

Eurailspeed

Parallel Session F.1

Michael Schemmer

Chairman UNIFE WG Transport and Environment

Bombardier Transportation



Under the patronage of



Organisers



Partners



Media partner



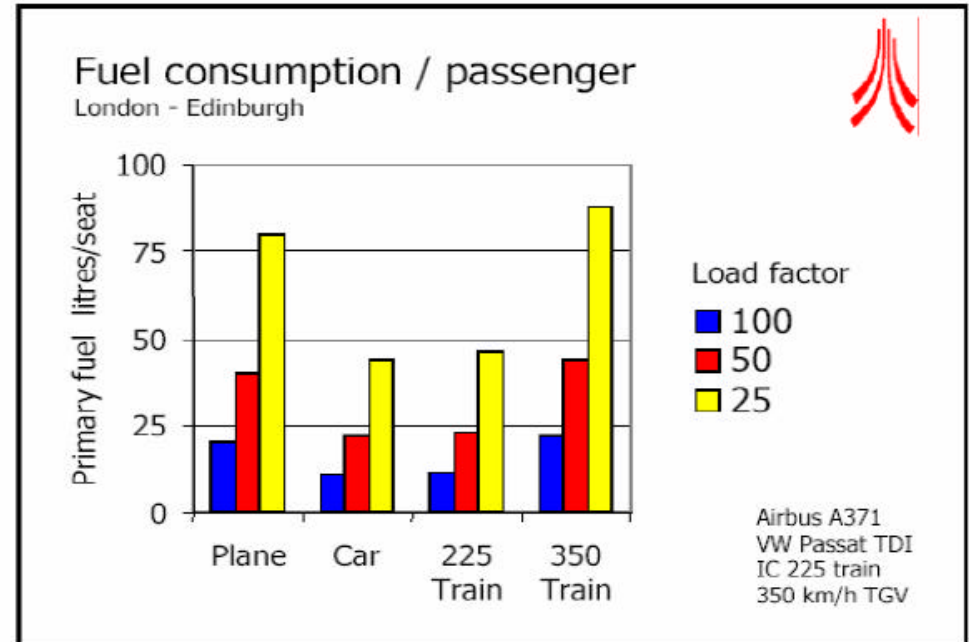
High-speed rail, the environmentally friendly solution for mobility



