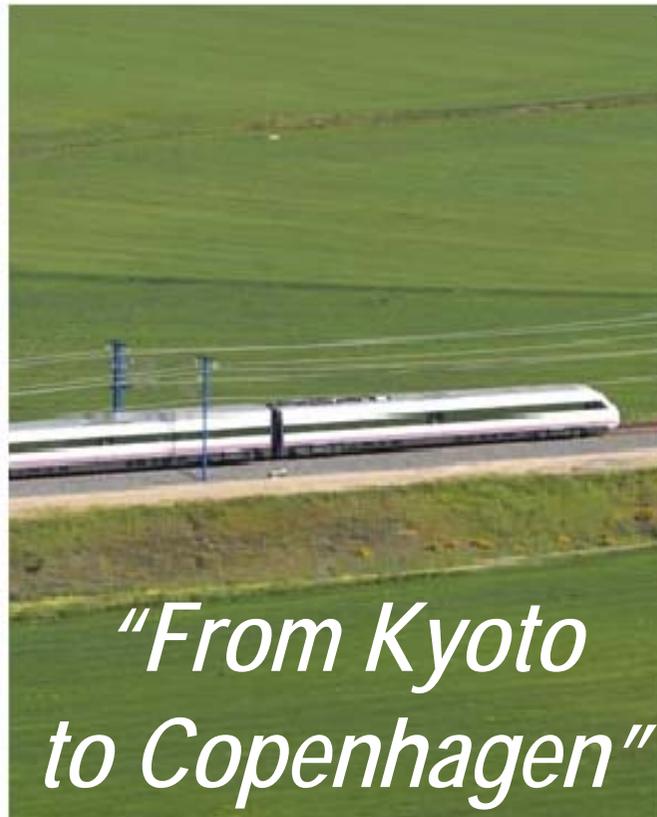
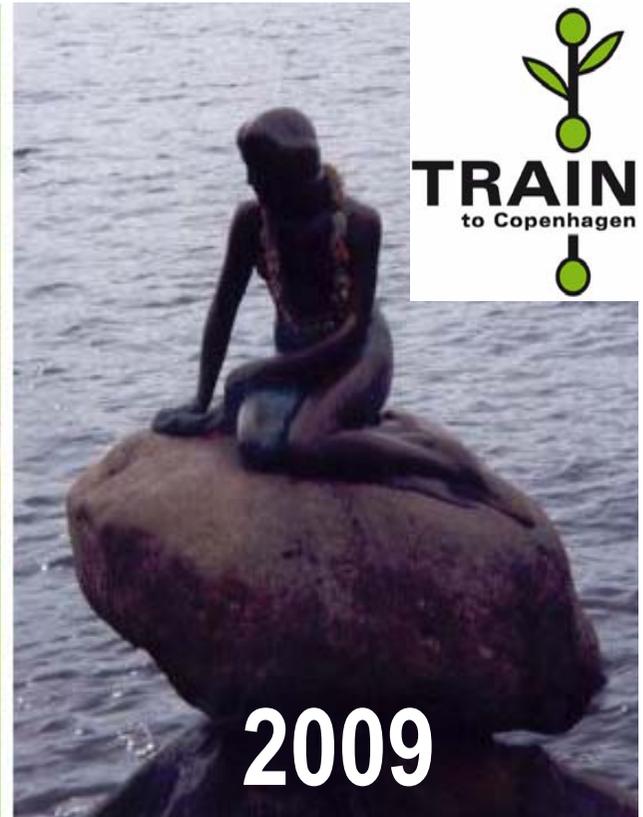




1990



*"From Kyoto  
to Copenhagen"*



2009



**renfe**

Santos Núñez del Campo  
Head of Environmental Affairs  
[santosn@renfe.es](mailto:santosn@renfe.es)

## *RENFE'S CONTRIBUTION TO SUSTAINABILITY*

*CO<sub>2</sub> emissions reduction from energy consumption & modal shift  
The "Spanish case" for High Speed Rail*

*"CLIMATE EXPRESS"*

*Brussels to Copenhagen, 5th December 2009*

## "Tren español a Copenhague"



Take the train to the United Nations Climate Change Conference 2009 in Copenhagen.

*Bringing people to Copenhagen and Copenhagen to the people*

Train to Copenhagen

Renfe is a partner in the international "Train to Copenhagen" campaign that includes UIC, UNEP and WWF

Downloads

[www.traintocopenhagen.org](http://www.traintocopenhagen.org)

