

RAIL FORUM EUROPE

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TRANSPORT

ALSTOM

Agenda

1. Presentation of ALSTOM

2. Transport GHG emissions & EU action

3. CO2 & rail: insight from industry

4. The way forward: ALSTOM key messages

Three main activities

93500 employees in 70 countries



Power sector
Equipment & services for power generation

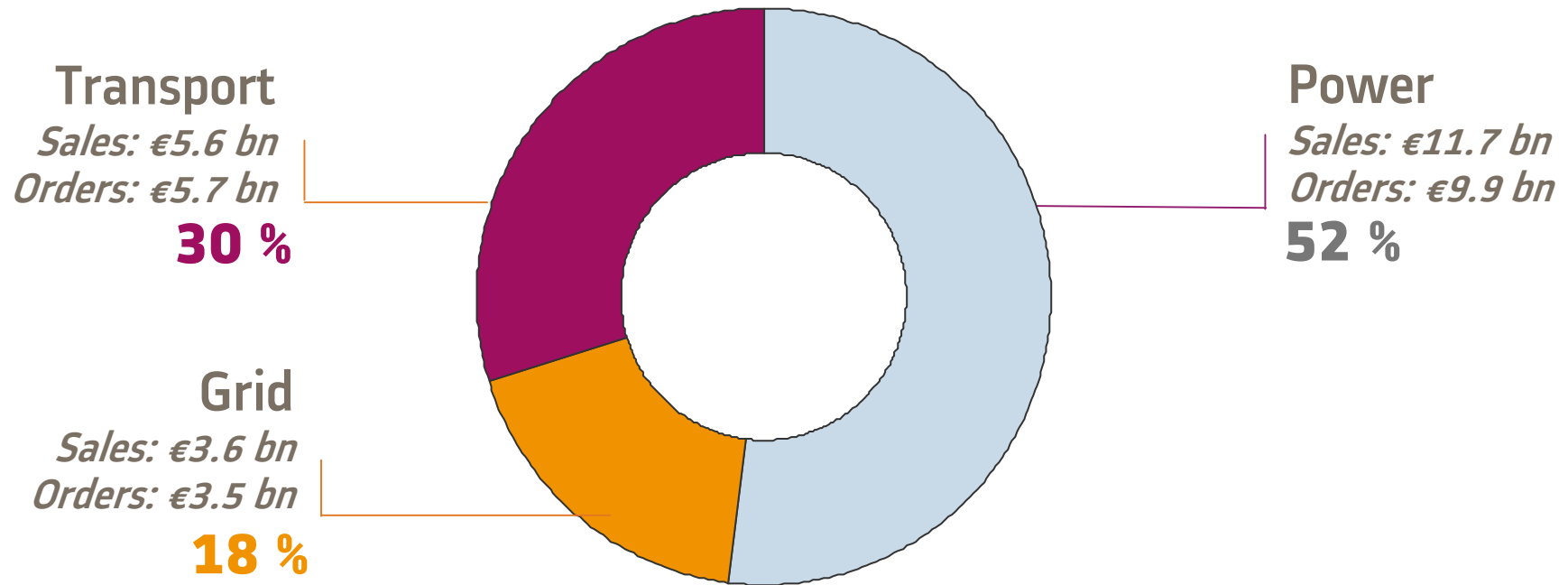


Grid sector
Equipment & services for power transmission



Transport sector
Equipment & services for rail transport

Key figures



Total sales 2010/11: €20.9 bn
Total orders 2010/11: €19.1 bn

A wide range of products and services

Rolling stock: from trams to very high speed...