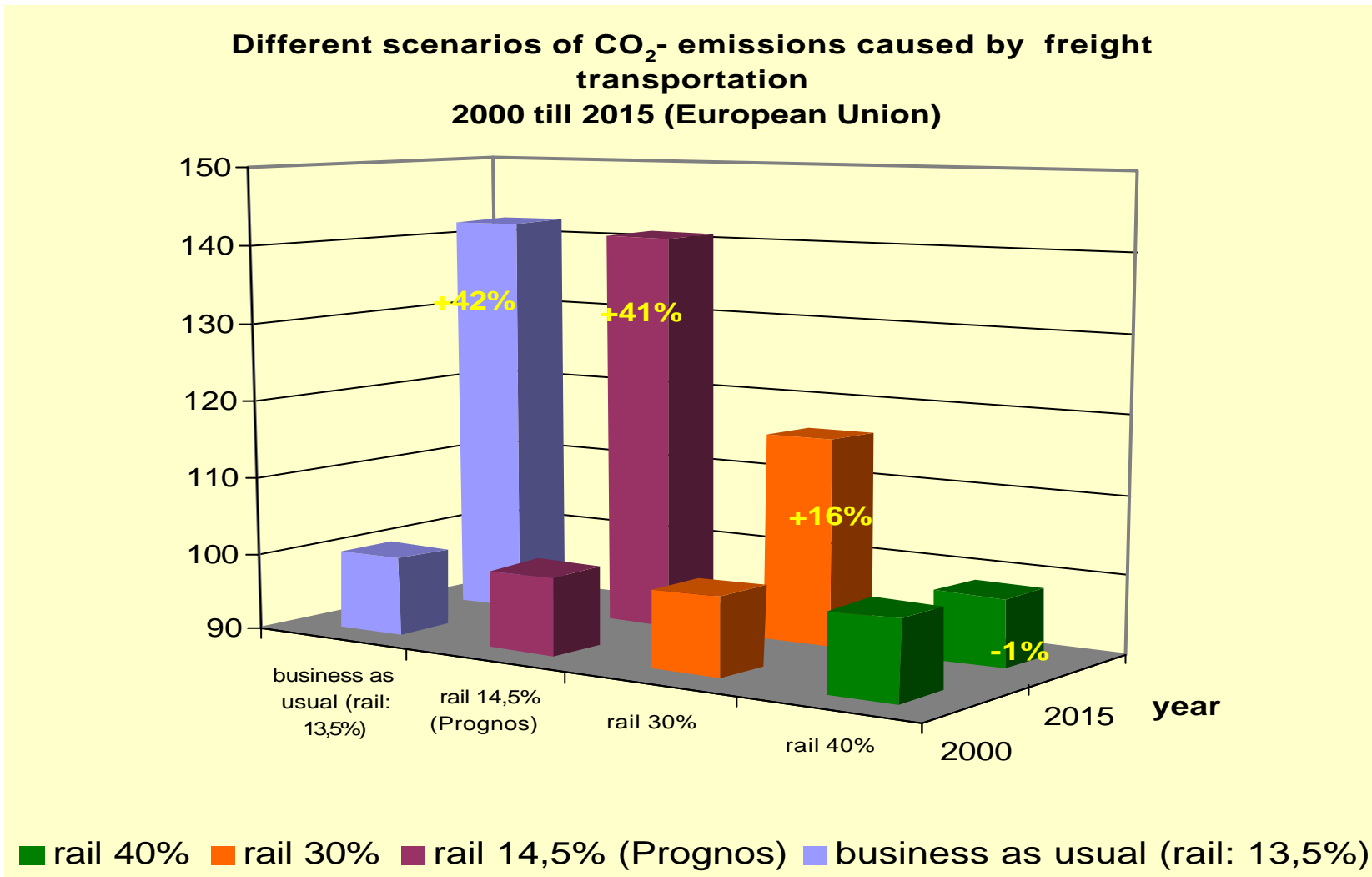
Dr. Michael Schemmer
Chairman, UNIFE Transport & Environment WG
Senior Director Health, Safety & Environment, Bombardier Transportation

BOMBARDIER

Is rail really environmental friendly?



Without rail, reduction of CO₂ emissions is impossible!

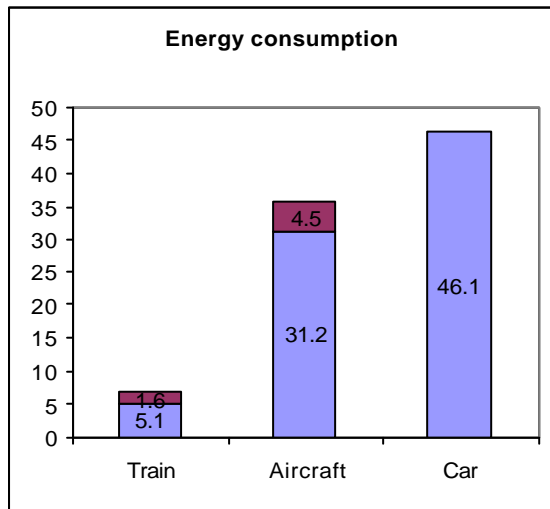


Source: Prognos, Basel; UIC, Paris; BMU, Berlin; calculations by Bombardier Transportation