Partners



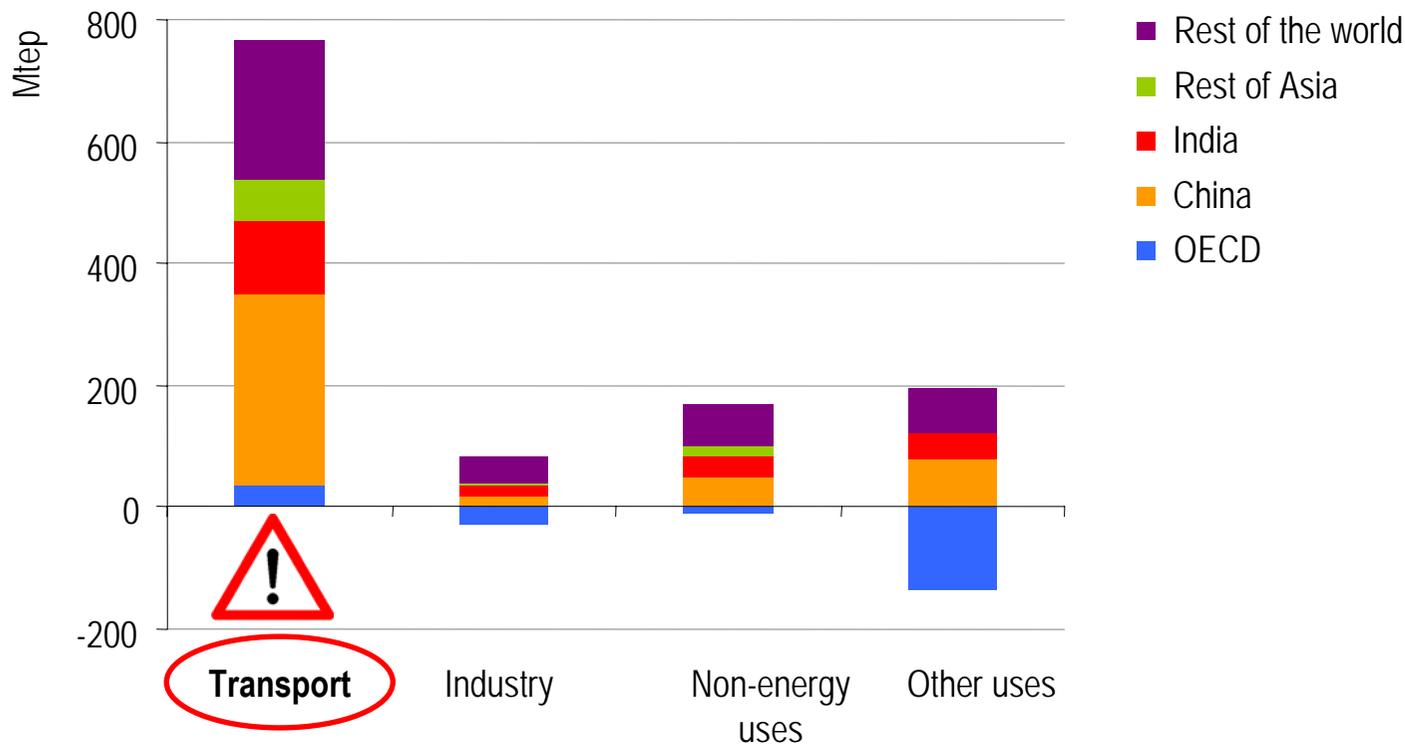
 Follow us on Facebook

tickets for the Climate Express



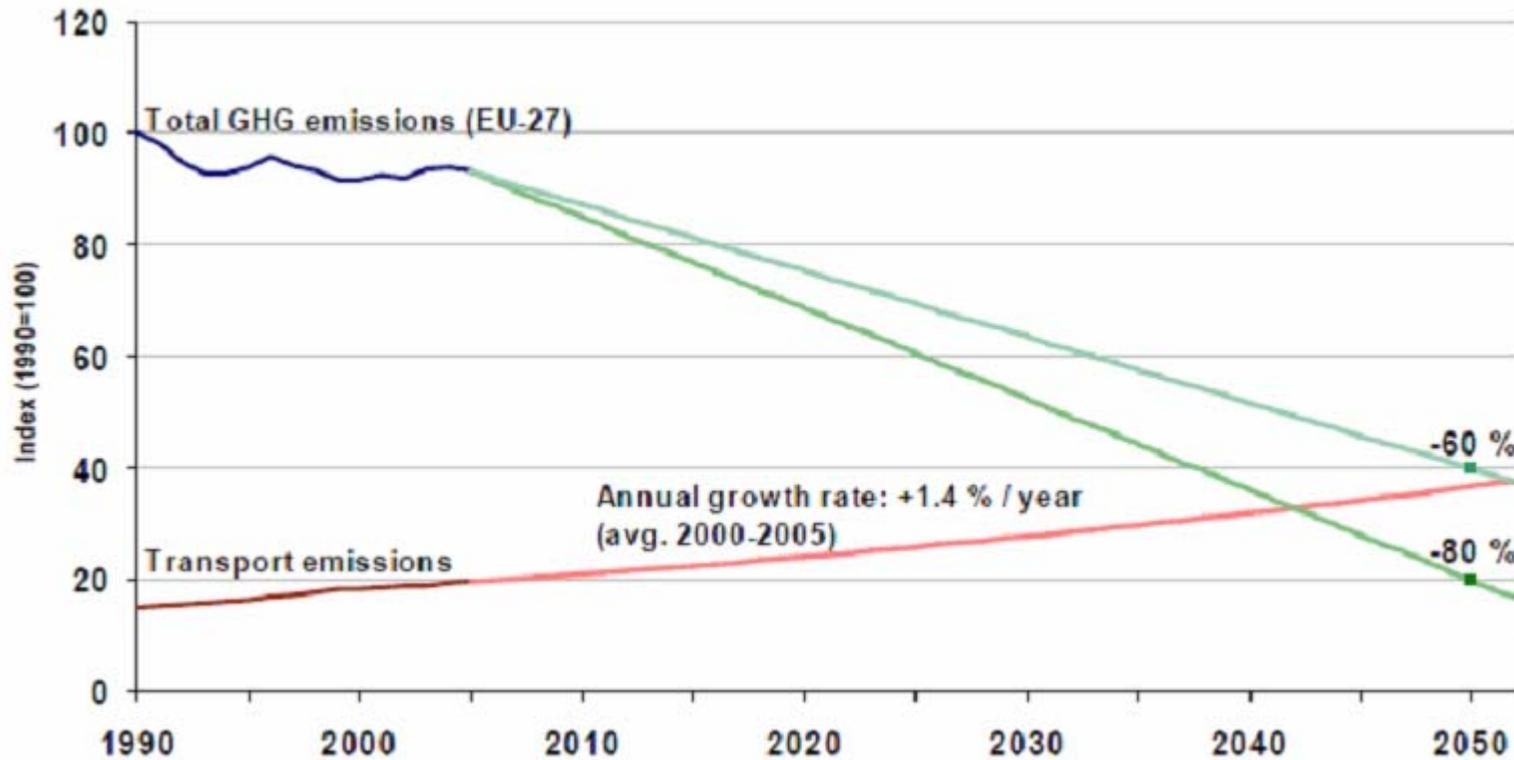
Expected increase in oil demand

Reference Forecasts of IMF-WTO (2006-2030):



Around 75% of the expected increase comes from the transport sector!

Transport: a global challenge for GHG



(Source: European Environment Agency (EEA))

If the trend in transport emissions does not change, it will put in danger the whole CO<sub>2</sub> reduction objective of the EU

## The train as the solution

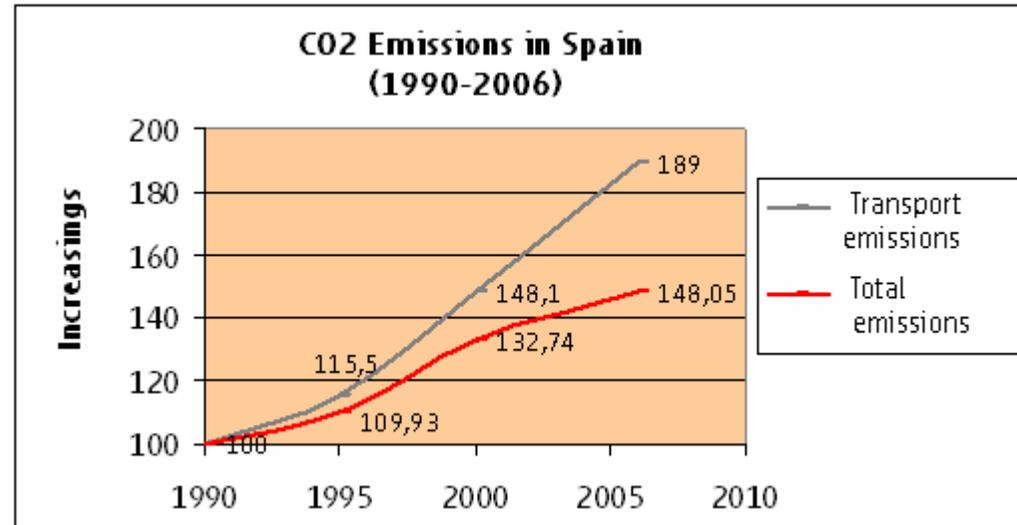
**CO<sub>2</sub>: Possibly the greatest global problem**

### **The train is an important part of the solution**

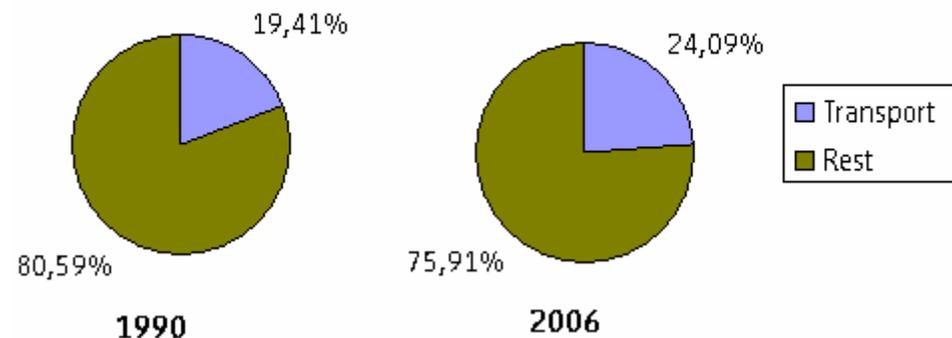
- In 2010, Renfe will save 2.5 million tonnes of CO<sub>2</sub> if compared to a complete modal shift from rail to less efficient modes of transport
- The new high-speed service between Madrid and Valencia due to open in 2010 will add savings of 80,000 tonnes of CO<sub>2</sub> - a saving equivalent to the domestic electricity consumption of a city with 250,000 inhabitants
- By 2020, Renfe will have decreased its specific CO<sub>2</sub> emissions by 57% on its 1990 values (the base year in the Kyoto Protocol)

## Trends in Spain: the transport sector

- Spanish CO<sub>2</sub> total emission increased by **48%** (1990-2006)
- But Transport sector emissions have risen by **89%** (1990-2006) !!!
- **The emissions growth in the transport sector is much more than in other sectors, especially industry**