A wide range of products and services

Infrastructure, signalling, services and maintenance



SIGNALLING

Atlas

Revolution in interoperable drive systems

Urbalis

Optimal and efficient monitoring of complex urban transport systems

SERVICES AND MAINTENANCE

Full maintenance management

Spare parts management

Renovation

Traintracer

INFRASTRUCTURE

Track laying

Electrification

Electric power supply

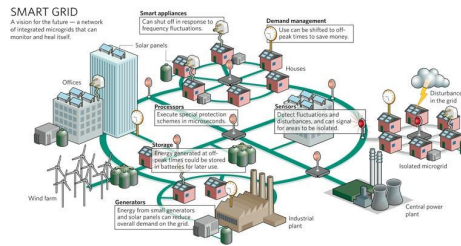
Electromechanical equipment

ALSTOM and Sustainable Development



Clean Power

- Clean Coal
- CCS
- Hydro
- Wind
- Nuclear



Smart Grid

- Transmission optimisation
- Smart dispatch
- Renewable integration



Efficient Transport

- ERTMS
- High speed trains
- Full maintenance services
- APS

Clean, Smart & Efficient
3 levers driving the 3 ALSTOM Sectors

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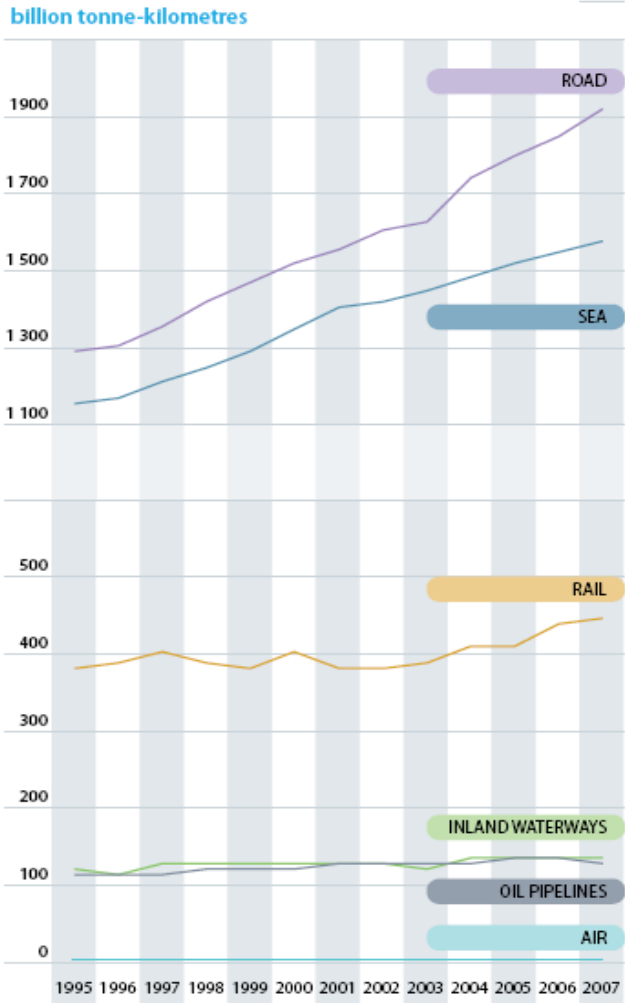
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3. CO2 and transport: insight from industry

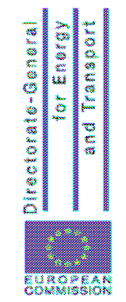
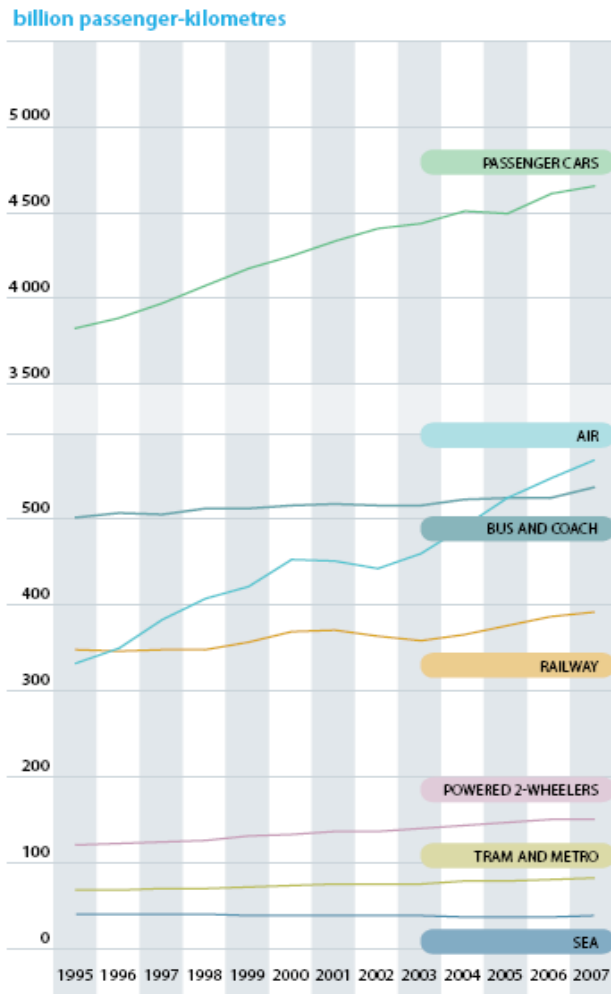
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Transport development on 12 years (1995 – 2007)

