel and pure petrol. This way, modelled exhaust SO<sub>2</sub> emissions per vehicle-km are equal for blended and unblended fuels. This is also the case for the other pollutants. In ASTRA the energy content of (blended) biofuels is considered to be different than for the fossil counterparts.

In TREMOVE exhaust CO<sub>2</sub> emissions related to biofuels use are excluded from the external environmental cost calculations, as they are considered not to contribute to global warming. In ASTRA biofuels account with a certain fraction of their fossil fuel counterparts to the emissions of CO<sub>2</sub>. (roughly between 40% to 60% of gasoline or diesel CO<sub>2</sub> emissions). The prices of pure biofuels and blended biofuels are taken from POLES and are thus changing according to the energy policy implemented in POLES.

*EURO VI standard*

The introduction of Euro VI standard changes first the NO<sub>x</sub> emission factors (hot and cold) of the corresponding vehicles in comparison to the Euro IV vehicles. This decrease in emission factors is followed by additional purchase costs. However, there is some uncertainty as to the technology combinations that will be used to meet the Euro VI emission limit scenario and consequently, as to the fuel consumption impacts of the technology that will be applied. Therefore, in the modelling work it was assumed that Euro VI vehicles would have no additional impact on fuel consumption compared to Euro V vehicles.

### 5.3.3 Energy assumptions

Main assumptions of the energy system concern the energy prices, the fossil transport fuels, the electricity generation, the final energy demand and the impact of Kyoto Protocol and other energy policies on the renewable energy generation.

With respect to prices of energy resources, the world primary energy prices are estimated to remain on high levels until 2030. Crude oil price rose recently from prices around 20 €/bbl to more than 100 €/bbl and declined thereafter due to the economic crisis. It is assumed that the crude oil price will increase and remain in a range of 75 to 95 €<sub>2005</sub>/bbl between 2010 and 2030. Prices for natural gas can be expected to increase at lower growth rates as the price of crude oil. The price of coal is estimated to increase on a very low rate due to ample amount of coal reserves.

With regard to transport fuels, the trend of high fossil fuel prices is expected to continue. In this way, the price of gasoline might be in the range of 1.00 €/l to 1.45 €/l, while diesel remains slightly lower than gasoline, though the relative increase of diesel fuel price is stronger. CNG follows in principle the same trends, while the price of hydrogen should decrease slightly through improvements in the production technologies. The price of electricity is expected to rise slightly until 2020 and should keep this level.

The change in the availability of fossil energy resources should affect trade to a certain extent. Looking at oil, gas and coal trade, the most important differences might be the growing share of imports of oil from gulf countries and the growing share of imports of gas from Russia.

Under the assumed changes of fossil fuel prices investments in conventional technologies using oil would decline while technologies using gas as fuel should increase to quite some extent. Coal powerplants might experience an increase at a much smaller pace while nuclear energy is assumed to remain at current levels.

The Kyoto Protocol and the renewable share target in electricity lead to an increase of renewables in the electricity generation. Onshore wind energy is expected to have the highest share of investment in the near future. After 2015 renewable energy technologies like wind off-shore, central solar powerplants and biomass for electricity should play a more important role due to experienced learning for these technologies.



### 5.3.4 Emissions assumptions

Transport emissions are largely managed by the TREMOVE model. The passenger and freight traffic performance data is fed into the TREMOVE model from the “revised” TRANS-TOOLS results. In order to produce the input data for TREMOVE, the conversion procedure between TRANS-TOOLS and TREMOVE initially developed in the REFIT project has been implemented.

To produce consistent transport emissions, the same economic background as applied in TRANS-TOOLS, ASTRA, and POLES has been applied in TREMOVE. This means that TREMOVE takes GDP and population assumption predicted by ASTRA. In the energy side, fuel prices from POLES have also been adopted and implemented in TREMOVE model. Further assumptions concern policy measures described in section 5.2. Additionally, in TREMOVE also the following assumptions are made:

- On average, no further car fuel efficiency improvements will happen after 2009. However, as a weight increase is expected in the 2009-2012 period, technological improvements are needed to keep the average CO<sub>2</sub> emission of new cars at 140 g/km. The related 2009-2012 fuel efficiency changes by car type, are also derived from data and projections reported in the TNO CO<sub>2</sub>CAR Task A study (TNO 2006). Also the purchase cost increases related to these fuel efficiency improvements are taken from this TNO report.
- The Reference Scenario does not include any further changes in fuel efficiency of new cars beyond 2012.
- For all other road vehicles the 1995-2009 base case fuel efficiency increases were initially taken from the Auto Oil II programme, in which an agreement on improvement estimates has been reached with the manufacturers representatives. After 2009 no further increases in fuel efficiency and emission reductions were assumed in TREMOVE.

In ASTRA emission factors and fuel consumption factors of conventional vehicles are adapted by two mechanisms: First, new emission standards decrease both factors compared with previous emission standards. This improvement roughly projects past trends. Despite that ASTRA considers already a virtual Euro 7 standard a further trend of improvements is required after 2022. This affects then the average emission and fuel consumption factor of vehicles belonging to Euro 7 category and slightly reduces this average factor over time until 2030.

## 5.4 Validation of base year iTREN-2030 Reference Scenario data

In the following captions, some comparisons between base year 2005 results in the iTREN-2030 reference Scenario and the statistics reported in the publication “EU Energy and Transport in Figures – Statistical pocketbook 2009” are reported. The tables provide comparisons for some aggregation of European countries:

- EU27: All member states of the European Union as of today (2008)
- EU15: Member states that joined the European Union before 2004
- EU12: Member states that joined the European Union after 2003
- Big Four: FR, DE, IT, UK.
- Northern EU: AT, DK, IE, FI, BE, LU, NL, SE
- Southern EU: ES, EL, PT, CY, MT
- Eastern EU: BG, CZ, EE, LV, LT, HU, PL, RO, SL, SK
- Non-EU: HR, NO, CH, TR.

Country based comparisons are provided in Annex I.

### 5.4.1 Passengers demand

Table 5-5 below shows the comparison between total transport demand (passengers-km) of land transport modes at the base year 2005 in the iTREN-2030 reference Scenario and the statistics reported in the publication “EU Energy and Transport in Figures – Statistical pocketbook 2009” (ETiF, from now on). Table 5-6 reports the comparison of mode shares for available modes. Air transport is not considered in both tables since ETiF provides air passengers-km only for the EU27 as a whole (the published data is 527 billion pass-km compared to 442 billion pass-km in the iTREN-2030 reference scenario where intercontinental demand is not modelled, however).

The tables show that iTREN-2030 Reference scenario is quite close to ETiF for all the aggregations considered, with the largest discrepancy being largely below 10%.

Table 5-5: Passenger land\* transport activity in the year 2005: comparison between iTREN-2030 and ETiF (Billion pkms)

Region Code	Region Name	iTREN-2030	ETiF
EU27	EU27 countries	5,757	5,523
EU15	EU15 countries	5,076	4,831
EU12	EU12 countries	680	692
BIG 4	DE, FR, UK, IT	3,668	3,500
Southern EU	ES, EL, PT, CY, MT	667	623
Northern EU	AT, DK, IE, FI, BE LU, NL, SE	749	717
Eastern EU	BG, CZ, EE, LV, LT, HU, PL, RO, SL, SK	672	684
Non-EU	HR, NO, CH, TK	n.a.	394

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

\* Car, bus and train/tram only

Table 5-6: Passenger land\* modes split in the year 2005: comparison between iTREN-2030 and ETiF (% based on pkm)

Region Code	iTREN-2030			ETiF		
	Car	Bus	Train	Car	Bus	Train
EU27	81%	11%	8%	82%	10%	8%
EU15	83%	9%	8%	83%	9%	8%
EU12	66%	21%	13%	74%	16%	10%
BIG 4	84%	8%	8%	84%	7%	8%
Southern EU	82%	14%	5%	80%	14%	6%
Northern EU	81%	11%	8%	82%	10%	9%
Eastern EU	67%	20%	13%	74%	16%	11%
Non-EU	n.a.	n.a.	n.a.	67%	26%	7%

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

\* Car, bus and train/tram only

## 5.4.2 Freight demand

Table 5-7 and 5-8 report comparisons of total freight demand (tonnes-km) of land modes and, respectively, of mode shares. Maritime is not included in the comparisons because ETiF reports just a share of total maritime activity.

Table 5-7: Freight transport activity on the national territory in the year 2005: comparison between iTREN-2030 and ETiF (Billion tkms)

Region Code	Region Name	iTREN-2030	ETiF
EU27	EU27 countries	2,677	2,353
EU15	EU15 countries	2,150	1,878
EU12	EU12 countries	527	475
BIG 4	DE, FR, UK, IT	1,323	1,149
Southern EU	ES, EL, PT, CY, MT	382	323
Northern EU	AT, DK, IE, FI, BE LU, NL, SE	445	405
Eastern EU	BG, CZ, EE, LV, LT, HU, PL, RO, SL, SK	527	474
Non-EU	HR, NO, CH, TK	110	232

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

Table 5-8: Freight mode split on the national territory in the year 2005: comparison between iTREN-2030 and ETiF (% based on tkm)

Region code	iTREN-2030			ETiF		
	Road	Rail	IWW	Road	Rail	IWW
EU27	78%	17%	5%	77%	18%	6%
EU15	81%	13%	5%	79%	14%	7%
EU12	67%	30%	3%	66%	32%	3%
BIG 4	80%	15%	5%	78%	16%	6%
Southern EU	95%	5%	0%	95%	5%	0%
Northern EU	73%	16%	11%	70%	17%	13%
Eastern EU	67%	30%	3%	65%	32%	3%
Non-EU	78%	22%	0%	88%	11%	0%

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

Even if the discrepancies are a bit larger than for passengers, the iTREN-2030 reference scenario data at the year 2005 is well comparable to ETiF statistics in all regions and also the different mode shares are well reflected in the iTREN-2030 results.

### 5.4.3 Energy

Tables 5-9 and 5-10 show the comparison of iTREN-2030 data and ETiF statistics for two energy indicators: Gross inland consumption by source and Final energy demand by consuming sector. It is apparent that for both indicators the iTREN-2030 Reference Scenario reproduces ETiF statistics with a very high degree of precision.

Table 5-9: Gross Inland Energy Consumption by source in 2005: comparison between iTREN-2030 and ETiF (Mtoe)

Region code	iTREN-2030					ETiF				
	Total	Oil	Gas	Coal, Nuclear	Renewables	Total	Oil	Gas	Coal, Nuclear	Renewables
EU27	1,792	658	437	574	123	1,821	677	446	577	121
EU15	1,543	601	383	451	107	1,544	606	386	449	103
EU12	248	57	54	122	15	277	71	60	128	18
BIG 4	1,042	378	276	333	55	1,044	384	278	332	50
Southern EU	205	106	36	49	15	206	108	36	48	14
Northern EU	296	117	72	69	38	298	118	72	70	38
Eastern EU	248	57	54	122	15	274	67	60	128	18
Non EU	n.a.	n.a.	n.a.	n.a.	n.a.	153	62	33	30	29

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

Table 5-10: Final energy demand by consuming sector in 2005: comparison between iTREN-2030 and ETiF (Mtoe)

Region code	iTREN-2030				ETiF			
	Total	Industry	Transport	Residential & services	Total	Industry	Transport	Residential & services
EU27	1,177	330	369	478	1,172	326	362	484
EU15	1,029	280	336	413	1,008	274	325	409
EU12	147	50	33	65	164	52	37	75
BIG 4	680	170	219	291	662	165	211	287
Southern EU	137	40	56	41	139	41	56	42
Northern EU	212	70	61	81	208	68	59	81
Eastern EU	147	50	33	65	162	52	36	75
Non EU		<i>n.a.</i>	<i>n.a.</i>	<i>n.a.</i>		35	27	48

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

#### 5.4.4 Emissions

Table 5-11 reports the comparison between iTREN-2030 and ETiF as far as CO<sub>2</sub> transport emissions in the year 2005 are concerned. The iTREN-2030 Reference Scenario is close to the ETiF data especially at the aggregated level. The largest discrepancies are registered for Northern and Eastern EU, where iTREN-2030 underestimate and, respectively, overestimate emissions.

Table 5-11: CO<sub>2</sub> Transport emissions in 2005: comparison between iTREN-2030 and ETiF (Million tonnes per year)

Region Code	Region Name	iTREN-2030	ETiF
EU27	EU27 countries	1,274	1,247
EU15	EU15 countries	1,105	1,129
EU12	EU12 countries	170	118
BIG 4	DE, FR, UK, IT	760	668
Southern EU	ES, EL, PT, CY, MT	170	200
Northern EU	AT, DK, IE, FI, BE LU, NL, SE	180	267
Eastern EU	BG, CZ, EE, LV, LT, HU, PL, RO, SL, SK	164	111
Non-EU	HR, NO, CH, TK	86	80

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

### 5.4.5 Fleet

The number of cars in the European fleet in the year 2005 according to the iTREN-2030 Reference Scenario is compared to the ETiF statistics in table 5-12. For all regions considered the differences between the two sources are small, with an underestimation of the fleet in Southern EU countries as the largest discrepancy registered.

Table 5-12: Car fleet size in 2005: comparison between iTREN-2030 and ETiF (1000 vehicles)

Region Code	Region Name	iTREN-2030	ETiF
EU27	EU27 countries	210,923	220,223
EU15	EU15 countries	180,763	189,611
EU12	EU12 countries	30,160	30,612
BIG 4	DE, FR, UK, IT	133,165	134,150
Southern EU	ES, EL, PT, CY, MT	21,965	29,321
Northern EU	AT, DK, IE, FI, BE LU, NL, SE	26,165	26,708
Eastern EU	BG, CZ, EE, LV, LT, HU, PL, RO, SL, SK	29,628	30,044
Non-EU	HR, NO, CH, TK	n.a.	13,048

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

## **5.5 Transport demand in Reference Scenario**

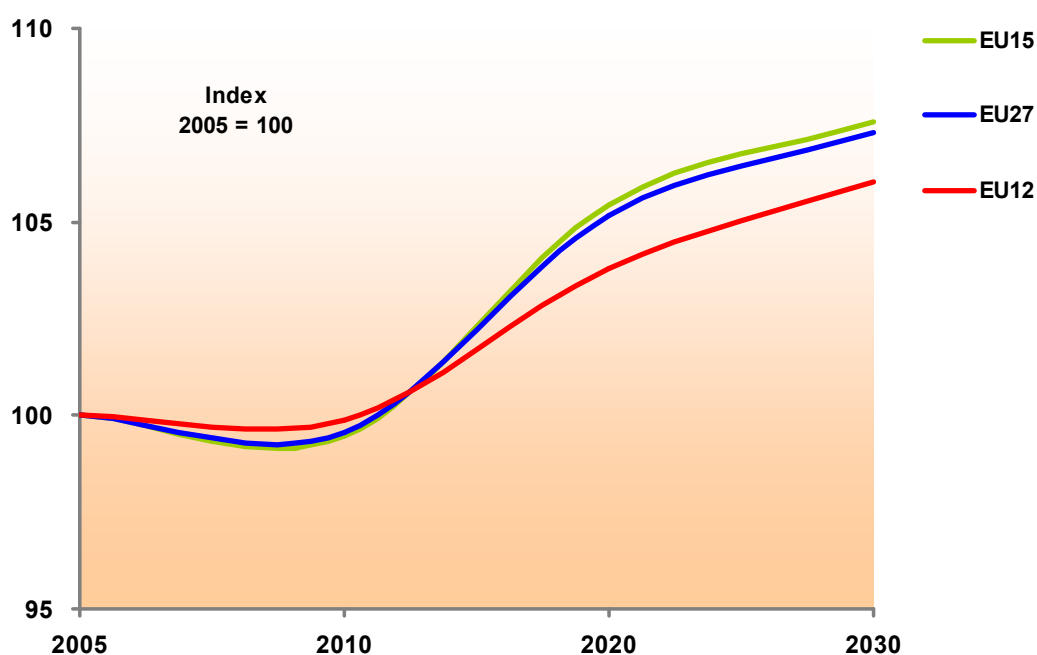
### **5.5.1 Passengers demand**

The detailed picture of the iTREN-2030 transport demand projections in the Reference Scenario is provided in the indicator sheets available in the annex for each Member State as well as for the aggregates of EU27, EU15 and EU12. Here, a summary of the more relevant trends is presented.

The passenger transport demand forecasts for the iTREN-2030 Reference Scenario until the year 2030 feature following patterns.

The passenger transport volume (measured in number of trips) is forecasted to develop at moderate pace, with slightly higher growth rates in the EU15 countries than in the country group of EU12 countries. This difference is mainly due to the demographic trends, since for the EU15 country group a stable population is expected while for the EU12 countries a population decline is forecasted. The passenger transport volume is forecasted to increase between 2005 and 2030 by 9.6% in the EU15 countries and by 6.7% in the EU12 countries.

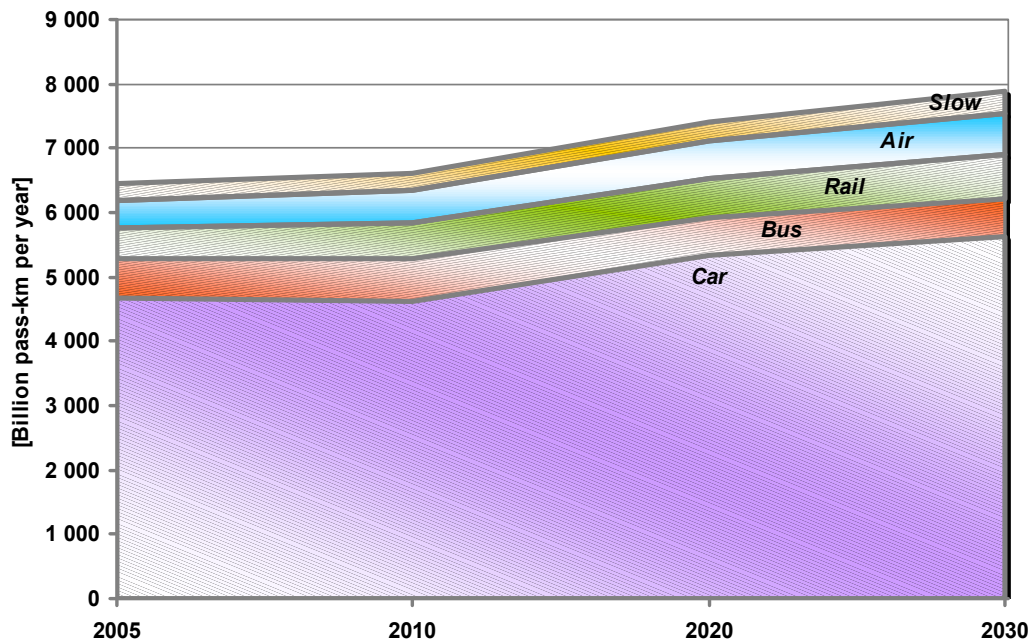




Source: TRANS-TOOLS model

Figure 5-3: Number of trips originated in the EU27 countries (2005 = 100)

Regarding the evolution of passenger transport performance (measured in passenger-km), the growth rates are considerably above the growth rates for passenger transport volume. Clearly, the highest dynamics is expected in the country group of the New Member States (EU12), where motorization and personal income is expected to develop more dynamically than in the EU15 countries, and where the current level of mobility is farer away from saturation levels than in the former EU Member States. In the period of time 2005-2030, the total passenger transport demand is forecasted to increase by 23.2% in the EU15 countries, and by 32.8% in the country group of EU12.



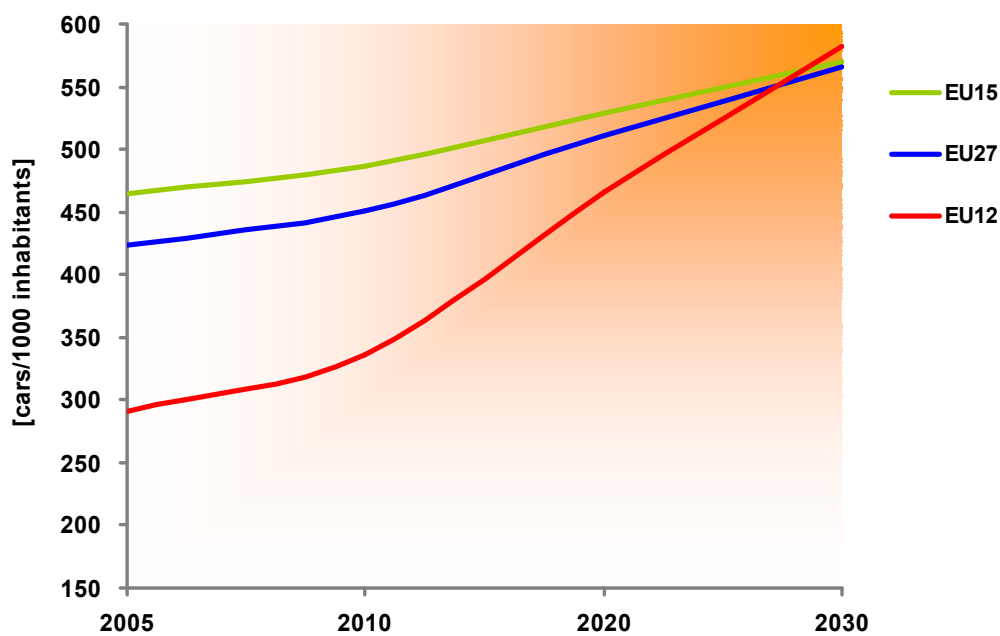
Source: TRANS-TOOLS model

Figure 5-4: Passengers-km in EU27 by mode of transport

The strongest dynamic is caused by air transport, particularly in the new Member States EU12, even if not at the high growth rates expected in the European Energy and Transport - Trends to 2030 (European Commission, 2008a). Also road passenger transport is expected to grow considerably by around 40% in the EU12 countries. Rail transport is forecasted to increase by 21.6% in EU15 countries, and by 5.7% in the New Member States EU12. This relatively strong difference is caused by the fact that on the territory of EU15 countries, several new, highly competitive high-speed links are put into operation within the period of time 2005-2030, which are capable of enhancing considerably the attractiveness of the rail mode. In the New Member States EU12, the scope of comparatively moderate investments in the railway infrastructure is not expected to result in a significant increase in rail passenger transport performance.

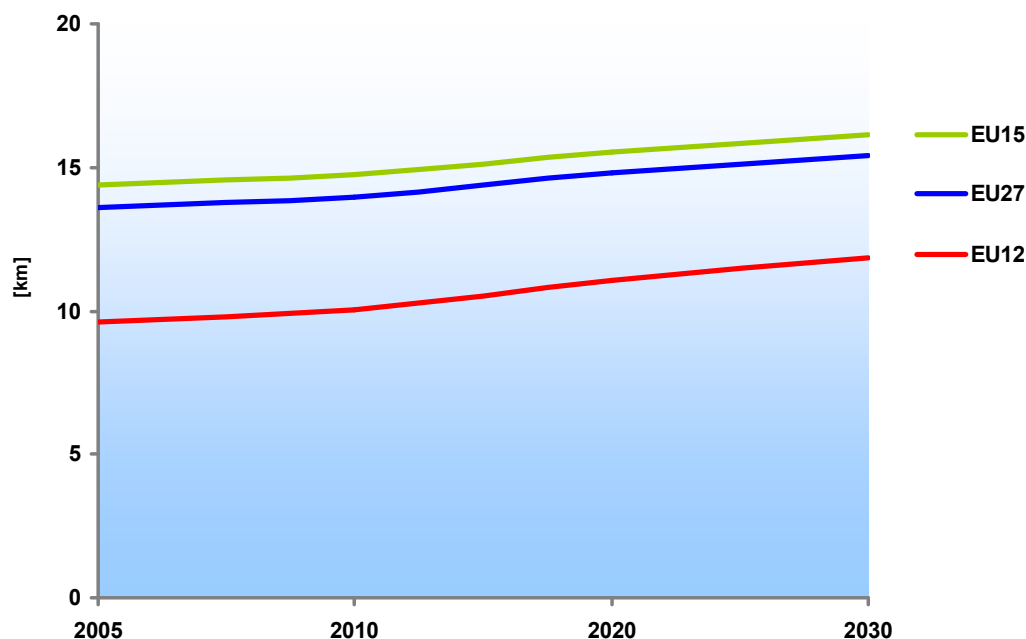
Socio-demographic changes – such as increase in household income or motorisation – and improvements on the supply side of transport services – e.g. by travel time reduction or higher frequencies – have impacts on trip distribution which results to an increase in trip length. This aspect is reflected by the transport forecasts: the average length of a trip is expected to rise by 24.5% in the EU12 countries, and by 12.3% in the EU15 countries. Despite of the different dimension of growth rates in the EU12 and EU15 countries, in 2030 the average trip length in the group of EU12 countries is still expected to be significantly below the average trip length in the EU15 countries.

This is different for car-ownership. Figure 5-5 reveals that in 2010 EU15 are close to 500 cars per 1000 inhabitants while EU12 only have reached a level of above 300 cars per 1000 inhabitants. Until 2030 there is a catch-up of EU12 such that both regions have a car-ownership of about 550 cars per 1000 inhabitants.



Source: TREMOVE model

Figure 5-5: Cars per 1000 inhabitants



Source: iTREN-2030 elaboration on TRANS-TOOLS data

Figure 5-6: Average passenger transport distance

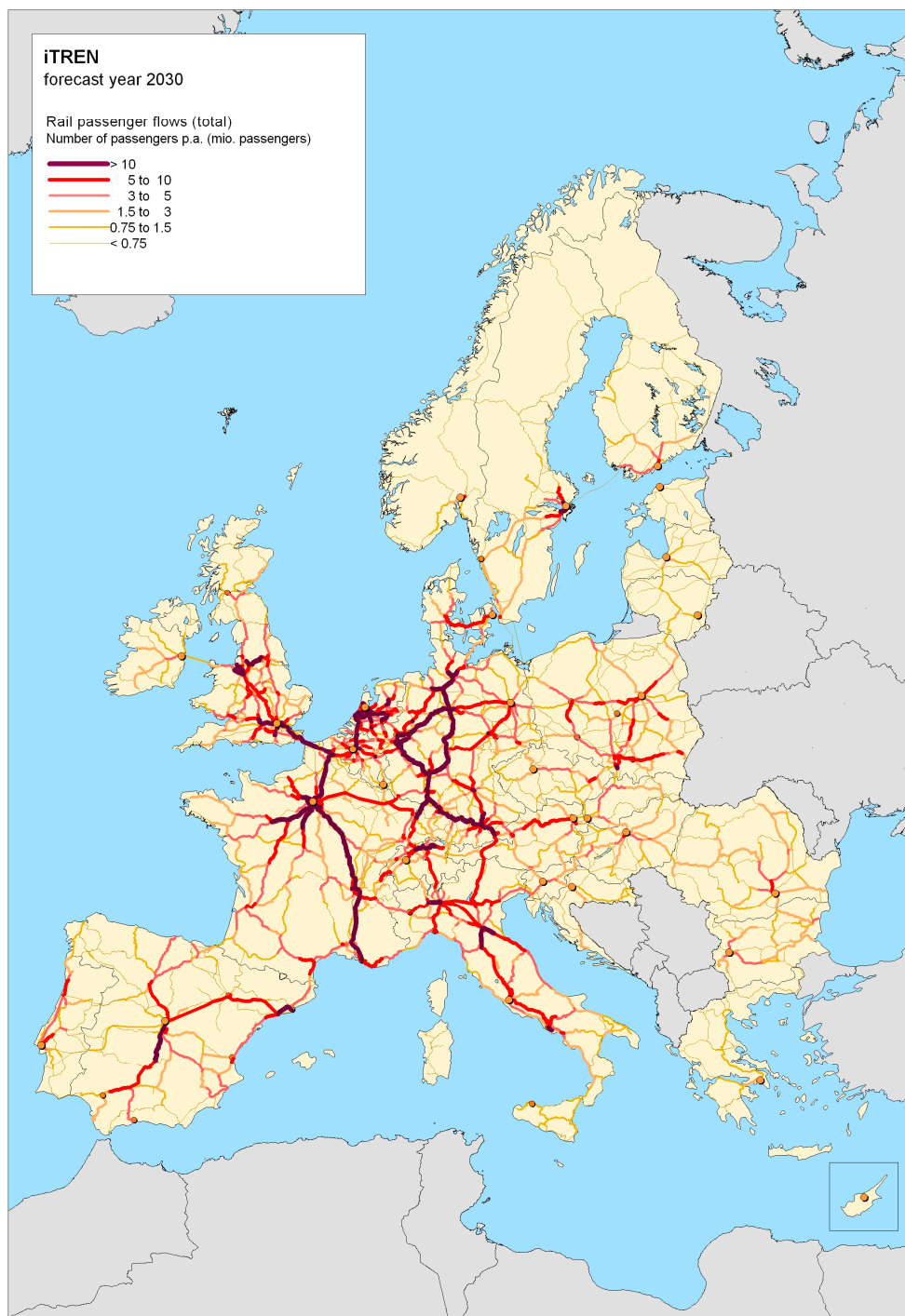
The rail passenger assignment results shown by Figure 5-7 (base year 2005) and Figure 5-8 (Reference Scenario 2030), have been computed by the Vaclav model under application of the model hybrid TRANS-TOOLS v1/ Vaclav/ WORLDNET (see section 5.3.1). The highest passenger demand is forecasted on high-speed links in Western Europe that connect large agglomerations, such as Paris – Marseille, Paris – Lille – London, Brussels – Amsterdam, Munich – Stuttgart – Frankfurt – Cologne or Frankfurt – Hanover – Hamburg. Also the new high-speed lines Madrid – Barcelona and Paris – Strasbourg are expected to considerably attract passengers. Regarding trans-Alpine passenger transport, the Brenner and the Gotthard base tunnels will benefit from the assumed infrastructure investments.

The comparison of road passenger assignment results (taken from TEN-Connect) between the base year 2005 and the forecasted year 2030 (Figure 5-9 and Figure 5-10) shows an increase of traffic on most of the European road network, but particularly in the Eastern European countries. Namely, East-West corridors in Poland and Czech-Republic as well as North-South axes between Slovakia and Poland and between Romania and Bulgaria are foreseen to see a large growth of road traffic.



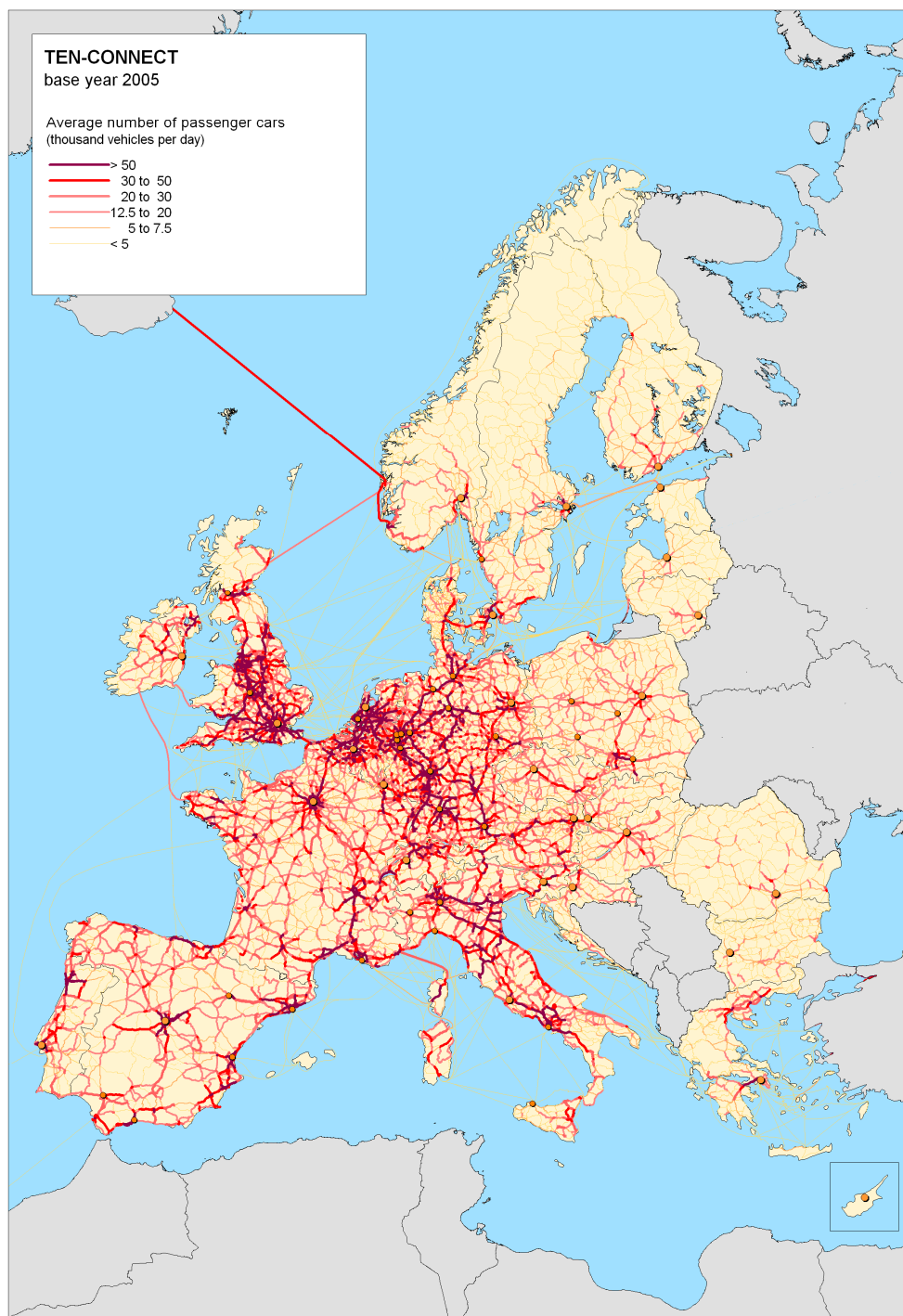
Source: VACLAV model

Figure 5-7: Rail passenger assignment base year 2005



Source: VACLAV model

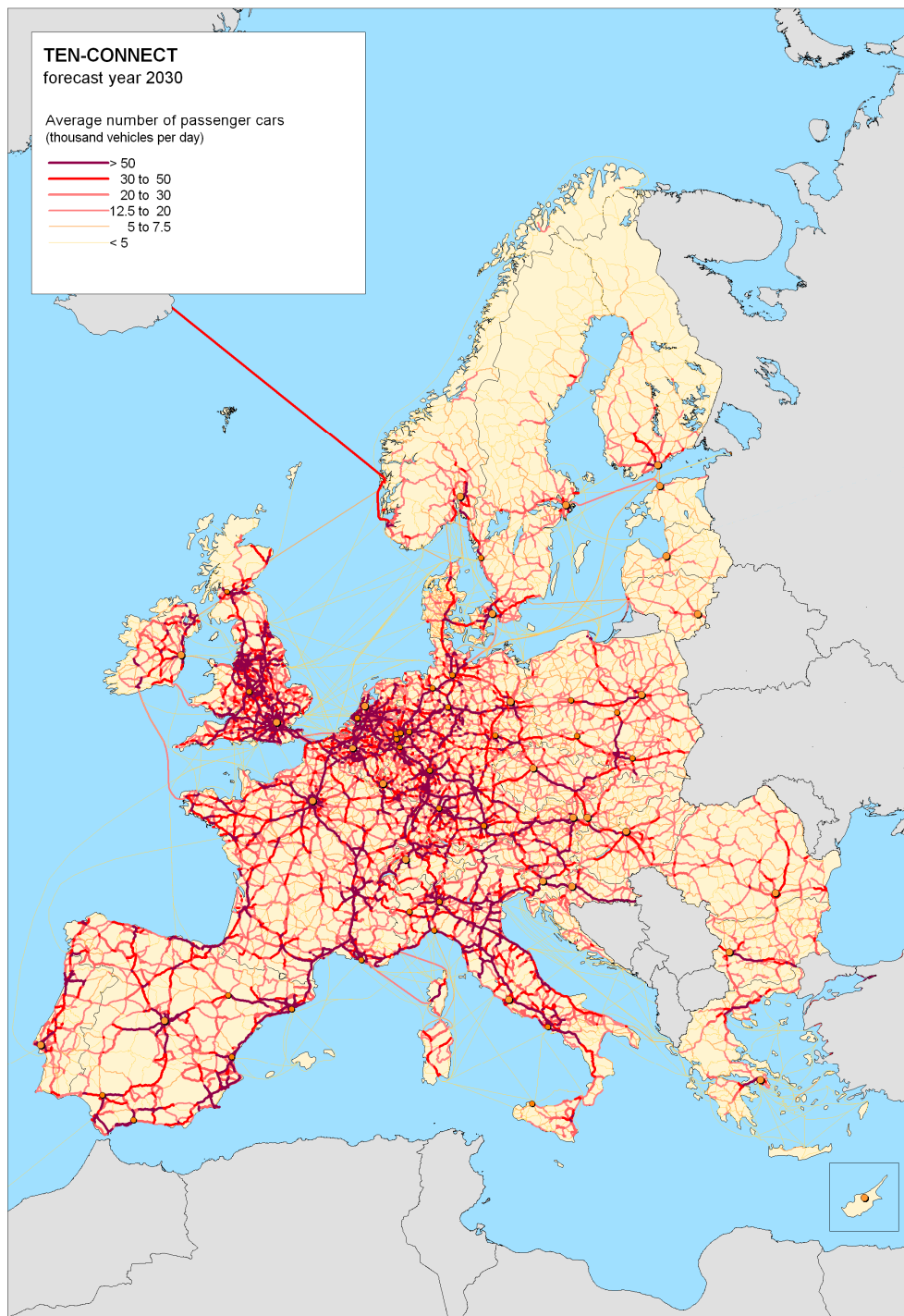
Figure 5-8: Rail passenger assignment Reference Scenario 2030



Source: TRANS-TOOLS/ TEN-Connect data

Figure 5-9: Road passenger assignment base year 2005





Source: TRANS-TOOLS/ TEN-Connect data

Figure 5-10: Road passenger assignment Reference Scenario 2030



Table 5-13 shows a comparison between the passenger demand projections in the iTREN-2030 Reference Scenario and other studies' forecasts<sup>22</sup>. iTREN-2030 corresponds to TRANS-TOOLS version 2 since the latter (i.e. TEN-Connect scenario) has been taken as reference. Rail development is however different since, as mentioned, above, the very high growth rate in TRANS-TOOLS version 2 was considered unreliable.

Both TRANSVISIONS and European Energy and Transport trends to 2030 are more optimistic with reference to the growth rate of rail, with the former forecasting a really fast development and the latter very close to the assumption made in iTREN-2030 Reference Scenario. It is remarkable that in all studies (but TRANS-TOOLS version 2) road is expected to grow less than other modes.

iTREN-2030 Reference Scenario is in line with TRANSVISIONS concerning air transport growth, whereas European Energy and Transport trends to 2030 assumes a two times higher rate. Recently, air demand is growing even faster than 3% per year, however some reasons exist to consider the recent trend as unsustainable in the future. In particular, the booming of air transport is strictly related to the low cost flight that new companies started some years ago. As effect of these new services, new air demand has been generated. Further massive fares cuts in the future are much less likely, since budget airlines have exploited basically any possible source to save costs and lately they have started to apply additional fees (e.g. for additional luggage or for faster boarding) on the top of ticket price. Furthermore, energy price is expected to remain high in the future and the oil price at the level of the years 2007-2008 proved to be challenging for low cost carriers. Fares are still high in intercontinental connections, but this part of air transport demand is not accounted for in TRANS-TOOLS and in iTREN-2030.

For those reasons, even if low in comparison to recent trend, the growth rate expected for air passenger demand in TRANS-TOOLS version 2 was accepted in iTREN-2030 Reference Scenario.

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<sup>22</sup> Data used for the comparisons below comes from the technical note "TRANS-TOOLS Baseline for Impact Assessment" produced by IPTS and from the publication "European Energy and Transport Trends to 2030 – update 2007" [European Commission, 2008a].

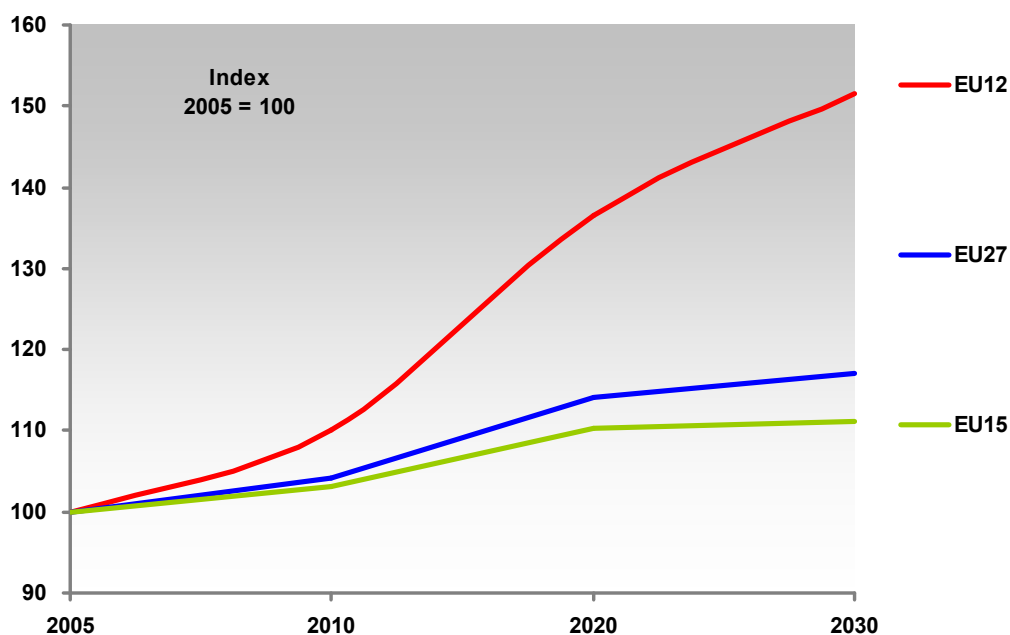
Table 5-13 iTREN-2030 Reference Scenario passenger demand growth rates compared to other studies

Mode	iTREN-2030	TRANS-TOOLS v2	TRANSVISIONS	EET trends
Road	0.7%	0.7%	1.1%	1.2%
Rail	1.5%	2.5%	4.6%	1.6%
Air	1.4%	1.4%	1.3%	3.0%
Total	0.8%	0.8%	1.3%	1.4%

Source: iTREN-2030 on various data

### 5.5.2 Freight demand

In the iTREN-2030 Reference Scenario, freight demand is expected to grow faster than passenger demand. The increase of tonnes lifted is in large part expected in the EU12 countries, because of the faster economic growth, while in EU15 countries only a limited increment of tonnes transported is forecasted.



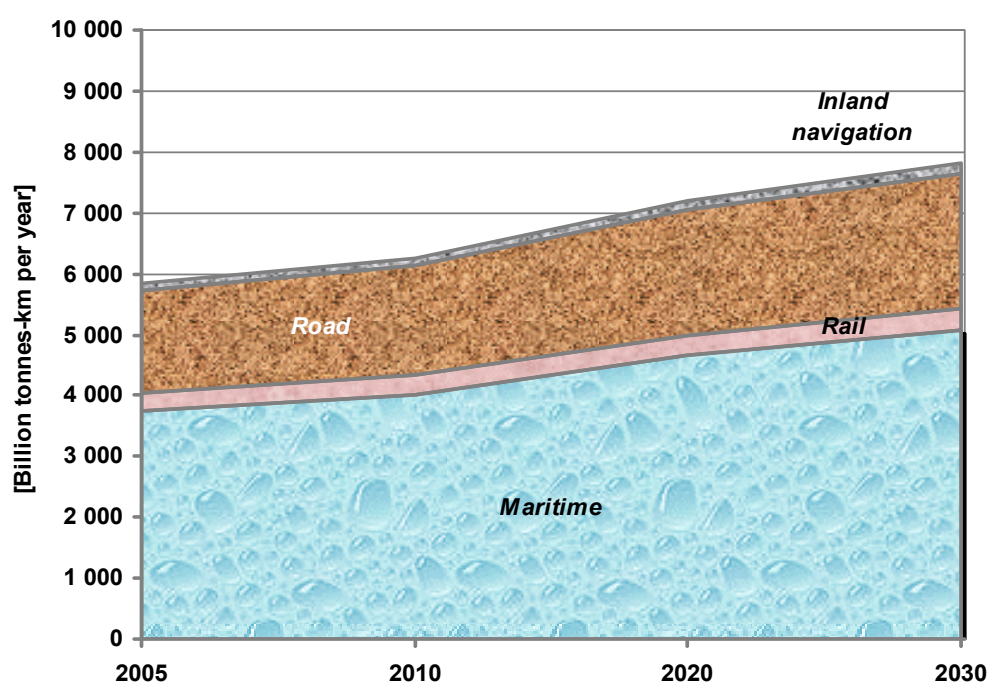
Source: TRANS-TOOLS model

Figure 5-11: Number of tonnes originated in the EU27 countries (2005 = 100)

A stronger growth is forecasted in terms of freight transport performance, which means longer average transport distances. All modes are expected to grow, so that mode shares are not significantly changed even if rail freight has the largest growth rate and

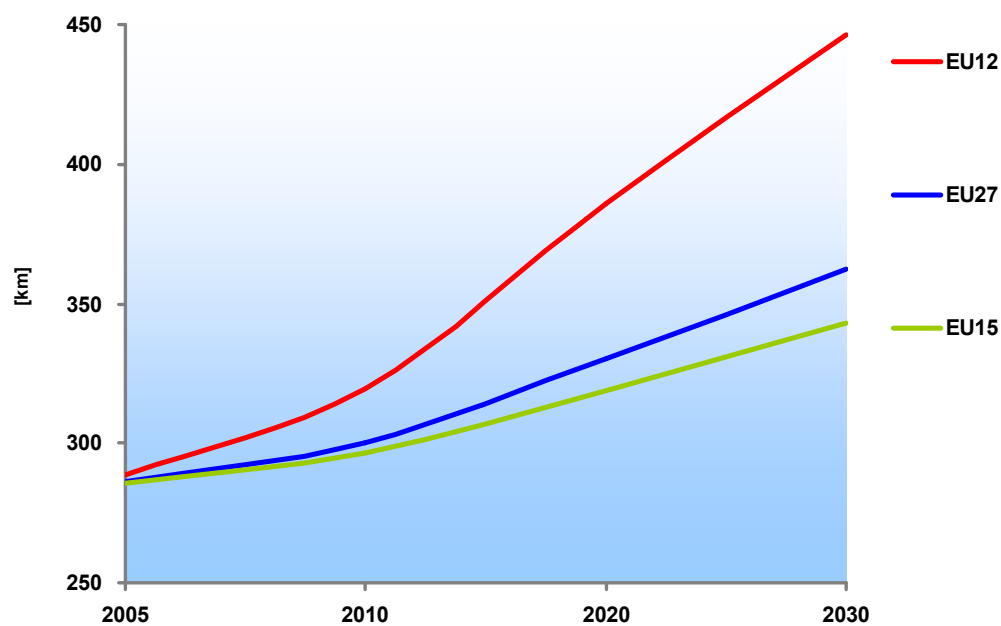
its share is forecasted to reach 8% in 2030 compared to 6.5% in the year 2005. Again, the trend in EU12 explains much of the expected change.

It is interesting to note that the average distance of freight transport in EU12 is forecasted to grow significantly, which indicates that especially long-distance transport (i.e. import-export) will drive the growth of freight traffic. It should be considered that average distance concern only freight transport within Europe, i.e. maritime includes only domestic and Intra-EU short sea shipping and not intercontinental sea traffic.



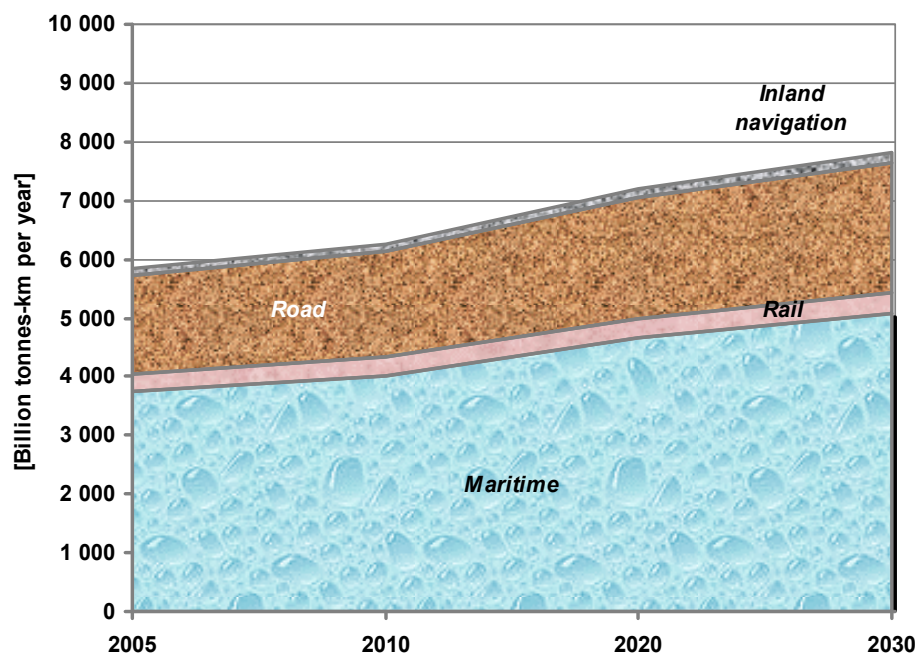
Source: ASTRA model

Figure 5-12: Tonnes-km in EU27 by mode of transport



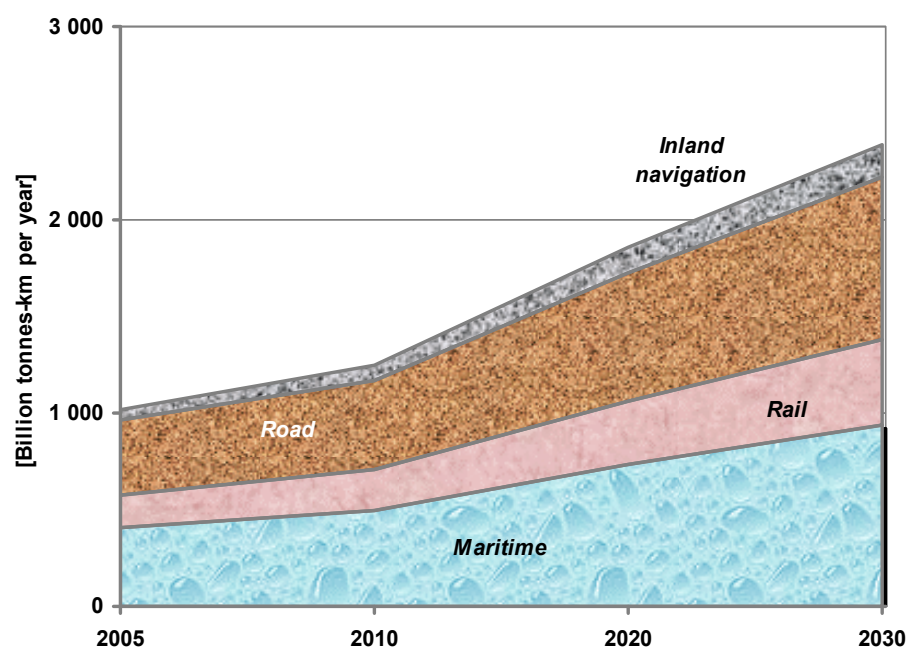
Source: iTREN-2030 elaboration on TRANS-TOOLS data

Figure 5-13: Average freight transport distance



Source: ASTRA model

Figure 5-14: Tonnes-km in EU15 by mode of transport



Source: ASTRA model

Figure 5-15: Tonnes-km in EU12 by mode of transport

Table 5-14 shows a comparison between the freight demand projections in the iTREN-2030 Reference Scenario and other studies' forecasts. Some differences can be noticed despite the growth rates of the total demand are largely comparable. iTREN-2030 corresponds to TRANS-TOOLS version 2 since the latter (i.e. TEN-Connect scenario) has been taken as reference. Both TRANSVISIONS and European Energy and Transport trends are more conservative than iTREN-2030 with reference to the growth rate of inland navigation whereas they assume a slightly faster development of road freight demand. Basically, in iTREN-2030 Reference Scenario (following TRANS-TOOLS version 2), the growth rate of road freight is lower than other modes'. This is a break of the observed trend, since in the last decades, road freight transport has developed faster than its competitors.

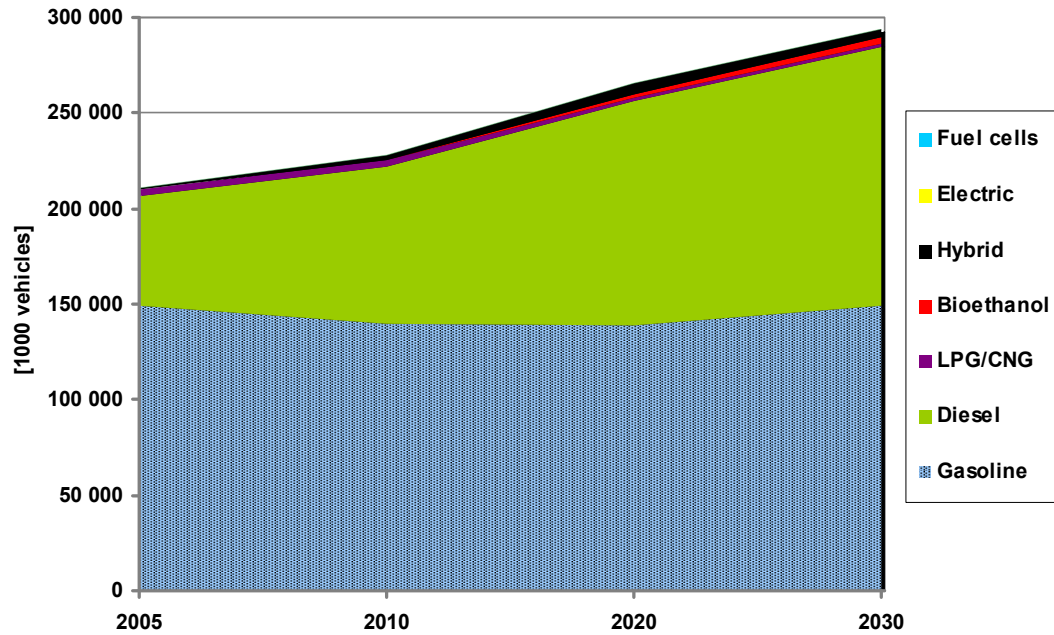
Table 5-14 iTREN-2030 Reference Scenario freight demand growth rates compared to other studies

Mode	iTREN-2030	TRANS-TOOLS v2	TRANSVISIONS	EET trends
Road	1.3%	1.3%	2.2%	1.8%
Rail	2.3%	2.3%	2.3%	1.4%
Inland Navigation	1.3%	1.3%	0.2%	1.0%
Maritime	1.5%	1.5%	1.7%	n.a.
Total	1.5%	1.5%	1.9%	n.a.

Source: iTREN-2030 on various data

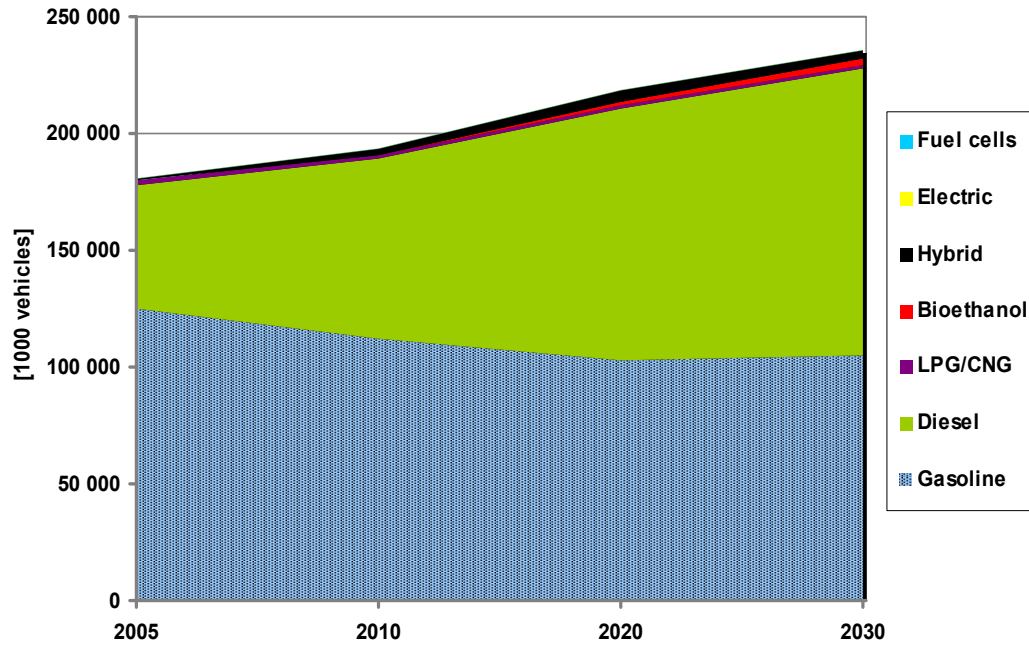
## 5.6 Vehicle fleet in Reference Scenario

In the iTREN-2030 Reference Scenario, EU27 car fleet is expected to reach almost 300 millions vehicles in the year 2030. In particular, the car fleet in EU12 countries should almost double, while in EU15 the growth should be of nearly 30% over the period considered. In both macro-regions of Europe, the number of diesel cars is expected to grow faster than the number of gasoline cars. In EU15 this different trend leads diesel cars to be the majority in the car fleet, overtaking gasoline cars before the year 2020 (with gasoline cars in EU15 being less in 2030 than in 2005). Instead, in EU12 gasoline cars continue to have the largest share of the fleet. Alternative technologies are expected to have a limited penetration in the EU27 car fleet. Only 8 out of 293 Millions cars are expected to be hybrid cars or use bioethanol (almost entirely in EU15). Part of these cars would replace LPG/CNG vehicles. The number of electric cars in the Reference Scenario is expected to be negligible, while no fuel cell cars are foreseen until the year 2030. It should be recalled that the Reference Scenario neither assumes ambitious climate policy nor technological breakthrough, which would be the prerequisite for both technologies to enter the market.



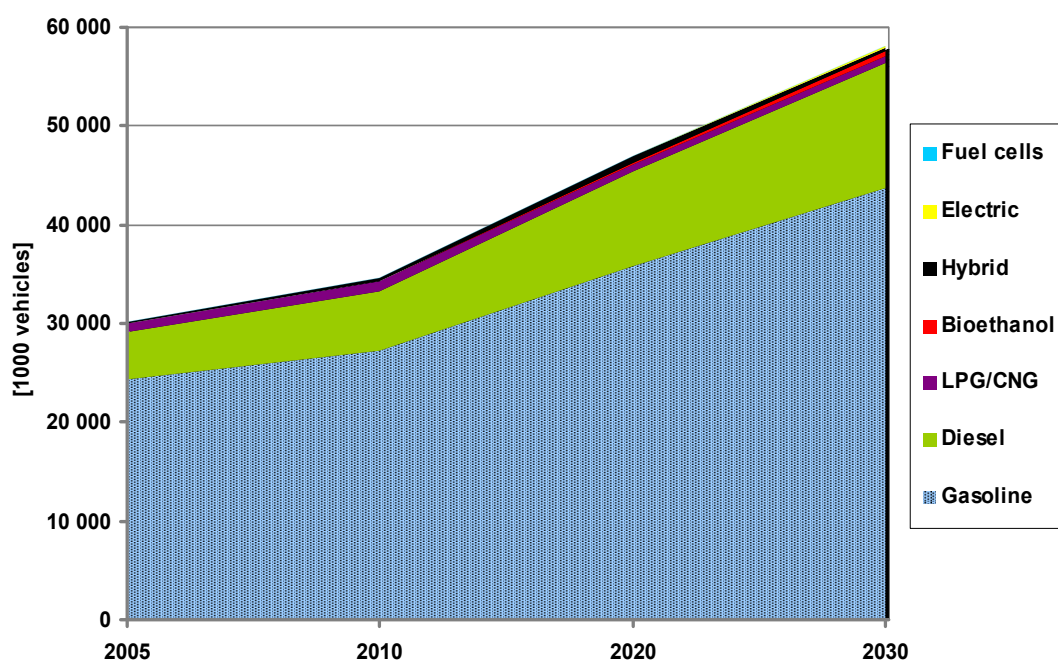
Source: iTREN-2030 - TREMOVE and ASTRA models

Figure 5-16: Car fleet in EU27 countries by technology



Source: iTREN-2030 - TREMOVE and ASTRA model

Figure 5-17: Car fleet in EU15 countries by technology



Source: iTREN-2030 - TREMOVE and ASTRA model

Figure 5-18: Car fleet in EU12 countries by technology

Within conventional cars, smaller diesel vehicles (<2.000 cc) are expected to have the largest share in the year 2030 overtaking medium and small gasoline cars. The latter however should be dominant (about 50% of all vehicles) in the EU12 fleet.



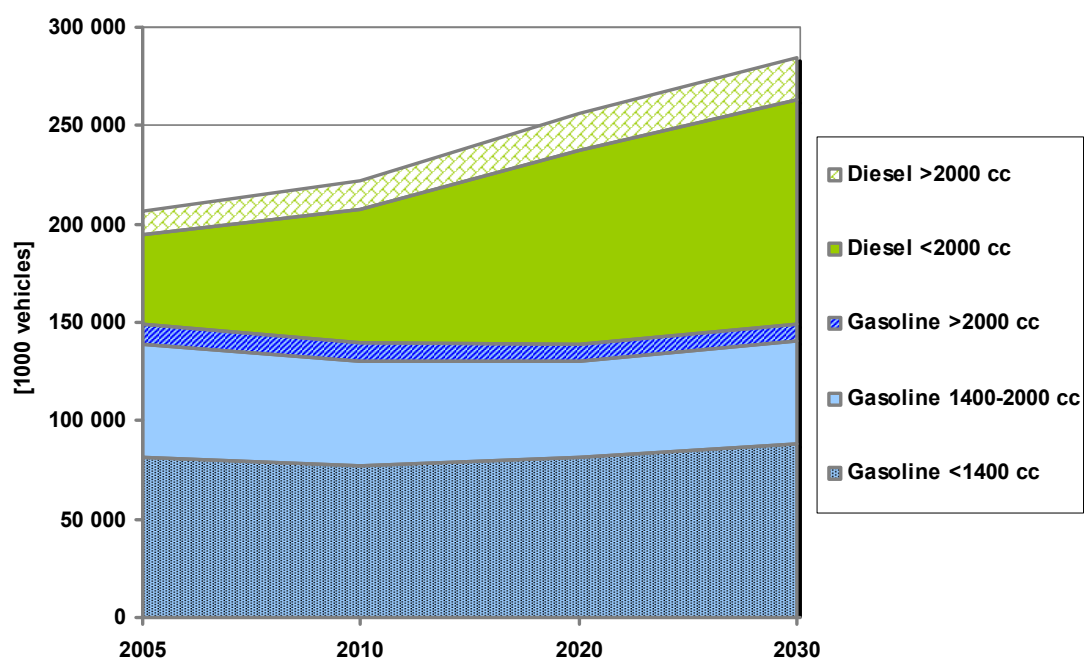


Figure 5-19: Conventional car fleet in EU27 countries by cubic capacity

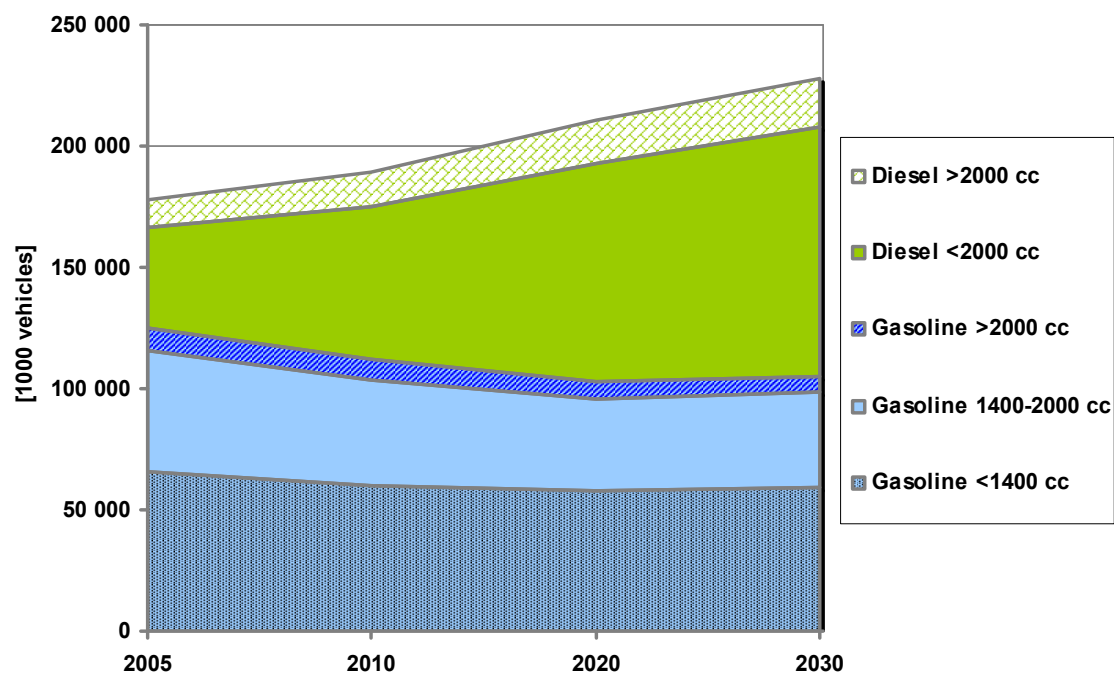
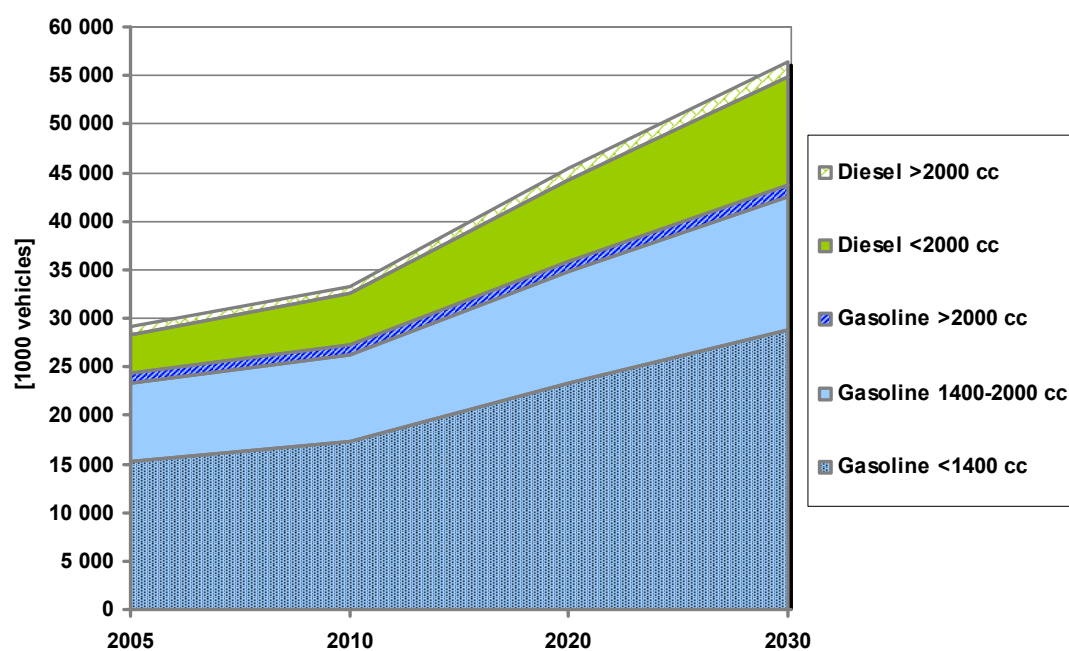


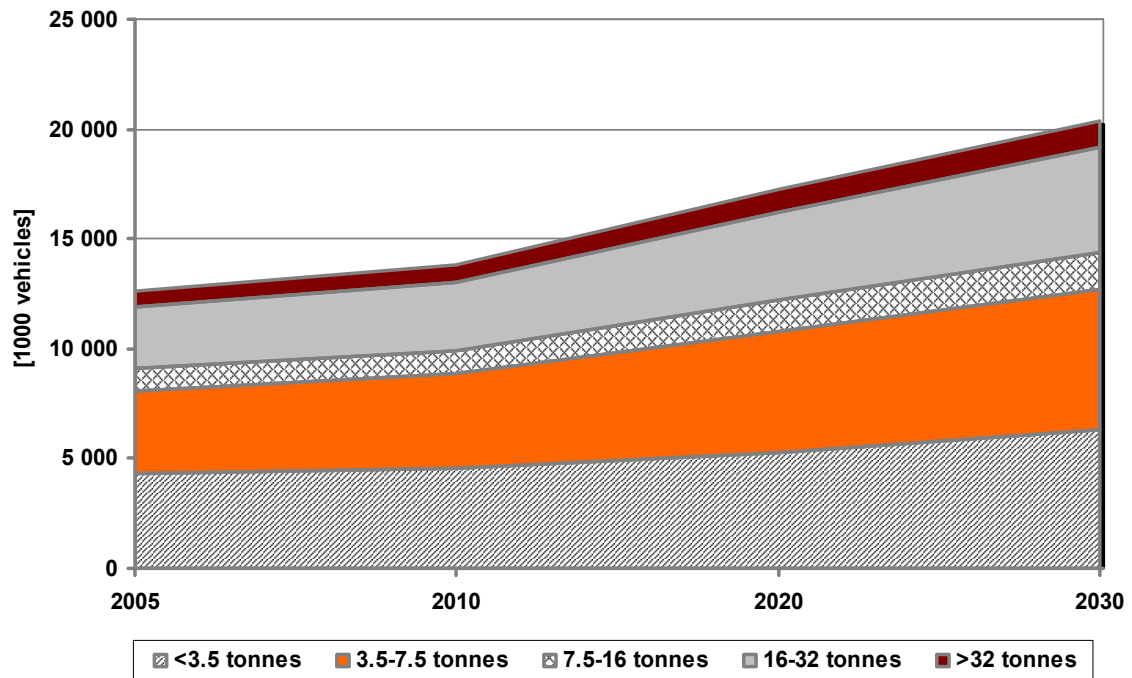
Figure 5-20: Conventional car fleet in EU15 countries by cubic capacity



Source: iTREN-2030 - TREMOVE model

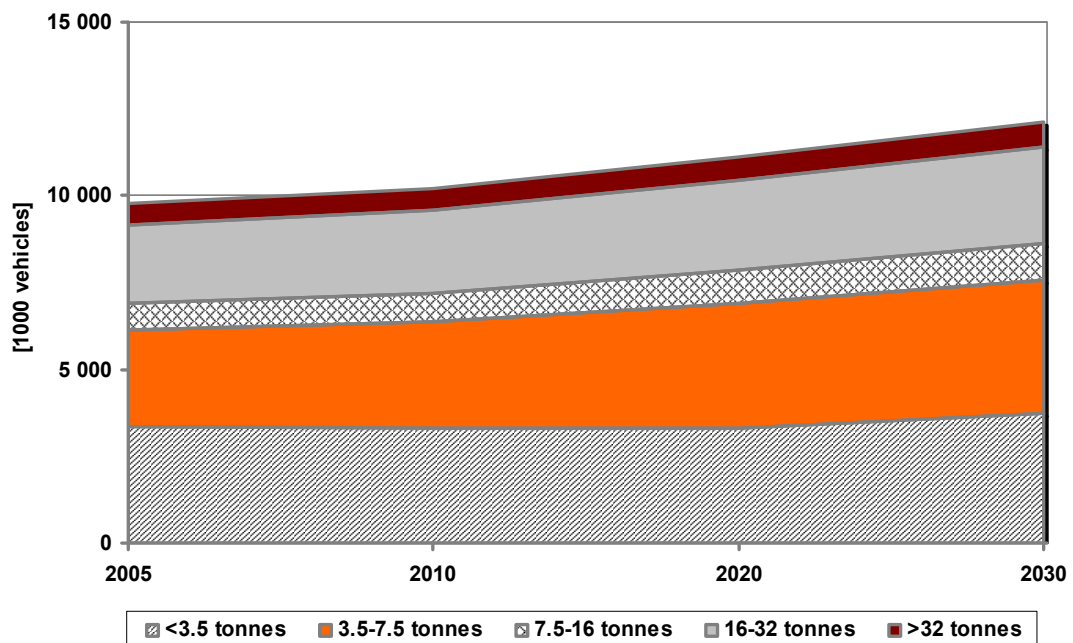
Figure 5-21: Conventional car fleet in EU12 countries by cubic capacity

Also the duty vehicle fleet is expected to grow significantly in almost all its components. In EU12 the share of heavy trucks should increase, consistently with the growth of long distance freight transport.



