

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

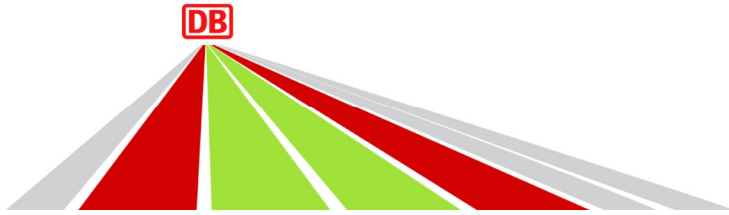


**New overarching strategy at DB:
Focus on rail**

**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**



Shift away from fossil fuels

DB's route to becoming CO₂-free by 2050

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%)

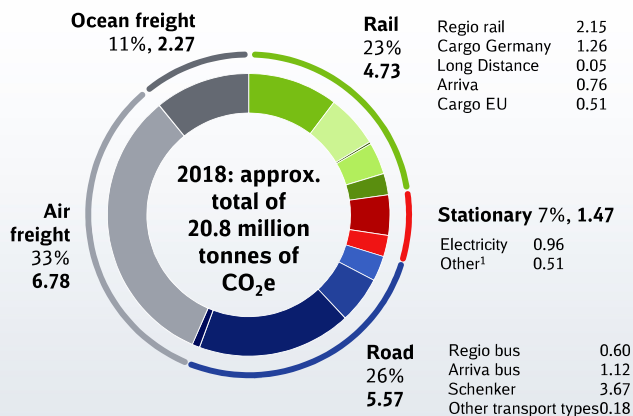
Goals of AFK project

- 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**

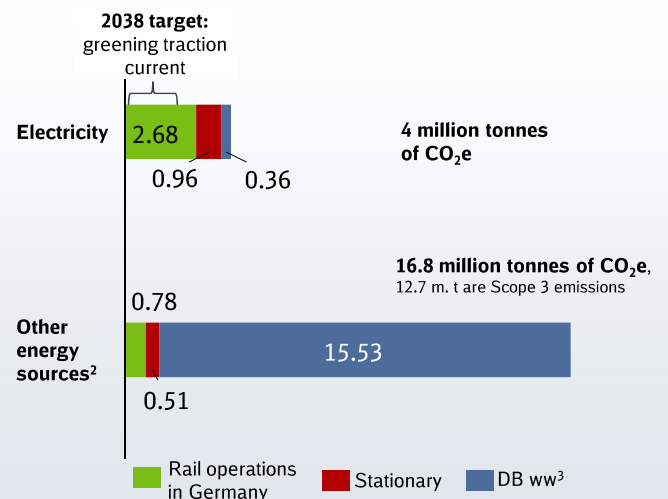
Internal levers DB is identifying areas for action to turn DB climate-neutral

Absolute greenhouse gas emissions (CO₂e)

By transport type [million tonnes of CO₂e]



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

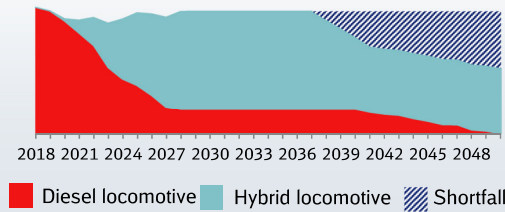


¹ Stationary, other: district heating, district cooling, heating oil, natural gas, coal, wood pellets, 0.2 million tonnes of CO₂e due to losses during traction current provision (DB Energie), ² Other energy sources: diesel, kerosene, district heating, district cooling, heating oil, natural gas, wood 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

Figures for diesel-powered shunting locomotives at DB Cargo

Number of vehicles



Assumptions and estimates

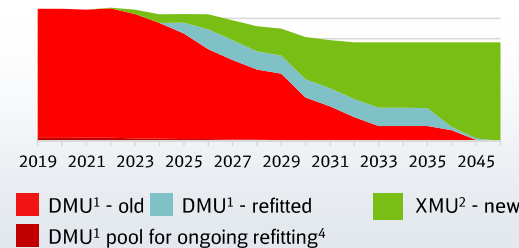
- Ongoing electrification reduces diesel-need
- Interim technology plays role in reducing CO₂
- Need for more investment must be factored
- Hybrid vehicles will be in use for a period of 40+ years. Two options for our CO₂-free goal
 - Use of synthetic fuels
 - Replacement of vehicles ahead of schedule

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

Diesel traction at DB Regio

Number of vehicles



- To be factored in: electrification measures³
- Discontinuation of diesel used for transport contracts
- Refitting of old vehicles with alternative drive systems, not restricted to a single technological platform from 2022
- Only vehicles with alternative drive systems should be bought for medium-term period

- Political conditions/momentum
- Germany's transport market: ongoing/future orders and vehicles used for existing contracts that can still be deployed
- Hybrids aren't CO₂-free yet

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

Fleet Modernisation Environmentally friendly solutions

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

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

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

Rail

Drive technology types



- Electrification and electric vehicles
- Battery hybrids / islands for catenary supports
- Hydrogen, incl. LOHC¹
- 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)