EU-27 Performance by Mode for Freight Transport – 1995-2007



EU-27 Performance by Mode for Passenger Transport – 1995-2007

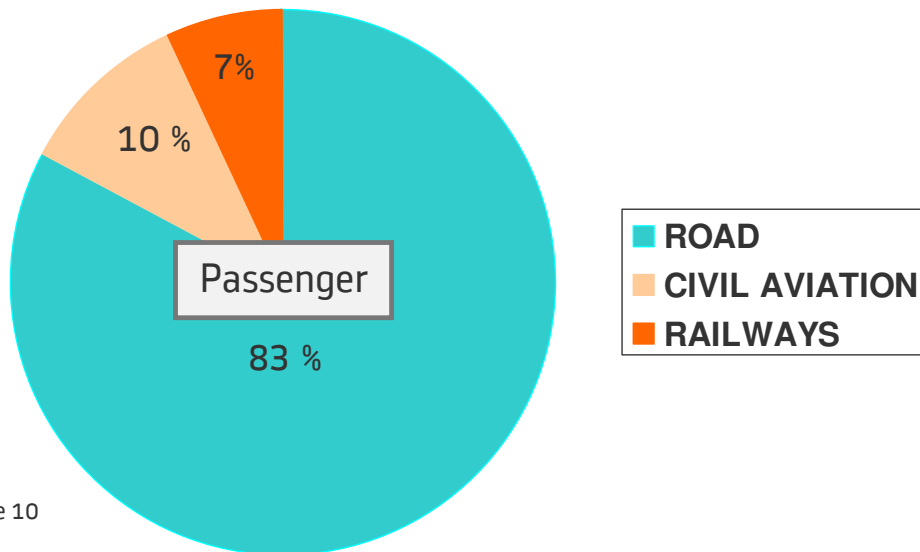
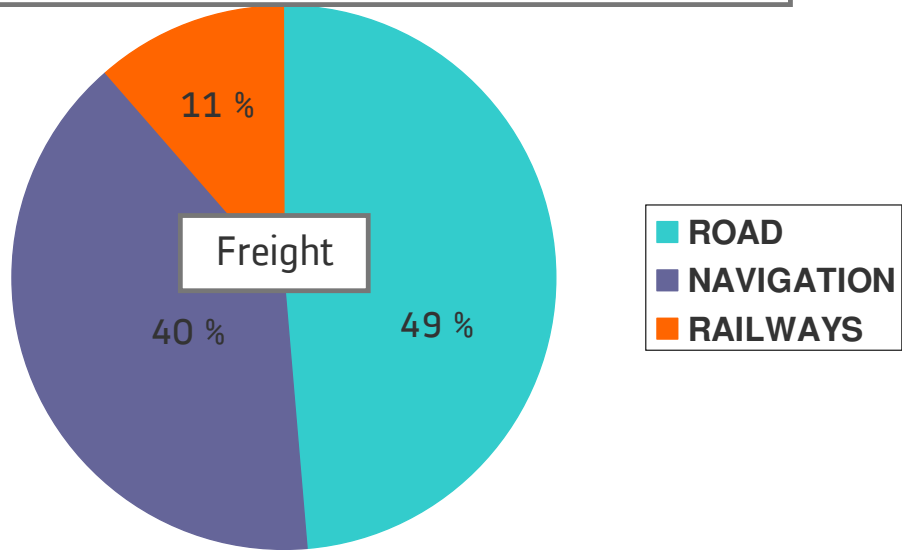