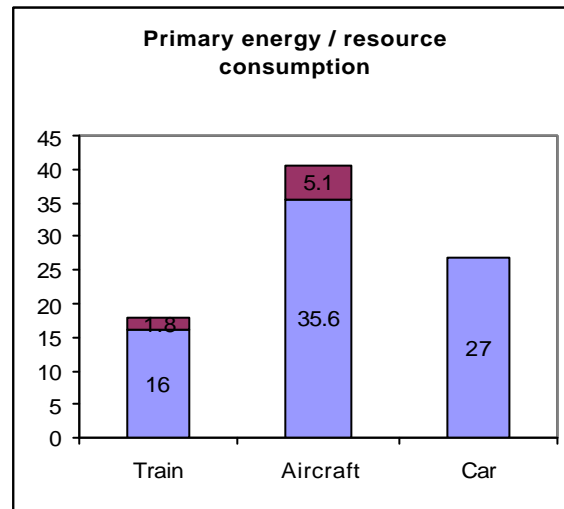
Energy consumption / related CO₂ Emission

- Example : Business trip Berlin – Frankfurt

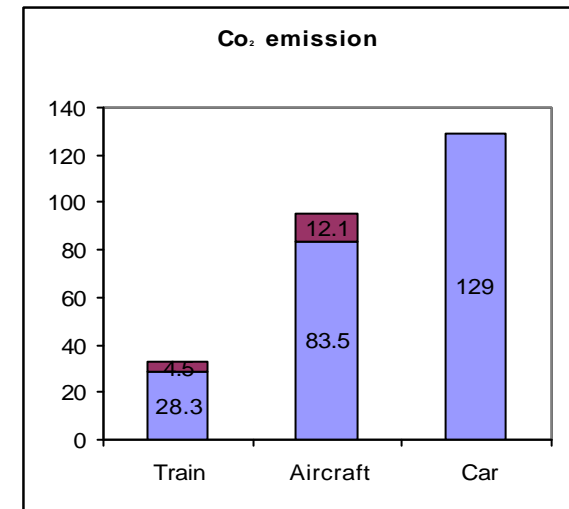
ICE, Aircraft (LH-Mix*), Car



l / person



l / person



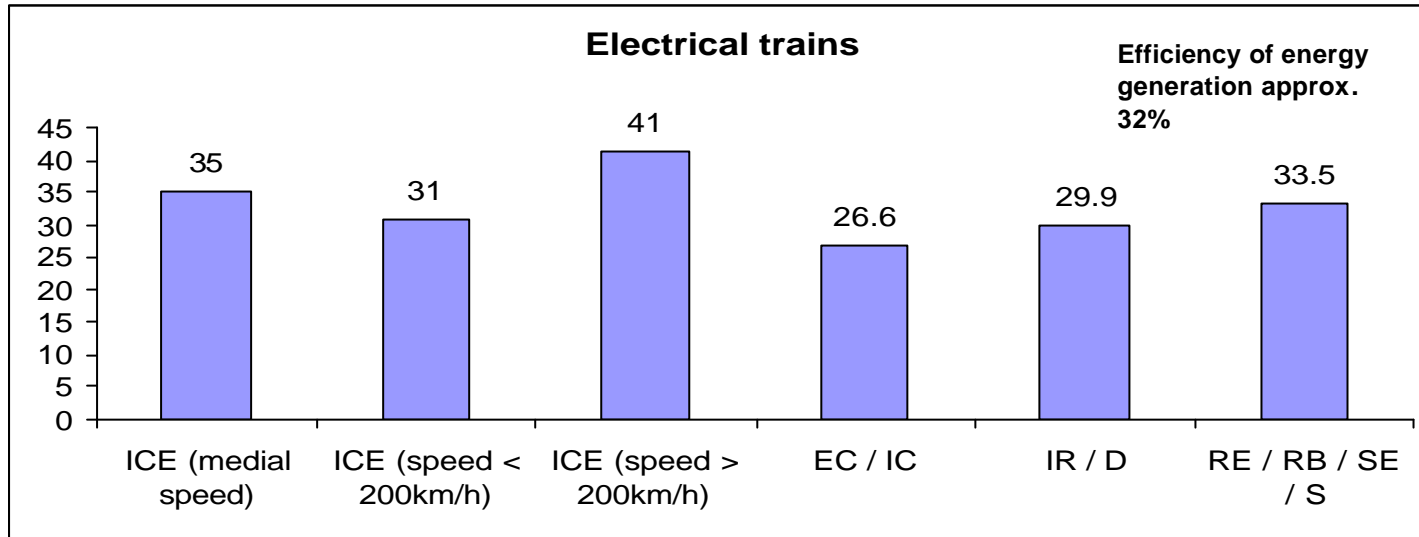
Kg / person

Incl. Taxi (red)

