

ECORails Final Conference, Berlin

23 June 2011

ECORails



What Rail Industries expect from Train Operating Companies and Politics

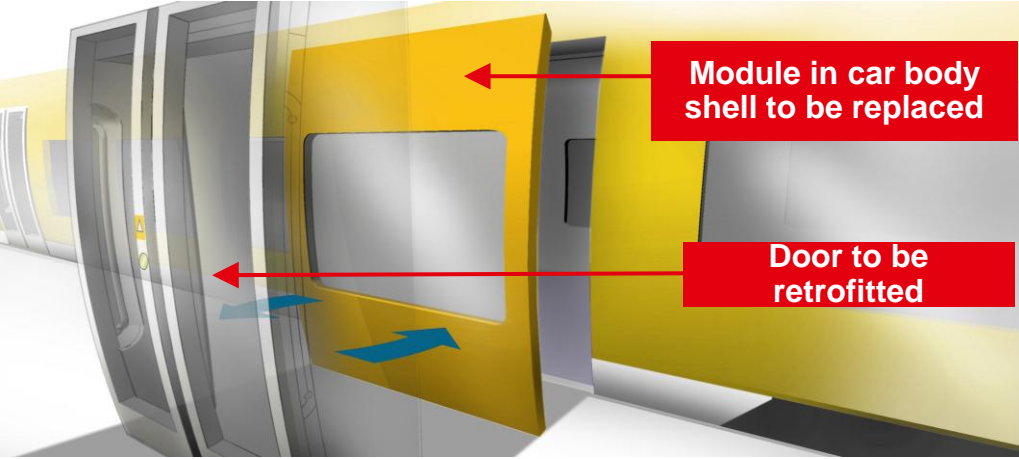
BOMBARDIER

Market requirements today

- **Railways stand for sustainable mobility**
- **Rail industry already fulfills highest environmental demands**
- **We aim at further extending the economic advantage of rail**
- **Market requirements for regional trains are characterised by**
 - smaller quantities
 - variety of different technical requirements
 - capacity, number of cars, train length
 - Motorisation, power
 - number of doors
 - comfort level (seating, aircon, passenger information system, interior, etc...)
 - entry heights
- **Market requirements for locomotives are characterised by**
 - Different power systems for cross-border transport
 - Different signaling systems for cross-border transport
 - Passenger and freight traffic
 - Electrified and non-electrified lines

The answer to these complex needs are standardised product platforms – example Talent 2

- Scalable train configurations with variable number of doors

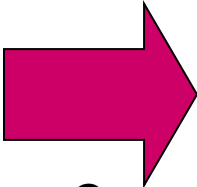
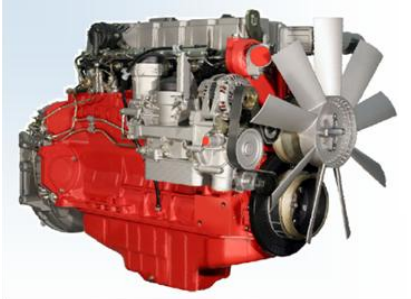


Platform concept for locomotives: TRAXX Last Mile - combines diesel, electric and battery operation

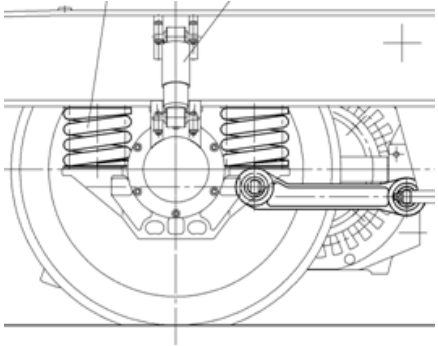
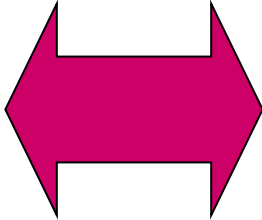
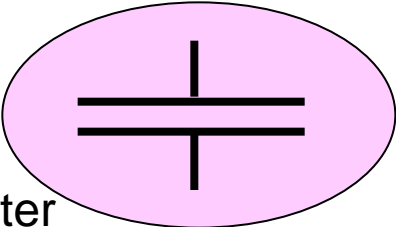
Electric traction



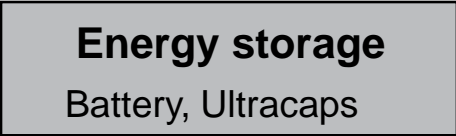
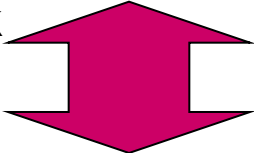
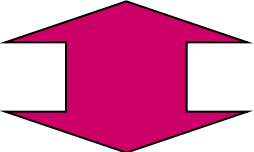
Diesel for Last Mile