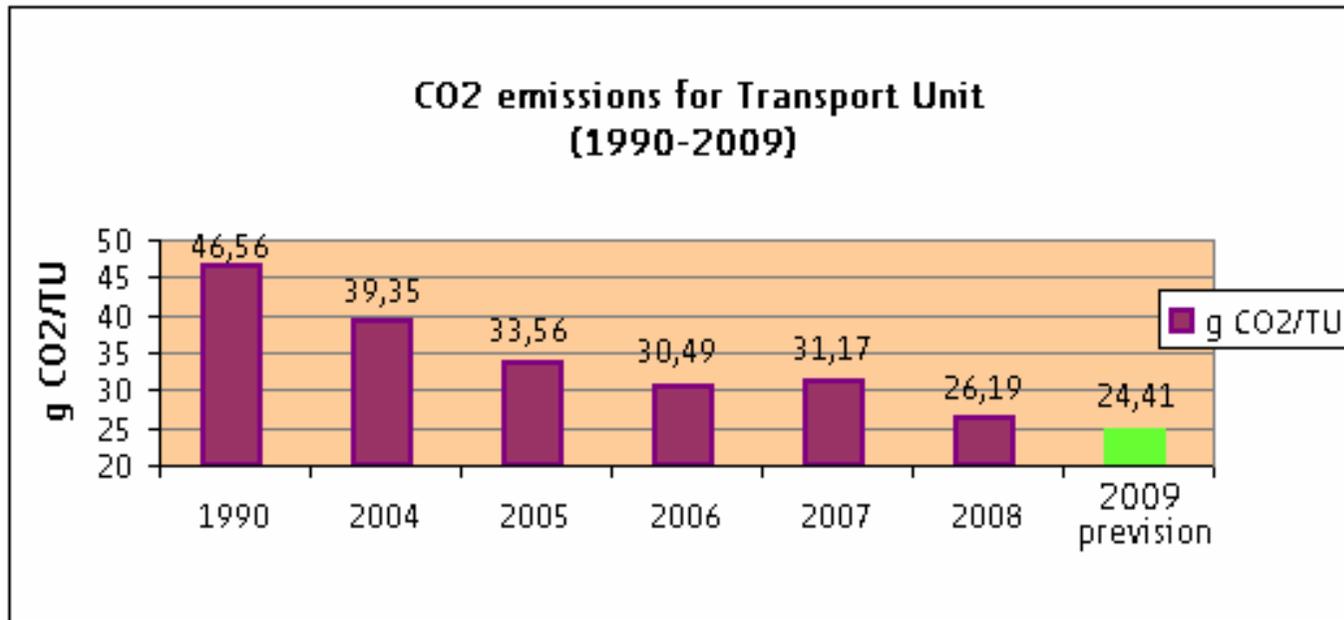
Share of GHG Transport Emissions in the total Spanish Emissions



**In Spain, the transport sector and not industry is the main source of GHG emissions**

## Renfe's specific CO<sub>2</sub> evolution

↓ There has been a reduction of **44%** in specific CO<sub>2</sub> emissions (gCO<sub>2</sub>/TU) from traction energy in the period 1990-2008. This figure is expected to fall further to **48% in 2009**

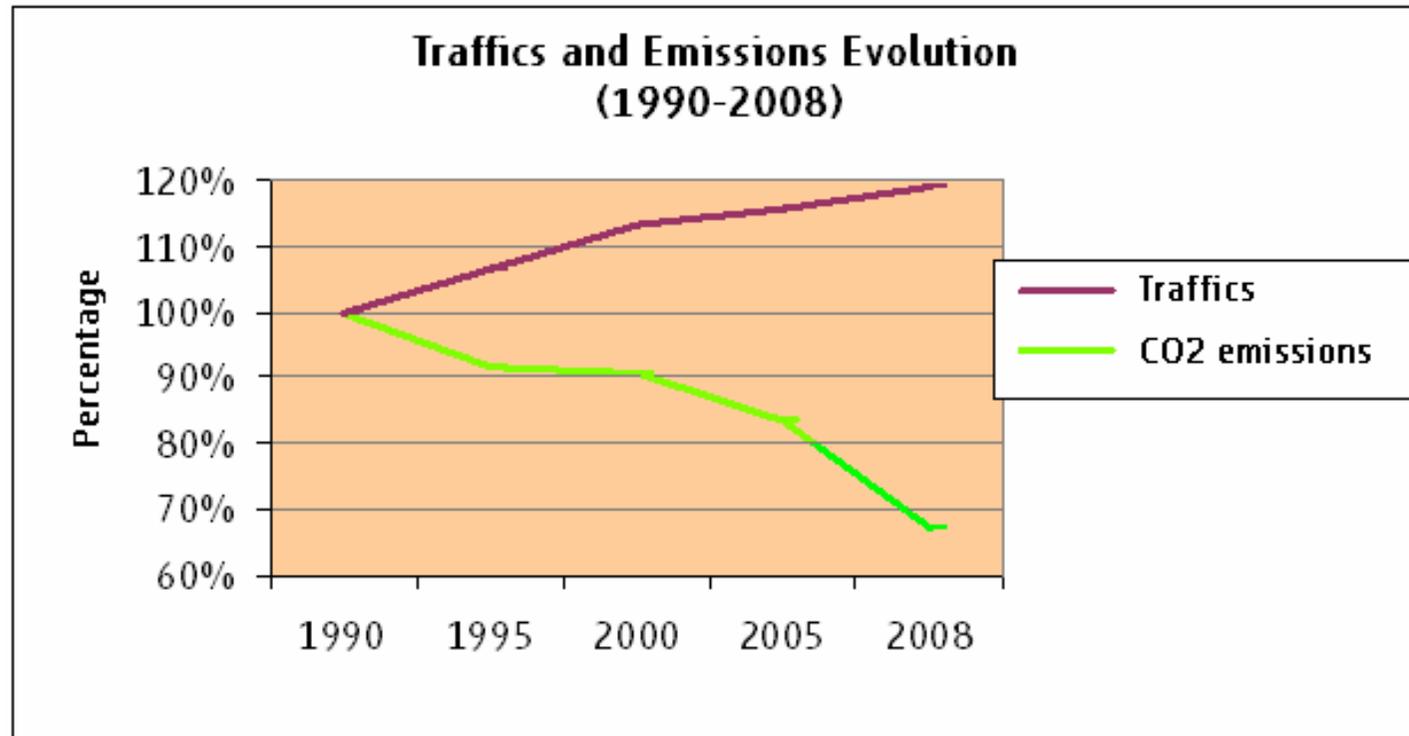


Renfe's emissions reduction is even more relevant due to it being the biggest consumer of electricity in Spain!

## Renfe's total CO<sub>2</sub> evolution

↑ Traffic has increased by 19% during the same period

↓ Reduction of total CO<sub>2</sub> emissions was 33% in the period 1990-2008

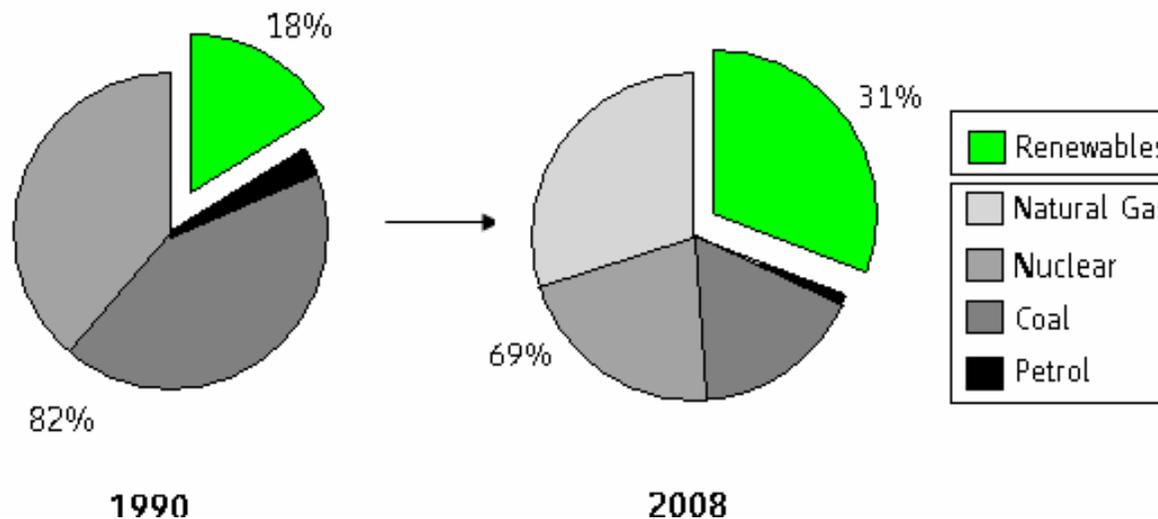


**With rail in the transport chain, decoupling is possible!!!**

## Causes of CO<sub>2</sub> emissions reductions (i)

- Improvements in the mix of Spanish electricity production, **due to a large increase in the use of renewable energy**
  - ✓ **43% reduction of CO<sub>2</sub> emissions per Kwh**
  - ✓ **Renfe is a very significant consumer of renewable energy for traction (23% in 2008)** compared to other competing transport modes

