European railway research and environment

SIFER Conference
Lille, 26 May 2009

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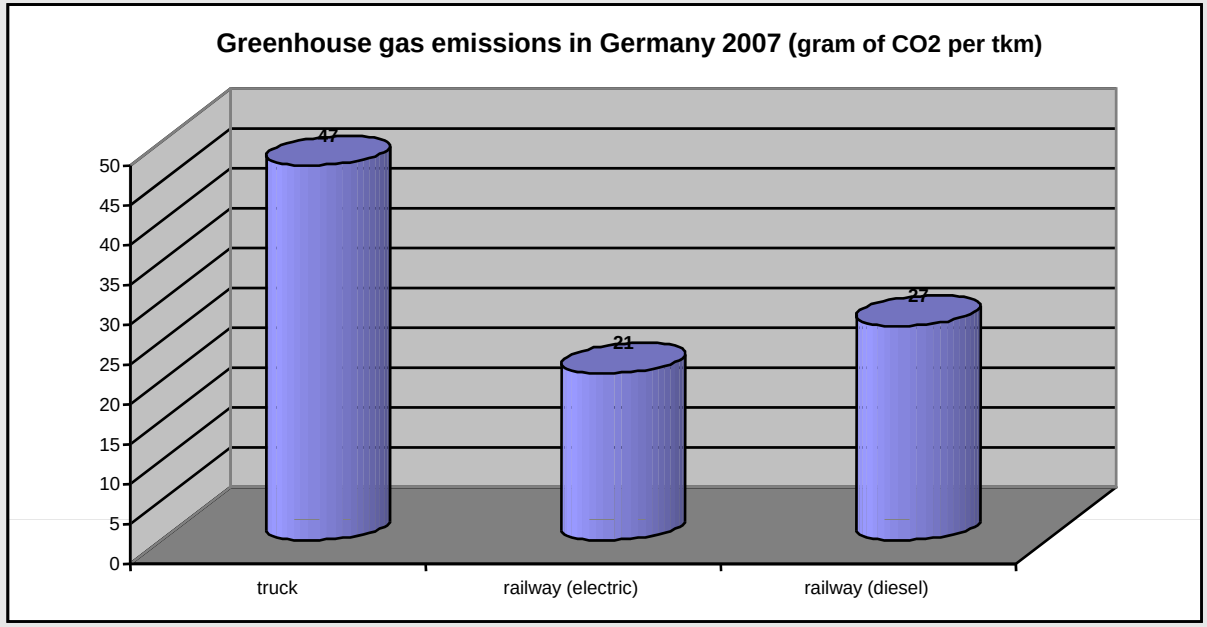
UNIFE General Manager

Agenda

- **Modal shift as a solution for sustainable transport**
  - State of the art: rail vs. other transport modes
- **Technical developments to accompany a modal shift**
  - UNIFE led research projects on energy efficiency:
    - Railenergy
    - ModUrban – ModEnergy
  - Emissions from diesel traction: CleanER-D project
- **ERRAC focus on environment**
  - General introduction
  - Environmental related activities

Some comparisons (1/3)