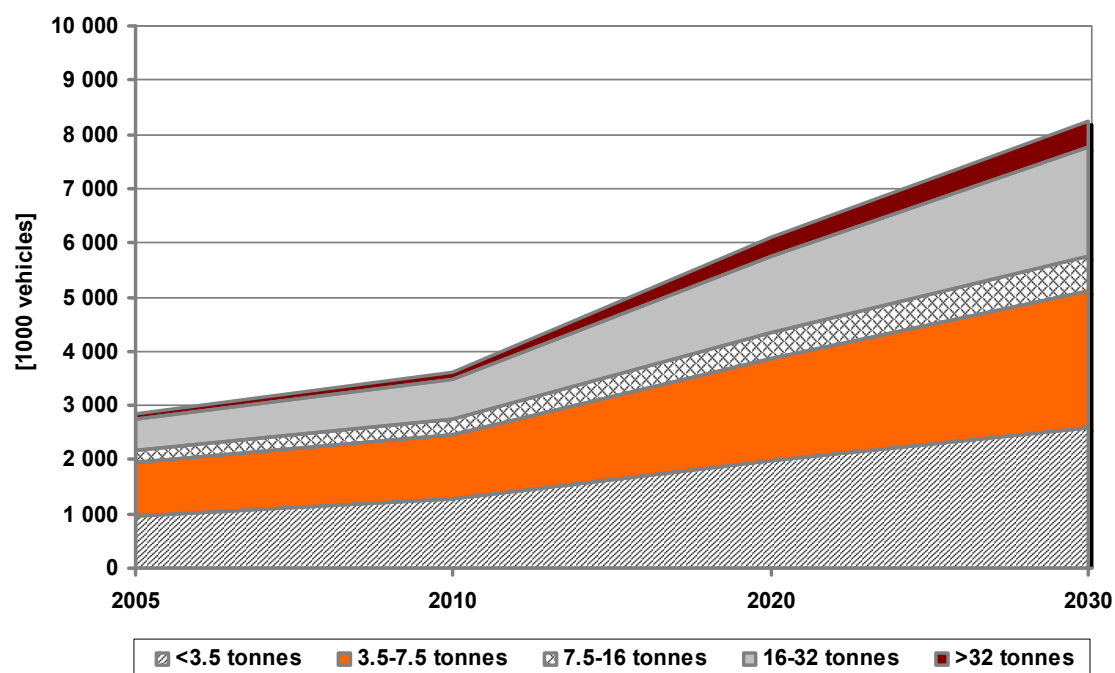
Source: iTREN-2030 - TREMOVE model

Figure 5-22: Duty vehicles fleet in EU27 countries by vehicles size



Source: iTREN-2030 - TREMOVE model

Figure 5-23: Duty vehicles fleet in EU15 countries by vehicles size

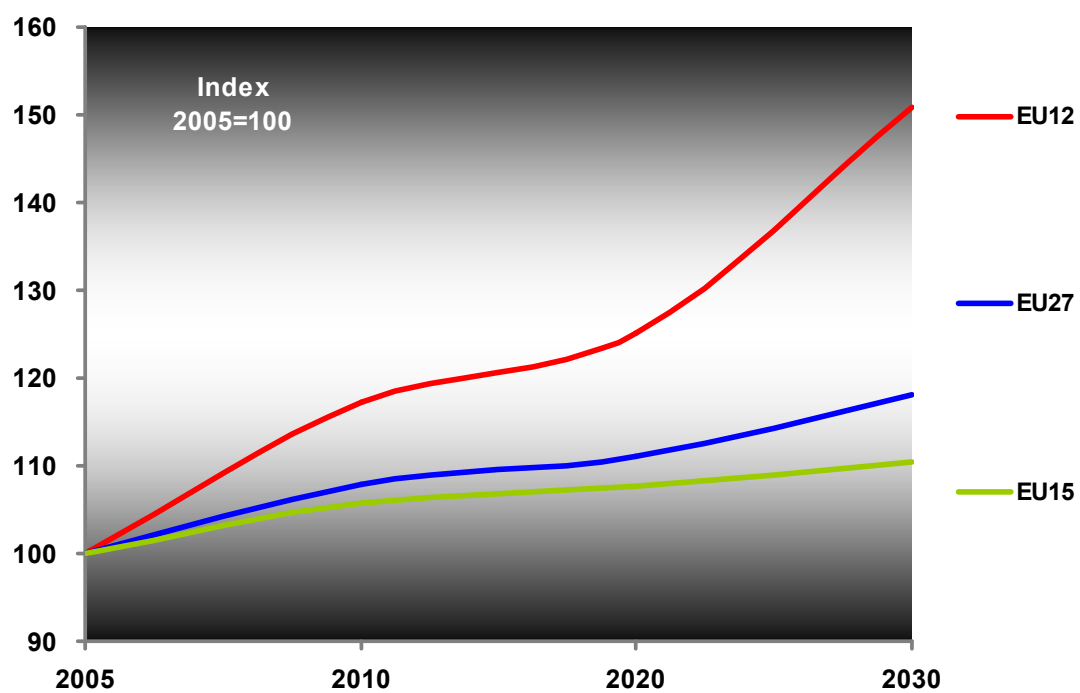


Source: iTREN-2030 - TREMOVE model

Figure 5-24: Duty vehicles fleet in EU12 countries by vehicles size

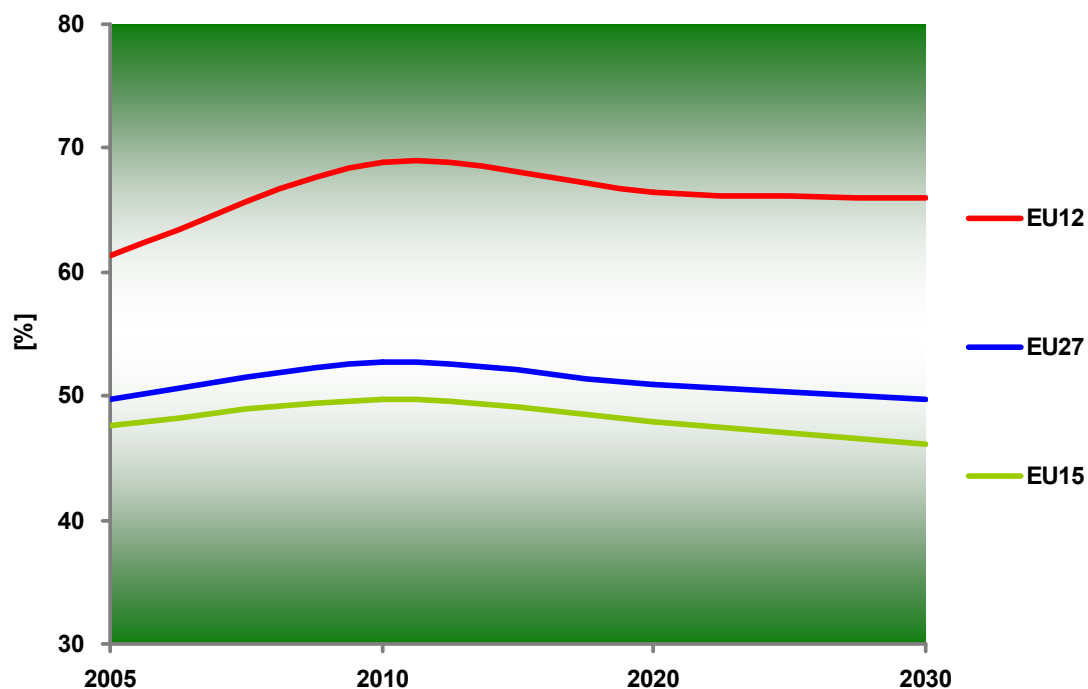
## 5.7 Energy sector in Reference Scenario

A growth of primary energy production in EU27 is forecasted in the iTREN-2030 Reference Scenario. The increase is quite significant in EU12 countries (+50%) while it is much more limited in EU15. At the same time, the share of domestic production is stable around 50%, with some increase in EU12 and a limited reduction in EU15.



Source: iTREN-2030 – POLES model

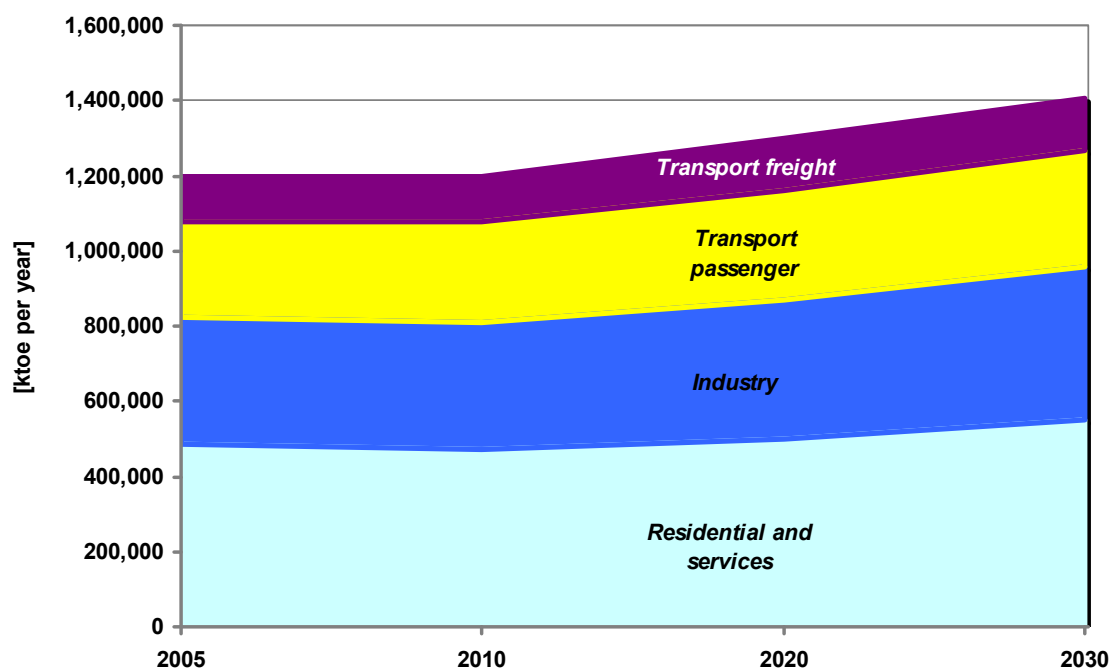
Figure 5-25: Primary energy production



Source: iTREN-2030 – POLES model

Figure 5-26: Share of domestic energy production

The increase of final energy demand is assumed to continue but at a slower pace as in the past. For the residential and service (including agriculture) sectors we foresee a growth around 13% between 2005 and 2030, considering lower trends than observed in the past decades (which had growth rates of around 2% per year) and the implemented policies to improve energy efficiency. The increase in the industrial sector should reach 21%. For the transport sector, the final energy demand is expected to increase in EU27 by around 0.8% per year i.e. 20% as a whole over the time period considered. Therefore, the energy consumption of the transport sector is in line with other sectors.



Source: iTREN-2030 – POLES model

Figure 5-27: Final energy demand by consuming sector in EU27 countries

Looking in more detail at the energy consumption of the transport sector, a higher growth is estimated for the final energy demand of passenger transport than for freight transport. The growth in final energy demand stems mainly from road passenger transport and air transport. Final energy demand of road passenger transport and air transport increase by almost 22%. On the freight side mainly energy demand of road freight transport is growing by 16%.

Table 5-15 Final energy demand per transport mode

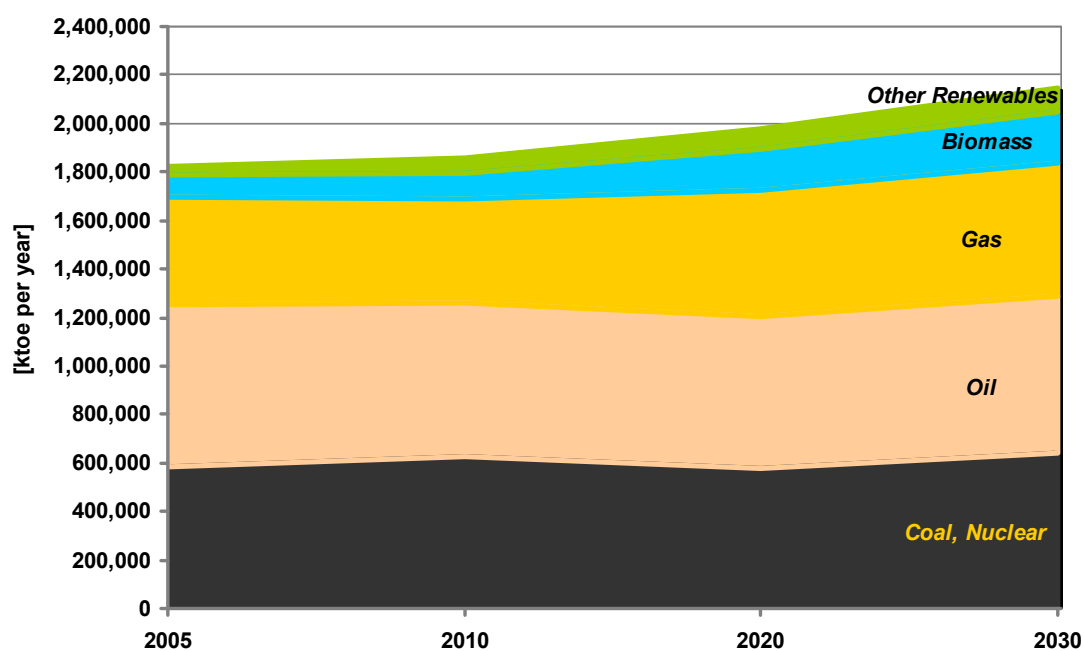
<b>Final energy demand [Mtoe]</b>	<b>2005</b>	<b>2010</b>	<b>2020</b>	<b>2030</b>
Transport – all modes	375	389	427	451
Road transport cars	201	221	230	246
Road transport freight	108	108	125	125
Rail	9	10	11	12
Aviation	51	46	56	63
Other transport	6	5	5	5

*Source: iTREN-2030 – POLES model*

Among the fossil fuels a shift from oil and coal towards gas is foreseen such as the share of gas on gross inland consumption might increase from 24% to 26% in 2030. Remarkably is also the increase of the share of biomass and of renewables to gross inland consumption from 5% respectively 2% in 2005 to almost 10% respectively 5% in 2030. Under the given conditions for biofuels in the Reference Scenario its share is expected to increase. However, we assume that in 2010 the biofuels share will be around 3.4%, falling short of the 5.75% target of the biofuels Directive. Nevertheless, we expect the biofuels consumption to increase to 6.6% in 2020 and to almost 10% in 2030. The increase of biofuels consumption is based on the high oil prices and on a decrease of production cost of biofuels, whose price is however ultimately forecasted to increase under demand pressure.

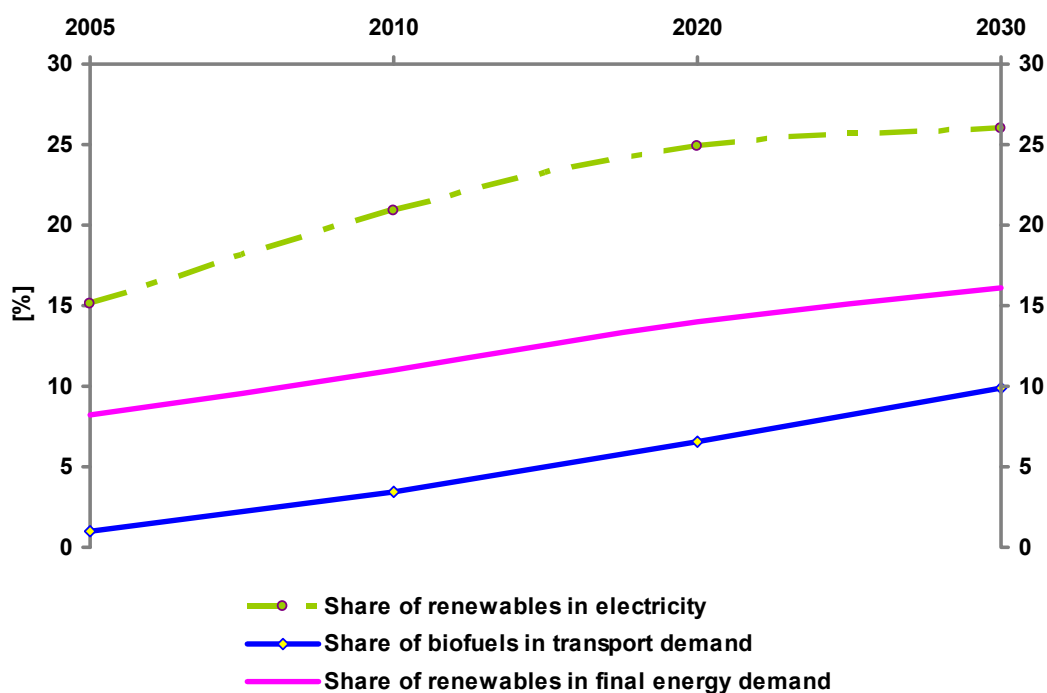
In comparison with other studies like the European Energy and Transport – Trends to 2030 (European Commission 2008a) the results are quite comparable. Minor differences emerge as we consider in POLES oil prices between 75 and 95 €<sub>2005</sub>/bbl, while in PRIMES the oil price increase from 55\$/bbl to 63\$/bbl. This leads to a stronger shift from oil towards gas, biomass and renewables in POLES. Hence, their share of primary energy reaches higher levels. The share of energy imports is affected from this shift as well. Due to gas, biomass and renewables the energy imports remain at a level of about 50% in POLES, whereas PRIMES assumes rising energy imports.





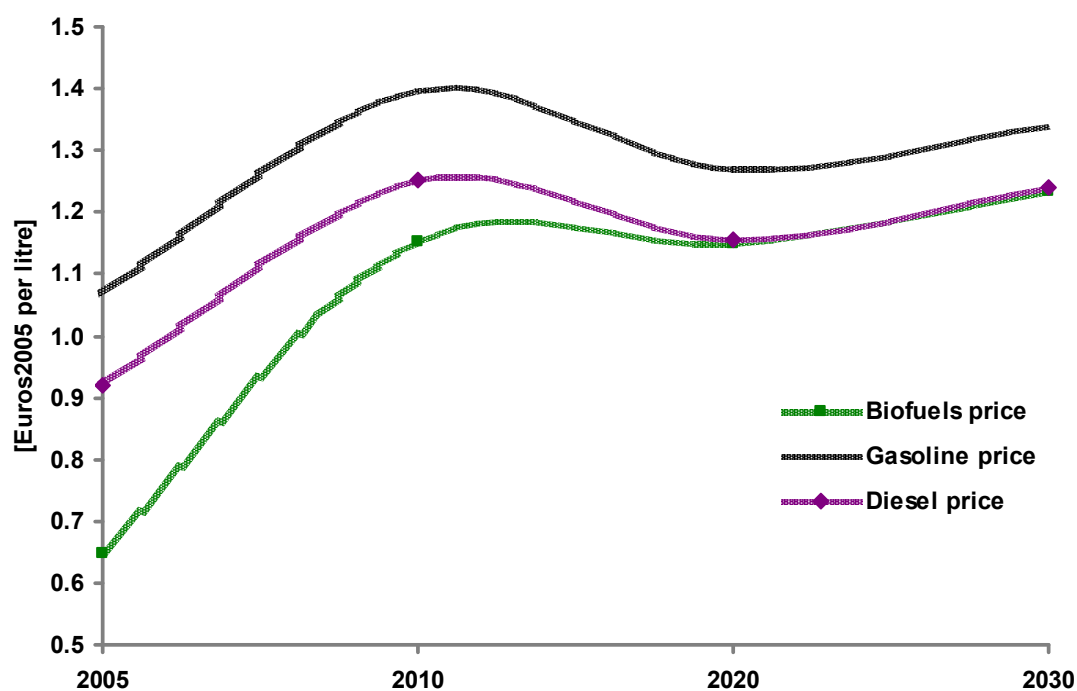
Source: iTREN-2030 – POLES model

Figure 5-28: Gross inland energy consumption by source in EU27 countries



Source: iTREN-2030 – POLES model

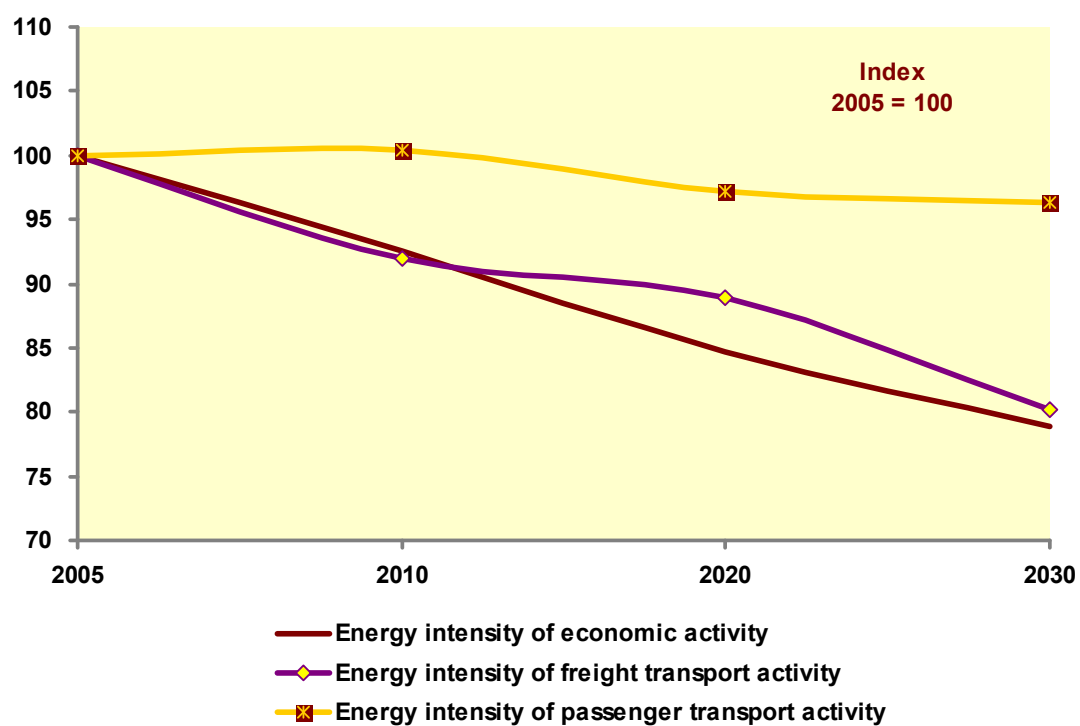
Figure 5-29: Shares of alternative energy sources in EU27 countries



Source: iTREN-2030 – POLES model

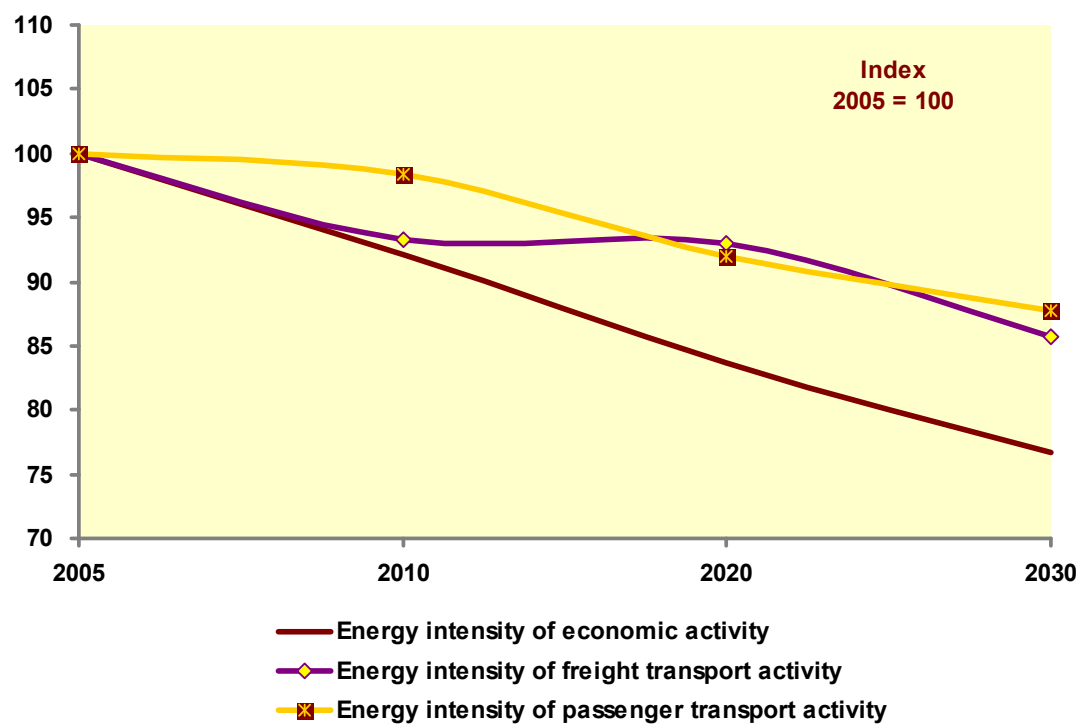
Figure 5-30: Average transport fuel price in EU27 countries

Energy consumption factors are decreasing between -0.2 and -0.8% per year. As already mentioned, in the transport sector the largest gains of efficiency are expected for freight, while the amount of energy per passenger moved is even expected to grow in EU12 because of the increasing motorisation.



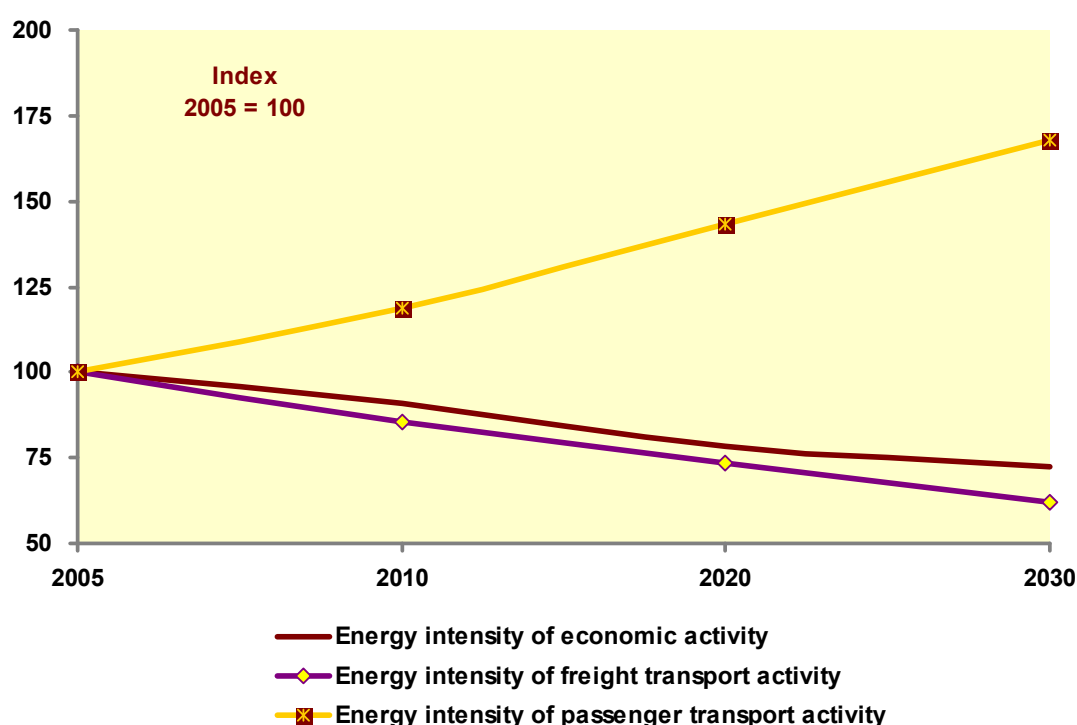
Source: iTREN-2030 elaboration on ASTRA and POLES data

Figure 5-31: Energy intensity of transport and economy in EU27 countries (2005 = 100)



Source: iTREN-2030 elaboration on ASTRA and POLES data

Figure 5-32: Energy intensity of transport and economy in EU15 countries (2005 = 100)



Source: iTREN-2030 elaboration on ASTRA and POLES data

Figure 5-33: Energy intensity of transport and economy in EU12 countries (2005 = 100)

The trends of energy consumption by source and of final energy demand by consuming sector in the iTREN-2030 Reference Scenario are shown in Table 5-16 and, respectively, Table 5-17 below compared to the European Energy and Transport - Trends to 2030.

As far as energy consumption is concerned, the iTREN-2030 Reference Scenario is slightly more optimistic in terms of renewable sources, whose growth rate is larger than in the Energy and Transport Trends to 2030. However, in both studies renewable sources develop faster than any other energy sources. Also, in both studies the contribution of oil, coal and nuclear is rather stable while gas is the second most dynamic source. In the iTREN-2030 Reference Scenario the total energy consumption is expected to grow at a faster pace than in the other study, but the two projections are comparable.

Also regarding final energy demand, the iTREN-2030 Reference Scenario and Energy and Transport Trends to 2030 are largely similar. The overall growth rate is the same and the only remarkable difference is that in iTREN-2030 energy demand of the transport sector is expected to grow slightly less than the average, in the other study it is expected to grow above the average.

Table 5-16 iTREN-2030 Reference Scenario energy consumption growth rates compared to European Energy and Transport Trends to 2030

Energy source	iTREN-2030	EET trends
Oil	-0.1%	0.2%
Gas	0.9%	0.6%
Coal – Nuclear	0.4%	-0.3%
Biomass	3.5%	2.7%
Other renewable	4.1%	
<i>Total</i>	<i>0.7%</i>	<i>0.4%</i>

Source: iTREN-2030 on various data

Table 5-17 iTREN-2030 Final energy demand growth rates compared to European Energy and Transport Trends to 2030

Energy source	iTREN-2030	EET trends
Passenger transport	0.8%	1.0%
Freight transport	0.6%	
Residential and Services	0.5%	0.6%
Industry	0.8%	0.7%
<i>Total</i>	<i>0.6%</i>	<i>0.7%</i>

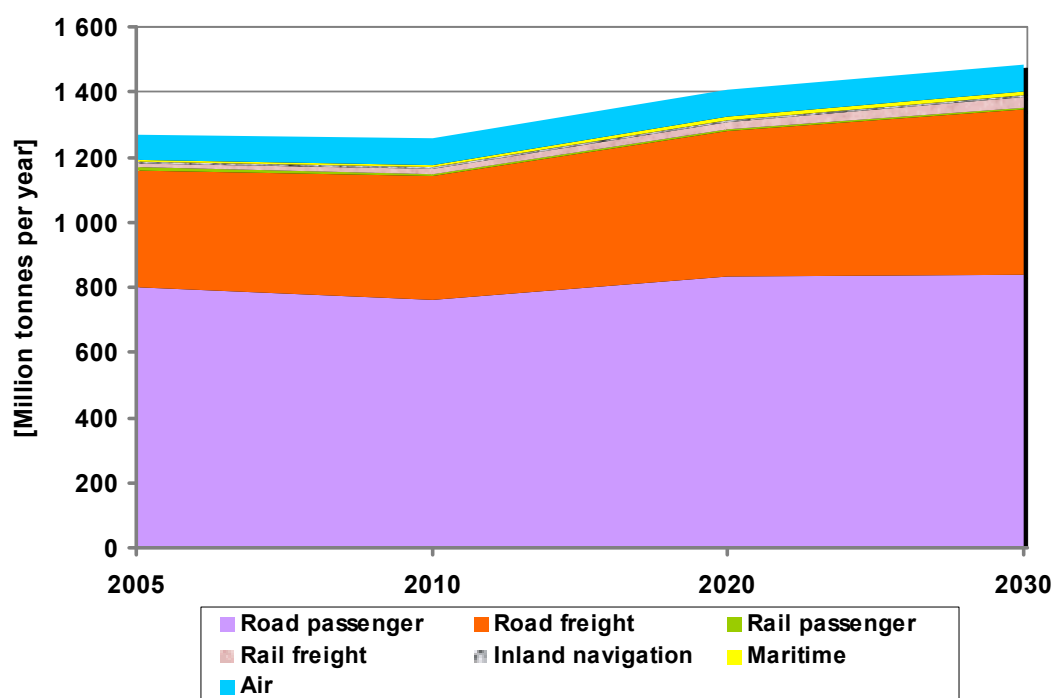
Source: iTREN-2030 on various data

## 5.8 Transport emissions in Reference Scenario

CO<sub>2</sub> emissions of transport in EU27 countries slightly increase between 2005 and 2030 in the iTREN-2030 Reference Scenario. This forecast is in line with respect to the projections of the European Energy and Transport – Trends to 2030 (European Commission, 2008a), where an increase of transport CO<sub>2</sub> emissions is envisaged as well.

The bulk of the emissions comes from road passenger mode followed by road freight and air modes. The road passenger emissions are basically stable and the share of this mode in total emissions decreases slightly from 63% to 57%. Road freight emissions increase by an average of 0.8% between 2005 and 2010 then by an average of 1.5% between 2010 and 2030. The share of this mode's emission increases from around 29% in 2005 to 34% in 2030. Emission share of air mode remains relatively constant at around 6% during the 25 year period. It is worth to note that rail freight is the mode that has the highest growth rate of CO<sub>2</sub> emissions: it increases by an average

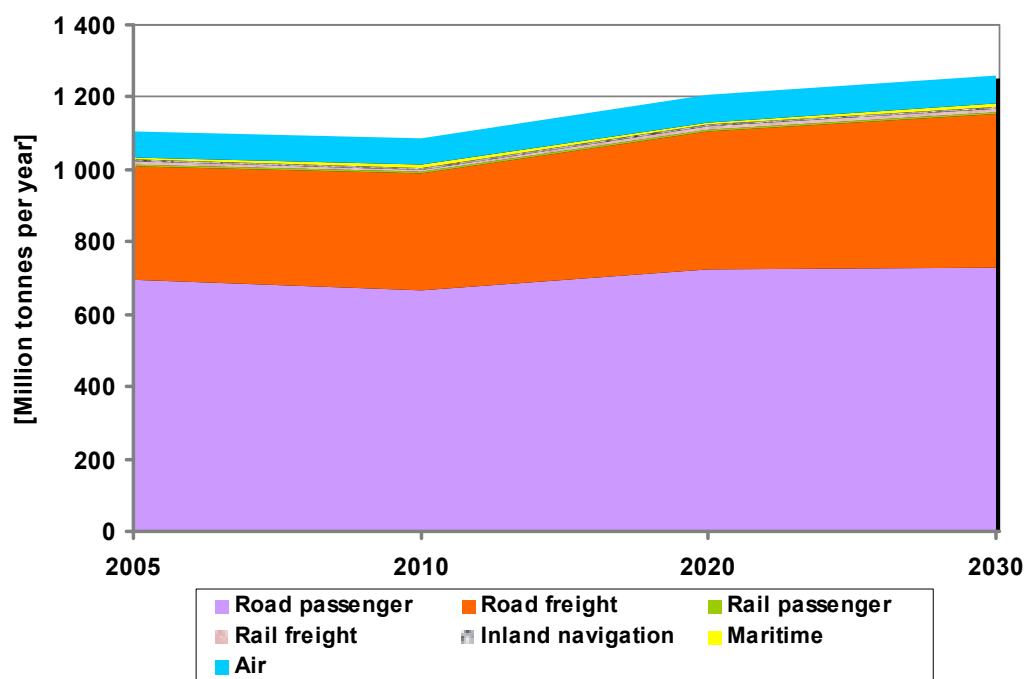
of 5.4% between 2005 and 2010 and by an average of 3.9% between 2010 and 2030 driven by the strongest demand growth. The share of rail freight CO<sub>2</sub> emissions increases from around 1% in 2005 to around 2% in 2030.



Source: iTREN-2030 – ASTRA model

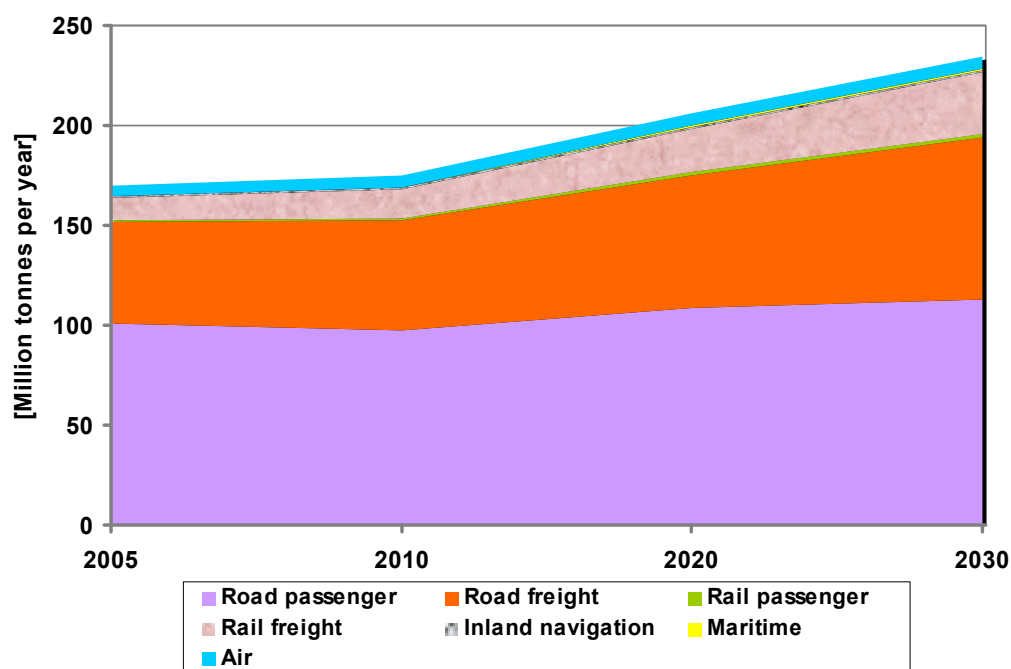
Figure 5-34: CO<sub>2</sub> transport emissions in EU27 countries by mode of transport

Observation on EU15 and EU12 gives different panorama on the evolution of CO<sub>2</sub> emissions in relation to that of EU27. Total CO<sub>2</sub> emissions in EU15 increase by around 14% during 25 years, while the total CO<sub>2</sub> emissions in EU12 increase by around 38% during the same period. Increase in the rail freight CO<sub>2</sub> emissions in EU12 is significant which is also the principle cause of the increase of total CO<sub>2</sub> in EU12: its share increases twofold from 6.4% (11 Mtonnes) in 2005 to 13.2% (31 Mtonnes) in 2030. It is also important to note how in absolute term the CO<sub>2</sub> emissions from rail freight mode in EU12 are two (in 2005) to three times (in 2030) bigger than those in EU15.



Source: iTREN-2030 – ASTRA model

Figure 5-35: CO<sub>2</sub> transport emissions in EU15 countries by mode of transport



Source: iTREN-2030 – ASTRA model

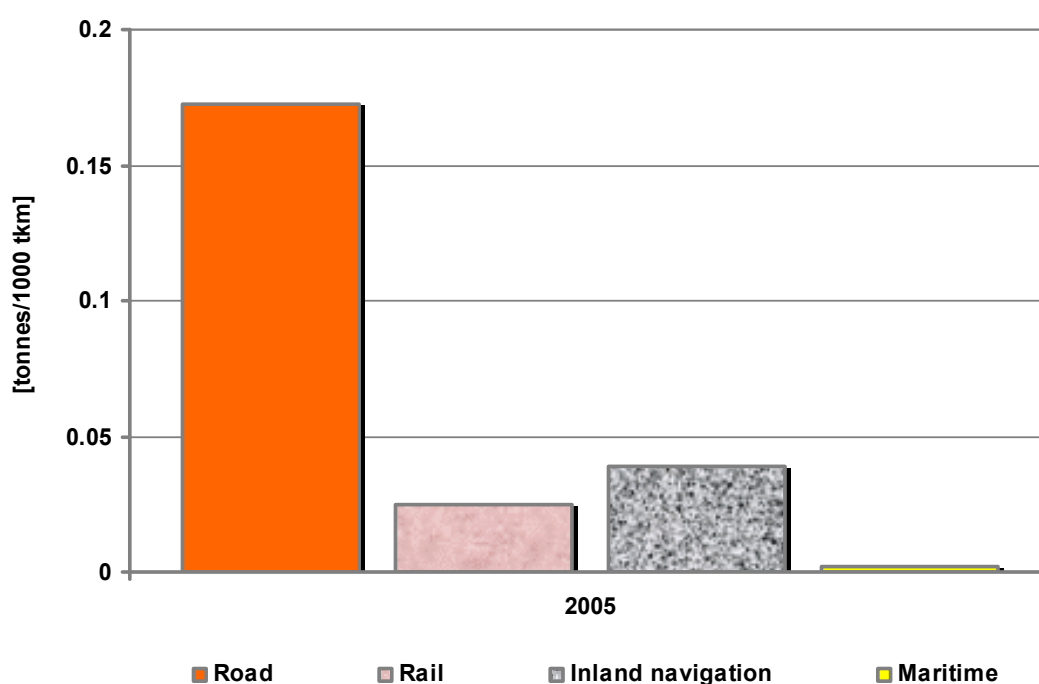
Figure 5-36: CO<sub>2</sub> transport emissions in EU12 countries by mode of transport



Road freight modes show the highest CO<sub>2</sub> intensity in term of tonnes per 1000 tkm. At EU27 level in 2005, it shows an intensity of 0.17 tonnes CO<sub>2</sub> per 1000 tkm. At that year this intensity is five times bigger than that of inland waterway modes, more than eight times bigger than that of rail freight modes and 100 times bigger than that of maritime modes.

CO<sub>2</sub> transport intensity of road remains unchanged during the 25 year period, while limited progress is expected from inland navigation (-7%) and maritime (-13%). Rail freight, in the contrary, shows more than 50% increase during the same period. This increase in the CO<sub>2</sub> intensity of rail freight seems to be one of the main causes of the increase of CO<sub>2</sub> emissions from this mode as shown at the beginning of this sub-section. Nevertheless, rail freight remains largely more 'CO<sub>2</sub>-efficient' than road freight.

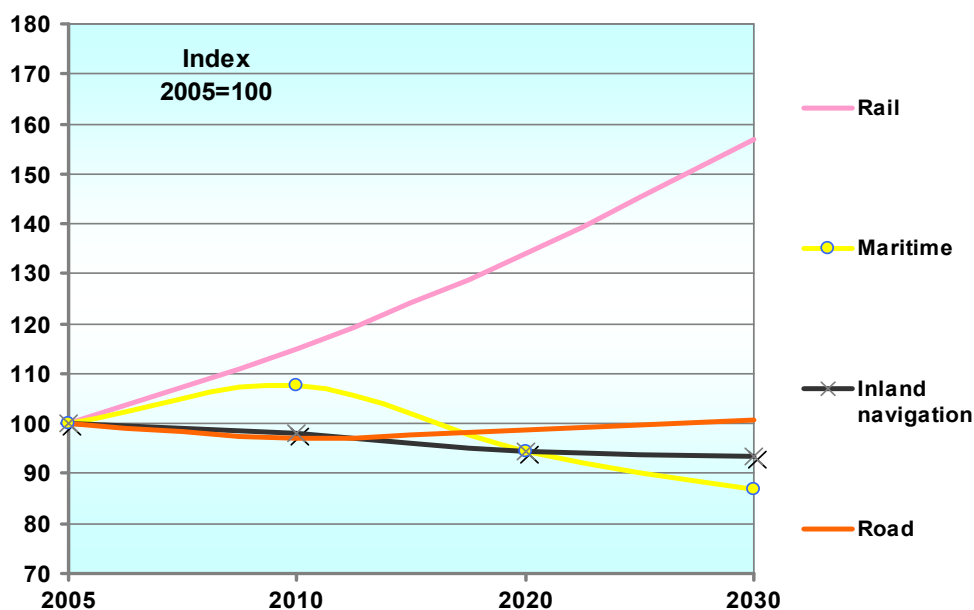
Concerning the passenger transport, air transport mode is the one that has the highest CO<sub>2</sub> emission intensity in 2005. The CO<sub>2</sub> intensity of air transport is around 0.17 tonnes CO<sub>2</sub> per 1000 pkm in 2005 which is around 1.3 times bigger than that of road passenger and more than 10 times bigger than that of rail passenger modes. Between 2005 and 2030, all the three modes show decrease in CO<sub>2</sub> emission intensity: more than 15% from road passenger modes, nearly 10% for rail and around 20% from air.



Source: iTREN-2030 – ASTRA model

Figure 5-37: CO<sub>2</sub> transport intensity of freight transport in EU27 countries in the year 2005

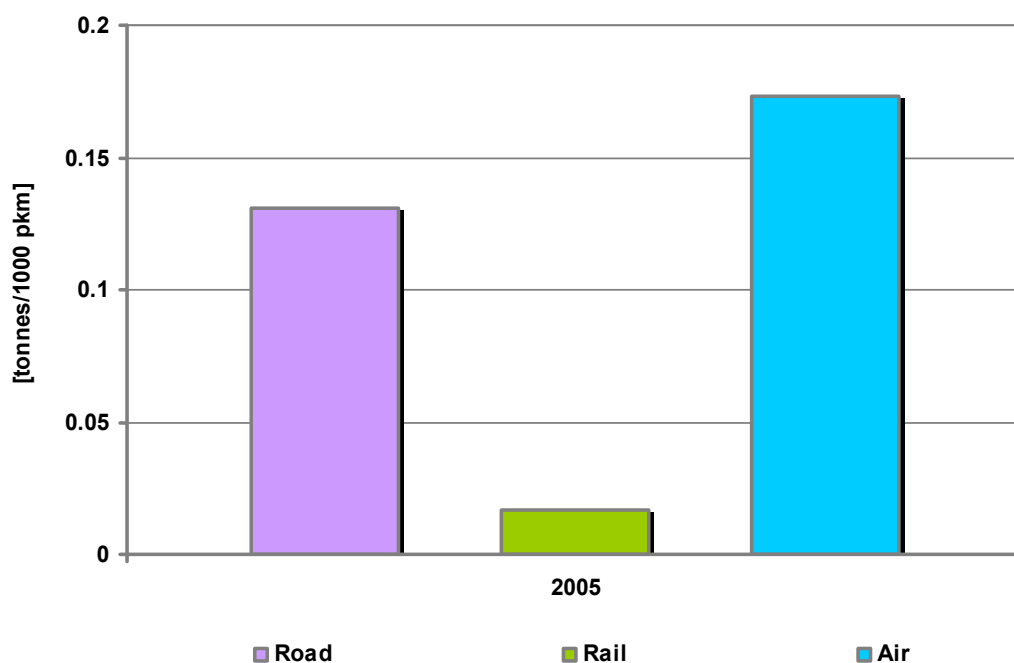
The result in Figure 5-38 is obtained by a calculation from the totals of emissions and total transport performance by mode. I.e. it is not a pure measure of technical progress, but it accounts for the full picture, which in the case of rail includes technical progress, changes of goods structure (less bulk goods and thus shorter/lighter trains), changes of transport distances and changes of speeds (longer distances with higher speeds).



Source: iTREN-2030 – ASTRA model

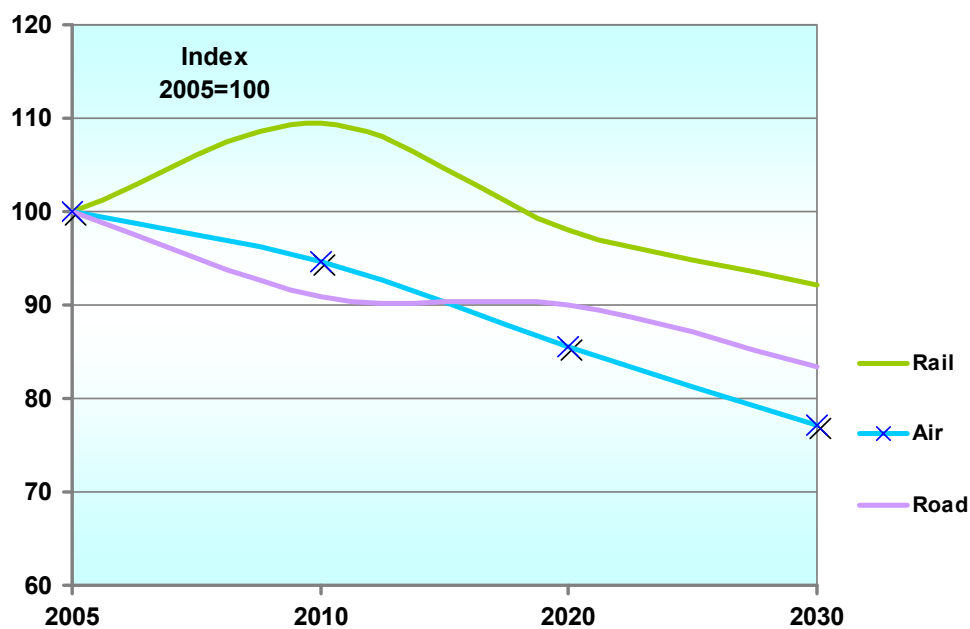
Figure 5-38: Trend of CO<sub>2</sub> transport intensity of freight transport in EU27 countries (2005 = 100)

For passenger rail transport (see Figure 5-39) it is similar that the trend to increase the speed of rail (e.g. by high-speed rail) in the first years tends to increase the energy demand and CO<sub>2</sub> intensity of rail passenger transport. After that CO<sub>2</sub> intensity is going to improve for all modes.



Source: iTREN-2030 – ASTRA model

Figure 5-39: CO<sub>2</sub> transport intensity of passenger transport in EU27 countries in the year 2005

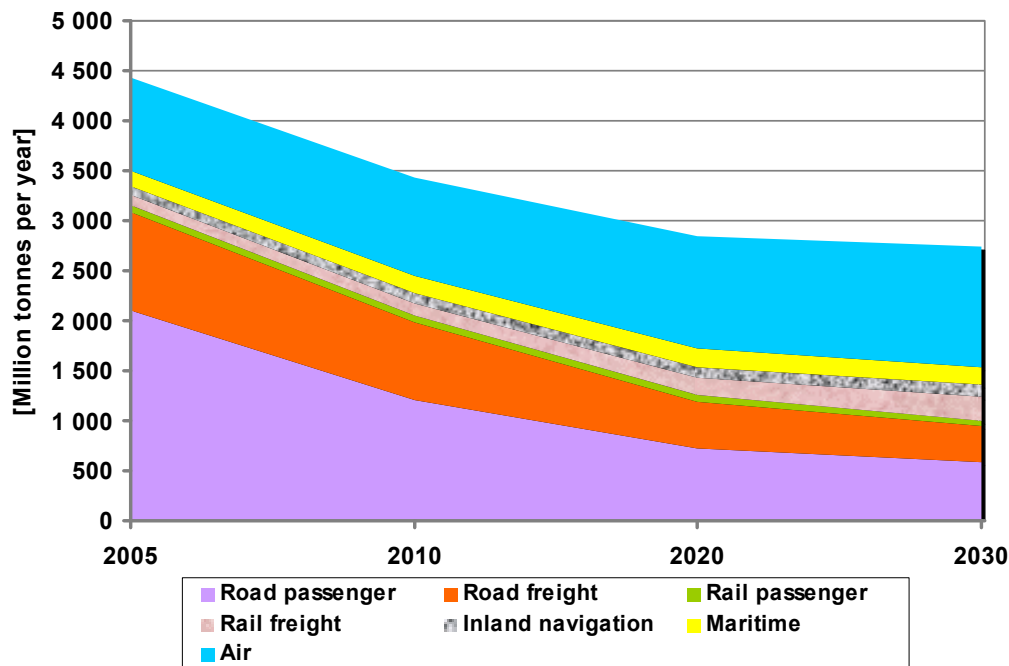


Source: iTREN-2030 – ASTRA model

Figure 5-40: Trend of CO<sub>2</sub> transport intensity of passenger transport in EU27 countries (2005 = 100)

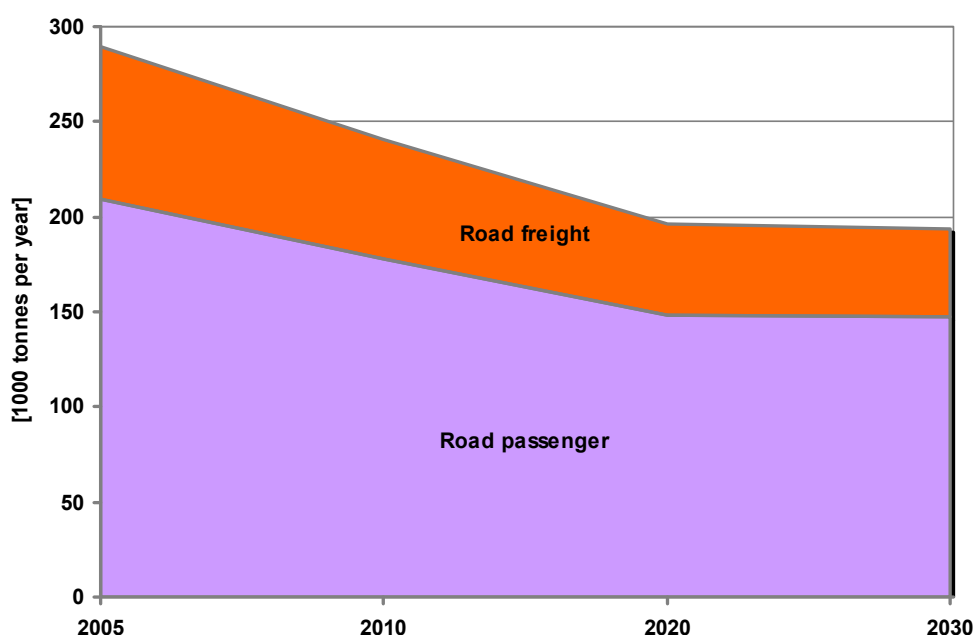
Finally, it is interesting also to remark how total  $\text{NO}_x$  and  $\text{PM}_{10}$  emissions can be expected to decrease during the 25 year period. Total  $\text{NO}_x$  transport emissions in EU27 decrease by around 40% during that period. In 2005, the contribution of road passenger modes reaches almost 50% of the total  $\text{NO}_x$  emissions followed by air transport and road freight with around 20% each. In 2030, the panorama changes significantly: the contribution of air transport can be expected to reach around 45%, road passenger around 20%, and road freight 12%. The most significant decrease comes from the road passenger modes (75% in 25 years), followed by road freight modes (around 67%). The highest increase during the 25 year period can be expected to happen in the rail freight modes (more than 3 times) while air transport modes undergo increase of around 30% in 25 years.

$\text{PM}_{10}$  emissions decrease by around 34% between 2005 and 2030. The main decrease can be traced to the decrease of the  $\text{PM}_{10}$  emissions from road freight modes with more than 40% of emission decrease during the 25 year period. Meanwhile, the decrease of  $\text{PM}_{10}$  emissions from road passenger is around 30% during the same observed period. The share of  $\text{PM}_{10}$  emissions from the two modes remains relatively constant during the period: around 25% from road freight and around 75% from road passenger modes.



Source: iTREN-2030 – ASTRA model

Figure 5-41:  $\text{NO}_x$  transport emissions in EU27 countries by mode of transport



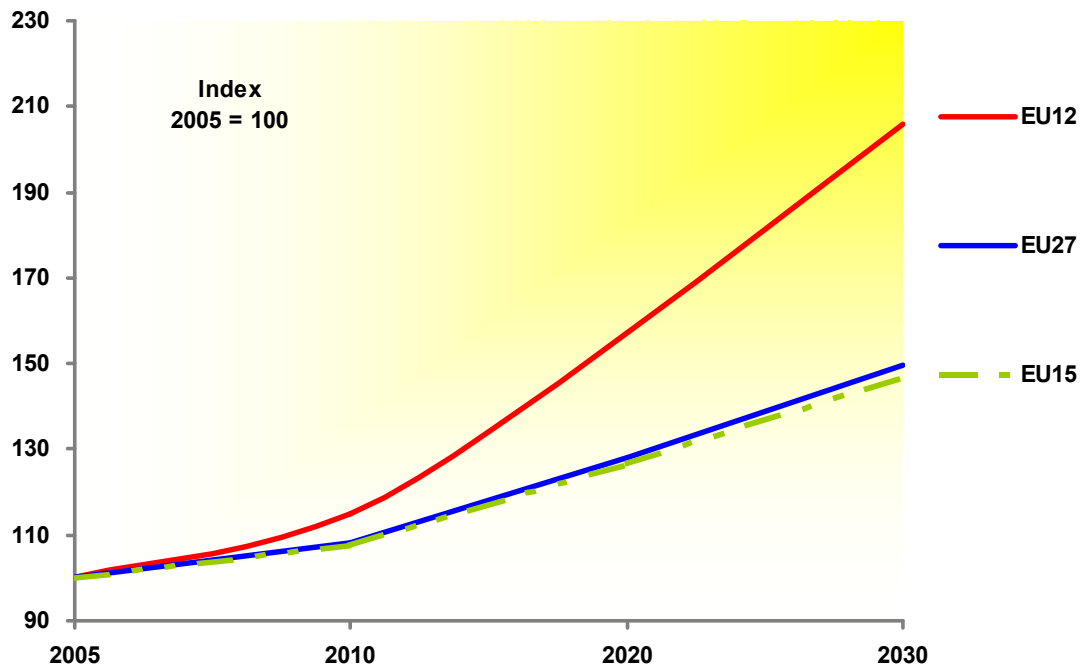
Source: iTREN-2030 – ASTRA model

Figure 5-42: PM<sub>10</sub> road transport emissions in EU27 countries by mode of transport

## 5.9 Economy in Reference Scenario

As already mentioned among the assumptions, in the iTREN-2030 Reference Scenario a moderate economic growth is expected in the EU27 (see Figure 5-43), with a significantly faster development in EU12 (nearly 3% per year) than in EU15 (nearly 1.5% per year). For both the European areas, these assumptions are less optimistic than those adopted in European Energy and Transport – Trends to 2030 (European Commission 2008a), which expected an average annual growth of just above 2%, while the growth of EU27 in the Reference Scenario in iTREN-2030 is 1.6%, only. Despite this difference looks small it causes a difference of the level of EU27 GDP of about 15% in 2030.

Population development is comparable between the two studies with 489/490 million persons in 2005/2006 and 495/494 million persons in 2030 in the EU27.

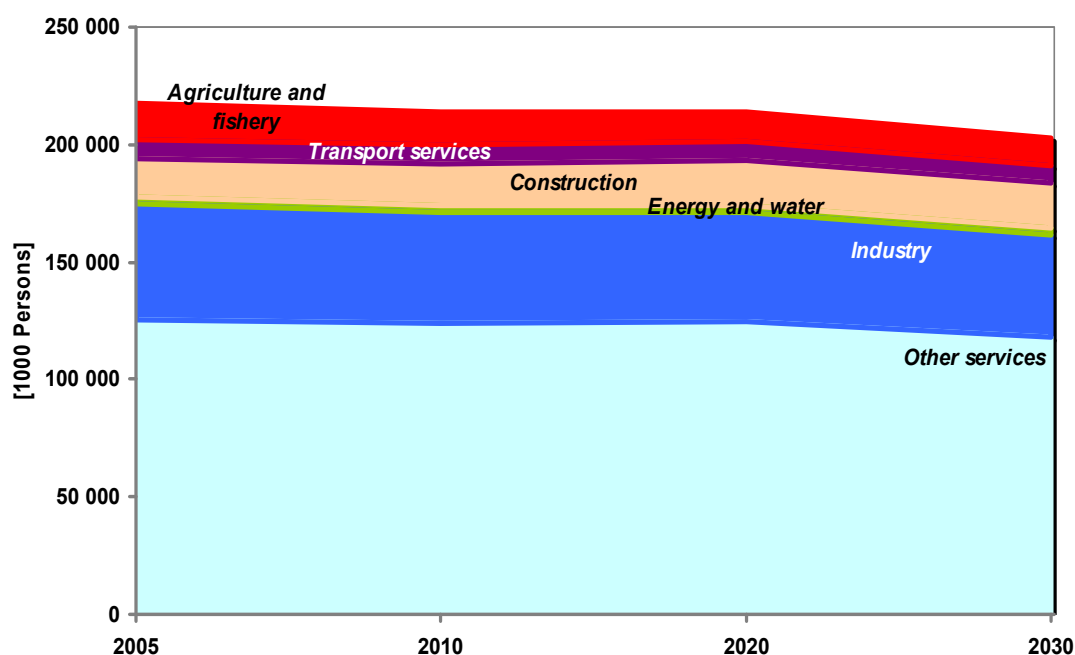


Source: iTREN-2030 – ASTRA model

Figure 5-43: GDP growth (2005 = 100)

The one expected is a jobless growth, i.e. the number of employed persons is expected to fall from 217 millions in the year 2005 to 203 millions at the horizon of the year 2030. This trend is partially explained by demographic reasons, because also labour forces should be shrinking, but the reduction of employment would be faster.

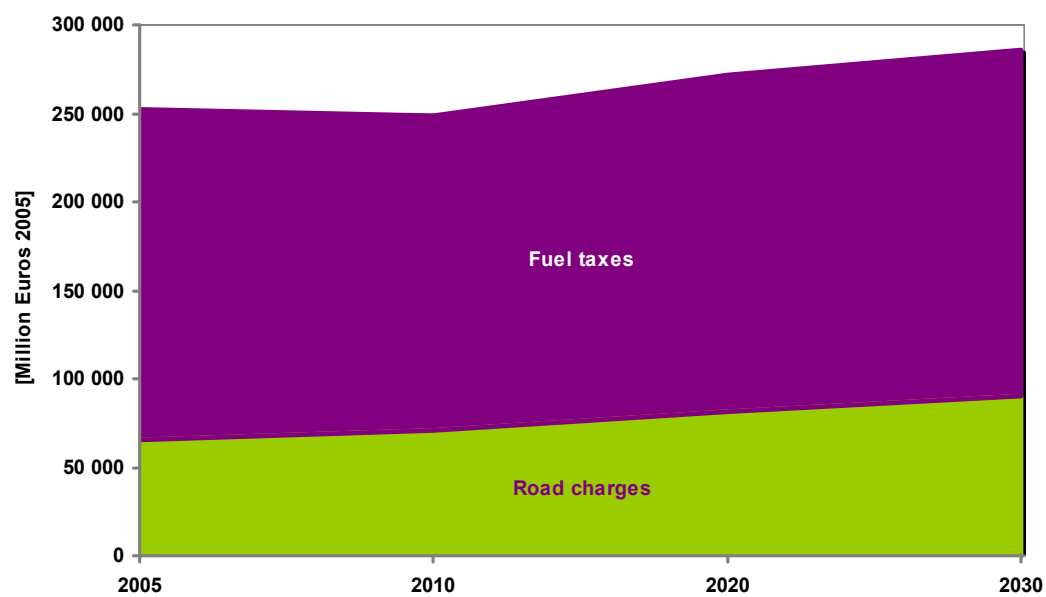
The energy sector is one of the few where the employment is forecasted to increase (another is construction). In particular agriculture and other services are reducing employment. For agriculture the reason is that the restructuring process, in particular in Eastern Europe, towards larger and more mechanised farms continues reducing employment (a shift towards biological farming that would be more labour intense was not assumed). Other services loose employment in two ways: first government is part of this sector and continues to reduce employment and second the productivity growth in these sectors is higher than the overall (moderate) economic growth such that employment gets lost.



Source: iTREN-2030 – ASTRA model

Figure 5-44: Employment by sector in EU27 countries

A specific economic impact of the transformations expected in the Reference Scenario is the partial modification of the sources of transport taxation revenues. Because of the improvements on the energy efficiency side and the slow introduction of alternative fuels, the share of revenues from fuel taxes on total transport taxation revenues are expected to slightly fall from 74% in 2005 to 68% in 2030. A larger share is instead expected to come from road charges due to the introduction of road pricing for heavy duty vehicles. As a whole, transport taxation revenues are expected to increase.



Source: iTREN-2030 – ASTRA model

Figure 5-45: Transport taxation revenues by source in EU27 countries



## 6 Conclusions

The iTREN-2030 Reference Scenario provides an overview of transport, energy, economic and environmental forecasts thanks to the application of four modelling tools that were integrated to provide consistent projections. A significant amount of work was carried out in WP4 to harmonise models, to update the interface between TRANS-TOOLS and TREMOVE and to produce the reference projections data. Transport demand forecasts were drawn from the TEN-Connect project, as requested by the Commission, with some revisions concerning rail passenger demand.

The outcome of WP4 is therefore twofold. On the one hand, four modelling tools were made more consistent with each other, are using common inputs and are calibrated according to the same assumptions. In particular, the TREMOVE model now has TRANS-TOOLS as the provider of the transport demand baseline it needs for simulating scenarios. On the other hand, a detailed set of quantitative forecasts and a comprehensive data output template was produced for the EU27 as a whole and the individual Member States concerning the different domains covered by the four models. These detailed data sets are given in the Annex to this deliverable.