Freight
 Road: + 47%
 Sea: + 37%
 Rail: + 18%

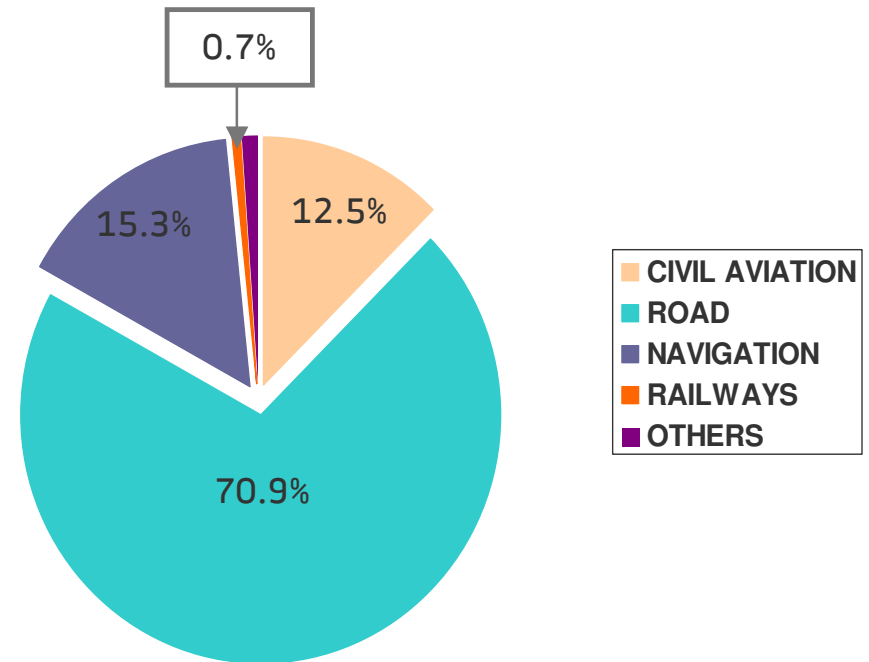
Passenger
 Road: + 24%
 Air: + 76%
 Rail: + 13%

Use of transport modes vs GHG emissions

% of transport mode used in EU (2007)



GHG Emissions in Transport – EU-27 by mode (2007)



Sources: European Environment Agency: 2010

EU new objectives in the transport sector

- **White Paper on Transport adopted on 28 March 2011:**

- Decided to tackle the increasing GHG emissions from the transport sector
- Objective: cut transport GHG by 60 % by 2050 compared to 1990 levels
- But without curbing mobility

⇒ Contribution from all modes of transport will be needed

Rail and GHG emissions reduction targets

- **Among the 10 objectives to reach by 2050:**

- No more conventionally-fuelled cars in cities by 2050;
- A 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport;
- Complete a European high-speed rail network by 2050. Triple the length of the existing high-speed rail network by 2030 and by 2050 the majority of medium-distance passenger transport to go by rail;
- Deployment of ERTMS;
- Complete the Trans-European Transport network (TEN-T) by 2030.