**Evolution of Renewable Energies in the Spanish Electricity Production**



## Causes of CO<sub>2</sub> emissions reductions (ii)

➤ Improvements brought about by **Renfe management:**

- ✓ **18%** improvement in the **energy efficiency** of traction
- ✓ **Progressive replacement of diesel by electricity**

Evolution from **59% - 41%**  
**electricity-diesel balance** in 1990,  
to **74% - 26%** in 2008



## Energy Efficiency in Renfe: Present and Future

### \* High renovation of rolling stock

- In 2010, **the most modern European fleet** (source: UNIFE), due to an investment of € 6,000 million over 5 years
- New rolling stock with **energy efficiency** improvements
- **Regenerative Brake**: Braking = Returning energy



### \* Efficient operation and high occupation rates

- **Efficient driving**, using Kinetic Energy and based on the line profile
- **High occupation** rate and load factor trains, **double the European average for passengers**, adaptation to client demands
- **Mix diesel/electricity**: electricity consumption increase, diesel decrease

## Renfe's Energy Efficiency Plan

### \* 2009: Renfe's Energy Efficiency Plan

Renfe's board of directors in 2009 approved plans to **extend current actions**

These plans will generate additional reductions per year of:

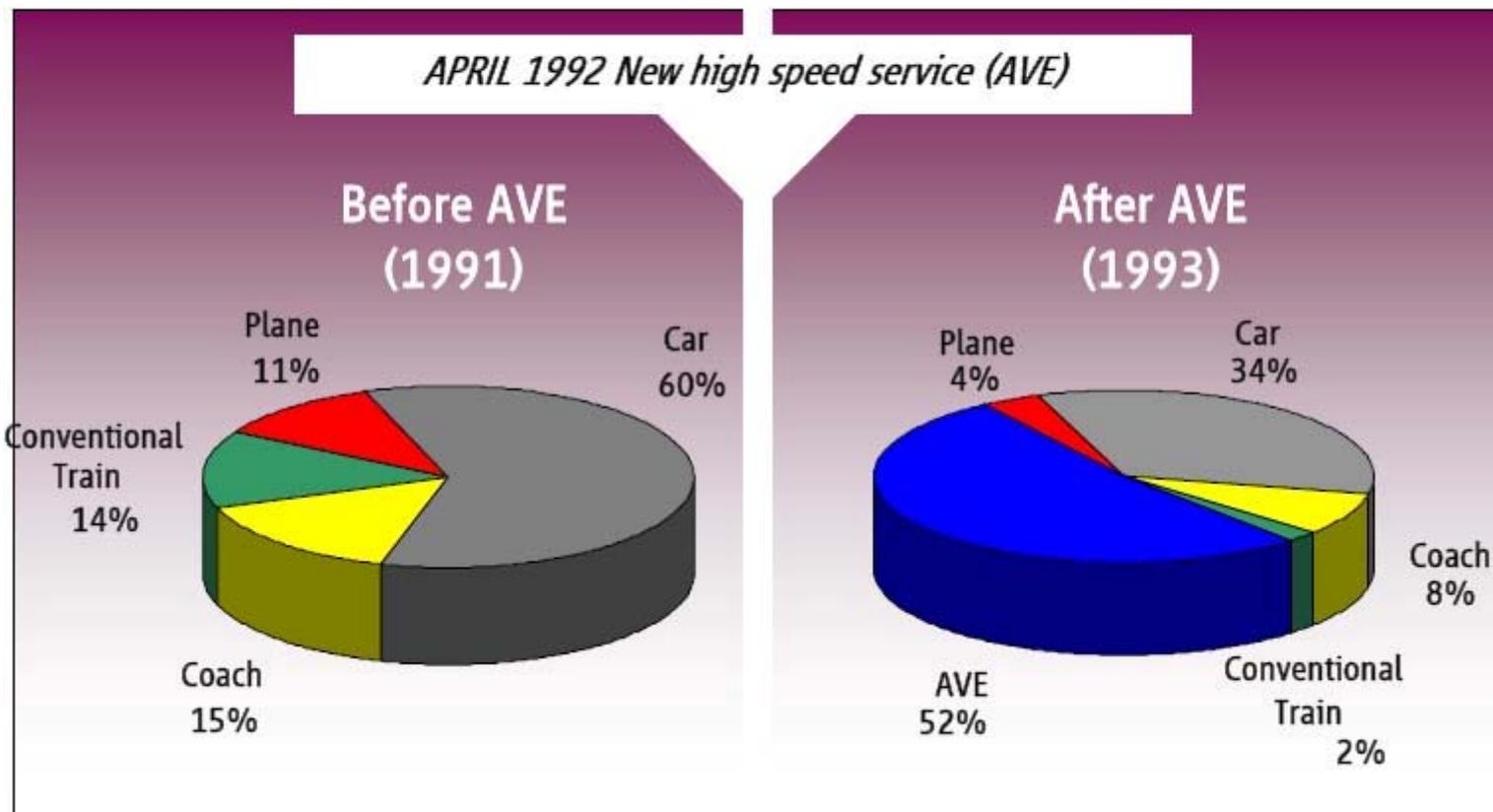
- **€53 million in energy costs**
- **115,000 tonnes of CO<sub>2</sub>**



CO<sub>2</sub> savings due to modal shift:  
Emissions savings for the whole of society (i)

## Our Milestone

### Modal Distribution: Madrid-Seville Corridor

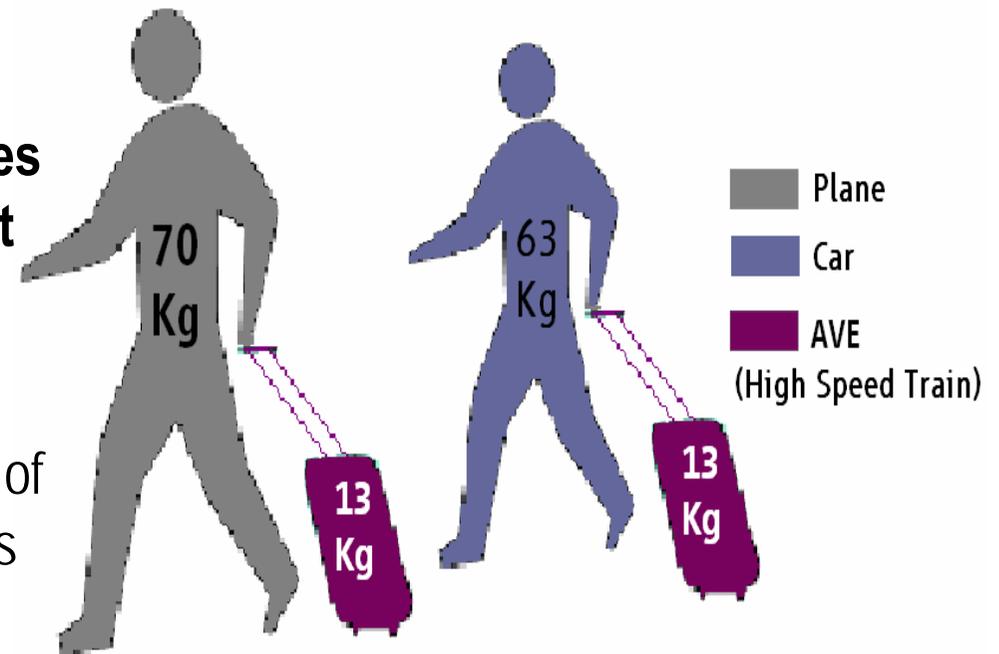


CO<sub>2</sub> savings due to modal shift:  
Emissions savings for the whole of society (ii)

## The Present

➤ The high speed Madrid-Zaragoza-Barcelona line has saved 250,000 tonnes of CO<sub>2</sub> due to real modal shift in its first year of operation.

