The route to making DB CO2-free
Presentation for the UIC workshop "The End of Fossil Fuels"

Deutsche Bahn | Environment | Dr. Klaus Vestner (Head of Environmental Protection and Innovation) | Zürich, 13 November 2019

DB Strategy

New overarching strategy at DB: Focus on rail

Climate protection is at the top of the agenda

Rail transport is an important solution provider in Germany
DB's corporate goals on its route towards minimising its climate impact - **AFK is a project to define measures for this**

**DB Group's self-ordained goals for climate protection**
- **By 2050**: ensure the **Group** is completely **CO₂-free**
- **By 2038**: ensure that the **traction current in Germany consists 100% of energy from renewable sources**
- **By 2030** (as interim goal):
  - Reduce the **Group's specific CO₂ emissions** by more than **half** (based on 2006's figures)
  - Increase **renewable power's contribution to DB's traction current mix to 80%** (2018: 57.2%)

**Goals of AFK project**
- Developing **measures and transition timetables** so the Group can reach its targets
- Developing **transition proposals** so the German rail system can be **CO₂-free by 2038**

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**Internal levers**
**DB is identifying areas for action to turn DB climate-neutral**

**Absolute greenhouse gas emissions (CO₂e)**

**By transport type [million tonnes of CO₂e]**

<table>
<thead>
<tr>
<th>Mode</th>
<th>2018: approx. total of 20.8 million tonnes of CO₂e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean freight</td>
<td>11%, 2.27</td>
</tr>
<tr>
<td>Air freight</td>
<td>33%, 6.78</td>
</tr>
<tr>
<td>Rail</td>
<td>23%, 4.73</td>
</tr>
<tr>
<td>Stationary 7%, 1.47</td>
<td></td>
</tr>
<tr>
<td>Regio rail</td>
<td>2.15</td>
</tr>
<tr>
<td>Cargo Germany</td>
<td>1.26</td>
</tr>
<tr>
<td>Long Distance</td>
<td>0.05</td>
</tr>
<tr>
<td>Ariva</td>
<td>0.18</td>
</tr>
<tr>
<td>Cargo EU</td>
<td>0.31</td>
</tr>
<tr>
<td>Road</td>
<td>26%, 5.57</td>
</tr>
<tr>
<td>Regio bus</td>
<td>0.60</td>
</tr>
<tr>
<td>Ariva bus</td>
<td>1.12</td>
</tr>
<tr>
<td>Schenker</td>
<td>3.67</td>
</tr>
<tr>
<td>Other transport types0.18</td>
<td></td>
</tr>
</tbody>
</table>

**By energy source in three areas [million tonnes of CO₂e]**

- **Electricity**
  - 2038 target: greening traction current
    - 2.68
  - 0.96
  - 0.36
- **Other energy sources²**
  - 0.78
  - 15.53
  - 0.51
- **Rail operations in Germany**
  - 16.8 million tonnes of CO₂e
- **Stationary**
- **DB ww³**

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¹ Stationary, other: district heating, district cooling, heating oil, natural gas, coal, wood pellets, 0.2 million tonnes of CO₂e due to losses during traction current provision (DB Energie).
² Other energy sources: diesel, kerosene, district heating, district cooling, heating oil, natural gas, wood pellets, 3 in different countries.
**DB Cargo**: Searching for solutions for heavy loads. **DB Regio**: Local Transport authorities' play a crucial role in how market develops

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**Figures for diesel-powered shunting locomotives at DB Cargo**

Number of vehicles

- Diesel locomotive
- Hybrid locomotive
- Shortfall

2018 2021 2024 2027 2030 2033 2036 2039 2042 2045 2048

**Diesel traction at DB Regio**

Number of vehicles

- DMU - old
- DMU - refitted
- DMU pool for ongoing refitting
- XMU - new


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**Assumptions and estimates**

- Ongoing electrification reduces diesel-need
- Interim technology plays role in reducing CO2
- Need for more investment must be factored
- Hybrid vehicles will be in use for a period of 40+ years. Two options for our CO2-free goal
  - Use of synthetic fuels
  - Replacement of vehicles ahead of schedule

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**Uncertainties & challenges**

- Political conditions/momentum
- Hybrids aren't CO2-free yet
- Developing synthetic fuel
- Rail freight Growth
- Shortfall of vehicles
- Investments based on current technology

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1 DMU: diesel locomotive, 2 XMU: alternative drive system, flexible technology platform, 3 Pool for ongoing refitting: rolling fleet for making up shortfall due to refitting

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**Fleet Modernisation**

**Environmentally friendly solutions**

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**DB Cargo – HELMS (Hybrid Electro Mechanical Shunter)**

- **Innovation and new components**
  - Power-split mech. transmission
  - Traction converter and drive control
  - 2 traction motors and 1 generator
  - 1,000 kW diesel engine

- **Hybridisation targets**
  - Fuel consumption cut by 20%
  - CO2 reduced
  - 100% emissions-free last-mile

- **Modernisation targets**
  - Life extension of 16 years, less maintenance work
  - Better availability

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**DB Regional – hybrid shunting locomotive (H3 Alstom)**

- **Key data**
  - Alstom H3 hybrid model with 700 kW
  - Diesel-electric traction (battery)
  - Maximum speed: 100 km/h
  - Over 75% operation with battery
  - Substantial reduction in emissions

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**Regional Rail – Stadler FLIRT Akku, battery-powered MUs**

- **Key data**
  - Batteries mounted on roof
  - Maximum speed: 140 km/h
  - Range: 150 km (using battery only)
  - Emission-free operation

- **Intended usage**
  - Deployment in Schleswig-Holstein, networks in North and East regions
  - Recharging batteries
  - Use of 55 vehicles as of 2022
Solutions
Rail, road, air/ocean freight and stationary facilities

Drive technology types

Rail
- Electrification and electric vehicles
- Battery hybrids / islands for catenary supports
- Hydrogen, incl. LOHC$^1$
- Synthetic & bio fuels

Road
- Electric vehicles
- Hydrogen
- Synthetic & bio fuels

Air/ocean transport
- Synthetic & bio fuels
- Hydrogen

Stationary units
- Photovoltaic (internal use)
- Geothermal energy / heat pumps
- Cogeneration unit
- Wood-fired heating (pellets and chips)
- Synthetic & bio fuels & hydrogen

$^1$ Liquid Organic Hydrogen Carrier, usually an organic liquid (petroleum-based carbon compound)

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