

## The SCENES model in TREMOVE

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## The SCENES model in TREMOVE

- Brief presentation of the SCENES European transport model
- The linkage of SCENES and TREMOVE models
- The adaptation of the SCENES output to TREMOVE needs

## History of SCENES

STREAMS model started in 1997

Team comprised:

- MEAP (UK) – now WSP
- TRT (IT)
- University of Dortmund (DE)
- MECSA (ES)
- LT (FI)

SCENES completed in 2001

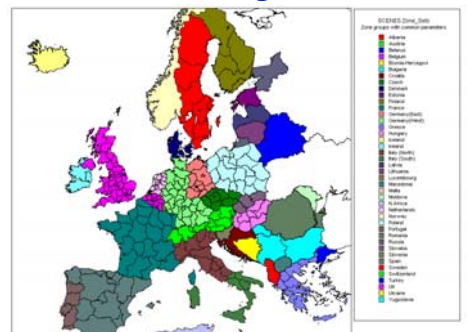
## Main features of the SCENES model / 1

- Incorporates all travel on all modes for all EU and much of the rest of Europe
- Has separate passenger and freight demand modules
- 4 stage transport model
  - detailed physical networks for each mode /intermodal service
  - 11 freight modes
  - 6 passenger modes

## Main features of the SCENES model / 2

- Feedback loop for highway congestion on road
- Uses 244 EU & Acc zones – NUTS II, plus 21 external zones, plus 7 intrazonal distance-band zones
- 1995 calibration and validation
- 2020 forecast scenario, based on constant costs/tariffs with TENS included

## The SCENES zoning scheme



## Passenger demand

Demand matrix based on:

- national travel survey derived trip rates
- population in 20 socio-economic groups per zone
- 10 trip purpose categories
- costs of transport by mode and country
- calibration parameters

*Passenger model includes 8 Accession Countries*

## Freight Demand

Demand matrix based on:

- 15 EU Input / Output tables in a Regional Economic Model
- Calculates zonal demand, using 24 economic sectors/commodity types
- Trade in each sector moves from production to consumption zones
- Ratios then translate monetary trade into tonnes moved, for 13 Transport Flows

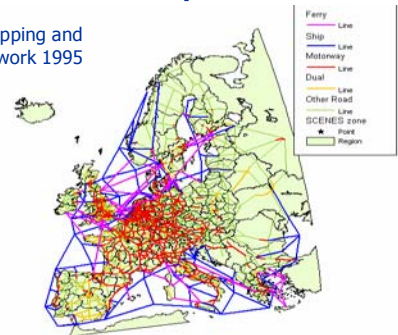
## Supply Representation

Model uses detailed transport networks:

- Multi-modal networks for road, rail, air, sea, inland waterway and pipeline
- Uses a 'dummy zone' system to include all intra-zonal passenger trips
- Network costs represented for all modes / countries
- Intermodal movements are assigned explicitly