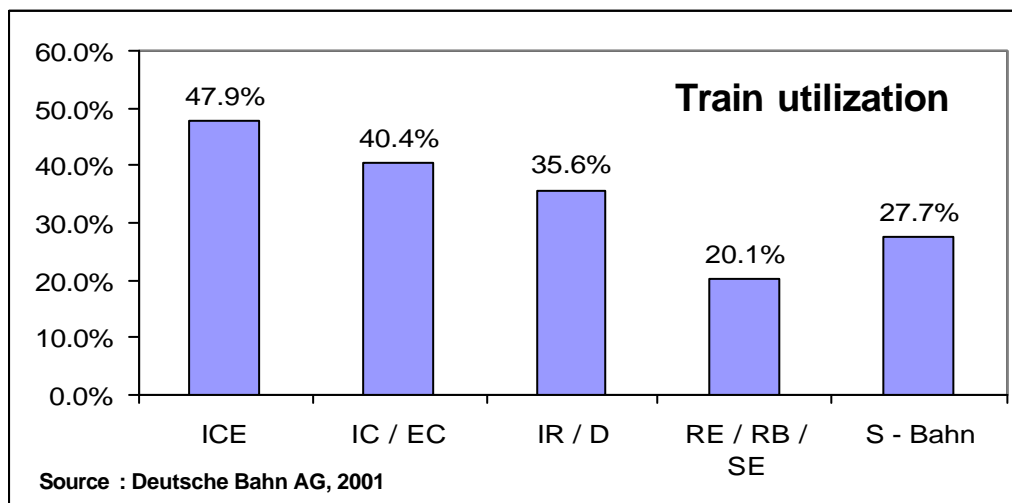
* A310, A320, B737

Source: IFEU, 2002 / Deutsche Bahn AG

Specific energy consumption (Wh/seat km)



Source: IFEU Heidelberg, 2002



Manufacturers: Influencing and documenting Environmental Performance

▪ Environmentally sound materials

- All materials in the vehicles are known and listed
- Bombardier has developed a list of Prohibited & Restricted Substances to ensure that no harmful materials are used in the vehicles

▪ High recyclability > 90% (by weight)

- The vehicles are produced with a high fraction of recycled and recyclable materials
- Polymers over 100 grams are marked, according to ISO standards, to facilitate recycling

▪ Increased load factor (passenger-km / offered seat-km)

- High speed lines are more attractive and thus have a higher load factor
- Improved space utilisation maximised in terms of seats per length of train

▪ Low energy consumption - thus low emissions of CO₂, NO_x, SO₂

- Reduced running resistance, dominated by aerodynamic drag
- Reduced weight
- Reduced energy losses in e.g. propulsion and auxiliary systems and also in the catenary and feeding system
- Reduced energy consumption of comfort equipment, e.g. auxiliary equipment
- Use of energy regeneration
- Energy efficient driving and “eco-driving”

▪ Low noise emissions – TSI for high-speed

▪ Low particle emissions – minimised wear and tear

▪ Efficient mode of transport – in terms of land use

▪ Environmental Product Declarations (EPD)

- Product environmental performance is documented in a reliable way according to ISO standards 14021 / 14025
- Based on a Life Cycle Assessment (LCA) according to ISO standard 14040
- Other environmental documentation: Recycling manual, Environmental assessment report etc.



Improved energy consumption

Measured for trip Stockholm – Västerås (Sweden)

~20% reduced energy consumption even though top speed has increased and thus also travel time decreased dramatically!

