Panel 3 (a)

Diesel Rail Services – Introduction

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Fleet development & Fleet renewal

Development of Numbers of Tractive Rolling Stock, EU27 & EFTA, UIC Members

Fleet renewal DMUs 2010-2020: ca 250 / year
Fleet renewal Diesel locos 2010-2020: ca 150 / year
Source: DB Eco Rail Initiative/SCI Verkehr 2010
Production in train-km – Share of Traction Type (2008)

Production share per traction type for Passenger transport

- Diesel loco pass.: 6%
- DMU pass.: 17%
- Electric loco pass.: 38%
- EMU pass.: 39%
Electrified and not electrified lines - length in km
EU 27 & EFTA UIC Members, projections till 2020
(based on ERIM 2020 and TEN-T 2017 forecast)

Sources: UIC Railisastatistics
ERIM forecast 2020
TEN-T lines forecast 2017
Energy Consumption of Diesel Rail Services

Final Energy Consumption per Service Type

- Highspeed
- Intercity
- Regional
- Freight

GWh

Share of Final Energy

- Diesel: 20%
- E-Traction: 80%

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About 45% of European Networks are not electrified

Electrification rate is low

Diesel Traction consumes 20% of total final energy & produces 23% of pass train km

Diesel traction will still be significant in 2020
Importance of Diesel traction & Framework for Energy Savings (2)

- Since fleet renewal until 2020 is small, the biggest saving potential for this time horizon have
  - Operational measures
  - Efficiency Technologies for existing rolling stock
- Following presentations: Overview and concrete examples for energy efficiency technologies
Panel 3 (b)
Innovative Diesel Components

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Innovative Diesel Components – Overview

Technologies investigated in RAILENERGY:

- Use of waste heat for climatisation
  - Absorption refrigeration technology
- Permanent Magnet Technology
  - Permanent magnet excited (PM) generator and traction motor
- On-board energy storage
  - Batteries, flywheels, supercaps, combinations (battery + supercap)
- Hybrid diesel electric propulsion system
  - PM technology combined with an on-board energy storage
Main achievements - Use of waste heat

- Use the waste heat from exhaust air of the diesel engine for air conditioning (heating and cooling)
- Laboratory status for mobile applications, available for stationary use
- Additional weight, complex system, cooling power limited by ambient temperature, could be used for mild climate
- Fair saving potential
- Pure waste heat used for heating is best practise
Main achievements - PM technology

- Traction generator + traction motor in PM technology
- Higher efficiency, increased torque and power density and lower mass compared to induction machines
- PM motor tested in several prototypes (i.e. Gröna Tåget)
- Technology available for new projects (i.e. power pack for Desiro ML, traction motors for DD SBB-FV)
- Suitable for DMU’s
- Good saving potentials
Main achievements - On-board energy storage

- Most suitable technology for DEMU: supercaps
- Already in operation in LRV service
- Additional power for acceleration
  - Compensate for time delays
  - Apply coasting in case of time reserve
- Best for frequent stops, short distances
- Promising saving potential in Regional service
Main achievements - Diesel hybrid

- Combination of PM technology and supercap
- Optimisation of the efficiency for acceleration and deceleration
- Best for frequent stops, short distances
- Promising saving potential in Regional service
Conclusions & Outlook

- Use of waste heat for heating state of the art and best practise
- PM technology offers additional energy savings (wide range of applications)
- On-board energy storage very promising for Regional service
- Combination of PM technology and on-board energy storage leads to higher overall savings