The iTREN-2030 Reference Scenario does not assume relevant shocks in the exogenous elements. In particular, the global economic crisis that started in 2008 is not reflected in the modelling estimations. It is implicitly assumed that the economic downturn is a temporary event while the scenario concerns a 25-year period until the year 2030. However, the economic forecast applied in iTREN-2030 was already moderate and at the lower end of available projections. The possible impact of even a relatively short crisis on the future trends will be considered in the iTREN-2030 Integrated Scenario developed in WP5.

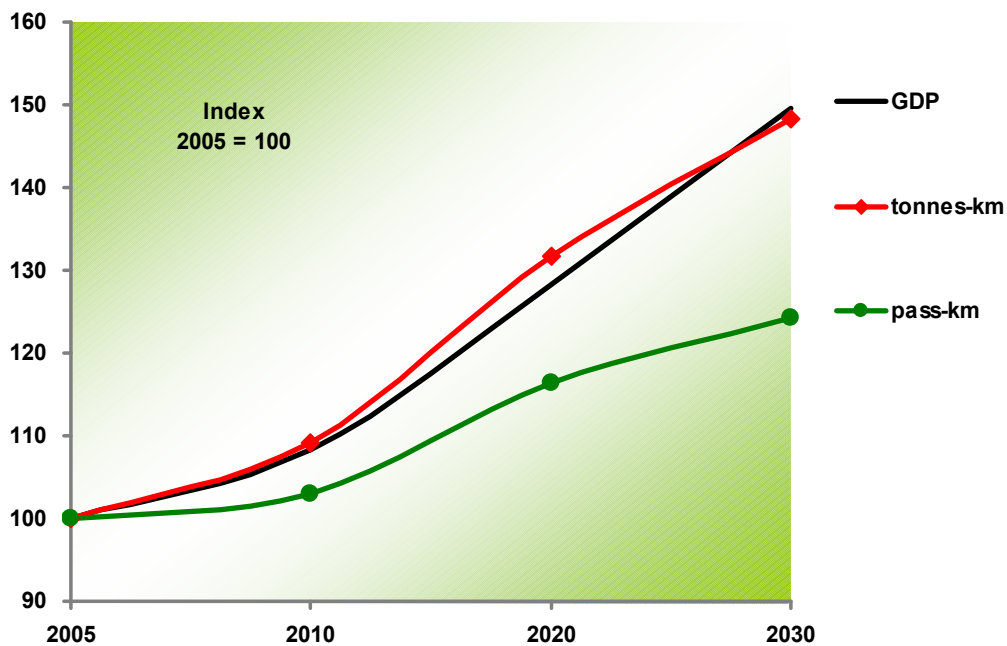
In brief, the iTREN-2030 Reference Scenario should not be regarded as a forecast of the most likely future until 2030. It is a set of projections under given, reasonable assumptions concerning both the socio-economic environment and a kind of frozen policy environment. From this point of view, in the Reference Scenario, only policies approved by mid 2008 are included. The Integrated scenario will explore the impact of a richer set of policies.

The storyline of the Reference Scenario is one of an overall stagnant population combined with ageing of this population, i.e. with a strongly growing share of population being 65 years of age and older. Economic development still sees an increase of income expressed as moderately growing GDP, though the average growth rate is expected to be lower than in the past two decades. In the transport sector the opportunities of introducing and harmonising pricing and taxation are not taken by most Member

States, preserving the scattered and unbalanced level of charges and taxes across countries and modes. The TEN-T networks are slowly implemented. Advanced regulation e.g. driven by ambitious climate policy or energy security issues is not implemented, so that R&D and innovation efforts are not stimulated by adequate regulation. Overall, the energy and transport framework can be described as “Policy Frozen in 2008”, i.e. only those policies become part of the Reference Scenario that have been decided by the EU Council or the EU parliament by mid 2008.

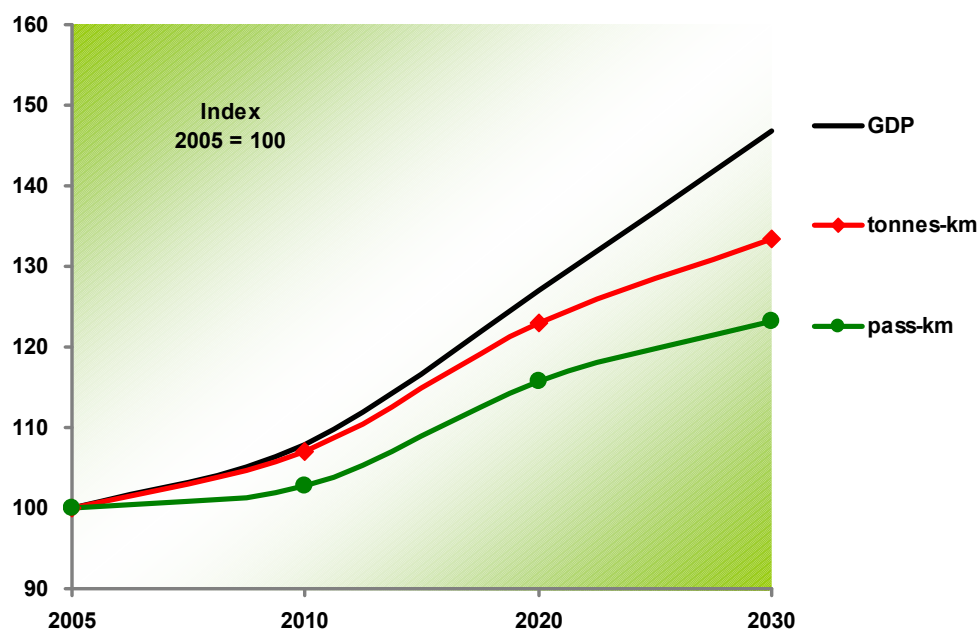
The iTREN-2030 Reference Scenario shows that transport demand will increase until 2030, especially freight demand, which is projected to be 50% greater in the year 2030 than in the year 2005, while passenger demand should grow more slowly. Therefore, for the EU27 as a whole, decoupling between economic growth and transport demand is expected only for passengers but not for freight.

Freight demand should increase, especially in EU12 countries, driven by their stronger economic growth. Actually, freight transport performance is expected to grow even faster than GDP because of the increment of average distances. Instead, in the EU15 both passenger and freight growth rates are below GDP.



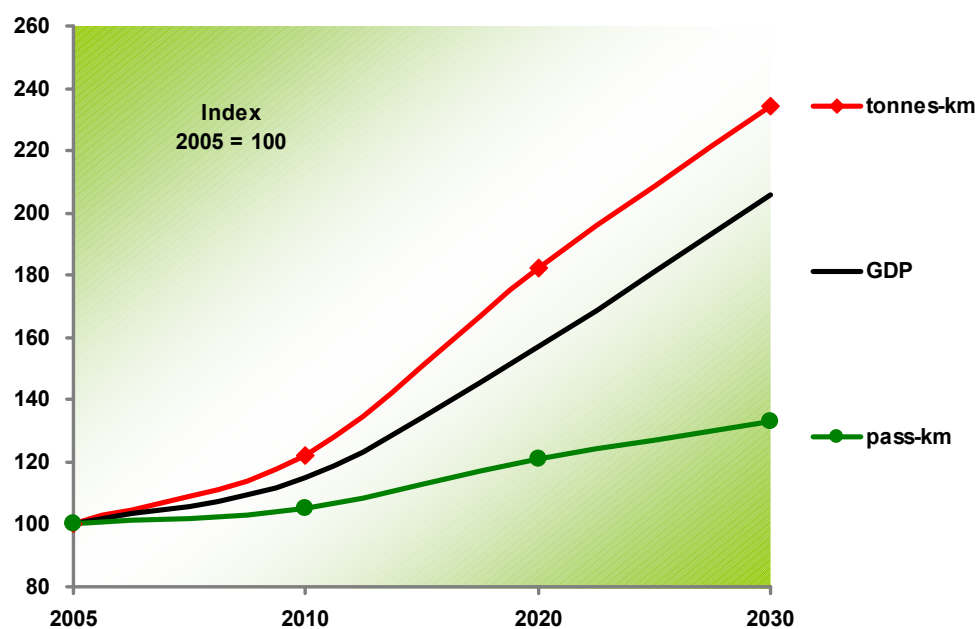
Source: iTREN-2030 elaboration on TRANS-TOOLS and ASTRA data

Figure 6-1: Transport demand trend compared to economic trend for EU27 countries



Source: iTREN-2030 elaboration on TRANS-TOOLS and ASTRA data

Figure 6-2: Transport demand trend compared to economic trend for EU15 countries



Source: iTREN-2030 elaboration on TRANS-TOOLS and ASTRA data

Figure 6-3: Transport demand trend compared to economic trend for EU12 countries

While the economy of the EU27 is expected to grow on average at 1.6% per year (but with a decreasing level of employment) and transport at the same pace or somewhat less for passengers, final energy demand is expected to grow by less than 1% per year, which means that the EU27 should become slightly more energy-efficient with the contribution of all aggregate sectors (industry, transport, residential and services). Higher costs for fossil energy should provide an incentive for the efficiency gains and also for some penetration of renewable sources, which are forecast to satisfy 16% of final energy demand (26% of electricity production) in the EU27 in 2030.

In the transport sector, without the pressure from ambitious climate policy and policies that improve energy security, the market uptake of innovative alternative technologies remains limited. The market share of biofuels in transport would reach 6% in 2020 and 10% in 2030 only. The penetration of innovative vehicle technologies entering the car fleet would stay at 8 million cars - mainly bioethanol and hybrid cars - equivalent to a share of 2.5% of the whole fleet in the year 2030.

A positive trend is expected for the polluting emissions of transport (e.g. NO<sub>x</sub> and PM<sub>10</sub>). The introduction and enforcement of the European road vehicle emission standards will substantially decrease these emissions until 2030.

However, increased energy efficiency and renewable sources (biofuels) of the Reference Scenario will not be sufficient to stop the growth of CO<sub>2</sub> emissions in the transport sector, which are expected to be 17% over the level of the year 2005. This would strongly contradict the European Energy and Climate Package (European Commission 2008b), which calls for a reduction of -10% of GHG of the transport sector, already by 2020. To draw a scenario that would be compatible with such requirements defined by the European energy and climate policy will be the purpose of the Integrated Scenario of iTREN-2030, which will be described in the next deliverable (D5) of the project.

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## **Annex 1: Validation of base year iTREN-2030 Reference Scenario data**

The following tables provide comparisons between iTREN-2030 Reference Scenario results and statistics drawn from the publication “EU Energy and Transport in Figures – Statistical pocketbook 2009” (referenced as ETiF in the tables). The comparisons are made at the country level and concern the following indicators:

- Total passengers-km of land modes of transport;
- Mode shares (computed on passengers-km) of passenger land modes;
- Total tonnes-km of land modes of transport;
- Mode shares (computed on tonnes-km) of freight land modes;
- Gross inland consumption by source;
- Final energy demand by consuming sector;
- CO2 transport emissions;
- Number of vehicles in the car fleet.

Table A-1: Passenger land\* transport activity in the year 2005: comparison between iTREN-2030 and ETiF (Billion pkms)

Country code	Country Name	iTREN-2030	ETiF
BLX	Belgium & Luxemburg	147	144
BG	Bulgaria	50	43
CZ	Czech Republic	101	99
DK	Denmark	71	66
DE	Germany	1,053	1,016
EE	Estonia	13	13
IE	Ireland	37	47
EL	Greece	91	110
ES	Spain	471	419
FR	France	909	860
IT	Italy	915	847
CY	Cyprus	6	6
LV	Latvia	14	19
LT	Lithuania	27	39
HU	Hungary	80	77
MT	Malta	2	2
NL	The Netherlands	198	177
AT	Austria	108	93
PL	Poland	234	249
PT	Portugal	96	86
RO	Romania	87	82
SI	Slovenia	22	26
SK	Slovak Republic	42	37
FI	Finland	70	73
SE	Sweden	118	117
UK	United Kingdom	791	777
HR	Croatia	n.a.	29
TR	Turkey	n.a.	195
NO	Norway	71	61
CH	Switzerland	111	109

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

\* Car, bus and train/tram only

Table A-2: Passenger land\* modes split in the year 2005: comparison between iTREN-2030 and ETiF (% based on pkm)

Country code	iTREN-2030			ETiF		
	Car	Bus	Train	Car	Bus	Train
BLX	82%	11%	6%	80%	13%	7%
BG	38%	53%	8%	67%	26%	7%
CZ	73%	11%	16%	69%	16%	15%
DK	78%	16%	6%	80%	11%	9%
DE	82%	8%	10%	84%	7%	9%
EE	77%	20%	2%	77%	21%	2%
IE	76%	21%	4%	82%	14%	4%
EL	76%	22%	3%	77%	20%	3%
ES	84%	11%	5%	81%	13%	7%
FR	85%	6%	9%	85%	5%	10%
IT	82%	12%	6%	81%	12%	7%
CY	48%	52%	0%	79%	21%	0%
LV	71%	21%	8%	78%	16%	6%
LT	84%	12%	4%	89%	9%	1%
HU	64%	24%	12%	61%	23%	16%
MT	74%	26%	0%	80%	20%	0%
NL	86%	5%	9%	84%	7%	9%
AT	75%	15%	10%	76%	10%	14%
PL	74%	13%	13%	79%	12%	9%
PT	80%	15%	5%	82%	13%	5%
RO	42%	34%	24%	68%	14%	18%
SI	86%	9%	4%	85%	12%	3%
SK	72%	20%	9%	70%	23%	7%
FI	81%	13%	6%	84%	10%	5%
SE	82%	10%	9%	83%	8%	9%
UK	85%	7%	8%	87%	6%	7%
HR	n.a.	n.a.	n.a.	82%	12%	6%
TR	n.a.	n.a.	n.a.	51%	46%	3%
NO	86%	11%	3%	88%	7%	5%
CH	84%	3%	12%	79%	5%	16%

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

\* Car, bus and train/tram only

Table A-3: Freight transport activity on the national territory in the year 2005: comparison between iTREN-2030 models estimation and Energy and Transport in Figure (Billion tkms)

Country code	Country	iTREN-2030	ETiF
BLX	Belgium & Luxemburg	94	70
BG	Bulgaria	25	20
CZ	Czech Republic	61	58
DK	Denmark	30	25
DE	Germany	551	470
EE	Estonia	18	16
IE	Ireland	22	18
EL	Greece	28	33
ES	Spain	300	245
FR	France	298	255
IT	Italy	275	235
CY	Cyprus	n.a.	1
LV	Latvia	33	28
LT	Lithuania	38	28
HU	Hungary	42	36
MT	Malta	n.a.	0
NL	The Netherlands	130	132
AT	Austria	61	58
PL	Poland	182	162
PT	Portugal	53	45
RO	Romania	87	77
SI	Slovenia	18	14
SK	Slovak Republic	23	33
FI	Finland	47	42
SE	Sweden	60	60
UK	United Kingdom	199	190
HR	Croatia	94	70
TR	Turkey	25	20
NO	Norway	61	58
CH	Switzerland	30	25

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

Table A-4: Freight mode split on the national territory in the year 2005: comparison between iTREN-2030 models estimation and Energy and Transport in Figure (% based on tkm)

Country code	iTREN			ETiF		
	Road	Rail	lww	Road	Rail	lww
BLX	80%	10%	10%	75%	12%	13%
BG	68%	28%	4%	71%	25%	4%
CZ	78%	22%	0%	74%	25%	0%
DK	92%	8%	0%	92%	8%	0%
DE	70%	19%	10%	66%	20%	14%
EE	35%	65%	0%	35%	65%	0%
IE	99%	1%	0%	98%	2%	0%
EL	98%	2%	0%	98%	2%	0%
ES	95%	5%	0%	95%	5%	0%
FR	84%	13%	3%	81%	16%	3%
IT	91%	9%	0%	90%	10%	0%
CY	100%	0%	0%	100%	0%	0%
LV	37%	63%	0%	30%	70%	0%
LT	58%	42%	0%	56%	44%	0%
HU	69%	21%	10%	69%	25%	6%
MT	100%	0%	0%	100%	0%	0%
NL	67%	5%	28%	64%	4%	32%
AT	68%	27%	5%	64%	33%	3%
PL	72%	28%	0%	69%	31%	0%
PT	94%	6%	0%	95%	5%	0%
RO	70%	20%	10%	67%	22%	11%
SI	75%	25%	0%	77%	23%	0%
SK	64%	35%	1%	69%	29%	2%
FI	74%	26%	0%	77%	23%	0%
SE	61%	39%	0%	64%	36%	0%
UK	86%	14%	0%	88%	12%	0%
HR	71%	27%	1%	76%	23%	1%
TR	81%	19%	0%	95%	5%	0%
NO	87%	13%	0%	85%	15%	0%
CH	69%	31%	0%	47%	53%	0%

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

Table A-5: Gross Inland Energy Consumption by source in 2005: comparison between iTREN-2030 model estimation and Transport in Figure 2009 data (Mtoe)

Country-code	iTREN					ETiF				
	Total	Oil	Gas	Coal, Nuclear	Renewables	Total	Oil	Gas	Coal, Nuclear	Renewables
BLX	61.8	25.9	15.9	17.6	2.4	63.1	27.8	15.9	17.8	1.5
BG	21.6	5.1	2.8	12.5	1.2	20.6	4.9	2.8	11.7	1.1
CZ	47.1	10.0	7.7	27.8	1.7	46.3	10.1	7.7	26.7	1.8
DK	19.4	8.3	4.5	3.7	2.9	19.6	8.2	4.4	3.8	3.3
DE	349.2	122.8	78.8	125.3	22.3	347.5	124.3	80.9	124.9	17.5
EE	n.a.	n.a.	n.a.	n.a.	n.a.	5.7	1.1	0.8	3.2	0.6
IE	15.6	9.3	3.4	2.5	0.4	14.9	8.4	3.5	2.7	0.4
EL	30.7	17.7	2.3	9.0	1.7	31.0	18.1	2.4	9.0	1.6
ES	147.5	72.0	29.7	36.4	9.5	144.7	70.6	29.8	35.5	8.7
FR	281.0	90.8	41.0	132.0	17.3	281.6	93.0	41.1	130.8	16.8
IT	178.1	80.2	70.6	16.4	10.9	183.0	83.7	70.7	16.5	12.1
CY	n.a.	n.a.	n.a.	n.a.	n.a.	2.5	2.4	0.0	0.0	0.0
LV	n.a.	n.a.	n.a.	n.a.	n.a.	4.3	1.4	1.4	0.1	1.5
LT	n.a.	n.a.	n.a.	n.a.	n.a.	8.9	2.8	2.5	2.9	0.8
HU	26.9	7.2	11.8	6.6	1.2	27.4	7.5	12.1	6.6	1.2
MT	n.a.	n.a.	n.a.	n.a.	n.a.	1.0	1.0	0.0	0.0	0.0
NL	80.3	33.0	35.3	9.1	2.9	80.9	33.5	35.3	9.2	2.8
AT	33.5	14.7	8.1	3.3	7.4	33.6	14.5	8.2	4.0	6.9
PL	95.6	22.6	12.4	55.5	5.1	94.4	22.7	12.2	54.9	4.5
PT	26.8	15.9	3.8	3.5	3.6	26.4	15.8	3.8	3.3	3.6
RO	38.4	8.8	13.8	10.5	5.2	39.4	10.3	13.9	10.2	4.9
SI	n.a.	n.a.	n.a.	n.a.	n.a.	7.3	2.6	0.9	3.1	0.8
SK	18.9	3.4	5.4	9.4	0.8	19.3	3.8	5.9	8.8	0.8
FI	33.8	10.8	3.6	11.1	8.3	33.2	10.6	3.6	10.9	8.0
SE	51.6	15.4	0.8	21.6	13.8	52.3	14.9	0.8	21.3	15.3
UK	234.2	84.5	85.4	59.8	4.5	232.2	83.1	85.6	59.4	4.0
TR	86.1	29.0	22.9	24.9	9.2	85.4	30.2	22.8	22.3	10.1
NO	n.a.	n.a.	n.a.	n.a.	n.a.	33.3	14.3	5.2	0.8	13.0
CH	n.a.	n.a.	n.a.	n.a.	n.a.	26.0	12.6	2.8	6.2	4.5

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

Table A-6: Final energy demand by consuming sector in 2005: comparison between iTREN-2030 model estimation and Transport in Figure 2009 data (Mtoe)

Country code	iTREN				ETiF			
	Total	Industry	Transport	Residential / services	Total	Industry	Transport	Residential / services
BLX	45.1	16.1	13.1	15.9	42.9	14.5	12.6	15.7
BG	9.7	4.1	2.6	3.1	9.6	3.7	2.6	3.3
CZ	26.0	9.9	6.5	9.6	25.8	9.6	6.2	10.0
DK	15.4	3.0	5.2	7.2	15.5	2.9	5.3	7.3
DE	232.0	58.2	63.8	109.9	218.4	55.7	62.1	100.6
EE	n.a.	n.a.	n.a.	n.a.	2.8	0.6	0.8	1.4
IE	12.1	2.2	5.0	5.0	12.3	2.5	5.0	4.9
EL	21.1	4.1	8.3	8.7	20.8	4.1	8.1	8.6
ES	97.1	30.2	40.3	26.6	97.5	31.1	39.6	26.7
FR	158.7	37.7	52.2	68.8	159.3	35.6	49.9	73.7
IT	134.9	40.6	46.7	47.5	132.6	39.1	43.8	49.7
CY	n.a.	n.a.	n.a.	n.a.	1.8	0.3	1.0	0.5
LV	n.a.	n.a.	n.a.	n.a.	4.0	0.7	1.1	2.3
LT	n.a.	n.a.	n.a.	n.a.	4.5	1.0	1.4	2.1
HU	18.1	3.4	4.5	10.3	18.1	3.4	4.2	10.5
MT	n.a.	n.a.	n.a.	n.a.	0.5	0.0	0.3	0.2
NL	53.8	15.8	16.1	21.9	51.6	14.9	15.1	21.6
AT	27.5	8.0	8.3	11.3	27.1	8.6	8.0	10.5
PL	57.9	17.5	12.5	27.9	57.3	16.5	12.1	28.7
PT	19.3	6.0	7.5	5.8	18.7	5.7	7.1	6.0
RO	24.8	10.2	4.8	9.7	24.6	9.9	4.2	10.5
SI	n.a.	n.a.	n.a.	n.a.	4.9	1.7	1.5	1.8
SK	10.6	4.6	1.6	4.4	10.6	4.5	1.8	4.3
FI	24.7	12.5	4.9	7.3	25.3	12.1	4.8	8.3
SE	33.6	12.5	8.7	12.5	33.7	12.7	8.6	12.5
UK	154.7	33.1	56.6	64.9	152.2	34.3	55.2	62.7
TR	62.3	21.9	14.6	25.8	63.2	22.5	13.4	27.4
NO	n.a.	n.a.	n.a.	n.a.	18.5	6.6	4.9	7.0
CH	n.a.	n.a.	n.a.	n.a.	21.7	4.1	7.0	10.6

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009

Table A-7: CO<sub>2</sub> Transport emissions in 2005: comparison between iTREN-2030 model estimation and Transport in Figure 2009 data (Million tonnes per year)

Country code	Country / Region	iTREN	ETiF
BLX	Belgium & Luxemburg	44.3	62.7
BG	Bulgaria	12.2	8.9
CZ	Czech Republic	18.1	18.2
DK	Denmark	12.4	18.3
DE	Germany	223.1	193.0
EE	Estonia	4.1	2.7
IE	Ireland	10.4	15.6
EL	Greece	16.5	33.8
ES	Spain	110.0	137.3
FR	France	258.3	162.9
IT	Italy	121.6	141.7
CY	Cyprus	2.7	3.5
LV	Latvia	8.9	4.0
LT	Lithuania	10.3	4.7
HU	Hungary	20.0	12.5
MT	Malta	3.0	2.9
NL	The Netherlands	30.7	99.6
AT	Austria	17.9	25.7
PL	Poland	33.6	37.3
PT	Portugal	37.6	23.0
RO	Romania	37.3	12.3
SI	Slovenia	11.8	4.5
SK	Slovak Republic	7.8	6.3
FI	Finland	24.2	16.4
SE	Sweden	40.3	28.6
UK	United Kingdom	157.2	170.2
HR	Croatia	17.6	5.9
TR	Turkey	17.6	40.5
NO	Norway	25.0	14.0
CH	Switzerland	26.1	19.3

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009



Table A-8: Car fleet size in 2005: comparison between iTREN-2030 model estimation and Transport in Figure 2009 data (1000 vehicles)

Country code	Country / Region	iTREN	ETiF
BLX	Belgium & Luxemburg	5,068.0	5,225.8
BG	Bulgaria	2,640.7	2,538.0
CZ	Czech Republic	3,657.2	3,958.7
DK	Denmark	1,923.4	1,964.7
DE	Germany	44,126.9	40,659.5
EE	Estonia	541.3	493.8
IE	Ireland	1,348.1	1,684.0
EL	Greece	2,442.2	4,303.1
ES	Spain	16,526.6	20,250.4
FR	France	28,297.1	30,497.0
IT	Italy	34,757.6	34,667.5
CY	Cyprus	335.0	355.1
LV	Latvia	604.9	742.4
LT	Lithuania	1,286.8	1,455.3
HU	Hungary	2,693.0	2,888.7
MT	Malta	197.1	212.6
NL	The Netherlands	6,485.9	7,092.3
AT	Austria	4,174.1	4,156.7
PL	Poland	11,788.5	12,339.4
PT	Portugal	2,463.8	4,200.0
RO	Romania	4,028.6	3,363.8
SI	Slovenia	945.5	960.2
SK	Slovak Republic	1,441.7	1,303.7
FI	Finland	2,457.8	2,430.3
SE	Sweden	4,707.5	4,153.7
UK	United Kingdom	25,983.9	28,326.3
HR	Croatia	n.a.	1,384.7
TR	Turkey	n.a.	5,772.7
NO	Norway	2,146.7	2,028.9
CH	Switzerland	3,811.7	3,861.4

Source: iTREN-2030 – Energy and Transport in Figure – Statistical Pocketbook 2009



## **Annex 2: quantitative results by country and EU aggregates**

The following spreadsheets provide country data for a set of selected indicators of the iTREN-2030 Reference Scenario. The indicators are drawn from the modelling tools and concern all the domains addressed in iTREN-2030: transport, economy, energy, environment and vehicle fleet.

The spreadsheets include both absolute figures and average annual changes at different time intervals.

Not all indicators are available for all countries, depending either on the nature of the data (e.g. maritime demand is not existing in Austria) or on the modelling scope of the tools (e.g. fleet data is not available for Croatia). The symbol ‘-’ in the table means that the data is not available. Zero values mean that data can exist but it is null in the Reference Scenario.

Belgium and Luxembourg are reported as separate countries as well as together because some models (TREMOVE, TRANS-TOOLS) simulate the two countries independently while the others (ASTRA, POLES) simulate the two countries together. Therefore, some indicators are available for both countries, while others are reported only for two countries together. Energy indicators are not available for the three Baltic countries (Estonia, Latvia and Lithuania) because these are not separate zones in POLES. However, they are accounted for in the energy indicators for EU12 and EU27.

ITREN-2030 EU27		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	24,029	25,009	27,410	28,114	0.8	0.9	0.3	0.6
Freight transport activity originated in the country	Billion tonnes-km per year	6,875	7,506	9,059	10,193	1.8	1.9	1.2	1.5
Road	Billion tonnes-km per year	2,073	2,261	2,716	3,056	1.7	1.9	1.2	1.5
Rail	Billion tonnes-km per year	447	505	663	798	2.5	2.8	1.9	2.3
Inland navigation	Billion tonnes-km per year	192	217	288	335	2.5	2.9	1.5	2.2
Maritime (Intra-EU)	Billion tonnes-km per year	4,162	4,524	5,392	6,004	1.7	1.8	1.1	1.4
Average freight transport distance	km	286	300	330	363	1.0	1.0	0.9	0.9
Freight transport activity on the national territory	Billion tonnes-km per year	2,677	2,899	3,444	3,888	1.6	1.7	1.2	1.5
Road	Billion tonnes-km per year	2,101	2,254	2,615	2,911	1.4	1.5	1.1	1.3
Rail	Billion tonnes-km per year	446	505	663	796	2.5	2.8	1.8	2.3
Inland navigation	Billion tonnes-km per year	130	140	165	181	1.5	1.6	0.9	1.3
Freight road vehicles-km on the national territory	Billion vehicles-km per year	272	290	332	373	1.3	1.4	1.2	1.3
Trips originated in the country	Million trips per year	475,623	473,466	500,233	510,491	-0.1	0.6	0.2	0.4
Passenger transport activity originated in the country	Billion pass-km per year	6,457	6,605	7,410	7,873	0.5	1.2	0.6	0.9
Car	Billion pass-km per year	4,665	4,623	5,328	5,633	-0.2	1.4	0.6	1.0
Bus	Billion pass-km per year	615	651	598	585	1.1	-0.9	-0.2	-0.5
Rail	Billion pass-km per year	477	578	616	695	3.9	0.6	1.2	0.9
Air (Intra-EU)	Billion pass-km per year	442	482	565	628	1.8	1.6	1.1	1.3
Slow	Billion pass-km per year	259	271	303	333	0.9	1.1	0.9	1.0
Average passenger transport distance	km	13.6	14.0	14.8	15.4	0.5	0.6	0.4	0.5
Passenger transport activity on the national territory	Billion pass-km per year	6,553	6,876	7,581	8,244	1.0	1.0	0.8	0.9
Road	Billion pass-km per year	6,137	6,446	7,120	7,748	1.0	1.0	0.8	0.9
Rail	Billion pass-km per year	416	430	462	496	0.7	0.7	0.7	0.7
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	3,300	3,508	3,972	4,376	1.2	1.2	1.0	1.1
Motorization rate	cars/1000 inhabitants	424	451	512	566	1.3	1.3	1.0	1.1
ECONOMY INDICATORS									
GDP	Billion Euros 2005	8,734	9,450	11,188	13,029	1.6	1.7	1.5	1.6
Employment	1000 Persons	217,560	212,937	214,107	203,386	-0.4	0.1	-0.5	-0.2
Agriculture and fishery	1000 Persons	15,383	13,401	12,670	11,938	-2.7	-0.6	-0.6	-0.6
Construction	1000 Persons	16,848	18,066	19,288	18,983	1.4	0.7	-0.2	0.2
Energy and water	1000 Persons	2,627	2,987	2,913	2,901	2.6	-0.3	0.0	-0.1
Industry	1000 Persons	49,739	47,118	46,469	43,899	-1.1	-0.1	-0.6	-0.4
Transport services	1000 Persons	7,876	8,188	8,122	7,802	0.8	-0.1	-0.4	-0.2
Other services	1000 Persons	125,086	123,177	124,645	117,863	-0.3	0.1	-0.6	-0.2
Population total	1000 Persons	488,594	492,379	496,269	494,331	0.2	0.1	0.0	0.0
Labour force	1000 Persons	314,100	319,001	315,545	304,261	0.3	-0.1	-0.4	-0.2
Retired (> 65 years)	1000 Persons	76,582	78,181	88,609	103,376	0.4	1.3	1.6	1.4
Transport taxation revenues	Million Euros 2005	252,620	248,417	271,435	285,785	-0.3	0.9	0.5	0.7
Fuel taxes	Million Euros 2005	187,380	177,497	189,955	195,315	-1.1	0.7	0.3	0.5
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	65,240	70,920	81,480	90,470	1.7	1.4	1.1	1.2
ENERGY INDICATORS									
Primary energy production	Billion toe per year	905	977	1,005	1,069	1.5	0.3	0.6	0.4
Share of domestic energy production	%	50	53	51	50	1.2	-0.3	-0.2	-0.3
Final energy demand by source	Billion toe per year	1,821	1,855	1,974	2,149	0.4	0.6	0.9	0.7
Oil	Billion toe per year	669	634	631	646	-1.1	0.0	0.2	0.1
Gas	Billion toe per year	443	423	520	551	-0.9	2.1	0.6	1.3
Coal, Nuclear	Billion toe per year	583	629	574	642	1.5	-0.9	1.1	0.1
Biomass	Billion toe per year	90	110	168	211	4.1	4.4	2.3	3.3
Other Renewables	Billion toe per year	37	60	80	100	10.2	3.0	2.2	2.6
Final energy demand by consuming sector	Billion toe per year	1,197	1,198	1,297	1,407	0.0	0.8	0.8	0.8
Transport freight	Billion toe per year	120	120	138	139	0.0	1.4	0.1	0.8
Transport passenger	Billion toe per year	255	270	289	312	1.1	0.7	0.8	0.7
Industry	Billion toe per year	335	339	371	404	0.2	0.9	0.9	0.9
Residential and services	Billion toe per year	486	469	499	551	-0.7	0.6	1.0	0.8
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.92	1.25	1.16	1.24	6.4	-0.8	0.7	0.0
Gasoline price	Euros2005 per litre	1.07	1.40	1.27	1.34	5.5	-0.9	0.5	-0.2
Biofuels price	Euros2005 per eecf	0.65	1.15	1.15	1.24	12.2	0.0	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	1.0	3.4	6.6	9.9	27.4	6.7	4.2	5.4
Share of renewables in electricity	%	15.1	20.9	24.9	26.0	6.7	1.8	0.4	1.1
Share of renewables in final energy demand	%	8.3	10.9	14.0	16.1	5.8	2.5	1.4	1.9
Energy intensity of freight transport activity	toe/1000tkm	18	16	16	14	-1.7	-0.3	-1.0	-0.7
Energy intensity of passenger transport activity	toe/1000pkm	36	37	35	35	0.1	-0.3	-0.1	-0.2
Energy intensity of economic activity	toe/Million Euros 1995	137	127	116	108	-1.5	-0.9	-0.7	-0.8

ITREN-2030 EU27		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	1,268	1,256	1,407	1,485	-0.2	1.1	0.5	0.8
Road freight	Million tonnes per year	363	379	446	507	0.8	1.6	1.3	1.5
Road passenger	Million tonnes per year	798	762	832	840	-0.9	0.9	0.1	0.5
Rail freight	Million tonnes per year	11	14	22	31	5.4	4.3	3.5	3.9
Rail passenger	Million tonnes per year	7	8	8	8	2.5	-0.4	0.1	-0.2
Inland navigation	Million tonnes per year	5	5	6	7	1.1	1.3	0.8	1.0
Maritime (Intra-EU)	Million tonnes per year	7	9	9	9	3.2	0.5	0.2	0.3
Air (Intra-EU)	Million tonnes per year	76	79	83	84	0.7	0.6	0.0	0.3
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.057	0.055	0.055	0.056	-0.6	0.0	0.2	0.1
Road	tonnes/1000 tkm	0.173	0.168	0.171	0.174	-0.6	0.1	0.2	0.2
Rail	tonnes/1000 tkm	0.025	0.029	0.033	0.039	2.8	1.5	1.6	1.6
Inland navigation	tonnes/1000 tkm	0.039	0.038	0.037	0.037	-0.4	-0.4	-0.1	-0.2
Maritime (Intra-EU)	tonnes/1000 tkm	0.002	0.002	0.002	0.002	1.5	-1.3	-0.9	-1.1
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.126	0.115	0.113	0.105	-1.7	-0.2	-0.8	-0.5
Road	tonnes/1000 pkm	0.130	0.118	0.117	0.108	-1.9	-0.1	-0.8	-0.4
Rail	tonnes/1000 pkm	0.017	0.019	0.017	0.016	1.8	-1.1	-0.6	-0.9
Air (Intra-EU)	tonnes/1000 pkm	0.173	0.164	0.148	0.133	-1.1	-1.0	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	4,424	3,438	2,841	2,747	-4.9	-1.9	-0.3	-1.1
Road freight	1000 Tonnes per year	982	774	473	352	-4.6	-4.8	-2.9	-3.9
Road passenger	1000 Tonnes per year	2,112	1,214	723	594	-10.5	-5.1	-1.9	-3.5
Rail freight	1000 Tonnes per year	102	122	176	240	3.6	3.7	3.2	3.5
Rail passenger	1000 Tonnes per year	61	69	64	60	2.4	-0.8	-0.6	-0.7
Inland navigation	1000 Tonnes per year	85	89	102	110	1.1	1.3	0.8	1.0
Maritime (Intra-EU)	1000 Tonnes per year	163	188	189	186	2.8	0.1	-0.2	0.0
Air (Intra-EU)	1000 Tonnes per year	918	981	1,114	1,204	1.3	1.3	0.8	1.0
PM10 Transport emissions	1000 Tonnes per year	290	240	196	194	-3.7	-2.0	-0.1	-1.1
Road freight	1000 Tonnes per year	80	62	48	46	-4.9	-2.7	-0.2	-1.5
Road passenger	1000 Tonnes per year	210	178	148	147	-3.2	-1.8	-0.1	-0.9
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	211,062	228,172	265,628	294,212	1.6	1.5	1.0	1.3
Gasoline	1000 vehicles	149,304	139,539	139,027	148,788	-1.3	0.0	0.7	0.3
Diesel	1000 vehicles	57,588	82,723	117,190	135,371	7.5	3.5	1.5	2.5
LPG/CNG	1000 vehicles	3,229	2,856	2,061	2,016	-2.4	-3.2	-0.2	-1.7
Bioethanol	1000 vehicles	46	204	1,630	3,843	34.9	23.1	9.0	15.8
Hybrid	1000 vehicles	892	2,841	5,650	4,010	26.1	7.1	-3.4	1.7
Electric	1000 vehicles	3	9	69	184	20.8	22.9	10.3	16.4
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	81,124	77,477	81,020	87,954	-0.9	0.4	0.8	0.6
Gasoline 1400-2000 cc	1000 vehicles	57,831	52,460	49,628	52,876	-1.9	-0.6	0.6	0.0
Gasoline >2000 cc	1000 vehicles	10,349	9,601	8,378	7,958	-1.5	-1.4	-0.5	-0.9
Diesel <2000 cc	1000 vehicles	45,473	67,938	98,281	113,979	8.4	3.8	1.5	2.6
Diesel >2000 cc	1000 vehicles	12,115	14,786	18,909	21,392	4.1	2.5	1.2	1.9
PreEURO	1000 vehicles	33,346	10,386	461	2	-20.8	-26.8	-42.8	-35.2
EURO I	1000 vehicles	45,033	22,928	2,060	55	-12.6	-21.4	-30.4	-26.1
EURO II	1000 vehicles	50,195	36,584	4,706	216	-6.1	-18.5	-26.5	-22.6
EURO III	1000 vehicles	80,918	71,749	21,633	1,543	-2.4	-11.3	-23.2	-17.5
EURO IV	1000 vehicles	629	49,148	27,685	2,948	139.1	-5.6	-20.1	-13.1
EURO V or later	1000 vehicles	0	34,324	201,734	281,412	0.0	19.4	3.4	11.1
Duty vehicle fleet size	1000 vehicles	12,620	13,831	17,231	20,380	1.8	2.2	1.7	2.0
<3.5 tonnes	1000 vehicles	4,311	4,589	5,269	6,309	1.3	1.4	1.8	1.6
3.5-7.5 tonnes	1000 vehicles	3,769	4,240	5,477	6,392	2.4	2.6	1.6	2.1
7.5-16 tonnes	1000 vehicles	990	1,113	1,435	1,672	2.4	2.6	1.5	2.1
16-32 tonnes	1000 vehicles	2,839	3,110	4,022	4,780	1.8	2.6	1.7	2.2
>32 tonnes	1000 vehicles	711	779	1,028	1,227	1.8	2.8	1.8	2.3
PreEURO	1000 vehicles	5,819	3,757	958	162	-8.4	-12.8	-16.3	-14.5
EURO I	1000 vehicles	1,471	1,180	470	149	-4.3	-8.8	-10.8	-9.8
EURO II	1000 vehicles	2,475	2,209	1,163	283	-2.2	-6.2	-13.2	-9.8
EURO III	1000 vehicles	2,854	3,543	2,678	1,065	4.4	-2.8	-8.8	-5.8
EURO IV	1000 vehicles	1	2,071	1,833	1,027	358.2	-1.2	-5.6	-3.4
EURO V or later	1000 vehicles	0	1,070	10,129	17,694	382.3	25.2	5.7	15.1

ITREN-2030 EU15		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
<b>TRANSPORT INDICATORS</b>									
Tonnes originated in the country	Million tonnes per year	20,495	21,116	22,586	22,761	0.6	0.7	0.1	0.4
Freight transport activity originated in the country	Billion tonnes-km per year	5,854	6,263	7,197	7,804	1.4	1.4	0.8	1.1
Road	Billion tonnes-km per year	1,687	1,798	2,049	2,214	1.3	1.3	0.8	1.0
Rail	Billion tonnes-km per year	283	300	337	363	1.1	1.2	0.7	1.0
Inland navigation	Billion tonnes-km per year	133	140	156	164	1.1	1.1	0.5	0.8
Maritime (Intra-EU)	Billion tonnes-km per year	3,751	4,025	4,654	5,062	1.4	1.5	0.8	1.2
Average freight transport distance	km	286	297	319	343	0.8	0.7	0.7	0.7
Freight transport activity on the national territory	Billion tonnes-km per year	2,150	2,269	2,536	2,733	1.1	1.1	0.8	0.9
Road	Billion tonnes-km per year	1,747	1,842	2,054	2,216	1.1	1.1	0.8	0.9
Rail	Billion tonnes-km per year	287	305	345	373	1.2	1.2	0.8	1.0
Inland navigation	Billion tonnes-km per year	116	122	137	144	1.1	1.2	0.5	0.8
Freight road vehicles-km on the national territory	Billion vehicles-km per year	229	239	262	286	0.9	0.9	0.9	0.9
Trips originated in the country	Million trips per year	396,192	394,123	417,772	426,253	-0.1	0.6	0.2	0.4
Passenger transport activity originated in the country	Billion pass-km per year	5,696	5,812	6,497	6,875	0.4	1.1	0.6	0.8
Car	Billion pass-km per year	4,213	4,152	4,757	4,995	-0.3	1.4	0.5	0.9
Bus	Billion pass-km per year	474	511	461	452	1.5	-1.0	-0.2	-0.6
Rail	Billion pass-km per year	389	483	511	577	4.4	0.6	1.2	0.9
Air (Intra-EU)	Billion pass-km per year	410	447	522	577	1.7	1.6	1.0	1.3
Slow	Billion pass-km per year	209	218	247	273	0.9	1.2	1.0	1.1
Average passenger transport distance	km	14.4	14.7	15.6	16.1	0.5	0.5	0.4	0.4
Passenger transport activity on the national territory	Billion pass-km per year	5,761	6,040	6,645	7,173	0.9	1.0	0.8	0.9
Road	Billion pass-km per year	5,403	5,668	6,243	6,738	1.0	1.0	0.8	0.9
Rail	Billion pass-km per year	358	372	402	435	0.8	0.8	0.8	0.8
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	2,985	3,161	3,547	3,867	1.1	1.2	0.9	1.0
Motorization rate	cars/1000 inhabitants	464	487	529	570	1.0	0.8	0.7	0.8
<b>ECONOMY INDICATORS</b>									
GDP	Billion Euros 2005	8,353	9,012	10,589	12,245	1.5	1.6	1.5	1.5
Employment	1000 Persons	170,358	165,964	161,942	152,878	-0.5	-0.2	-0.6	-0.4
Agriculture and fishery	1000 Persons	8,308	7,626	6,917	6,129	-1.7	-1.0	-1.2	-1.1
Construction	1000 Persons	12,537	13,288	14,055	13,830	1.2	0.6	-0.2	0.2
Energy and water	1000 Persons	2,265	2,644	2,608	2,582	3.1	-0.1	-0.1	-0.1
Industry	1000 Persons	34,529	32,225	30,919	29,360	-1.4	-0.4	-0.5	-0.5
Transport services	1000 Persons	6,181	6,310	6,008	5,671	0.4	-0.5	-0.6	-0.5
Other services	1000 Persons	106,539	103,872	101,436	95,305	-0.5	-0.2	-0.6	-0.4
Population total	1000 Persons	384,812	390,214	396,997	398,382	0.3	0.2	0.0	0.1
Labour force	1000 Persons	246,831	250,425	250,451	243,288	0.3	0.0	-0.3	-0.1
Retired (> 65 years)	1000 Persons	62,194	63,790	71,345	84,145	0.5	1.1	1.7	1.4
Transport taxation revenues	Million Euros 2005	227,315	220,081	239,782	251,365	-0.6	0.9	0.5	0.7
Fuel taxes	Million Euros 2005	169,849	159,383	170,915	175,379	-1.3	0.7	0.3	0.5
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	57,466	60,698	68,867	75,986	1.1	1.3	1.0	1.1
<b>ENERGY INDICATORS</b>									
Primary energy production	Billion toe per year	735	778	792	812	1.1	0.2	0.2	0.2
Share of domestic energy production	%	48	50	48	46	0.9	-0.4	-0.4	-0.4
Final energy demand by source	Billion toe per year	1,544	1,565	1,653	1,760	0.3	0.5	0.6	0.6
Oil	Billion toe per year	601	560	543	540	-1.4	-0.3	0.0	-0.2
Gas	Billion toe per year	383	376	456	475	-0.4	2.0	0.4	1.2
Coal, Nuclear	Billion toe per year	451	487	447	491	1.5	-0.9	0.9	0.0
Biomass	Billion toe per year	75	89	138	167	3.6	4.4	1.9	3.2
Other Renewables	Billion toe per year	33	53	71	87	10.2	2.9	2.1	2.5
Final energy demand by consuming sector	Billion toe per year	1,030	1,024	1,092	1,158	-0.1	0.6	0.6	0.6
Transport freight	Billion toe per year	107	107	121	121	-0.1	1.3	0.0	0.6
Transport passenger	Billion toe per year	230	237	245	253	0.7	0.3	0.3	0.3
Industry	Billion toe per year	280	281	310	334	0.1	1.0	0.8	0.9
Residential and services	Billion toe per year	413	398	416	450	-0.7	0.4	0.8	0.6
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.94	1.28	1.18	1.27	6.3	-0.8	0.7	0.0
Gasoline price	Euros2005 per litre	1.09	1.43	1.32	1.42	5.6	-0.8	0.7	0.0
Biofuels price	Euros2005 per eeccf	0.65	1.16	1.16	1.25	12.3	-0.1	0.8	0.4
Share of biofuels in gasoline+diesel energy demand	%	1.1	3.5	7.1	10.2	25.0	7.5	3.6	5.5
Share of renewables in electricity	%	15.7	21.4	25.4	26.9	6.4	1.7	0.6	1.2
Share of renewables in final energy demand	%	8.0	10.7	13.8	15.8	6.0	2.6	1.4	2.0
Energy intensity of freight transport activity	toe/1000tkm	18	17	17	16	-1.4	0.0	-0.8	-0.4
Energy intensity of passenger transport activity	toe/1000pkm	37	37	34	33	-0.3	-0.7	-0.5	-0.6
Energy intensity of economic activity	toe/Million Euros 1995	123	114	103	95	-1.6	-1.0	-0.9	-0.9

ITREN-2030 EU15		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	1,104	1,088	1,209	1,261	-0.3	1.1	0.4	0.7
Road freight	Million tonnes per year	312	324	380	426	0.7	1.6	1.2	1.4
Road passenger	Million tonnes per year	697	664	724	727	-1.0	0.9	0.0	0.5
Rail freight	Million tonnes per year	6	6	8	11	0.7	2.1	3.2	2.7
Rail passenger	Million tonnes per year	5	6	6	6	3.2	-0.5	0.1	-0.2
Inland navigation	Million tonnes per year	5	5	5	6	0.8	0.8	0.4	0.6
Maritime (Intra-EU)	Million tonnes per year	7	8	8	8	3.0	0.4	0.1	0.3
Air (Intra-EU)	Million tonnes per year	71	74	77	77	0.6	0.5	0.0	0.3
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.056	0.055	0.056	0.058	-0.5	0.2	0.4	0.3
Road	tonnes/1000 tkm	0.179	0.176	0.185	0.192	-0.3	0.5	0.4	0.4
Rail	tonnes/1000 tkm	0.022	0.021	0.023	0.029	-0.5	0.9	2.4	1.6
Inland navigation	tonnes/1000 tkm	0.042	0.041	0.040	0.039	-0.3	-0.3	-0.1	-0.2
Maritime (Intra-EU)	tonnes/1000 tkm	0.002	0.002	0.002	0.002	1.6	-1.1	-0.7	-0.9
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.125	0.115	0.113	0.105	-1.8	-0.2	-0.7	-0.5
Road	tonnes/1000 pkm	0.129	0.117	0.116	0.108	-1.9	-0.1	-0.7	-0.4
Rail	tonnes/1000 pkm	0.015	0.017	0.015	0.014	2.4	-1.2	-0.7	-1.0
Air (Intra-EU)	tonnes/1000 pkm	0.174	0.164	0.148	0.134	-1.1	-1.0	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	3,824	2,943	2,399	2,276	-5.1	-2.0	-0.5	-1.3
Road freight	1000 Tonnes per year	801	620	376	281	-5.0	-4.9	-2.9	-3.9
Road passenger	1000 Tonnes per year	1,845	1,056	630	520	-10.6	-5.0	-1.9	-3.5
Rail freight	1000 Tonnes per year	38	38	39	45	-0.3	0.4	1.3	0.9
Rail passenger	1000 Tonnes per year	50	58	53	50	3.0	-0.9	-0.6	-0.7
Inland navigation	1000 Tonnes per year	80	83	91	95	0.8	0.8	0.4	0.6
Maritime (Intra-EU)	1000 Tonnes per year	152	173	173	169	2.6	0.0	-0.2	-0.1
Air (Intra-EU)	1000 Tonnes per year	858	916	1,037	1,117	1.3	1.2	0.7	1.0
PM10 Transport emissions	1000 Tonnes per year	258	213	168	166	-3.7	-2.3	-0.1	-1.2
Road freight	1000 Tonnes per year	68	52	36	35	-5.5	-3.6	-0.2	-1.9
Road passenger	1000 Tonnes per year	189	161	133	131	-3.1	-1.9	-0.1	-1.0
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	180,903	193,607	218,709	236,081	1.4	1.2	0.8	1.0
Gasoline	1000 vehicles	125,025	112,288	103,212	105,088	-2.1	-0.8	0.2	-0.3
Diesel	1000 vehicles	52,804	76,642	107,553	122,710	7.7	3.4	1.3	2.4
LPG/CNG	1000 vehicles	2,229	1,916	1,375	1,233	-3.0	-3.3	-1.1	-2.2
Bioethanol	1000 vehicles	44	192	1,464	3,266	34.1	22.5	8.4	15.2
Hybrid	1000 vehicles	796	2,562	5,051	3,649	26.3	7.0	-3.2	1.8
Electric	1000 vehicles	3	7	53	135	19.6	23.1	9.7	16.2
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	65,949	60,237	57,676	59,158	-1.8	-0.4	0.3	-0.1
Gasoline 1400-2000 cc	1000 vehicles	49,653	43,399	38,188	39,127	-2.7	-1.3	0.2	-0.5
Gasoline >2000 cc	1000 vehicles	9,423	8,651	7,348	6,802	-1.7	-1.6	-0.8	-1.2
Diesel <2000 cc	1000 vehicles	41,417	62,677	89,783	102,753	8.6	3.7	1.4	2.5
Diesel >2000 cc	1000 vehicles	11,387	13,965	17,770	19,957	4.2	2.4	1.2	1.8
PreEURO	1000 vehicles	26,603	8,823	439	2	-19.8	-25.9	-42.7	-34.8
EURO I	1000 vehicles	42,546	21,009	1,973	48	-13.2	-21.1	-31.0	-26.2
EURO II	1000 vehicles	44,294	31,115	4,622	207	-6.8	-17.4	-26.7	-22.2
EURO III	1000 vehicles	65,987	57,289	17,893	1,500	-2.8	-11.0	-22.0	-16.6
EURO IV	1000 vehicles	629	42,663	22,629	2,915	132.4	-6.1	-18.5	-12.6
EURO V or later	1000 vehicles	0	29,945	164,577	224,350	0.0	18.6	3.1	10.6
Duty vehicle fleet size	1000 vehicles	9,763	10,213	11,135	12,131	0.9	0.9	0.9	0.9
<3.5 tonnes	1000 vehicles	3,340	3,306	3,290	3,720	-0.2	0.0	1.2	0.6
3.5-7.5 tonnes	1000 vehicles	2,802	3,072	3,589	3,862	1.9	1.6	0.7	1.2
7.5-16 tonnes	1000 vehicles	759	830	968	1,041	1.8	1.5	0.7	1.1
16-32 tonnes	1000 vehicles	2,261	2,372	2,591	2,766	1.0	0.9	0.7	0.8
>32 tonnes	1000 vehicles	601	633	696	742	1.0	1.0	0.6	0.8
PreEURO	1000 vehicles	4,333	2,492	335	46	-10.5	-18.2	-18.1	-18.1
EURO I	1000 vehicles	1,194	907	241	39	-5.3	-12.4	-16.6	-14.6
EURO II	1000 vehicles	2,135	1,872	859	106	-2.6	-7.5	-18.9	-13.4
EURO III	1000 vehicles	2,099	2,613	1,780	375	4.5	-3.8	-14.4	-9.3
EURO IV	1000 vehicles	1	1,555	1,322	573	332.7	-1.6	-8.0	-4.9
EURO V or later	1000 vehicles	0	775	6,598	10,992	352.2	23.9	5.2	14.2

ITREN-2030 EU12		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	3,534	3,894	4,824	5,353	2.0	2.2	1.0	1.6
Freight transport activity originated in the country	Billion tonnes-km per year	1,021	1,244	1,861	2,389	4.0	4.1	2.5	3.3
Road	Billion tonnes-km per year	386	463	666	842	3.7	3.7	2.4	3.0
Rail	Billion tonnes-km per year	164	205	326	435	4.6	4.7	2.9	3.8
Inland navigation	Billion tonnes-km per year	60	78	132	170	5.4	5.4	2.6	4.0
Maritime (Intra-EU)	Billion tonnes-km per year	411	499	737	942	3.9	4.0	2.5	3.2
Average freight transport distance	km	289	319	386	446	2.0	1.9	1.5	1.7
Freight transport activity on the national territory	Billion tonnes-km per year	527	630	907	1,155	3.6	3.7	2.4	3.1
Road	Billion tonnes-km per year	353	412	561	695	3.1	3.1	2.2	2.7
Rail	Billion tonnes-km per year	159	201	318	423	4.7	4.7	2.9	3.8
Inland navigation	Billion tonnes-km per year	15	18	28	37	4.5	4.5	2.6	3.6
Freight road vehicles-km on the national territory	Billion vehicles-km per year	43	51	70	87	3.3	3.3	2.2	2.8
Trips originated in the country	Million trips per year	79,431	79,343	82,461	84,238	0.0	0.4	0.2	0.3
Passenger transport activity originated in the country	Billion pass-km per year	762	794	912	998	0.8	1.4	0.9	1.2
Car	Billion pass-km per year	451	470	570	638	0.8	1.9	1.1	1.5
Bus	Billion pass-km per year	141	140	137	133	-0.1	-0.2	-0.3	-0.3
Rail	Billion pass-km per year	88	95	105	118	1.6	1.0	1.2	1.1
Air (Intra-EU)	Billion pass-km per year	31	35	43	50	2.4	2.1	1.4	1.8
Slow	Billion pass-km per year	50	53	56	59	1.0	0.6	0.5	0.6
Average passenger transport distance	km	9.6	10.0	11.1	11.8	0.8	1.0	0.7	0.9
Passenger transport activity on the national territory	Billion pass-km per year	792	837	936	1,071	1.1	1.1	1.4	1.2
Road	Billion pass-km per year	734	778	876	1,010	1.2	1.2	1.4	1.3
Rail	Billion pass-km per year	58	59	60	61	0.2	0.2	0.2	0.2
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	315	348	426	509	2.0	2.0	1.8	1.9
Motorization rate	cars/1000 inhabitants	291	336	466	582	3.0	3.3	2.2	2.8
ECONOMY INDICATORS									
GDP	Billion Euros 2005	381	439	599	784	2.8	3.2	2.7	2.9
Employment	1000 Persons	47,202	46,973	52,166	50,508	-0.1	1.1	-0.3	0.4
Agriculture and fishery	1000 Persons	7,075	5,775	5,754	5,809	-4.0	0.0	0.1	0.0
Construction	1000 Persons	4,311	4,778	5,233	5,153	2.1	0.9	-0.2	0.4
Energy and water	1000 Persons	363	344	305	319	-1.1	-1.2	0.4	-0.4
Industry	1000 Persons	15,210	14,894	15,551	14,539	-0.4	0.4	-0.7	-0.1
Transport services	1000 Persons	1,695	1,878	2,115	2,130	2.1	1.2	0.1	0.6
Other services	1000 Persons	18,547	19,304	23,208	22,558	0.8	1.9	-0.3	0.8
Population total	1000 Persons	103,782	102,165	99,272	95,949	-0.3	-0.3	-0.3	-0.3
Labour force	1000 Persons	67,269	68,576	65,094	60,972	0.4	-0.5	-0.7	-0.6
Retired (> 65 years)	1000 Persons	14,387	14,391	17,264	19,231	0.0	1.8	1.1	1.5
Transport taxation revenues	Million Euros 2005	25,305	28,337	31,653	34,420	2.3	1.1	0.8	1.0
Fuel taxes	Million Euros 2005	17,531	18,115	19,040	19,936	0.7	0.5	0.5	0.5
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	7,774	10,222	12,613	14,484	5.6	2.1	1.4	1.8
ENERGY INDICATORS									
Primary energy production	Billion toe per year	170	200	213	257	3.2	0.7	1.9	1.3
Share of domestic energy production	%	61	69	66	66	2.4	-0.4	-0.1	-0.2
Final energy demand by source	Billion toe per year	278	290	321	389	0.9	1.0	1.9	1.5
Oil	Billion toe per year	68	74	89	106	1.7	1.8	1.8	1.8
Gas	Billion toe per year	60	47	65	76	-4.6	3.2	1.6	2.4
Coal, Nuclear	Billion toe per year	132	142	127	151	1.5	-1.1	1.7	0.3
Biomass	Billion toe per year	15	20	30	44	6.5	4.1	3.8	4.0
Other Renewables	Billion toe per year	4	6	10	13	10.6	4.2	2.6	3.4
Final energy demand by consuming sector	Billion toe per year	166	174	205	248	0.9	1.6	1.9	1.8
Transport freight	Billion toe per year	13	13	16	18	0.5	2.3	0.8	1.5
Transport passenger	Billion toe per year	26	32	44	59	4.7	3.1	3.0	3.0
Industry	Billion toe per year	55	58	61	71	1.0	0.6	1.4	1.0
Residential and services	Billion toe per year	73	71	84	101	-0.5	1.6	1.9	1.8
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.72	1.03	0.95	1.02	7.3	-0.8	0.8	-0.1
Gasoline price	Euros2005 per litre	0.92	1.23	1.13	1.21	5.9	-0.8	0.7	-0.1
Biofuels price	Euros2005 per eeccf	0.61	1.09	1.09	1.17	12.4	0.0	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.2	3.3	3.6	8.6	84.2	0.8	9.1	4.9
Share of renewables in electricity	%	11.6	17.6	22.0	21.3	8.7	2.3	-0.3	1.0
Share of renewables in final energy demand	%	10.0	12.5	15.3	17.2	4.7	2.0	1.2	1.6
Energy intensity of freight transport activity	toe/1000tkm	14	12	10	8	-3.1	-1.5	-1.7	-1.6
Energy intensity of passenger transport activity	toe/1000pkm	31	37	45	52	3.5	1.9	1.6	1.7
Energy intensity of economic activity	toe/Million Euros 1995	436	398	343	317	-1.8	-1.5	-0.8	-1.1



ITREN-2030 EU12		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	170	175	206	235	0.6	1.7	1.3	1.5
Road freight	Million tonnes per year	51	55	66	81	1.5	1.9	2.0	2.0
Road passenger	Million tonnes per year	101	98	109	113	-0.6	1.1	0.4	0.7
Rail freight	Million tonnes per year	11	14	22	31	5.4	4.3	3.5	3.9
Rail passenger	Million tonnes per year	2	2	2	2	0.1	-0.1	0.0	0.0
Inland navigation	Million tonnes per year	0	0	1	1	6.2	6.3	3.4	4.8
Maritime (Intra-EU)	Million tonnes per year	1	1	1	1	5.2	1.6	1.0	1.3
Air (Intra-EU)	Million tonnes per year	5	5	6	6	1.3	1.1	0.4	0.7
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.067	0.062	0.055	0.054	-1.4	-1.3	-0.1	-0.7
Road	tonnes/1000 tkm	0.144	0.133	0.118	0.116	-1.6	-1.2	-0.1	-0.7
Rail	tonnes/1000 tkm	0.069	0.072	0.069	0.073	0.7	-0.4	0.6	0.1
Inland navigation	tonnes/1000 tkm	0.019	0.020	0.024	0.026	1.6	1.7	0.8	1.2
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.001	0.001	1.2	-2.3	-1.4	-1.8
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.130	0.120	0.119	0.108	-1.7	-0.1	-0.9	-0.5
Road	tonnes/1000 pkm	0.137	0.125	0.124	0.112	-1.8	-0.1	-1.0	-0.6
Rail	tonnes/1000 pkm	0.027	0.027	0.026	0.025	-0.1	-0.3	-0.2	-0.3
Air (Intra-EU)	tonnes/1000 pkm	0.163	0.154	0.139	0.126	-1.1	-1.0	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	600	495	442	471	-3.8	-1.1	0.6	-0.2
Road freight	1000 Tonnes per year	181	154	97	71	-3.2	-4.5	-3.1	-3.8
Road passenger	1000 Tonnes per year	266	159	93	75	-9.9	-5.2	-2.1	-3.7
Rail freight	1000 Tonnes per year	64	84	136	195	5.6	5.0	3.6	4.3
Rail passenger	1000 Tonnes per year	12	12	11	10	0.0	-0.7	-0.8	-0.8
Inland navigation	1000 Tonnes per year	4	6	11	16	6.2	6.3	3.4	4.8
Maritime (Intra-EU)	1000 Tonnes per year	12	15	16	17	4.7	1.2	0.6	0.9
Air (Intra-EU)	1000 Tonnes per year	60	66	78	87	1.8	1.7	1.1	1.4
PM10 Transport emissions	1000 Tonnes per year	32	27	28	27	-3.3	0.1	-0.1	0.0
Road freight	1000 Tonnes per year	12	11	12	11	-1.9	1.1	-0.4	0.3
Road passenger	1000 Tonnes per year	20	17	16	16	-4.1	-0.6	0.2	-0.2
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	30,160	34,567	46,925	58,140	2.8	3.1	2.2	2.6
Gasoline	1000 vehicles	24,278	27,251	35,815	43,700	2.3	2.8	2.0	2.4
Diesel	1000 vehicles	4,784	6,081	9,637	12,661	4.9	4.7	2.8	3.7
LPG/CNG	1000 vehicles	1,001	943	692	791	-1.2	-3.0	1.3	-0.9
Bioethanol	1000 vehicles	1	11	166	577	53.6	30.6	13.3	21.6
Hybrid	1000 vehicles	95	279	599	361	24.0	8.0	-4.9	1.3
Electric	1000 vehicles	1	2	16	49	25.2	22.1	12.0	16.9
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	15,175	17,240	23,345	28,796	2.6	3.1	2.1	2.6
Gasoline 1400-2000 cc	1000 vehicles	8,178	9,061	11,440	13,749	2.1	2.4	1.9	2.1
Gasoline >2000 cc	1000 vehicles	926	950	1,030	1,155	0.5	0.8	1.2	1.0
Diesel <2000 cc	1000 vehicles	4,056	5,260	8,498	11,225	5.3	4.9	2.8	3.9
Diesel >2000 cc	1000 vehicles	728	821	1,139	1,436	2.4	3.3	2.3	2.8
PreEURO	1000 vehicles	6,743	1,563	22	0	-25.4	-34.6	-44.5	-39.7
EURO I	1000 vehicles	2,488	1,919	86	6	-5.1	-26.7	-23.1	-24.9
EURO II	1000 vehicles	5,901	5,469	83	9	-1.5	-34.2	-19.8	-27.3
EURO III	1000 vehicles	14,931	14,460	3,740	43	-0.6	-12.6	-36.1	-25.3
EURO IV	1000 vehicles	0	6,485	5,056	34	0.0	-2.5	-39.4	-23.1
EURO V or later	1000 vehicles	0	4,379	37,157	57,061	0.0	23.8	4.4	13.7
Duty vehicle fleet size	1000 vehicles	2,857	3,617	6,097	8,250	4.8	5.4	3.1	4.2
<3.5 tonnes	1000 vehicles	971	1,283	1,979	2,589	5.7	4.4	2.7	3.6
3.5-7.5 tonnes	1000 vehicles	967	1,168	1,888	2,530	3.8	4.9	3.0	3.9
7.5-16 tonnes	1000 vehicles	231	282	467	631	4.1	5.2	3.1	4.1
16-32 tonnes	1000 vehicles	579	738	1,431	2,015	5.0	6.8	3.5	5.1
>32 tonnes	1000 vehicles	109	145	332	485	5.9	8.6	3.9	6.2
PreEURO	1000 vehicles	1,486	1,265	623	117	-3.2	-6.8	-15.4	-11.2
EURO I	1000 vehicles	277	273	229	110	-0.3	-1.7	-7.1	-4.4
EURO II	1000 vehicles	340	337	304	177	-0.1	-1.0	-5.3	-3.2
EURO III	1000 vehicles	755	931	898	690	4.3	-0.4	-2.6	-1.5
EURO IV	1000 vehicles	0	516	511	454	0.0	-0.1	-1.2	-0.6
EURO V or later	1000 vehicles	0	295	3,531	6,702	0.0	28.2	6.6	16.9

ITREN-2030 AT - Austria		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	283	284	286	266	0.1	0.1	-0.7	-0.3
Freight transport activity originated in the country	Billion tonnes-km per year	36	38	44	47	1.4	1.5	0.6	1.0
Road	Billion tonnes-km per year	18	20	22	24	1.3	1.3	0.5	0.9
Rail	Billion tonnes-km per year	14	15	17	17	1.1	1.1	0.1	0.6
Inland navigation	Billion tonnes-km per year	3	4	5	6	3.2	3.2	2.0	2.6
Maritime (Intra-EU)	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Average freight transport distance	km	126	135	154	176	1.4	1.4	1.3	1.3
Freight transport activity on the national territory	Billion tonnes-km per year	61	68	85	100	2.3	2.3	1.6	2.0
Road	Billion tonnes-km per year	41	46	57	69	2.2	2.2	1.8	2.0
Rail	Billion tonnes-km per year	17	18	23	25	2.1	2.1	0.9	1.5
Inland navigation	Billion tonnes-km per year	3	4	6	7	4.4	4.4	2.2	3.3
Freight road vehicles-km on the national territory	Billion vehicles-km per year	4	4	5	6	2.2	2.2	1.7	1.9
Trips originated in the country	Million trips per year	7,863	7,806	8,316	8,382	-0.1	0.6	0.1	0.4
Passenger transport activity originated in the country	Billion pass-km per year	121	124	138	142	0.6	1.1	0.3	0.7
Car	Billion pass-km per year	81	80	93	93	-0.3	1.5	0.0	0.8
Bus	Billion pass-km per year	16	17	15	15	0.9	-1.1	-0.1	-0.6
Rail	Billion pass-km per year	11	14	15	17	4.4	0.4	1.3	0.9
Air (Intra-EU)	Billion pass-km per year	9	10	12	13	2.1	2.0	0.9	1.4
Slow	Billion pass-km per year	4	4	4	5	0.7	1.5	1.2	1.4
Average passenger transport distance	km	15.4	15.9	16.6	17.0	0.7	0.4	0.2	0.3
Passenger transport activity on the national territory	Billion pass-km per year	132	138	151	166	0.9	0.9	0.9	0.9
Road	Billion pass-km per year	124	129	142	155	0.9	0.9	0.9	0.9
Rail	Billion pass-km per year	9	9	10	11	0.8	0.8	0.8	0.8
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	66	71	81	90	1.3	1.3	1.1	1.2
Motorization rate	cars/1000 inhabitants	506	538	598	656	1.2	1.1	0.9	1.0
ECONOMY INDICATORS									
GDP	Billion Euros 2005	221	239	281	319	1.6	1.6	1.3	1.4
Employment	1000 Persons	3,894	3,781	3,766	3,543	-0.6	0.0	-0.6	-0.3
Agriculture and fishery	1000 Persons	174	163	159	147	-1.3	-0.2	-0.8	-0.5
Construction	1000 Persons	375	362	389	397	-0.7	0.7	0.2	0.5
Energy and water	1000 Persons	48	63	63	67	5.5	0.0	0.7	0.3
Industry	1000 Persons	979	994	1,065	1,052	0.3	0.7	-0.1	0.3
Transport services	1000 Persons	202	200	196	185	-0.2	-0.2	-0.6	-0.4
Other services	1000 Persons	2,116	2,000	1,894	1,696	-1.1	-0.5	-1.1	-0.8
Population total	1000 Persons	8,164	8,253	8,414	8,479	0.2	0.2	0.1	0.1
Labour force	1000 Persons	5,252	5,253	5,349	5,149	0.0	0.2	-0.4	-0.1
Retired (> 65 years)	1000 Persons	1,339	1,449	1,574	1,876	1.6	0.8	1.8	1.3
Transport taxation revenues	Million Euros 2005	3,130	3,087	3,054	3,191	-0.3	-0.1	0.4	0.2
Fuel taxes	Million Euros 2005	2,024	1,913	2,097	2,149	-1.1	0.9	0.2	0.6
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	1,106	1,174	957	1,042	1.2	-2.0	0.9	-0.6
ENERGY INDICATORS									
Primary energy production	Billion toe per year	10	12	14	14	2.9	1.9	0.3	1.1
Share of domestic energy production	%	30	36	38	36	3.5	0.7	-0.6	0.0
Final energy demand by source	Billion toe per year	33	32	37	40	-0.6	1.2	0.8	1.0
Oil	Billion toe per year	15	13	13	13	-1.9	-0.2	0.0	-0.1
Gas	Billion toe per year	8	7	9	10	-3.5	3.0	1.2	2.1
Coal, Nuclear	Billion toe per year	3	4	3	4	3.2	-1.3	0.7	-0.3
Biomass	Billion toe per year	4	4	6	7	-0.4	4.2	2.1	3.2
Other Renewables	Billion toe per year	4	5	5	6	6.0	1.2	0.7	1.0
Final energy demand by consuming sector	Billion toe per year	28	27	30	32	-0.2	0.9	0.7	0.8
Transport freight	Billion toe per year	2	2	3	3	-0.4	1.8	0.3	1.0
Transport passenger	Billion toe per year	6	6	6	6	-0.5	-0.1	-0.1	-0.1
Industry	Billion toe per year	8	8	10	12	0.4	2.0	1.5	1.8
Residential and services	Billion toe per year	11	11	11	12	-0.5	0.4	0.5	0.5
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.84	1.18	1.07	1.17	7.0	-0.9	0.8	-0.1
Gasoline price	Euros2005 per litre	1.00	1.36	1.24	1.34	6.2	-0.9	0.8	-0.1
Biofuels price	Euros2005 per ecccf	0.66	1.17	1.16	1.24	12.0	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.3	1.6	4.1	5.1	38.5	9.8	2.1	5.9
Share of renewables in electricity	%	64.9	73.6	71.6	68.6	2.5	-0.3	-0.4	-0.3
Share of renewables in final energy demand	%	24.8	29.6	32.9	34.8	3.6	1.1	0.5	0.8
Energy intensity of freight transport activity	toe/1000tkm	36	31	30	26	-2.6	-0.5	-1.3	-0.9
Energy intensity of passenger transport activity	toe/1000pkm	43	40	36	33	-1.4	-1.0	-1.1	-1.0
Energy intensity of economic activity	toe/Million Euros 1995	124	114	106	101	-1.7	-0.7	-0.5	-0.6