Early 1990's

Intercity train (5 cars)

- Speed: 110 – 130 km/h
- Travel time: 1:18 min
- Energy: 0,12 kWh / pkm*
- Load factor: 35 %



Today

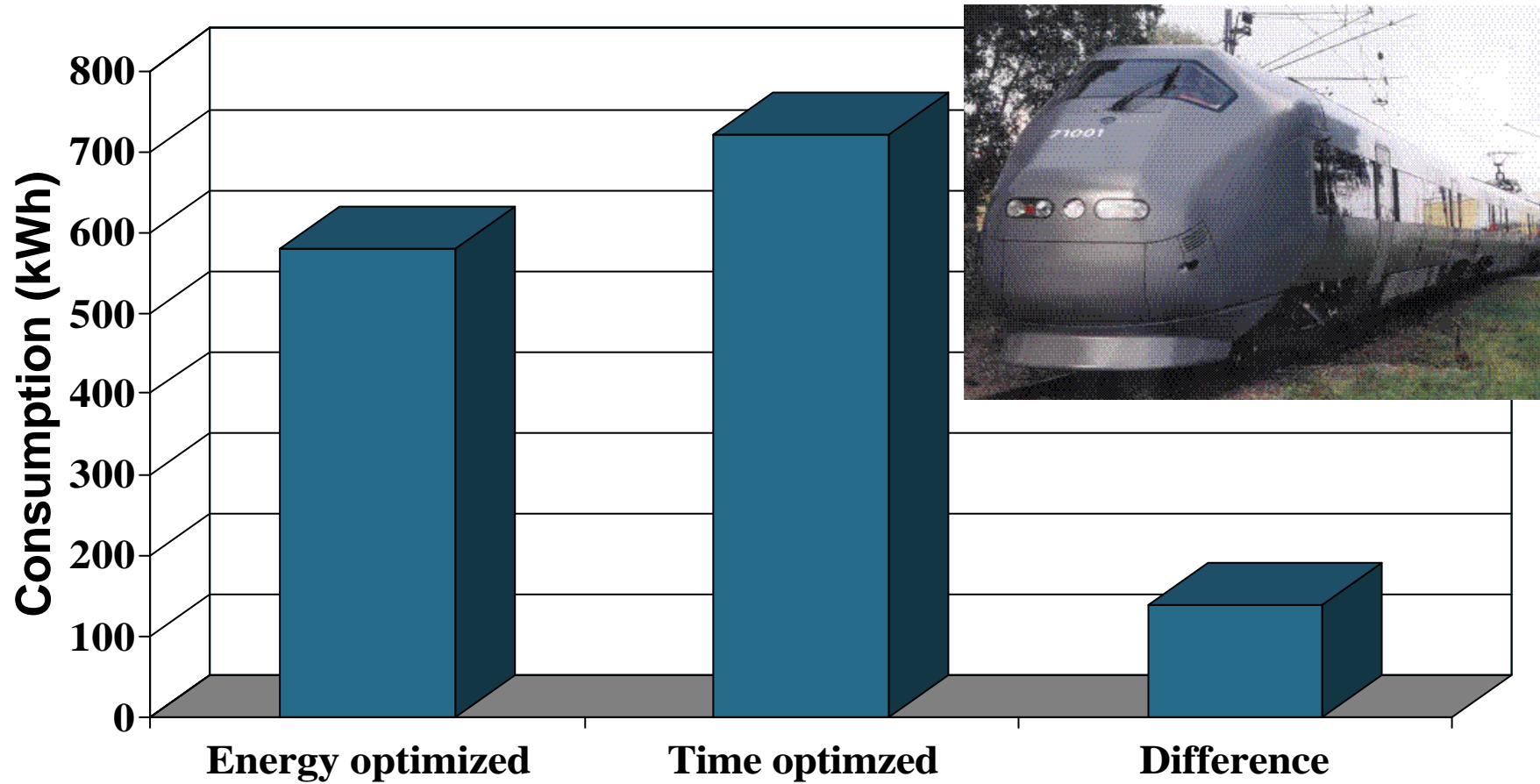
Regina

- Speed: 110 – 200 km/h
- Travel time: 0:53 min
- Energy: 0,10 kWh / pkm*
- Load factor: 35 %