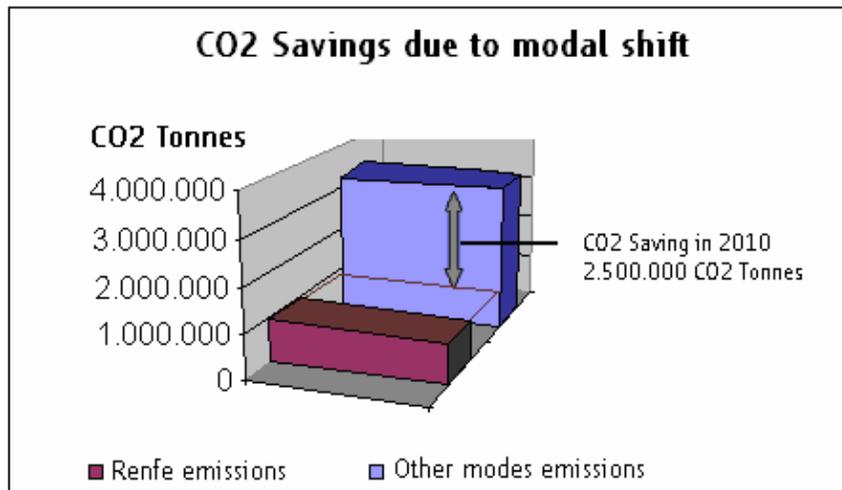
➤ On a Madrid-Barcelona trip, CO<sub>2</sub> emissions savings for modal replacement of a plane trip is 57 kg, while for a car trip it is 50 kg



Madrid-Barcelona was the busiest air shuttle in the world before the opening of Renfe's HS line

CO<sub>2</sub> savings due to modal shift:  
Emissions savings for the whole of society (iii)

## Immediate future

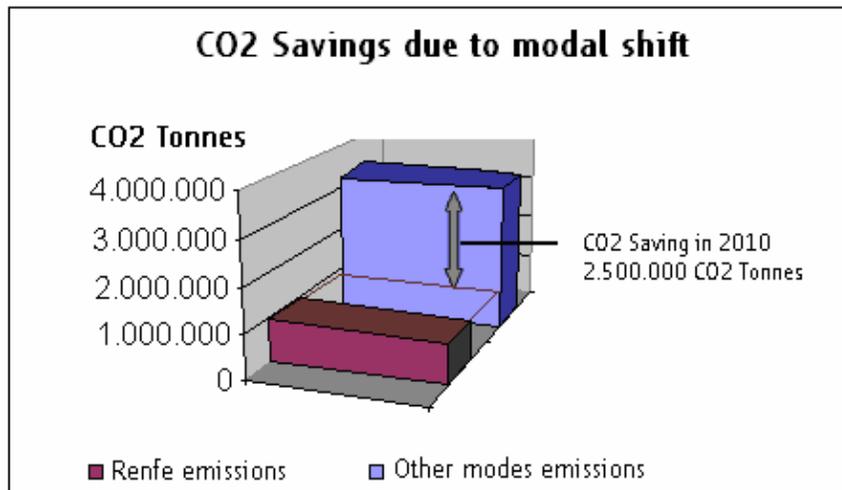


➤ In 2010 Renfe's services will save 2.5 million tonnes of CO<sub>2</sub>



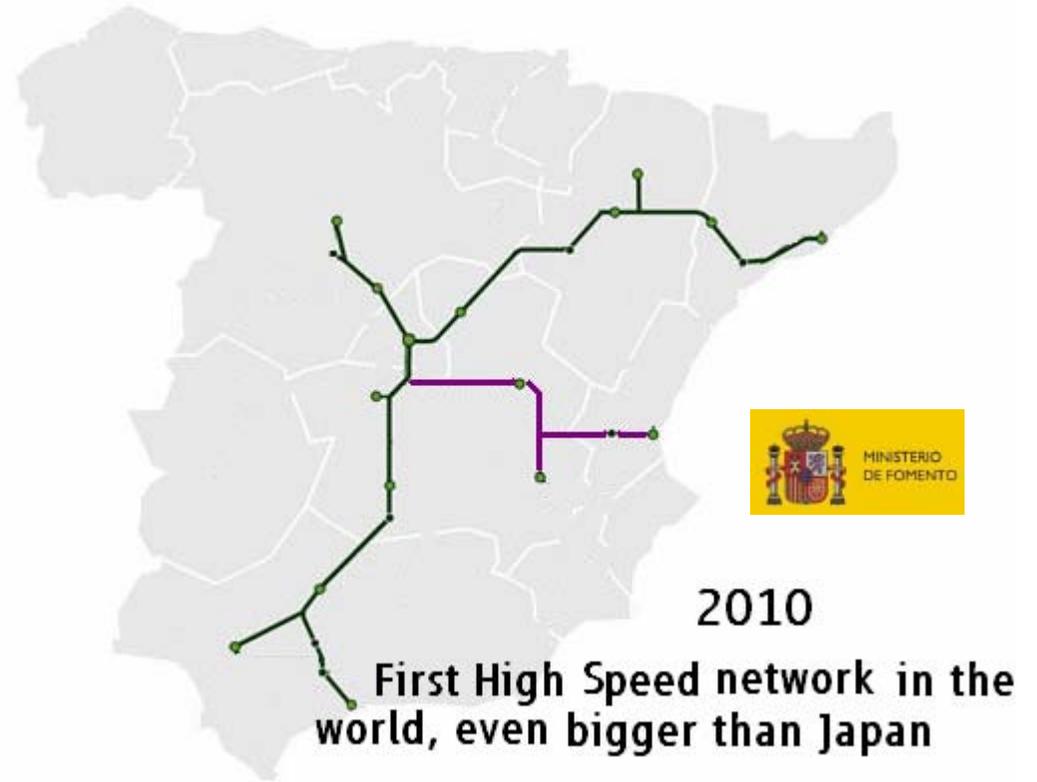
CO<sub>2</sub> savings due to modal shift:  
Emissions savings for the whole of society (iii)

## Immediate future



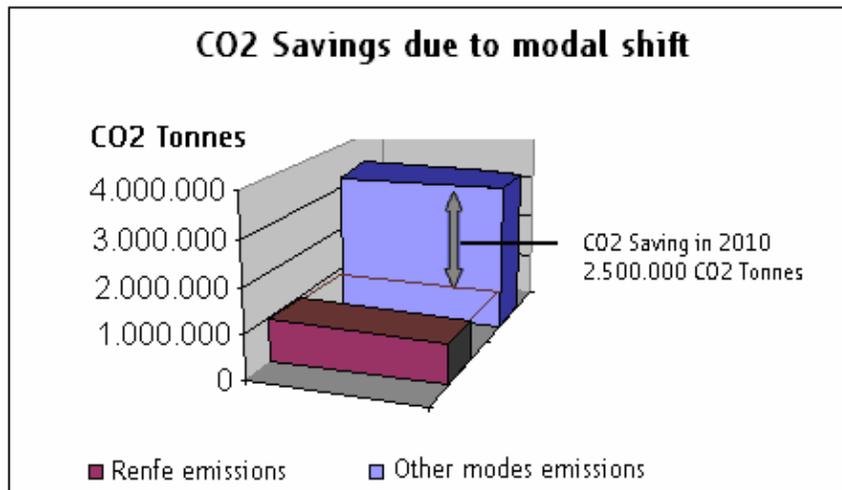
➤ In 2010 Renfe's services will save 2.5 million tonnes of CO<sub>2</sub>