ITREN-2030 AT - Austria		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	18	17	20	21	-0.6	1.3	0.5	0.9
Road freight	Million tonnes per year	5	5	6	7	0.4	1.9	1.7	1.8
Road passenger	Million tonnes per year	11	11	12	12	-1.4	1.1	-0.1	0.5
Rail freight	Million tonnes per year	0	0	0	0	0.1	3.5	1.2	2.3
Rail passenger	Million tonnes per year	0	0	0	0	3.3	-0.7	0.0	-0.4
Inland navigation	Million tonnes per year	0	0	0	0	5.3	3.8	2.2	3.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	2.9	0.2	0.1	0.2
Air (Intra-EU)	Million tonnes per year	1	2	2	2	0.8	1.0	-0.1	0.5
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.082	0.075	0.073	0.074	-1.8	-0.3	0.1	-0.1
Road	tonnes/1000 tkm	0.111	0.101	0.099	0.098	-1.8	-0.3	-0.1	-0.2
Rail	tonnes/1000 tkm	0.015	0.013	0.015	0.016	-2.0	1.4	0.2	0.8
Inland navigation	tonnes/1000 tkm	0.034	0.035	0.033	0.033	0.8	-0.6	-0.1	-0.3
Maritime (Intra-EU)	tonnes/1000 tkm	-	-	-	-	-	-	-	-
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.092	0.083	0.083	0.075	-2.0	0.1	-1.0	-0.5
Road	tonnes/1000 pkm	0.092	0.082	0.083	0.075	-2.2	0.2	-1.0	-0.4
Rail	tonnes/1000 pkm	0.010	0.012	0.010	0.009	2.4	-1.5	-0.9	-1.2
Air (Intra-EU)	tonnes/1000 pkm	0.166	0.156	0.142	0.128	-1.3	-0.9	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	84	67	53	49	-4.5	-2.3	-0.8	-1.5
Road freight	1000 Tonnes per year	22	18	10	7	-3.3	-5.9	-3.1	-4.5
Road passenger	1000 Tonnes per year	40	24	14	10	-9.6	-5.5	-3.0	-4.2
Rail freight	1000 Tonnes per year	1	1	2	2	1.9	3.9	0.8	2.3
Rail passenger	1000 Tonnes per year	1	1	1	1	2.4	-1.2	-0.7	-0.9
Inland navigation	1000 Tonnes per year	2	2	3	4	5.3	3.8	2.2	3.0
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	2.5	-0.1	-0.2	-0.2
Air (Intra-EU)	1000 Tonnes per year	17	18	22	23	1.2	1.7	0.7	1.2
PM10 Transport emissions	1000 Tonnes per year	6	5	4	4	-4.1	-2.4	0.2	-1.1
Road freight	1000 Tonnes per year	1	1	1	1	-3.8	-2.1	0.7	-0.7
Road passenger	1000 Tonnes per year	5	4	3	3	-4.2	-2.4	0.0	-1.2
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	4,174	4,495	5,143	5,693	1.5	1.4	1.0	1.2
Gasoline	1000 vehicles	2,147	1,721	1,546	1,623	-4.3	-1.1	0.5	-0.3
Diesel	1000 vehicles	2,023	2,761	3,560	4,030	6.4	2.6	1.2	1.9
LPG/CNG	1000 vehicles	0	0	0	1	0.0	10.6	2.3	6.4
Bioethanol	1000 vehicles	0	0	6	17	97.6	35.3	11.0	22.5
Hybrid	1000 vehicles	5	12	30	22	20.7	9.7	-2.8	3.3
Electric	1000 vehicles	0	0	0	1	20.2	13.7	9.4	11.5
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	968	810	752	781	-3.5	-0.7	0.4	-0.2
Gasoline 1400-2000 cc	1000 vehicles	1,033	785	691	746	-5.3	-1.3	0.8	-0.3
Gasoline >2000 cc	1000 vehicles	145	126	103	96	-2.8	-2.0	-0.7	-1.4
Diesel <2000 cc	1000 vehicles	1,636	2,295	2,993	3,380	7.0	2.7	1.2	2.0
Diesel >2000 cc	1000 vehicles	386	466	568	649	3.8	2.0	1.3	1.7
PreEURO	1000 vehicles	145	16	0	0	-36.0	-78.6	-100.0	-100.0
EURO I	1000 vehicles	1,477	526	0	0	-18.7	-56.6	-100.0	-100.0
EURO II	1000 vehicles	1,100	829	16	0	-5.5	-32.5	-87.4	-70.8
EURO III	1000 vehicles	1,448	1,340	328	0	-1.5	-13.1	-61.1	-41.9
EURO IV	1000 vehicles	0	1,018	617	3	0.0	-4.9	-41.7	-25.5
EURO V or later	1000 vehicles	0	755	4,146	5,650	0.0	18.6	3.1	10.6
Duty vehicle fleet size	1000 vehicles	296	330	399	462	2.2	1.9	1.5	1.7
<3.5 tonnes	1000 vehicles	22	23	23	26	0.2	0.3	1.1	0.7
3.5-7.5 tonnes	1000 vehicles	115	129	157	180	2.4	2.0	1.4	1.7
7.5-16 tonnes	1000 vehicles	30	34	41	47	2.4	2.0	1.4	1.7
16-32 tonnes	1000 vehicles	102	115	141	166	2.4	2.1	1.6	1.8
>32 tonnes	1000 vehicles	26	29	36	43	2.5	2.1	1.7	1.9
PreEURO	1000 vehicles	132	76	0	0	-10.4	-39.6	-100.0	-100.0
EURO I	1000 vehicles	34	33	6	0	-0.5	-15.3	-100.0	-100.0
EURO II	1000 vehicles	66	66	45	0	-0.1	-3.8	-57.3	-35.9
EURO III	1000 vehicles	63	81	77	10	4.9	-0.4	-18.5	-9.9
EURO IV	1000 vehicles	0	54	53	31	0.0	-0.1	-5.4	-2.8
EURO V or later	1000 vehicles	0	20	217	422	0.0	26.8	6.9	16.4

ITREN-2030 BE - Belgium		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	803	787	756	720	-0.4	-0.4	-0.5	-0.4
Freight transport activity originated in the country	Billion tonnes-km per year	378	393	423	431	0.8	0.8	0.2	0.5
Road	Billion tonnes-km per year	51	53	57	58	0.7	0.7	0.2	0.5
Rail	Billion tonnes-km per year	14	14	15	15	0.4	0.4	0.0	0.2
Inland navigation	Billion tonnes-km per year	17	18	20	22	1.2	1.2	0.9	1.1
Maritime (Intra-EU)	Billion tonnes-km per year	296	308	331	336	0.7	0.7	0.1	0.4
Average freight transport distance	km	471	499	560	598	1.2	1.2	0.7	0.9
Freight transport activity on the national territory	Billion tonnes-km per year	89	93	100	105	0.8	0.8	0.5	0.6
Road	Billion tonnes-km per year	71	74	81	86	0.9	0.9	0.6	0.7
Rail	Billion tonnes-km per year	9	9	10	10	0.3	0.3	0.3	0.3
Inland navigation	Billion tonnes-km per year	9	9	10	10	0.3	0.3	-0.1	0.1
Freight road vehicles-km on the national territory	Billion vehicles-km per year	7	8	8	9	0.8	0.8	0.7	0.8
Trips originated in the country	Million trips per year	-	-	-	-	-	-	-	-
Passenger transport activity originated in the country	Billion pass-km per year	-	-	-	-	-	-	-	-
Car	Billion pass-km per year	-	-	-	-	-	-	-	-
Bus	Billion pass-km per year	-	-	-	-	-	-	-	-
Rail	Billion pass-km per year	-	-	-	-	-	-	-	-
Air (Intra-EU)	Billion pass-km per year	-	-	-	-	-	-	-	-
Slow	Billion pass-km per year	-	-	-	-	-	-	-	-
Average passenger transport distance	km	-	-	-	-	-	-	-	-
Passenger transport activity on the national territory	Billion pass-km per year	165	172	186	202	0.8	0.8	0.8	0.8
Road	Billion pass-km per year	157	163	177	193	0.8	0.8	0.9	0.8
Rail	Billion pass-km per year	8	9	9	9	0.4	0.4	0.4	0.4
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	87	91	100	110	0.9	0.9	1.0	1.0
Motorization rate	cars/1000 inhabitants	466	485	521	561	0.8	0.7	0.7	0.7
ECONOMY INDICATORS									
GDP	Billion Euros 2005	-	-	-	-	-	-	-	-
Employment	1000 Persons	-	-	-	-	-	-	-	-
Agriculture and fishery	1000 Persons	-	-	-	-	-	-	-	-
Construction	1000 Persons	-	-	-	-	-	-	-	-
Energy and water	1000 Persons	-	-	-	-	-	-	-	-
Industry	1000 Persons	-	-	-	-	-	-	-	-
Transport services	1000 Persons	-	-	-	-	-	-	-	-
Other services	1000 Persons	-	-	-	-	-	-	-	-
Population total	1000 Persons	-	-	-	-	-	-	-	-
Labour force	1000 Persons	-	-	-	-	-	-	-	-
Retired (> 65 years)	1000 Persons	-	-	-	-	-	-	-	-
Transport taxation revenues	Million Euros 2005	3,130	3,087	3,054	3,191	-0.3	-0.1	0.4	0.2
Fuel taxes	Million Euros 2005	2,024	1,913	2,097	2,149	-1.1	0.9	0.2	0.6
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	1,106	1,174	957	1,042	1.2	-2.0	0.9	-0.6
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per eeccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

ITREN-2030 BE - Belgium		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	18	18	20	21	-0.7	1.3	0.5	0.9
Road freight	Million tonnes per year	5	5	6	7	0.4	1.9	1.7	1.8
Road passenger	Million tonnes per year	11	11	12	12	-1.4	1.1	-0.1	0.5
Rail freight	Million tonnes per year	0	0	0	0	-2.6	1.4	5.0	3.2
Rail passenger	Million tonnes per year	0	0	0	0	3.3	-0.7	0.0	-0.4
Inland navigation	Million tonnes per year	0	0	0	0	-0.2	0.0	-0.4	-0.2
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	2.9	0.2	0.1	0.2
Air (Intra-EU)	Million tonnes per year	-	-	-	-	-	-	-	-
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.014	0.013	0.015	0.017	-0.5	1.0	1.4	1.2
Road	tonnes/1000 tkm	0.064	0.063	0.069	0.078	-0.5	1.0	1.1	1.1
Rail	tonnes/1000 tkm	0.015	0.013	0.014	0.022	-2.9	1.1	4.7	2.9
Inland navigation	tonnes/1000 tkm	0.053	0.052	0.050	0.048	-0.5	-0.4	-0.3	-0.3
Maritime (Intra-EU)	tonnes/1000 tkm	0.000	0.000	0.000	0.000	2.2	-0.5	0.0	-0.3
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.078	0.071	0.073	0.067	-1.8	0.3	-0.9	-0.3
Road	tonnes/1000 pkm	0.072	0.065	0.067	0.061	-2.1	0.3	-0.9	-0.3
Rail	tonnes/1000 pkm	0.011	0.012	0.011	0.010	2.9	-1.1	-0.4	-0.8
Air (Intra-EU)	tonnes/1000 pkm	-	-	-	-	-	-	-	-
NOx Transport emissions	1000 Tonnes per year	90	72	57	51	-4.4	-2.4	-0.9	-1.7
Road freight	1000 Tonnes per year	22	18	10	7	-3.3	-5.9	-3.1	-4.5
Road passenger	1000 Tonnes per year	40	24	14	10	-9.6	-5.5	-3.0	-4.2
Rail freight	1000 Tonnes per year	1	1	1	1	-6.2	-1.4	1.4	0.0
Rail passenger	1000 Tonnes per year	1	1	1	1	2.4	-1.2	-0.7	-0.9
Inland navigation	1000 Tonnes per year	8	8	8	8	-0.2	0.0	-0.4	-0.2
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	2.5	-0.1	-0.2	-0.2
Air (Intra-EU)	1000 Tonnes per year	17	18	22	23	1.2	1.7	0.7	1.2
PM10 Transport emissions	1000 Tonnes per year	8	6	5	5	-4.6	-2.8	0.3	-1.3
Road freight	1000 Tonnes per year	2	1	1	1	-5.9	-2.2	0.5	-0.9
Road passenger	1000 Tonnes per year	6	5	3	4	-4.2	-3.0	0.2	-1.4
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	4,858	5,138	5,649	6,192	1.1	1.0	0.9	0.9
Gasoline	1000 vehicles	2,354	1,937	1,614	1,614	-3.8	-1.8	0.0	-0.9
Diesel	1000 vehicles	2,505	3,177	4,015	4,559	4.9	2.4	1.3	1.8
LPG/CNG	1000 vehicles	0	24	19	19	0.0	-2.1	-0.1	-1.1
Bioethanol	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Hybrid	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Electric	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	1,419	1,155	989	1,013	-4.0	-1.5	0.2	-0.7
Gasoline 1400-2000 cc	1000 vehicles	784	650	530	530	-3.7	-2.0	0.0	-1.0
Gasoline >2000 cc	1000 vehicles	150	131	94	71	-2.7	-3.2	-2.8	-3.0
Diesel <2000 cc	1000 vehicles	2,136	2,782	3,590	4,131	5.4	2.6	1.4	2.0
Diesel >2000 cc	1000 vehicles	368	395	426	428	1.4	0.8	0.0	0.4
PreEURO	1000 vehicles	591	132	5	0	-25.9	-28.6	-19.9	-24.4
EURO I	1000 vehicles	780	331	19	2	-15.8	-24.8	-19.8	-22.3
EURO II	1000 vehicles	971	551	48	3	-10.7	-21.7	-25.5	-23.6
EURO III	1000 vehicles	1,917	1,419	261	13	-5.8	-15.6	-26.1	-21.0
EURO IV	1000 vehicles	629	1,791	632	42	23.3	-9.9	-23.7	-17.1
EURO V or later	1000 vehicles	0	913	4,683	6,132	0.0	17.8	2.7	10.0
Duty vehicle fleet size	1000 vehicles	242	251	270	292	0.7	0.7	0.8	0.8
<3.5 tonnes	1000 vehicles	99	102	108	121	0.5	0.6	1.2	0.9
3.5-7.5 tonnes	1000 vehicles	28	30	32	34	0.8	0.8	0.6	0.7
7.5-16 tonnes	1000 vehicles	33	35	38	40	0.8	0.8	0.6	0.7
16-32 tonnes	1000 vehicles	41	44	48	50	1.0	0.9	0.5	0.7
>32 tonnes	1000 vehicles	39	41	45	47	1.0	0.9	0.5	0.7
PreEURO	1000 vehicles	44	13	1	0	-22.1	-25.7	-41.6	-34.1
EURO I	1000 vehicles	23	10	1	0	-15.3	-21.6	-35.9	-29.1
EURO II	1000 vehicles	86	51	8	0	-9.9	-16.7	-26.1	-21.6
EURO III	1000 vehicles	87	90	24	3	0.6	-12.2	-20.2	-16.3
EURO IV	1000 vehicles	1	45	20	3	113.5	-7.9	-16.6	-12.4
EURO V or later	1000 vehicles	0	42	215	286	152.1	17.8	2.9	10.1

ITREN-2030		Reference scenario							
BLX - Belgium + Luxembourg									
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	1,027	1,027	1,034	1,064	0.0	0.1	0.3	0.2
Freight transport activity originated in the country	Billion tonnes-km per year	393	409	446	462	0.8	0.9	0.4	0.6
Road	Billion tonnes-km per year	64	68	77	85	1.2	1.3	1.0	1.1
Rail	Billion tonnes-km per year	14	15	15	15	0.5	0.5	0.1	0.3
Inland navigation	Billion tonnes-km per year	18	19	23	26	1.5	1.5	1.4	1.5
Maritime (Intra-EU)	Billion tonnes-km per year	296	308	331	336	0.7	0.7	0.1	0.4
Average freight transport distance	km	382	399	431	434	0.8	0.8	0.1	0.4
Freight transport activity on the national territory	Billion tonnes-km per year	94	98	107	114	0.8	0.8	0.6	0.7
Road	Billion tonnes-km per year	76	79	87	94	1.0	1.0	0.7	0.8
Rail	Billion tonnes-km per year	10	10	10	10	0.3	0.3	0.3	0.3
Inland navigation	Billion tonnes-km per year	9	9	10	10	0.3	0.3	-0.1	0.1
Freight road vehicles-km on the national territory	Billion vehicles-km per year	8	8	9	10	0.9	0.9	0.8	0.9
Trips originated in the country	Million trips per year	11,022	10,922	11,672	12,102	-0.2	0.7	0.4	0.5
Passenger transport activity originated in the country	Billion pass-km per year	182	184	204	216	0.3	1.1	0.6	0.8
Car	Billion pass-km per year	121	118	135	144	-0.5	1.3	0.6	1.0
Bus	Billion pass-km per year	17	19	18	18	2.7	-0.5	0.1	-0.2
Rail	Billion pass-km per year	9	12	13	15	5.5	0.8	1.3	1.1
Air (Intra-EU)	Billion pass-km per year	29	29	32	32	0.0	0.9	0.0	0.4
Slow	Billion pass-km per year	5	6	7	8	1.4	1.6	1.4	1.5
Average passenger transport distance	km	16.5	16.8	17.5	17.9	0.5	0.4	0.2	0.3
Passenger transport activity on the national territory	Billion pass-km per year	177	184	201	220	0.8	0.8	0.9	0.9
Road	Billion pass-km per year	168	176	191	211	0.9	0.9	1.0	0.9
Rail	Billion pass-km per year	9	9	9	10	0.4	0.4	0.4	0.4
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	93	98	108	120	1.0	1.0	1.1	1.0
Motorization rate	cars/1000 inhabitants	-	-	-	-	-	-	-	-
ECONOMY INDICATORS									
GDP	Billion Euros 2005	280	296	324	352	1.1	0.9	0.8	0.9
Employment	1000 Persons	4,570	4,361	3,982	3,632	-0.9	-0.9	-0.9	-0.9
Agriculture and fishery	1000 Persons	33	29	28	24	-2.1	-0.5	-1.4	-1.0
Construction	1000 Persons	270	291	273	239	1.5	-0.6	-1.3	-1.0
Energy and water	1000 Persons	41	56	52	52	6.3	-0.7	0.0	-0.4
Industry	1000 Persons	1,067	1,134	1,183	1,156	1.2	0.4	-0.2	0.1
Transport services	1000 Persons	161	172	169	157	1.3	-0.2	-0.7	-0.5
Other services	1000 Persons	2,998	2,680	2,277	2,004	-2.2	-1.6	-1.3	-1.4
Population total	1000 Persons	10,887	11,006	11,291	11,525	0.2	0.3	0.2	0.2
Labour force	1000 Persons	6,803	6,954	7,013	6,851	0.4	0.1	-0.2	-0.1
Retired (> 65 years)	1000 Persons	1,835	1,822	2,069	2,441	-0.1	1.3	1.7	1.5
Transport taxation revenues	Million Euros 2005	4,458	4,546	5,245	5,244	0.4	1.4	0.0	0.7
Fuel taxes	Million Euros 2005	4,458	4,500	4,904	4,867	0.2	0.9	-0.1	0.4
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	46	341	377	0.0	22.1	1.0	11.0
ENERGY INDICATORS									
Primary energy production	Billion toe per year	15	14	12	11	-1.9	-0.9	-1.3	-1.1
Share of domestic energy production	%	24	21	19	16	-2.7	-0.9	-1.7	-1.3
Final energy demand by source	Billion toe per year	62	64	64	67	0.8	0.0	0.4	0.2
Oil	Billion toe per year	26	24	22	22	-1.6	-0.8	-0.1	-0.4
Gas	Billion toe per year	16	15	17	17	-0.9	1.0	0.4	0.7
Coal, Nuclear	Billion toe per year	18	22	20	21	4.7	-1.0	0.2	-0.4
Biomass	Billion toe per year	2	2	3	5	-0.7	5.2	3.4	4.3
Other Renewables	Billion toe per year	0	1	2	2	34.3	6.1	1.1	3.6
Final energy demand by consuming sector	Billion toe per year	45	44	45	46	-0.4	0.2	0.3	0.2
Transport freight	Billion toe per year	4	4	4	4	-1.2	0.6	-0.3	0.1
Transport passenger	Billion toe per year	9	9	8	8	-1.1	-0.3	-0.2	-0.3
Industry	Billion toe per year	16	17	19	21	1.4	1.1	1.1	1.1
Residential and services	Billion toe per year	16	15	13	13	-1.8	-0.8	-0.4	-0.6
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.84	1.18	1.08	1.17	6.9	-0.9	0.8	-0.1
Gasoline price	Euros2005 per litre	1.06	1.39	1.29	1.38	5.7	-0.8	0.7	-0.1
Biofuels price	Euros2005 per ecccf	0.66	1.17	1.16	1.24	12.0	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.7	2.4	3.8	4.5	26.8	4.7	1.9	3.3
Share of renewables in electricity	%	5.1	11.8	21.3	23.9	18.3	6.1	1.2	3.6
Share of renewables in final energy demand	%	3.8	5.5	8.8	10.6	7.9	4.8	1.9	3.3
Energy intensity of freight transport activity	toe/1000tkm	10	9	9	8	-2.0	-0.2	-0.5	-0.4
Energy intensity of passenger transport activity	toe/1000pkm	45	41	37	33	-1.8	-1.2	-1.0	-1.1
Energy intensity of economic activity	toe/Million Euros 1995	161	149	139	132	-1.5	-0.7	-0.5	-0.6

ITREN-2030 BLX - Belgium + Luxembourg		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	44	45	49	50	0.4	0.9	0.1	0.5
Road freight	Million tonnes per year	18	21	23	24	2.4	1.0	0.3	0.7
Road passenger	Million tonnes per year	20	19	21	21	-1.2	1.0	0.1	0.6
Rail freight	Million tonnes per year	0	0	0	0	-2.3	1.3	4.8	3.0
Rail passenger	Million tonnes per year	0	0	0	0	4.6	0.3	0.7	0.5
Inland navigation	Million tonnes per year	0	0	0	0	-0.2	0.0	-0.4	-0.2
Maritime (Intra-EU)	Million tonnes per year	0	1	1	1	2.4	0.0	-0.1	-0.1
Air (Intra-EU)	Million tonnes per year	5	5	5	4	-1.1	-0.1	-0.9	-0.5
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.050	0.054	0.055	0.055	1.5	0.2	0.1	0.1
Road	tonnes/1000 tkm	0.242	0.260	0.261	0.251	1.4	0.1	-0.4	-0.2
Rail	tonnes/1000 tkm	0.015	0.014	0.015	0.023	-2.6	1.0	4.5	2.7
Inland navigation	tonnes/1000 tkm	0.053	0.052	0.050	0.048	-0.5	-0.4	-0.3	-0.3
Maritime (Intra-EU)	tonnes/1000 tkm	0.002	0.002	0.002	0.002	1.7	-0.8	-0.2	-0.5
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.121	0.110	0.109	0.100	-1.9	-0.1	-0.9	-0.5
Road	tonnes/1000 pkm	0.117	0.106	0.107	0.099	-2.0	0.1	-0.8	-0.4
Rail	tonnes/1000 pkm	0.011	0.014	0.014	0.014	4.2	-0.1	0.3	0.1
Air (Intra-EU)	tonnes/1000 pkm	0.174	0.165	0.149	0.136	-1.1	-1.0	-0.9	-0.9
NOx Transport emissions	1000 Tonnes per year	188	158	133	119	-3.4	-1.7	-1.1	-1.4
Road freight	1000 Tonnes per year	56	44	27	18	-4.9	-4.8	-4.1	-4.4
Road passenger	1000 Tonnes per year	47	30	19	16	-8.4	-4.5	-1.9	-3.2
Rail freight	1000 Tonnes per year	1	1	1	1	-5.5	-1.3	1.3	0.0
Rail passenger	1000 Tonnes per year	1	1	1	1	4.3	-0.4	-0.3	-0.4
Inland navigation	1000 Tonnes per year	8	8	8	8	-0.2	0.0	-0.4	-0.2
Maritime (Intra-EU)	1000 Tonnes per year	11	12	11	11	2.0	-0.4	-0.5	-0.5
Air (Intra-EU)	1000 Tonnes per year	64	63	66	65	-0.5	0.6	-0.2	0.2
PM10 Transport emissions	1000 Tonnes per year	8	7	5	5	-4.6	-2.7	0.4	-1.1
Road freight	1000 Tonnes per year	2	2	1	1	-5.7	-2.1	0.6	-0.8
Road passenger	1000 Tonnes per year	6	5	4	4	-4.2	-2.9	0.4	-1.3
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	5,068	5,113	5,164	5,346	0.2	0.1	0.3	0.2
Gasoline	1000 vehicles	2,465	2,022	1,710	1,719	-3.9	-1.7	0.1	-0.8
Diesel	1000 vehicles	2,691	3,422	4,318	4,933	4.9	2.4	1.3	1.8
LPG/CNG	1000 vehicles	0	24	20	19	0.0	-2.1	-0.1	-1.1
Bioethanol	1000 vehicles	0	3	28	62	57.0	26.8	8.1	17.1
Hybrid	1000 vehicles	20	64	123	104	26.1	6.8	-1.6	2.5
Electric	1000 vehicles	0	0	1	2	17.9	16.6	6.3	11.3
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	1,464	1,209	1,055	1,084	-3.8	-1.4	0.3	-0.5
Gasoline 1400-2000 cc	1000 vehicles	832	674	556	560	-4.1	-1.9	0.1	-0.9
Gasoline >2000 cc	1000 vehicles	170	139	99	75	-3.8	-3.4	-2.7	-3.1
Diesel <2000 cc	1000 vehicles	2,278	2,982	3,841	4,446	5.5	2.6	1.5	2.0
Diesel >2000 cc	1000 vehicles	413	440	477	487	1.3	0.8	0.2	0.5
PreEURO	1000 vehicles	591	132	5	0	-25.9	-28.6	-19.9	-24.4
EURO I	1000 vehicles	784	331	19	2	-15.8	-24.8	-19.8	-22.3
EURO II	1000 vehicles	1,031	552	48	3	-11.7	-21.7	-25.5	-23.6
EURO III	1000 vehicles	2,152	1,492	261	13	-7.1	-16.0	-26.1	-21.2
EURO IV	1000 vehicles	0	1,928	632	42	0.0	-10.5	-23.7	-17.4
EURO V or later	1000 vehicles	0	1,033	5,082	6,612	0.0	17.3	2.7	9.7
Duty vehicle fleet size	1000 vehicles	257	268	290	316	0.8	0.8	0.9	0.8
<3.5 tonnes	1000 vehicles	100	103	109	122	0.5	0.6	1.2	0.9
3.5-7.5 tonnes	1000 vehicles	36	38	42	46	1.1	1.0	0.9	0.9
7.5-16 tonnes	1000 vehicles	35	37	40	43	0.9	0.8	0.7	0.8
16-32 tonnes	1000 vehicles	46	48	53	57	1.1	1.0	0.7	0.8
>32 tonnes	1000 vehicles	40	42	46	48	1.0	0.9	0.5	0.7
PreEURO	1000 vehicles	49	15	1	0	-21.0	-24.4	-36.7	-30.8
EURO I	1000 vehicles	25	12	1	0	-14.4	-20.1	-31.3	-25.9
EURO II	1000 vehicles	90	55	10	1	-9.5	-16.0	-24.9	-20.6
EURO III	1000 vehicles	91	95	27	3	0.7	-11.7	-19.4	-15.6
EURO IV	1000 vehicles	1	49	22	4	116.3	-7.5	-15.7	-11.7
EURO V or later	1000 vehicles	0	43	228	308	153.6	18.2	3.0	10.4

ITREN-2030 BU - Bulgaria		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	44	59	104	148	5.8	5.9	3.6	4.8
Freight transport activity originated in the country	Billion tonnes-km per year	31	41	70	97	5.5	5.5	3.3	4.4
Road	Billion tonnes-km per year	11	14	22	29	4.7	4.7	2.8	3.7
Rail	Billion tonnes-km per year	6	8	14	20	5.5	5.5	3.8	4.7
Inland navigation	Billion tonnes-km per year	1	2	4	6	7.9	7.9	5.0	6.5
Maritime (Intra-EU)	Billion tonnes-km per year	13	17	31	42	5.9	5.9	3.3	4.6
Average freight transport distance	km	713	700	673	656	-0.4	-0.4	-0.3	-0.3
Freight transport activity on the national territory	Billion tonnes-km per year	25	29	42	58	3.6	3.8	3.1	3.4
Road	Billion tonnes-km per year	17	19	25	33	2.7	2.7	2.6	2.7
Rail	Billion tonnes-km per year	7	9	16	23	5.6	5.6	3.9	4.7
Inland navigation	Billion tonnes-km per year	1	1	2	2	4.2	4.2	2.6	3.4
Freight road vehicles-km on the national territory	Billion vehicles-km per year	2	3	3	5	3.0	3.0	2.8	2.9
Trips originated in the country	Million trips per year	4,642	4,484	4,466	4,410	-0.7	0.0	-0.1	-0.1
Passenger transport activity originated in the country	Billion pass-km per year	54	53	59	65	-0.5	1.1	1.0	1.1
Car	Billion pass-km per year	19	18	23	28	-1.6	2.5	2.2	2.4
Bus	Billion pass-km per year	27	26	25	24	-0.6	-0.3	-0.6	-0.4
Rail	Billion pass-km per year	4	5	6	7	2.5	2.1	2.4	2.3
Air (Intra-EU)	Billion pass-km per year	2	2	2	3	4.0	2.3	1.9	2.1
Slow	Billion pass-km per year	3	3	3	3	1.1	0.6	0.5	0.5
Average passenger transport distance	km	11.7	11.8	13.2	14.8	0.2	1.1	1.1	1.1
Passenger transport activity on the national territory	Billion pass-km per year	86	91	103	122	1.2	1.2	1.7	1.5
Road	Billion pass-km per year	83	88	100	119	1.3	1.3	1.7	1.5
Rail	Billion pass-km per year	3	3	3	3	0.3	0.3	0.3	0.3
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	25	30	43	56	3.6	3.6	2.7	3.1
Motorization rate	cars/1000 inhabitants	341	447	689	848	5.6	4.4	2.1	3.3
ECONOMY INDICATORS									
GDP	Billion Euros 2005	13	14	17	21	1.7	2.1	2.1	2.1
Employment	1000 Persons	4,018	3,979	3,771	3,279	-0.2	-0.5	-1.4	-1.0
Agriculture and fishery	1000 Persons	495	410	369	366	-3.7	-1.0	-0.1	-0.6
Construction	1000 Persons	450	498	516	451	2.1	0.4	-1.3	-0.5
Energy and water	1000 Persons	69	62	57	62	-2.0	-0.8	0.7	0.0
Industry	1000 Persons	1,131	1,036	934	710	-1.7	-1.0	-2.7	-1.9
Transport services	1000 Persons	98	102	102	95	0.9	-0.1	-0.7	-0.4
Other services	1000 Persons	1,776	1,871	1,793	1,595	1.1	-0.4	-1.2	-0.8
Population total	1000 Persons	7,690	7,390	6,817	6,206	-0.8	-0.8	-0.9	-0.9
Labour force	1000 Persons	4,841	4,803	4,258	3,790	-0.2	-1.2	-1.2	-1.2
Retired (> 65 years)	1000 Persons	1,412	1,382	1,486	1,467	-0.4	0.7	-0.1	0.3
Transport taxation revenues	Million Euros 2005	873	829	1,107	1,355	-1.0	2.9	2.0	2.5
Fuel taxes	Million Euros 2005	852	802	952	1,165	-1.2	1.7	2.0	1.9
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	22	27	155	190	4.6	19.1	2.1	10.3
ENERGY INDICATORS									
Primary energy production	Billion toe per year	11	12	12	14	2.5	0.0	1.5	0.8
Share of domestic energy production	%	50	54	54	54	1.6	0.0	0.1	0.0
Final energy demand by source	Billion toe per year	22	22	23	26	0.8	0.0	1.4	0.7
Oil	Billion toe per year	5	6	6	7	2.4	1.0	0.9	1.0
Gas	Billion toe per year	3	2	3	3	-5.8	2.8	2.2	2.5
Coal, Nuclear	Billion toe per year	13	13	11	11	0.6	-1.6	0.4	-0.6
Biomass	Billion toe per year	1	1	2	3	7.5	4.0	6.5	5.3
Other Renewables	Billion toe per year	0	1	1	1	10.6	2.2	2.2	2.2
Final energy demand by consuming sector	Billion toe per year	10	10	12	14	1.3	1.1	1.6	1.4
Transport freight	Billion toe per year	1	1	1	1	0.6	0.4	-0.7	-0.1
Transport passenger	Billion toe per year	2	2	3	3	5.0	1.8	1.9	1.9
Industry	Billion toe per year	4	4	5	6	0.3	1.2	1.9	1.5
Residential and services	Billion toe per year	3	3	3	4	0.4	0.7	1.3	1.0
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.46	0.78	0.69	0.77	11.0	-1.2	1.0	-0.1
Gasoline price	Euros2005 per litre	1.00	1.32	1.24	1.31	5.7	-0.7	0.6	0.0
Biofuels price	Euros2005 per ecccf	0.67	1.17	1.17	1.24	11.9	0.0	0.6	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	2.5	1.9	13.5	1032.4	-2.7	21.5	8.8
Share of renewables in electricity	%	12.9	20.4	25.5	27.9	9.6	2.3	0.9	1.6
Share of renewables in final energy demand	%	11.1	14.5	16.9	21.6	5.5	1.5	2.5	2.0
Energy intensity of freight transport activity	toe/1000tkm	21	17	11	8	-3.7	-4.0	-3.7	-3.9
Energy intensity of passenger transport activity	toe/1000pkm	21	25	27	27	3.7	0.6	0.2	0.4
Energy intensity of economic activity	toe/Million Euros 1995	762	750	684	649	-0.3	-0.9	-0.5	-0.7



ITREN-2030 BU - Bulgaria		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	12	12	14	16	-0.7	1.5	1.6	1.6
Road freight	Million tonnes per year	3	3	2	2	-2.3	-1.2	0.1	-0.6
Road passenger	Million tonnes per year	7	6	7	8	-2.2	1.7	1.2	1.5
Rail freight	Million tonnes per year	2	3	4	5	4.8	3.5	3.3	3.4
Rail passenger	Million tonnes per year	0	0	0	0	1.2	1.2	1.5	1.4
Inland navigation	Million tonnes per year	0	0	0	0	5.1	3.7	2.8	3.2
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	5.4	2.0	1.2	1.6
Air (Intra-EU)	Million tonnes per year	0	0	0	0	2.9	1.2	0.7	0.9
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.138	0.116	0.085	0.076	-3.4	-3.1	-1.0	-2.1
Road	tonnes/1000 tkm	0.184	0.143	0.097	0.075	-4.9	-3.8	-2.5	-3.2
Rail	tonnes/1000 tkm	0.291	0.280	0.230	0.217	-0.7	-2.0	-0.6	-1.3
Inland navigation	tonnes/1000 tkm	0.087	0.090	0.086	0.088	0.8	-0.5	0.2	-0.2
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.001	0.001	-0.4	-3.7	-2.0	-2.8
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.080	0.068	0.071	0.067	-3.2	0.4	-0.5	0.0
Road	tonnes/1000 pkm	0.080	0.067	0.070	0.067	-3.4	0.4	-0.5	0.0
Rail	tonnes/1000 pkm	0.019	0.020	0.022	0.025	0.8	0.9	1.2	1.0
Air (Intra-EU)	tonnes/1000 pkm	0.191	0.181	0.161	0.144	-1.1	-1.2	-1.1	-1.1
NOx Transport emissions	1000 Tonnes per year	49	45	49	62	-1.6	0.9	2.3	1.6
Road freight	1000 Tonnes per year	8	6	3	2	-5.5	-6.5	-2.9	-4.7
Road passenger	1000 Tonnes per year	23	14	8	6	-9.0	-5.1	-2.5	-3.8
Rail freight	1000 Tonnes per year	13	19	30	44	7.3	4.8	3.9	4.4
Rail passenger	1000 Tonnes per year	1	1	1	1	0.9	0.5	0.8	0.6
Inland navigation	1000 Tonnes per year	1	2	2	3	5.1	3.7	2.8	3.2
Maritime (Intra-EU)	1000 Tonnes per year	0	0	0	0	5.0	1.6	0.9	1.3
Air (Intra-EU)	1000 Tonnes per year	3	4	5	6	3.5	1.8	1.5	1.6
PM10 Transport emissions	1000 Tonnes per year	3	2	2	2	-6.0	-1.6	1.1	-0.3
Road freight	1000 Tonnes per year	1	1	0	1	-1.4	-1.1	0.9	-0.1
Road passenger	1000 Tonnes per year	3	2	1	2	-7.1	-1.8	1.1	-0.3
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	2,641	3,314	4,680	5,991	4.6	3.5	2.5	3.0
Gasoline	1000 vehicles	1,748	2,117	2,953	3,755	3.9	3.4	2.4	2.9
Diesel	1000 vehicles	890	1,191	1,703	2,189	6.0	3.6	2.5	3.1
LPG/CNG	1000 vehicles	0	0	0	1	16.5	9.5	3.6	6.5
Bioethanol	1000 vehicles	0	0	11	37	92.1	41.9	12.6	26.4
Hybrid	1000 vehicles	2	5	12	9	20.4	9.5	-3.5	2.8
Electric	1000 vehicles	0	0	0	0	21.7	20.0	17.4	18.7
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	1,252	1,520	2,140	2,735	4.0	3.5	2.5	3.0
Gasoline 1400-2000 cc	1000 vehicles	458	555	764	962	3.9	3.2	2.3	2.8
Gasoline >2000 cc	1000 vehicles	38	42	49	58	2.3	1.4	1.8	1.6
Diesel <2000 cc	1000 vehicles	2,136	2,782	3,590	4,131	5.4	2.6	1.4	2.0
Diesel >2000 cc	1000 vehicles	103	121	154	192	3.3	2.5	2.2	2.4
PreEURO	1000 vehicles	453	147	0	0	-20.2	-95.8	-100.0	-100.0
EURO I	1000 vehicles	165	140	0	0	-3.2	-76.7	-100.0	-100.0
EURO II	1000 vehicles	1,122	1,058	17	0	-1.2	-33.9	-100.0	-100.0
EURO III	1000 vehicles	899	844	269	0	-1.2	-10.8	-100.0	-100.0
EURO IV	1000 vehicles	0	651	496	0	0.0	-2.7	-77.4	-53.1
EURO V or later	1000 vehicles	0	468	3,874	5,945	0.0	23.5	4.4	13.5
Duty vehicle fleet size	1000 vehicles	191	241	343	457	4.7	3.6	2.9	3.3
<3.5 tonnes	1000 vehicles	122	162	244	333	5.8	4.2	3.2	3.7
3.5-7.5 tonnes	1000 vehicles	33	37	46	57	2.5	2.2	2.2	2.2
7.5-16 tonnes	1000 vehicles	9	10	12	15	2.5	2.2	2.2	2.2
16-32 tonnes	1000 vehicles	23	26	34	42	3.0	2.5	2.3	2.4
>32 tonnes	1000 vehicles	5	5	7	9	3.1	2.6	2.3	2.5
PreEURO	1000 vehicles	82	70	38	10	-3.2	-5.9	-12.6	-9.3
EURO I	1000 vehicles	30	29	26	15	-0.2	-1.1	-5.6	-3.3
EURO II	1000 vehicles	21	20	19	12	-0.1	-0.8	-4.6	-2.7
EURO III	1000 vehicles	59	71	69	54	3.8	-0.3	-2.3	-1.3
EURO IV	1000 vehicles	0	28	28	25	0.0	-0.1	-1.2	-0.7
EURO V or later	1000 vehicles	0	22	163	341	0.0	22.2	7.7	14.7

ITREN-2030 CY - Cyprus		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	0	0	0	0	7.3	7.3	2.8	5.0
Freight transport activity originated in the country	Billion tonnes-km per year	0	0	0	0	7.3	7.3	2.8	5.0
Road	Billion tonnes-km per year	0	0	0	0	5.0	5.0	-19.1	-7.8
Rail	Billion tonnes-km per year	0	0	0	0	7.3	7.3	2.8	5.0
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Average freight transport distance	km	4,491	4,491	4,491	4,491	0.0	0.0	0.0	0.0
Freight transport activity on the national territory	Billion tonnes-km per year	0	0	0	0	1.9	1.9	0.6	1.2
Road	Billion tonnes-km per year	0	0	0	0	1.9	1.9	0.6	1.2
Rail	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	0	0	0	0	1.9	1.9	0.6	1.2
Trips originated in the country	Million trips per year	581	619	709	771	1.3	1.4	0.8	1.1
Passenger transport activity originated in the country	Billion pass-km per year	18	20	24	27	1.9	1.8	1.2	1.5
Car	Billion pass-km per year	3	3	4	4	1.7	1.5	1.8	1.7
Bus	Billion pass-km per year	3	4	4	4	3.1	0.6	0.1	0.4
Rail	Billion pass-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Air (Intra-EU)	Billion pass-km per year	11	12	15	17	1.5	2.2	1.4	1.8
Slow	Billion pass-km per year	1	1	2	2	2.3	2.2	1.2	1.7
Average passenger transport distance	km	31.1	32.0	33.5	34.9	0.6	0.5	0.4	0.4
Passenger transport activity on the national territory	Billion pass-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Road	Billion pass-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Rail	Billion pass-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Motorization rate	cars/1000 inhabitants	442	450	472	473	0.4	0.5	0.0	0.3
ECONOMY INDICATORS									
GDP	Billion Euros 2005	10	10	11	12	0.6	0.9	1.1	1.0
Employment	1000 Persons	280	259	285	309	-1.6	1.0	0.8	0.9
Agriculture and fishery	1000 Persons	28	21	19	17	-5.5	-1.3	-1.1	-1.2
Construction	1000 Persons	24	24	26	27	-0.2	0.9	0.5	0.7
Energy and water	1000 Persons	0	0	0	0	-2.9	1.5	1.6	1.6
Industry	1000 Persons	43	36	49	62	-3.4	3.0	2.4	2.7
Transport services	1000 Persons	6	6	6	6	0.0	0.1	0.0	0.1
Other services	1000 Persons	178	171	185	196	-0.8	0.8	0.6	0.7
Population total	1000 Persons	742	784	865	922	1.1	1.0	0.6	0.8
Labour force	1000 Persons	482	520	588	607	1.5	1.2	0.3	0.8
Retired (> 65 years)	1000 Persons	94	104	137	172	2.0	2.8	2.3	2.6
Transport taxation revenues	Million Euros 2005	106	112	129	143	1.0	1.5	1.0	1.2
Fuel taxes	Million Euros 2005	106	112	128	141	1.0	1.4	1.0	1.2
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	0	1	2	0.0	0.0	1.2	0.0
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per eeccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

ITREN-2030 CY - Cyprus		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	3	3	3	3	0.4	1.3	0.6	1.0
Road freight	Million tonnes per year	0	0	0	0	-2.0	1.6	1.8	1.7
Road passenger	Million tonnes per year	1	1	1	1	0.7	1.5	1.0	1.3
Rail freight	Million tonnes per year	-	-	-	-	-	-	-	-
Rail passenger	Million tonnes per year	-	-	-	-	-	-	-	-
Inland navigation	Million tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	-1.4	-1.9	-1.0	-1.4
Air (Intra-EU)	Million tonnes per year	2	2	2	2	0.4	1.3	0.4	0.8
CO2 intensity of freight transport activity	tonnes/1000 tkm	1.243	1.025	0.965	1.069	-3.8	-0.6	1.0	0.2
Road	tonnes/1000 tkm	1.126	0.925	0.897	1.011	-3.8	-0.3	1.2	0.4
Rail	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	-	-	-	-	-	-	-	-
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.235	0.224	0.206	0.190	-1.0	-0.8	-0.8	-0.8
Road	tonnes/1000 pkm	-	-	-	-	-	-	-	-
Rail	tonnes/1000 pkm	-	-	-	-	-	-	-	-
Air (Intra-EU)	tonnes/1000 pkm	0.154	0.146	0.133	0.120	-1.1	-0.9	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	23	24	29	32	0.7	1.9	1.0	1.4
Road freight	1000 Tonnes per year	0	0	0	0	-5.3	-3.8	-1.5	-2.7
Road passenger	1000 Tonnes per year	1	1	1	1	-6.2	-1.7	-0.5	-1.1
Rail freight	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Rail passenger	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Inland navigation	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	1000 Tonnes per year	0	0	0	0	-1.7	-2.3	-1.4	-1.9
Air (Intra-EU)	1000 Tonnes per year	22	23	28	31	1.1	2.0	1.1	1.5
PM10 Transport emissions	1000 Tonnes per year	0	0	0	0	-1.0	-2.2	-2.5	-2.4
Road freight	1000 Tonnes per year	0	0	0	0	0.5	-2.0	-2.3	-2.2
Road passenger	1000 Tonnes per year	0	0	0	0	-2.5	-2.6	-2.8	-2.7
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	335	358	417	454	1.4	1.5	0.8	1.2
Gasoline	1000 vehicles	307	327	372	392	1.3	1.3	0.5	0.9
Diesel	1000 vehicles	28	31	41	48	1.9	2.8	1.7	2.3
LPG/CNG	1000 vehicles	0	0	0	0	24.6	11.6	5.4	8.5
Bioethanol	1000 vehicles	0	0	3	12	26.3	31.1	15.6	23.1
Hybrid	1000 vehicles	0	1	2	2	21.0	11.6	-0.2	5.6
Electric	1000 vehicles	0	0	0	0	0.0	0.0	27.1	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	115	124	145	156	1.4	1.6	0.7	1.2
Gasoline 1400-2000 cc	1000 vehicles	158	168	192	202	1.3	1.3	0.5	0.9
Gasoline >2000 cc	1000 vehicles	33	34	36	34	0.7	0.5	-0.5	0.0
Diesel <2000 cc	1000 vehicles	24	27	37	44	2.3	3.2	1.9	2.6
Diesel >2000 cc	1000 vehicles	4	4	4	4	-0.3	-0.1	-0.3	-0.2
PreEURO	1000 vehicles	122	94	21	0	-5.0	-13.9	-44.8	-31.1
EURO I	1000 vehicles	122	119	81	6	-0.6	-3.7	-22.7	-13.8
EURO II	1000 vehicles	27	27	24	9	-0.5	-1.0	-9.5	-5.3
EURO III	1000 vehicles	63	61	58	40	-0.6	-0.5	-3.7	-2.1
EURO IV	1000 vehicles	0	32	30	26	0.0	-0.5	-1.3	-0.9
EURO V or later	1000 vehicles	0	25	199	359	0.0	23.0	6.1	14.2
Duty vehicle fleet size	1000 vehicles	45	52	55	58	3.2	0.5	0.5	0.5
<3.5 tonnes	1000 vehicles	31	38	40	42	4.1	0.5	0.5	0.5
3.5-7.5 tonnes	1000 vehicles	7	7	7	8	0.8	0.5	0.5	0.5
7.5-16 tonnes	1000 vehicles	2	2	2	2	0.8	0.5	0.5	0.5
16-32 tonnes	1000 vehicles	4	4	5	5	0.8	0.5	0.5	0.5
>32 tonnes	1000 vehicles	1	1	1	1	0.9	0.5	0.5	0.5
PreEURO	1000 vehicles	20	17	9	1	-2.5	-6.9	-19.7	-13.5
EURO I	1000 vehicles	6	6	5	2	-0.2	-1.6	-10.1	-5.9
EURO II	1000 vehicles	14	14	13	7	-0.1	-0.9	-6.5	-3.8
EURO III	1000 vehicles	4	6	6	5	8.1	-0.2	-2.4	-1.3
EURO IV	1000 vehicles	0	5	5	4	0.0	-0.1	-1.1	-0.6
EURO V or later	1000 vehicles	0	3	17	39	0.0	17.8	8.7	13.1

ITREN-2030 CZ - Czech Republic		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	786	816	885	897	0.7	0.8	0.1	0.5
Freight transport activity originated in the country	Billion tonnes-km per year	65	77	111	136	3.7	3.7	2.1	2.9
Road	Billion tonnes-km per year	50	59	80	97	3.2	3.2	1.9	2.6
Rail	Billion tonnes-km per year	14	19	31	39	5.2	5.2	2.5	3.8
Inland navigation	Billion tonnes-km per year	0	0	0	0	3.6	3.6	5.0	4.3
Maritime (Intra-EU)	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Average freight transport distance	km	82	95	126	152	2.9	2.9	1.9	2.4
Freight transport activity on the national territory	Billion tonnes-km per year	61	72	101	122	3.4	3.4	2.0	2.7
Road	Billion tonnes-km per year	47	55	73	87	2.9	2.9	1.8	2.3
Rail	Billion tonnes-km per year	13	17	28	35	5.1	5.1	2.4	3.7
Inland navigation	Billion tonnes-km per year	0	0	0	0	2.9	2.9	1.5	2.2
Freight road vehicles-km on the national territory	Billion vehicles-km per year	6	7	10	12	3.5	3.5	1.9	2.7
Trips originated in the country	Million trips per year	9,224	9,321	9,862	10,135	0.2	0.6	0.3	0.4
Passenger transport activity originated in the country	Billion pass-km per year	109	114	130	142	0.9	1.4	0.8	1.1
Car	Billion pass-km per year	74	75	88	97	0.5	1.6	1.0	1.3
Bus	Billion pass-km per year	11	12	11	10	0.3	-0.4	-0.6	-0.5
Rail	Billion pass-km per year	16	18	21	24	2.6	1.5	1.2	1.4
Air (Intra-EU)	Billion pass-km per year	4	5	5	6	2.6	1.3	0.7	1.0
Slow	Billion pass-km per year	4	4	5	5	1.5	0.9	0.6	0.8
Average passenger transport distance	km	11.8	12.2	13.2	14.0	0.7	0.8	0.6	0.7
Passenger transport activity on the national territory	Billion pass-km per year	114	119	129	141	0.8	0.8	0.9	0.9
Road	Billion pass-km per year	105	109	119	132	0.9	0.9	1.0	0.9
Rail	Billion pass-km per year	10	9	9	9	-0.3	-0.3	-0.3	-0.3
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	47	50	57	64	1.3	1.3	1.2	1.3
Motorization rate	cars/1000 inhabitants	357	386	446	507	1.6	1.5	1.3	1.4
ECONOMY INDICATORS									
GDP	Billion Euros 2005	55	60	73	91	1.4	2.1	2.2	2.2
Employment	1000 Persons	5,083	4,877	5,144	5,035	-0.8	0.5	-0.2	0.2
Agriculture and fishery	1000 Persons	286	238	214	204	-3.6	-1.1	-0.4	-0.8
Construction	1000 Persons	374	366	396	410	-0.4	0.8	0.4	0.6
Energy and water	1000 Persons	17	17	15	16	0.2	-1.3	0.4	-0.5
Industry	1000 Persons	2,245	2,105	2,233	2,221	-1.3	0.6	-0.1	0.3
Transport services	1000 Persons	310	354	424	437	2.7	1.8	0.3	1.0
Other services	1000 Persons	1,852	1,796	1,862	1,747	-0.6	0.4	-0.6	-0.1
Population total	1000 Persons	10,153	10,091	9,964	9,678	-0.1	-0.1	-0.3	-0.2
Labour force	1000 Persons	6,832	6,900	6,555	6,340	0.2	-0.5	-0.3	-0.4
Retired (> 65 years)	1000 Persons	1,332	1,397	1,770	1,822	1.0	2.4	0.3	1.3
Transport taxation revenues	Million Euros 2005	2,235	2,635	2,963	3,201	3.3	1.2	0.8	1.0
Fuel taxes	Million Euros 2005	2,022	2,121	2,394	2,534	1.0	1.2	0.6	0.9
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	213	514	569	667	19.2	1.0	1.6	1.3
ENERGY INDICATORS									
Primary energy production	Billion toe per year	33	32	33	38	-0.2	0.2	1.3	0.7
Share of domestic energy production	%	70	76	70	66	1.8	-0.7	-0.6	-0.7
Final energy demand by source	Billion toe per year	47	43	47	57	-1.9	0.9	1.9	1.4
Oil	Billion toe per year	10	11	12	14	1.9	1.2	1.4	1.3
Gas	Billion toe per year	8	6	8	9	-5.2	2.6	2.1	2.4
Coal, Nuclear	Billion toe per year	28	23	23	27	-3.6	-0.2	1.8	0.8
Biomass	Billion toe per year	1	2	3	4	6.0	4.2	4.2	4.2
Other Renewables	Billion toe per year	0	1	1	2	27.0	4.5	2.3	3.4
Final energy demand by consuming sector	Billion toe per year	26	25	29	34	-0.5	1.2	1.9	1.5
Transport freight	Billion toe per year	3	3	3	3	-0.6	1.5	0.6	1.1
Transport passenger	Billion toe per year	4	4	5	7	3.2	2.3	2.3	2.3
Industry	Billion toe per year	10	10	11	14	0.6	1.0	1.9	1.5
Residential and services	Billion toe per year	10	8	9	11	-3.2	0.7	2.1	1.4
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.83	1.14	1.05	1.12	6.4	-0.8	0.7	0.0
Gasoline price	Euros2005 per litre	0.95	1.26	1.17	1.25	5.9	-0.7	0.6	0.0
Biofuels price	Euros2005 per ecccf	0.67	1.17	1.17	1.24	11.9	0.0	0.6	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.7	3.3	3.4	7.9	38.2	0.3	8.7	4.4
Share of renewables in electricity	%	5.5	16.4	19.1	17.0	24.5	1.5	-1.1	0.2
Share of renewables in final energy demand	%	4.3	8.2	11.3	12.9	13.8	3.3	1.4	2.3
Energy intensity of freight transport activity	toe/1000tkm	48	39	33	29	-3.9	-1.9	-1.3	-1.6
Energy intensity of passenger transport activity	toe/1000pkm	30	34	39	45	2.3	1.4	1.4	1.4
Energy intensity of economic activity	toe/Million Euros 1995	469	426	389	378	-1.9	-0.9	-0.3	-0.6

ITREN-2030 CZ - Czech Republic		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	18	19	21	24	0.5	1.4	1.3	1.4
Road freight	Million tonnes per year	6	6	7	9	0.6	1.0	1.9	1.5
Road passenger	Million tonnes per year	9	9	10	10	-0.7	1.2	0.4	0.8
Rail freight	Million tonnes per year	2	2	3	4	5.0	3.8	2.9	3.3
Rail passenger	Million tonnes per year	0	0	0	0	1.4	0.6	0.2	0.4
Inland navigation	Million tonnes per year	0	0	0	0	2.8	2.4	1.1	1.7
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	2.6	0.5	0.9	0.7
Air (Intra-EU)	Million tonnes per year	1	1	1	1	1.5	0.3	-0.3	0.0
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.132	0.121	0.103	0.106	-1.7	-1.6	0.2	-0.7
Road	tonnes/1000 tkm	0.133	0.118	0.099	0.099	-2.3	-1.8	0.1	-0.9
Rail	tonnes/1000 tkm	0.130	0.130	0.115	0.121	0.0	-1.2	0.5	-0.4
Inland navigation	tonnes/1000 tkm	0.032	0.032	0.030	0.029	-0.1	-0.5	-0.4	-0.4
Maritime (Intra-EU)	tonnes/1000 tkm	-	-	-	-	-	-	-	-
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.085	0.080	0.082	0.078	-1.3	0.3	-0.6	-0.1
Road	tonnes/1000 pkm	0.087	0.081	0.083	0.078	-1.5	0.3	-0.6	-0.2
Rail	tonnes/1000 pkm	0.028	0.030	0.033	0.035	1.8	0.9	0.6	0.7
Air (Intra-EU)	tonnes/1000 pkm	0.170	0.161	0.145	0.132	-1.1	-1.0	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	70	56	48	49	-4.3	-1.6	0.2	-0.7
Road freight	1000 Tonnes per year	17	15	9	7	-2.8	-4.9	-3.0	-4.0
Road passenger	1000 Tonnes per year	33	18	10	9	-11.2	-5.4	-1.3	-3.4
Rail freight	1000 Tonnes per year	10	12	16	21	4.2	3.0	2.5	2.7
Rail passenger	1000 Tonnes per year	2	2	2	2	1.1	-0.1	-0.8	-0.4
Inland navigation	1000 Tonnes per year	0	0	0	0	2.8	2.4	1.1	1.7
Maritime (Intra-EU)	1000 Tonnes per year	0	0	0	0	2.1	0.1	0.6	0.3
Air (Intra-EU)	1000 Tonnes per year	8	9	10	10	2.1	1.0	0.5	0.7
PM10 Transport emissions	1000 Tonnes per year	5	4	3	3	-4.1	-1.8	0.0	-0.9
Road freight	1000 Tonnes per year	2	1	1	1	-2.6	-1.1	0.3	-0.4
Road passenger	1000 Tonnes per year	3	3	2	2	-4.8	-2.2	-0.2	-1.2
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	3,657	3,928	4,496	5,002	1.4	1.4	1.1	1.2
Gasoline	1000 vehicles	2,800	2,826	3,065	3,362	0.2	0.8	0.9	0.9
Diesel	1000 vehicles	851	1,084	1,368	1,569	5.0	2.4	1.4	1.9
LPG/CNG	1000 vehicles	0	0	0	1	20.7	8.2	2.9	5.5
Bioethanol	1000 vehicles	0	1	11	29	56.4	34.2	10.1	21.5
Hybrid	1000 vehicles	6	17	52	42	22.0	11.5	-2.0	4.5
Electric	1000 vehicles	0	0	0	0	0.0	0.0	9.7	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	1,925	2,018	2,299	2,536	0.9	1.3	1.0	1.2
Gasoline 1400-2000 cc	1000 vehicles	784	729	692	747	-1.5	-0.5	0.8	0.1
Gasoline >2000 cc	1000 vehicles	90	80	74	78	-2.5	-0.7	0.4	-0.1
Diesel <2000 cc	1000 vehicles	744	972	1,252	1,446	5.5	2.6	1.4	2.0
Diesel >2000 cc	1000 vehicles	110	118	129	145	1.4	1.0	1.1	1.0
PreEURO	1000 vehicles	850	101	0	0	-34.7	-100.0	0.0	-100.0
EURO I	1000 vehicles	776	578	0	0	-5.7	-78.4	-100.0	-100.0
EURO II	1000 vehicles	162	151	0	0	-1.4	-60.4	-100.0	-100.0
EURO III	1000 vehicles	1,863	1,816	603	0	-0.5	-10.4	-100.0	-100.0
EURO IV	1000 vehicles	0	786	618	0	0.0	-2.4	-77.5	-53.2
EURO V or later	1000 vehicles	0	478	3,211	4,931	0.0	21.0	4.4	12.4
Duty vehicle fleet size	1000 vehicles	265	319	426	503	3.8	2.9	1.7	2.3
<3.5 tonnes	1000 vehicles	69	94	142	175	6.3	4.2	2.1	3.1
3.5-7.5 tonnes	1000 vehicles	94	107	133	153	2.7	2.2	1.4	1.8
7.5-16 tonnes	1000 vehicles	25	28	35	40	2.7	2.2	1.4	1.8
16-32 tonnes	1000 vehicles	64	75	96	112	3.1	2.5	1.6	2.0
>32 tonnes	1000 vehicles	13	15	20	23	3.3	2.6	1.6	2.1
PreEURO	1000 vehicles	148	119	52	10	-4.2	-7.9	-15.1	-11.6
EURO I	1000 vehicles	26	26	22	11	-0.3	-1.5	-7.1	-4.4
EURO II	1000 vehicles	29	29	26	15	-0.1	-1.0	-5.4	-3.2
EURO III	1000 vehicles	62	78	75	58	4.7	-0.3	-2.5	-1.4
EURO IV	1000 vehicles	0	45	44	39	0.0	-0.1	-1.2	-0.6
EURO V or later	1000 vehicles	0	23	205	369	0.0	24.6	6.0	14.9

ITREN-2030 DE - Germany		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	3,836	3,764	3,626	3,283	-0.4	-0.4	-1.0	-0.7
Freight transport activity originated in the country	Billion tonnes-km per year	1,082	1,114	1,181	1,167	0.6	0.6	-0.1	0.2
Road	Billion tonnes-km per year	315	323	338	337	0.5	0.5	0.0	0.2
Rail	Billion tonnes-km per year	95	94	93	86	-0.1	-0.1	-0.8	-0.5
Inland navigation	Billion tonnes-km per year	48	49	50	48	0.3	0.3	-0.5	-0.1
Maritime (Intra-EU)	Billion tonnes-km per year	623	648	700	697	0.8	0.8	0.0	0.4
Average freight transport distance	km	282	296	326	356	1.0	1.0	0.9	0.9
Freight transport activity on the national territory	Billion tonnes-km per year	551	565	595	605	0.5	0.5	0.2	0.3
Road	Billion tonnes-km per year	387	395	411	419	0.4	0.4	0.2	0.3
Rail	Billion tonnes-km per year	107	109	113	110	0.3	0.3	-0.2	0.0
Inland navigation	Billion tonnes-km per year	57	62	71	76	1.4	1.4	0.6	1.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	46	47	49	51	0.4	0.4	0.3	0.4
Trips originated in the country	Million trips per year	84,992	82,989	86,696	86,426	-0.5	0.4	0.0	0.2
Passenger transport activity originated in the country	Billion pass-km per year	1,166	1,171	1,274	1,296	0.1	0.8	0.2	0.5
Car	Billion pass-km per year	866	842	942	950	-0.6	1.1	0.1	0.6
Bus	Billion pass-km per year	82	86	70	66	0.9	-2.0	-0.6	-1.3
Rail	Billion pass-km per year	105	123	125	134	3.3	0.2	0.7	0.4
Air (Intra-EU)	Billion pass-km per year	56	62	72	76	2.3	1.4	0.6	1.0
Slow	Billion pass-km per year	57	58	65	70	0.3	1.1	0.8	0.9
Average passenger transport distance	km	13.7	14.1	14.7	15.0	0.6	0.4	0.2	0.3
Passenger transport activity on the national territory	Billion pass-km per year	1,127	1,155	1,215	1,285	0.5	0.5	0.6	0.5
Road	Billion pass-km per year	1,037	1,063	1,118	1,183	0.5	0.5	0.6	0.5
Rail	Billion pass-km per year	89	92	97	102	0.5	0.5	0.5	0.5
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	604	626	673	717	0.7	0.7	0.6	0.7
Motorization rate	cars/1000 inhabitants	532	552	593	641	0.8	0.7	0.8	0.7
ECONOMY INDICATORS									
GDP	Billion Euros 2005	2,311	2,506	2,958	3,318	1.6	1.7	1.2	1.4
Employment	1000 Persons	38,329	37,846	36,227	33,060	-0.3	-0.4	-0.9	-0.7
Agriculture and fishery	1000 Persons	870	735	627	548	-3.3	-1.6	-1.3	-1.5
Construction	1000 Persons	3,229	3,337	3,244	3,003	0.7	-0.3	-0.8	-0.5
Energy and water	1000 Persons	471	569	501	476	3.8	-1.3	-0.5	-0.9
Industry	1000 Persons	7,424	6,579	5,909	5,327	-2.4	-1.1	-1.0	-1.1
Transport services	1000 Persons	1,334	1,314	1,195	1,083	-0.3	-0.9	-1.0	-1.0
Other services	1000 Persons	25,001	25,312	24,751	22,622	0.2	-0.2	-0.9	-0.6
Population total	1000 Persons	82,571	82,669	82,365	81,112	0.0	0.0	-0.2	-0.1
Labour force	1000 Persons	54,244	53,948	53,902	50,857	-0.1	0.0	-0.6	-0.3
Retired (> 65 years)	1000 Persons	13,076	13,615	14,114	16,989	0.8	0.4	1.9	1.1
Transport taxation revenues	Million Euros 2005	40,967	39,762	40,312	41,277	-0.6	0.1	0.2	0.2
Fuel taxes	Million Euros 2005	38,574	34,737	36,475	37,062	-2.1	0.5	0.2	0.3
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	2,392	5,025	3,837	4,215	16.0	-2.7	0.9	-0.9
ENERGY INDICATORS									
Primary energy production	Billion toe per year	145	157	144	146	1.5	-0.8	0.1	-0.3
Share of domestic energy production	%	42	45	41	42	1.7	-1.0	0.2	-0.4
Final energy demand by source	Billion toe per year	349	345	350	350	-0.2	0.1	0.0	0.1
Oil	Billion toe per year	123	111	102	96	-2.0	-0.8	-0.6	-0.7
Gas	Billion toe per year	79	80	102	99	0.4	2.4	-0.3	1.1
Coal, Nuclear	Billion toe per year	125	127	107	109	0.3	-1.7	0.1	-0.8
Biomass	Billion toe per year	17	18	26	28	1.4	3.5	0.9	2.2
Other Renewables	Billion toe per year	5	8	12	17	9.1	4.8	3.2	4.0
Final energy demand by consuming sector	Billion toe per year	232	228	238	241	-0.4	0.4	0.2	0.3
Transport freight	Billion toe per year	21	21	24	23	0.2	1.1	-0.4	0.4
Transport passenger	Billion toe per year	43	44	44	43	0.6	0.0	-0.2	-0.1
Industry	Billion toe per year	58	56	60	63	-0.8	0.7	0.5	0.6
Residential and services	Billion toe per year	110	106	110	113	-0.7	0.4	0.2	0.3
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.97	1.29	1.19	1.28	5.9	-0.8	0.7	-0.1
Gasoline price	Euros2005 per litre	1.11	1.43	1.33	1.41	5.2	-0.7	0.6	0.0
Biofuels price	Euros2005 per ecccf	0.66	1.17	1.16	1.24	12.0	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	3.4	4.4	7.7	10.1	5.3	5.7	2.8	4.2
Share of renewables in electricity	%	11.9	14.8	20.2	22.9	4.5	3.2	1.3	2.2
Share of renewables in final energy demand	%	6.6	8.3	11.4	13.9	4.8	3.2	2.0	2.6
Energy intensity of freight transport activity	toe/1000tkm	18	18	18	18	-0.4	0.4	-0.4	0.0
Energy intensity of passenger transport activity	toe/1000pkm	36	36	34	32	0.0	-0.6	-0.7	-0.7
Energy intensity of economic activity	toe/Million Euros 1995	100	91	80	73	-2.0	-1.2	-1.0	-1.1