Converter
dc-link



Drive system



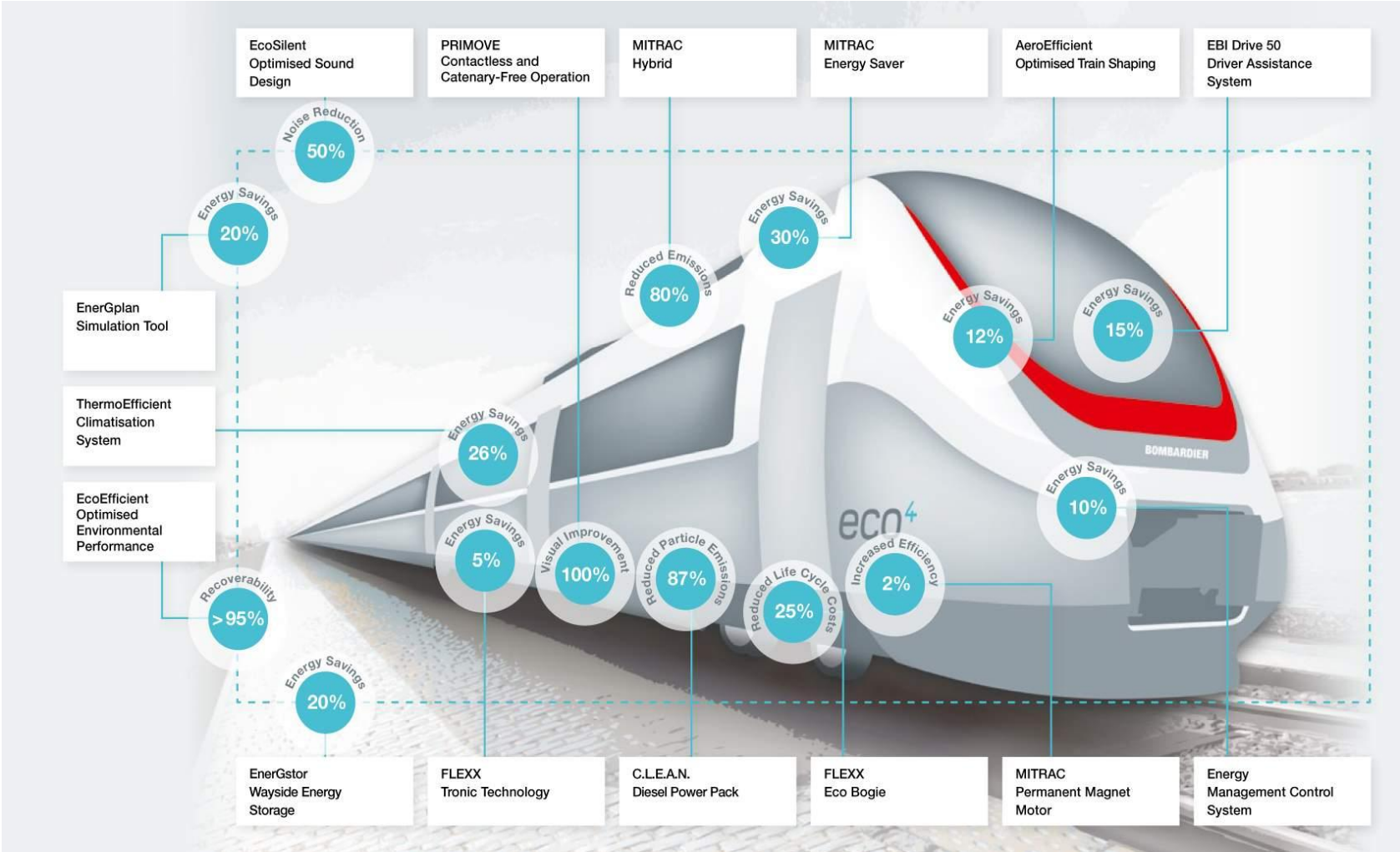
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Railways stand for sustainable mobility

- We have constantly improved the environmental friendliness of our trains for many years
- We incorporate into our platform concepts also advanced technologies for improved train performance
- The **Bombardier Formula for Total Train Performance**
 - Energy
 - Efficiency
 - Economy
 - Ecology

eco⁴

eco⁴ - a Strong Portfolio of Technologies and Solutions



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AeroEfficient Tool for Optimized Train Shaping