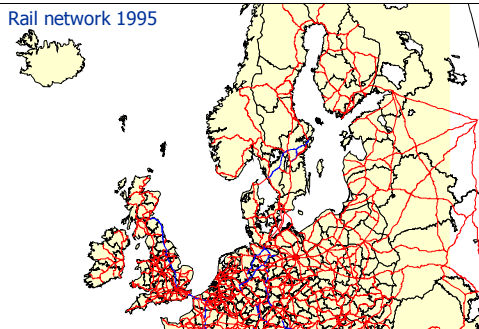
## The SCENES transport network

Road, Shipping and Ferry network 1995



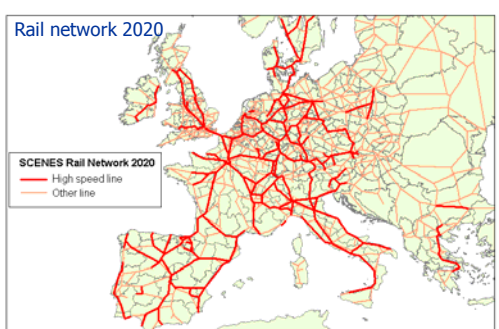
## The SCENES transport network

Rail network 1995



## The SCENES transport network

Rail network 2020



## Network supply characteristics

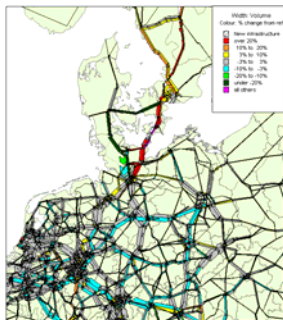
- travel time
  - Includes congestion from passengers and freight
- monetary cost
  - vehicle operating cost for cars & lorries
  - user tariff for other modes
  - may vary by commodity/passenger/vehicle type by country
- distance

## Recent uses of the SCENES model in EC studies

- **MC-ICAM:** to analyse impacts of socially optimum pricing
- **IASON:** to estimate wider economic benefits of transport initiatives
- **TIPMAC:** to interconnect a multicountry EU macroeconomic model to the SCENES model
- **SPECTRUM:** To analyse the transport impacts of combinations of policy measures

## Fast TENs & fuel tax network impacts, 2010

IASON project



## Recent SCENES model developments

- GDP growth rates and Population growth rates for Acc. Countries match those in PRIMES
- Freight supply characteristics updated
- Improved 2020 long distance passenger movements
- Recalibration of passenger flows in Germany
- Improved freight flows to/from Eastern Europe
- Highest EU car ownership growth assumptions reduced

## The use of SCENES in TREMOVE

to provide a spatially detailed 1995 database from which aggregated data is extracted  
*many existing published data sets are not complete or not consistent across Europe*

to provide a 2020 Baseline Scenario dataset of transport demand and costs  
*taking account of impacts on transport demand of changes in network infrastructure*

## Assumptions for 2020 Baseline

- TEN's infrastructure – Van Miert
- Constant transport costs and tariffs
- Car ownership growth rates – partly SCENES
- Population growth matches PRIMES by country
- Rate of growth in domestic final demand
  - matches PRIMES GDP growth rates for each country
- Breakdown of growth between economic sectors
  - based on E3ME macroeconomic model of EU
- Employment growth is from E3ME model,
  - see App. 1 of TIPMAC D7 at

<http://www.camecon.com/services/projects/Tipmac/pdfs/D7v2.pdf>

## The baseline infrastructure scenario

The infrastructure scenario incorporated TEN-T core projects as complete in the SCENES 2020 network.

The list and modifications are derived from the DG-TREN TIPMAC project.

The actual link-based implementations are derived from the network changes provided by IRPUD.

## The adaptation of the SCENES output to TREMOVE needs

Demand volumes (pass-km) per year are transferred from SCENES to TREMOVE.

- Match SCENES zoning system to TREMOVE metropolitan, other urban, non-urban zones by country
- Match SCENES purpose, mode and vehicle categories to TREMOVE
- Introduce exogenous data to split
  - m/c' and mopeds
  - vans and cars by size and fuel type
  - tram and metro

## Regions

The SCENES model produces Origin/Destination matrices at the NUTS II zoning level.

The zone list was arranged into country sets and ordered by population density (REGIO 1995 data) and all zones ranked highest in their respective countries were then classified as Metropolitan

The cumulative population totals were used to determine the cut off between Urban and Non-Urban zones

## Regions and metropolitan areas

Country	Metropolitan area	Country	Metropolitan area
<b>Austria</b>	Vienna	<b>Ireland</b>	Dublin
<b>Belgium</b>	Brussels	<b>Italy</b>	Rome
<b>Switzerland</b>	Zurich	<b>Luxembourg</b>	-
<b>Czech Republic</b>	Prague	<b>The Netherlands</b>	Randstad
<b>Germany</b>	Berlin	<b>Norway</b>	Oslo
<b>Denmark</b>	Copenhagen	<b>Poland</b>	Warsaw
<b>Spain</b>	Madrid	<b>Portugal</b>	Lisbon
<b>Finland</b>	Helsinki	<b>Sweden</b>	Stockholm
<b>France</b>	Paris	<b>Slovenia</b>	-
<b>Greece</b>	Athens	<b>United Kingdom</b>	London
<b>Hungary</b>	Budapest		