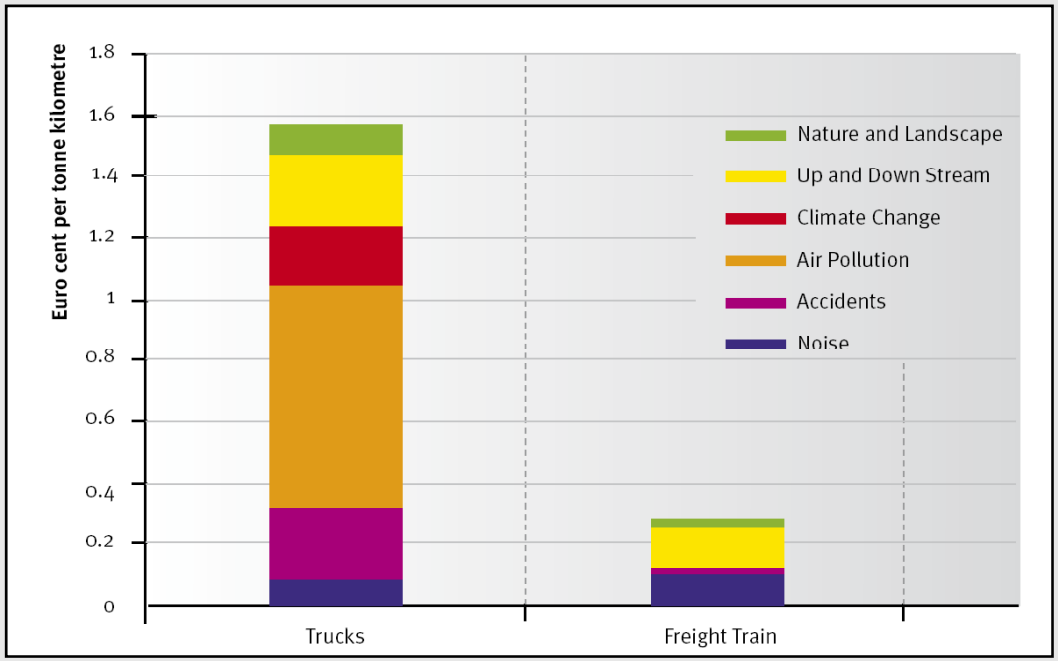
GHG emmissions



Rail environmental performance could and should be better acknowledged and communicated

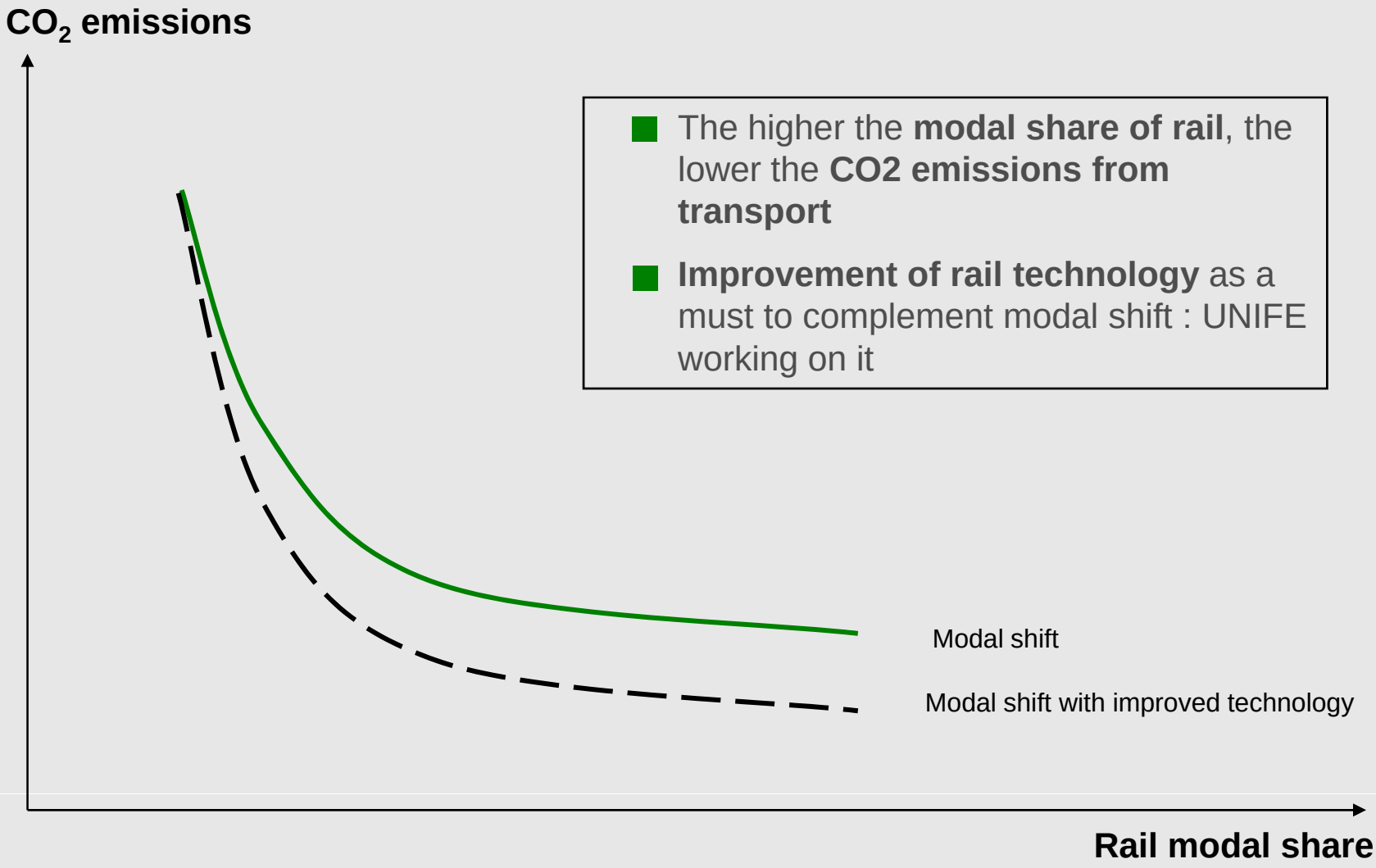
Some comparisons (2/3)