ITREN-2030 DE - Germany		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	223	215	237	241	-0.8	1.0	0.2	0.6
Road freight	Million tonnes per year	67	69	83	91	0.6	2.0	0.9	1.4
Road passenger	Million tonnes per year	139	127	133	130	-1.7	0.5	-0.2	0.1
Rail freight	Million tonnes per year	2	2	2	2	-0.4	0.6	-0.6	0.0
Rail passenger	Million tonnes per year	2	2	2	2	2.4	-1.2	-0.8	-1.0
Inland navigation	Million tonnes per year	2	2	3	3	1.4	1.3	0.7	1.0
Maritime (Intra-EU)	Million tonnes per year	1	1	1	2	3.6	0.6	0.3	0.4
Air (Intra-EU)	Million tonnes per year	10	11	12	11	1.3	0.5	-0.3	0.1
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.061	0.062	0.069	0.075	0.0	1.2	0.8	1.0
Road	tonnes/1000 tkm	0.172	0.174	0.203	0.217	0.2	1.5	0.7	1.1
Rail	tonnes/1000 tkm	0.022	0.021	0.022	0.021	-0.7	0.3	-0.4	0.0
Inland navigation	tonnes/1000 tkm	0.037	0.037	0.037	0.037	0.0	-0.1	0.1	0.0
Maritime (Intra-EU)	tonnes/1000 tkm	0.002	0.002	0.002	0.002	2.8	-0.2	0.3	0.1
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.128	0.115	0.114	0.105	-2.0	-0.1	-0.8	-0.4
Road	tonnes/1000 pkm	0.134	0.119	0.119	0.110	-2.2	0.0	-0.8	-0.4
Rail	tonnes/1000 pkm	0.022	0.024	0.020	0.018	1.8	-1.7	-1.3	-1.5
Air (Intra-EU)	tonnes/1000 pkm	0.186	0.177	0.162	0.148	-1.0	-0.9	-0.9	-0.9
NOx Transport emissions	1000 Tonnes per year	795	586	454	418	-5.9	-2.5	-0.8	-1.7
Road freight	1000 Tonnes per year	195	143	84	61	-6.1	-5.2	-3.1	-4.1
Road passenger	1000 Tonnes per year	389	212	116	94	-11.5	-5.9	-2.1	-4.0
Rail freight	1000 Tonnes per year	8	7	6	6	-1.7	-1.2	-0.3	-0.7
Rail passenger	1000 Tonnes per year	12	13	11	10	1.7	-1.5	-1.2	-1.4
Inland navigation	1000 Tonnes per year	35	38	43	46	1.4	1.3	0.7	1.0
Maritime (Intra-EU)	1000 Tonnes per year	25	30	31	30	3.2	0.3	-0.1	0.1
Air (Intra-EU)	1000 Tonnes per year	130	144	163	171	2.0	1.2	0.5	0.9
PM10 Transport emissions	1000 Tonnes per year	55	44	33	31	-4.3	-3.1	-0.5	-1.8
Road freight	1000 Tonnes per year	18	13	7	6	-5.9	-6.0	-1.2	-3.7
Road passenger	1000 Tonnes per year	37	31	25	25	-3.6	-2.0	-0.3	-1.1
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	44,127	46,611	51,621	54,607	1.1	1.0	0.6	0.8
Gasoline	1000 vehicles	33,062	30,427	27,912	27,855	-1.6	-0.9	0.0	-0.4
Diesel	1000 vehicles	10,776	15,117	21,030	24,017	7.0	3.4	1.3	2.3
LPG/CNG	1000 vehicles	0	0	0	1	20.7	8.2	2.9	5.5
Bioethanol	1000 vehicles	4	54	459	1,059	67.4	23.8	8.7	16.0
Hybrid	1000 vehicles	284	1,011	2,202	1,629	28.9	8.1	-3.0	2.4
Electric	1000 vehicles	0	1	18	46	26.8	28.4	10.1	18.9
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	12,218	11,844	11,746	11,841	-0.6	-0.1	0.1	0.0
Gasoline 1400-2000 cc	1000 vehicles	16,594	14,648	12,901	13,079	-2.5	-1.3	0.1	-0.6
Gasoline >2000 cc	1000 vehicles	4,251	3,935	3,264	2,935	-1.5	-1.9	-1.1	-1.5
Diesel <2000 cc	1000 vehicles	7,225	10,505	14,633	16,685	7.8	3.4	1.3	2.3
Diesel >2000 cc	1000 vehicles	3,550	4,612	6,397	7,333	5.4	3.3	1.4	2.3
PreEURO	1000 vehicles	4,311	1,212	23	0	-22.4	-32.6	-47.3	-40.4
EURO I	1000 vehicles	13,611	6,791	466	3	-13.0	-23.5	-39.2	-31.8
EURO II	1000 vehicles	10,340	7,422	1,315	30	-6.4	-15.9	-31.5	-24.1
EURO III	1000 vehicles	15,576	13,613	4,848	327	-2.7	-9.8	-23.6	-17.0
EURO IV	1000 vehicles	0	9,702	5,408	746	0.0	-5.7	-18.0	-12.0
EURO V or later	1000 vehicles	0	6,808	36,891	50,777	0.0	18.4	3.2	10.6
Duty vehicle fleet size	1000 vehicles	1,606	1,644	1,721	1,779	0.5	0.5	0.3	0.4
<3.5 tonnes	1000 vehicles	351	347	342	378	-0.3	-0.1	1.0	0.4
3.5-7.5 tonnes	1000 vehicles	506	531	579	588	1.0	0.9	0.2	0.5
7.5-16 tonnes	1000 vehicles	132	139	151	154	1.0	0.9	0.2	0.5
16-32 tonnes	1000 vehicles	482	490	506	514	0.3	0.3	0.2	0.2
>32 tonnes	1000 vehicles	134	137	143	145	0.4	0.4	0.2	0.3
PreEURO	1000 vehicles	993	656	26	0	-7.9	-27.5	-100.0	-100.0
EURO I	1000 vehicles	184	181	65	0	-0.4	-9.7	-81.6	-59.2
EURO II	1000 vehicles	210	209	164	1	-0.1	-2.4	-37.8	-22.1
EURO III	1000 vehicles	219	286	277	81	5.5	-0.3	-11.6	-6.1
EURO IV	1000 vehicles	0	213	212	150	0.0	0.0	-3.4	-1.7
EURO V or later	1000 vehicles	0	99	976	1,547	0.0	25.7	4.7	14.7

ITREN-2030 DK - Denmark		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	425	425	426	397	0.0	0.0	-0.7	-0.3
Freight transport activity originated in the country	Billion tonnes-km per year	108	117	136	142	1.5	1.5	0.5	1.0
Road	Billion tonnes-km per year	31	32	33	32	0.4	0.4	-0.3	0.0
Rail	Billion tonnes-km per year	4	4	5	5	2.0	2.0	0.8	1.4
Inland navigation	Billion tonnes-km per year	1	1	2	2	4.5	4.5	1.4	2.9
Maritime (Intra-EU)	Billion tonnes-km per year	72	79	96	102	1.9	1.9	0.6	1.3
Average freight transport distance	km	254	274	319	358	1.5	1.5	1.2	1.3
Freight transport activity on the national territory	Billion tonnes-km per year	30	31	32	32	0.4	0.4	-0.1	0.1
Road	Billion tonnes-km per year	28	28	29	28	0.2	0.2	-0.2	0.0
Rail	Billion tonnes-km per year	2	3	3	3	1.7	1.7	0.8	1.3
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	3	3	3	3	0.1	0.1	0.1	0.1
Trips originated in the country	Million trips per year	5,052	4,968	5,297	5,404	-0.3	0.6	0.2	0.4
Passenger transport activity originated in the country	Billion pass-km per year	82	83	94	100	0.3	1.2	0.6	0.9
Car	Billion pass-km per year	55	54	67	71	-0.4	2.1	0.6	1.4
Bus	Billion pass-km per year	11	11	8	7	0.5	-3.4	-1.3	-2.3
Rail	Billion pass-km per year	4	5	5	6	4.2	-0.7	0.8	0.1
Air (Intra-EU)	Billion pass-km per year	9	10	11	13	2.0	1.4	1.2	1.3
Slow	Billion pass-km per year	2	2	3	3	1.0	1.1	1.1	1.1
Average passenger transport distance	km	16.2	16.8	17.8	18.5	0.7	0.6	0.4	0.5
Passenger transport activity on the national territory	Billion pass-km per year	95	99	108	115	0.9	0.9	0.6	0.7
Road	Billion pass-km per year	89	93	102	108	0.9	0.9	0.6	0.8
Rail	Billion pass-km per year	6	6	6	7	0.6	0.6	0.6	0.6
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	46	49	56	61	1.2	1.2	0.8	1.0
Motorization rate	cars/1000 inhabitants	352	374	416	444	1.2	1.1	0.7	0.9
ECONOMY INDICATORS									
GDP	Billion Euros 2005	156	178	219	261	2.7	2.1	1.8	1.9
Employment	1000 Persons	2,439	2,660	2,733	2,544	1.8	0.3	-0.7	-0.2
Agriculture and fishery	1000 Persons	155	158	152	135	0.5	-0.4	-1.2	-0.8
Construction	1000 Persons	135	168	183	165	4.5	0.8	-1.0	-0.1
Energy and water	1000 Persons	12	15	14	12	5.3	-1.0	-1.3	-1.2
Industry	1000 Persons	510	573	640	643	2.4	1.1	0.1	0.6
Transport services	1000 Persons	259	308	348	361	3.5	1.2	0.4	0.8
Other services	1000 Persons	1,369	1,437	1,396	1,228	1.0	-0.3	-1.3	-0.8
Population total	1000 Persons	5,414	5,480	5,540	5,539	0.2	0.1	0.0	0.1
Labour force	1000 Persons	3,441	3,434	3,417	3,371	0.0	0.0	-0.1	-0.1
Retired (> 65 years)	1000 Persons	777	831	981	1,055	1.4	1.7	0.7	1.2
Transport taxation revenues	Million Euros 2005	1,637	1,496	1,588	1,562	-1.8	0.6	-0.2	0.2
Fuel taxes	Million Euros 2005	1,637	1,434	1,129	1,022	-2.6	-2.4	-1.0	-1.7
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	63	459	540	0.0	22.0	1.6	11.3
ENERGY INDICATORS									
Primary energy production	Billion toe per year	30	38	51	52	4.6	3.0	0.3	1.6
Share of domestic energy production	%	155	160	189	178	0.6	1.7	-0.6	0.5
Final energy demand by source	Billion toe per year	19	24	27	29	4.0	1.3	0.8	1.1
Oil	Billion toe per year	8	9	9	9	0.6	0.6	0.3	0.5
Gas	Billion toe per year	4	4	7	7	0.1	3.8	0.7	2.2
Coal, Nuclear	Billion toe per year	4	8	7	8	15.7	-0.6	0.8	0.1
Biomass	Billion toe per year	2	2	3	4	-1.4	3.7	2.2	3.0
Other Renewables	Billion toe per year	1	1	1	1	1.5	2.8	2.5	2.6
Final energy demand by consuming sector	Billion toe per year	15	16	19	21	1.1	1.4	1.0	1.2
Transport freight	Billion toe per year	2	2	3	3	2.8	3.1	0.9	2.0
Transport passenger	Billion toe per year	3	4	4	4	1.1	0.4	0.3	0.4
Industry	Billion toe per year	3	3	4	5	1.4	2.2	1.4	1.8
Residential and services	Billion toe per year	7	7	8	9	0.6	1.1	1.0	1.1
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.87	1.26	1.14	1.24	7.7	-1.0	0.9	-0.1
Gasoline price	Euros2005 per litre	1.05	1.42	1.31	1.40	6.1	-0.8	0.7	-0.1
Biofuels price	Euros2005 per ecccf	0.67	1.17	1.17	1.24	11.9	0.0	0.6	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	1.8	4.6	6.7	1070.8	9.7	3.7	6.7
Share of renewables in electricity	%	30.6	25.4	29.9	33.4	-3.7	1.7	1.1	1.4
Share of renewables in final energy demand	%	14.2	12.6	14.8	17.1	-2.4	1.6	1.4	1.5
Energy intensity of freight transport activity	toe/1000tkm	18	19	22	23	1.4	1.5	0.5	1.0
Energy intensity of passenger transport activity	toe/1000pkm	33	33	32	31	0.1	-0.5	-0.3	-0.4
Energy intensity of economic activity	toe/Million Euros 1995	99	92	86	79	-1.5	-0.6	-0.8	-0.7



ITREN-2030 DK - Denmark		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	12	12	14	15	-0.3	1.2	0.9	1.0
Road freight	Million tonnes per year	3	4	5	6	2.0	3.2	2.2	2.7
Road passenger	Million tonnes per year	7	6	6	6	-2.0	0.1	-0.2	-0.1
Rail freight	Million tonnes per year	0	0	0	0	1.2	0.2	0.4	0.3
Rail passenger	Million tonnes per year	0	0	0	0	2.8	-1.6	-0.2	-0.9
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	4.0	0.9	0.4	0.7
Air (Intra-EU)	Million tonnes per year	2	2	2	2	0.9	0.5	0.2	0.4
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.037	0.038	0.044	0.052	0.6	1.5	1.6	1.5
Road	tonnes/1000 tkm	0.123	0.134	0.180	0.229	1.8	3.0	2.4	2.7
Rail	tonnes/1000 tkm	0.048	0.047	0.040	0.038	-0.6	-1.6	-0.4	-1.0
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.003	0.004	0.003	0.003	2.0	-1.0	-0.2	-0.6
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.083	0.074	0.068	0.063	-2.4	-0.8	-0.7	-0.8
Road	tonnes/1000 pkm	0.078	0.067	0.062	0.057	-2.9	-0.8	-0.8	-0.8
Rail	tonnes/1000 pkm	0.014	0.016	0.013	0.012	2.2	-2.2	-0.8	-1.5
Air (Intra-EU)	tonnes/1000 pkm	0.177	0.167	0.152	0.138	-1.1	-0.9	-0.9	-0.9
NOx Transport emissions	1000 Tonnes per year	76	65	50	47	-3.1	-2.5	-0.6	-1.6
Road freight	1000 Tonnes per year	23	20	12	8	-2.4	-5.3	-3.4	-4.3
Road passenger	1000 Tonnes per year	26	15	6	4	-10.5	-9.0	-4.9	-7.0
Rail freight	1000 Tonnes per year	1	1	1	2	1.3	-0.4	0.5	0.1
Rail passenger	1000 Tonnes per year	1	1	1	1	2.2	-2.0	-0.9	-1.4
Inland navigation	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	1000 Tonnes per year	5	6	7	7	3.6	0.5	0.0	0.3
Air (Intra-EU)	1000 Tonnes per year	20	21	24	26	1.5	1.2	1.0	1.1
PM10 Transport emissions	1000 Tonnes per year	3	3	2	2	-3.3	-1.3	0.2	-0.6
Road freight	1000 Tonnes per year	1	1	0	0	-7.2	-3.5	-0.4	-2.0
Road passenger	1000 Tonnes per year	2	2	2	2	-2.0	-0.7	0.3	-0.2
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	1,923	2,073	2,349	2,529	1.5	1.3	0.7	1.0
Gasoline	1000 vehicles	1,715	1,697	1,714	1,826	-0.2	0.1	0.6	0.4
Diesel	1000 vehicles	193	345	588	653	12.3	5.5	1.0	3.2
LPG/CNG	1000 vehicles	2	2	2	3	3.7	2.0	1.2	1.6
Bioethanol	1000 vehicles	0	1	8	21	35.0	25.9	10.0	17.7
Hybrid	1000 vehicles	13	28	35	22	16.1	2.1	-4.6	-1.4
Electric	1000 vehicles	0	0	2	5	17.5	16.5	9.6	13.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	704	565	488	484	-4.3	-1.5	-0.1	-0.8
Gasoline 1400-2000 cc	1000 vehicles	135	221	349	394	10.4	4.7	1.2	2.9
Gasoline >2000 cc	1000 vehicles	83	81	80	95	-0.6	-0.1	1.7	0.8
Diesel <2000 cc	1000 vehicles	165	313	544	605	13.7	5.7	1.1	3.3
Diesel >2000 cc	1000 vehicles	28	32	44	48	2.3	3.2	0.9	2.0
PreEURO	1000 vehicles	157	4	0	0	-51.7	-100.0	0.0	-100.0
EURO I	1000 vehicles	687	324	0	0	-13.9	-89.6	-100.0	-100.0
EURO II	1000 vehicles	508	470	2	0	-1.5	-42.8	-100.0	-100.0
EURO III	1000 vehicles	558	551	193	0	-0.2	-10.0	-96.0	-81.1
EURO IV	1000 vehicles	0	395	336	0	0.0	-1.6	-65.7	-41.9
EURO V or later	1000 vehicles	0	299	1,774	2,482	0.0	19.5	3.4	11.2
Duty vehicle fleet size	1000 vehicles	189	191	195	198	0.2	0.2	0.2	0.2
<3.5 tonnes	1000 vehicles	51	49	46	52	-0.8	-0.6	1.0	0.2
3.5-7.5 tonnes	1000 vehicles	65	68	73	72	0.9	0.7	-0.1	0.3
7.5-16 tonnes	1000 vehicles	17	18	19	19	0.9	0.7	-0.1	0.3
16-32 tonnes	1000 vehicles	45	46	47	46	0.2	0.2	-0.2	0.0
>32 tonnes	1000 vehicles	10	10	10	10	0.2	0.1	-0.2	0.0
PreEURO	1000 vehicles	50	7	0	0	-33.4	-100.0	0.0	-100.0
EURO I	1000 vehicles	36	22	0	0	-9.6	-100.0	0.0	-100.0
EURO II	1000 vehicles	59	54	0	0	-1.6	-39.2	-100.0	-100.0
EURO III	1000 vehicles	44	56	24	0	4.9	-8.2	-100.0	-100.0
EURO IV	1000 vehicles	0	36	32	0	0.0	-1.2	-61.2	-38.1
EURO V or later	1000 vehicles	0	17	140	198	0.0	23.7	3.6	13.2

ITREN-2030 EE - Estonia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	120	142	198	225	3.4	3.4	1.3	2.4
Freight transport activity originated in the country	Billion tonnes-km per year	57	68	99	123	3.7	3.7	2.2	3.0
Road	Billion tonnes-km per year	15	18	25	30	3.5	3.5	1.6	2.6
Rail	Billion tonnes-km per year	14	18	29	39	5.0	5.0	2.8	3.9
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	28	32	44	54	3.1	3.1	2.1	2.6
Average freight transport distance	km	475	483	498	545	0.3	0.3	0.9	0.6
Freight transport activity on the national territory	Billion tonnes-km per year	18	22	34	43	4.4	4.4	2.4	3.4
Road	Billion tonnes-km per year	6	7	10	12	3.4	3.4	1.8	2.6
Rail	Billion tonnes-km per year	12	15	24	31	4.9	4.9	2.7	3.8
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	1	1	1	2	2.9	2.9	2.2	2.6
Trips originated in the country	Million trips per year	1,456	1,438	1,505	1,544	-0.3	0.5	0.3	0.4
Passenger transport activity originated in the country	Billion pass-km per year	14	14	17	18	0.7	1.6	1.1	1.4
Car	Billion pass-km per year	10	10	12	14	0.6	1.7	1.2	1.5
Bus	Billion pass-km per year	3	3	3	3	0.4	1.0	0.6	0.8
Rail	Billion pass-km per year	0	0	0	0	2.4	1.5	1.1	1.3
Air (Intra-EU)	Billion pass-km per year	0	0	0	1	4.0	3.9	2.6	3.3
Slow	Billion pass-km per year	1	1	1	1	1.1	0.8	0.6	0.7
Average passenger transport distance	km	9.3	9.8	11.0	11.9	1.0	1.2	0.8	1.0
Passenger transport activity on the national territory	Billion pass-km per year	8	9	11	12	1.8	1.8	1.5	1.6
Road	Billion pass-km per year	8	9	10	12	1.8	1.8	1.4	1.6
Rail	Billion pass-km per year	0	0	0	0	2.3	2.3	2.3	2.3
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	3	4	5	6	2.5	2.5	1.8	2.1
Motorization rate	cars/1000 inhabitants	398	469	619	747	3.3	2.8	1.9	2.4
ECONOMY INDICATORS									
GDP	Billion Euros 2005	5	5	6	8	1.6	2.1	1.9	2.0
Employment	1000 Persons	719	678	677	653	-1.2	0.0	-0.4	-0.2
Agriculture and fishery	1000 Persons	48	42	44	47	-2.7	0.5	0.5	0.5
Construction	1000 Persons	41	39	41	41	-0.6	0.4	0.0	0.2
Energy and water	1000 Persons	83	71	48	42	-2.9	-3.9	-1.3	-2.6
Industry	1000 Persons	137	121	122	109	-2.4	0.1	-1.1	-0.5
Transport services	1000 Persons	50	58	74	83	3.1	2.4	1.2	1.8
Other services	1000 Persons	360	346	349	332	-0.8	0.1	-0.5	-0.2
Population total	1000 Persons	1,344	1,312	1,253	1,202	-0.5	-0.5	-0.4	-0.4
Labour force	1000 Persons	803	818	784	778	0.4	-0.4	-0.1	-0.2
Retired (> 65 years)	1000 Persons	247	249	233	212	0.2	-0.6	-0.9	-0.8
Transport taxation revenues	Million Euros 2005	409	421	516	552	0.6	2.0	0.7	1.4
Fuel taxes	Million Euros 2005	409	421	482	512	0.6	1.4	0.6	1.0
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	0	34	40	0.0	0.0	1.8	0.0
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per ecccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

ITREN-2030 EE - Estonia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	4	4	5	6	0.5	1.8	1.2	1.5
Road freight	Million tonnes per year	1	1	2	2	0.3	1.9	2.2	2.1
Road passenger	Million tonnes per year	3	3	3	3	0.3	1.6	0.6	1.1
Rail freight	Million tonnes per year	0	0	0	0	5.8	3.9	2.3	3.1
Rail passenger	Million tonnes per year	0	0	0	0	1.1	0.7	0.1	0.4
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	5.3	2.3	1.6	1.9
Air (Intra-EU)	Million tonnes per year	0	0	0	0	2.7	2.7	1.5	2.1
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.030	0.026	0.023	0.023	-2.7	-1.5	0.0	-0.8
Road	tonnes/1000 tkm	0.203	0.175	0.151	0.158	-2.9	-1.4	0.5	-0.5
Rail	tonnes/1000 tkm	0.007	0.007	0.007	0.007	0.8	-1.0	-0.4	-0.7
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.001	0.001	2.2	-0.7	-0.6	-0.6
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.327	0.303	0.296	0.269	-1.5	-0.2	-0.9	-0.6
Road	tonnes/1000 pkm	0.339	0.315	0.309	0.283	-1.5	-0.2	-0.9	-0.5
Rail	tonnes/1000 pkm	0.038	0.036	0.031	0.025	-1.2	-1.6	-2.1	-1.8
Air (Intra-EU)	tonnes/1000 pkm	0.151	0.142	0.126	0.113	-1.2	-1.2	-1.1	-1.2
NOx Transport emissions	1000 Tonnes per year	11	8	8	8	-5.7	-0.7	0.5	-0.1
Road freight	1000 Tonnes per year	2	2	1	1	-3.5	-3.6	-1.4	-2.5
Road passenger	1000 Tonnes per year	7	4	3	2	-11.4	-3.4	-1.4	-2.4
Rail freight	1000 Tonnes per year	1	2	2	3	5.8	3.9	2.3	3.1
Rail passenger	1000 Tonnes per year	0	0	0	0	0.8	-0.2	-0.9	-0.6
Inland navigation	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	5.0	2.0	1.3	1.6
Air (Intra-EU)	1000 Tonnes per year	0	0	1	1	3.1	3.0	2.0	2.5
PM10 Transport emissions	1000 Tonnes per year	0	0	0	0	-3.0	-0.5	0.5	0.0
Road freight	1000 Tonnes per year	0	0	0	0	-2.5	-0.8	0.3	-0.2
Road passenger	1000 Tonnes per year	0	0	0	0	-3.6	-0.2	0.7	0.2
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	541	628	806	943	3.0	2.5	1.6	2.1
Gasoline	1000 vehicles	477	545	670	773	2.7	2.1	1.4	1.8
Diesel	1000 vehicles	59	70	101	123	3.6	3.8	2.0	2.9
LPG/CNG	1000 vehicles	0	0	0	0	10.7	7.3	2.8	5.0
Bioethanol	1000 vehicles	1	2	10	22	23.0	19.3	8.5	13.7
Hybrid	1000 vehicles	5	12	25	24	19.6	7.9	-0.3	3.7
Electric	1000 vehicles	0	0	0	0	0.0	0.0	21.5	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	134	155	198	230	3.0	2.5	1.5	2.0
Gasoline 1400-2000 cc	1000 vehicles	277	316	389	451	2.7	2.1	1.5	1.8
Gasoline >2000 cc	1000 vehicles	67	74	83	92	2.2	1.2	1.1	1.1
Diesel <2000 cc	1000 vehicles	38	46	66	81	3.6	3.6	2.1	2.9
Diesel >2000 cc	1000 vehicles	20	24	35	43	3.6	4.0	1.9	3.0
PreEURO	1000 vehicles	74	13	0	0	-29.9	-100.0	0.0	-100.0
EURO I	1000 vehicles	8	6	0	0	-6.6	-95.8	-100.0	-100.0
EURO II	1000 vehicles	48	43	0	0	-2.0	-51.8	-100.0	-100.0
EURO III	1000 vehicles	406	396	57	0	-0.5	-17.6	-100.0	-100.0
EURO IV	1000 vehicles	0	99	78	0	0.0	-2.4	-77.6	-53.2
EURO V or later	1000 vehicles	0	59	636	897	0.0	26.9	3.5	14.6
Duty vehicle fleet size	1000 vehicles	43	50	63	80	2.8	2.4	2.4	2.4
<3.5 tonnes	1000 vehicles	21	23	29	40	2.1	2.1	3.4	2.7
3.5-7.5 tonnes	1000 vehicles	11	13	16	19	3.2	2.5	1.4	2.0
7.5-16 tonnes	1000 vehicles	3	3	4	5	3.2	2.5	1.4	2.0
16-32 tonnes	1000 vehicles	7	9	12	13	3.9	3.0	1.5	2.2
>32 tonnes	1000 vehicles	1	2	2	2	3.9	3.0	1.5	2.2
PreEURO	1000 vehicles	25	20	8	1	-4.4	-8.5	-17.2	-13.0
EURO I	1000 vehicles	3	3	2	1	-0.4	-2.0	-8.3	-5.2
EURO II	1000 vehicles	3	3	3	1	-0.2	-1.1	-5.4	-3.3
EURO III	1000 vehicles	12	14	14	11	3.4	-0.3	-2.5	-1.4
EURO IV	1000 vehicles	0	6	6	5	0.0	-0.1	-1.2	-0.6
EURO V or later	1000 vehicles	0	3	30	60	0.0	24.4	7.2	15.4

ITREN-2030 ES - Spain		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
<b>TRANSPORT INDICATORS</b>									
Tonnes originated in the country	Million tonnes per year	3,037	3,305	3,922	4,113	1.7	1.7	0.5	1.1
Freight transport activity originated in the country	Billion tonnes-km per year	584	664	862	1,008	2.6	2.6	1.6	2.1
Road	Billion tonnes-km per year	326	362	445	498	2.1	2.1	1.1	1.6
Rail	Billion tonnes-km per year	13	16	21	26	3.0	3.0	2.1	2.6
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	244	287	395	484	3.3	3.3	2.1	2.7
Average freight transport distance	km	192	201	220	245	0.9	0.9	1.1	1.0
Freight transport activity on the national territory	Billion tonnes-km per year	300	334	413	459	2.1	2.1	1.1	1.6
Road	Billion tonnes-km per year	287	318	392	435	2.1	2.1	1.0	1.6
Rail	Billion tonnes-km per year	14	15	20	24	2.7	2.7	1.8	2.3
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	37	41	49	55	1.9	1.9	1.2	1.5
Trips originated in the country	Million trips per year	42,556	43,760	46,489	46,813	0.6	0.6	0.1	0.3
Passenger transport activity originated in the country	Billion pass-km per year	552	580	655	691	1.0	1.2	0.5	0.9
Car	Billion pass-km per year	395	411	475	500	0.8	1.5	0.5	1.0
Bus	Billion pass-km per year	53	56	52	51	1.1	-0.7	-0.2	-0.4
Rail	Billion pass-km per year	23	27	29	32	3.0	0.8	0.7	0.8
Air (Intra-EU)	Billion pass-km per year	67	72	82	92	1.5	1.3	1.1	1.2
Slow	Billion pass-km per year	13	14	16	17	1.1	1.0	0.7	0.9
Average passenger transport distance	km	13.0	13.3	14.1	14.8	0.4	0.6	0.5	0.5
Passenger transport activity on the national territory	Billion pass-km per year	759	816	944	1,014	1.5	1.5	0.7	1.1
Road	Billion pass-km per year	736	791	915	980	1.5	1.5	0.7	1.1
Rail	Billion pass-km per year	23	25	29	34	1.5	1.5	1.5	1.5
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	360	390	460	501	1.7	1.7	0.9	1.3
Motorization rate	cars/1000 inhabitants	380	407	453	490	1.3	1.1	0.8	0.9
<b>ECONOMY INDICATORS</b>									
GDP	Billion Euros 2005	601	648	761	876	1.5	1.6	1.4	1.5
Employment	1000 Persons	15,322	15,582	16,313	15,892	0.3	0.5	-0.3	0.1
Agriculture and fishery	1000 Persons	925	797	725	641	-2.9	-1.0	-1.2	-1.1
Construction	1000 Persons	1,334	1,620	1,752	1,702	4.0	0.8	-0.3	0.2
Energy and water	1000 Persons	134	184	187	194	6.6	0.1	0.4	0.3
Industry	1000 Persons	3,274	3,328	3,559	3,522	0.3	0.7	-0.1	0.3
Transport services	1000 Persons	602	615	586	544	0.4	-0.5	-0.7	-0.6
Other services	1000 Persons	9,051	9,037	9,505	9,288	0.0	0.5	-0.2	0.1
Population total	1000 Persons	43,014	44,404	45,655	45,500	0.6	0.3	0.0	0.1
Labour force	1000 Persons	28,880	29,737	29,814	28,514	0.6	0.0	-0.4	-0.2
Retired (> 65 years)	1000 Persons	6,946	7,093	7,863	10,288	0.4	1.0	2.7	1.9
Transport taxation revenues	Million Euros 2005	18,829	19,124	21,915	23,501	0.3	1.4	0.7	1.0
Fuel taxes	Million Euros 2005	10,827	10,634	11,821	12,097	-0.4	1.1	0.2	0.6
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	8,001	8,490	10,094	11,404	1.2	1.7	1.2	1.5
<b>ENERGY INDICATORS</b>									
Primary energy production	Billion toe per year	33	42	57	64	5.4	2.9	1.2	2.1
Share of domestic energy production	%	22	28	33	33	4.5	1.7	0.1	0.9
Final energy demand by source	Billion toe per year	148	154	174	194	0.9	1.2	1.1	1.2
Oil	Billion toe per year	72	68	68	71	-1.3	0.1	0.3	0.2
Gas	Billion toe per year	30	30	38	43	0.2	2.3	1.2	1.8
Coal, Nuclear	Billion toe per year	36	38	44	50	1.0	1.5	1.2	1.3
Biomass	Billion toe per year	6	10	15	20	12.0	4.5	2.8	3.7
Other Renewables	Billion toe per year	4	9	9	11	16.7	0.5	1.8	1.2
Final energy demand by consuming sector	Billion toe per year	97	101	113	125	0.8	1.1	1.0	1.0
Transport freight	Billion toe per year	18	18	19	19	-0.5	0.9	0.0	0.4
Transport passenger	Billion toe per year	22	25	29	32	2.6	1.2	1.0	1.1
Industry	Billion toe per year	30	32	36	40	1.0	1.1	1.1	1.1
Residential and services	Billion toe per year	27	27	30	34	0.0	1.2	1.4	1.3
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.82	1.12	1.02	1.10	6.3	-0.9	0.8	-0.1
Gasoline price	Euros2005 per litre	0.87	1.17	1.08	1.16	6.0	-0.8	0.7	-0.1
Biofuels price	Euros2005 per ecccf	0.66	1.17	1.16	1.24	12.1	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.8	3.0	7.4	12.6	31.8	9.4	5.4	7.4
Share of renewables in electricity	%	16.6	33.1	30.0	28.8	14.8	-1.0	-0.4	-0.7
Share of renewables in final energy demand	%	7.8	13.7	14.9	17.2	11.9	0.9	1.4	1.1
Energy intensity of freight transport activity	toe/1000tkm	33	28	24	20	-3.1	-1.8	-1.5	-1.6
Energy intensity of passenger transport activity	toe/1000pkm	27	28	28	29	1.1	-0.2	0.3	0.0
Energy intensity of economic activity	toe/Million Euros 1995	162	156	149	143	-0.7	-0.5	-0.4	-0.5

ITREN-2030 ES - Spain		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	110	113	128	134	0.5	1.3	0.5	0.9
Road freight	Million tonnes per year	30	31	38	44	0.6	2.1	1.5	1.8
Road passenger	Million tonnes per year	67	69	77	77	0.5	1.1	0.0	0.6
Rail freight	Million tonnes per year	0	0	1	1	-0.5	1.6	1.8	1.7
Rail passenger	Million tonnes per year	0	0	0	0	1.8	-0.2	-0.3	-0.3
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	1	1	1	1	3.7	0.8	0.4	0.6
Air (Intra-EU)	Million tonnes per year	11	11	11	11	0.2	0.1	-0.1	0.0
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.057	0.052	0.049	0.048	-2.0	-0.6	-0.1	-0.3
Road	tonnes/1000 tkm	0.105	0.098	0.097	0.102	-1.5	0.0	0.5	0.2
Rail	tonnes/1000 tkm	0.036	0.031	0.028	0.027	-3.2	-1.1	-0.1	-0.6
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.002	0.002	0.002	0.002	0.4	-2.4	-1.6	-2.0
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.095	0.091	0.086	0.080	-1.0	-0.5	-0.7	-0.6
Road	tonnes/1000 pkm	0.092	0.087	0.084	0.079	-1.0	-0.3	-0.7	-0.5
Rail	tonnes/1000 pkm	0.014	0.014	0.012	0.010	0.3	-1.7	-1.8	-1.8
Air (Intra-EU)	tonnes/1000 pkm	0.164	0.155	0.136	0.121	-1.2	-1.2	-1.2	-1.2
NOx Transport emissions	1000 Tonnes per year	405	322	261	242	-4.5	-2.1	-0.7	-1.4
Road freight	1000 Tonnes per year	74	56	35	27	-5.4	-4.7	-2.5	-3.6
Road passenger	1000 Tonnes per year	191	119	71	55	-9.0	-5.0	-2.6	-3.8
Rail freight	1000 Tonnes per year	3	2	2	2	-4.5	-2.7	-0.6	-1.7
Rail passenger	1000 Tonnes per year	3	3	3	2	1.4	-1.1	-1.4	-1.3
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	12	14	15	15	3.3	0.5	0.0	0.2
Air (Intra-EU)	1000 Tonnes per year	123	128	136	142	0.8	0.6	0.5	0.5
PM10 Transport emissions	1000 Tonnes per year	35	30	24	23	-3.3	-2.1	-0.4	-1.3
Road freight	1000 Tonnes per year	11	9	7	7	-4.3	-2.5	0.1	-1.2
Road passenger	1000 Tonnes per year	24	21	17	16	-2.9	-2.0	-0.6	-1.3
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	16,527	18,045	21,019	22,673	1.8	1.5	0.8	1.1
Gasoline	1000 vehicles	9,812	8,441	6,863	6,662	-3.0	-2.0	-0.3	-1.2
Diesel	1000 vehicles	6,595	9,456	13,898	15,724	7.5	3.9	1.2	2.6
LPG/CNG	1000 vehicles	103	100	95	93	-0.5	-0.6	-0.2	-0.4
Bioethanol	1000 vehicles	0	2	51	132	0.0	38.1	10.0	23.2
Hybrid	1000 vehicles	16	45	113	62	23.1	9.5	-5.8	1.6
Electric	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	5,728	4,466	3,153	3,029	-4.9	-3.4	-0.4	-1.9
Gasoline 1400-2000 cc	1000 vehicles	3,693	3,615	3,413	3,368	-0.4	-0.6	-0.1	-0.4
Gasoline >2000 cc	1000 vehicles	390	360	297	266	-1.6	-1.9	-1.1	-1.5
Diesel <2000 cc	1000 vehicles	5,578	8,471	12,872	14,634	8.7	4.3	1.3	2.8
Diesel >2000 cc	1000 vehicles	1,017	985	1,026	1,090	-0.6	0.4	0.6	0.5
PreEURO	1000 vehicles	4,643	1,987	74	0	-15.6	-28.0	-50.8	-40.5
EURO I	1000 vehicles	3,296	2,361	334	2	-6.5	-17.8	-40.1	-29.8
EURO II	1000 vehicles	3,597	3,104	982	28	-2.9	-10.9	-30.0	-21.0
EURO III	1000 vehicles	4,975	4,745	2,702	301	-0.9	-5.5	-19.7	-12.9
EURO IV	1000 vehicles	0	3,429	2,661	659	0.0	-2.5	-13.0	-7.9
EURO V or later	1000 vehicles	0	2,372	14,102	21,489	0.0	19.5	4.3	11.6
Duty vehicle fleet size	1000 vehicles	1,187	1,282	1,476	1,671	1.6	1.4	1.2	1.3
<3.5 tonnes	1000 vehicles	633	667	743	863	1.1	1.1	1.5	1.3
3.5-7.5 tonnes	1000 vehicles	265	295	352	389	2.1	1.8	1.0	1.4
7.5-16 tonnes	1000 vehicles	69	77	92	102	2.1	1.8	1.0	1.4
16-32 tonnes	1000 vehicles	179	197	232	254	1.9	1.6	0.9	1.3
>32 tonnes	1000 vehicles	39	45	57	62	2.9	2.3	0.9	1.6
PreEURO	1000 vehicles	558	341	31	0	-9.4	-21.4	-55.8	-41.0
EURO I	1000 vehicles	131	120	40	0	-1.6	-10.4	-44.0	-29.2
EURO II	1000 vehicles	253	246	153	8	-0.5	-4.7	-25.8	-15.9
EURO III	1000 vehicles	245	307	268	73	4.6	-1.4	-12.2	-6.9
EURO IV	1000 vehicles	0	166	159	85	0.0	-0.4	-6.1	-3.3
EURO V or later	1000 vehicles	0	102	826	1,505	0.0	23.3	6.2	14.4

ITREN-2030 FI - Finland		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	544	566	615	620	0.8	0.8	0.1	0.5
Freight transport activity originated in the country	Billion tonnes-km per year	227	251	307	365	2.0	2.0	1.8	1.9
Road	Billion tonnes-km per year	47	50	57	62	1.3	1.3	0.9	1.1
Rail	Billion tonnes-km per year	14	16	21	27	2.8	2.8	2.4	2.6
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	167	185	229	276	2.1	2.1	1.9	2.0
Average freight transport distance	km	418	444	499	589	1.2	1.2	1.7	1.4
Freight transport activity on the national territory	Billion tonnes-km per year	47	51	59	68	1.5	1.6	1.4	1.5
Road	Billion tonnes-km per year	35	37	41	46	1.1	1.1	1.0	1.1
Rail	Billion tonnes-km per year	12	14	18	22	2.6	2.6	2.1	2.4
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	4	5	5	5	0.6	0.6	0.9	0.8
Trips originated in the country	Million trips per year	6,392	6,193	6,393	6,610	-0.6	0.3	0.3	0.3
Passenger transport activity originated in the country	Billion pass-km per year	81	81	89	97	0.0	1.0	0.8	0.9
Car	Billion pass-km per year	57	55	63	70	-0.7	1.4	1.0	1.2
Bus	Billion pass-km per year	9	10	9	8	1.0	-1.3	-0.9	-1.1
Rail	Billion pass-km per year	4	5	4	4	2.7	-0.7	-0.2	-0.5
Air (Intra-EU)	Billion pass-km per year	8	9	11	13	2.0	1.7	1.6	1.7
Slow	Billion pass-km per year	2	2	3	3	0.6	0.5	0.8	0.6
Average passenger transport distance	km	12.6	13.0	14.0	14.7	0.7	0.7	0.5	0.6
Passenger transport activity on the national territory	Billion pass-km per year	89	94	106	117	1.2	1.2	1.0	1.1
Road	Billion pass-km per year	86	91	102	113	1.2	1.2	1.0	1.1
Rail	Billion pass-km per year	3	4	4	4	0.7	0.7	0.7	0.7
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	45	49	56	63	1.5	1.5	1.1	1.3
Motorization rate	cars/1000 inhabitants	466	501	568	627	1.5	1.3	1.0	1.1
ECONOMY INDICATORS									
GDP	Billion Euros 2005	150	166	214	284	2.0	2.6	2.9	2.7
Employment	1000 Persons	2,599	2,510	2,470	2,400	-0.7	-0.2	-0.3	-0.2
Agriculture and fishery	1000 Persons	265	248	225	198	-1.3	-1.0	-1.3	-1.1
Construction	1000 Persons	134	143	145	146	1.3	0.2	0.0	0.1
Energy and water	1000 Persons	36	43	40	44	3.8	-0.7	0.8	0.1
Industry	1000 Persons	470	469	506	524	0.0	0.7	0.4	0.6
Transport services	1000 Persons	135	135	132	131	0.0	-0.2	-0.1	-0.1
Other services	1000 Persons	1,559	1,471	1,421	1,357	-1.2	-0.3	-0.5	-0.4
Population total	1000 Persons	5,230	5,277	5,390	5,433	0.2	0.2	0.1	0.1
Labour force	1000 Persons	3,343	3,382	3,304	3,251	0.2	-0.2	-0.2	-0.2
Retired (> 65 years)	1000 Persons	707	730	947	1,015	0.6	2.6	0.7	1.7
Transport taxation revenues	Million Euros 2005	3,043	2,884	3,003	3,047	-1.1	0.4	0.1	0.3
Fuel taxes	Million Euros 2005	3,043	2,884	2,819	2,802	-1.1	-0.2	-0.1	-0.1
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	0	184	246	0.0	0.0	2.9	0.0
ENERGY INDICATORS									
Primary energy production	Billion toe per year	16	20	25	30	5.3	2.3	1.6	1.9
Share of domestic energy production	%	46	50	54	57	1.5	0.9	0.4	0.6
Final energy demand by source	Billion toe per year	34	41	46	52	3.7	1.4	1.2	1.3
Oil	Billion toe per year	11	9	9	10	-3.7	0.3	0.5	0.4
Gas	Billion toe per year	4	4	6	7	2.9	3.8	0.9	2.4
Coal, Nuclear	Billion toe per year	11	19	19	22	10.8	0.4	1.3	0.8
Biomass	Billion toe per year	7	8	11	12	2.3	2.9	1.2	2.0
Other Renewables	Billion toe per year	1	1	1	2	-3.4	3.7	3.5	3.6
Final energy demand by consuming sector	Billion toe per year	25	27	32	35	1.7	1.6	1.1	1.4
Transport freight	Billion toe per year	2	2	2	3	0.5	2.9	1.5	2.2
Transport passenger	Billion toe per year	3	3	3	4	0.3	0.5	0.6	0.6
Industry	Billion toe per year	13	14	17	19	3.0	1.9	0.7	1.3
Residential and services	Billion toe per year	7	7	8	10	0.2	1.3	2.0	1.6
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.84	1.20	1.09	1.19	7.5	-1.0	0.9	-0.1
Gasoline price	Euros2005 per litre	1.07	1.43	1.32	1.42	6.0	-0.8	0.7	-0.1
Biofuels price	Euros2005 per ecccf	0.66	1.17	1.16	1.24	12.1	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	1.5	5.6	9.6	12.1	30.4	5.6	2.3	3.9
Share of renewables in electricity	%	27.0	17.6	21.0	24.2	-8.2	1.8	1.4	1.6
Share of renewables in final energy demand	%	31.6	27.4	30.9	32.0	-2.8	1.2	0.4	0.8
Energy intensity of freight transport activity	toe/1000tkm	8	8	8	8	-1.5	0.8	-0.3	0.2
Energy intensity of passenger transport activity	toe/1000pkm	32	31	29	27	-0.9	-0.7	-0.4	-0.5
Energy intensity of economic activity	toe/Million Euros 1995	164	162	147	124	-0.3	-0.9	-1.7	-1.3

ITREN-2030 FI - Finland		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	24	24	27	31	0.2	1.0	1.3	1.2
Road freight	Million tonnes per year	11	12	15	18	1.4	2.0	2.3	2.1
Road passenger	Million tonnes per year	11	10	10	10	-1.2	-0.2	-0.2	-0.2
Rail freight	Million tonnes per year	0	0	0	0	0.6	2.5	2.7	2.6
Rail passenger	Million tonnes per year	0	0	0	0	1.8	-1.6	-1.1	-1.3
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	3.8	1.1	1.2	1.1
Air (Intra-EU)	Million tonnes per year	2	2	2	2	0.3	0.2	0.4	0.3
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.055	0.053	0.053	0.055	-0.6	0.0	0.5	0.2
Road	tonnes/1000 tkm	0.325	0.329	0.358	0.404	0.2	0.8	1.2	1.0
Rail	tonnes/1000 tkm	0.022	0.020	0.019	0.021	-2.0	-0.2	0.6	0.2
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.001	0.001	1.6	-1.0	-0.7	-0.9
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.129	0.115	0.101	0.090	-2.2	-1.3	-1.2	-1.2
Road	tonnes/1000 pkm	0.127	0.113	0.099	0.088	-2.4	-1.3	-1.2	-1.3
Rail	tonnes/1000 pkm	0.019	0.020	0.016	0.014	1.1	-2.3	-1.7	-2.0
Air (Intra-EU)	tonnes/1000 pkm	0.194	0.178	0.154	0.136	-1.7	-1.4	-1.2	-1.3
NOx Transport emissions	1000 Tonnes per year	78	56	44	44	-6.3	-2.4	0.0	-1.2
Road freight	1000 Tonnes per year	20	14	9	8	-7.2	-3.9	-1.2	-2.6
Road passenger	1000 Tonnes per year	35	18	8	6	-12.3	-7.4	-3.2	-5.3
Rail freight	1000 Tonnes per year	3	3	4	5	1.6	1.0	2.1	1.5
Rail passenger	1000 Tonnes per year	1	1	1	0	1.2	-2.5	-2.2	-2.3
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	3	4	4	4	3.5	0.8	0.9	0.8
Air (Intra-EU)	1000 Tonnes per year	16	16	18	20	0.8	1.0	1.2	1.1
PM10 Transport emissions	1000 Tonnes per year	5	4	3	3	-4.6	-2.9	0.0	-1.5
Road freight	1000 Tonnes per year	1	1	1	1	-5.4	-5.0	-0.1	-2.6
Road passenger	1000 Tonnes per year	3	3	2	2	-4.3	-2.2	0.1	-1.1
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	2,458	2,675	3,094	3,421	1.7	1.5	1.0	1.2
Gasoline	1000 vehicles	2,141	2,255	2,514	2,732	1.0	1.1	0.8	1.0
Diesel	1000 vehicles	304	396	544	656	5.4	3.2	1.9	2.6
LPG/CNG	1000 vehicles	0	0	1	1	0.0	12.6	3.3	7.9
Bioethanol	1000 vehicles	0	0	6	15	94.7	29.4	10.3	19.5
Hybrid	1000 vehicles	12	23	30	18	14.0	2.5	-5.1	-1.4
Electric	1000 vehicles	0	0	0	0	0.0	0.0	16.8	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	879	716	610	612	-4.0	-1.6	0.0	-0.8
Gasoline 1400-2000 cc	1000 vehicles	1,117	1,365	1,685	1,855	4.1	2.1	1.0	1.5
Gasoline >2000 cc	1000 vehicles	10,349	9,601	8,378	7,958	-1.5	-1.4	-0.5	-0.9
Diesel <2000 cc	1000 vehicles	45,473	67,938	98,281	113,979	8.4	3.8	1.5	2.6
Diesel >2000 cc	1000 vehicles	12,115	14,786	18,909	21,392	4.1	2.5	1.2	1.9
PreEURO	1000 vehicles	207	13	0	0	-42.8	-100.0	0.0	-100.0
EURO I	1000 vehicles	914	543	0	0	-9.9	-70.4	-100.0	-100.0
EURO II	1000 vehicles	602	580	25	0	-0.8	-26.9	-100.0	-100.0
EURO III	1000 vehicles	723	713	398	0	-0.3	-5.7	-81.3	-58.0
EURO IV	1000 vehicles	0	452	414	1	0.0	-0.9	-43.6	-25.2
EURO V or later	1000 vehicles	0	352	2,220	3,387	0.0	20.2	4.3	12.0
Duty vehicle fleet size	1000 vehicles	117	118	119	126	0.1	0.1	0.6	0.3
<3.5 tonnes	1000 vehicles	55	51	44	44	-1.5	-1.5	0.0	-0.8
3.5-7.5 tonnes	1000 vehicles	31	33	38	41	1.4	1.3	0.9	1.1
7.5-16 tonnes	1000 vehicles	8	9	10	11	1.4	1.3	0.9	1.1
16-32 tonnes	1000 vehicles	20	21	23	26	1.2	1.1	0.9	1.0
>32 tonnes	1000 vehicles	4	4	4	5	1.3	1.2	0.9	1.0
PreEURO	1000 vehicles	58	33	2	0	-10.9	-26.0	-67.5	-51.0
EURO I	1000 vehicles	16	14	3	0	-2.1	-13.9	-56.4	-38.7
EURO II	1000 vehicles	21	20	11	0	-0.6	-6.0	-32.8	-20.5
EURO III	1000 vehicles	22	27	23	4	4.4	-1.7	-15.9	-9.1
EURO IV	1000 vehicles	0	15	14	6	0.0	-0.5	-7.8	-4.2
EURO V or later	1000 vehicles	0	8	66	116	0.0	23.4	5.7	14.2

ITREN-2030 FR - France		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	2,234	2,310	2,473	2,601	0.7	0.7	0.5	0.6
Freight transport activity originated in the country	Billion tonnes-km per year	814	874	1,007	1,126	1.4	1.4	1.1	1.3
Road	Billion tonnes-km per year	203	216	243	270	1.2	1.2	1.1	1.1
Rail	Billion tonnes-km per year	37	40	47	53	1.5	1.5	1.4	1.5
Inland navigation	Billion tonnes-km per year	10	11	12	14	1.6	1.6	1.0	1.3
Maritime (Intra-EU)	Billion tonnes-km per year	564	607	705	789	1.5	1.5	1.1	1.3
Average freight transport distance	km	365	378	407	433	0.7	0.7	0.6	0.7
Freight transport activity on the national territory	Billion tonnes-km per year	298	312	344	384	1.0	1.0	1.1	1.0
Road	Billion tonnes-km per year	250	261	284	317	0.9	0.9	1.1	1.0
Rail	Billion tonnes-km per year	39	42	49	56	1.6	1.6	1.3	1.4
Inland navigation	Billion tonnes-km per year	9	10	11	12	1.1	1.1	0.8	1.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	43	44	46	53	0.5	0.5	1.3	0.9
Trips originated in the country	Million trips per year	58,722	58,358	62,415	65,393	-0.1	0.7	0.5	0.6
Passenger transport activity originated in the country	Billion pass-km per year	982	999	1,120	1,205	0.3	1.2	0.7	0.9
Car	Billion pass-km per year	772	752	862	923	-0.5	1.4	0.7	1.0
Bus	Billion pass-km per year	59	65	59	58	2.1	-1.1	0.0	-0.6
Rail	Billion pass-km per year	78	101	105	118	5.5	0.3	1.2	0.8
Air (Intra-EU)	Billion pass-km per year	42	47	57	63	2.4	2.0	1.0	1.5
Slow	Billion pass-km per year	31	33	37	43	1.1	1.3	1.3	1.3
Average passenger transport distance	km	16.7	17.1	17.9	18.4	0.5	0.5	0.3	0.4
Passenger transport activity on the national territory	Billion pass-km per year	1,030	1,084	1,200	1,328	1.0	1.0	1.0	1.0
Road	Billion pass-km per year	966	1,016	1,126	1,246	1.0	1.0	1.0	1.0
Rail	Billion pass-km per year	64	68	74	82	1.0	1.0	1.0	1.0
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	534	567	639	713	1.2	1.2	1.1	1.2
Motorization rate	cars/1000 inhabitants	452	471	506	544	0.8	0.7	0.7	0.7
ECONOMY INDICATORS									
GDP	Billion Euros 2005	1,479	1,582	1,851	2,215	1.4	1.6	1.8	1.7
Employment	1000 Persons	25,778	25,348	25,252	23,861	-0.3	0.0	-0.6	-0.3
Agriculture and fishery	1000 Persons	723	687	635	555	-1.0	-0.8	-1.3	-1.1
Construction	1000 Persons	1,918	2,235	3,111	3,470	3.1	3.4	1.1	2.2
Energy and water	1000 Persons	339	439	422	412	5.3	-0.4	-0.2	-0.3
Industry	1000 Persons	4,342	4,176	4,144	3,838	-0.8	-0.1	-0.8	-0.4
Transport services	1000 Persons	708	725	646	579	0.5	-1.1	-1.1	-1.1
Other services	1000 Persons	17,748	17,085	16,293	15,007	-0.8	-0.5	-0.8	-0.6
Population total	1000 Persons	60,440	61,521	63,439	64,980	0.4	0.3	0.2	0.3
Labour force	1000 Persons	37,119	37,996	37,674	37,650	0.5	-0.1	0.0	0.0
Retired (> 65 years)	1000 Persons	9,631	9,694	11,841	13,643	0.1	2.0	1.4	1.7
Transport taxation revenues	Million Euros 2005	59,410	57,184	61,755	64,833	-0.8	0.8	0.5	0.6
Fuel taxes	Million Euros 2005	40,415	38,533	42,273	43,357	-0.9	0.9	0.3	0.6
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	18,996	18,651	19,481	21,477	-0.4	0.4	1.0	0.7
ENERGY INDICATORS									
Primary energy production	Billion toe per year	140	146	157	186	0.8	0.7	1.7	1.2
Share of domestic energy production	%	50	51	51	55	0.3	0.0	0.8	0.4
Final energy demand by source	Billion toe per year	281	288	308	338	0.5	0.7	0.9	0.8
Oil	Billion toe per year	91	86	84	85	-1.0	-0.3	0.2	-0.1
Gas	Billion toe per year	41	37	50	51	-2.0	3.1	0.1	1.6
Coal, Nuclear	Billion toe per year	132	140	136	154	1.2	-0.3	1.2	0.5
Biomass	Billion toe per year	12	16	27	34	5.5	5.3	2.4	3.8
Other Renewables	Billion toe per year	5	9	11	14	11.2	2.4	2.5	2.4
Final energy demand by consuming sector	Billion toe per year	159	158	167	183	-0.1	0.6	0.9	0.7
Transport freight	Billion toe per year	18	17	19	19	-0.6	0.7	0.0	0.4
Transport passenger	Billion toe per year	34	36	39	42	0.9	0.7	1.0	0.8
Industry	Billion toe per year	38	38	41	44	0.4	0.6	0.6	0.6
Residential and services	Billion toe per year	69	66	69	78	-0.8	0.4	1.2	0.8
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.91	1.23	1.13	1.21	6.2	-0.8	0.7	-0.1
Gasoline price	Euros2005 per litre	1.06	1.39	1.29	1.38	5.5	-0.7	0.6	0.0
Biofuels price	Euros2005 per ecccf	0.66	1.17	1.16	1.24	12.1	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	1.0	4.8	10.8	15.5	37.3	8.4	3.6	6.0
Share of renewables in electricity	%	12.4	18.4	21.9	24.2	8.2	1.8	1.0	1.4
Share of renewables in final energy demand	%	9.2	12.4	15.7	18.0	6.3	2.4	1.4	1.9
Energy intensity of freight transport activity	toe/1000tkm	21	19	18	16	-1.9	-0.6	-1.1	-0.8
Energy intensity of passenger transport activity	toe/1000pkm	32	32	31	31	-0.1	-0.4	0.0	-0.2
Energy intensity of economic activity	toe/Million Euros 1995	107	100	90	82	-1.4	-1.0	-0.9	-0.9



The iTREN-2030 reference scenario until 2030

ITREN-2030 FR - France		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	258	256	289	306	-0.2	1.2	0.6	0.9
Road freight	Million tonnes per year	81	83	97	111	0.5	1.6	1.3	1.5
Road passenger	Million tonnes per year	168	162	181	184	-0.7	1.1	0.2	0.6
Rail freight	Million tonnes per year	1	1	1	1	1.7	2.1	1.3	1.7
Rail passenger	Million tonnes per year	0	1	1	1	4.7	-0.2	0.6	0.2
Inland navigation	Million tonnes per year	0	0	0	0	0.7	0.8	0.8	0.8
Maritime (Intra-EU)	Million tonnes per year	1	2	2	2	2.8	0.2	0.0	0.1
Air (Intra-EU)	Million tonnes per year	7	8	9	9	1.4	1.0	0.1	0.6
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.096	0.093	0.095	0.097	-0.7	0.2	0.2	0.2
Road	tonnes/1000 tkm	0.323	0.318	0.341	0.349	-0.3	0.7	0.3	0.5
Rail	tonnes/1000 tkm	0.014	0.014	0.015	0.015	0.1	0.6	-0.1	0.3
Inland navigation	tonnes/1000 tkm	0.040	0.039	0.038	0.038	-0.4	-0.3	-0.1	-0.2
Maritime (Intra-EU)	tonnes/1000 tkm	0.002	0.003	0.002	0.002	1.3	-1.2	-1.1	-1.2
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.164	0.151	0.151	0.139	-1.6	0.0	-0.8	-0.4
Road	tonnes/1000 pkm	0.174	0.160	0.160	0.147	-1.7	0.0	-0.8	-0.4
Rail	tonnes/1000 pkm	0.007	0.008	0.007	0.007	3.7	-1.2	-0.4	-0.8
Air (Intra-EU)	tonnes/1000 pkm	0.173	0.165	0.150	0.137	-1.0	-0.9	-0.9	-0.9
NOx Transport emissions	1000 Tonnes per year	604	475	386	360	-4.7	-2.0	-0.7	-1.4
Road freight	1000 Tonnes per year	161	125	81	62	-5.0	-4.2	-2.6	-3.4
Road passenger	1000 Tonnes per year	306	198	135	117	-8.3	-3.7	-1.5	-2.6
Rail freight	1000 Tonnes per year	5	5	4	5	-1.5	-1.0	1.2	0.1
Rail passenger	1000 Tonnes per year	6	8	7	7	4.0	-1.1	-0.6	-0.8
Inland navigation	1000 Tonnes per year	6	6	7	8	0.7	0.8	0.8	0.8
Maritime (Intra-EU)	1000 Tonnes per year	30	34	33	32	2.5	-0.1	-0.3	-0.2
Air (Intra-EU)	1000 Tonnes per year	90	99	118	130	2.1	1.8	0.9	1.3
PM10 Transport emissions	1000 Tonnes per year	48	38	28	28	-4.6	-3.1	0.0	-1.6
Road freight	1000 Tonnes per year	10	7	5	5	-6.4	-3.5	0.0	-1.8
Road passenger	1000 Tonnes per year	38	31	23	23	-4.2	-3.0	0.0	-1.5
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	28,297	30,203	34,042	37,526	1.3	1.2	1.0	1.1
Gasoline	1000 vehicles	14,967	11,777	10,123	10,431	-4.7	-1.5	0.3	-0.6
Diesel	1000 vehicles	13,249	18,160	23,282	26,327	6.5	2.5	1.2	1.9
LPG/CNG	1000 vehicles	0	1	2	2	0.0	9.5	2.0	5.6
Bioethanol	1000 vehicles	0	11	202	439	219.7	33.7	8.1	20.2
Hybrid	1000 vehicles	81	254	432	321	25.8	5.4	-2.9	1.2
Electric	1000 vehicles	0	0	1	5	12.7	27.1	15.1	21.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	8,257	6,829	6,251	6,454	-3.7	-0.9	0.3	-0.3
Gasoline 1400-2000 cc	1000 vehicles	404	494	703	851	4.1	3.6	1.9	2.8
Gasoline >2000 cc	1000 vehicles	45	42	34	29	-1.3	-2.2	-1.5	-1.9
Diesel <2000 cc	1000 vehicles	11,081	15,595	20,326	22,965	7.1	2.7	1.2	2.0
Diesel >2000 cc	1000 vehicles	2,168	2,565	2,956	3,363	3.4	1.4	1.3	1.4
PreEURO	1000 vehicles	3,022	528	1	0	-29.4	-47.5	-70.8	-60.9
EURO I	1000 vehicles	5,070	1,887	21	0	-17.9	-36.4	-61.6	-50.6
EURO II	1000 vehicles	7,875	4,569	209	0	-10.3	-26.5	-51.8	-40.5
EURO III	1000 vehicles	12,250	9,995	1,726	12	-4.0	-16.1	-39.1	-28.6
EURO IV	1000 vehicles	0	7,540	2,887	78	0.0	-9.2	-30.3	-20.4
EURO V or later	1000 vehicles	0	5,418	28,564	36,671	0.0	18.1	2.5	10.0
Duty vehicle fleet size	1000 vehicles	1,511	1,541	1,618	1,823	0.4	0.5	1.2	0.8
<3.5 tonnes	1000 vehicles	793	770	744	865	-0.6	-0.3	1.5	0.6
3.5-7.5 tonnes	1000 vehicles	316	346	403	442	1.8	1.5	0.9	1.2
7.5-16 tonnes	1000 vehicles	83	90	105	116	1.8	1.5	0.9	1.2
16-32 tonnes	1000 vehicles	255	267	292	320	0.9	0.9	0.9	0.9
>32 tonnes	1000 vehicles	64	67	73	81	0.9	0.9	0.9	0.9
PreEURO	1000 vehicles	668	274	0	0	-16.3	-62.4	-100.0	-100.0
EURO I	1000 vehicles	149	140	2	0	-1.3	-35.8	-100.0	-100.0
EURO II	1000 vehicles	319	316	115	0	-0.2	-9.6	-100.0	-100.0
EURO III	1000 vehicles	375	463	406	3	4.3	-1.3	-39.5	-22.8
EURO IV	1000 vehicles	0	225	221	40	0.0	-0.2	-15.8	-8.3
EURO V or later	1000 vehicles	0	124	875	1,781	0.0	21.6	7.4	14.3

ITREN-2030 GR - Greece		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	396	428	502	533	1.6	1.6	0.6	1.1
Freight transport activity originated in the country	Billion tonnes-km per year	104	120	159	191	2.8	2.9	1.9	2.4
Road	Billion tonnes-km per year	47	52	64	73	2.1	2.1	1.4	1.7
Rail	Billion tonnes-km per year	1	1	2	2	3.2	3.2	2.4	2.8
Inland navigation	Billion tonnes-km per year	0	0	0	0	2.6	2.6	1.8	2.2
Maritime (Intra-EU)	Billion tonnes-km per year	56	67	93	116	3.5	3.5	2.2	2.8
Average freight transport distance	km	263	280	316	359	1.2	1.2	1.3	1.3
Freight transport activity on the national territory	Billion tonnes-km per year	28	32	41	47	2.4	2.4	1.4	1.9
Road	Billion tonnes-km per year	28	31	39	45	2.4	2.4	1.4	1.9
Rail	Billion tonnes-km per year	1	1	1	1	3.3	3.3	2.4	2.8
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	4	5	6	7	2.1	2.1	1.5	1.8
Trips originated in the country	Million trips per year	12,393	12,698	13,597	13,577	0.5	0.7	0.0	0.3
Passenger transport activity originated in the country	Billion pass-km per year	115	120	133	140	0.8	1.0	0.5	0.8
Car	Billion pass-km per year	69	72	81	87	0.9	1.2	0.7	0.9
Bus	Billion pass-km per year	20	20	21	20	0.5	0.1	-0.4	-0.1
Rail	Billion pass-km per year	2	3	3	3	2.2	1.1	0.9	1.0
Air (Intra-EU)	Billion pass-km per year	19	20	22	24	0.5	1.2	0.7	1.0
Slow	Billion pass-km per year	5	5	6	6	1.1	1.5	0.7	1.1
Average passenger transport distance	km	9.3	9.4	9.8	10.3	0.3	0.3	0.5	0.4
Passenger transport activity on the national territory	Billion pass-km per year	101	103	108	115	0.5	0.5	0.6	0.6
Road	Billion pass-km per year	98	100	105	112	0.5	0.5	0.6	0.6
Rail	Billion pass-km per year	3	3	3	3	0.4	0.4	0.4	0.4
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	50	52	57	62	0.9	0.9	0.9	0.9
Motorization rate	cars/1000 inhabitants	220	229	246	270	0.8	0.7	0.9	0.8
ECONOMY INDICATORS									
GDP	Billion Euros 2005	128	133	137	152	0.7	0.4	1.0	0.7
Employment	1000 Persons	4,194	3,912	3,494	3,435	-1.4	-1.1	-0.2	-0.6
Agriculture and fishery	1000 Persons	860	771	689	636	-2.1	-1.1	-0.8	-1.0
Construction	1000 Persons	318	301	321	356	-1.1	0.7	1.0	0.8
Energy and water	1000 Persons	61	82	82	89	6.1	0.0	0.8	0.4
Industry	1000 Persons	711	673	704	745	-1.1	0.5	0.6	0.5
Transport services	1000 Persons	143	137	126	111	-0.9	-0.8	-1.2	-1.0
Other services	1000 Persons	2,101	1,948	1,572	1,499	-1.5	-2.1	-0.5	-1.3
Population total	1000 Persons	11,065	11,223	11,445	11,327	0.3	0.2	-0.1	0.0
Labour force	1000 Persons	7,202	7,375	7,439	7,033	0.5	0.1	-0.6	-0.2
Retired (> 65 years)	1000 Persons	2,008	2,029	2,287	2,732	0.2	1.2	1.8	1.5
Transport taxation revenues	Million Euros 2005	2,506	2,764	3,187	3,455	2.0	1.4	0.8	1.1
Fuel taxes	Million Euros 2005	1,236	1,291	1,272	1,247	0.9	-0.2	-0.2	-0.2
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	1,270	1,473	1,915	2,207	3.0	2.7	1.4	2.0
ENERGY INDICATORS									
Primary energy production	Billion toe per year	11	13	15	17	3.7	0.9	1.6	1.3
Share of domestic energy production	%	36	42	47	52	2.7	1.1	1.1	1.1
Final energy demand by source	Billion toe per year	31	32	32	33	1.0	-0.2	0.5	0.2
Oil	Billion toe per year	18	15	14	13	-2.7	-1.2	-0.4	-0.8
Gas	Billion toe per year	2	4	5	4	12.9	1.6	-1.6	0.0
Coal, Nuclear	Billion toe per year	9	9	9	11	1.0	-1.0	2.3	0.6
Biomass	Billion toe per year	1	2	3	3	12.2	4.0	1.9	3.0
Other Renewables	Billion toe per year	1	1	2	2	12.3	2.6	1.9	2.3
Final energy demand by consuming sector	Billion toe per year	21	20	20	21	-0.6	-0.1	0.3	0.1
Transport freight	Billion toe per year	3	3	3	3	-1.8	0.8	-0.2	0.3
Transport passenger	Billion toe per year	5	5	5	5	0.3	-0.3	-0.1	-0.2
Industry	Billion toe per year	4	4	4	5	0.1	0.4	0.9	0.7
Residential and services	Billion toe per year	9	8	8	8	-1.0	-0.6	0.5	0.0
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.79	1.08	0.99	1.07	6.5	-0.9	0.8	-0.1
Gasoline price	Euros2005 per litre	0.79	1.09	1.00	1.08	6.7	-0.9	0.8	-0.1
Biofuels price	Euros2005 per eeccf	0.67	1.17	1.17	1.24	11.9	0.0	0.6	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	3.8	7.9	10.7	1301.1	7.6	3.1	5.3
Share of renewables in electricity	%	11.2	19.2	24.2	26.5	11.4	2.4	0.9	1.6
Share of renewables in final energy demand	%	7.5	11.8	15.5	18.0	9.4	2.8	1.5	2.2
Energy intensity of freight transport activity	toe/1000tkm	39	30	24	19	-4.7	-2.2	-2.2	-2.2
Energy intensity of passenger transport activity	toe/1000pkm	42	42	38	35	-0.1	-0.9	-0.8	-0.9
Energy intensity of economic activity	toe/Million Euros 1995	164	154	147	138	-1.3	-0.5	-0.6	-0.6