➤ The new high-speed Madrid-Valencia service will save more than 80,000 tonnes of CO<sub>2</sub> every year

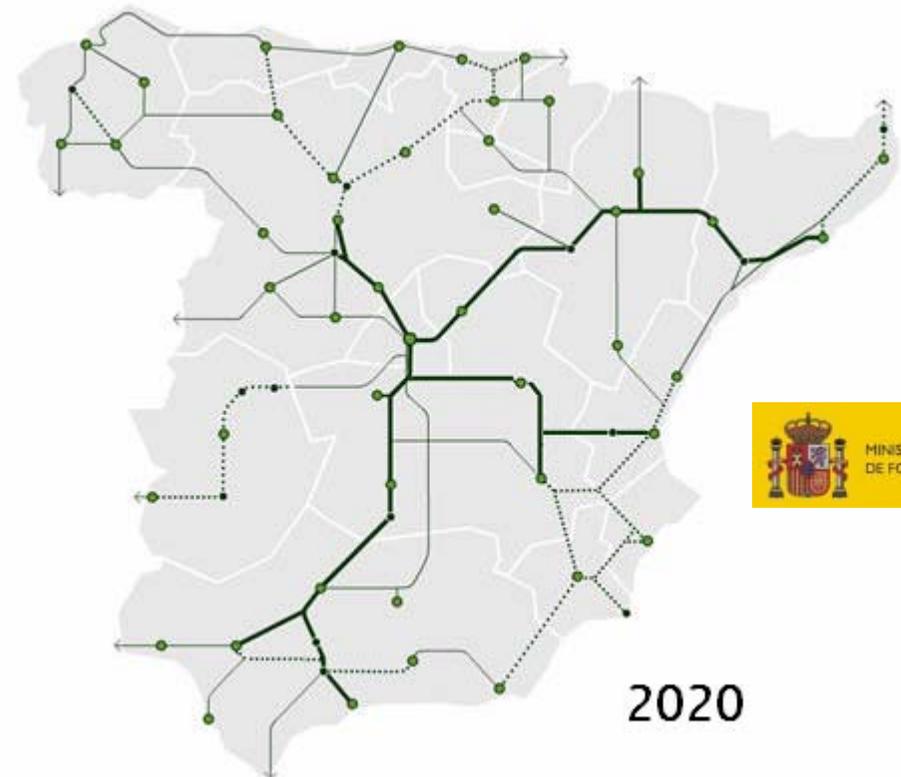


CO<sub>2</sub> savings due to modal shift:  
Emissions savings for the whole of society (iii)

## Immediate future



➤ In 2010 Renfe's services will save 2.5 million tonnes of CO<sub>2</sub>



renfe

*The "Spanish case" for High Speed Railway*

**But the "Spanish case" is not only High-Speed Rail**



## Civia commuter train (i)

- The Civia Train is an example of integration of stakeholders by Renfe's management
- Renfe integrated clients, suppliers, workers, and other organisations (e.g. disabled users), in the train design
- Civia reduces environmental impact, it is accessible to reduced-mobility people, and it increases comfort to clients and train drivers



## Civia commuter train (ii)

- Other environmental advantages include acoustic insulators which reduce noise emissions from the source, and the use of recyclable materials
- Civia allows a decrease in energy consumption of 30%. Modularity, lower weight, regenerative braking, and more efficient engines make this possible. Without any doubt, it is one of the most efficient European trains of its type



## High-Speed regional services

**Fast, comfortable, reasonably priced and a territorial accessibility booster**

- These services create, since first 90's, a **new and sustainable metropolitan mobility** due to halving travel time between cities
- Currently these services are working in the Madrid-Ciudad Real-Puertollano (since 1992), Seville-Córdoba-Málaga, Jaén-Seville-Cádiz, Madrid-Toledo, Madrid-Segovia-Valladolid, Calatayud-Zaragoza, and Lleida-Tarragona-Barcelona corridors

### Example: Madrid-Toledo Regional High-Speed service

- **40% of clients make daily trips for work or study**
- **Over the last 4 years of operation, this service has saved 16,000 tonnes of CO<sub>2</sub>, equivalent to the domestic electricity emissions of Toledo**
- **The service removes 3,100 cars a day from our roads**



# Freight transport and GHG emissions (i)

## Transporting vehicles

850 Tn 180 cars

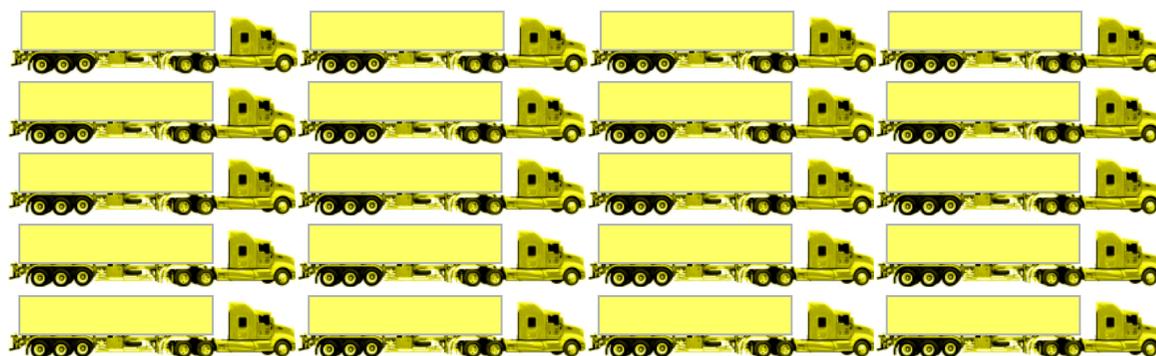


15 x



12 cars

552Km

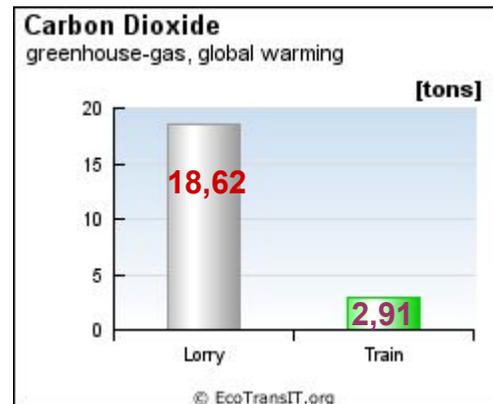


473 Km

20 x



9 cars

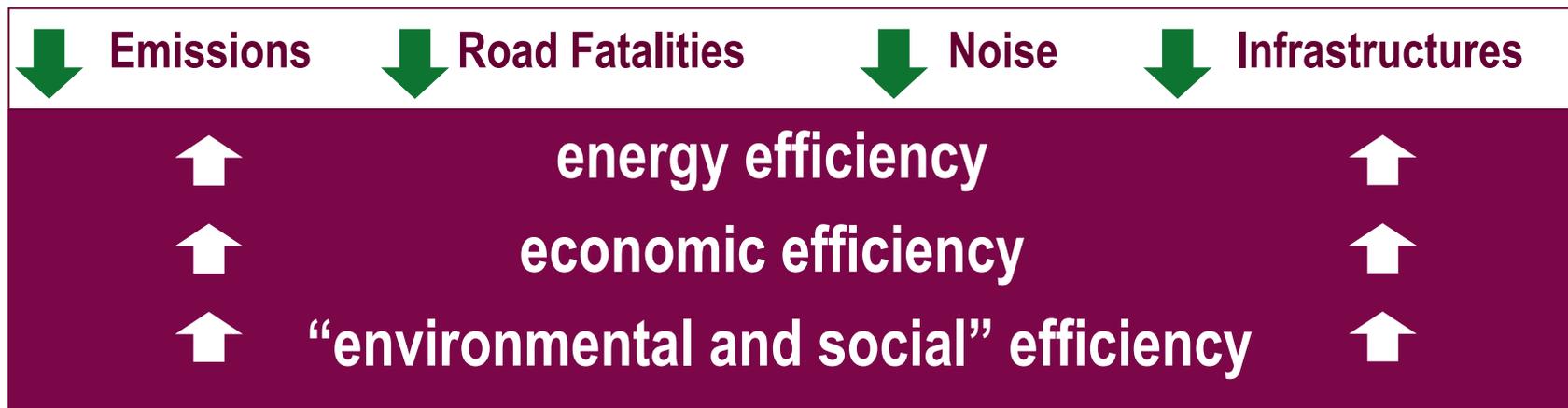


**Emission Factor = 1:6.4 !!!!**

## Freight transport and GHG emissions (ii)

### Comodality advantages for the supply chain

Rail is a mean of transport that can improve sustainability and reduce environmental impact:



The main contribution of freight railways to sustainability is to provide efficient services, which integrated in logistic chains can transfer freight traffics from less sustainable modes in a single framework involving suppliers, ports, and logistic centres

## Spanish Railways Undertakings for Sustainability Forum (FEFS)

Created in 2006 at the 8th Spanish National Environment Congress (CONAMA 8)

### Working Groups:

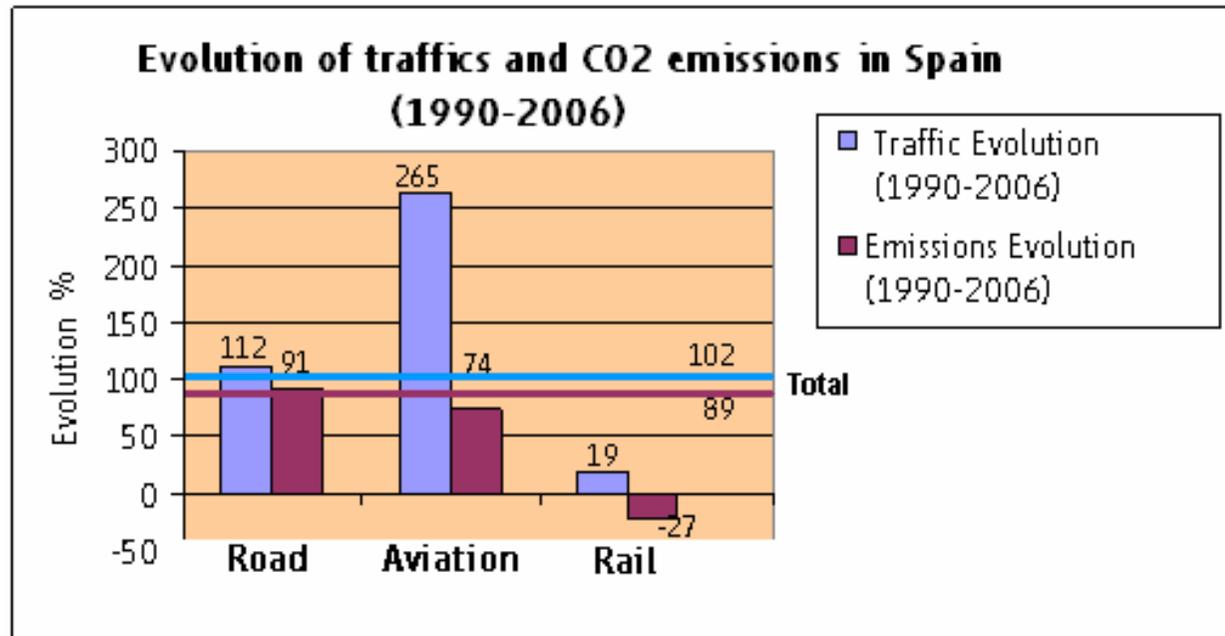
- **Accesibility**
- **Eco-Procurement**
- **Environmental Actions on Infra**
- **Energy Efficiency**
- **Sustainable Mobility**
- **Noise and Vibrations**
- **Social Responsibility**
- **Sustainability and Marketing**



[www.ferrocarrilsostenible.es](http://www.ferrocarrilsostenible.es)

## CO<sub>2</sub> emission evolution in Spain in the transport sector

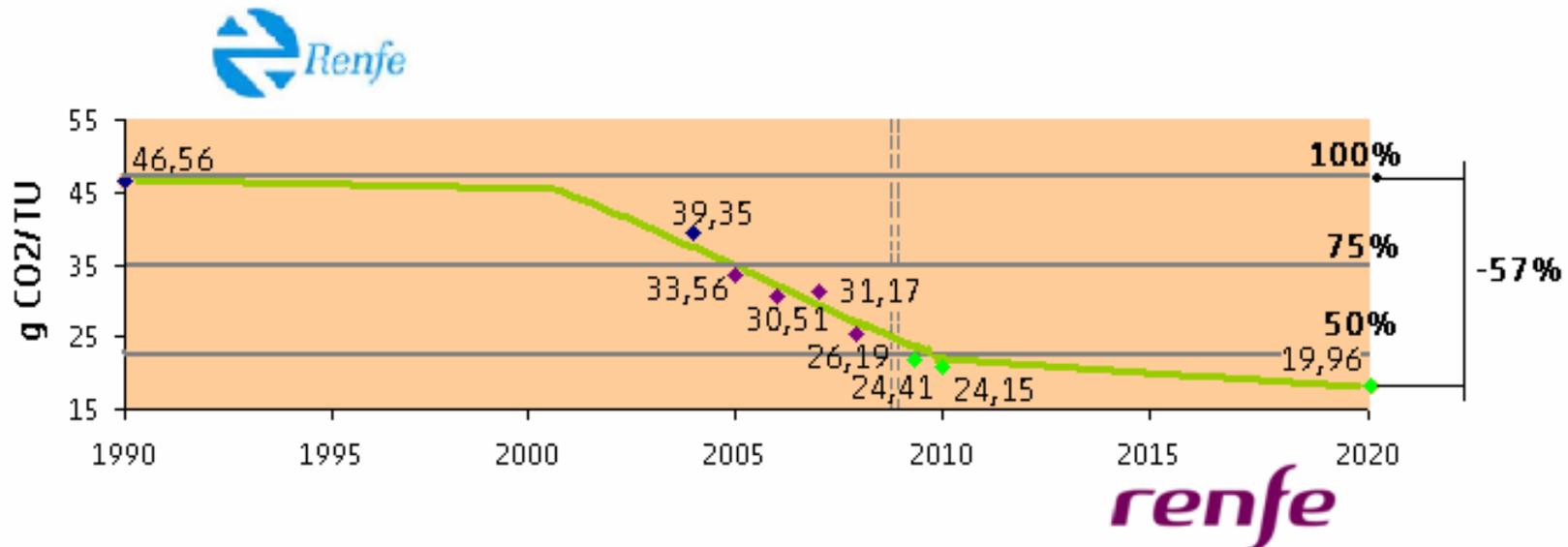
- **Rail is the only transport mode which has reduced its total (27%) and specific emissions (35%)** in Spain over the period 1990-2006
- **Road transport has reduced** its specific emissions, but by less than the railways over the same period (**only 10%**)
- Even though **aviation** has improved too, its **specific CO<sub>2</sub> emissions remain 5-6 times higher than rail**



2020 vision: less than 20 g of CO<sub>2</sub> (i)