External costs



A comparison with marginal external costs in road and rail traffic shows a clear advantage for the rail transport

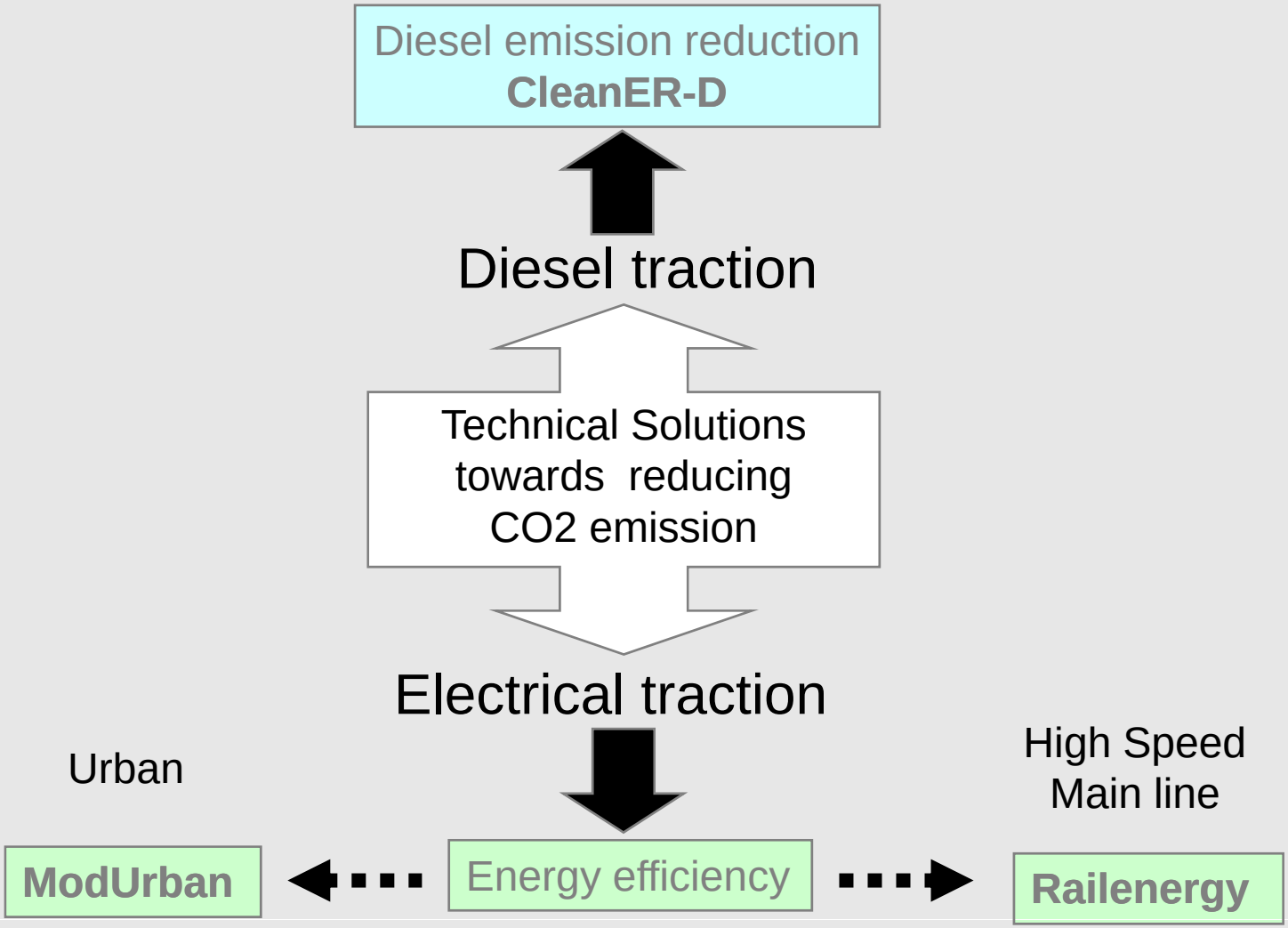
How modal shift and technology should complement each other