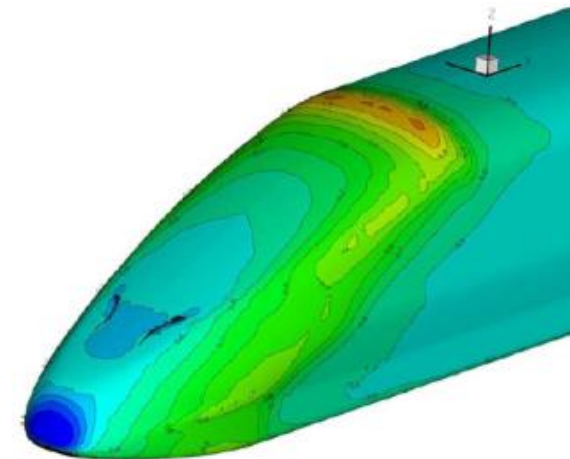
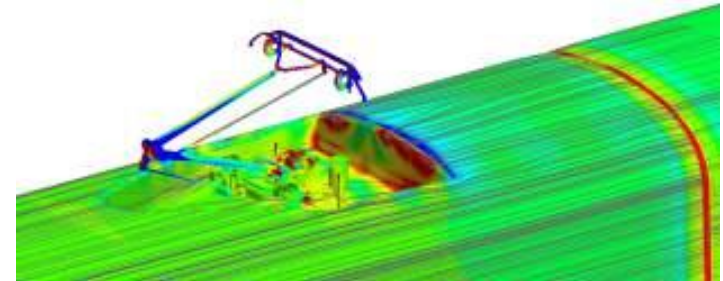
Energy Saving
max. 12%

Features

- Addresses high energy consumption caused by aerodynamic resistance (35% at 200kph, 50% at 300kph)
- Developed with Bombardier Aerospace
- Optimization of complete train configuration results in aerodynamic improvement
- Most advanced system knowledge used to achieve benchmark results

Unique Benefits

- Minimizing aerodynamic resistance for complete train
- Energy savings of max. 12% to current standard design



Applications

- SBB TWINDEXX (59 trains)
- OMNEO (80 trains)
- ZEFIRO 380 China (80 trains)

MITRAC Energy Saver

Recuperating Energy

Energy Savings
max. 30%

Features:

- Storing electrical energy on-board of LRV, Metro and DMU
- Re-use for - acceleration or
- autonomous operation



Applications

- Rhein-Neckar-Verkehrsverbund (30 trains)
- Mannheim VV (4 Year pilot project)



Benefits:

- Up to 30% energy savings for a train
- Reduce substations along newly built tracks
- Headway reduction through higher acceleration
- Environmentally-friendly and reduced CO₂ emissions – profit from payback

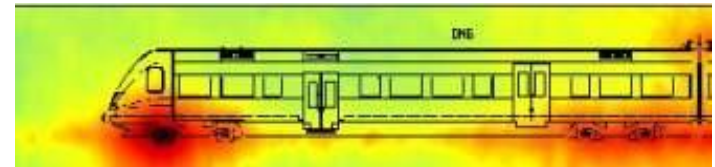
Minimizing Noise Pollution Impact

Features

- Limits noise pollution and will therefore promote expansion of railway infrastructure and rail as a preferred mode of transportation
- Anticipates future requirements for further noise reduction (e.g. TSI)
- Based on profound train/track system knowledge to meet acoustic requirements
- Advanced toolbox to select most efficient solutions

Benefits

- Low noise solutions available for:
 - cooling systems by efficient encapsulations
 - wheels by special design
 - HS trains by optimized aero acoustic shape
 - bogies



Energy Management Control System

Managing Energy Consumption of Locomotives and Trains

Energy Savings
max. 10%

Features

- Managing energy consumption of all consumers on-board a vehicle
- Energy Management - Energy Display shows the driver actual & average energy consumption compared to fleet average
- Energy Management - Energy Metering allows billing and tracking the energy consumption for operators (new norm!)
- Energy Management - Smart Stabling reduces unnecessary auxiliary loads at turnaround, inter-peak and overnight



Benefits

- Increases cost awareness of the driver
- Prepared for future European norm in energy metering
- Reduces energy consumption at standstill

Applications

- OMNEO (80 trains)
- SBB TWINDEXX (59 trains)

▪ Tender requirements

- Tenders must allow flexible and functional solutions
- The technical and environmental criteria have to be fixed in the tender and have to follow applicable standards and norms/TSIs, be transparent and comprehensible
- The control of the adherence to the specifications must also follow standardized procedures
- Delivery schedules have to be realistic

▪ Political requirements

- Develop the long-term framework for environmental and other criteria (safety, etc...)
- Ensure long-term planning
- Define transition periods for the introduction of new standards

▪ Industry

- Offers products
 - Based on Platforms
 - With a catalog of options
 - Including environmental and energy-saving technologies



- **Industry provides competitive solutions**
 - Economic,
 - ecologic,
 - efficient
- **Industry drives innovation**
- **But process requires a joint effort of all participants**
 - transport authorities (Verkehrsverbände),
 - operators,
 - railway authorities (Zulassungsbehörden),
 - rail industry and
 - politics