The iTREN-2030 reference scenario until 2030

ITREN-2030 GR - Greece		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	16	17	18	19	0.3	0.8	0.3	0.6
Road freight	Million tonnes per year	3	3	4	4	1.4	2.6	1.1	1.8
Road passenger	Million tonnes per year	10	10	10	10	0.0	0.2	0.2	0.2
Rail freight	Million tonnes per year	1	1	1	1	1.7	2.1	1.3	1.7
Rail passenger	Million tonnes per year	0	0	0	0	0.9	0.1	-0.1	0.0
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	2.8	1.2	0.3	0.8
Air (Intra-EU)	Million tonnes per year	3	3	3	3	-0.5	0.4	-0.4	0.0
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.045	0.042	0.039	0.035	-1.5	-0.7	-0.9	-0.8
Road	tonnes/1000 tkm	0.105	0.100	0.102	0.099	-0.9	0.2	-0.3	0.0
Rail	tonnes/1000 tkm	0.774	0.715	0.641	0.573	-1.6	-1.1	-1.1	-1.1
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.006	0.006	0.005	0.004	-0.6	-2.2	-1.9	-2.0
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.106	0.103	0.099	0.094	-0.6	-0.3	-0.6	-0.5
Road	tonnes/1000 pkm	0.099	0.097	0.094	0.090	-0.5	-0.3	-0.5	-0.4
Rail	tonnes/1000 pkm	0.022	0.022	0.022	0.021	0.6	-0.3	-0.5	-0.4
Air (Intra-EU)	tonnes/1000 pkm	0.152	0.145	0.133	0.119	-1.0	-0.8	-1.1	-1.0
NOx Transport emissions	1000 Tonnes per year	93	79	68	63	-3.4	-1.5	-0.6	-1.1
Road freight	1000 Tonnes per year	15	13	7	5	-3.5	-5.3	-3.4	-4.4
Road passenger	1000 Tonnes per year	36	22	11	8	-9.1	-6.4	-3.0	-4.7
Rail freight	1000 Tonnes per year	0	0	0	0	3.9	3.0	2.4	2.7
Rail passenger	1000 Tonnes per year	0	0	0	0	0.5	-0.9	-1.2	-1.0
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	8	9	9	9	2.6	0.9	0.0	0.4
Air (Intra-EU)	1000 Tonnes per year	34	34	39	40	0.2	1.2	0.2	0.7
PM10 Transport emissions	1000 Tonnes per year	5	4	3	3	-3.6	-2.1	-1.4	-1.8
Road freight	1000 Tonnes per year	1	1	1	1	-3.2	-2.0	-0.8	-1.4
Road passenger	1000 Tonnes per year	4	3	2	2	-3.7	-2.1	-1.7	-1.9
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	2,442	2,568	2,824	3,067	1.0	1.0	0.8	0.9
Gasoline	1000 vehicles	2,402	2,525	2,771	3,005	1.0	0.9	0.8	0.9
Diesel	1000 vehicles	32	33	35	38	0.5	0.6	0.6	0.6
LPG/CNG	1000 vehicles	7	9	12	15	3.9	3.4	1.9	2.6
Bioethanol	1000 vehicles	0	0	1	6	0.0	34.1	15.2	24.3
Hybrid	1000 vehicles	1	1	4	2	14.1	11.3	-9.0	0.6
Electric	1000 vehicles	0	0	0	2	19.1	54.0	16.3	33.9
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	1,953	1,988	2,034	2,125	0.4	0.2	0.4	0.3
Gasoline 1400-2000 cc	1000 vehicles	404	494	703	851	4.1	3.6	1.9	2.8
Gasoline >2000 cc	1000 vehicles	45	42	34	29	-1.3	-2.2	-1.5	-1.9
Diesel <2000 cc	1000 vehicles	21	23	27	30	1.7	1.7	1.1	1.4
Diesel >2000 cc	1000 vehicles	11	10	8	7	-1.8	-2.2	-1.2	-1.7
PreEURO	1000 vehicles	1,164	823	143	0	-6.7	-16.0	-47.7	-33.8
EURO I	1000 vehicles	703	685	461	31	-0.5	-3.9	-23.7	-14.4
EURO II	1000 vehicles	205	201	184	70	-0.4	-0.9	-9.2	-5.1
EURO III	1000 vehicles	369	359	344	244	-0.5	-0.4	-3.4	-1.9
EURO IV	1000 vehicles	0	285	272	239	0.0	-0.4	-1.3	-0.9
EURO V or later	1000 vehicles	0	214	1,415	2,473	0.0	20.8	5.7	13.0
Duty vehicle fleet size	1000 vehicles	461	514	618	707	2.2	1.9	1.3	1.6
<3.5 tonnes	1000 vehicles	223	238	270	313	1.3	1.3	1.5	1.4
3.5-7.5 tonnes	1000 vehicles	115	135	174	197	3.3	2.6	1.3	1.9
7.5-16 tonnes	1000 vehicles	30	35	45	52	3.3	2.5	1.3	1.9
16-32 tonnes	1000 vehicles	76	85	104	117	2.4	2.0	1.2	1.6
>32 tonnes	1000 vehicles	17	20	25	28	2.8	2.3	1.2	1.7
PreEURO	1000 vehicles	278	218	82	8	-4.7	-9.3	-21.1	-15.4
EURO I	1000 vehicles	34	33	28	9	-0.2	-1.9	-10.9	-6.5
EURO II	1000 vehicles	76	76	70	38	-0.1	-0.8	-5.9	-3.4
EURO III	1000 vehicles	74	95	93	73	5.2	-0.2	-2.3	-1.3
EURO IV	1000 vehicles	0	59	58	52	0.0	-0.1	-1.0	-0.5
EURO V or later	1000 vehicles	0	34	288	526	0.0	24.0	6.2	14.7

ITREN-2030 HU - Hungary		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
<b>TRANSPORT INDICATORS</b>									
Tonnes originated in the country	Million tonnes per year	307	303	296	295	-0.3	-0.2	0.0	-0.1
Freight transport activity originated in the country	Billion tonnes-km per year	31	35	46	55	2.7	2.7	1.7	2.2
Road	Billion tonnes-km per year	23	26	32	37	2.1	2.1	1.5	1.8
Rail	Billion tonnes-km per year	6	8	12	14	4.1	4.1	1.7	2.9
Inland navigation	Billion tonnes-km per year	1	2	3	4	4.6	4.6	3.2	3.9
Maritime (Intra-EU)	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Average freight transport distance	km	101	117	157	186	3.0	3.0	1.7	2.4
Freight transport activity on the national territory	Billion tonnes-km per year	42	49	68	86	3.1	3.2	2.4	2.8
Road	Billion tonnes-km per year	29	33	41	51	2.3	2.3	2.1	2.2
Rail	Billion tonnes-km per year	9	11	18	24	4.6	4.6	2.9	3.7
Inland navigation	Billion tonnes-km per year	4	5	9	11	5.0	5.0	2.6	3.8
Freight road vehicles-km on the national territory	Billion vehicles-km per year	3	4	5	6	2.3	2.3	2.1	2.2
Trips originated in the country	Million trips per year	8,276	8,232	8,383	8,542	-0.1	0.2	0.2	0.2
Passenger transport activity originated in the country	Billion pass-km per year	88	92	101	108	0.9	1.0	0.7	0.8
Car	Billion pass-km per year	51	54	61	67	1.0	1.3	0.8	1.1
Bus	Billion pass-km per year	19	20	20	20	0.2	0.1	0.2	0.1
Rail	Billion pass-km per year	10	10	11	12	1.4	0.7	0.7	0.7
Air (Intra-EU)	Billion pass-km per year	3	3	4	4	1.3	1.4	0.9	1.2
Slow	Billion pass-km per year	4	5	5	5	0.7	0.5	0.6	0.5
Average passenger transport distance	km	10.6	11.1	12.0	12.6	1.0	0.8	0.5	0.6
Passenger transport activity on the national territory	Billion pass-km per year	88	89	93	106	0.4	0.4	1.2	0.8
Road	Billion pass-km per year	78	80	84	96	0.5	0.5	1.4	0.9
Rail	Billion pass-km per year	10	10	10	10	-0.1	-0.1	-0.1	-0.1
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	34	36	42	50	1.4	1.4	1.8	1.6
Motorization rate	cars/1000 inhabitants	265	296	371	525	2.2	2.3	3.5	2.9
<b>ECONOMY INDICATORS</b>									
GDP	Billion Euros 2005	47	53	67	81	2.4	2.4	1.9	2.1
Employment	1000 Persons	4,122	4,074	4,199	3,926	-0.2	0.3	-0.7	-0.2
Agriculture and fishery	1000 Persons	284	257	258	259	-2.0	0.0	0.0	0.0
Construction	1000 Persons	373	352	317	256	-1.1	-1.0	-2.1	-1.6
Energy and water	1000 Persons	12	12	11	12	-1.3	-0.2	0.4	0.1
Industry	1000 Persons	1,281	1,302	1,413	1,411	0.3	0.8	0.0	0.4
Transport services	1000 Persons	177	181	181	170	0.4	0.0	-0.6	-0.3
Other services	1000 Persons	1,995	1,971	2,018	1,817	-0.2	0.2	-1.0	-0.4
Population total	1000 Persons	10,100	9,958	9,726	9,469	-0.3	-0.2	-0.3	-0.3
Labour force	1000 Persons	6,606	6,579	6,280	6,066	-0.1	-0.5	-0.3	-0.4
Retired (> 65 years)	1000 Persons	1,481	1,514	1,778	1,855	0.5	1.6	0.4	1.0
Transport taxation revenues	Million Euros 2005	3,215	3,237	3,821	3,946	0.1	1.7	0.3	1.0
Fuel taxes	Million Euros 2005	2,509	2,498	2,608	2,619	-0.1	0.4	0.0	0.2
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	706	740	1,213	1,327	0.9	5.1	0.9	3.0
<b>ENERGY INDICATORS</b>									
Primary energy production	Billion toe per year	11	13	18	21	3.5	3.1	1.8	2.4
Share of domestic energy production	%	41	46	54	55	2.2	1.6	0.2	0.9
Final energy demand by source	Billion toe per year	27	29	33	39	1.3	1.4	1.6	1.5
Oil	Billion toe per year	7	9	10	12	3.8	1.6	1.4	1.5
Gas	Billion toe per year	12	10	9	9	-3.6	-0.8	-0.1	-0.4
Coal, Nuclear	Billion toe per year	7	8	11	13	4.5	2.5	1.8	2.2
Biomass	Billion toe per year	1	2	3	5	8.7	4.5	5.2	4.9
Other Renewables	Billion toe per year	0	0	1	1	44.7	15.9	3.7	9.6
Final energy demand by consuming sector	Billion toe per year	18	19	22	25	0.6	1.5	1.4	1.4
Transport freight	Billion toe per year	1	1	2	2	1.2	2.9	0.7	1.8
Transport passenger	Billion toe per year	3	4	6	7	4.9	2.9	2.7	2.8
Industry	Billion toe per year	3	3	4	5	0.6	2.2	1.5	1.8
Residential and services	Billion toe per year	10	10	10	11	-1.0	0.3	0.6	0.5
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.87	1.16	1.07	1.14	5.8	-0.8	0.7	-0.1
Gasoline price	Euros2005 per litre	0.92	1.20	1.11	1.19	5.5	-0.8	0.7	-0.1
Biofuels price	Euros2005 per ecccf	0.67	1.17	1.17	1.24	11.9	0.0	0.6	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	4.2	4.7	12.8	1261.6	1.0	10.7	5.7
Share of renewables in electricity	%	4.6	6.3	15.4	17.1	6.5	9.4	1.0	5.2
Share of renewables in final energy demand	%	4.9	6.6	10.1	13.7	6.4	4.3	3.1	3.7
Energy intensity of freight transport activity	toe/1000tkm	27	25	24	20	-1.9	-0.3	-1.7	-1.0
Energy intensity of passenger transport activity	toe/1000pkm	37	45	58	67	4.4	2.4	1.5	1.9
Energy intensity of economic activity	toe/Million Euros 1995	385	352	322	308	-1.8	-0.9	-0.5	-0.7

ITREN-2030 HU - Hungary		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	20	21	24	27	0.6	1.4	1.5	1.5
Road freight	Million tonnes per year	7	7	7	8	1.2	-0.1	0.5	0.2
Road passenger	Million tonnes per year	12	12	13	13	-0.1	0.8	0.3	0.6
Rail freight	Million tonnes per year	0	0	3	6	13.7	18.3	8.2	13.2
Rail passenger	Million tonnes per year	0	0	0	0	0.2	-0.2	-0.3	-0.2
Inland navigation	Million tonnes per year	0	0	0	0	9.4	9.8	2.8	6.3
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	3.6	0.7	0.7	0.7
Air (Intra-EU)	Million tonnes per year	0	0	0	0	0.1	0.3	0.0	0.1
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.174	0.163	0.149	0.158	-1.2	-0.9	0.5	-0.2
Road	tonnes/1000 tkm	0.241	0.228	0.179	0.152	-1.1	-2.4	-1.6	-2.0
Rail	tonnes/1000 tkm	0.027	0.041	0.139	0.231	8.7	13.1	5.2	9.1
Inland navigation	tonnes/1000 tkm	0.011	0.013	0.020	0.020	4.1	4.5	0.2	2.3
Maritime (Intra-EU)	tonnes/1000 tkm	-	-	-	-	-	-	-	-
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.139	0.135	0.139	0.127	-0.5	0.3	-0.9	-0.3
Road	tonnes/1000 pkm	0.154	0.149	0.154	0.139	-0.6	0.3	-1.0	-0.4
Rail	tonnes/1000 pkm	0.014	0.014	0.014	0.014	0.2	-0.1	-0.2	-0.2
Air (Intra-EU)	tonnes/1000 pkm	0.155	0.146	0.131	0.119	-1.2	-1.1	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	67	50	46	52	-5.6	-0.8	1.1	0.1
Road freight	1000 Tonnes per year	24	20	11	6	-4.4	-5.9	-4.8	-5.4
Road passenger	1000 Tonnes per year	33	19	12	10	-10.3	-5.0	-1.9	-3.4
Rail freight	1000 Tonnes per year	2	3	13	24	13.2	17.0	5.8	11.3
Rail passenger	1000 Tonnes per year	1	1	1	1	-0.1	-1.0	-1.4	-1.2
Inland navigation	1000 Tonnes per year	1	1	3	4	9.4	9.8	2.8	6.3
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	3.2	0.4	0.4	0.4
Air (Intra-EU)	1000 Tonnes per year	5	5	6	6	0.5	0.9	0.7	0.8
PM10 Transport emissions	1000 Tonnes per year	3	3	2	2	-4.2	-0.8	-0.3	-0.6
Road freight	1000 Tonnes per year	1	1	1	1	-2.8	-0.1	-3.1	-1.6
Road passenger	1000 Tonnes per year	2	2	1	2	-4.9	-1.3	1.2	0.0
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	2,693	2,990	3,713	5,062	2.1	2.2	3.1	2.7
Gasoline	1000 vehicles	2,414	2,678	3,261	4,499	2.1	2.0	3.3	2.6
Diesel	1000 vehicles	264	264	332	477	0.0	2.3	3.7	3.0
LPG/CNG	1000 vehicles	0	0	1	1	-4.2	6.5	5.1	5.8
Bioethanol	1000 vehicles	0	0	5	17	96.9	33.5	12.8	22.7
Hybrid	1000 vehicles	15	47	114	67	26.0	9.2	-5.2	1.7
Electric	1000 vehicles	0	0	0	2	0.0	55.9	18.2	35.7
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	1,733	1,987	2,499	3,449	2.8	2.3	3.3	2.8
Gasoline 1400-2000 cc	1000 vehicles	633	651	730	1,007	0.6	1.1	3.3	2.2
Gasoline >2000 cc	1000 vehicles	48	40	33	42	-3.5	-2.1	2.6	0.2
Diesel <2000 cc	1000 vehicles	219	221	286	412	0.2	2.6	3.7	3.2
Diesel >2000 cc	1000 vehicles	45	42	46	65	-1.2	0.9	3.4	2.2
PreEURO	1000 vehicles	680	173	0	0	-24.0	-95.9	-100.0	-100.0
EURO I	1000 vehicles	191	163	0	0	-3.1	-76.6	-100.0	-100.0
EURO II	1000 vehicles	417	391	3	0	-1.2	-38.4	-100.0	-100.0
EURO III	1000 vehicles	1,390	1,314	365	0	-1.1	-12.0	-100.0	-100.0
EURO IV	1000 vehicles	0	558	426	0	0.0	-2.7	-77.5	-53.3
EURO V or later	1000 vehicles	0	343	2,801	4,977	0.0	23.4	5.9	14.3
Duty vehicle fleet size	1000 vehicles	224	267	396	491	3.6	4.0	2.2	3.1
<3.5 tonnes	1000 vehicles	72	83	111	137	2.8	2.9	2.2	2.5
3.5-7.5 tonnes	1000 vehicles	73	89	137	169	4.0	4.5	2.1	3.3
7.5-16 tonnes	1000 vehicles	19	23	36	45	4.0	4.5	2.2	3.3
16-32 tonnes	1000 vehicles	49	60	92	116	4.0	4.4	2.2	3.3
>32 tonnes	1000 vehicles	10	12	20	24	4.3	4.7	2.3	3.5
PreEURO	1000 vehicles	117	105	60	14	-2.1	-5.4	-13.6	-9.6
EURO I	1000 vehicles	29	29	26	14	-0.2	-1.1	-5.7	-3.4
EURO II	1000 vehicles	39	39	36	21	-0.1	-0.9	-5.0	-3.0
EURO III	1000 vehicles	38	48	46	35	4.6	-0.4	-2.7	-1.5
EURO IV	1000 vehicles	0	31	30	27	0.0	-0.1	-1.1	-0.6
EURO V or later	1000 vehicles	0	16	198	380	0.0	28.7	6.7	17.2

ITREN-2030 IE - Ireland		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	519	616	868	979	3.5	3.5	1.2	2.3
Freight transport activity originated in the country	Billion tonnes-km per year	43	51	69	79	3.2	3.2	1.3	2.3
Road	Billion tonnes-km per year	28	33	46	52	3.4	3.4	1.2	2.3
Rail	Billion tonnes-km per year	0	0	0	1	3.7	3.7	2.2	2.9
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	15	17	23	26	2.9	2.9	1.4	2.1
Average freight transport distance	km	83	82	80	81	-0.3	-0.2	0.1	-0.1
Freight transport activity on the national territory	Billion tonnes-km per year	22	26	34	39	2.7	2.7	1.5	2.1
Road	Billion tonnes-km per year	22	25	33	38	2.7	2.7	1.5	2.1
Rail	Billion tonnes-km per year	0	0	1	1	3.6	3.6	2.1	2.8
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	3	3	4	5	3.3	3.3	1.5	2.4
Trips originated in the country	Million trips per year	3,985	4,240	4,947	5,574	1.2	1.6	1.2	1.4
Passenger transport activity originated in the country	Billion pass-km per year	48	53	68	80	2.1	2.4	1.6	2.0
Car	Billion pass-km per year	28	31	40	47	1.8	2.7	1.6	2.1
Bus	Billion pass-km per year	8	8	9	9	1.4	0.6	0.7	0.6
Rail	Billion pass-km per year	1	2	2	2	4.6	1.9	1.5	1.7
Air (Intra-EU)	Billion pass-km per year	9	11	14	18	3.3	2.9	2.2	2.5
Slow	Billion pass-km per year	2	2	3	4	2.3	2.4	2.2	2.3
Average passenger transport distance	km	12.1	12.6	13.7	14.3	0.9	0.8	0.4	0.6
Passenger transport activity on the national territory	Billion pass-km per year	55	62	78	93	2.3	2.4	1.7	2.0
Road	Billion pass-km per year	53	60	76	90	2.4	2.4	1.7	2.1
Rail	Billion pass-km per year	2	2	2	2	1.3	1.3	1.3	1.3
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	28	32	41	50	2.7	2.7	1.9	2.3
Motorization rate	cars/1000 inhabitants	320	354	408	455	2.0	1.4	1.1	1.3
ECONOMY INDICATORS									
GDP	Billion Euros 2005	81	92	109	124	2.6	1.7	1.3	1.5
Employment	1000 Persons	1,589	1,707	1,704	1,567	1.4	0.0	-0.8	-0.4
Agriculture and fishery	1000 Persons	145	126	102	82	-2.7	-2.1	-2.2	-2.1
Construction	1000 Persons	80	84	78	69	1.1	-0.7	-1.3	-1.0
Energy and water	1000 Persons	21	28	26	24	6.1	-0.7	-0.9	-0.8
Industry	1000 Persons	571	661	715	693	3.0	0.8	-0.3	0.2
Transport services	1000 Persons	43	48	51	54	2.0	0.7	0.5	0.6
Other services	1000 Persons	730	760	731	645	0.8	-0.4	-1.2	-0.8
Population total	1000 Persons	4,095	4,329	4,753	5,066	1.1	0.9	0.6	0.8
Labour force	1000 Persons	2,664	2,804	2,969	3,157	1.0	0.6	0.6	0.6
Retired (> 65 years)	1000 Persons	450	475	599	766	1.1	2.3	2.5	2.4
Transport taxation revenues	Million Euros 2005	1,618	2,070	2,485	2,682	5.0	1.8	0.8	1.3
Fuel taxes	Million Euros 2005	1,307	1,383	1,561	1,585	1.1	1.2	0.1	0.7
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	311	687	924	1,097	17.2	3.0	1.7	2.4
ENERGY INDICATORS									
Primary energy production	Billion toe per year	1	3	4	4	12.1	3.6	2.0	2.8
Share of domestic energy production	%	9	14	19	21	8.8	3.0	1.3	2.1
Final energy demand by source	Billion toe per year	16	18	19	21	3.0	0.6	0.7	0.6
Oil	Billion toe per year	9	9	9	9	-1.3	-0.1	0.1	0.0
Gas	Billion toe per year	3	4	4	5	0.5	2.3	0.9	1.6
Coal, Nuclear	Billion toe per year	2	5	4	4	13.4	-2.1	0.5	-0.8
Biomass	Billion toe per year	0	1	2	2	31.6	8.0	2.5	5.2
Other Renewables	Billion toe per year	0	0	1	1	15.7	5.0	3.3	4.1
Final energy demand by consuming sector	Billion toe per year	12	13	14	15	1.2	1.0	0.8	0.9
Transport freight	Billion toe per year	1	1	1	1	2.1	2.9	0.3	1.6
Transport passenger	Billion toe per year	4	5	5	5	2.5	0.5	0.3	0.4
Industry	Billion toe per year	2	2	3	4	1.9	3.1	2.3	2.7
Residential and services	Billion toe per year	5	5	5	5	-0.4	-0.3	0.2	-0.1
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.91	1.24	1.14	1.23	6.4	-0.9	0.8	-0.1
Gasoline price	Euros2005 per litre	1.02	1.36	1.26	1.35	5.8	-0.8	0.7	-0.1
Biofuels price	Euros2005 per eeccf	0.66	1.17	1.16	1.24	12.1	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	3.9	8.2	11.0	1255.7	7.8	3.1	5.4
Share of renewables in electricity	%	8.3	15.9	25.2	29.7	13.8	4.7	1.6	3.2
Share of renewables in final energy demand	%	3.0	6.4	10.7	13.3	16.2	5.2	2.2	3.7
Energy intensity of freight transport activity	toe/1000tkm	26	25	25	22	-0.7	0.1	-1.2	-0.5
Energy intensity of passenger transport activity	toe/1000pkm	62	62	51	44	0.0	-1.9	-1.5	-1.7
Energy intensity of economic activity	toe/Million Euros 1995	149	140	130	123	-1.3	-0.7	-0.5	-0.6

ITREN-2030 IE - Ireland		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	10	11	13	14	1.4	1.4	0.6	1.0
Road freight	Million tonnes per year	2	2	2	3	3.1	1.0	0.6	0.8
Road passenger	Million tonnes per year	7	7	8	8	0.7	1.5	0.5	1.0
Rail freight	Million tonnes per year	0	0	0	0	4.3	3.2	2.1	2.6
Rail passenger	Million tonnes per year	0	0	0	0	3.8	1.0	0.6	0.8
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	4.2	1.1	0.5	0.8
Air (Intra-EU)	Million tonnes per year	2	2	2	2	1.7	1.5	1.1	1.3
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.054	0.055	0.046	0.043	0.4	-1.7	-0.8	-1.3
Road	tonnes/1000 tkm	0.086	0.088	0.074	0.068	0.4	-1.7	-0.9	-1.3
Rail	tonnes/1000 tkm	0.211	0.218	0.211	0.211	0.7	-0.3	0.0	-0.2
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.002	0.002	0.002	0.002	1.3	-1.7	-0.9	-1.3
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.130	0.120	0.110	0.098	-1.5	-0.9	-1.2	-1.0
Road	tonnes/1000 pkm	0.126	0.116	0.107	0.094	-1.6	-0.9	-1.3	-1.1
Rail	tonnes/1000 pkm	0.013	0.015	0.015	0.014	2.5	-0.2	-0.7	-0.5
Air (Intra-EU)	tonnes/1000 pkm	0.175	0.162	0.142	0.128	-1.6	-1.3	-1.0	-1.2
NOx Transport emissions	1000 Tonnes per year	38	35	37	41	-1.5	0.5	1.2	0.9
Road freight	1000 Tonnes per year	2	2	1	1	-4.9	-1.8	-0.7	-1.2
Road passenger	1000 Tonnes per year	15	10	7	6	-7.7	-3.8	-1.7	-2.8
Rail freight	1000 Tonnes per year	1	1	2	2	4.3	3.2	2.1	2.6
Rail passenger	1000 Tonnes per year	0	0	0	0	2.9	0.2	-0.5	-0.1
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	3.8	0.8	0.1	0.4
Air (Intra-EU)	1000 Tonnes per year	19	21	26	31	2.2	2.1	1.9	2.0
PM10 Transport emissions	1000 Tonnes per year	2	2	2	2	-2.0	0.5	1.2	0.9
Road freight	1000 Tonnes per year	1	1	1	1	-1.8	-0.6	0.5	0.0
Road passenger	1000 Tonnes per year	2	1	1	2	-2.2	1.0	1.6	1.3
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	1,348	1,598	2,120	2,486	3.5	2.9	1.6	2.2
Gasoline	1000 vehicles	1,136	1,269	1,547	1,802	2.2	2.0	1.5	1.8
Diesel	1000 vehicles	195	279	433	551	7.5	4.5	2.4	3.5
LPG/CNG	1000 vehicles	0	0	0	0	0.0	11.1	3.8	7.4
Bioethanol	1000 vehicles	0	0	5	20	42.4	28.9	14.4	21.5
Hybrid	1000 vehicles	16	48	123	83	24.0	9.9	-3.8	2.8
Electric	1000 vehicles	1	2	12	29	17.4	20.9	9.4	15.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	779	825	959	1,123	1.1	1.5	1.6	1.6
Gasoline 1400-2000 cc	1000 vehicles	335	421	568	662	4.7	3.0	1.5	2.3
Gasoline >2000 cc	1000 vehicles	48	40	33	42	-3.5	-2.1	2.6	0.2
Diesel <2000 cc	1000 vehicles	219	221	286	412	0.2	2.6	3.7	3.2
Diesel >2000 cc	1000 vehicles	45	42	46	65	-1.2	0.9	3.4	2.2
PreEURO	1000 vehicles	680	173	0	0	-24.0	-95.9	-100.0	-100.0
EURO I	1000 vehicles	191	163	0	0	-3.1	-76.6	-100.0	-100.0
EURO II	1000 vehicles	417	391	3	0	-1.2	-38.4	-100.0	-100.0
EURO III	1000 vehicles	1,390	1,314	365	0	-1.1	-12.0	-100.0	-100.0
EURO IV	1000 vehicles	0	558	426	0	0.0	-2.7	-77.5	-53.3
EURO V or later	1000 vehicles	0	343	2,801	4,977	0.0	23.4	5.9	14.3
Duty vehicle fleet size	1000 vehicles	162	203	279	321	4.5	3.3	1.4	2.3
<3.5 tonnes	1000 vehicles	16	16	16	18	-0.4	-0.2	1.5	0.7
3.5-7.5 tonnes	1000 vehicles	83	110	162	186	5.9	3.9	1.4	2.7
7.5-16 tonnes	1000 vehicles	22	29	42	49	5.9	3.9	1.4	2.7
16-32 tonnes	1000 vehicles	36	41	51	58	2.7	2.2	1.4	1.8
>32 tonnes	1000 vehicles	6	7	9	10	2.7	2.2	1.3	1.8
PreEURO	1000 vehicles	75	62	33	9	-3.6	-6.2	-11.8	-9.0
EURO I	1000 vehicles	19	19	15	8	-0.6	-2.1	-6.6	-4.4
EURO II	1000 vehicles	40	39	35	22	-0.2	-1.2	-4.4	-2.8
EURO III	1000 vehicles	29	39	37	29	6.4	-0.5	-2.3	-1.4
EURO IV	1000 vehicles	0	32	31	27	0.0	-0.2	-1.4	-0.8
EURO V or later	1000 vehicles	0	11	128	225	0.0	27.4	5.8	16.1

ITREN-2030 IT - Italy		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	2,186	2,244	2,365	2,408	0.5	0.5	0.2	0.4
Freight transport activity originated in the country	Billion tonnes-km per year	1,072	1,150	1,323	1,461	1.4	1.4	1.0	1.2
Road	Billion tonnes-km per year	253	270	309	340	1.3	1.3	1.0	1.2
Rail	Billion tonnes-km per year	27	29	35	39	1.7	1.7	1.3	1.5
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	792	850	979	1,082	1.4	1.4	1.0	1.2
Average freight transport distance	km	490	512	559	607	0.9	0.9	0.8	0.8
Freight transport activity on the national territory	Billion tonnes-km per year	275	288	316	341	0.9	0.9	0.8	0.8
Road	Billion tonnes-km per year	249	260	284	306	0.9	0.9	0.7	0.8
Rail	Billion tonnes-km per year	26	28	32	36	1.5	1.5	1.1	1.3
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	28	29	31	34	0.8	0.8	0.8	0.8
Trips originated in the country	Million trips per year	59,100	58,606	61,621	61,744	-0.2	0.5	0.0	0.3
Passenger transport activity originated in the country	Billion pass-km per year	981	983	1,077	1,114	0.0	0.9	0.3	0.6
Car	Billion pass-km per year	750	733	835	863	-0.4	1.3	0.3	0.8
Bus	Billion pass-km per year	111	117	104	102	1.0	-1.1	-0.2	-0.7
Rail	Billion pass-km per year	55	65	64	71	3.5	-0.2	1.0	0.4
Air (Intra-EU)	Billion pass-km per year	38	40	40	42	0.8	0.1	0.5	0.3
Slow	Billion pass-km per year	27	29	32	36	1.0	1.2	0.9	1.1
Average passenger transport distance	km	16.6	16.8	17.5	18.0	0.2	0.4	0.3	0.4
Passenger transport activity on the national territory	Billion pass-km per year	788	814	870	917	0.7	0.7	0.5	0.6
Road	Billion pass-km per year	734	759	811	854	0.7	0.7	0.5	0.6
Rail	Billion pass-km per year	54	55	59	63	0.6	0.6	0.6	0.6
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	381	400	441	475	1.0	1.0	0.8	0.9
Motorization rate	cars/1000 inhabitants	590	622	684	749	1.1	1.0	0.9	0.9
ECONOMY INDICATORS									
GDP	Billion Euros 2005	1,027	1,077	1,208	1,331	1.0	1.2	1.0	1.1
Employment	1000 Persons	25,110	23,344	21,810	20,428	-1.4	-0.7	-0.7	-0.7
Agriculture and fishery	1000 Persons	1,650	1,500	1,338	1,212	-1.9	-1.1	-1.0	-1.1
Construction	1000 Persons	1,848	1,876	1,777	1,660	0.3	-0.5	-0.7	-0.6
Energy and water	1000 Persons	171	197	176	178	2.8	-1.1	0.1	-0.5
Industry	1000 Persons	4,481	4,223	4,066	3,803	-1.2	-0.4	-0.7	-0.5
Transport services	1000 Persons	889	879	781	713	-0.2	-1.2	-0.9	-1.0
Other services	1000 Persons	16,070	14,669	13,672	12,863	-1.8	-0.7	-0.6	-0.7
Population total	1000 Persons	58,034	58,466	58,367	57,115	0.1	0.0	-0.2	-0.1
Labour force	1000 Persons	37,141	37,260	36,490	35,002	0.1	-0.2	-0.4	-0.3
Retired (> 65 years)	1000 Persons	11,098	11,399	12,172	13,362	0.5	0.7	0.9	0.8
Transport taxation revenues	Million Euros 2005	42,200	39,783	43,057	46,100	-1.2	0.8	0.7	0.7
Fuel taxes	Million Euros 2005	19,574	17,576	17,392	18,523	-2.1	-0.1	0.6	0.3
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	22,625	22,207	25,665	27,578	-0.4	1.5	0.7	1.1
ENERGY INDICATORS									
Primary energy production	Billion toe per year	27	36	43	43	6.0	1.6	0.0	0.8
Share of domestic energy production	%	15	21	24	23	6.8	1.3	-0.3	0.5
Final energy demand by source	Billion toe per year	178	171	177	183	-0.8	0.3	0.3	0.3
Oil	Billion toe per year	80	74	69	66	-1.5	-0.7	-0.5	-0.6
Gas	Billion toe per year	71	67	78	85	-0.9	1.5	0.8	1.2
Coal, Nuclear	Billion toe per year	16	16	12	11	0.0	-3.0	-1.1	-2.1
Biomass	Billion toe per year	7	6	10	12	-3.1	5.3	2.4	3.8
Other Renewables	Billion toe per year	4	7	8	9	13.3	1.1	1.1	1.1
Final energy demand by consuming sector	Billion toe per year	135	131	136	139	-0.5	0.4	0.2	0.3
Transport freight	Billion toe per year	13	12	14	14	-0.2	1.4	-0.2	0.6
Transport passenger	Billion toe per year	34	35	33	32	0.4	-0.4	-0.4	-0.4
Industry	Billion toe per year	41	40	42	42	-0.3	0.4	0.2	0.3
Residential and services	Billion toe per year	48	44	47	51	-1.5	0.6	0.8	0.7
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.98	1.32	1.21	1.30	6.0	-0.8	0.7	-0.1
Gasoline price	Euros2005 per litre	1.08	1.41	1.31	1.40	5.5	-0.8	0.7	0.0
Biofuels price	Euros2005 per eeccf	0.66	1.17	1.16	1.24	12.0	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.6	2.3	6.2	9.8	29.3	10.6	4.7	7.6
Share of renewables in electricity	%	14.9	25.5	26.2	26.8	11.3	0.3	0.2	0.3
Share of renewables in final energy demand	%	4.7	8.0	9.9	11.4	11.1	2.2	1.4	1.8
Energy intensity of freight transport activity	toe/1000tkm	12	11	11	10	-1.5	0.1	-1.2	-0.6
Energy intensity of passenger transport activity	toe/1000pkm	41	41	37	33	-0.2	-1.1	-0.9	-1.0
Energy intensity of economic activity	toe/Million Euros 1995	131	122	113	104	-1.5	-0.8	-0.8	-0.8



ITREN-2030 IT - Italy		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	122	116	126	133	-0.9	0.8	0.5	0.7
Road freight	Million tonnes per year	21	21	25	29	0.4	1.7	1.2	1.5
Road passenger	Million tonnes per year	91	85	91	92	-1.3	0.7	0.1	0.4
Rail freight	Million tonnes per year	1	1	2	4	2.5	4.5	8.2	6.3
Rail passenger	Million tonnes per year	1	1	1	1	2.4	-1.2	0.0	-0.6
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	1	1	1	1	1.8	-0.6	-0.4	-0.5
Air (Intra-EU)	Million tonnes per year	7	7	6	6	-0.2	-0.7	-0.5	-0.6
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.022	0.021	0.022	0.024	-0.7	0.5	0.8	0.7
Road	tonnes/1000 tkm	0.084	0.082	0.090	0.094	-0.5	0.9	0.5	0.7
Rail	tonnes/1000 tkm	0.040	0.043	0.057	0.113	1.0	3.0	7.0	5.0
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.001	0.001	0.4	-2.0	-1.4	-1.7
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.119	0.109	0.108	0.103	-1.9	-0.1	-0.4	-0.3
Road	tonnes/1000 pkm	0.124	0.112	0.112	0.108	-2.0	0.0	-0.4	-0.2
Rail	tonnes/1000 pkm	0.017	0.019	0.016	0.015	1.8	-1.8	-0.7	-1.2
Air (Intra-EU)	tonnes/1000 pkm	0.173	0.165	0.152	0.138	-1.0	-0.8	-1.0	-0.9
NOx Transport emissions	1000 Tonnes per year	569	377	247	219	-7.9	-4.1	-1.2	-2.7
Road freight	1000 Tonnes per year	88	74	40	28	-3.5	-6.0	-3.5	-4.8
Road passenger	1000 Tonnes per year	374	192	98	79	-12.5	-6.5	-2.1	-4.4
Rail freight	1000 Tonnes per year	2	2	2	4	-1.9	2.8	7.8	5.3
Rail passenger	1000 Tonnes per year	7	8	6	6	1.9	-1.9	-1.1	-1.5
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	20	21	20	18	1.5	-0.9	-0.8	-0.9
Air (Intra-EU)	1000 Tonnes per year	78	80	82	84	0.6	0.2	0.3	0.2
PM10 Transport emissions	1000 Tonnes per year	33	27	21	19	-4.1	-2.4	-0.9	-1.6
Road freight	1000 Tonnes per year	9	6	4	4	-5.7	-3.4	-0.3	-1.9
Road passenger	1000 Tonnes per year	25	21	17	15	-3.5	-2.1	-1.0	-1.6
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	34,758	36,983	41,249	44,111	1.2	1.1	0.7	0.9
Gasoline	1000 vehicles	23,545	20,839	17,914	17,780	-2.4	-1.5	-0.1	-0.8
Diesel	1000 vehicles	9,589	14,486	21,643	24,843	8.6	4.1	1.4	2.7
LPG/CNG	1000 vehicles	1,450	1,140	616	439	-4.7	-6.0	-3.3	-4.7
Bioethanol	1000 vehicles	0	11	222	570	436.3	34.9	9.9	21.8
Hybrid	1000 vehicles	173	504	843	457	23.9	5.3	-5.9	-0.5
Electric	1000 vehicles	1	2	11	23	17.6	20.8	7.6	14.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	19,192	17,472	16,104	16,427	-1.9	-0.8	0.2	-0.3
Gasoline 1400-2000 cc	1000 vehicles	4,032	3,026	1,495	1,110	-5.6	-6.8	-2.9	-4.9
Gasoline >2000 cc	1000 vehicles	321	342	315	243	1.3	-0.8	-2.6	-1.7
Diesel <2000 cc	1000 vehicles	7,485	11,893	18,292	21,137	9.7	4.4	1.5	2.9
Diesel >2000 cc	1000 vehicles	2,104	2,593	3,351	3,706	4.3	2.6	1.0	1.8
PreEURO	1000 vehicles	8,952	3,735	190	1	-16.0	-25.8	-41.7	-34.2
EURO I	1000 vehicles	7,075	4,637	657	10	-8.1	-17.7	-34.0	-26.3
EURO II	1000 vehicles	7,559	6,070	1,688	75	-4.3	-12.0	-26.7	-19.7
EURO III	1000 vehicles	10,998	10,110	4,948	590	-1.7	-6.9	-19.2	-13.2
EURO IV	1000 vehicles	0	7,035	4,824	1,092	0.0	-3.7	-13.8	-8.9
EURO V or later	1000 vehicles	0	4,877	27,866	41,293	0.0	19.0	4.0	11.3
Duty vehicle fleet size	1000 vehicles	1,553	1,613	1,737	1,871	0.8	0.7	0.7	0.7
<3.5 tonnes	1000 vehicles	395	371	330	361	-1.3	-1.2	0.9	-0.1
3.5-7.5 tonnes	1000 vehicles	475	524	617	665	2.0	1.6	0.8	1.2
7.5-16 tonnes	1000 vehicles	124	137	161	174	2.0	1.6	0.8	1.2
16-32 tonnes	1000 vehicles	436	454	491	524	0.8	0.8	0.7	0.7
>32 tonnes	1000 vehicles	122	127	138	148	0.9	0.8	0.7	0.7
PreEURO	1000 vehicles	783	434	2	0	-11.1	-41.4	-100.0	-100.0
EURO I	1000 vehicles	190	184	23	0	-0.6	-18.8	-100.0	-100.0
EURO II	1000 vehicles	286	285	181	0	-0.1	-4.4	-63.3	-40.8
EURO III	1000 vehicles	294	372	353	32	4.9	-0.5	-21.4	-11.6
EURO IV	1000 vehicles	0	235	233	118	0.0	-0.1	-6.6	-3.4
EURO V or later	1000 vehicles	0	103	944	1,722	0.0	24.8	6.2	15.1

ITREN-2030 LT - Lithuania		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	75	89	123	136	3.3	3.3	1.0	2.2
Freight transport activity originated in the country	Billion tonnes-km per year	57	68	95	119	3.4	3.5	2.2	2.8
Road	Billion tonnes-km per year	18	23	34	44	4.3	4.3	2.4	3.3
Rail	Billion tonnes-km per year	3	3	6	8	5.3	5.3	2.9	4.1
Inland navigation	Billion tonnes-km per year	0	0	0	0	2.9	2.9	1.0	1.9
Maritime (Intra-EU)	Billion tonnes-km per year	36	42	55	68	2.8	2.8	2.0	2.4
Average freight transport distance	km	763	766	775	875	0.1	0.1	1.2	0.7
Freight transport activity on the national territory	Billion tonnes-km per year	38	45	63	80	3.4	3.4	2.4	2.9
Road	Billion tonnes-km per year	22	26	35	44	3.2	3.2	2.1	2.7
Rail	Billion tonnes-km per year	16	19	28	37	3.7	3.7	2.8	3.2
Inland navigation	Billion tonnes-km per year	0	0	0	0	3.6	3.6	1.2	2.4
Freight road vehicles-km on the national territory	Billion vehicles-km per year	2	3	4	5	3.3	3.3	2.2	2.8
Trips originated in the country	Million trips per year	3,582	3,618	3,776	3,804	0.2	0.4	0.1	0.3
Passenger transport activity originated in the country	Billion pass-km per year	30	32	38	41	1.4	1.8	0.7	1.2
Car	Billion pass-km per year	23	24	29	32	1.2	1.9	0.7	1.3
Bus	Billion pass-km per year	3	4	4	4	1.4	0.9	0.5	0.7
Rail	Billion pass-km per year	1	1	1	1	2.4	0.9	0.1	0.5
Air (Intra-EU)	Billion pass-km per year	1	1	1	2	4.6	3.6	1.5	2.5
Slow	Billion pass-km per year	2	2	2	2	1.4	0.6	0.4	0.5
Average passenger transport distance	km	8.3	8.9	10.1	10.8	1.2	1.3	0.6	1.0
Passenger transport activity on the national territory	Billion pass-km per year	20	21	26	29	1.8	1.8	1.1	1.4
Road	Billion pass-km per year	19	21	25	28	1.8	1.8	1.1	1.5
Rail	Billion pass-km per year	0	0	0	0	1.0	1.0	1.0	1.0
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	10	11	13	15	2.0	2.0	1.3	1.6
Motorization rate	cars/1000 inhabitants	377	427	534	611	2.6	2.2	1.4	1.8
ECONOMY INDICATORS									
GDP	Billion Euros 2005	10	11	15	20	2.4	2.9	2.8	2.9
Employment	1000 Persons	1,915	1,852	1,987	1,838	-0.7	0.7	-0.8	0.0
Agriculture and fishery	1000 Persons	230	196	212	224	-3.1	0.8	0.6	0.7
Construction	1000 Persons	171	170	168	173	-0.2	-0.1	0.3	0.1
Energy and water	1000 Persons	5	5	3	2	-1.6	-4.6	-2.5	-3.6
Industry	1000 Persons	542	518	502	320	-0.9	-0.3	-4.4	-2.4
Transport services	1000 Persons	65	74	85	84	2.6	1.5	-0.2	0.6
Other services	1000 Persons	903	889	1,016	1,035	-0.3	1.4	0.2	0.8
Population total	1000 Persons	3,414	3,342	3,202	3,089	-0.4	-0.4	-0.4	-0.4
Labour force	1000 Persons	2,104	2,143	2,113	2,002	0.4	-0.1	-0.5	-0.3
Retired (> 65 years)	1000 Persons	529	546	550	589	0.6	0.1	0.7	0.4
Transport taxation revenues	Million Euros 2005	1,154	1,214	1,483	1,561	1.0	2.0	0.5	1.3
Fuel taxes	Million Euros 2005	1,154	1,212	1,422	1,482	1.0	1.6	0.4	1.0
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	2	61	79	0.0	42.3	2.6	20.8
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per ecccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

ITREN-2030 LT - Lithuania		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	10	11	13	14	1.0	1.7	0.8	1.3
Road freight	Million tonnes per year	3	3	4	5	2.0	1.6	2.1	1.9
Road passenger	Million tonnes per year	7	7	8	9	0.4	1.7	0.1	0.9
Rail freight	Million tonnes per year	0	0	0	0	3.9	2.9	2.3	2.6
Rail passenger	Million tonnes per year	0	0	0	0	1.1	0.0	-0.8	-0.4
Inland navigation	Million tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	5.4	1.8	1.1	1.4
Air (Intra-EU)	Million tonnes per year	0	0	0	0	3.2	2.5	0.5	1.5
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.043	0.041	0.035	0.035	-0.9	-1.4	-0.1	-0.8
Road	tonnes/1000 tkm	0.136	0.128	0.109	0.110	-1.2	-1.6	0.0	-0.8
Rail	tonnes/1000 tkm	0.010	0.010	0.009	0.009	0.2	-0.8	-0.4	-0.6
Inland navigation	tonnes/1000 tkm	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	tonnes/1000 tkm	0.002	0.002	0.002	0.001	2.5	-1.0	-0.9	-1.0
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.349	0.325	0.321	0.289	-1.4	-0.1	-1.0	-0.6
Road	tonnes/1000 pkm	0.363	0.339	0.337	0.304	-1.3	-0.1	-1.0	-0.6
Rail	tonnes/1000 pkm	0.025	0.025	0.023	0.019	0.1	-1.0	-1.8	-1.4
Air (Intra-EU)	tonnes/1000 pkm	0.153	0.143	0.129	0.116	-1.4	-1.0	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	21	18	16	16	-3.6	-0.8	0.0	-0.4
Road freight	1000 Tonnes per year	6	5	4	3	-3.2	-3.2	-1.8	-2.5
Road passenger	1000 Tonnes per year	11	7	6	5	-7.8	-2.2	-1.1	-1.6
Rail freight	1000 Tonnes per year	2	3	4	5	3.9	2.9	2.3	2.6
Rail passenger	1000 Tonnes per year	0	0	0	0	0.7	-1.0	-2.1	-1.5
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	1	2	2	2	4.7	1.2	0.6	0.9
Air (Intra-EU)	1000 Tonnes per year	1	1	1	1	4.1	3.3	1.3	2.3
PM10 Transport emissions	1000 Tonnes per year	1	1	1	1	-2.0	-0.5	0.5	0.0
Road freight	1000 Tonnes per year	1	1	1	1	-2.7	-0.7	0.7	0.0
Road passenger	1000 Tonnes per year	1	1	1	1	-1.2	-0.2	0.3	0.1
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	1,287	1,427	1,707	1,910	2.1	1.8	1.1	1.5
Gasoline	1000 vehicles	1,165	1,287	1,511	1,672	2.0	1.6	1.0	1.3
Diesel	1000 vehicles	110	124	168	194	2.6	3.0	1.5	2.2
LPG/CNG	1000 vehicles	12	13	15	17	2.0	1.6	1.0	1.3
Bioethanol	1000 vehicles	0	0	4	11	41.6	30.7	9.9	19.8
Hybrid	1000 vehicles	1	3	7	7	28.3	9.3	0.2	4.7
Electric	1000 vehicles	0	0	2	9	21.5	17.7	16.0	16.8
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	327	365	439	487	2.2	1.9	1.0	1.5
Gasoline 1400-2000 cc	1000 vehicles	673	742	874	972	2.0	1.6	1.1	1.4
Gasoline >2000 cc	1000 vehicles	164	179	197	214	1.7	1.0	0.8	0.9
Diesel <2000 cc	1000 vehicles	72	82	108	125	2.5	2.8	1.5	2.1
Diesel >2000 cc	1000 vehicles	37	42	60	69	2.7	3.5	1.4	2.5
PreEURO	1000 vehicles	114	12	0	0	-36.2	-100.0	0.0	-100.0
EURO I	1000 vehicles	7	5	0	0	-6.6	-95.8	-100.0	-100.0
EURO II	1000 vehicles	22	20	0	0	-2.3	-52.5	-100.0	-100.0
EURO III	1000 vehicles	1,143	1,114	139	0	-0.5	-18.8	-100.0	-100.0
EURO IV	1000 vehicles	0	181	141	0	0.0	-2.5	-77.8	-53.5
EURO V or later	1000 vehicles	0	92	1,414	1,883	0.0	31.4	2.9	16.3
Duty vehicle fleet size	1000 vehicles	77	92	124	153	3.8	3.0	2.1	2.5
<3.5 tonnes	1000 vehicles	14	19	30	39	6.4	4.4	2.7	3.5
3.5-7.5 tonnes	1000 vehicles	31	36	45	55	2.9	2.4	1.9	2.2
7.5-16 tonnes	1000 vehicles	8	9	12	14	2.9	2.4	1.9	2.2
16-32 tonnes	1000 vehicles	20	24	31	38	3.7	2.9	1.9	2.4
>32 tonnes	1000 vehicles	4	4	6	7	3.7	2.9	1.8	2.4
PreEURO	1000 vehicles	47	38	15	2	-4.3	-8.9	-19.4	-14.3
EURO I	1000 vehicles	3	3	3	1	-0.4	-2.2	-9.2	-5.8
EURO II	1000 vehicles	4	4	4	2	-0.2	-1.1	-5.7	-3.5
EURO III	1000 vehicles	22	27	26	20	4.0	-0.3	-2.5	-1.4
EURO IV	1000 vehicles	0	14	14	12	0.0	-0.1	-1.1	-0.6
EURO V or later	1000 vehicles	0	7	63	116	0.0	25.3	6.2	15.4

ITREN-2030 LU - Luxembourg		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	224	241	278	343	1.5	1.5	2.1	1.8
Freight transport activity originated in the country	Billion tonnes-km per year	15	17	23	31	3.1	3.1	3.2	3.1
Road	Billion tonnes-km per year	13	15	20	27	3.0	3.0	3.0	3.0
Rail	Billion tonnes-km per year	0	0	1	1	2.4	2.4	2.6	2.5
Inland navigation	Billion tonnes-km per year	1	1	2	4	4.7	4.7	4.9	4.8
Maritime (Intra-EU)	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Average freight transport distance	km	65	70	83	92	1.6	1.6	1.0	1.3
Freight transport activity on the national territory	Billion tonnes-km per year	5	6	7	8	1.7	1.7	1.9	1.8
Road	Billion tonnes-km per year	5	5	6	8	1.8	1.8	2.0	1.9
Rail	Billion tonnes-km per year	0	0	1	1	0.6	0.6	0.9	0.8
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	1	1	1	1	1.8	1.8	2.0	1.9
Trips originated in the country	Million trips per year	-	-	-	-	-	-	-	-
Passenger transport activity originated in the country	Billion pass-km per year	-	-	-	-	-	-	-	-
Car	Billion pass-km per year	-	-	-	-	-	-	-	-
Bus	Billion pass-km per year	-	-	-	-	-	-	-	-
Rail	Billion pass-km per year	-	-	-	-	-	-	-	-
Air (Intra-EU)	Billion pass-km per year	-	-	-	-	-	-	-	-
Slow	Billion pass-km per year	-	-	-	-	-	-	-	-
Average passenger transport distance	km	-	-	-	-	-	-	-	-
Passenger transport activity on the national territory	Billion pass-km per year	11	12	15	18	1.8	1.8	2.1	1.9
Road	Billion pass-km per year	11	12	15	18	1.8	1.8	2.1	1.9
Rail	Billion pass-km per year	0	0	0	0	1.1	1.1	1.1	1.1
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	6	7	8	10	1.9	1.9	2.1	2.0
Motorization rate	cars/1000 inhabitants	654	692	761	842	1.2	0.9	1.0	1.0
ECONOMY INDICATORS									
GDP	Billion Euros 2005	-	-	-	-	-	-	-	-
Employment	1000 Persons	-	-	-	-	-	-	-	-
Agriculture and fishery	1000 Persons	-	-	-	-	-	-	-	-
Construction	1000 Persons	-	-	-	-	-	-	-	-
Energy and water	1000 Persons	-	-	-	-	-	-	-	-
Industry	1000 Persons	-	-	-	-	-	-	-	-
Transport services	1000 Persons	-	-	-	-	-	-	-	-
Other services	1000 Persons	-	-	-	-	-	-	-	-
Population total	1000 Persons	-	-	-	-	-	-	-	-
Labour force	1000 Persons	-	-	-	-	-	-	-	-
Retired (> 65 years)	1000 Persons	-	-	-	-	-	-	-	-
Transport taxation revenues	Million Euros 2005	3,130	3,087	3,054	3,191	-0.3	-0.1	0.4	0.2
Fuel taxes	Million Euros 2005	2,024	1,913	2,097	2,149	-1.1	0.9	0.2	0.6
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	1,106	1,174	957	1,042	1.2	-2.0	0.9	-0.6
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per ecccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

The iTREN-2030 reference scenario until 2030

ITREN-2030 LU - Luxembourg		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	18	17	19	20	-0.7	1.3	0.5	0.9
Road freight	Million tonnes per year	5	5	6	7	0.4	1.9	1.7	1.8
Road passenger	Million tonnes per year	11	11	12	12	-1.4	1.1	-0.1	0.5
Rail freight	Million tonnes per year	0	0	0	0	0.2	0.4	3.1	1.8
Rail passenger	Million tonnes per year	0	0	0	0	3.3	-0.7	0.0	-0.4
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	2.9	0.2	0.1	0.2
Air (Intra-EU)	Million tonnes per year	1	2	2	2	0.8	1.0	-0.1	0.5
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.893	0.838	0.856	0.838	-1.3	0.2	-0.2	0.0
Road	tonnes/1000 tkm	0.968	0.902	0.914	0.889	-1.4	0.1	-0.3	-0.1
Rail	tonnes/1000 tkm	0.031	0.030	0.030	0.037	-0.4	-0.2	2.2	1.0
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	-	-	-	-	-	-	-	-
CO2 intensity of passenger transport activity	tonnes/1000 pkm	1.132	0.983	0.916	0.742	-2.8	-0.7	-2.1	-1.4
Road	tonnes/1000 pkm	1.011	0.865	0.807	0.652	-3.1	-0.7	-2.1	-1.4
Rail	tonnes/1000 pkm	0.491	0.545	0.454	0.404	2.1	-1.8	-1.2	-1.5
Air (Intra-EU)	tonnes/1000 pkm	-	-	-	-	-	-	-	-
NOx Transport emissions	1000 Tonnes per year	82	64	48	43	-4.8	-2.8	-1.1	-1.9
Road freight	1000 Tonnes per year	22	18	10	7	-3.3	-5.9	-3.1	-4.5
Road passenger	1000 Tonnes per year	40	24	14	10	-9.6	-5.5	-3.0	-4.2
Rail freight	1000 Tonnes per year	0	0	0	0	-1.8	-0.5	1.0	0.2
Rail passenger	1000 Tonnes per year	1	1	1	1	2.4	-1.2	-0.7	-0.9
Inland navigation	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	2.5	-0.1	-0.2	-0.2
Air (Intra-EU)	1000 Tonnes per year	17	18	22	23	1.2	1.7	0.7	1.2
PM10 Transport emissions	1000 Tonnes per year	1	0	0	0	-4.0	-1.1	2.2	0.5
Road freight	1000 Tonnes per year	0	0	0	0	-3.3	-1.4	2.1	0.3
Road passenger	1000 Tonnes per year	0	0	0	0	-4.3	-1.0	2.2	0.6
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	299	331	398	480	2.1	1.9	1.9	1.9
Gasoline	1000 vehicles	112	86	96	105	-5.2	1.1	1.0	1.0
Diesel	1000 vehicles	187	245	302	374	5.6	2.1	2.2	2.1
LPG/CNG	1000 vehicles	0	0	0	0	-12.4	-0.4	1.3	0.4
Bioethanol	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Hybrid	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Electric	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	45	53	65	72	3.5	2.1	0.9	1.5
Gasoline 1400-2000 cc	1000 vehicles	48	24	26	30	-12.8	0.7	1.5	1.1
Gasoline >2000 cc	1000 vehicles	19	9	4	4	-14.9	-6.4	-1.6	-4.0
Diesel <2000 cc	1000 vehicles	142	200	251	315	7.1	2.3	2.3	2.3
Diesel >2000 cc	1000 vehicles	45	45	51	59	0.3	1.2	1.5	1.4
PreEURO	1000 vehicles	0	0	0	0	-95.2	-100.0	0.0	-100.0
EURO I	1000 vehicles	4	0	0	0	-79.7	-100.0	0.0	-100.0
EURO II	1000 vehicles	60	1	0	0	-52.9	-100.0	0.0	-100.0
EURO III	1000 vehicles	235	73	0	0	-20.8	-73.4	-100.0	-100.0
EURO IV	1000 vehicles	0	137	0	0	0.0	-50.9	-100.0	-100.0
EURO V or later	1000 vehicles	0	120	398	480	0.0	12.8	1.9	7.2
Duty vehicle fleet size	1000 vehicles	15	17	20	24	1.9	1.7	1.8	1.8
<3.5 tonnes	1000 vehicles	1	1	1	1	1.4	1.3	1.3	1.3
3.5-7.5 tonnes	1000 vehicles	7	8	10	12	1.9	1.8	1.8	1.8
7.5-16 tonnes	1000 vehicles	2	2	3	3	1.9	1.8	1.8	1.8
16-32 tonnes	1000 vehicles	4	5	5	6	1.9	1.8	1.8	1.8
>32 tonnes	1000 vehicles	1	1	1	1	1.9	1.8	1.8	1.8
PreEURO	1000 vehicles	4	2	0	0	-12.6	-19.5	-31.0	-25.5
EURO I	1000 vehicles	2	1	0	0	-6.3	-13.5	-25.5	-19.7
EURO II	1000 vehicles	4	4	1	0	-3.6	-9.4	-20.1	-14.9
EURO III	1000 vehicles	4	5	3	1	3.1	-5.3	-14.4	-10.0
EURO IV	1000 vehicles	0	3	2	1	0.0	-2.9	-10.5	-6.8
EURO V or later	1000 vehicles	0	1	13	22	0.0	26.9	5.8	15.8

ITREN-2030 LV - Latvia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	146	174	245	287	3.5	3.5	1.6	2.5
Freight transport activity originated in the country	Billion tonnes-km per year	136	159	219	275	3.2	3.2	2.3	2.8
Road	Billion tonnes-km per year	15	18	26	32	3.7	3.7	2.2	3.0
Rail	Billion tonnes-km per year	43	49	63	77	2.6	2.6	2.1	2.4
Inland navigation	Billion tonnes-km per year	0	0	0	0	3.7	3.7	0.0	1.8
Maritime (Intra-EU)	Billion tonnes-km per year	78	93	130	165	3.5	3.5	2.4	2.9
Average freight transport distance	km	930	917	893	960	-0.3	-0.3	0.7	0.2
Freight transport activity on the national territory	Billion tonnes-km per year	33	40	57	73	3.6	3.7	2.5	3.1
Road	Billion tonnes-km per year	12	14	18	23	2.7	2.7	2.3	2.5
Rail	Billion tonnes-km per year	21	26	39	50	4.2	4.2	2.6	3.4
Inland navigation	Billion tonnes-km per year	0	0	0	0	3.6	3.6	-0.7	1.4
Freight road vehicles-km on the national territory	Billion vehicles-km per year	1	2	2	3	2.8	2.8	2.8	2.8
Trips originated in the country	Million trips per year	1,885	1,827	1,837	1,844	-0.6	0.1	0.0	0.0
Passenger transport activity originated in the country	Billion pass-km per year	16	17	20	22	1.1	1.4	0.9	1.1
Car	Billion pass-km per year	10	11	12	14	1.1	1.5	0.9	1.2
Bus	Billion pass-km per year	3	3	3	4	0.2	0.8	0.6	0.7
Rail	Billion pass-km per year	1	1	2	2	1.8	1.5	1.2	1.4
Air (Intra-EU)	Billion pass-km per year	1	1	1	1	4.4	2.6	1.9	2.3
Slow	Billion pass-km per year	1	1	1	1	0.2	0.4	0.4	0.4
Average passenger transport distance	km	8.6	9.4	10.7	11.7	1.7	1.3	0.9	1.1
Passenger transport activity on the national territory	Billion pass-km per year	16	17	20	21	1.7	1.7	0.5	1.1
Road	Billion pass-km per year	15	16	19	20	1.7	1.7	0.5	1.1
Rail	Billion pass-km per year	1	1	1	1	1.4	1.4	1.4	1.4
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	7	8	9	10	2.0	2.0	1.0	1.5
Motorization rate	cars/1000 inhabitants	263	301	379	432	2.7	2.3	1.3	1.8
ECONOMY INDICATORS									
GDP	Billion Euros 2005	7	8	10	13	2.2	2.5	2.1	2.3
Employment	1000 Persons	1,359	1,274	1,232	1,130	-1.3	-0.3	-0.9	-0.6
Agriculture and fishery	1000 Persons	169	137	120	130	-4.1	-1.3	0.8	-0.3
Construction	1000 Persons	161	157	140	124	-0.6	-1.2	-1.2	-1.2
Energy and water	1000 Persons	0	0	0	0	-6.2	-2.9	0.2	-1.4
Industry	1000 Persons	440	418	373	294	-1.0	-1.1	-2.4	-1.7
Transport services	1000 Persons	57	64	76	82	2.4	1.7	0.7	1.2
Other services	1000 Persons	531	498	524	500	-1.3	0.5	-0.5	0.0
Population total	1000 Persons	2,297	2,228	2,115	2,025	-0.6	-0.5	-0.4	-0.5
Labour force	1000 Persons	1,407	1,420	1,342	1,266	0.2	-0.6	-0.6	-0.6
Retired (> 65 years)	1000 Persons	415	425	415	427	0.5	-0.2	0.3	0.0
Transport taxation revenues	Million Euros 2005	908	948	1,137	1,193	0.9	1.8	0.5	1.2
Fuel taxes	Million Euros 2005	908	948	1,102	1,146	0.9	1.5	0.4	1.0
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	0	35	46	0.0	0.0	2.8	0.0
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per ecccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

ITREN-2030 LV - Latvia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	9	9	11	12	0.8	1.9	1.0	1.5
Road freight	Million tonnes per year	3	3	4	5	0.6	2.6	2.0	2.3
Road passenger	Million tonnes per year	6	6	7	7	0.7	1.5	0.3	0.9
Rail freight	Million tonnes per year	0	0	0	0	4.9	3.6	2.5	3.0
Rail passenger	Million tonnes per year	0	0	0	0	0.7	0.6	0.3	0.5
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	4.5	1.4	0.8	1.1
Air (Intra-EU)	Million tonnes per year	0	0	0	0	2.9	1.3	0.8	1.0
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.028	0.025	0.023	0.022	-2.5	-0.8	-0.4	-0.6
Road	tonnes/1000 tkm	0.237	0.214	0.213	0.207	-2.0	-0.1	-0.3	-0.2
Rail	tonnes/1000 tkm	0.009	0.009	0.008	0.008	0.7	-0.6	-0.1	-0.4
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.000	0.000	1.0	-2.0	-1.6	-1.8
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.358	0.340	0.333	0.323	-1.0	-0.2	-0.3	-0.3
Road	tonnes/1000 pkm	0.384	0.365	0.360	0.353	-1.0	-0.1	-0.2	-0.2
Rail	tonnes/1000 pkm	0.012	0.012	0.011	0.010	-0.7	-0.7	-1.1	-0.9
Air (Intra-EU)	tonnes/1000 pkm	0.199	0.185	0.163	0.145	-1.5	-1.3	-1.1	-1.2
NOx Transport emissions	1000 Tonnes per year	16	14	15	16	-2.4	0.1	0.7	0.4
Road freight	1000 Tonnes per year	3	3	2	2	-2.4	-1.3	-0.7	-1.0
Road passenger	1000 Tonnes per year	8	6	4	4	-7.2	-2.6	-1.1	-1.9
Rail freight	1000 Tonnes per year	3	4	5	6	4.9	3.6	2.5	3.0
Rail passenger	1000 Tonnes per year	0	0	0	0	0.1	-0.4	-1.0	-0.7
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	4.1	1.0	0.4	0.7
Air (Intra-EU)	1000 Tonnes per year	1	1	1	1	2.9	1.6	1.4	1.5
PM10 Transport emissions	1000 Tonnes per year	1	1	1	1	-3.3	-0.8	0.4	-0.2
Road freight	1000 Tonnes per year	0	0	0	0	-3.1	-1.2	0.7	-0.3
Road passenger	1000 Tonnes per year	0	0	0	0	-3.4	-0.4	0.1	-0.2
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	605	673	803	886	2.2	1.8	1.0	1.4
Gasoline	1000 vehicles	547	607	716	780	2.1	1.7	0.8	1.3
Diesel	1000 vehicles	52	60	81	92	2.8	3.1	1.3	2.2
LPG/CNG	1000 vehicles	5	6	1	0	0.5	-13.2	-18.4	-15.8
Bioethanol	1000 vehicles	0	0	4	14	39.8	36.1	13.1	24.1
Hybrid	1000 vehicles	0	0	0	0	17.6	9.1	-0.3	4.3
Electric	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	152	171	208	227	2.3	2.0	0.9	1.4
Gasoline 1400-2000 cc	1000 vehicles	317	351	415	454	2.1	1.7	0.9	1.3
Gasoline >2000 cc	1000 vehicles	78	86	94	99	1.8	0.9	0.5	0.7
Diesel <2000 cc	1000 vehicles	34	39	52	59	2.7	2.9	1.3	2.1
Diesel >2000 cc	1000 vehicles	18	21	29	32	2.9	3.4	1.2	2.3
PreEURO	1000 vehicles	74	10	0	0	-33.2	-100.0	0.0	-100.0
EURO I	1000 vehicles	5	4	0	0	-6.6	-100.0	0.0	-100.0
EURO II	1000 vehicles	16	14	0	0	-2.3	-52.5	-100.0	-100.0
EURO III	1000 vehicles	510	497	64	0	-0.5	-18.5	-100.0	-100.0
EURO IV	1000 vehicles	0	97	76	0	0.0	-2.4	-77.7	-53.4
EURO V or later	1000 vehicles	0	51	659	872	0.0	29.1	2.8	15.2
Duty vehicle fleet size	1000 vehicles	89	110	156	222	4.3	3.5	3.6	3.6
<3.5 tonnes	1000 vehicles	38	52	83	133	6.6	4.8	4.9	4.8
3.5-7.5 tonnes	1000 vehicles	26	29	35	43	2.3	2.0	2.0	2.0
7.5-16 tonnes	1000 vehicles	7	8	9	11	2.3	2.0	2.0	2.0
16-32 tonnes	1000 vehicles	16	19	24	29	3.0	2.5	2.0	2.2
>32 tonnes	1000 vehicles	3	3	4	5	3.0	2.5	2.0	2.2
PreEURO	1000 vehicles	44	36	15	2	-4.0	-8.5	-18.8	-13.8
EURO I	1000 vehicles	4	3	3	1	-0.4	-2.2	-9.1	-5.7
EURO II	1000 vehicles	4	4	3	2	-0.2	-1.1	-5.6	-3.4
EURO III	1000 vehicles	38	43	42	33	2.8	-0.3	-2.5	-1.4
EURO IV	1000 vehicles	0	14	14	13	0.0	-0.1	-1.2	-0.6
EURO V or later	1000 vehicles	0	9	79	172	0.0	23.7	8.1	15.6