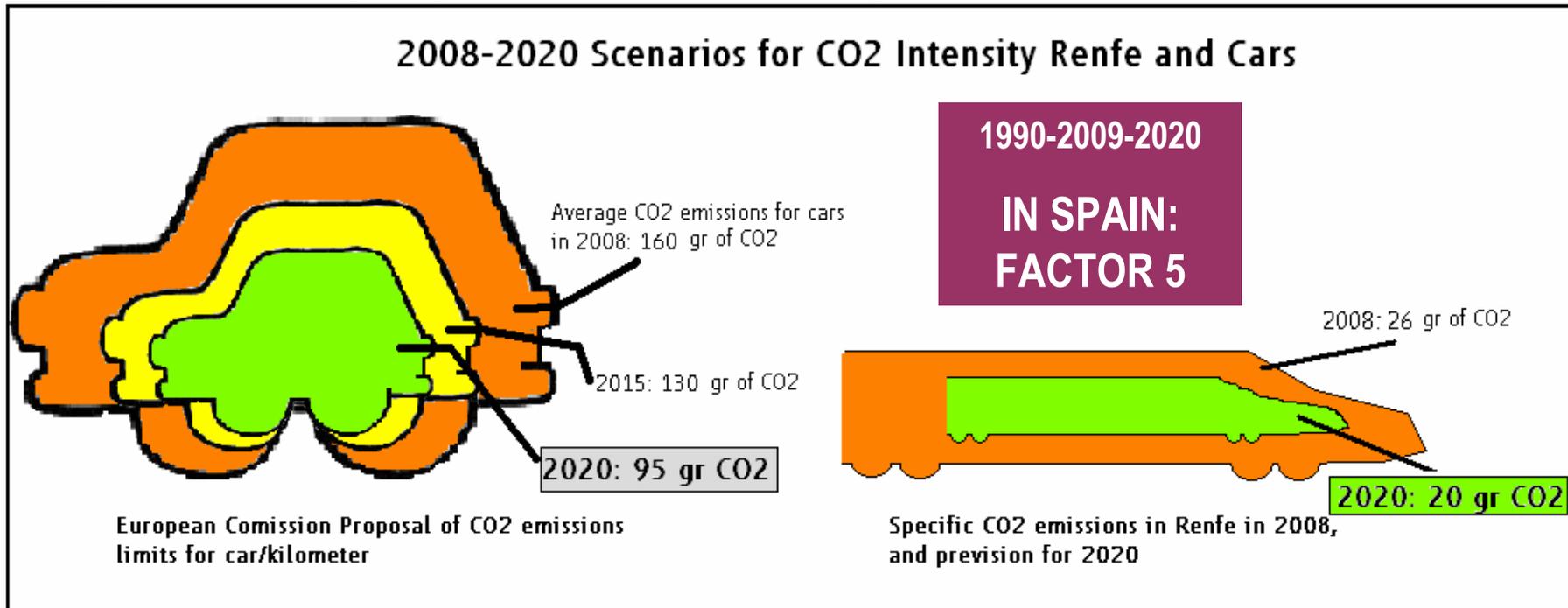
- Renfe's strategic plans include a reduction of specific emissions to values under 20 g CO<sub>2</sub> per TU in 2020
- This reduction is a 57% decrease on the figure for 1990, the base year under the Kyoto Protocol

Evolution of CO<sub>2</sub> specific emissions



2020 vision: less than 20 g of CO<sub>2</sub> (ii)

- Renfe's Energy Efficiency Plan will allow Renfe to maintain and improve its competitive advantage in sustainability
- In 2020, expected specific emissions will be almost 5 times less than the proposal of the European Commission for cars



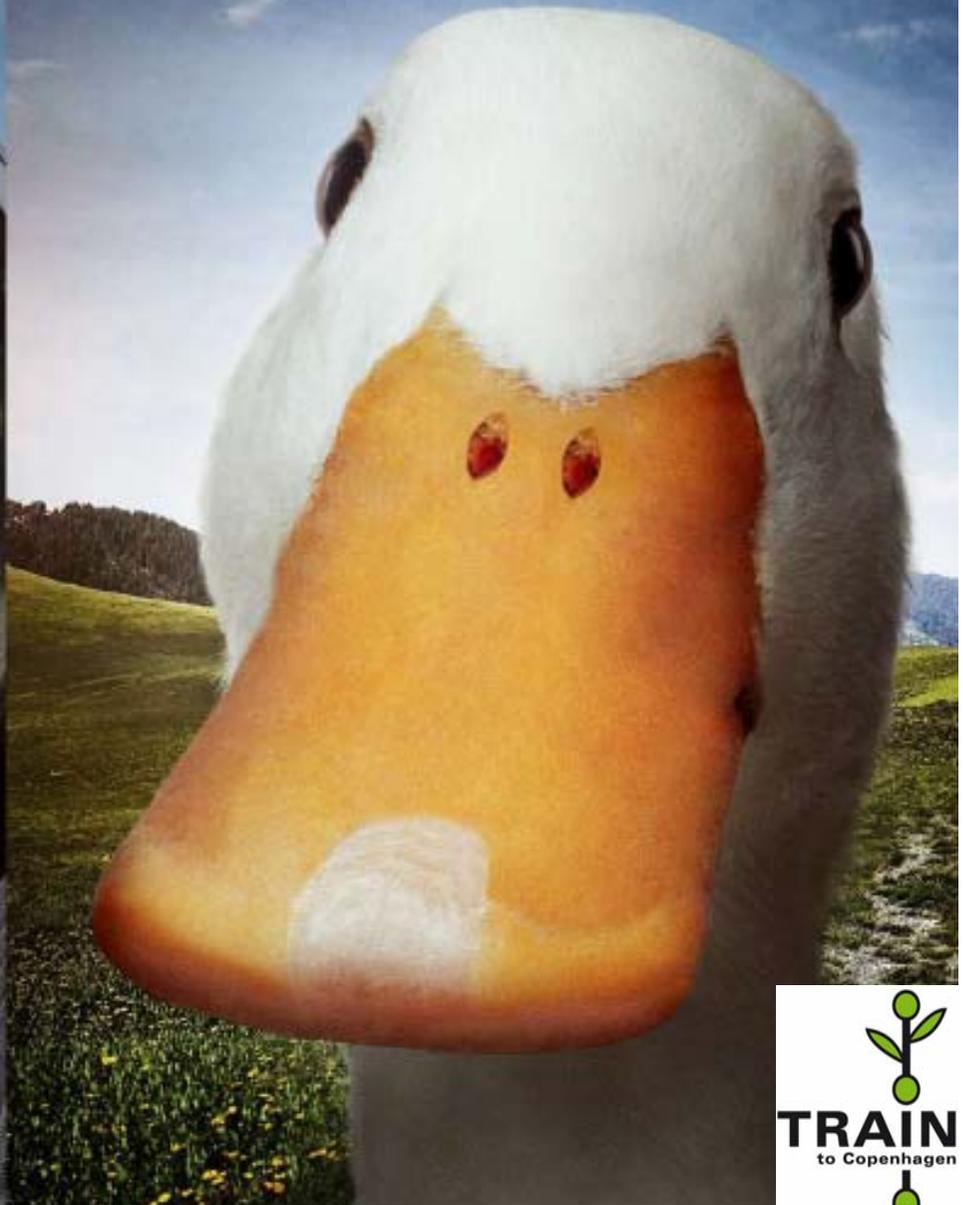
**The train is not the problem:  
it is a vital part of the solution**



**Renfe's main contribution to sustainable mobility  
will continue to be offering a real alternative  
to less sustainable transport modes.**

*La mejor manera de proteger la naturaleza, es imitarla*  
*Gracias al diseño de pico de pato la eficiencia energética aumenta un 30%*

Nuevos tiempos  
Nuevos trenes



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La mejor manera de proteger la naturaleza, es imitarla  
Gracias al diseño de pico de pato la eficiencia energética aumenta un 30%

Nuevos tiempos  
Nuevos trenes

renfe  
AVE

Tak for din opmærksomhed!  
Thanks for your attention!  
Merci de votre attention!  
Danke für Ihre Aufmerksamkeit!  
Спасибо за ваше внимание  
شکرا لاهتمامکم  
आपका ध्यान के लिए धन्यवाद  
称謝  
ありがとう  
¡Gracias por su atención!



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