⇒ Rail has a role to play

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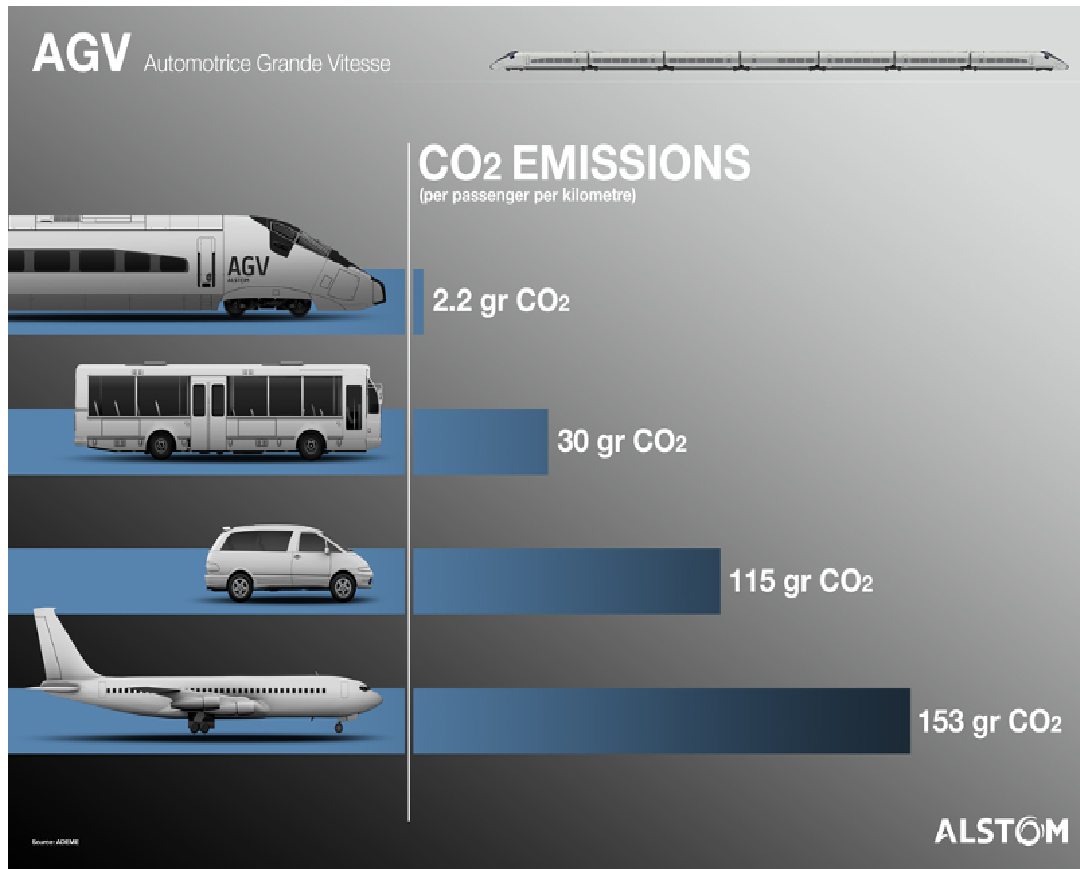
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Rail contribution to reach EU Objectives



1.8t CO₂ / person emission stand for:

1 round trip Paris – New York by plane
or

1 round trip Paris Beijing by car

or

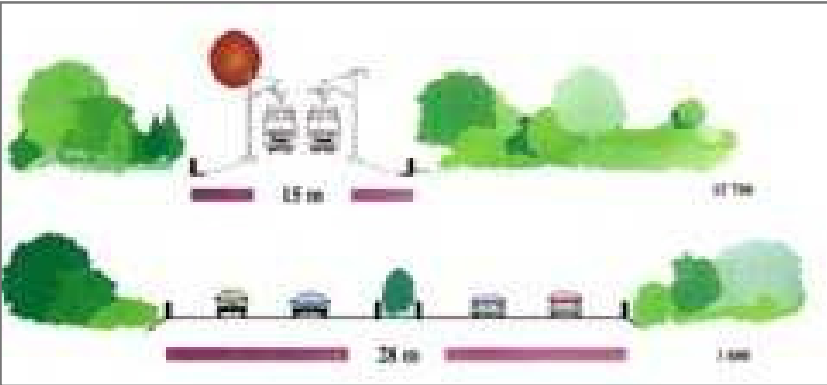
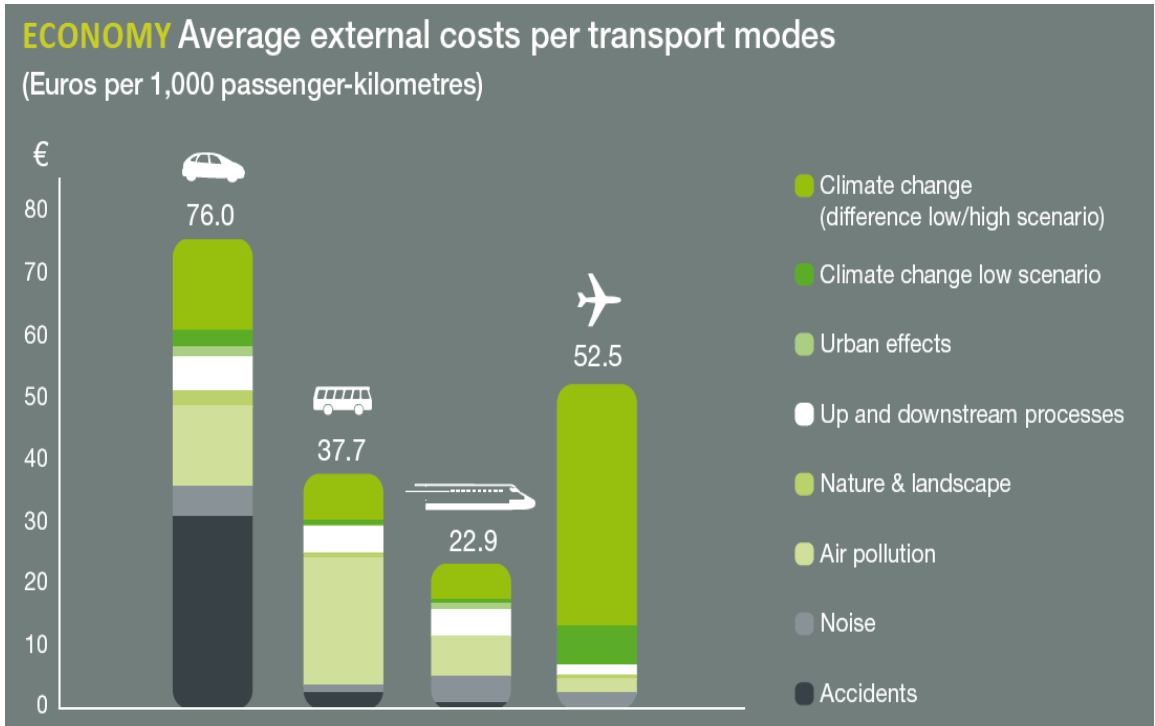
18 times around the earth by TGV.

Source : IPCC: Intergovernmental Panel on Climate Change 2008

Rail advantages beyond CO2 emissions

Reduced externals costs

No fatal accident after 30 years of TGV operation



Visual Integration and footprint

At peak hours Paris/Lyon high speed line is equivalent to 16 highway lanes (1 train with 1000 passenger every 4 minutes)

The footprint of the high speed line Paris / Lyon is equivalent to the surface of Roissy Airport

Source : UIC

Global railways carbon footprint : TGV Rhine – Rhone example

After 30 years of operation

Construction : 1 188 000 tCO₂

Operation & Maintenance : 685 000 tCO₂

Total effect: 1 873 000 tCO₂



1,2 M Passengers/ year will be shift from Air & Road to the rail:

Air to rail during 30 years: 2 758 000 tCO₂

Road to rail during 30 years; 1 137 000 tCO₂

Total: 3 895 000 tCO₂

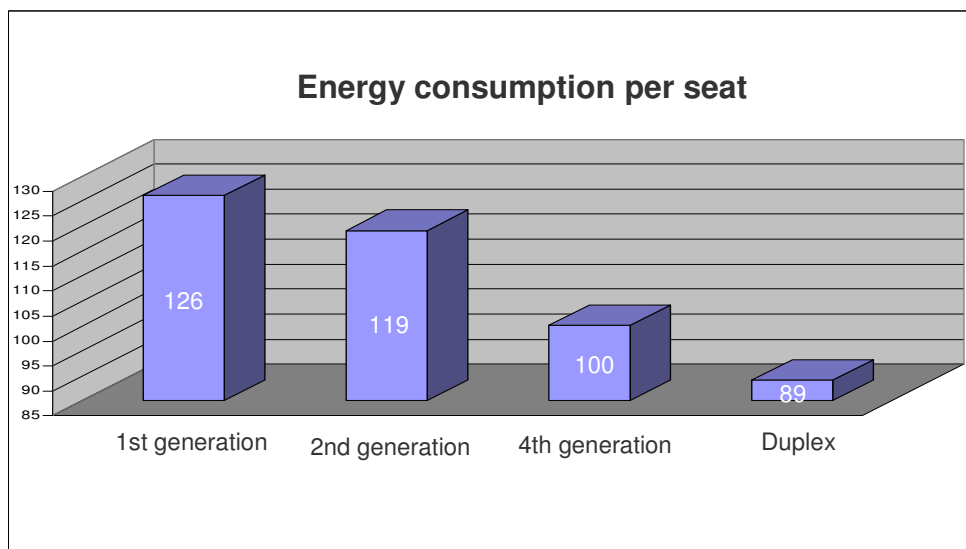
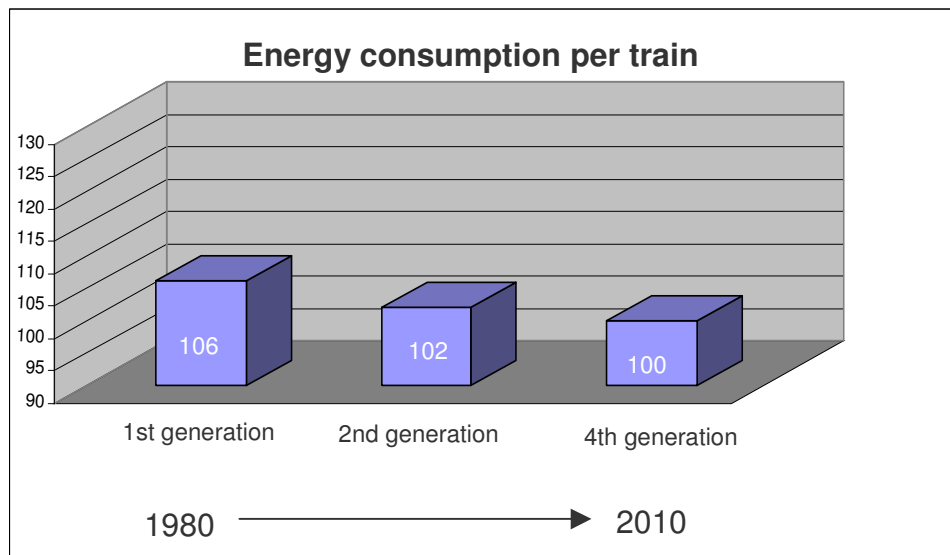
Σ saving in 30 years: 2 000 000 tCO₂

TGV Rhine – Rhone Carbon

positive in:

12 years

Energy Efficiency improvement in Rolling Stock (1/2)