Additionally…

To accompany a **modal shift** and to maintain **rail competitive advantages**, the rail industry is strongly involved in the **development of new technologies**

Technical Solutions via research projects: UNIFE's field of action



- **“Innovative Integrated Energy Efficiency Solutions for Railway Rolling Stock, Rail Infrastructure and Train Operation”**

- **Main objectives of Railenergy is to cut the energy consumption:**
  - Development of a holistic framework approach for proper integration
  - Study new concepts and integrated technical and technological solutions to improve energy efficiency.
  - Final target of achieving a 6% reduction in the specific energy consumption of the rail system by 2020, assuming that traffic volumes double in comparison with current figures.

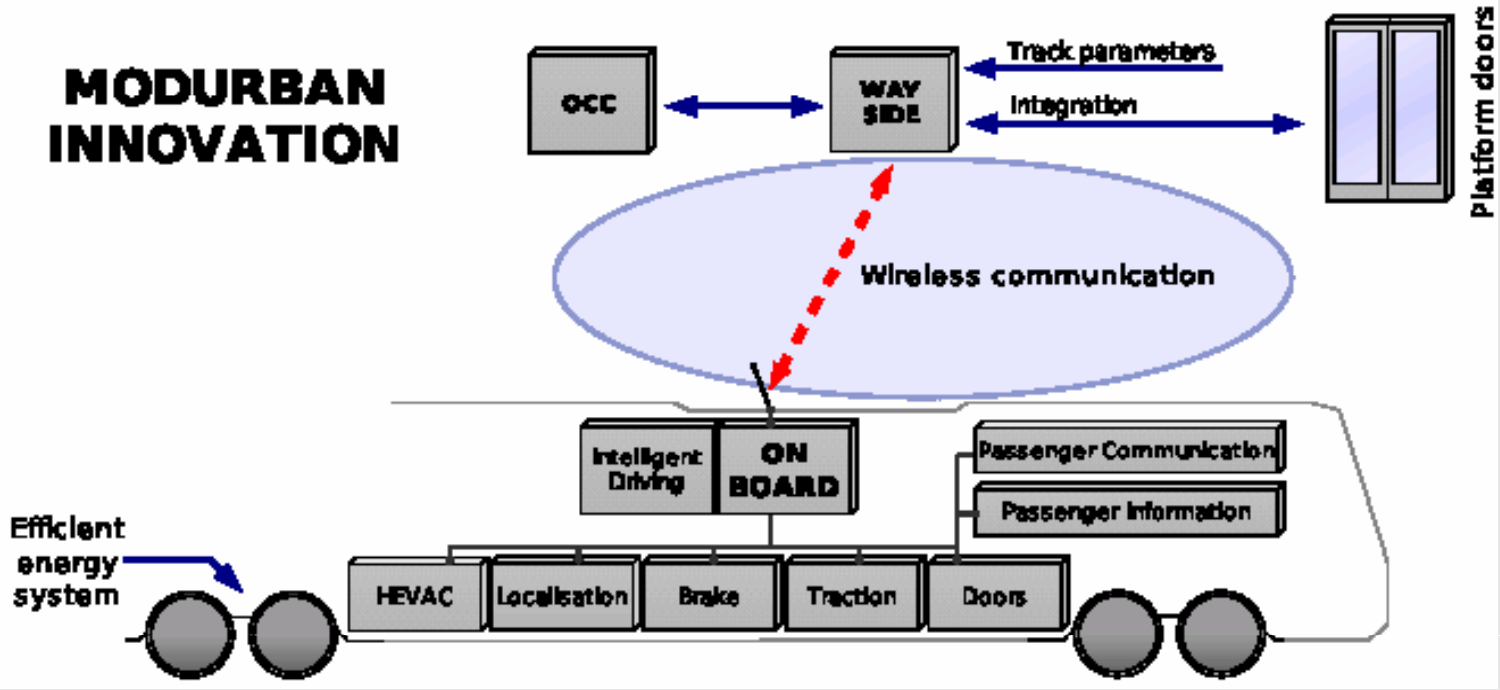
- **Railenergy figures:**
  - 4 years duration (2006-2010)
  - €14.7M (out of which the EC grant is €8M).
  - 27 partners (railway operators, infrastructure managers, component suppliers, universities and consultancies)

