Session 6:
New Technologies, Standardisation

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Since 2011: Senior Researcher at IVT, ETH Zürich; main research topics are rail freight and railway operations, especially energy efficiency of rail freight and optimization of Single Wagonload.

2006 – 2011: Senior Expert at SBB Cargo in the field of infrastructure demand management and infrastructure plannung

2006: phD at the University Duisburg-Essen about the containerisation of Single Wagonload
Energy Efficiency in rail freight
Dr. Dirk Bruckmann
ETH Zürich
Energy efficiency in rail freight
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Approaches to improve the energy efficiency in rail freight
Energy consumption in EU rail freight

- The largest part of the energy consumption is used for operation purposes

- But there is also a significant use of grey energy for rolling stock and infrastructure
Approaches to reduce the energy consumption

- **Infrastructure**
  - Building materials
  - Infrastructure use

- **Rolling Stock**
  - Traction (efficiency of use, recuperation, ...)
  - Wagons (weight, aerodynamics, rolling resistance)

- **Planning**
  - Network design
  - Scheduling

- **Operations**
  - Drivers assistance
  - Adaptive train control

- **Modal Shift**
  - Modal shift from Road to Rail
Infrastructure

Reducing energy consumption by increasing the efficiency of infrastructure use:

More train paths through optimized signalling technologies

Efficient use of train paths by longer and heavier trains:

Source: UIC/VIA Verkehrsconsult
Rolling stock

Aerodynamic optimisation of freight wagons

Lightweight construction to reduce the tare and increase the load factor

Optimised bogies and axles to reduce the rolling resistances

Source: Hecht et al.

Source: Wascosa

Source: TU Berlin
Planning

Network optimisation to reduce the deviation of freight wagons

Optimisation of the schedules to reduce overtaking stops of freight trains
Operations

Adaptive train control to avoid conflicts in network nodes

Drivers assistance to achieve an energy effective speed profile
Modal Shift

• The measures in energy efficiency increase the quality of rail freight and reduce the operational costs.
• Thus the energy efficiency improves the competitiveness of rail freight.
• Additional effects by modal shift can be achieved.
Any Questions?

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