## Demand segments - Passengers

TREMOVE	SCENES
Commuting	<i>Commuting and Business - short</i> <i>Commuting and Business - long</i> <i>International Business</i>
Non-working	<i>Shopping, Personal &amp; Educational - short</i> <i>Shopping, Personal &amp; Educational - long</i> <i>Visiting friends &amp; relatives, Entert. - short</i> <i>Visiting friends &amp; relatives, Entert. - long</i> <i>Domestic holiday</i> <i>International holiday</i>

## Demand segments - Freight

TREMOVE	SCENES
Bulk	<i>Solid fuels and ores</i> <i>Petroleum products</i> <i>Crude building materials</i> <i>Basic chemicals</i>
General Cargo	<i>Cereals and agriculture products</i> <i>Metal products</i> <i>Fertilisers, plastic and other chemicals</i> <i>Large Machinery</i>
Unitised	<i>Consumer food</i> <i>Conditioned food</i> <i>Cement and manufact. building materials</i> <i>Small Machinery</i> <i>Miscell. manufact. articles</i>

## Mode of transport - Passengers

TREMOVE	SCENES
Slow	Slow
Bus (Urban & Non Urban)	Coach
Train (Urban & Non Urban)	Train High Speed Train International Train
Plane	Air Business Air Independent Air Charter
Big Car	Car
Small Car	
Motorcycle	n.a.

## Mode of transport - Passengers

SCENES does not divide cars into large and small car. Ratios of large cars versus small cars were computed from data from TRENDS and TRENEN – ECMT

Motorcycles are considered in SCENES as part of car traffic. Based on TRENDS data, the total amount of moped and motorcycle vehicle kilometres was estimated.

Based on external information, tram and metro demand was estimated as share of the urban train kilometres of SCENES.

## Mode of transport - Freight

TREMOVE	SCENES
Inland Navigation	Bulk Inland Waterway Unitised Inland Waterway Intrazonal Inland Waterway
Train	Bulk Rail Unitised Rail Shuttle Trains Intrazonal Rail
Heavy Duty Vehicles	LGV HGV Intrazonal road
Light Duty Vehicles	n.a.

## Mode of transport – Freight - LDV

LDVs are not modelled in SCENES: total LDV kilometres were estimated from TRENDS data.

Based on a former study, the total amount of LDV kilometres was set up according to the travel purpose:

10% Non work - 10% Commuting - 50% Business  
30% Freight

The total amount of LDV kilometres was divided between 'large car' and 'small truck' applying purpose percentages to total data.

## Distance/Road type

In TREMOVE, within the metropolitan and other urban area only one type of road is present. In the non-urban regions, motorways and other roads are modelled separately and trips are split into long (>500km) and short distances.

The SCENES Origin/Destination matrices can identify long and short distance trips.

The classification of the links of the SCENES network into different road categories can identify the share of traffic on motorways and other roads

## Peak/Off peak

SCENES describes transport over a complete day, while TREMOVE explicitly separates peak and off-peak periods.

The division of the peak from the off-peak traffic was based on the trip purpose profile of trips by time of day from national UK travel survey data.

The peak period is supposed to last 6 hours, while off-peak period takes 18 hours.

## Time/Value of time

The speed on a road type in TREMOVE (metropolitan, other urban, non-urban motorways and other non-urban roads) is a weighted average over SCENES links.

The speed of transit modes is also drawn from the SCENES model results.

Value of time is estimated from the values used in SCENES plus additional information used to weight value of waiting time (estimated 60% higher than in-vehicle value of time).

## SCENES improvements planned in Lot 2

- Increased use of "official" country projections for inputs
  - *Car ownership growth*
  - *Future changes in transport costs/tariffs*
- Improved load factors and shares of trucks by size
- Improved data on
  - *Large/ small cars*
  - *Train/tram/metro split*
- Improved split between urban/non-urban