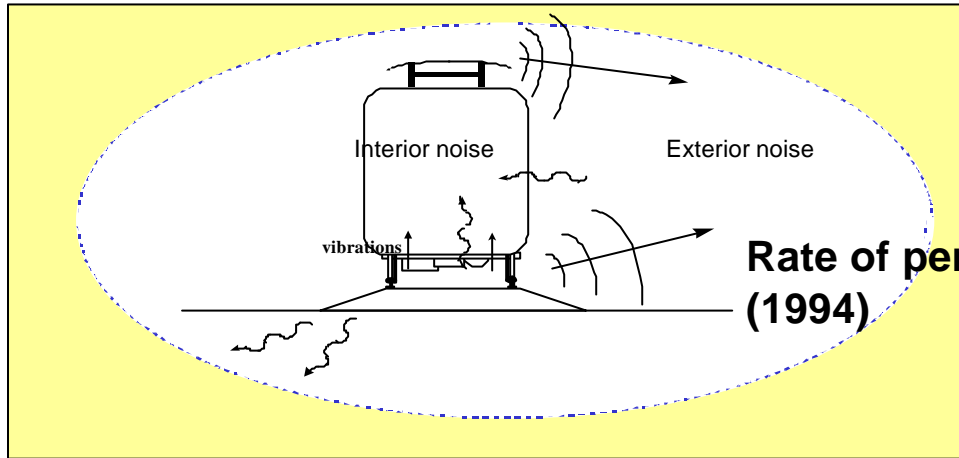


*pkm = passenger kilometer

Energy Consumption, Influence of Driving Style (Oslo Airport Train, measured data)



Noise exposure



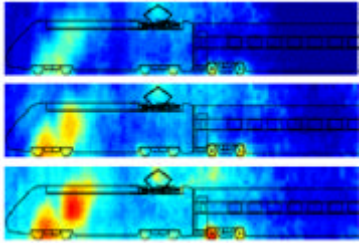
Rate of persons affected by noise in Germany (1994)

	affected	heavily affected
Road traffic	69%	22%
Airtraffic	42%	9%
Rail traffic	21%	3%
Industry	21%	3%
Neighbours	22%	6%
Sport facilities	7%	1%

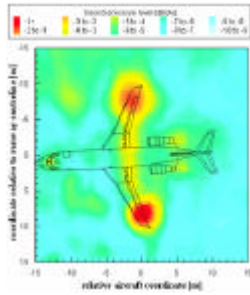
Source: IFEU Heidelberg, 2002

Bombardier High Speed Trains use Synergies from Bombardier Aerospace

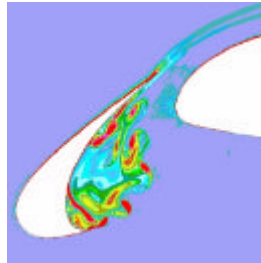
▪ Aeroacoustic Sources



Bogie

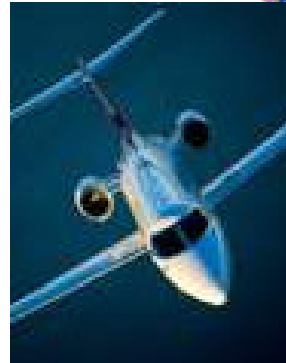
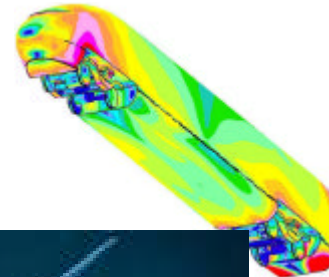