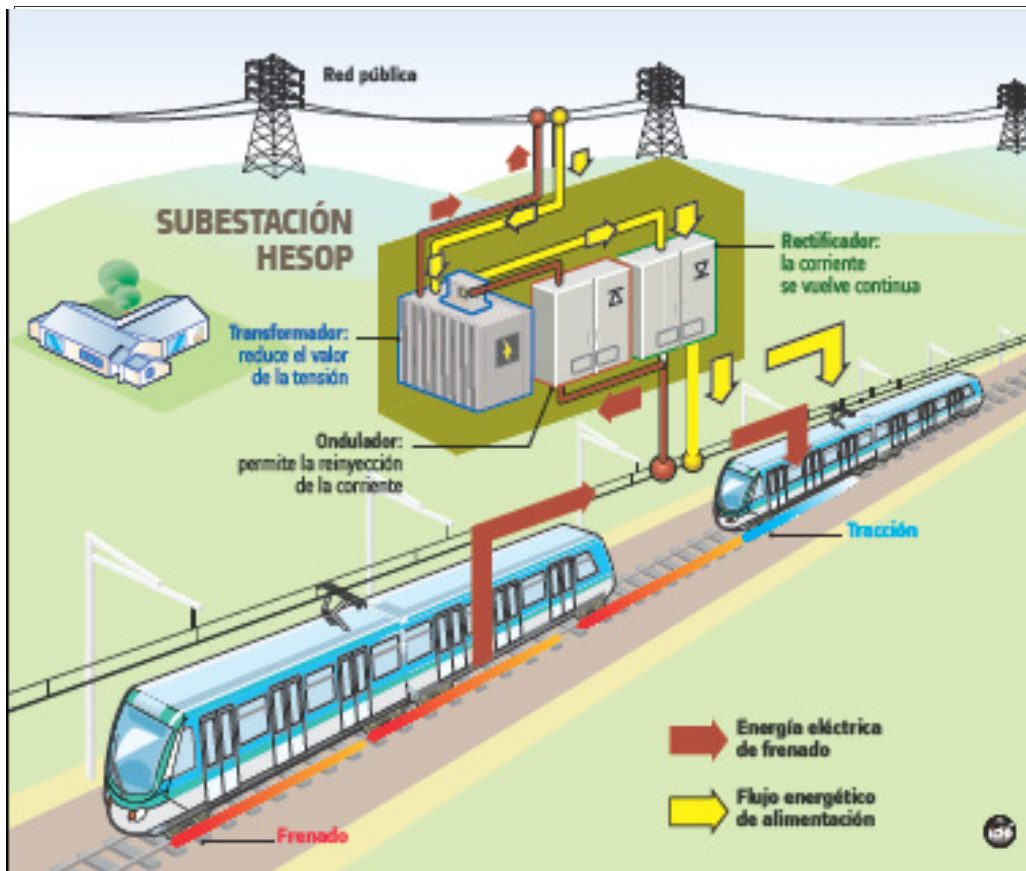
- Technological improvements on the traction chain and on the mechanical transmission has steadily improved the energy consumption at train level.
- The advent of the distributed traction on the AGV (4th generation) also has dramatically improved its consumption level per seat with the additional seating capacity provided with the same train length.
- Alstom Duplex Train (double deck) due to its very high seating capacity makes it the best performer in terms of energy efficiency per seat with 11% improvement compared to the 4th generation.

Energy Efficiency Improvement in Rolling Stock (2/2)

Key findings:

- Compared to 1970's technology, present design for single deck trains gives:
 - 20 to 25% improvement per seat;
 - Additional 10% with regenerative braking;
 - In total, estimated 30-35 % improvement in energy efficiency;
 - At the same time, the level of comfort for passengers has been significantly improved with increased need for energy.
- **Thanks to its higher capacity the double deck is 10% more efficient per seat than the best single deck train**

Urban/Tram: innovative solutions to re-use braking energy



1. On-board storage of supercapacitors

- Prototype with RATP (STEEM project)
- Running without pantograph between 2 stations

2. HESOP reversible substation

- 2 prototypes on-going (for tramways)
- Allows full recovery of braking energy
- Application to metros, tramways,..
- 20% average energy saving for 14km of tramway line

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The contribution of rail to EU targets is achievable

3 main conditions:

1. Speed up modal shift to sustainable modes of transport
2. Support the development of innovative transport technologies
3. Improve the carbon footprint

1. Speed up the modal shift

- Link EU 27 capitals with a high speed rail network
- Integrate transport strategy within a large sustainable urban and suburban agenda
- Integrate all modes of transport through e-ticketing systems
- Get a EU-wide ERTMS deployment plan, beyond the 6 ERTMS corridor
- Set minimum % for structural funds to be spent on sustainable modes of transport

Support the development of innovative transport technologies

- Still many “low hanging fruits” in rail energy efficiency
- Next financial perspectives and FP8:
 - Get rail sector priorities in EU R&D&D programmes
 - Focus on the promotion of sustainable transport projects
- Ensure the necessary funding for the Strategic Transport Technology Plan to develop the rail transport technologies of the future

Improve the carbon footprint (1/2)

1. Get the right EU framework

- Get a common EU methodology to calculate carbon footprint for each mode of transport
- Create EU labels for rolling stock, introducing energy efficiency classes

2. Development of rail infrastructures

- Accelerate electrification of lines
- Define the adequate funding for sustainable projects (next EU budget, EU project bonds etc.) and promote earmarking

Improve the carbon footprint (2/2)

3. Procurement rules

- Turn “ green advantage” into “ economic advantage:
- Promote life cycle cost vs lowest price and electrification vs diesel
- Encourage purchase of energy efficient rolling stock

4. Operation systems

- Implement green driving mode: will improve the timetable while decreasing energy consumption, thus reducing CO2 emissions.

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