ITREN-2030 MT - Malta		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	0	0	0	0	7.7	7.7	6.0	6.9
Freight transport activity originated in the country	Billion tonnes-km per year	0	0	0	0	7.8	7.8	6.0	6.9
Road	Billion tonnes-km per year	0	0	0	0	5.7	5.7	5.7	5.7
Rail	Billion tonnes-km per year	0	0	0	0	7.8	7.8	6.0	6.9
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Average freight transport distance	km	3,940	3,941	3,943	3,945	0.0	0.0	0.0	0.0
Freight transport activity on the national territory	Billion tonnes-km per year	0	0	0	0	-2.5	-2.5	0.3	-1.1
Road	Billion tonnes-km per year	0	0	0	0	-2.5	-2.5	0.3	-1.1
Rail	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	0	0	0	0	-2.5	-2.5	0.3	-1.1
Trips originated in the country	Million trips per year	296	306	348	378	0.7	1.3	0.8	1.1
Passenger transport activity originated in the country	Billion pass-km per year	8	8	10	11	1.3	1.8	1.3	1.5
Car	Billion pass-km per year	2	2	2	3	1.4	1.8	1.2	1.5
Bus	Billion pass-km per year	1	1	1	1	1.7	-0.3	-0.2	-0.3
Rail	Billion pass-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Air (Intra-EU)	Billion pass-km per year	4	5	6	7	1.1	2.0	1.4	1.7
Slow	Billion pass-km per year	1	1	1	1	1.8	1.8	1.3	1.6
Average passenger transport distance	km	25.5	26.3	27.6	28.8	0.6	0.5	0.4	0.5
Passenger transport activity on the national territory	Billion pass-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Road	Billion pass-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Rail	Billion pass-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Motorization rate	cars/1000 inhabitants	484	512	510	507	1.1	0.0	0.0	0.0
ECONOMY INDICATORS									
GDP	Billion Euros 2005	4	4	6	8	2.0	3.3	3.0	3.2
Employment	1000 Persons	57	58	56	57	0.4	-0.3	0.2	-0.1
Agriculture and fishery	1000 Persons	4	3	3	3	-1.5	-0.9	0.6	-0.2
Construction	1000 Persons	3	3	3	3	-0.6	-0.6	0.4	-0.1
Energy and water	1000 Persons	0	0	0	0	-2.5	-1.2	0.8	-0.2
Industry	1000 Persons	8	7	7	7	-1.9	-0.4	0.5	0.0
Transport services	1000 Persons	21	23	23	22	2.2	-0.3	-0.2	-0.2
Other services	1000 Persons	22	22	21	22	-0.1	-0.3	0.3	0.0
Population total	1000 Persons	404	421	455	477	0.8	0.8	0.5	0.6
Labour force	1000 Persons	250	259	290	306	0.7	1.1	0.6	0.8
Retired (> 65 years)	1000 Persons	70	78	85	87	2.1	0.9	0.2	0.6
Transport taxation revenues	Million Euros 2005	232	242	159	108	0.8	-4.1	-3.8	-3.9
Fuel taxes	Million Euros 2005	232	242	153	100	0.8	-4.5	-4.1	-4.3
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	0	6	8	0.0	0.0	2.9	0.0
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per eeccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-



ITREN-2030 MT - Malta		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	3	3	2	2	0.1	-2.5	-1.8	-2.2
Road freight	Million tonnes per year	-	-	-	-	-	-	-	-
Road passenger	Million tonnes per year	2	2	2	1	0.1	-3.9	-3.1	-3.5
Rail freight	Million tonnes per year	-	-	-	-	-	-	-	-
Rail passenger	Million tonnes per year	-	-	-	-	-	-	-	-
Inland navigation	Million tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	4.1	2.1	1.7	1.9
Air (Intra-EU)	Million tonnes per year	1	1	1	1	0.0	1.1	0.4	0.8
CO2 intensity of freight transport activity	tonnes/1000 tkm	1.405	1.947	3.086	3.552	6.7	4.7	1.4	3.1
Road	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Rail	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	-	-	-	-	-	-	-	-
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.679	0.644	0.405	0.292	-1.0	-4.5	-3.2	-3.9
Road	tonnes/1000 pkm	-	-	-	-	-	-	-	-
Rail	tonnes/1000 pkm	-	-	-	-	-	-	-	-
Air (Intra-EU)	tonnes/1000 pkm	0.151	0.143	0.130	0.118	-1.1	-0.9	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	10	10	12	13	0.0	1.0	0.9	0.9
Road freight	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Road passenger	1000 Tonnes per year	2	2	1	1	-3.7	-5.7	-4.3	-5.0
Rail freight	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Rail passenger	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Inland navigation	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	1000 Tonnes per year	0	0	0	1	3.7	1.7	1.3	1.5
Air (Intra-EU)	1000 Tonnes per year	8	9	10	12	0.6	1.8	1.2	1.5
PM10 Transport emissions	1000 Tonnes per year	0	0	0	0	-4.7	-3.3	-0.8	-2.0
Road freight	1000 Tonnes per year	0	0	0	0	-6.3	-5.2	-0.6	-2.9
Road passenger	1000 Tonnes per year	0	0	0	0	-3.7	-2.2	-0.9	-1.5
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	197	222	265	288	2.4	1.8	0.9	1.3
Gasoline	1000 vehicles	160	179	197	205	2.3	0.9	0.4	0.7
Diesel	1000 vehicles	35	36	35	39	0.3	-0.1	1.0	0.4
LPG/CNG	1000 vehicles	0	0	0	0	27.3	7.0	2.4	4.7
Bioethanol	1000 vehicles	0	0	3	8	27.6	27.7	9.9	18.5
Hybrid	1000 vehicles	1	6	21	10	31.9	14.0	-6.6	3.2
Electric	1000 vehicles	0	1	10	27	29.2	30.7	10.9	20.4
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	127	142	155	163	2.3	0.9	0.5	0.7
Gasoline 1400-2000 cc	1000 vehicles	31	35	39	39	2.4	1.0	0.2	0.6
Gasoline >2000 cc	1000 vehicles	2	3	3	2	1.7	-0.1	-0.8	-0.5
Diesel <2000 cc	1000 vehicles	32	33	34	37	0.8	0.2	1.0	0.6
Diesel >2000 cc	1000 vehicles	3	3	1	1	-5.4	-5.6	-0.5	-3.1
PreEURO	1000 vehicles	46	21	1	0	-14.8	-24.3	-40.7	-33.0
EURO I	1000 vehicles	53	35	5	0	-8.3	-18.0	-34.3	-26.6
EURO II	1000 vehicles	38	31	9	0	-4.3	-12.0	-26.8	-19.8
EURO III	1000 vehicles	58	52	25	3	-2.0	-7.3	-19.7	-13.7
EURO IV	1000 vehicles	0	46	32	7	0.0	-3.7	-13.8	-8.9
EURO V or later	1000 vehicles	0	31	161	233	0.0	18.0	3.8	10.7
Duty vehicle fleet size	1000 vehicles	34	33	33	34	-0.3	-0.2	0.3	0.0
<3.5 tonnes	1000 vehicles	3	2	2	2	-2.9	-2.0	0.3	-0.9
3.5-7.5 tonnes	1000 vehicles	25	24	24	25	-0.2	-0.1	0.3	0.1
7.5-16 tonnes	1000 vehicles	1	1	1	1	-0.2	-0.2	0.3	0.1
16-32 tonnes	1000 vehicles	4	4	4	4	0.2	0.4	0.3	0.3
>32 tonnes	1000 vehicles	1	1	1	1	0.4	0.5	0.3	0.4
PreEURO	1000 vehicles	16	9	0	0	-10.3	-43.4	-100.0	-100.0
EURO I	1000 vehicles	5	5	1	0	-0.6	-18.1	-100.0	-100.0
EURO II	1000 vehicles	9	8	5	0	-0.1	-5.0	-66.0	-43.1
EURO III	1000 vehicles	4	5	5	0	4.9	-0.5	-21.5	-11.7
EURO IV	1000 vehicles	0	4	4	2	0.0	-0.1	-6.4	-3.3
EURO V or later	1000 vehicles	0	1	18	31	0.0	28.7	5.5	16.5

ITREN-2030 NL - The Netherlands		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	1,803	1,735	1,609	1,496	-0.8	-0.8	-0.7	-0.7
Freight transport activity originated in the country	Billion tonnes-km per year	586	602	635	635	0.5	0.5	0.0	0.3
Road	Billion tonnes-km per year	113	115	118	120	0.3	0.3	0.2	0.2
Rail	Billion tonnes-km per year	8	8	8	8	0.1	0.1	-0.1	0.0
Inland navigation	Billion tonnes-km per year	52	55	63	68	1.4	1.4	0.7	1.0
Maritime (Intra-EU)	Billion tonnes-km per year	413	424	446	439	0.5	0.5	-0.1	0.2
Average freight transport distance	km	325	347	394	424	1.3	1.3	0.7	1.0
Freight transport activity on the national territory	Billion tonnes-km per year	130	131	133	133	0.1	0.1	0.0	0.1
Road	Billion tonnes-km per year	88	87	87	87	0.0	0.0	0.0	0.0
Rail	Billion tonnes-km per year	6	6	7	7	0.4	0.4	0.0	0.2
Inland navigation	Billion tonnes-km per year	36	37	39	40	0.5	0.5	0.1	0.3
Freight road vehicles-km on the national territory	Billion vehicles-km per year	9	9	9	9	0.2	0.2	0.0	0.1
Trips originated in the country	Million trips per year	17,912	18,040	19,142	19,709	0.1	0.6	0.3	0.4
Passenger transport activity originated in the country	Billion pass-km per year	228	237	267	284	0.8	1.2	0.6	0.9
Car	Billion pass-km per year	169	172	196	205	0.3	1.3	0.5	0.9
Bus	Billion pass-km per year	10	11	10	9	0.4	-1.0	-0.3	-0.7
Rail	Billion pass-km per year	18	22	25	29	4.2	1.1	1.6	1.4
Air (Intra-EU)	Billion pass-km per year	15	17	19	20	1.7	1.4	0.5	1.0
Slow	Billion pass-km per year	14	15	18	20	1.2	1.5	1.3	1.4
Average passenger transport distance	km	12.7	13.1	13.9	14.4	0.7	0.6	0.3	0.5
Passenger transport activity on the national territory	Billion pass-km per year	218	225	239	254	0.6	0.6	0.6	0.6
Road	Billion pass-km per year	203	209	222	236	0.6	0.6	0.6	0.6
Rail	Billion pass-km per year	15	16	16	17	0.5	0.5	0.5	0.5
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	138	143	155	166	0.8	0.8	0.7	0.8
Motorization rate	cars/1000 inhabitants	395	405	423	442	0.5	0.4	0.4	0.4
ECONOMY INDICATORS									
GDP	Billion Euros 2005	412	447	533	629	1.7	1.8	1.7	1.7
Employment	1000 Persons	7,453	7,266	6,945	6,451	-0.5	-0.5	-0.7	-0.6
Agriculture and fishery	1000 Persons	292	257	208	169	-2.5	-2.1	-2.1	-2.1
Construction	1000 Persons	299	260	216	185	-2.8	-1.8	-1.6	-1.7
Energy and water	1000 Persons	46	49	45	43	1.2	-0.9	-0.4	-0.7
Industry	1000 Persons	1,157	1,066	948	834	-1.6	-1.2	-1.3	-1.2
Transport services	1000 Persons	311	319	311	290	0.5	-0.2	-0.7	-0.5
Other services	1000 Persons	5,348	5,315	5,216	4,930	-0.1	-0.2	-0.6	-0.4
Population total	1000 Persons	16,366	16,724	17,204	17,509	0.4	0.3	0.2	0.2
Labour force	1000 Persons	10,440	10,548	10,355	10,088	0.2	-0.2	-0.3	-0.2
Retired (> 65 years)	1000 Persons	2,437	2,630	3,384	4,109	1.5	2.6	2.0	2.3
Transport taxation revenues	Million Euros 2005	4,670	4,568	5,206	5,419	-0.4	1.3	0.4	0.9
Fuel taxes	Million Euros 2005	4,670	4,538	5,007	5,193	-0.6	1.0	0.4	0.7
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	30	199	226	0.0	21.0	1.3	10.7
ENERGY INDICATORS									
Primary energy production	Billion toe per year	63	62	82	96	-0.2	2.8	1.6	2.2
Share of domestic energy production	%	78	74	89	93	-1.0	1.8	0.5	1.1
Final energy demand by source	Billion toe per year	80	84	93	103	0.8	1.0	1.1	1.1
Oil	Billion toe per year	33	32	33	33	-0.6	0.2	0.2	0.2
Gas	Billion toe per year	35	35	35	35	-0.4	0.2	-0.1	0.0
Coal, Nuclear	Billion toe per year	9	14	19	27	9.6	2.7	3.7	3.2
Biomass	Billion toe per year	3	2	5	6	-4.8	8.2	3.2	5.7
Other Renewables	Billion toe per year	0	1	1	2	23.7	7.4	4.1	5.7
Final energy demand by consuming sector	Billion toe per year	54	54	60	66	0.2	1.0	0.9	0.9
Transport freight	Billion toe per year	4	4	6	6	0.3	2.4	0.8	1.6
Transport passenger	Billion toe per year	12	12	12	13	0.2	0.4	0.2	0.3
Industry	Billion toe per year	16	16	18	20	-0.2	1.2	1.1	1.1
Residential and services	Billion toe per year	22	22	24	27	0.5	0.9	1.1	1.0
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.91	1.25	1.15	1.24	6.6	-0.9	0.8	-0.1
Gasoline price	Euros2005 per litre	1.24	1.60	1.49	1.58	5.1	-0.7	0.6	0.0
Biofuels price	Euros2005 per eeccf	0.66	1.17	1.16	1.24	12.0	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	2.4	4.7	5.2	1411.2	7.1	1.1	4.0
Share of renewables in electricity	%	7.6	7.0	12.9	16.1	-1.6	6.3	2.3	4.2
Share of renewables in final energy demand	%	2.5	2.9	5.7	7.5	3.2	6.8	2.9	4.9
Energy intensity of freight transport activity	toe/1000tkm	8	8	10	10	-0.1	2.0	0.9	1.5
Energy intensity of passenger transport activity	toe/1000pkm	51	49	48	46	-0.5	-0.3	-0.4	-0.3
Energy intensity of economic activity	toe/Million Euros 1995	131	122	113	104	-1.5	-0.8	-0.8	-0.8

ITREN-2030 NL - The Netherlands		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	31	30	33	34	-0.1	0.8	0.2	0.5
Road freight	Million tonnes per year	8	8	8	9	0.5	0.8	1.0	0.9
Road passenger	Million tonnes per year	18	17	19	19	-0.7	0.9	-0.1	0.4
Rail freight	Million tonnes per year	0	0	0	0	-0.5	-1.2	2.0	0.4
Rail passenger	Million tonnes per year	0	0	0	0	3.2	0.4	0.9	0.7
Inland navigation	Million tonnes per year	2	2	2	2	0.0	0.1	-0.1	0.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	2.5	-0.1	-0.2	-0.1
Air (Intra-EU)	Million tonnes per year	3	3	3	3	0.8	0.5	-0.4	0.1
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.018	0.018	0.018	0.020	0.1	0.2	0.9	0.5
Road	tonnes/1000 tkm	0.087	0.089	0.096	0.106	0.6	0.8	1.0	0.9
Rail	tonnes/1000 tkm	0.015	0.014	0.012	0.015	-0.9	-1.6	2.0	0.2
Inland navigation	tonnes/1000 tkm	0.048	0.046	0.045	0.044	-0.5	-0.4	-0.2	-0.3
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.001	0.001	2.0	-0.6	0.0	-0.3
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.090	0.085	0.087	0.081	-1.1	0.2	-0.7	-0.3
Road	tonnes/1000 pkm	0.089	0.083	0.086	0.080	-1.3	0.3	-0.7	-0.2
Rail	tonnes/1000 pkm	0.016	0.018	0.018	0.019	2.7	-0.1	0.4	0.2
Air (Intra-EU)	tonnes/1000 pkm	0.183	0.175	0.160	0.146	-0.9	-0.9	-0.9	-0.9
NOx Transport emissions	1000 Tonnes per year	139	119	108	106	-3.1	-0.9	-0.2	-0.6
Road freight	1000 Tonnes per year	19	15	9	7	-4.4	-5.4	-2.3	-3.9
Road passenger	1000 Tonnes per year	47	27	18	15	-10.5	-4.3	-1.3	-2.8
Rail freight	1000 Tonnes per year	0	0	0	0	-0.4	0.3	-0.2	0.0
Rail passenger	1000 Tonnes per year	2	2	2	2	3.0	-0.1	0.2	0.1
Inland navigation	1000 Tonnes per year	29	29	29	29	0.0	0.1	-0.1	0.0
Maritime (Intra-EU)	1000 Tonnes per year	6	6	6	6	2.1	-0.5	-0.5	-0.5
Air (Intra-EU)	1000 Tonnes per year	36	39	44	46	1.5	1.2	0.4	0.8
PM10 Transport emissions	1000 Tonnes per year	10	8	7	7	-3.4	-1.8	0.3	-0.8
Road freight	1000 Tonnes per year	3	2	1	1	-7.5	-3.7	-0.2	-1.9
Road passenger	1000 Tonnes per year	7	6	5	6	-1.7	-1.3	0.4	-0.4
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	6,486	6,865	7,656	8,182	1.1	1.1	0.7	0.9
Gasoline	1000 vehicles	4,553	4,377	4,434	4,571	-0.8	0.1	0.3	0.2
Diesel	1000 vehicles	1,258	1,716	2,235	2,557	6.4	2.7	1.4	2.0
LPG/CNG	1000 vehicles	637	631	607	634	-0.2	-0.4	0.4	0.0
Bioethanol	1000 vehicles	1	11	90	197	74.6	23.4	8.1	15.5
Hybrid	1000 vehicles	37	129	287	215	28.1	8.3	-2.8	2.6
Electric	1000 vehicles	0	1	3	8	19.5	17.6	8.7	13.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	2,339	2,189	2,336	2,382	-1.3	0.7	0.2	0.4
Gasoline 1400-2000 cc	1000 vehicles	1,949	1,934	1,877	1,962	-0.2	-0.3	0.4	0.1
Gasoline >2000 cc	1000 vehicles	264	255	221	227	-0.7	-1.4	0.3	-0.6
Diesel <2000 cc	1000 vehicles	1,003	1,430	1,892	2,156	7.3	2.8	1.3	2.1
Diesel >2000 cc	1000 vehicles	255	286	344	401	2.3	1.8	1.6	1.7
PreEURO	1000 vehicles	138	0	0	0	-80.3	-100.0	0.0	-100.0
EURO I	1000 vehicles	1,619	152	0	0	-37.7	-100.0	0.0	-100.0
EURO II	1000 vehicles	1,987	1,349	0	0	-7.4	-91.2	-100.0	-100.0
EURO III	1000 vehicles	2,704	2,605	65	0	-0.7	-30.9	-100.0	-100.0
EURO IV	1000 vehicles	0	1,555	674	0	0.0	-8.0	-100.0	-100.0
EURO V or later	1000 vehicles	0	1,062	6,538	7,762	0.0	19.9	1.7	10.5
Duty vehicle fleet size	1000 vehicles	564	571	584	586	0.2	0.2	0.0	0.1
<3.5 tonnes	1000 vehicles	1	1	1	1	0.9	0.8	0.9	0.9
3.5-7.5 tonnes	1000 vehicles	238	245	257	259	0.6	0.5	0.1	0.3
7.5-16 tonnes	1000 vehicles	62	64	67	68	0.6	0.5	0.1	0.3
16-32 tonnes	1000 vehicles	208	207	205	205	-0.1	-0.1	0.0	0.0
>32 tonnes	1000 vehicles	55	54	54	54	-0.1	-0.1	0.0	-0.1
PreEURO	1000 vehicles	133	12	0	0	-37.8	-100.0	0.0	-100.0
EURO I	1000 vehicles	114	53	0	0	-14.1	-85.2	-100.0	-100.0
EURO II	1000 vehicles	166	143	1	0	-3.0	-38.6	-100.0	-100.0
EURO III	1000 vehicles	152	192	63	0	4.8	-10.6	-85.1	-63.4
EURO IV	1000 vehicles	0	129	102	0	0.0	-2.3	-55.4	-34.0
EURO V or later	1000 vehicles	0	42	418	586	0.0	25.9	3.4	14.1

ITREN-2030 PL - Poland		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	1,190	1,355	1,761	1,957	2.6	2.7	1.1	1.9
Freight transport activity originated in the country	Billion tonnes-km per year	365	453	697	904	4.4	4.4	2.6	3.5
Road	Billion tonnes-km per year	158	192	285	364	4.0	4.0	2.5	3.2
Rail	Billion tonnes-km per year	43	55	88	117	4.8	4.8	2.9	3.9
Inland navigation	Billion tonnes-km per year	1	1	1	1	4.7	4.7	2.5	3.6
Maritime (Intra-EU)	Billion tonnes-km per year	164	205	323	422	4.6	4.6	2.7	3.7
Average freight transport distance	km	307	334	396	462	1.7	1.7	1.6	1.6
Freight transport activity on the national territory	Billion tonnes-km per year	182	220	323	408	3.9	3.9	2.4	3.1
Road	Billion tonnes-km per year	130	155	221	275	3.6	3.6	2.2	2.9
Rail	Billion tonnes-km per year	51	64	101	132	4.6	4.6	2.7	3.7
Inland navigation	Billion tonnes-km per year	0	0	1	1	4.8	4.8	2.3	3.5
Freight road vehicles-km on the national territory	Billion vehicles-km per year	15	18	26	32	3.7	3.7	2.1	2.9
Trips originated in the country	Million trips per year	28,622	28,802	30,426	31,364	0.1	0.5	0.3	0.4
Passenger transport activity originated in the country	Billion pass-km per year	254	270	315	340	1.2	1.5	0.8	1.2
Car	Billion pass-km per year	173	188	235	260	1.6	2.3	1.0	1.6
Bus	Billion pass-km per year	31	30	27	26	-0.1	-1.0	-0.7	-0.9
Rail	Billion pass-km per year	30	31	30	30	0.6	-0.3	0.0	-0.1
Air (Intra-EU)	Billion pass-km per year	3	4	4	5	3.1	1.7	1.4	1.5
Slow	Billion pass-km per year	17	18	19	20	0.8	0.5	0.5	0.5
Average passenger transport distance	km	8.9	9.4	10.3	10.8	1.1	1.0	0.5	0.7
Passenger transport activity on the national territory	Billion pass-km per year	254	271	307	346	1.3	1.3	1.2	1.2
Road	Billion pass-km per year	239	255	291	329	1.3	1.3	1.2	1.3
Rail	Billion pass-km per year	15	15	16	17	0.5	0.5	0.5	0.5
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	112	124	151	176	2.0	2.0	1.5	1.8
Motorization rate	cars/1000 inhabitants	308	344	419	485	2.3	2.0	1.5	1.7
ECONOMY INDICATORS									
GDP	Billion Euros 2005	156	190	284	394	4.0	4.1	3.3	3.7
Employment	1000 Persons	17,507	18,301	22,221	21,421	0.9	2.0	-0.4	0.8
Agriculture and fishery	1000 Persons	2,446	1,831	1,947	1,863	-5.6	0.6	-0.4	0.1
Construction	1000 Persons	2,019	2,404	2,683	2,584	3.6	1.1	-0.4	0.4
Energy and water	1000 Persons	31	37	27	26	3.3	-2.9	-0.5	-1.7
Industry	1000 Persons	4,959	5,042	5,300	5,025	0.3	0.5	-0.5	0.0
Transport services	1000 Persons	515	582	645	629	2.5	1.0	-0.3	0.4
Other services	1000 Persons	7,536	8,405	11,619	11,295	2.2	3.3	-0.3	1.5
Population total	1000 Persons	38,355	37,860	37,208	36,377	-0.3	-0.2	-0.2	-0.2
Labour force	1000 Persons	25,078	25,806	24,603	22,671	0.6	-0.5	-0.8	-0.6
Retired (> 65 years)	1000 Persons	4,660	4,554	6,064	7,360	-0.5	2.9	2.0	2.4
Transport taxation revenues	Million Euros 2005	9,408	11,756	12,310	13,713	4.6	0.5	1.1	0.8
Fuel taxes	Million Euros 2005	3,189	3,476	3,161	3,201	1.7	-0.9	0.1	-0.4
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	6,218	8,280	9,149	10,512	5.9	1.0	1.4	1.2
ENERGY INDICATORS									
Primary energy production	Billion toe per year	69	84	82	100	4.1	-0.3	2.0	0.9
Share of domestic energy production	%	72	77	64	63	1.1	-1.8	-0.2	-1.0
Final energy demand by source	Billion toe per year	96	110	128	160	2.9	1.5	2.2	1.9
Oil	Billion toe per year	23	25	33	41	2.2	2.8	2.2	2.5
Gas	Billion toe per year	12	12	25	31	-0.8	7.8	2.1	4.9
Coal, Nuclear	Billion toe per year	56	64	54	65	3.0	-1.8	1.8	0.0
Biomass	Billion toe per year	5	8	14	19	10.7	5.5	3.4	4.4
Other Renewables	Billion toe per year	0	1	2	4	21.7	10.1	4.2	7.1
Final energy demand by consuming sector	Billion toe per year	58	64	83	103	2.0	2.6	2.2	2.4
Transport freight	Billion toe per year	4	4	6	6	1.8	3.7	1.3	2.5
Transport passenger	Billion toe per year	9	12	19	27	6.7	4.1	3.6	3.9
Industry	Billion toe per year	17	19	20	20	1.5	0.4	0.4	0.4
Residential and services	Billion toe per year	28	29	39	50	0.7	3.0	2.5	2.8
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.79	1.11	1.02	1.10	6.9	-0.9	0.8	-0.1
Gasoline price	Euros2005 per litre	0.90	1.21	1.11	1.19	6.1	-0.9	0.8	-0.1
Biofuels price	Euros2005 per eeccf	0.67	1.17	1.17	1.24	11.9	0.0	0.6	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.1	4.5	5.2	10.4	102.4	1.4	7.2	4.2
Share of renewables in electricity	%	4.0	8.6	16.5	16.6	16.7	6.7	0.0	3.3
Share of renewables in final energy demand	%	7.9	10.4	14.1	15.7	5.7	3.1	1.1	2.1
Energy intensity of freight transport activity	toe/1000tkm	10	9	9	8	-2.3	-0.5	-1.2	-0.9
Energy intensity of passenger transport activity	toe/1000pkm	35	45	60	76	5.3	2.8	2.4	2.6
Energy intensity of economic activity	toe/Million Euros 1995	371	337	291	262	-1.9	-1.5	-1.0	-1.3

ITREN-2030 PL - Poland		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	34	38	49	58	2.2	2.6	1.7	2.2
Road freight	Million tonnes per year	10	12	16	22	3.7	3.4	3.1	3.2
Road passenger	Million tonnes per year	17	18	22	24	0.6	2.4	0.7	1.6
Rail freight	Million tonnes per year	5	7	8	10	4.7	2.3	1.8	2.0
Rail passenger	Million tonnes per year	1	1	1	1	-0.7	-1.2	-0.9	-1.0
Inland navigation	Million tonnes per year	0	0	0	0	6.4	4.3	2.5	3.4
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	5.8	1.8	0.9	1.3
Air (Intra-EU)	Million tonnes per year	1	1	1	1	1.8	0.6	0.5	0.5
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.044	0.044	0.039	0.039	-0.2	-1.2	0.1	-0.6
Road	tonnes/1000 tkm	0.075	0.076	0.074	0.081	0.1	-0.2	0.9	0.3
Rail	tonnes/1000 tkm	0.103	0.104	0.083	0.076	0.1	-2.2	-0.9	-1.6
Inland navigation	tonnes/1000 tkm	0.029	0.031	0.030	0.030	1.5	-0.4	0.2	-0.1
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.001	0.001	1.2	-2.8	-1.7	-2.2
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.071	0.069	0.076	0.072	-0.7	1.0	-0.6	0.2
Road	tonnes/1000 pkm	0.071	0.069	0.077	0.073	-0.7	1.1	-0.6	0.3
Rail	tonnes/1000 pkm	0.049	0.046	0.039	0.034	-1.2	-1.7	-1.4	-1.5
Air (Intra-EU)	tonnes/1000 pkm	0.175	0.164	0.147	0.134	-1.3	-1.1	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	199	160	118	109	-4.2	-3.0	-0.8	-1.9
Road freight	1000 Tonnes per year	78	69	43	31	-2.5	-4.5	-3.2	-3.9
Road passenger	1000 Tonnes per year	83	47	21	14	-10.8	-7.6	-3.9	-5.8
Rail freight	1000 Tonnes per year	22	26	33	43	3.8	2.4	2.5	2.5
Rail passenger	1000 Tonnes per year	4	4	3	3	-0.9	-2.0	-1.9	-1.9
Inland navigation	1000 Tonnes per year	0	0	0	0	6.4	4.3	2.5	3.4
Maritime (Intra-EU)	1000 Tonnes per year	5	7	7	8	5.3	1.3	0.5	0.9
Air (Intra-EU)	1000 Tonnes per year	7	7	8	9	2.2	1.2	1.2	1.2
PM10 Transport emissions	1000 Tonnes per year	11	10	9	9	-3.2	-0.6	0.4	-0.1
Road freight	1000 Tonnes per year	5	4	4	4	-2.8	-0.6	0.5	-0.1
Road passenger	1000 Tonnes per year	7	6	5	5	-3.6	-0.5	0.3	-0.1
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	11,788	13,161	15,863	18,094	2.2	1.9	1.3	1.6
Gasoline	1000 vehicles	9,808	11,007	13,453	15,244	2.3	2.0	1.3	1.6
Diesel	1000 vehicles	949	1,084	1,424	1,721	2.7	2.8	1.9	2.3
LPG/CNG	1000 vehicles	982	922	670	767	-1.3	-3.1	1.4	-0.9
Bioethanol	1000 vehicles	0	4	56	240	0.0	31.1	15.6	23.1
Hybrid	1000 vehicles	50	145	256	112	23.8	5.9	-7.9	-1.3
Electric	1000 vehicles	0	1	3	9	24.5	12.9	10.7	11.8
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	6,123	6,896	8,467	9,542	2.4	2.1	1.2	1.6
Gasoline 1400-2000 cc	1000 vehicles	3,370	3,795	4,654	5,333	2.4	2.1	1.4	1.7
Gasoline >2000 cc	1000 vehicles	315	316	332	369	0.1	0.5	1.1	0.8
Diesel <2000 cc	1000 vehicles	741	855	1,140	1,379	2.9	2.9	1.9	2.4
Diesel >2000 cc	1000 vehicles	208	229	284	343	1.9	2.2	1.9	2.0
PreEURO	1000 vehicles	3,070	665	0	0	-26.4	-100.0	0.0	-100.0
EURO I	1000 vehicles	514	365	0	0	-6.6	-95.4	-100.0	-100.0
EURO II	1000 vehicles	1,830	1,656	1	0	-2.0	-51.6	-100.0	-100.0
EURO III	1000 vehicles	6,324	6,197	1,690	0	-0.4	-12.2	-100.0	-100.0
EURO IV	1000 vehicles	0	2,517	1,990	0	0.0	-2.3	-77.5	-53.1
EURO V or later	1000 vehicles	0	1,612	11,866	17,733	0.0	22.1	4.1	12.7
Duty vehicle fleet size	1000 vehicles	1,072	1,342	1,867	2,238	4.6	3.4	1.8	2.6
<3.5 tonnes	1000 vehicles	353	482	729	862	6.4	4.2	1.7	2.9
3.5-7.5 tonnes	1000 vehicles	359	423	551	665	3.4	2.7	1.9	2.3
7.5-16 tonnes	1000 vehicles	94	111	144	174	3.4	2.7	1.9	2.3
16-32 tonnes	1000 vehicles	226	276	374	454	4.1	3.1	2.0	2.5
>32 tonnes	1000 vehicles	41	50	69	84	4.3	3.2	2.0	2.6
PreEURO	1000 vehicles	637	556	275	43	-2.7	-6.8	-16.9	-12.0
EURO I	1000 vehicles	106	104	86	37	-0.4	-1.9	-8.1	-5.1
EURO II	1000 vehicles	110	109	98	57	-0.1	-1.0	-5.3	-3.2
EURO III	1000 vehicles	219	286	277	219	5.5	-0.3	-2.3	-1.3
EURO IV	1000 vehicles	0	182	180	160	0.0	-0.1	-1.2	-0.6
EURO V or later	1000 vehicles	0	105	952	1,722	0.0	24.6	6.1	15.0

ITREN-2030 PT - Portugal		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
<b>TRANSPORT INDICATORS</b>									
Tonnes originated in the country	Million tonnes per year	628	669	760	818	1.3	1.3	0.7	1.0
Freight transport activity originated in the country	Billion tonnes-km per year	86	96	121	141	2.3	2.3	1.5	1.9
Road	Billion tonnes-km per year	56	62	76	87	2.0	2.0	1.4	1.7
Rail	Billion tonnes-km per year	4	4	5	6	2.1	2.1	1.6	1.9
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	26	30	39	47	2.9	2.9	1.8	2.4
Average freight transport distance	km	137	144	159	172	1.0	1.0	0.8	0.9
Freight transport activity on the national territory	Billion tonnes-km per year	53	57	66	73	1.4	1.4	1.0	1.2
Road	Billion tonnes-km per year	50	54	62	68	1.4	1.4	1.0	1.2
Rail	Billion tonnes-km per year	3	3	4	5	1.9	1.9	1.5	1.7
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	5	5	6	7	1.4	1.4	1.0	1.2
Trips originated in the country	Million trips per year	10,069	10,016	10,739	10,968	-0.1	0.7	0.2	0.5
Passenger transport activity originated in the country	Billion pass-km per year	113	115	129	141	0.3	1.2	0.9	1.0
Car	Billion pass-km per year	77	75	86	93	-0.5	1.3	0.8	1.1
Bus	Billion pass-km per year	14	16	16	17	1.7	0.4	0.2	0.3
Rail	Billion pass-km per year	5	6	7	8	3.8	0.6	1.4	1.0
Air (Intra-EU)	Billion pass-km per year	11	12	14	16	1.2	1.8	1.8	1.8
Slow	Billion pass-km per year	6	6	7	8	0.8	1.2	0.9	1.1
Average passenger transport distance	km	11.2	11.4	12.0	12.9	0.4	0.5	0.7	0.6
Passenger transport activity on the national territory	Billion pass-km per year	109	113	123	128	0.8	0.8	0.4	0.6
Road	Billion pass-km per year	104	108	117	121	0.8	0.8	0.4	0.6
Rail	Billion pass-km per year	5	5	6	7	1.4	1.4	1.4	1.4
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	61	63	67	72	0.7	0.7	0.7	0.7
Motorization rate	cars/1000 inhabitants	233	239	249	269	0.5	0.4	0.7	0.6
<b>ECONOMY INDICATORS</b>									
GDP	Billion Euros 2005	117	132	166	202	2.4	2.3	2.0	2.1
Employment	1000 Persons	5,349	4,915	4,821	4,970	-1.7	-0.2	0.3	0.1
Agriculture and fishery	1000 Persons	465	398	375	344	-3.1	-0.6	-0.9	-0.7
Construction	1000 Persons	613	644	638	639	1.0	-0.1	0.0	0.0
Energy and water	1000 Persons	58	63	79	90	1.6	2.3	1.3	1.8
Industry	1000 Persons	1,319	1,160	1,009	977	-2.5	-1.4	-0.3	-0.9
Transport services	1000 Persons	125	124	120	114	-0.1	-0.4	-0.6	-0.5
Other services	1000 Persons	2,769	2,525	2,599	2,808	-1.8	0.3	0.8	0.5
Population total	1000 Persons	10,533	10,667	10,760	10,686	0.3	0.1	-0.1	0.0
Labour force	1000 Persons	6,894	7,050	7,180	6,973	0.4	0.2	-0.3	-0.1
Retired (> 65 years)	1000 Persons	1,548	1,539	1,647	1,994	-0.1	0.7	1.9	1.3
Transport taxation revenues	Million Euros 2005	7,314	7,596	8,762	9,300	0.8	1.4	0.6	1.0
Fuel taxes	Million Euros 2005	4,549	4,831	5,519	5,513	1.2	1.3	0.0	0.7
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	2,765	2,765	3,243	3,787	0.0	1.6	1.6	1.6
<b>ENERGY INDICATORS</b>									
Primary energy production	Billion toe per year	4	6	10	14	11.3	4.3	3.3	3.8
Share of domestic energy production	%	14	23	30	36	10.8	2.4	1.8	2.1
Final energy demand by source	Billion toe per year	27	27	33	38	0.5	1.8	1.4	1.6
Oil	Billion toe per year	16	13	13	13	-4.0	0.0	0.1	0.0
Gas	Billion toe per year	4	5	6	5	4.2	1.6	-0.8	0.4
Coal, Nuclear	Billion toe per year	4	4	7	11	2.7	5.4	4.8	5.1
Biomass	Billion toe per year	3	4	5	6	3.6	3.7	1.6	2.6
Other Renewables	Billion toe per year	1	2	3	3	28.7	1.5	1.5	1.5
Final energy demand by consuming sector	Billion toe per year	19	19	22	24	-0.1	1.4	1.0	1.2
Transport freight	Billion toe per year	1	1	2	2	-0.7	3.0	0.2	1.6
Transport passenger	Billion toe per year	6	6	7	7	0.5	0.4	0.2	0.3
Industry	Billion toe per year	6	6	7	8	-1.0	1.8	1.2	1.5
Residential and services	Billion toe per year	6	6	7	8	0.4	1.6	1.7	1.7
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.83	1.18	1.09	1.17	7.3	-0.8	0.7	-0.1
Gasoline price	Euros2005 per litre	1.08	1.51	1.40	1.50	7.1	-0.8	0.7	-0.1
Biofuels price	Euros2005 per ecccf	0.67	1.17	1.17	1.24	11.9	0.0	0.6	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	3.5	7.1	9.4	1348.1	7.3	2.9	5.1
Share of renewables in electricity	%	16.7	42.2	39.4	37.0	20.3	-0.7	-0.6	-0.7
Share of renewables in final energy demand	%	16.5	24.9	27.2	28.6	8.6	0.9	0.5	0.7
Energy intensity of freight transport activity	toe/1000tkm	17	15	17	15	-2.6	1.0	-1.1	0.0
Energy intensity of passenger transport activity	toe/1000pkm	51	51	48	46	-0.3	-0.5	-0.4	-0.4
Energy intensity of economic activity	toe/Million Euros 1995	165	146	133	120	-2.4	-0.9	-1.0	-0.9

ITREN-2030 PT - Portugal		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	38	40	48	51	1.2	1.8	0.6	1.2
Road freight	Million tonnes per year	10	12	16	20	2.6	3.4	2.0	2.7
Road passenger	Million tonnes per year	26	27	30	29	0.7	1.1	-0.2	0.5
Rail freight	Million tonnes per year	0	0	0	0	1.1	0.9	1.4	1.2
Rail passenger	Million tonnes per year	0	0	0	0	2.7	-0.4	0.3	0.0
Inland navigation	Million tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	4.0	1.2	0.5	0.8
Air (Intra-EU)	Million tonnes per year	1	1	2	2	0.1	0.7	0.6	0.7
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.132	0.137	0.157	0.168	0.7	1.4	0.7	1.0
Road	tonnes/1000 tkm	0.204	0.216	0.263	0.293	1.2	2.0	1.1	1.5
Rail	tonnes/1000 tkm	0.045	0.043	0.039	0.038	-0.9	-1.0	-0.1	-0.6
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.003	0.003	0.003	0.002	1.1	-1.7	-1.3	-1.5
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.227	0.225	0.230	0.214	-0.1	0.2	-0.7	-0.3
Road	tonnes/1000 pkm	0.246	0.246	0.255	0.241	0.0	0.4	-0.6	-0.1
Rail	tonnes/1000 pkm	0.018	0.019	0.016	0.014	1.3	-1.8	-1.1	-1.4
Air (Intra-EU)	tonnes/1000 pkm	0.133	0.125	0.113	0.101	-1.1	-1.0	-1.2	-1.1
NOx Transport emissions	1000 Tonnes per year	85	66	55	51	-5.0	-1.8	-0.7	-1.3
Road freight	1000 Tonnes per year	19	15	11	10	-4.7	-2.6	-1.8	-2.2
Road passenger	1000 Tonnes per year	48	32	22	18	-7.8	-3.6	-2.1	-2.9
Rail freight	1000 Tonnes per year	1	1	1	2	0.0	-0.3	1.6	0.6
Rail passenger	1000 Tonnes per year	1	1	1	1	2.2	-1.2	-0.7	-0.9
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	2	2	2	2	3.6	0.8	0.1	0.5
Air (Intra-EU)	1000 Tonnes per year	14	15	17	19	0.6	1.4	1.2	1.3
PM10 Transport emissions	1000 Tonnes per year	5	5	4	3	-3.3	-2.2	-0.9	-1.5
Road freight	1000 Tonnes per year	2	2	1	1	-4.3	-3.4	-1.1	-2.3
Road passenger	1000 Tonnes per year	3	3	3	2	-2.8	-1.6	-0.8	-1.2
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	2,464	2,554	2,754	2,954	0.7	0.8	0.7	0.7
Gasoline	1000 vehicles	1,842	1,385	928	926	-5.5	-3.9	0.0	-2.0
Diesel	1000 vehicles	616	1,154	1,775	1,957	13.4	4.4	1.0	2.7
LPG/CNG	1000 vehicles	0	0	0	0	0.0	10.2	1.9	6.0
Bioethanol	1000 vehicles	0	0	12	43	109.5	39.8	13.5	26.0
Hybrid	1000 vehicles	5	15	39	28	22.0	10.3	-3.2	3.4
Electric	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	1,343	1,136	827	827	-3.3	-3.1	0.0	-1.6
Gasoline 1400-2000 cc	1000 vehicles	440	226	94	94	-12.5	-8.4	-0.1	-4.3
Gasoline >2000 cc	1000 vehicles	59	22	6	5	-17.7	-12.1	-2.4	-7.4
Diesel <2000 cc	1000 vehicles	387	629	857	938	10.2	3.1	0.9	2.0
Diesel >2000 cc	1000 vehicles	141	211	300	330	8.3	3.6	0.9	2.3
PreEURO	1000 vehicles	436	17	0	0	-47.6	-100.0	0.0	-100.0
EURO I	1000 vehicles	718	320	0	0	-14.9	-96.0	-100.0	-100.0
EURO II	1000 vehicles	518	465	0	0	-2.1	-52.0	-100.0	-100.0
EURO III	1000 vehicles	787	766	208	0	-0.5	-12.2	-100.0	-100.0
EURO IV	1000 vehicles	0	569	451	0	0.0	-2.3	-77.2	-52.8
EURO V or later	1000 vehicles	0	401	2,043	2,882	0.0	17.7	3.5	10.4
Duty vehicle fleet size	1000 vehicles	583	627	714	794	1.4	1.3	1.1	1.2
<3.5 tonnes	1000 vehicles	127	127	130	155	0.0	0.2	1.8	1.0
3.5-7.5 tonnes	1000 vehicles	213	237	284	312	2.2	1.8	0.9	1.4
7.5-16 tonnes	1000 vehicles	56	62	74	82	2.2	1.8	0.9	1.4
16-32 tonnes	1000 vehicles	152	162	181	197	1.3	1.2	0.9	1.0
>32 tonnes	1000 vehicles	36	39	45	48	1.6	1.4	0.9	1.1
PreEURO	1000 vehicles	382	324	158	28	-3.2	-6.9	-15.8	-11.4
EURO I	1000 vehicles	70	69	56	23	-0.4	-2.0	-8.7	-5.4
EURO II	1000 vehicles	65	65	59	36	-0.1	-0.9	-5.0	-3.0
EURO III	1000 vehicles	66	85	82	65	5.1	-0.3	-2.3	-1.3
EURO IV	1000 vehicles	0	59	58	52	0.0	-0.1	-1.1	-0.6
EURO V or later	1000 vehicles	0	26	300	590	0.0	27.9	7.0	17.0

ITREN-2030 RO - Romania		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
<b>TRANSPORT INDICATORS</b>									
Tonnes originated in the country	Million tonnes per year	430	516	750	909	3.7	3.8	1.9	2.9
Freight transport activity originated in the country	Billion tonnes-km per year	167	213	351	469	5.0	5.1	3.0	4.0
Road	Billion tonnes-km per year	63	77	112	145	3.8	3.8	2.7	3.2
Rail	Billion tonnes-km per year	24	32	61	89	6.5	6.5	3.9	5.2
Inland navigation	Billion tonnes-km per year	56	73	124	158	5.4	5.4	2.5	3.9
Maritime (Intra-EU)	Billion tonnes-km per year	24	31	54	77	5.6	5.6	3.5	4.6
Average freight transport distance	km	389	414	468	516	1.3	1.2	1.0	1.1
Freight transport activity on the national territory	Billion tonnes-km per year	87	106	155	201	3.8	3.9	2.6	3.3
Road	Billion tonnes-km per year	61	71	98	121	3.2	3.2	2.2	2.7
Rail	Billion tonnes-km per year	18	23	40	58	5.7	5.7	3.7	4.7
Inland navigation	Billion tonnes-km per year	9	11	17	22	4.2	4.2	2.7	3.4
Freight road vehicles-km on the national territory	Billion vehicles-km per year	8	9	12	16	3.3	3.3	2.5	2.9
Trips originated in the country	Million trips per year	14,146	14,011	14,155	14,250	-0.2	0.1	0.1	0.1
Passenger transport activity originated in the country	Billion pass-km per year	103	103	120	138	0.0	1.5	1.4	1.4
Car	Billion pass-km per year	37	35	44	55	-1.2	2.5	2.1	2.3
Bus	Billion pass-km per year	30	28	28	27	-0.8	-0.1	-0.6	-0.3
Rail	Billion pass-km per year	21	23	29	36	1.8	2.2	2.2	2.2
Air (Intra-EU)	Billion pass-km per year	2	2	3	4	6.0	3.2	2.5	2.8
Slow	Billion pass-km per year	14	15	15	16	1.0	0.6	0.4	0.5
Average passenger transport distance	km	7.3	7.4	8.5	9.7	0.2	1.4	1.3	1.4
Passenger transport activity on the national territory	Billion pass-km per year	132	142	166	200	1.5	1.6	1.9	1.7
Road	Billion pass-km per year	116	126	149	183	1.7	1.7	2.0	1.9
Rail	Billion pass-km per year	16	16	17	17	0.3	0.3	0.3	0.3
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	45	52	68	86	2.8	2.8	2.4	2.6
Motorization rate	cars/1000 inhabitants	186	249	547	774	6.0	8.2	3.5	5.8
<b>ECONOMY INDICATORS</b>									
GDP	Billion Euros 2005	28	31	39	50	1.7	2.4	2.4	2.4
Employment	1000 Persons	8,263	7,926	8,688	8,997	-0.8	0.9	0.3	0.6
Agriculture and fishery	1000 Persons	2,701	2,313	2,264	2,397	-3.1	-0.2	0.6	0.2
Construction	1000 Persons	318	367	481	563	2.9	2.7	1.6	2.2
Energy and water	1000 Persons	140	134	138	154	-0.8	0.3	1.1	0.7
Industry	1000 Persons	3,292	3,330	3,695	3,532	0.2	1.0	-0.5	0.3
Transport services	1000 Persons	272	303	356	377	2.2	1.6	0.6	1.1
Other services	1000 Persons	1,540	1,478	1,755	1,974	-0.8	1.7	1.2	1.5
Population total	1000 Persons	21,916	21,427	20,374	19,342	-0.5	-0.5	-0.5	-0.5
Labour force	1000 Persons	14,004	14,308	13,348	12,472	0.4	-0.7	-0.7	-0.7
Retired (> 65 years)	1000 Persons	3,215	3,172	3,528	3,796	-0.3	1.1	0.7	0.9
Transport taxation revenues	Million Euros 2005	4,258	4,147	4,394	4,634	-0.5	0.6	0.5	0.6
Fuel taxes	Million Euros 2005	4,133	4,010	3,812	3,948	-0.6	-0.5	0.4	-0.1
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	125	138	583	686	1.9	15.5	1.6	8.4
<b>ENERGY INDICATORS</b>									
Primary energy production	Billion toe per year	28	35	45	56	5.2	2.3	2.3	2.3
Share of domestic energy production	%	72	94	114	113	5.5	1.9	-0.1	0.9
Final energy demand by source	Billion toe per year	38	38	39	50	-0.3	0.4	2.4	1.4
Oil	Billion toe per year	9	10	12	15	2.4	1.7	2.6	2.1
Gas	Billion toe per year	14	10	11	12	-6.0	0.4	1.2	0.8
Coal, Nuclear	Billion toe per year	11	12	10	13	2.3	-1.8	3.0	0.6
Biomass	Billion toe per year	4	4	5	7	2.9	2.0	3.5	2.7
Other Renewables	Billion toe per year	2	2	2	3	2.1	1.4	1.7	1.5
Final energy demand by consuming sector	Billion toe per year	25	26	28	34	0.9	0.7	2.1	1.4
Transport freight	Billion toe per year	2	2	2	2	-0.2	1.2	0.3	0.8
Transport passenger	Billion toe per year	3	4	5	7	4.9	3.0	3.1	3.0
Industry	Billion toe per year	10	11	11	14	0.8	-0.1	2.8	1.4
Residential and services	Billion toe per year	10	10	10	11	-0.2	0.3	1.1	0.7
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.46	0.76	0.68	0.75	10.5	-1.1	1.0	-0.1
Gasoline price	Euros2005 per litre	1.00	1.31	1.23	1.30	5.5	-0.6	0.5	0.0
Biofuels price	Euros2005 per ecccf	0.67	1.17	1.17	1.24	11.9	0.0	0.6	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	1.5	0.8	2.7	1064.4	-6.2	12.8	2.8
Share of renewables in electricity	%	37.1	40.7	40.2	34.8	1.8	-0.1	-1.4	-0.8
Share of renewables in final energy demand	%	20.1	21.5	23.4	24.3	1.3	0.8	0.4	0.6
Energy intensity of freight transport activity	toe/1000tkm	18	14	11	8	-4.2	-3.0	-2.5	-2.7
Energy intensity of passenger transport activity	toe/1000pkm	21	25	29	32	3.2	1.3	1.2	1.3
Energy intensity of economic activity	toe/Million Euros 1995	869	835	702	681	-0.8	-1.7	-0.3	-1.0



ITREN-2030 RO - Romania		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	37	34	35	38	-1.7	0.3	0.7	0.5
Road freight	Million tonnes per year	7	7	7	8	-0.9	0.2	1.3	0.7
Road passenger	Million tonnes per year	29	26	26	26	-2.2	-0.2	0.1	0.0
Rail freight	Million tonnes per year	0	1	1	2	9.4	11.0	5.6	8.2
Rail passenger	Million tonnes per year	0	0	0	0	0.5	1.2	1.3	1.3
Inland navigation	Million tonnes per year	0	0	0	0	5.6	6.2	4.1	5.2
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	7.2	2.4	1.6	2.0
Air (Intra-EU)	Million tonnes per year	0	0	1	1	4.8	1.9	1.2	1.6
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.068	0.055	0.042	0.039	-4.2	-2.7	-0.6	-1.7
Road	tonnes/1000 tkm	0.116	0.095	0.071	0.065	-3.9	-2.9	-0.9	-1.9
Rail	tonnes/1000 tkm	0.018	0.022	0.035	0.042	3.5	5.0	1.8	3.4
Inland navigation	tonnes/1000 tkm	0.015	0.016	0.019	0.022	1.3	1.9	1.4	1.7
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.001	0.001	1.5	-3.0	-1.9	-2.4
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.222	0.185	0.156	0.131	-3.6	-1.7	-1.7	-1.7
Road	tonnes/1000 pkm	0.251	0.207	0.171	0.142	-3.8	-1.9	-1.9	-1.9
Rail	tonnes/1000 pkm	0.017	0.017	0.019	0.021	0.3	1.0	1.0	1.0
Air (Intra-EU)	tonnes/1000 pkm	0.189	0.179	0.158	0.140	-1.1	-1.2	-1.2	-1.2
NOx Transport emissions	1000 Tonnes per year	71	56	57	68	-4.4	0.1	1.8	1.0
Road freight	1000 Tonnes per year	19	14	8	5	-5.8	-5.6	-3.5	-4.5
Road passenger	1000 Tonnes per year	39	26	18	15	-8.3	-3.7	-1.8	-2.8
Rail freight	1000 Tonnes per year	3	5	15	28	11.6	12.1	6.1	9.0
Rail passenger	1000 Tonnes per year	3	3	3	3	0.0	0.4	0.4	0.4
Inland navigation	1000 Tonnes per year	2	3	5	8	5.6	6.2	4.1	5.2
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	6.8	2.1	1.3	1.7
Air (Intra-EU)	1000 Tonnes per year	4	5	7	8	5.4	2.6	1.8	2.2
PM10 Transport emissions	1000 Tonnes per year	3	3	6	5	0.4	5.7	-1.3	2.1
Road freight	1000 Tonnes per year	1	1	3	3	3.1	9.3	-1.6	3.7
Road passenger	1000 Tonnes per year	2	2	3	2	-1.2	2.5	-0.9	0.8
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	4,029	5,295	11,189	15,996	5.6	7.8	3.6	5.7
Gasoline	1000 vehicles	2,696	3,399	7,089	10,054	4.7	7.6	3.6	5.6
Diesel	1000 vehicles	1,330	1,885	4,036	5,774	7.2	7.9	3.6	5.8
LPG/CNG	1000 vehicles	0	0	1	1	19.8	13.9	4.4	9.1
Bioethanol	1000 vehicles	0	2	44	154	271.0	33.4	13.4	23.0
Hybrid	1000 vehicles	3	9	19	11	24.9	8.0	-5.5	1.0
Electric	1000 vehicles	0	0	0	0	0.0	0.0	34.0	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	1,944	2,462	5,195	7,409	4.8	7.8	3.6	5.7
Gasoline 1400-2000 cc	1000 vehicles	701	880	1,802	2,523	4.7	7.4	3.4	5.4
Gasoline >2000 cc	1000 vehicles	51	56	91	122	2.0	5.0	3.0	4.0
Diesel <2000 cc	1000 vehicles	1,175	1,698	3,683	5,286	7.6	8.1	3.7	5.8
Diesel >2000 cc	1000 vehicles	155	187	353	489	3.9	6.6	3.3	4.9
PreEURO	1000 vehicles	797	259	0	0	-20.2	-95.8	-100.0	-100.0
EURO I	1000 vehicles	290	246	0	0	-3.2	-76.7	-100.0	-100.0
EURO II	1000 vehicles	1,954	1,842	29	0	-1.2	-33.9	-100.0	-100.0
EURO III	1000 vehicles	985	926	264	0	-1.2	-11.8	-100.0	-100.0
EURO IV	1000 vehicles	0	1,092	836	0	0.0	-2.6	-77.2	-52.9
EURO V or later	1000 vehicles	0	919	9,997	15,830	0.0	27.0	4.7	15.3
Duty vehicle fleet size	1000 vehicles	605	866	2,326	3,642	7.4	10.4	4.6	7.4
<3.5 tonnes	1000 vehicles	183	249	466	704	6.4	6.5	4.2	5.3
3.5-7.5 tonnes	1000 vehicles	202	284	746	1,158	7.0	10.2	4.5	7.3
7.5-16 tonnes	1000 vehicles	53	74	195	303	7.0	10.2	4.5	7.3
16-32 tonnes	1000 vehicles	138	212	721	1,152	8.9	13.0	4.8	8.8
>32 tonnes	1000 vehicles	28	48	198	323	11.0	15.3	5.0	10.1
PreEURO	1000 vehicles	230	193	101	25	-3.4	-6.3	-13.2	-9.8
EURO I	1000 vehicles	43	42	38	20	-0.2	-1.2	-5.9	-3.6
EURO II	1000 vehicles	85	85	78	49	-0.1	-0.8	-4.6	-2.7
EURO III	1000 vehicles	247	294	282	211	3.5	-0.4	-2.9	-1.7
EURO IV	1000 vehicles	0	162	160	143	0.0	-0.1	-1.1	-0.6
EURO V or later	1000 vehicles	0	90	1,668	3,195	0.0	33.9	6.7	19.5

ITREN-2030 SE - Sweden		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	860	866	881	902	0.1	0.2	0.2	0.2
Freight transport activity originated in the country	Billion tonnes-km per year	216	235	279	318	1.7	1.7	1.3	1.5
Road	Billion tonnes-km per year	54	56	62	68	0.9	0.9	1.0	1.0
Rail	Billion tonnes-km per year	24	26	31	37	1.9	1.9	1.7	1.8
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	138	152	186	213	2.0	2.0	1.4	1.7
Average freight transport distance	km	251	271	316	352	1.6	1.6	1.1	1.3
Freight transport activity on the national territory	Billion tonnes-km per year	60	63	70	80	1.1	1.1	1.3	1.2
Road	Billion tonnes-km per year	36	38	40	45	0.6	0.6	1.1	0.9
Rail	Billion tonnes-km per year	23	26	31	36	1.8	1.8	1.5	1.7
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	5	5	5	6	0.5	0.5	1.1	0.8
Trips originated in the country	Million trips per year	10,252	10,144	10,979	11,699	-0.2	0.8	0.6	0.7
Passenger transport activity originated in the country	Billion pass-km per year	137	141	165	185	0.6	1.6	1.2	1.4
Car	Billion pass-km per year	96	95	112	124	-0.2	1.7	1.0	1.3
Bus	Billion pass-km per year	12	12	12	12	1.2	-0.5	0.0	-0.3
Rail	Billion pass-km per year	10	12	14	16	4.2	1.0	1.7	1.3
Air (Intra-EU)	Billion pass-km per year	14	16	21	26	3.0	2.7	2.0	2.4
Slow	Billion pass-km per year	5	5	6	7	1.3	1.5	1.6	1.6
Average passenger transport distance	km	13.3	13.9	15.0	15.8	0.9	0.8	0.5	0.6
Passenger transport activity on the national territory	Billion pass-km per year	126	135	155	174	1.4	1.4	1.2	1.3
Road	Billion pass-km per year	117	125	144	163	1.4	1.4	1.2	1.3
Rail	Billion pass-km per year	9	9	10	11	0.8	0.8	0.8	0.8
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	64	69	82	93	1.7	1.7	1.3	1.5
Motorization rate	cars/1000 inhabitants	511	552	630	691	1.6	1.3	0.9	1.1
ECONOMY INDICATORS									
GDP	Billion Euros 2005	259	279	328	388	1.5	1.6	1.7	1.7
Employment	1000 Persons	4,315	4,231	4,190	4,119	-0.4	-0.1	-0.2	-0.1
Agriculture and fishery	1000 Persons	101	96	88	79	-1.1	-0.8	-1.2	-1.0
Construction	1000 Persons	277	253	220	191	-1.7	-1.4	-1.4	-1.4
Energy and water	1000 Persons	36	36	28	24	0.1	-2.4	-1.7	-2.1
Industry	1000 Persons	1,077	1,118	1,247	1,323	0.7	1.1	0.6	0.8
Transport services	1000 Persons	247	267	292	302	1.6	0.9	0.3	0.6
Other services	1000 Persons	2,577	2,460	2,314	2,201	-0.9	-0.6	-0.5	-0.6
Population total	1000 Persons	9,013	9,156	9,556	9,896	0.3	0.4	0.3	0.4
Labour force	1000 Persons	5,642	5,769	5,871	6,073	0.4	0.2	0.3	0.3
Retired (> 65 years)	1000 Persons	1,431	1,503	1,729	1,822	1.0	1.4	0.5	1.0
Transport taxation revenues	Million Euros 2005	5,739	5,768	7,030	7,618	0.1	2.0	0.8	1.4
Fuel taxes	Million Euros 2005	5,739	5,680	6,346	6,792	-0.2	1.1	0.7	0.9
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	88	684	826	0.0	22.7	1.9	11.8
ENERGY INDICATORS									
Primary energy production	Billion toe per year	33	31	26	22	-1.3	-1.6	-1.9	-1.8
Share of domestic energy production	%	64	61	53	43	-1.0	-1.4	-2.0	-1.7
Final energy demand by source	Billion toe per year	52	51	49	50	-0.3	-0.3	0.1	-0.1
Oil	Billion toe per year	15	13	14	14	-2.7	0.3	0.3	0.3
Gas	Billion toe per year	1	2	4	5	17.3	8.2	2.0	5.0
Coal, Nuclear	Billion toe per year	22	22	11	7	0.6	-6.5	-4.2	-5.4
Biomass	Billion toe per year	7	8	13	15	0.6	5.0	1.6	3.3
Other Renewables	Billion toe per year	6	6	8	9	-2.0	3.0	1.1	2.1
Final energy demand by consuming sector	Billion toe per year	34	33	35	37	-0.6	0.8	0.5	0.6
Transport freight	Billion toe per year	3	3	4	5	0.4	2.2	0.7	1.5
Transport passenger	Billion toe per year	5	6	6	6	1.3	0.4	0.4	0.4
Industry	Billion toe per year	12	12	14	14	-0.7	1.2	0.3	0.8
Residential and services	Billion toe per year	12	12	12	12	-1.6	0.0	0.7	0.4
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.94	1.39	1.26	1.37	8.1	-1.0	0.9	-0.1
Gasoline price	Euros2005 per litre	1.03	1.42	1.30	1.40	6.6	-0.9	0.8	-0.1
Biofuels price	Euros2005 per ecccf	0.66	1.17	1.16	1.24	12.1	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	3.0	3.0	5.2	7.4	-0.1	5.6	3.7	4.6
Share of renewables in electricity	%	54.5	50.6	68.6	73.1	-1.5	3.1	0.6	1.9
Share of renewables in final energy demand	%	36.4	36.2	46.2	49.1	-0.1	2.5	0.6	1.5
Energy intensity of freight transport activity	toe/1000tkm	17	16	16	15	-1.3	0.5	-0.6	-0.1
Energy intensity of passenger transport activity	toe/1000pkm	38	38	34	31	-0.3	-1.1	-0.9	-1.0
Energy intensity of economic activity	toe/Million Euros 1995	130	117	108	96	-2.1	-0.8	-1.2	-1.0

ITREN-2030 SE - Sweden		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	40	40	46	52	0.0	1.4	1.1	1.2
Road freight	Million tonnes per year	15	16	20	24	1.3	2.2	2.0	2.1
Road passenger	Million tonnes per year	22	21	22	23	-1.2	0.6	0.2	0.4
Rail freight	Million tonnes per year	0	0	0	1	2.0	7.9	8.5	8.2
Rail passenger	Million tonnes per year	0	0	0	0	3.2	0.1	0.7	0.4
Inland navigation	Million tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	Million tonnes per year	0	1	1	1	4.2	1.1	0.6	0.8
Air (Intra-EU)	Million tonnes per year	2	3	3	3	1.8	1.7	1.0	1.3
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.078	0.077	0.081	0.086	-0.3	0.5	0.7	0.6
Road	tonnes/1000 tkm	0.412	0.427	0.499	0.541	0.7	1.6	0.8	1.2
Rail	tonnes/1000 tkm	0.004	0.004	0.008	0.015	0.2	5.9	6.9	6.4
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.003	0.003	0.003	0.003	2.1	-0.9	-0.8	-0.8
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.178	0.158	0.146	0.132	-2.4	-0.8	-1.0	-0.9
Road	tonnes/1000 pkm	0.191	0.167	0.155	0.140	-2.6	-0.8	-1.0	-0.9
Rail	tonnes/1000 pkm	0.009	0.010	0.009	0.009	2.4	-0.7	-0.1	-0.4
Air (Intra-EU)	tonnes/1000 pkm	0.179	0.169	0.152	0.137	-1.2	-1.1	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	135	106	95	97	-4.9	-1.1	0.2	-0.4
Road freight	1000 Tonnes per year	39	29	19	15	-5.5	-4.3	-2.5	-3.4
Road passenger	1000 Tonnes per year	54	28	17	15	-12.4	-4.6	-1.3	-2.9
Rail freight	1000 Tonnes per year	1	1	1	1	-1.3	-2.0	1.5	-0.2
Rail passenger	1000 Tonnes per year	2	2	2	1	2.5	-0.9	-0.5	-0.7
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	10	12	12	13	3.8	0.7	0.2	0.4
Air (Intra-EU)	1000 Tonnes per year	30	34	43	52	2.5	2.4	1.8	2.1
PM10 Transport emissions	1000 Tonnes per year	4	4	4	4	-2.4	-0.4	0.8	0.2
Road freight	1000 Tonnes per year	1	1	1	1	-6.0	-3.6	0.2	-1.7
Road passenger	1000 Tonnes per year	3	3	3	3	-1.1	0.5	0.9	0.7
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	4,707	5,289	6,504	7,447	2.4	2.1	1.4	1.7
Gasoline	1000 vehicles	4,353	4,610	5,152	5,722	1.2	1.1	1.1	1.1
Diesel	1000 vehicles	263	451	793	963	11.4	5.8	2.0	3.9
LPG/CNG	1000 vehicles	0	0	1	2	0.0	12.3	2.8	7.5
Bioethanol	1000 vehicles	39	90	257	445	18.5	11.0	5.6	8.3
Hybrid	1000 vehicles	53	137	299	309	20.8	8.1	0.3	4.2
Electric	1000 vehicles	0	0	2	7	45.0	46.9	16.8	31.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	977	846	919	1,006	-2.9	0.8	0.9	0.9
Gasoline 1400-2000 cc	1000 vehicles	2,421	2,595	2,825	3,112	1.4	0.9	1.0	0.9
Gasoline >2000 cc	1000 vehicles	955	1,169	1,408	1,604	4.1	1.9	1.3	1.6
Diesel <2000 cc	1000 vehicles	166	301	546	664	12.6	6.2	2.0	4.0
Diesel >2000 cc	1000 vehicles	96	151	247	299	9.4	5.1	1.9	3.5
PreEURO	1000 vehicles	410	10	0	0	-52.0	-100.0	0.0	-100.0
EURO I	1000 vehicles	1,536	839	0	0	-11.4	-83.8	-100.0	-100.0
EURO II	1000 vehicles	1,267	1,192	12	0	-1.2	-36.8	-100.0	-100.0
EURO III	1000 vehicles	1,401	1,376	574	0	-0.4	-8.4	-92.4	-73.7
EURO IV	1000 vehicles	0	934	813	0	0.0	-1.4	-58.0	-35.6
EURO V or later	1000 vehicles	0	709	4,547	6,686	0.0	20.4	3.9	11.9
Duty vehicle fleet size	1000 vehicles	158	161	170	189	0.5	0.5	1.0	0.8
<3.5 tonnes	1000 vehicles	64	64	66	74	0.2	0.3	1.1	0.7
3.5-7.5 tonnes	1000 vehicles	44	46	49	54	0.7	0.7	1.0	0.9
7.5-16 tonnes	1000 vehicles	12	12	13	14	0.7	0.7	1.0	0.9
16-32 tonnes	1000 vehicles	31	32	34	38	0.6	0.6	1.0	0.8
>32 tonnes	1000 vehicles	7	7	7	8	0.7	0.7	1.0	0.9
PreEURO	1000 vehicles	77	40	0	0	-12.4	-47.3	-100.0	-100.0
EURO I	1000 vehicles	18	17	1	0	-0.8	-23.4	-100.0	-100.0
EURO II	1000 vehicles	30	29	16	0	-0.1	-5.7	-72.9	-49.4
EURO III	1000 vehicles	33	41	38	2	4.4	-0.7	-26.7	-14.7
EURO IV	1000 vehicles	0	22	22	8	0.0	-0.1	-9.0	-4.7
EURO V or later	1000 vehicles	0	12	93	178	0.0	22.7	6.8	14.4

ITREN-2030 SI - Slovenia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	58	63	76	83	1.8	1.9	0.9	1.4
Freight transport activity originated in the country	Billion tonnes-km per year	75	85	110	126	2.6	2.6	1.3	1.9
Road	Billion tonnes-km per year	4	5	6	8	2.6	2.6	1.5	2.1
Rail	Billion tonnes-km per year	2	2	3	4	3.7	3.7	2.3	3.0
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	69	78	101	114	2.6	2.6	1.2	1.9
Average freight transport distance	km	1,308	1,356	1,448	1,507	0.7	0.7	0.4	0.5
Freight transport activity on the national territory	Billion tonnes-km per year	18	20	23	28	1.3	1.4	2.3	1.9
Road	Billion tonnes-km per year	14	14	15	18	0.5	0.5	2.2	1.3
Rail	Billion tonnes-km per year	5	6	8	10	3.5	3.5	2.5	3.0
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	1	1	2	2	0.3	0.3	2.2	1.2
Trips originated in the country	Million trips per year	2,091	2,058	2,147	2,177	-0.3	0.4	0.1	0.3
Passenger transport activity originated in the country	Billion pass-km per year	23	24	27	29	0.6	1.1	0.7	0.9
Car	Billion pass-km per year	19	19	22	24	0.2	1.2	0.7	1.0
Bus	Billion pass-km per year	2	2	2	2	2.0	0.2	0.2	0.2
Rail	Billion pass-km per year	1	1	1	1	3.3	-0.5	-0.1	-0.3
Air (Intra-EU)	Billion pass-km per year	0	1	1	1	7.5	2.8	2.2	2.5
Slow	Billion pass-km per year	1	1	1	1	1.3	0.8	0.5	0.7
Average passenger transport distance	km	11.2	11.7	12.5	13.2	1.0	0.6	0.5	0.6
Passenger transport activity on the national territory	Billion pass-km per year	24	26	28	33	1.0	1.0	1.6	1.3
Road	Billion pass-km per year	24	25	27	32	1.0	1.0	1.7	1.3
Rail	Billion pass-km per year	1	1	1	1	0.8	0.8	0.8	0.8
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	13	13	15	18	1.2	1.2	1.7	1.5
Motorization rate	cars/1000 inhabitants	472	502	565	663	1.2	1.2	1.6	1.4
ECONOMY INDICATORS									
GDP	Billion Euros 2005	26	29	39	48	2.7	2.9	2.1	2.5
Employment	1000 Persons	1,129	1,031	1,019	928	-1.8	-0.1	-0.9	-0.5
Agriculture and fishery	1000 Persons	139	117	112	114	-3.4	-0.4	0.2	-0.1
Construction	1000 Persons	71	77	90	91	1.5	1.5	0.2	0.9
Energy and water	1000 Persons	1	1	1	1	-3.3	-0.8	0.4	-0.2
Industry	1000 Persons	275	208	188	178	-5.5	-1.0	-0.5	-0.8
Transport services	1000 Persons	33	35	37	36	1.0	0.7	-0.3	0.2
Other services	1000 Persons	610	594	591	507	-0.5	-0.1	-1.5	-0.8
Population total	1000 Persons	1,998	2,012	2,020	2,000	0.1	0.0	-0.1	0.0
Labour force	1000 Persons	1,340	1,375	1,362	1,313	0.5	-0.1	-0.4	-0.2
Retired (> 65 years)	1000 Persons	290	306	359	422	1.1	1.6	1.6	1.6
Transport taxation revenues	Million Euros 2005	1,443	1,687	2,138	2,309	3.2	2.4	0.8	1.6
Fuel taxes	Million Euros 2005	1,056	1,270	1,640	1,754	3.8	2.6	0.7	1.6
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	387	417	499	554	1.5	1.8	1.1	1.4
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per ecccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