- **Main Technologies to be developed include:**
  - Trackside
    - modelling, new components, new architectures
  - Components
    - energy storage, reuse of waste heat, ecodriving metering
  - Traction
    - modelling, superconducting transformers, medium frequency distribution, hybrid diesel-electric propulsion
  - Topologies
    - simulation of onboard integration, onboard energy efficient architectures

- **Main Outputs:**
  - Relevant baseline figures and scenarios for selected reference systems
  - A system-based concept for modeling energy consumption
  - An integrated simulation tool for energy consumption and Life Cycle Cost
  - An integrated railway energy efficiency Decision Support Tool

MODURBAN (Modular Urban Guided Rail Systems)

Total budget: € 20 million
Project Duration: Jan 2005 – March 2009
38 partners



ModUrban (2/2)

Subproject MODENERGY – Objectives

- **Increasing the energy efficiency of several subsystems:**
  - Optimised Train Control
  - Efficient Air-conditioning System
  - Energy recovery systems
  - Future potential use of lightweight materials
- **Develop and offer practical and affordable solutions to decrease the energy consumption of urban railway systems.**

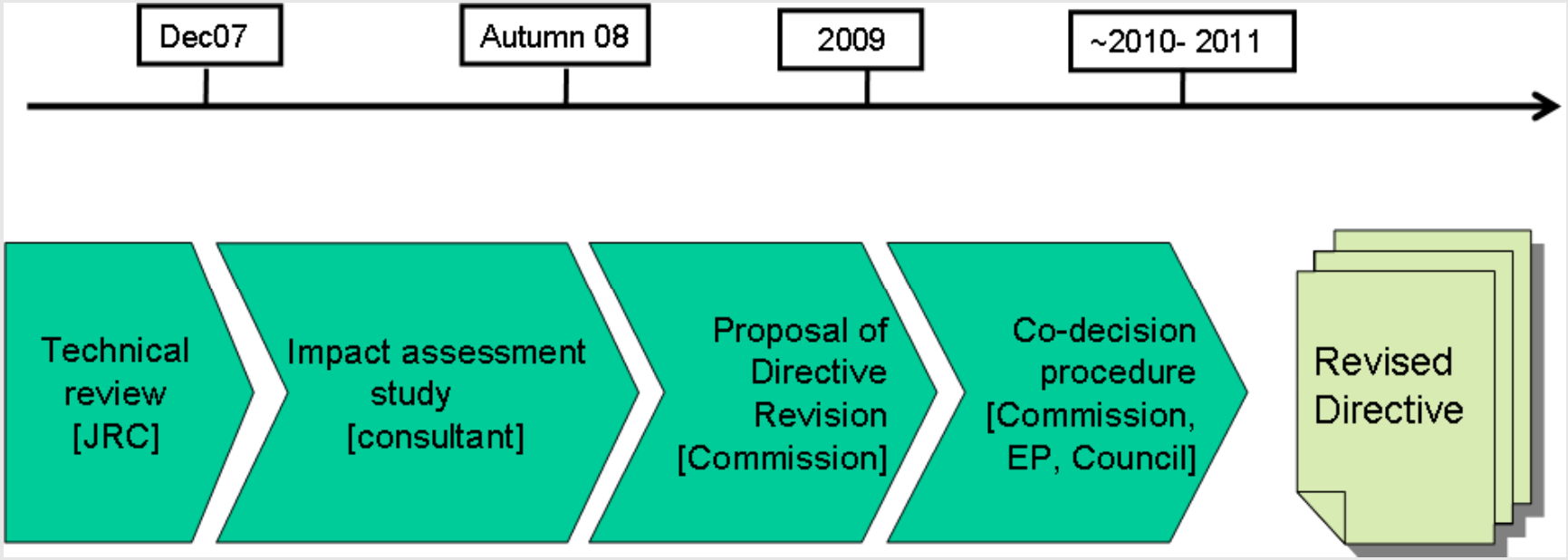
WPs	Resp. partner	Partners involved
WP 16: Prescription for HVAC's in a total system approach and development of an advanced optimisation software to reduce energy consumption in a Metro Systems (Stations, platforms, utilities)	ALSTOM	SIE, BT, ANS, KNORR, RATP, M.Madrid, CMM, M.Barcelona
WP 17: Energy savings by onboard storage	SIEMENS	ALS, BT, ANS
WP 18: Removing Constraints on the use of light weight materials	Newrail	ALS, SIE, ANS, ATAC, BT
WP 19: Power saving through the train control system	Siemens	Als, BT, Thales, RATP