Wing Tips

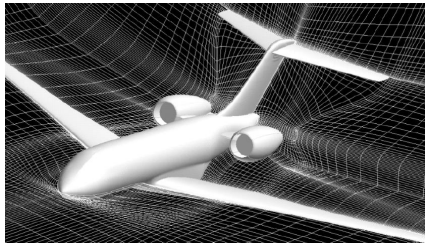


Local Turbulences

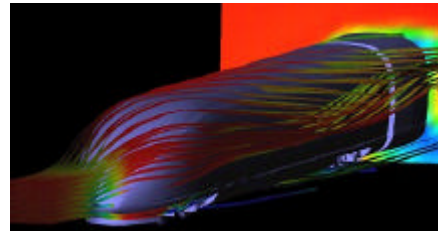
▪ Side Wind Loads



▪ Aerodynamic Drag

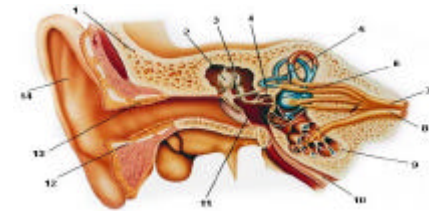
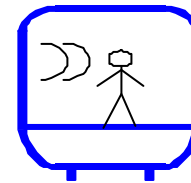
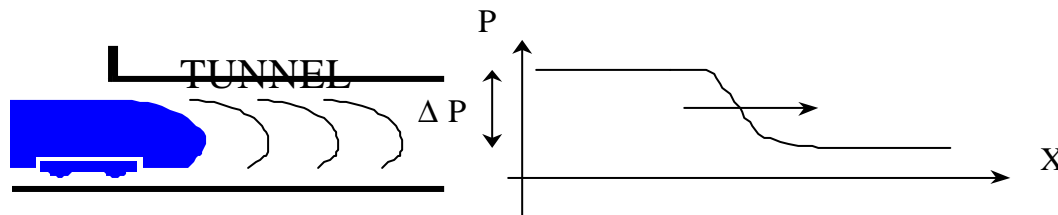


Global Express



High Speed Train

Bombardier Transportation and Aerospace have together put a lot of efforts in developing sophisticated tools to optimize acoustic and aerodynamic behavior of the trains/planes. BT has proven that those tools correctly predict the reality of the trains in service. This means that, we can now really optimize the trains in the design phase when we are introducing new or modified design.



REPID (EC funded): A common language for the rail sector

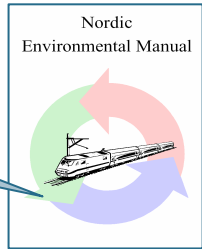


- ▶ A framework for dealing with **standardization of Environmental Performance Indicators** (EPI's) and data formats within the railway industry
- ▶ A **tool for improving usability of Environmental Performance Indicators** (EPI's) and data formats.

www.railway-procurement.org

PROSPER I & II Projects

Continuation of
"Nordic Manual" (1999)



Objectives:

- To increase the overall "eco-efficiency"/ sustainable performance of new rolling stock
- To assist railways in setting up environmental requirements and assessing tenders
- To initiate a dialogue with users (railways) and stakeholders (UNIFE, manufacturers)

Results of the Project:

- a **guideline** to assist in setting up environmental requirements and evaluating tenders
- a set of **recommended qualitative environmental specifications** (defining performance values, PROSPER II)
- a **reference document** for experience, examples and state of the art of environmental relations and their economic cost/benefit aspects

PROSPER Partners:

The logos of the four PROSPER partners are displayed: Die Bahn DB (German Rail), Trenitalia (Italian Rail), SBB CFF FFS (Swiss, French, and Finnish Rail), and NedTrain (Dutch Rail).

Output: Environmental Guideline for the Procurement of Rolling Stock (UIC Leaflet)

Conclusion

- From an environmental point of view, rail (including high-speed) is superior to other modes of transport.
- Nevertheless, manufacturers strive for further reduction of negative environmental impacts.
- Areas for improvement are primarily: energy efficiency, noise.
- Rail is the only solution to reduce or at least stabilize CO₂ emissions from transport.
- The true environmental cost (or external cost in general) must be taken into consideration.