ITREN-2030 SI - Slovenia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	12	14	19	22	2.8	3.3	1.8	2.6
Road freight	Million tonnes per year	8	10	14	18	3.2	3.8	2.1	2.9
Road passenger	Million tonnes per year	3	3	4	4	1.5	1.9	0.6	1.2
Rail freight	Million tonnes per year	0	0	0	0	9.5	4.5	3.4	3.9
Rail passenger	Million tonnes per year	0	0	0	0	2.1	-1.3	-0.9	-1.1
Inland navigation	Million tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	4.1	1.3	0.9	1.1
Air (Intra-EU)	Million tonnes per year	0	0	0	0	5.1	1.6	1.1	1.3
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.099	0.103	0.119	0.127	0.9	1.4	0.7	1.0
Road	tonnes/1000 tkm	0.614	0.702	0.973	0.961	2.7	3.3	-0.1	1.6
Rail	tonnes/1000 tkm	0.016	0.021	0.023	0.025	5.8	0.9	0.9	0.9
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.000	0.000	1.5	-1.3	-0.3	-0.8
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.130	0.133	0.145	0.130	0.5	0.9	-1.1	-0.1
Road	tonnes/1000 pkm	0.133	0.136	0.150	0.134	0.5	0.9	-1.1	-0.1
Rail	tonnes/1000 pkm	0.016	0.017	0.013	0.011	1.3	-2.1	-1.8	-1.9
Air (Intra-EU)	tonnes/1000 pkm	0.153	0.137	0.122	0.109	-2.2	-1.2	-1.1	-1.1
NOx Transport emissions	1000 Tonnes per year	23	19	16	15	-3.5	-1.7	-0.9	-1.3
Road freight	1000 Tonnes per year	12	11	10	9	-0.6	-1.1	-1.6	-1.3
Road passenger	1000 Tonnes per year	9	6	3	3	-9.8	-5.3	-1.2	-3.3
Rail freight	1000 Tonnes per year	1	1	1	1	2.2	3.5	2.5	3.0
Rail passenger	1000 Tonnes per year	0	0	0	0	1.8	-2.2	-2.1	-2.2
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	3.7	0.9	0.6	0.7
Air (Intra-EU)	1000 Tonnes per year	0	1	1	1	4.8	2.1	1.7	1.9
PM10 Transport emissions	1000 Tonnes per year	1	1	1	1	-1.5	-1.8	-0.4	-1.1
Road freight	1000 Tonnes per year	0	0	0	0	-1.8	-3.7	-0.8	-2.3
Road passenger	1000 Tonnes per year	1	1	1	1	-1.4	-0.8	-0.2	-0.5
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	946	1,008	1,150	1,348	1.3	1.3	1.6	1.5
Gasoline	1000 vehicles	869	914	1,011	1,170	1.0	1.0	1.5	1.2
Diesel	1000 vehicles	75	92	127	158	4.2	3.3	2.2	2.8
LPG/CNG	1000 vehicles	1	2	2	3	8.1	2.7	1.9	2.3
Bioethanol	1000 vehicles	0	1	9	15	23.1	24.3	5.9	14.7
Hybrid	1000 vehicles	0	0	1	1	18.8	18.3	-1.3	8.0
Electric	1000 vehicles	0	0	0	0	17.8	15.7	6.7	11.1
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	539	563	644	732	0.9	1.3	1.3	1.3
Gasoline 1400-2000 cc	1000 vehicles	310	332	350	417	1.4	0.5	1.8	1.1
Gasoline >2000 cc	1000 vehicles	21	19	18	21	-1.8	-0.7	2.0	0.7
Diesel <2000 cc	1000 vehicles	65	79	109	135	4.0	3.3	2.2	2.7
Diesel >2000 cc	1000 vehicles	10	13	18	23	5.4	3.4	2.6	3.0
PreEURO	1000 vehicles	242	36	0	0	-31.7	-100.0	0.0	-100.0
EURO I	1000 vehicles	128	82	0	0	-8.5	-95.7	-100.0	-100.0
EURO II	1000 vehicles	210	185	0	0	-2.5	-64.1	-100.0	-100.0
EURO III	1000 vehicles	364	350	82	0	-0.8	-13.5	-100.0	-100.0
EURO IV	1000 vehicles	0	207	161	0	0.0	-2.4	-77.3	-53.0
EURO V or later	1000 vehicles	0	147	897	1,332	0.0	19.8	4.0	11.6
Duty vehicle fleet size	1000 vehicles	52	55	62	73	1.1	1.2	1.6	1.4
<3.5 tonnes	1000 vehicles	28	31	38	44	2.4	2.0	1.4	1.7
3.5-7.5 tonnes	1000 vehicles	11	11	10	13	-0.8	-0.5	2.0	0.7
7.5-16 tonnes	1000 vehicles	3	3	3	3	-0.8	-0.6	2.0	0.7
16-32 tonnes	1000 vehicles	8	8	8	10	0.1	0.4	2.0	1.2
>32 tonnes	1000 vehicles	2	2	2	2	1.0	1.1	2.0	1.5
PreEURO	1000 vehicles	20	18	10	2	-2.3	-5.6	-14.7	-10.3
EURO I	1000 vehicles	13	13	11	5	-0.3	-1.7	-7.5	-4.7
EURO II	1000 vehicles	10	10	9	5	-0.2	-1.1	-5.5	-3.3
EURO III	1000 vehicles	8	9	9	7	2.2	-0.4	-2.8	-1.6
EURO IV	1000 vehicles	0	2	2	2	0.0	-0.1	-1.2	-0.7
EURO V or later	1000 vehicles	0	2	20	51	0.0	25.2	9.8	17.3

ITREN-2030 SK - Slovakia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	377	378	386	415	0.0	0.2	0.7	0.5
Freight transport activity originated in the country	Billion tonnes-km per year	36	43	63	85	3.8	3.9	3.0	3.4
Road	Billion tonnes-km per year	28	32	44	57	3.1	3.1	2.7	2.9
Rail	Billion tonnes-km per year	8	11	19	28	5.7	5.7	3.6	4.7
Inland navigation	Billion tonnes-km per year	0	0	0	0	5.3	5.3	6.3	5.8
Maritime (Intra-EU)	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Average freight transport distance	km	96	115	164	205	3.7	3.6	2.2	2.9
Freight transport activity on the national territory	Billion tonnes-km per year	23	28	41	55	4.0	4.1	2.9	3.5
Road	Billion tonnes-km per year	15	17	24	31	3.3	3.3	2.8	3.0
Rail	Billion tonnes-km per year	8	10	17	23	5.4	5.4	3.2	4.3
Inland navigation	Billion tonnes-km per year	0	0	1	1	5.0	5.0	2.5	3.7
Freight road vehicles-km on the national territory	Billion vehicles-km per year	3	3	4	5	3.3	3.3	2.4	2.8
Trips originated in the country	Million trips per year	4,629	4,628	4,847	5,020	0.0	0.5	0.4	0.4
Passenger transport activity originated in the country	Billion pass-km per year	45	46	53	58	0.7	1.3	1.0	1.2
Car	Billion pass-km per year	30	31	37	42	0.6	1.7	1.3	1.5
Bus	Billion pass-km per year	8	9	9	9	0.6	0.0	-0.1	0.0
Rail	Billion pass-km per year	4	4	4	5	1.8	0.9	0.8	0.8
Air (Intra-EU)	Billion pass-km per year	0	0	0	0	1.1	2.3	2.3	2.3
Slow	Billion pass-km per year	2	2	2	3	1.3	0.9	0.8	0.8
Average passenger transport distance	km	9.6	10.0	10.9	11.6	0.7	0.8	0.7	0.8
Passenger transport activity on the national territory	Billion pass-km per year	50	51	54	62	0.5	0.5	1.4	1.0
Road	Billion pass-km per year	48	49	52	60	0.5	0.5	1.5	1.0
Rail	Billion pass-km per year	2	2	2	2	0.0	0.0	0.0	0.0
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	19	20	23	28	1.2	1.2	2.0	1.6
Motorization rate	cars/1000 inhabitants	265	285	329	398	1.5	1.4	1.9	1.7
ECONOMY INDICATORS									
GDP	Billion Euros 2005	20	23	30	39	2.7	2.9	2.5	2.7
Employment	1000 Persons	2,748	2,663	2,886	2,936	-0.6	0.8	0.2	0.5
Agriculture and fishery	1000 Persons	245	209	191	184	-3.1	-0.9	-0.4	-0.6
Construction	1000 Persons	305	321	374	429	1.0	1.5	1.4	1.5
Energy and water	1000 Persons	5	5	4	4	0.2	-1.3	0.1	-0.6
Industry	1000 Persons	858	770	734	669	-2.1	-0.5	-0.9	-0.7
Transport services	1000 Persons	91	95	106	111	0.9	1.1	0.4	0.7
Other services	1000 Persons	1,245	1,263	1,476	1,539	0.3	1.6	0.4	1.0
Population total	1000 Persons	5,371	5,341	5,274	5,163	-0.1	-0.1	-0.2	-0.2
Labour force	1000 Persons	3,522	3,645	3,571	3,360	0.7	-0.2	-0.6	-0.4
Retired (> 65 years)	1000 Persons	644	664	858	1,022	0.6	2.6	1.8	2.2
Transport taxation revenues	Million Euros 2005	1,064	1,109	1,493	1,706	0.8	3.0	1.3	2.2
Fuel taxes	Million Euros 2005	961	1,003	1,186	1,332	0.9	1.7	1.2	1.4
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	103	106	307	373	0.5	11.3	2.0	6.5
ENERGY INDICATORS									
Primary energy production	Billion toe per year	7	7	7	8	1.4	0.0	0.9	0.5
Share of domestic energy production	%	37	44	42	40	3.5	-0.5	-0.4	-0.4
Final energy demand by source	Billion toe per year	19	17	18	21	-2.0	0.5	1.3	0.9
Oil	Billion toe per year	3	4	4	5	1.3	1.6	1.7	1.6
Gas	Billion toe per year	5	3	4	4	-12.5	3.1	1.3	2.2
Coal, Nuclear	Billion toe per year	9	9	8	8	-0.1	-1.6	0.7	-0.5
Biomass	Billion toe per year	0	1	1	2	13.3	4.9	4.1	4.5
Other Renewables	Billion toe per year	0	1	1	1	12.1	2.0	1.3	1.7
Final energy demand by consuming sector	Billion toe per year	11	11	12	14	1.0	0.8	1.4	1.1
Transport freight	Billion toe per year	1	1	1	1	1.0	2.9	1.0	1.9
Transport passenger	Billion toe per year	1	1	2	3	5.5	3.3	3.3	3.3
Industry	Billion toe per year	5	5	5	5	2.3	-1.0	0.1	-0.4
Residential and services	Billion toe per year	4	4	5	6	-1.6	1.6	1.8	1.7
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per litre	0.87	1.15	1.08	1.14	5.9	-0.7	0.6	0.0
Gasoline price	Euros2005 per litre	0.91	1.22	1.14	1.20	5.9	-0.7	0.6	0.0
Biofuels price	Euros2005 per eeccf	0.71	1.20	1.20	1.25	11.0	0.0	0.3	0.2
Share of biofuels in gasoline+diesel energy demand	%	0.0	4.2	4.7	8.5	1024.4	1.1	6.2	3.6
Share of renewables in electricity	%	16.6	29.6	30.2	28.5	12.3	0.2	-0.6	-0.2
Share of renewables in final energy demand	%	7.0	11.8	14.9	16.5	11.1	2.4	1.0	1.7
Energy intensity of freight transport activity	toe/1000tkm	26	22	20	16	-2.9	-1.2	-1.9	-1.5
Energy intensity of passenger transport activity	toe/1000pkm	21	27	35	42	5.0	2.8	1.8	2.3
Energy intensity of economic activity	toe/Million Euros 1995	533	491	400	359	-1.6	-2.0	-1.1	-1.6

The iTREN-2030 reference scenario until 2030

ITREN-2030 SK - Slovakia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	8	8	10	12	1.0	1.9	1.7	1.8
Road freight	Million tonnes per year	2	2	2	3	1.9	1.8	2.3	2.1
Road passenger	Million tonnes per year	5	5	6	6	-0.6	1.3	1.0	1.2
Rail freight	Million tonnes per year	1	1	2	3	7.1	3.9	2.7	3.3
Rail passenger	Million tonnes per year	0	0	0	0	0.5	0.0	-0.1	-0.1
Inland navigation	Million tonnes per year	0	0	0	0	6.5	4.4	2.3	3.4
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	4.5	1.5	1.1	1.3
Air (Intra-EU)	Million tonnes per year	0	0	0	0	0.3	1.0	1.1	1.0
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.118	0.117	0.102	0.098	-0.1	-1.3	-0.4	-0.9
Road	tonnes/1000 tkm	0.116	0.108	0.093	0.089	-1.4	-1.4	-0.5	-0.9
Rail	tonnes/1000 tkm	0.124	0.134	0.116	0.111	1.6	-1.4	-0.5	-0.9
Inland navigation	tonnes/1000 tkm	0.030	0.032	0.030	0.030	1.4	-0.5	-0.2	-0.4
Maritime (Intra-EU)	tonnes/1000 tkm	-	-	-	-	-	-	-	-
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.102	0.097	0.105	0.101	-1.1	0.8	-0.4	0.2
Road	tonnes/1000 pkm	0.106	0.100	0.109	0.104	-1.1	0.8	-0.4	0.2
Rail	tonnes/1000 pkm	0.022	0.022	0.022	0.022	0.4	-0.1	-0.2	-0.1
Air (Intra-EU)	tonnes/1000 pkm	0.146	0.140	0.124	0.109	-0.8	-1.3	-1.2	-1.2
NOx Transport emissions	1000 Tonnes per year	39	32	29	32	-3.7	-1.0	0.8	-0.1
Road freight	1000 Tonnes per year	13	11	6	4	-4.1	-5.4	-4.0	-4.7
Road passenger	1000 Tonnes per year	17	10	6	5	-10.4	-5.3	-1.0	-3.2
Rail freight	1000 Tonnes per year	8	11	16	21	6.2	4.1	2.7	3.4
Rail passenger	1000 Tonnes per year	0	0	0	0	0.2	-0.9	-1.3	-1.1
Inland navigation	1000 Tonnes per year	0	0	0	0	6.5	4.4	2.3	3.4
Maritime (Intra-EU)	1000 Tonnes per year	0	0	0	0	4.0	1.1	0.7	0.9
Air (Intra-EU)	1000 Tonnes per year	0	0	0	0	1.1	1.4	1.5	1.5
PM10 Transport emissions	1000 Tonnes per year	2	1	1	1	-5.0	-1.3	0.7	-0.3
Road freight	1000 Tonnes per year	1	1	0	1	-2.1	-1.2	0.5	-0.4
Road passenger	1000 Tonnes per year	1	1	1	1	-6.6	-1.3	0.8	-0.3
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	1,442	1,563	1,837	2,166	1.6	1.6	1.7	1.6
Gasoline	1000 vehicles	1,287	1,364	1,517	1,794	1.2	1.1	1.7	1.4
Diesel	1000 vehicles	142	162	222	275	2.7	3.2	2.2	2.7
LPG/CNG	1000 vehicles	0	0	0	0	12.3	8.3	3.0	5.6
Bioethanol	1000 vehicles	0	0	6	18	41.4	29.9	11.6	20.4
Hybrid	1000 vehicles	12	35	91	77	23.7	10.0	-1.7	4.0
Electric	1000 vehicles	0	0	0	1	25.7	14.4	12.0	13.2
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	803	837	956	1,129	0.8	1.3	1.7	1.5
Gasoline 1400-2000 cc	1000 vehicles	466	506	541	641	1.7	0.7	1.7	1.2
Gasoline >2000 cc	1000 vehicles	18	21	21	23	2.6	-0.2	1.3	0.5
Diesel <2000 cc	1000 vehicles	127	144	197	245	2.6	3.2	2.2	2.7
Diesel >2000 cc	1000 vehicles	15	18	25	30	3.5	3.1	2.0	2.5
PreEURO	1000 vehicles	219	33	0	0	-31.6	-100.0	0.0	-100.0
EURO I	1000 vehicles	228	177	0	0	-4.9	-77.8	-100.0	-100.0
EURO II	1000 vehicles	56	52	0	0	-1.4	-60.4	-100.0	-100.0
EURO III	1000 vehicles	927	893	124	0	-0.7	-17.9	-100.0	-100.0
EURO IV	1000 vehicles	0	220	172	0	0.0	-2.4	-77.4	-53.0
EURO V or later	1000 vehicles	0	153	1,444	2,070	0.0	25.2	3.7	13.9
Duty vehicle fleet size	1000 vehicles	161	189	247	301	3.3	2.7	2.0	2.3
<3.5 tonnes	1000 vehicles	36	46	66	77	5.1	3.6	1.6	2.6
3.5-7.5 tonnes	1000 vehicles	96	109	135	165	2.5	2.2	2.0	2.1
7.5-16 tonnes	1000 vehicles	9	11	14	17	3.5	2.8	2.1	2.5
16-32 tonnes	1000 vehicles	18	22	30	39	3.9	3.1	2.6	2.8
>32 tonnes	1000 vehicles	1	2	2	3	3.5	2.9	2.5	2.7
PreEURO	1000 vehicles	100	84	40	7	-3.5	-7.1	-15.6	-11.5
EURO I	1000 vehicles	8	8	7	3	-0.2	-1.5	-7.0	-4.3
EURO II	1000 vehicles	11	11	10	6	-0.1	-1.0	-5.2	-3.1
EURO III	1000 vehicles	42	50	48	37	3.8	-0.3	-2.5	-1.4
EURO IV	1000 vehicles	0	24	24	21	0.0	-0.1	-1.2	-0.6
EURO V or later	1000 vehicles	0	12	118	226	0.0	25.5	6.7	15.7

ITREN-2030 UK - United Kingdom		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	2,718	2,876	3,220	3,282	1.1	1.1	0.2	0.7
Freight transport activity originated in the country	Billion tonnes-km per year	503	542	629	661	1.5	1.5	0.5	1.0
Road	Billion tonnes-km per year	131	140	160	166	1.3	1.3	0.4	0.9
Rail	Billion tonnes-km per year	28	31	37	40	1.8	1.8	0.9	1.3
Inland navigation	Billion tonnes-km per year	0	0	0	0	1.6	1.6	1.0	1.3
Maritime (Intra-EU)	Billion tonnes-km per year	344	371	432	454	1.5	1.5	0.5	1.0
Average freight transport distance	km	185	189	195	202	0.4	0.4	0.3	0.3
Freight transport activity on the national territory	Billion tonnes-km per year	199	212	242	258	1.3	1.3	0.7	1.0
Road	Billion tonnes-km per year	172	183	207	221	1.3	1.3	0.6	0.9
Rail	Billion tonnes-km per year	27	29	35	37	1.6	1.6	0.8	1.2
Inland navigation	Billion tonnes-km per year	0	0	0	0	1.6	1.6	1.0	1.3
Freight road vehicles-km on the national territory	Billion vehicles-km per year	30	31	33	35	0.5	0.5	0.7	0.6
Trips originated in the country	Million UKips per year	65,883	65,384	69,471	71,852	-0.2	0.6	0.3	0.5
Passenger transport activity originated in the country	Billion pass-km per year	909	940	1,084	1,184	0.7	1.4	0.9	1.2
Car	Billion pass-km per year	675	662	769	824	-0.4	1.5	0.7	1.1
Bus	Billion pass-km per year	53	63	59	61	3.7	-0.7	0.3	-0.2
Rail	Billion pass-km per year	62	85	101	123	6.5	1.7	2.0	1.8
Air (Intra-EU)	Billion pass-km per year	84	93	114	131	2.1	2.0	1.4	1.7
Slow	Billion pass-km per year	34	36	41	46	1.1	1.2	1.1	1.2
Average passenger transport distance	km	13.8	14.4	15.6	16.5	0.8	0.8	0.5	0.7
Passenger transport activity on the national territory	Billion pass-km per year	956	1,016	1,148	1,248	1.2	1.2	0.8	1.0
Road	Billion pass-km per year	889	946	1,073	1,166	1.3	1.3	0.8	1.0
Rail	Billion pass-km per year	66	69	76	82	0.9	0.9	0.9	0.9
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	516	552	631	684	1.3	1.3	0.8	1.1
Motorization rate	cars/1000 inhabitants	433	457	501	527	1.1	0.9	0.5	0.7
ECONOMY INDICATORS									
GDP	Billion Euros 2005	1,131	1,237	1,500	1,795	1.8	2.0	1.8	1.9
Employment	1000 Persons	29,418	28,501	28,237	26,977	-0.6	-0.1	-0.5	-0.3
Agriculture and fishery	1000 Persons	1,651	1,659	1,567	1,361	0.1	-0.6	-1.4	-1.0
Construction	1000 Persons	1,708	1,715	1,707	1,609	0.1	0.0	-0.6	-0.3
Energy and water	1000 Persons	790	818	892	877	0.7	0.9	-0.2	0.3
Industry	1000 Persons	7,146	6,070	5,224	4,922	-3.2	-1.5	-0.6	-1.0
Transport services	1000 Persons	1,022	1,066	1,054	1,047	0.9	-0.1	-0.1	-0.1
Other services	1000 Persons	17,101	17,173	17,794	17,160	0.1	0.4	-0.4	0.0
Population total	1000 Persons	59,987	61,040	62,817	64,215	0.3	0.3	0.2	0.3
Labour force	1000 Persons	37,766	38,914	39,674	39,320	0.6	0.2	-0.1	0.1
Retired (> 65 years)	1000 Persons	8,911	8,980	10,138	12,056	0.2	1.2	1.7	1.5
Transport taxation revenues	Million Euros 2005	31,794	29,448	33,183	34,135	-1.5	1.2	0.3	0.7
Fuel taxes	Million Euros 2005	31,794	29,448	32,299	33,170	-1.5	0.9	0.3	0.6
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	0	0	884	965	0.0	0.0	0.9	0.0
ENERGY INDICATORS									
Primary energy production	Billion toe per year	206	198	153	114	-0.8	-2.6	-2.9	-2.7
Share of domestic energy production	%	88	85	63	43	-0.8	-3.0	-3.6	-3.3
Final energy demand by source	Billion toe per year	234	233	244	263	-0.1	0.4	0.8	0.6
Oil	Billion toe per year	84	84	84	86	-0.2	0.1	0.2	0.1
Gas	Billion toe per year	85	81	95	102	-1.0	1.6	0.8	1.2
Coal, Nuclear	Billion toe per year	60	58	47	54	-0.6	-2.0	1.2	-0.4
Biomass	Billion toe per year	4	8	11	13	16.3	3.9	1.3	2.6
Other Renewables	Billion toe per year	1	3	6	9	26.0	8.0	3.2	5.5
Final energy demand by consuming sector	Billion toe per year	155	151	161	173	-0.5	0.6	0.7	0.7
Transport freight	Billion toe per year	15	15	18	18	0.6	1.6	-0.2	0.7
Transport passenger	Billion toe per year	42	42	45	47	0.1	0.6	0.5	0.5
Industry	Billion toe per year	33	32	36	39	-0.7	1.1	1.0	1.0
Residential and services	Billion toe per year	65	62	63	69	-1.0	0.2	0.9	0.6
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per liUke	1.20	1.58	1.46	1.56	5.6	-0.8	0.7	-0.1
Gasoline price	Euros2005 per liUke	1.23	1.62	1.50	1.60	5.6	-0.8	0.7	-0.1
Biofuels price	Euros2005 per eeccf	0.66	1.17	1.16	1.24	12.0	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	3.2	5.5	7.3	147.1	5.6	2.9	4.2
Share of renewables in electricity	%	5.0	9.8	16.2	17.3	14.3	5.1	0.7	2.9
Share of renewables in final energy demand	%	1.6	3.9	6.7	8.2	19.1	5.5	1.9	3.7
Energy intensity of freight transport activity	toe/1000tkm	27	26	27	25	-0.8	0.2	-0.7	-0.3
Energy intensity of passenger transport activity	toe/1000pkm	40	38	35	34	-1.2	-0.7	-0.4	-0.6
Energy intensity of economic activity	toe/Million Euros 1995	137	122	107	96	-2.2	-1.3	-1.1	-1.2



ITREN-2030 UK - United Kingdom		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	157	151	161	163	-0.9	0.7	0.1	0.4
Road freight	Million tonnes per year	39	38	36	36	-0.3	-0.5	-0.2	-0.4
Road passenger	Million tonnes per year	101	94	104	106	-1.5	1.1	0.1	0.6
Rail freight	Million tonnes per year	1	1	1	1	1.5	1.6	0.8	1.2
Rail passenger	Million tonnes per year	1	1	1	2	5.4	0.8	1.0	0.9
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	1	1	1	1	2.7	0.0	0.0	0.0
Air (Intra-EU)	Million tonnes per year	15	16	17	18	0.9	0.9	0.4	0.7
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.074	0.068	0.057	0.052	-1.7	-1.9	-0.8	-1.3
Road	tonnes/1000 tkm	0.226	0.209	0.175	0.161	-1.6	-1.7	-0.9	-1.3
Rail	tonnes/1000 tkm	0.024	0.024	0.024	0.024	-0.1	0.0	0.0	0.0
Inland navigation	tonnes/1000 tkm	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	tonnes/1000 tkm	0.002	0.003	0.002	0.002	1.2	-1.5	-0.5	-1.0
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.112	0.100	0.097	0.091	-2.4	-0.2	-0.7	-0.5
Road	tonnes/1000 pkm	0.113	0.099	0.097	0.091	-2.7	-0.2	-0.7	-0.4
Rail	tonnes/1000 pkm	0.015	0.018	0.018	0.019	4.5	0.0	0.2	0.1
Air (Intra-EU)	tonnes/1000 pkm	0.179	0.169	0.152	0.137	-1.2	-1.1	-1.0	-1.0
NOx Transport emissions	1000 Tonnes per year	535	433	407	419	-4.1	-0.6	0.3	-0.2
Road freight	1000 Tonnes per year	68	54	32	24	-4.7	-5.2	-2.6	-3.9
Road passenger	1000 Tonnes per year	238	128	87	78	-11.6	-3.8	-1.2	-2.5
Rail freight	1000 Tonnes per year	9	10	12	13	1.8	1.6	0.8	1.2
Rail passenger	1000 Tonnes per year	14	17	18	18	4.6	0.1	0.0	0.0
Inland navigation	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	1000 Tonnes per year	19	21	20	20	2.3	-0.4	-0.4	-0.4
Air (Intra-EU)	1000 Tonnes per year	187	202	238	267	1.6	1.7	1.1	1.4
PM10 Transport emissions	1000 Tonnes per year	37	34	30	31	-2.1	-1.2	0.5	-0.4
Road freight	1000 Tonnes per year	7	6	5	5	-5.1	-2.3	0.7	-0.9
Road passenger	1000 Tonnes per year	30	28	25	26	-1.4	-1.0	0.5	-0.3
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	25,984	28,108	32,119	34,525	1.6	1.3	0.7	1.0
Gasoline	1000 vehicles	20,885	18,942	18,085	18,435	-1.9	-0.5	0.2	-0.1
Diesel	1000 vehicles	5,020	8,866	13,418	15,462	12.1	4.2	1.4	2.8
LPG/CNG	1000 vehicles	0	2	4	5	0.0	8.6	1.5	5.0
Bioethanol	1000 vehicles	0	8	117	241	125.5	31.6	7.4	18.9
Hybrid	1000 vehicles	80	290	492	376	29.6	5.4	-2.6	1.3
Electric	1000 vehicles	0	0	3	7	24.7	33.8	10.7	21.7
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	9,146	9,343	10,442	10,983	0.4	1.1	0.5	0.8
Gasoline 1400-2000 cc	1000 vehicles	9,790	8,055	6,654	6,728	-3.8	-1.9	0.1	-0.9
Gasoline >2000 cc	1000 vehicles	1,948	1,544	989	723	-4.5	-4.4	-3.1	-3.7
Diesel <2000 cc	1000 vehicles	3,932	7,397	11,556	13,453	13.5	4.6	1.5	3.0
Diesel >2000 cc	1000 vehicles	1,948	1,544	989	723	-4.5	-4.4	-3.1	-3.7
PreEURO	1000 vehicles	2,225	276	0	0	-34.1	-56.6	-82.4	-72.3
EURO I	1000 vehicles	4,827	1,486	5	0	-21.0	-43.9	-73.2	-61.2
EURO II	1000 vehicles	7,346	4,053	96	0	-11.2	-31.3	-62.1	-48.9
EURO III	1000 vehicles	11,506	9,148	1,127	2	-4.5	-18.9	-47.1	-34.5
EURO IV	1000 vehicles	0	7,463	2,438	26	0.0	-10.6	-36.6	-24.7
EURO V or later	1000 vehicles	0	5,383	27,842	33,873	0.0	17.9	2.0	9.6
Duty vehicle fleet size	1000 vehicles	1,119	1,150	1,214	1,288	0.5	0.5	0.6	0.6
<3.5 tonnes	1000 vehicles	509	479	426	450	-1.2	-1.2	0.5	-0.3
3.5-7.5 tonnes	1000 vehicles	299	334	402	429	2.3	1.9	0.7	1.3
7.5-16 tonnes	1000 vehicles	78	87	105	112	2.3	1.9	0.7	1.3
16-32 tonnes	1000 vehicles	192	206	231	245	1.4	1.2	0.6	0.9
>32 tonnes	1000 vehicles	41	44	49	52	1.4	1.2	0.6	0.9
PreEURO	1000 vehicles	97	0	0	0	-73.3	-100.0	0.0	-100.0
EURO I	1000 vehicles	175	11	0	0	-42.9	-100.0	0.0	-100.0
EURO II	1000 vehicles	455	268	0	0	-10.0	-100.0	0.0	-100.0
EURO III	1000 vehicles	392	473	12	0	3.8	-30.9	-100.0	-100.0
EURO IV	1000 vehicles	0	262	102	0	0.0	-9.0	-100.0	-100.0
EURO V or later	1000 vehicles	0	135	1,100	1,288	0.0	23.3	1.6	11.9

ITREN-2030 CH - Switzerland		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	89	92	96	98	0.5	0.5	0.2	0.3
Freight transport activity originated in the country	Billion tonnes-km per year	46	46	47	48	0.2	0.2	0.1	0.1
Road	Billion tonnes-km per year	25	25	25	25	0.1	0.1	0.1	0.1
Rail	Billion tonnes-km per year	19	20	20	20	0.3	0.3	0.1	0.2
Inland navigation	Billion tonnes-km per year	2	2	2	2	0.7	0.7	0.1	0.4
Maritime (Intra-EU)	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Average freight transport distance	km	515	508	494	489	-0.3	-0.3	-0.1	-0.2
Freight transport activity on the national territory	Billion tonnes-km per year	32	35	40	43	1.4	1.4	0.9	1.1
Road	Billion tonnes-km per year	22	24	29	32	1.7	1.7	1.1	1.4
Rail	Billion tonnes-km per year	10	10	11	12	0.7	0.7	0.4	0.5
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.9	0.9	0.3	0.6
Freight road vehicles-km on the national territory	Billion vehicles-km per year	2	3	3	3	1.8	1.8	1.1	1.4
Trips originated in the country	Million trips per year	8,426	8,376	8,750	8,731	-0.1	0.4	0.0	0.2
Passenger transport activity originated in the country	Billion pass-km per year	126	128	142	149	0.3	1.0	0.5	0.8
Car	Billion pass-km per year	93	92	101	104	-0.3	1.0	0.2	0.6
Bus	Billion pass-km per year	4	3	2	1	-1.9	-6.1	-3.6	-4.9
Rail	Billion pass-km per year	14	16	19	23	3.5	1.6	1.6	1.6
Air (Intra-EU)	Billion pass-km per year	12	12	15	17	0.7	2.1	1.1	1.6
Slow	Billion pass-km per year	4	4	4	5	1.5	1.3	1.1	1.2
Average passenger transport distance	km	15.0	15.3	16.2	17.1	0.4	0.6	0.5	0.6
Passenger transport activity on the national territory	Billion pass-km per year	149	153	163	174	0.6	0.6	0.6	0.6
Road	Billion pass-km per year	136	140	149	159	0.6	0.6	0.6	0.6
Rail	Billion pass-km per year	13	13	14	15	0.7	0.7	0.7	0.7
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	82	85	91	97	0.7	0.7	0.6	0.7
Motorization rate	cars/1000 inhabitants	0	0	0	0	0.0	0.0	0.0	0.0
ECONOMY INDICATORS									
GDP	Billion Euros 2005	285	314	379	435	1.9	1.9	1.4	1.7
Employment	1000 Persons	4,567	4,221	3,860	3,508	-1.6	-0.9	-1.0	-0.9
Agriculture and fishery	1000 Persons	211	182	153	138	-2.9	-1.7	-1.0	-1.4
Construction	1000 Persons	328	229	122	49	-6.9	-6.1	-8.7	-7.4
Energy and water	1000 Persons	34	37	44	50	1.9	1.8	1.1	1.4
Industry	1000 Persons	937	912	861	792	-0.5	-0.6	-0.8	-0.7
Transport services	1000 Persons	208	201	185	182	-0.6	-0.9	-0.1	-0.5
Other services	1000 Persons	2,849	2,659	2,496	2,297	-1.4	-0.6	-0.8	-0.7
Population total	1000 Persons	7,395	7,495	7,489	7,319	0.3	0.0	-0.2	-0.1
Labour force	1000 Persons	4,730	4,737	4,595	4,296	0.0	-0.3	-0.7	-0.5
Retired (> 65 years)	1000 Persons	1,268	1,398	1,643	1,883	2.0	1.6	1.4	1.5
Transport taxation revenues	Million Euros 2005	5,070	5,011	4,833	4,957	-0.2	-0.4	0.3	-0.1
Fuel taxes	Million Euros 2005	4,291	4,162	4,534	4,608	-0.6	0.9	0.2	0.5
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	779	848	298	349	1.7	-9.9	1.6	-4.4
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per eeccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

ITREN-2030 CH - Switzerland		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	26	25	28	29	-0.7	1.1	0.5	0.8
Road freight	Million tonnes per year	6	6	8	9	0.8	2.6	2.1	2.3
Road passenger	Million tonnes per year	18	17	18	17	-1.2	0.5	-0.2	0.1
Rail freight	Million tonnes per year	-	-	-	-	-	-	-	-
Rail passenger	Million tonnes per year	0	0	0	0	3.1	0.7	0.9	0.8
Inland navigation	Million tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	Million tonnes per year	-	-	-	-	-	-	-	-
Air (Intra-EU)	Million tonnes per year	2	2	2	2	-0.2	1.1	0.2	0.7
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.179	0.174	0.194	0.219	-0.6	1.1	1.2	1.2
Road	tonnes/1000 tkm	0.255	0.245	0.266	0.296	-0.9	0.9	1.0	1.0
Rail	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	-	-	-	-	-	-	-	-
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.127	0.116	0.114	0.105	-1.7	-0.2	-0.9	-0.5
Road	tonnes/1000 pkm	0.133	0.122	0.120	0.110	-1.8	-0.1	-0.9	-0.5
Rail	tonnes/1000 pkm	0.003	0.004	0.004	0.004	2.4	0.0	0.2	0.1
Air (Intra-EU)	tonnes/1000 pkm	0.183	0.175	0.160	0.146	-0.9	-0.9	-0.9	-0.9
NOx Transport emissions	1000 Tonnes per year	95	73	64	62	-5.2	-1.3	-0.3	-0.8
Road freight	1000 Tonnes per year	27	21	13	10	-5.0	-4.6	-3.0	-3.8
Road passenger	1000 Tonnes per year	37	20	13	11	-11.5	-4.2	-1.5	-2.9
Rail freight	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Rail passenger	1000 Tonnes per year	1	1	1	1	2.7	-0.2	-0.2	-0.2
Inland navigation	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	1000 Tonnes per year	2	2	2	2	1.2	-0.9	-0.8	-0.9
Air (Intra-EU)	1000 Tonnes per year	28	29	34	38	0.6	1.9	1.0	1.5
PM10 Transport emissions	1000 Tonnes per year	-	-	-	-	-	-	-	-
Road freight	1000 Tonnes per year	-	-	-	-	-	-	-	-
Road passenger	1000 Tonnes per year	-	-	-	-	-	-	-	-
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	3,812	4,123	4,789	5,340	1.6	1.5	1.1	1.3
Gasoline	1000 vehicles	2,933	3,069	3,400	3,768	0.9	1.0	1.0	1.0
Diesel	1000 vehicles	853	918	980	1,087	1.5	0.7	1.0	0.8
LPG/CNG	1000 vehicles	14	89	284	339	44.7	12.3	1.8	6.9
Bioethanol	1000 vehicles	2	14	59	93	53.2	15.0	4.7	9.7
Hybrid	1000 vehicles	9	32	65	49	28.0	7.3	-2.8	2.1
Electric	1000 vehicles	0	0	2	4	21.1	14.9	7.9	11.3
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	1,849	2,059	2,384	2,675	2.2	1.5	1.2	1.3
Gasoline 1400-2000 cc	1000 vehicles	823	761	796	875	-1.6	0.4	1.0	0.7
Gasoline >2000 cc	1000 vehicles	262	250	220	218	-0.9	-1.2	-0.1	-0.7
Diesel <2000 cc	1000 vehicles	693	758	821	919	1.8	0.8	1.1	1.0
Diesel >2000 cc	1000 vehicles	160	161	159	168	0.0	-0.1	0.6	0.2
PreEURO	1000 vehicles	398	19	0	0	-45.6	-100.0	0.0	-100.0
EURO I	1000 vehicles	835	275	0	0	-19.9	-100.0	0.0	-100.0
EURO II	1000 vehicles	909	668	1	0	-6.0	-48.1	-100.0	-100.0
EURO III	1000 vehicles	1,400	1,278	172	0	-1.8	-18.2	-100.0	-100.0
EURO IV	1000 vehicles	270	950	527	0	28.6	-5.7	-66.0	-43.4
EURO V or later	1000 vehicles	0	934	4,089	5,340	0.0	15.9	2.7	9.1
Duty vehicle fleet size	1000 vehicles	-	-	-	-	-	-	-	-
<3.5 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
3.5-7.5 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
7.5-16 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
16-32 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
>32 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
PreEURO	1000 vehicles	-	-	-	-	-	-	-	-
EURO I	1000 vehicles	-	-	-	-	-	-	-	-
EURO II	1000 vehicles	-	-	-	-	-	-	-	-
EURO III	1000 vehicles	-	-	-	-	-	-	-	-
EURO IV	1000 vehicles	-	-	-	-	-	-	-	-
EURO V or later	1000 vehicles	-	-	-	-	-	-	-	-

ITREN-2030 HR - Croatia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	76	93	139	182	4.1	4.1	2.8	3.4
Freight transport activity originated in the country	Billion tonnes-km per year	109	129	182	229	3.5	3.5	2.4	2.9
Road	Billion tonnes-km per year	12	15	20	25	3.2	3.2	2.3	2.8
Rail	Billion tonnes-km per year	4	5	8	11	4.4	4.4	3.3	3.8
Inland navigation	Billion tonnes-km per year	15	19	31	44	4.9	4.9	3.4	4.2
Maritime (Intra-EU)	Billion tonnes-km per year	77	90	123	150	3.2	3.2	2.0	2.6
Average freight transport distance	km	1,430	1,388	1,310	1,258	-0.6	-0.6	-0.4	-0.5
Freight transport activity on the national territory	Billion tonnes-km per year	15	17	21	27	2.4	2.4	2.4	2.4
Road	Billion tonnes-km per year	11	12	15	19	2.4	2.4	2.3	2.4
Rail	Billion tonnes-km per year	4	5	6	8	2.5	2.5	2.5	2.5
Inland navigation	Billion tonnes-km per year	0	0	0	0	1.2	1.2	1.5	1.4
Freight road vehicles-km on the national territory	Billion vehicles-km per year	1	1	2	2	2.3	2.3	2.2	2.2
Trips originated in the country	Million trips per year	-	-	-	-	-	-	-	-
Passenger transport activity originated in the country	Billion pass-km per year	-	-	-	-	-	-	-	-
Car	Billion pass-km per year	-	-	-	-	-	-	-	-
Bus	Billion pass-km per year	-	-	-	-	-	-	-	-
Rail	Billion pass-km per year	-	-	-	-	-	-	-	-
Air (Intra-EU)	Billion pass-km per year	-	-	-	-	-	-	-	-
Slow	Billion pass-km per year	-	-	-	-	-	-	-	-
Average passenger transport distance	km	-	-	-	-	-	-	-	-
Passenger transport activity on the national territory	Billion pass-km per year	26	28	34	40	1.7	1.7	1.9	1.8
Road	Billion pass-km per year	25	27	33	39	1.8	1.8	1.9	1.8
Rail	Billion pass-km per year	1	1	1	1	0.9	0.9	0.9	0.9
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	13	14	19	23	2.6	2.6	2.2	2.4
Motorization rate	cars/1000 inhabitants	-	-	-	-	-	-	-	-
ECONOMY INDICATORS									
GDP	Billion Euros 2005	-	-	-	-	-	-	-	-
Employment	1000 Persons	-	-	-	-	-	-	-	-
Agriculture and fishery	1000 Persons	-	-	-	-	-	-	-	-
Construction	1000 Persons	-	-	-	-	-	-	-	-
Energy and water	1000 Persons	-	-	-	-	-	-	-	-
Industry	1000 Persons	-	-	-	-	-	-	-	-
Transport services	1000 Persons	-	-	-	-	-	-	-	-
Other services	1000 Persons	-	-	-	-	-	-	-	-
Population total	1000 Persons	-	-	-	-	-	-	-	-
Labour force	1000 Persons	-	-	-	-	-	-	-	-
Retired (> 65 years)	1000 Persons	-	-	-	-	-	-	-	-
Transport taxation revenues	Million Euros 2005	3,130	3,087	3,054	3,191	-0.3	-0.1	0.4	0.2
Fuel taxes	Million Euros 2005	2,024	1,913	2,097	2,149	-1.1	0.9	0.2	0.6
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	1,106	1,174	957	1,042	1.2	-2.0	0.9	-0.6
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per eeccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

ITREN-2030 HR - Croatia		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	18	17	19	20	-0.7	1.3	0.5	0.9
Road freight	Million tonnes per year	5	5	6	7	0.4	1.9	1.7	1.8
Road passenger	Million tonnes per year	11	11	12	12	-1.4	1.1	-0.1	0.5
Rail freight	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Rail passenger	Million tonnes per year	0	0	0	0	3.3	-0.7	0.0	-0.4
Inland navigation	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	2.9	0.2	0.1	0.2
Air (Intra-EU)	Million tonnes per year	1	2	2	2	0.8	1.0	-0.1	0.5
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.050	0.044	0.040	0.038	-2.5	-1.1	-0.3	-0.7
Road	tonnes/1000 tkm	0.429	0.389	0.373	0.351	-1.9	-0.4	-0.6	-0.5
Rail	tonnes/1000 tkm	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0.0
Inland navigation	tonnes/1000 tkm	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.001	0.000	-0.2	-2.9	-1.8	-2.3
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.500	0.434	0.405	0.334	-2.8	-0.7	-1.9	-1.3
Road	tonnes/1000 pkm	0.454	0.388	0.362	0.298	-3.1	-0.7	-1.9	-1.3
Rail	tonnes/1000 pkm	0.110	0.124	0.105	0.095	2.3	-1.6	-1.0	-1.3
Air (Intra-EU)	tonnes/1000 pkm	-	-	-	-	-	-	-	-
NOx Transport emissions	1000 Tonnes per year	81	64	48	43	-4.8	-2.8	-1.1	-1.9
Road freight	1000 Tonnes per year	22	18	10	7	-3.3	-5.9	-3.1	-4.5
Road passenger	1000 Tonnes per year	40	24	14	10	-9.6	-5.5	-3.0	-4.2
Rail freight	1000 Tonnes per year	-	-	-	-	-	-	-	-
Rail passenger	1000 Tonnes per year	1	1	1	1	2.4	-1.2	-0.7	-0.9
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	2.5	-0.1	-0.2	-0.2
Air (Intra-EU)	1000 Tonnes per year	17	18	22	23	1.2	1.7	0.7	1.2
PM10 Transport emissions	1000 Tonnes per year	-	-	-	-	-	-	-	-
Road freight	1000 Tonnes per year	-	-	-	-	-	-	-	-
Road passenger	1000 Tonnes per year	-	-	-	-	-	-	-	-
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	-	-	-	-	-	-	-	-
Gasoline	1000 vehicles	-	-	-	-	-	-	-	-
Diesel	1000 vehicles	-	-	-	-	-	-	-	-
LPG/CNG	1000 vehicles	-	-	-	-	-	-	-	-
Bioethanol	1000 vehicles	-	-	-	-	-	-	-	-
Hybrid	1000 vehicles	-	-	-	-	-	-	-	-
Electric	1000 vehicles	-	-	-	-	-	-	-	-
Fuel cells	1000 vehicles	-	-	-	-	-	-	-	-
Gasoline <1400 cc	1000 vehicles	-	-	-	-	-	-	-	-
Gasoline 1400-2000 cc	1000 vehicles	-	-	-	-	-	-	-	-
Gasoline >2000 cc	1000 vehicles	-	-	-	-	-	-	-	-
Diesel <2000 cc	1000 vehicles	-	-	-	-	-	-	-	-
Diesel >2000 cc	1000 vehicles	-	-	-	-	-	-	-	-
PreEURO	1000 vehicles	-	-	-	-	-	-	-	-
EURO I	1000 vehicles	-	-	-	-	-	-	-	-
EURO II	1000 vehicles	-	-	-	-	-	-	-	-
EURO III	1000 vehicles	-	-	-	-	-	-	-	-
EURO IV	1000 vehicles	-	-	-	-	-	-	-	-
EURO V or later	1000 vehicles	-	-	-	-	-	-	-	-
Duty vehicle fleet size	1000 vehicles	-	-	-	-	-	-	-	-
<3.5 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
3.5-7.5 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
7.5-16 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
16-32 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
>32 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
PreEURO	1000 vehicles	-	-	-	-	-	-	-	-
EURO I	1000 vehicles	-	-	-	-	-	-	-	-
EURO II	1000 vehicles	-	-	-	-	-	-	-	-
EURO III	1000 vehicles	-	-	-	-	-	-	-	-
EURO IV	1000 vehicles	-	-	-	-	-	-	-	-
EURO V or later	1000 vehicles	-	-	-	-	-	-	-	-

ITREN-2030 NO - Norway		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	462	499	579	666	1.5	1.5	1.4	1.5
Freight transport activity originated in the country	Billion tonnes-km per year	314	340	397	447	1.6	1.6	1.2	1.4
Road	Billion tonnes-km per year	36	39	46	53	1.6	1.6	1.4	1.5
Rail	Billion tonnes-km per year	4	4	5	6	2.0	2.0	1.7	1.9
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	274	296	346	388	1.6	1.6	1.1	1.4
Average freight transport distance	km	679	681	685	671	0.1	0.1	-0.2	-0.1
Freight transport activity on the national territory	Billion tonnes-km per year	24	26	31	37	1.8	1.8	1.9	1.8
Road	Billion tonnes-km per year	21	22	27	32	1.7	1.7	1.9	1.8
Rail	Billion tonnes-km per year	3	3	4	5	2.0	2.0	1.8	1.9
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	3	3	4	4	1.9	1.9	2.0	2.0
Trips originated in the country	Million trips per year	4,022	4,103	4,334	4,548	0.4	0.5	0.5	0.5
Passenger transport activity originated in the country	Billion pass-km per year	82	87	99	110	1.2	1.2	1.1	1.2
Car	Billion pass-km per year	61	64	75	84	1.1	1.6	1.2	1.4
Bus	Billion pass-km per year	8	7	5	3	-1.7	-4.2	-3.9	-4.1
Rail	Billion pass-km per year	2	3	3	4	6.3	1.2	2.2	1.7
Air (Intra-EU)	Billion pass-km per year	11	12	15	17	2.2	2.1	1.5	1.8
Slow	Billion pass-km per year	1	1	1	1	1.1	1.0	1.1	1.0
Average passenger transport distance	km	20.4	21.2	22.8	24.1	0.8	0.7	0.6	0.6
Passenger transport activity on the national territory	Billion pass-km per year	103	111	129	153	1.5	1.5	1.7	1.6
Road	Billion pass-km per year	99	107	124	148	1.5	1.5	1.7	1.6
Rail	Billion pass-km per year	4	4	4	5	1.4	1.4	1.4	1.4
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	58	64	77	92	1.9	1.9	1.9	1.9
Motorization rate	cars/1000 inhabitants	0	0	0	0	0.0	0.0	0.0	0.0
ECONOMY INDICATORS									
GDP	Billion Euros 2005	157	182	239	294	3.0	2.8	2.1	2.4
Employment	1000 Persons	2,797	2,827	2,932	2,813	0.2	0.4	-0.4	0.0
Agriculture and fishery	1000 Persons	183	177	183	179	-0.6	0.3	-0.3	0.0
Construction	1000 Persons	136	114	96	80	-3.6	-1.6	-1.9	-1.8
Energy and water	1000 Persons	1	1	0	0	-3.3	-3.2	-2.3	-2.7
Industry	1000 Persons	493	498	490	514	0.2	-0.2	0.5	0.2
Transport services	1000 Persons	235	257	264	257	1.8	0.3	-0.3	0.0
Other services	1000 Persons	1,749	1,780	1,897	1,784	0.4	0.6	-0.6	0.0
Population total	1000 Persons	4,597	4,664	4,756	4,888	0.3	0.2	0.3	0.2
Labour force	1000 Persons	2,870	2,929	2,932	2,909	0.4	0.0	-0.1	0.0
Retired (> 65 years)	1000 Persons	681	702	871	1,036	0.6	2.2	1.8	2.0
Transport taxation revenues	Million Euros 2005	4,560	4,900	5,280	5,685	1.4	0.8	0.7	0.7
Fuel taxes	Million Euros 2005	3,957	4,175	4,639	4,887	1.1	1.1	0.5	0.8
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	602	725	641	798	3.8	-1.2	2.2	0.5
ENERGY INDICATORS									
Primary energy production	Billion toe per year	-	-	-	-	-	-	-	-
Share of domestic energy production	%	-	-	-	-	-	-	-	-
Final energy demand by source	Billion toe per year	-	-	-	-	-	-	-	-
Oil	Billion toe per year	-	-	-	-	-	-	-	-
Gas	Billion toe per year	-	-	-	-	-	-	-	-
Coal, Nuclear	Billion toe per year	-	-	-	-	-	-	-	-
Biomass	Billion toe per year	-	-	-	-	-	-	-	-
Other Renewables	Billion toe per year	-	-	-	-	-	-	-	-
Final energy demand by consuming sector	Billion toe per year	-	-	-	-	-	-	-	-
Transport freight	Billion toe per year	-	-	-	-	-	-	-	-
Transport passenger	Billion toe per year	-	-	-	-	-	-	-	-
Industry	Billion toe per year	-	-	-	-	-	-	-	-
Residential and services	Billion toe per year	-	-	-	-	-	-	-	-
Oil price	Euros2005 per barrel	-	-	-	-	-	-	-	-
Gas price	Euros2005 per boe	-	-	-	-	-	-	-	-
Diesel price	Euros2005 per litre	-	-	-	-	-	-	-	-
Gasoline price	Euros2005 per litre	-	-	-	-	-	-	-	-
Biofuels price	Euros2005 per ecccf	-	-	-	-	-	-	-	-
Share of biofuels in gasoline+diesel energy demand	%	-	-	-	-	-	-	-	-
Share of renewables in electricity	%	-	-	-	-	-	-	-	-
Share of renewables in final energy demand	%	-	-	-	-	-	-	-	-
Energy intensity of freight transport activity	toe/1000tkm	-	-	-	-	-	-	-	-
Energy intensity of passenger transport activity	toe/1000pkm	-	-	-	-	-	-	-	-
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-

ITREN-2030 NO - Norway		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	25	27	31	35	1.3	1.6	1.2	1.4
Road freight	Million tonnes per year	7	8	12	17	3.4	4.1	3.0	3.5
Road passenger	Million tonnes per year	16	16	16	16	0.3	0.2	-0.1	0.0
Rail freight	Million tonnes per year	0	0	0	0	-	-	-	-
Rail passenger	Million tonnes per year	0	0	0	0	5.6	0.3	1.3	0.8
Inland navigation	Million tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	4.1	1.0	0.4	0.7
Air (Intra-EU)	Million tonnes per year	2	2	2	3	1.3	1.2	0.5	0.9
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.024	0.026	0.033	0.039	1.8	2.4	1.7	2.1
Road	tonnes/1000 tkm	0.340	0.368	0.463	0.516	1.6	2.3	1.1	1.7
Rail	tonnes/1000 tkm	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0.0
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.000	0.000	0.000	0.000	2.5	-0.5	-0.8	-0.6
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.157	0.149	0.131	0.110	-1.1	-1.3	-1.7	-1.5
Road	tonnes/1000 pkm	0.159	0.150	0.131	0.109	-1.2	-1.3	-1.8	-1.6
Rail	tonnes/1000 pkm	0.004	0.005	0.004	0.004	4.2	-1.0	-0.1	-0.6
Air (Intra-EU)	tonnes/1000 pkm	0.191	0.182	0.167	0.152	-0.9	-0.9	-0.9	-0.9
NOx Transport emissions	1000 Tonnes per year	73	64	60	62	-2.7	-0.6	0.2	-0.2
Road freight	1000 Tonnes per year	15	14	12	10	-1.2	-2.0	-1.1	-1.6
Road passenger	1000 Tonnes per year	30	18	11	9	-9.4	-4.8	-2.0	-3.4
Rail freight	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Rail passenger	1000 Tonnes per year	0	0	0	0	4.9	-0.7	0.0	-0.4
Inland navigation	1000 Tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	1000 Tonnes per year	2	3	3	3	3.8	0.7	0.0	0.3
Air (Intra-EU)	1000 Tonnes per year	26	28	34	39	2.1	1.9	1.3	1.6
PM10 Transport emissions	1000 Tonnes per year	-	-	-	-	-	-	-	-
Road freight	1000 Tonnes per year	-	-	-	-	-	-	-	-
Road passenger	1000 Tonnes per year	-	-	-	-	-	-	-	-
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	2,147	2,216	2,282	2,418	0.6	0.3	0.6	0.4
Gasoline	1000 vehicles	1,747	1,760	1,563	1,461	0.1	-1.2	-0.7	-0.9
Diesel	1000 vehicles	391	408	350	333	0.9	-1.5	-0.5	-1.0
LPG/CNG	1000 vehicles	2	31	318	550	73.3	26.2	5.6	15.5
Bioethanol	1000 vehicles	0	3	26	55	111.7	26.0	7.7	16.5
Hybrid	1000 vehicles	7	14	25	18	16.7	5.6	-3.0	1.2
Electric	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Fuel cells	1000 vehicles	0	0	0	0	0.0	0.0	0.0	0.0
Gasoline <1400 cc	1000 vehicles	410	381	367	385	-1.5	-0.4	0.5	0.0
Gasoline 1400-2000 cc	1000 vehicles	1,177	1,219	1,063	960	0.7	-1.4	-1.0	-1.2
Gasoline >2000 cc	1000 vehicles	160	160	133	116	-0.1	-1.8	-1.3	-1.6
Diesel <2000 cc	1000 vehicles	264	278	244	236	1.0	-1.3	-0.3	-0.8
Diesel >2000 cc	1000 vehicles	126	130	106	97	0.5	-2.0	-0.8	-1.4
PreEURO	1000 vehicles	310	41	0	0	-33.4	-100.0	0.0	-100.0
EURO I	1000 vehicles	478	206	0	0	-15.5	-56.1	-100.0	-100.0
EURO II	1000 vehicles	536	451	9	0	-3.4	-32.5	-100.0	-100.0
EURO III	1000 vehicles	703	733	182	0	0.8	-13.0	-100.0	-100.0
EURO IV	1000 vehicles	120	409	292	1	27.8	-3.3	-42.7	-25.6
EURO V or later	1000 vehicles	0	376	1,799	2,417	0.0	16.9	3.0	9.7
Duty vehicle fleet size	1000 vehicles	-	-	-	-	-	-	-	-
<3.5 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
3.5-7.5 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
7.5-16 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
16-32 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
>32 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
PreEURO	1000 vehicles	-	-	-	-	-	-	-	-
EURO I	1000 vehicles	-	-	-	-	-	-	-	-
EURO II	1000 vehicles	-	-	-	-	-	-	-	-
EURO III	1000 vehicles	-	-	-	-	-	-	-	-
EURO IV	1000 vehicles	-	-	-	-	-	-	-	-
EURO V or later	1000 vehicles	-	-	-	-	-	-	-	-

ITREN-2030 TR - Turkey		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
TRANSPORT INDICATORS									
Tonnes originated in the country	Million tonnes per year	189	208	255	309	2.0	2.0	2.0	2.0
Freight transport activity originated in the country	Billion tonnes-km per year	199	232	316	405	3.1	3.1	2.5	2.8
Road	Billion tonnes-km per year	108	122	156	184	2.5	2.5	1.7	2.1
Rail	Billion tonnes-km per year	6	7	9	11	2.6	2.6	2.1	2.4
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	Billion tonnes-km per year	85	103	151	209	3.9	3.9	3.4	3.6
Average freight transport distance	km	1,057	1,114	1,239	1,309	1.1	1.1	0.5	0.8
Freight transport activity on the national territory	Billion tonnes-km per year	39	45	59	74	2.8	2.8	2.2	2.5
Road	Billion tonnes-km per year	32	37	48	60	2.8	2.8	2.2	2.5
Rail	Billion tonnes-km per year	7	8	11	13	2.6	2.6	2.1	2.4
Inland navigation	Billion tonnes-km per year	0	0	0	0	0.0	0.0	0.0	0.0
Freight road vehicles-km on the national territory	Billion vehicles-km per year	8	9	12	16	3.2	3.2	3.0	3.1
Trips originated in the country	Million SKips per year	-	-	-	-	-	-	-	-
Passenger transport activity originated in the country	Billion pass-km per year	-	-	-	-	-	-	-	-
Car	Billion pass-km per year	-	-	-	-	-	-	-	-
Bus	Billion pass-km per year	-	-	-	-	-	-	-	-
Rail	Billion pass-km per year	-	-	-	-	-	-	-	-
Air (Intra-EU)	Billion pass-km per year	-	-	-	-	-	-	-	-
Slow	Billion pass-km per year	-	-	-	-	-	-	-	-
Average passenger transport distance	km	-	-	-	-	-	-	-	-
Passenger transport activity on the national territory	Billion pass-km per year	160	173	211	273	1.6	2.0	2.6	2.3
Road	Billion pass-km per year	158	168	191	223	1.3	1.3	1.6	1.4
Rail	Billion pass-km per year	2	4	19	50	15.8	15.8	9.9	12.8
Passenger road vehicles-km on the national territory	Billion vehicles-km per year	49	60	91	123	4.2	4.2	3.1	3.6
Motorization rate	cars/1000 inhabitants	-	-	-	-	-	-	-	-
ECONOMY INDICATORS									
GDP	Billion Euros 2005	-	-	-	-	-	-	-	-
Employment	1000 Persons	-	-	-	-	-	-	-	-
Agriculture and fishery	1000 Persons	-	-	-	-	-	-	-	-
Construction	1000 Persons	-	-	-	-	-	-	-	-
Energy and water	1000 Persons	-	-	-	-	-	-	-	-
Industry	1000 Persons	-	-	-	-	-	-	-	-
Transport services	1000 Persons	-	-	-	-	-	-	-	-
Other services	1000 Persons	-	-	-	-	-	-	-	-
Population total	1000 Persons	-	-	-	-	-	-	-	-
Labour force	1000 Persons	-	-	-	-	-	-	-	-
Retired (> 65 years)	1000 Persons	-	-	-	-	-	-	-	-
Transport taxation revenues	Million Euros 2005	3,130	3,087	3,054	3,191	-0.3	-0.1	0.4	0.2
Fuel taxes	Million Euros 2005	2,024	1,913	2,097	2,149	-1.1	0.9	0.2	0.6
Emissions certificate	Million Euros 2005	0	0	0	0	0.0	0.0	0.0	0.0
Road charges	Million Euros 2005	1,106	1,174	957	1,042	1.2	-2.0	0.9	-0.6
ENERGY INDICATORS									
Primary energy production	Billion toe per year	26	38	61	88	8.5	4.7	3.8	4.3
Share of domestic energy production	%	30	34	33	34	2.7	-0.3	0.2	0.0
Final energy demand by source	Billion toe per year	86	113	184	261	5.7	5.0	3.6	4.3
Oil	Billion toe per year	29	28	34	44	-1.0	2.1	2.5	2.3
Gas	Billion toe per year	23	30	49	68	5.2	5.1	3.3	4.2
Coal, Nuclear	Billion toe per year	25	44	81	120	12.0	6.4	4.0	5.2
Biomass	Billion toe per year	5	7	12	18	5.5	5.7	4.0	4.8
Other Renewables	Billion toe per year	4	5	8	12	7.0	3.4	4.9	4.2
Final energy demand by consuming sector	Billion toe per year	62	74	118	163	3.4	4.8	3.3	4.0
Transport freight	Billion toe per year	4	5	9	12	3.8	5.7	3.2	4.5
Transport passenger	Billion toe per year	11	13	17	22	3.9	3.1	2.5	2.8
Industry	Billion toe per year	22	26	46	64	3.9	5.7	3.4	4.5
Residential and services	Billion toe per year	26	30	46	65	2.8	4.5	3.5	4.0
Oil price	Euros2005 per barrel	44	92	78	90	16.0	-1.7	1.5	-0.1
Gas price	Euros2005 per boe	22	39	36	43	12.0	-0.8	1.8	0.5
Diesel price	Euros2005 per lISke	1.06	1.38	1.28	1.36	5.4	-0.7	0.6	0.0
Gasoline price	Euros2005 per lISke	1.37	1.67	1.56	1.65	4.0	-0.6	0.6	0.0
Biofuels price	Euros2005 per eeccf	0.66	1.17	1.16	1.24	12.0	-0.1	0.7	0.3
Share of biofuels in gasoline+diesel energy demand	%	0.0	3.9	9.2	13.3	1558.6	9.1	3.7	6.4
Share of renewables in electricity	%	24.1	26.7	24.6	25.3	2.0	-0.8	0.3	-0.3
Share of renewables in final energy demand	%	14.1	14.5	12.8	13.4	0.6	-1.3	0.5	-0.4
Energy intensity of freight transport activity	toe/1000tkm	33	33	41	42	0.3	2.1	0.1	1.1
Energy intensity of passenger transport activity	toe/1000pkm	66	74	82	81	2.3	1.1	-0.1	0.5
Energy intensity of economic activity	toe/Million Euros 1995	-	-	-	-	-	-	-	-



ITREN-2030 TR - Turkey		Reference scenario							
Variable	Unit	Absolute values				Average annual % change			
		2005	2010	2020	2030	'05-'10	'10-'20	'20-'30	'10-'30
ENVIRONMENTAL INDICATORS									
CO2 Transport emissions	Million tonnes per year	18	17	19	20	-0.7	1.3	0.5	0.9
Road freight	Million tonnes per year	5	5	6	7	0.4	1.9	1.7	1.8
Road passenger	Million tonnes per year	11	11	12	12	-1.4	1.1	-0.1	0.5
Rail freight	Million tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Rail passenger	Million tonnes per year	0	0	0	0	3.3	-0.7	0.0	-0.4
Inland navigation	Million tonnes per year	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	Million tonnes per year	0	0	0	0	2.9	0.2	0.1	0.2
Air (Intra-EU)	Million tonnes per year	1	2	2	2	0.8	1.0	-0.1	0.5
CO2 intensity of freight transport activity	tonnes/1000 tkm	0.037	0.032	0.027	0.024	-3.0	-1.6	-1.3	-1.4
Road	tonnes/1000 tkm	0.142	0.126	0.116	0.111	-2.4	-0.8	-0.5	-0.7
Rail	tonnes/1000 tkm	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0.0
Inland navigation	tonnes/1000 tkm	-	-	-	-	-	-	-	-
Maritime (Intra-EU)	tonnes/1000 tkm	0.001	0.001	0.000	0.000	-0.9	-3.6	-3.1	-3.3
CO2 intensity of passenger transport activity	tonnes/1000 pkm	0.081	0.071	0.065	0.049	-2.6	-1.0	-2.6	-1.8
Road	tonnes/1000 pkm	0.072	0.063	0.062	0.052	-2.6	-0.2	-1.6	-0.9
Rail	tonnes/1000 pkm	0.041	0.023	0.005	0.002	-10.8	-14.2	-9.1	-11.7
Air (Intra-EU)	tonnes/1000 pkm	-	-	-	-	-	-	-	-
NOx Transport emissions	1000 Tonnes per year	81	64	48	43	-4.8	-2.8	-1.1	-1.9
Road freight	1000 Tonnes per year	22	18	10	7	-3.3	-5.9	-3.1	-4.5
Road passenger	1000 Tonnes per year	40	24	14	10	-9.6	-5.5	-3.0	-4.2
Rail freight	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Rail passenger	1000 Tonnes per year	1	1	1	1	2.4	-1.2	-0.7	-0.9
Inland navigation	1000 Tonnes per year	0	0	0	0	0.0	0.0	0.0	0.0
Maritime (Intra-EU)	1000 Tonnes per year	1	1	1	1	2.5	-0.1	-0.2	-0.2
Air (Intra-EU)	1000 Tonnes per year	17	18	22	23	1.2	1.7	0.7	1.2
PM10 Transport emissions	1000 Tonnes per year	-	-	-	-	-	-	-	-
Road freight	1000 Tonnes per year	-	-	-	-	-	-	-	-
Road passenger	1000 Tonnes per year	-	-	-	-	-	-	-	-
VEHICLE FLEET INDICATORS									
Car fleet size	1000 vehicles	-	-	-	-	-	-	-	-
Gasoline	1000 vehicles	-	-	-	-	-	-	-	-
Diesel	1000 vehicles	-	-	-	-	-	-	-	-
LPG/CNG	1000 vehicles	-	-	-	-	-	-	-	-
Bioethanol	1000 vehicles	-	-	-	-	-	-	-	-
Hybrid	1000 vehicles	-	-	-	-	-	-	-	-
Electric	1000 vehicles	-	-	-	-	-	-	-	-
Fuel cells	1000 vehicles	-	-	-	-	-	-	-	-
Gasoline <1400 cc	1000 vehicles	-	-	-	-	-	-	-	-
Gasoline 1400-2000 cc	1000 vehicles	-	-	-	-	-	-	-	-
Gasoline >2000 cc	1000 vehicles	-	-	-	-	-	-	-	-
Diesel <2000 cc	1000 vehicles	-	-	-	-	-	-	-	-
Diesel >2000 cc	1000 vehicles	-	-	-	-	-	-	-	-
PreEURO	1000 vehicles	-	-	-	-	-	-	-	-
EURO I	1000 vehicles	-	-	-	-	-	-	-	-
EURO II	1000 vehicles	-	-	-	-	-	-	-	-
EURO III	1000 vehicles	-	-	-	-	-	-	-	-
EURO IV	1000 vehicles	-	-	-	-	-	-	-	-
EURO V or later	1000 vehicles	-	-	-	-	-	-	-	-
Duty vehicle fleet size	1000 vehicles	-	-	-	-	-	-	-	-
<3.5 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
3.5-7.5 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
7.5-16 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
16-32 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
>32 tonnes	1000 vehicles	-	-	-	-	-	-	-	-
PreEURO	1000 vehicles	-	-	-	-	-	-	-	-
EURO I	1000 vehicles	-	-	-	-	-	-	-	-
EURO II	1000 vehicles	-	-	-	-	-	-	-	-
EURO III	1000 vehicles	-	-	-	-	-	-	-	-
EURO IV	1000 vehicles	-	-	-	-	-	-	-	-
EURO V or later	1000 vehicles	-	-	-	-	-	-	-	-