Next steps for Urban Rail

- **The HORUS project proposal for FP7 2nd call**
- **An integrated approach to Energy management in Urban Rail systems**
- **The project failed to be adopted by the EC for a few points and is today the first on the reserve list!**

Diesel Emissions (1/2)
NRMM Directive

- **The European Commission initiative:**
  - Directive 2004/26 amending Directive 97/68 applies to a broad range of non-road applications, including, for the first time, to **rail applications**



Diesel Emissions (2/2)

CleanER-D

- Answers the issues of compliance with the European Commission's NRMM directive
- Provides a **platform to the engine and train manufacturers** together with the operators to develop stage IIIB compliant vehicles
- **Evaluates long term impacts** on society and environment and the railway system
- Focuses on **innovative technical solutions** to comply with the upcoming stricter legislations and looks for a better balance between pollutant and GHG emissions (e.g. hybrid solution)
- The Project will try to address the issues raised by a **too early implementation of stage IIIB (2012**), to be compared with the equivalent EPA regulation foreseen in 2016

ERRAC history

- Set up in 2001 with the ambitious goal – embracing the Transport White Paper objectives – of creating a single European body able to contribute to the revitalisation and the competitiveness of the European rail sector through more innovation and more co-ordinated research activities.

- a unique body bringing together:
  - **Railway undertakings**
  - **Infrastructure companies**
  - **Urban and regional transport operators**
  - **Manufacturing industry**
  - **Representatives of the EU Member States**
  - **European Commission**
  - **Customer groups**
  - **Consultants and academic institutions**

- With the aim of achieving consensus on priorities for railway research and guiding research efforts towards common strategy

ERRAC WP01 Greening surface transport

- WP01 The greening of surface transport Leader **C.Cheron (SNCF) /** Co-Leader **M.Walter (Knorr-Bremse)**

- 3 roadmaps will be developed towards the vision for 2030:
  - **Energy**
  - **Noise and vibration**
  - **Other environmental issues**

- Members of the working group:

Ph. Berthier	SNCF
Dr. M. Mather	DB
U. Ostermayer	DB
Françoise Combelles	RATP
Dr. U. Henning	Siemens
J Goikoetxea	CAF
Peder Flykt	Bombardier
C. Koebel	Bombardier
Marco Nock	Knorr-Bremse
Manfred Walter	Knorr-Bremse
A Tarantino	Ansaldo Breda
P. Prenleloup	SAFT
P. Von den Kerkhoff	Dupont
J Carruthers	Newrail
A Bifulco	TEST
A Senatore	TEST

ERRAC WP01 & advices for the FP7 3rd call

- Three green topics identified by ERRAC for the FP7 third call
  - **Attenuation of ground-borne vibration and affecting residents near railway lines**
  - **More sustainable products for the railway infrastructure (i.e. replacement for creosotes wooden sleepers)**
  - **Energy consumption reduction in Urban Rail Systems (HORUS), rejected by DG Research because not in line with the focus on freight**
- As far as FP7 2nd call preparation was concerned, ERRAC could only Work in the frame provided by DG Research
- The UNIFE however deplores a too high focus on technological solutions for freight transport
- ERRAC will deliver the first R&D roadmaps for the future in a year time, experts are welcome to participate to the WPs activities!

Conclusion

- From an environmental point of view, **rail is the most sustainable transport mode.**
- Areas for improvement are primarily: **energy efficiency, noise** and **vibration**
- UNIFE's members have already achieved **major technological improvements** in the past 20 years

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 %

Trip Stockholm – Västerås (Sweden)

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

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