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What Rail Industries expect from Train Operating Companies and Politics

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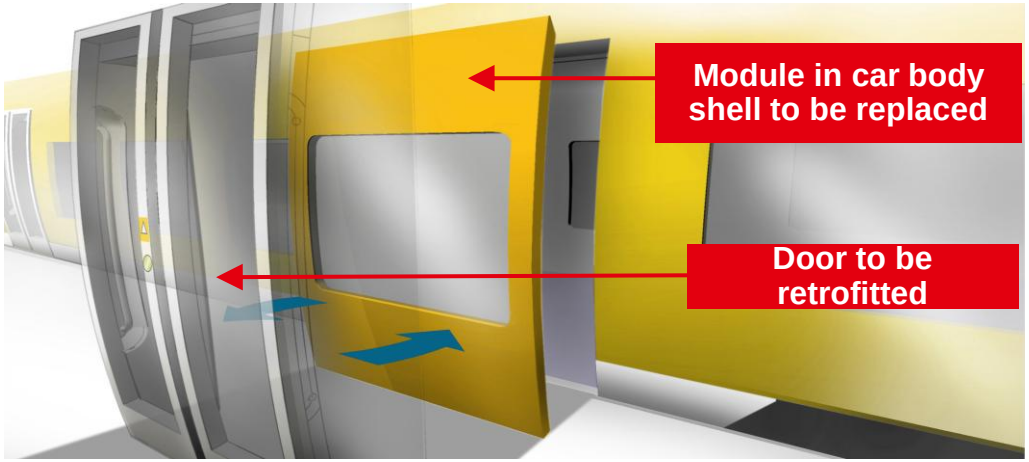
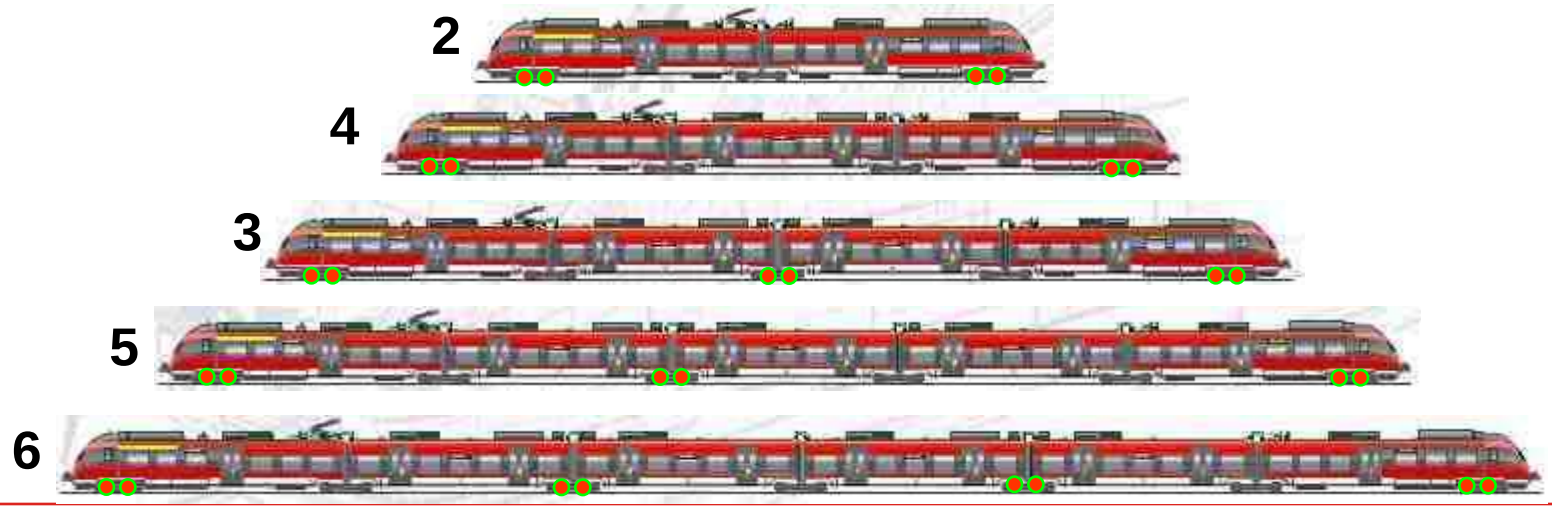
Market requirements today

- **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**





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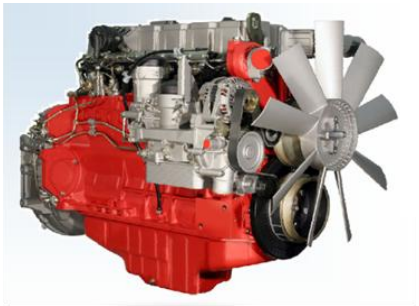
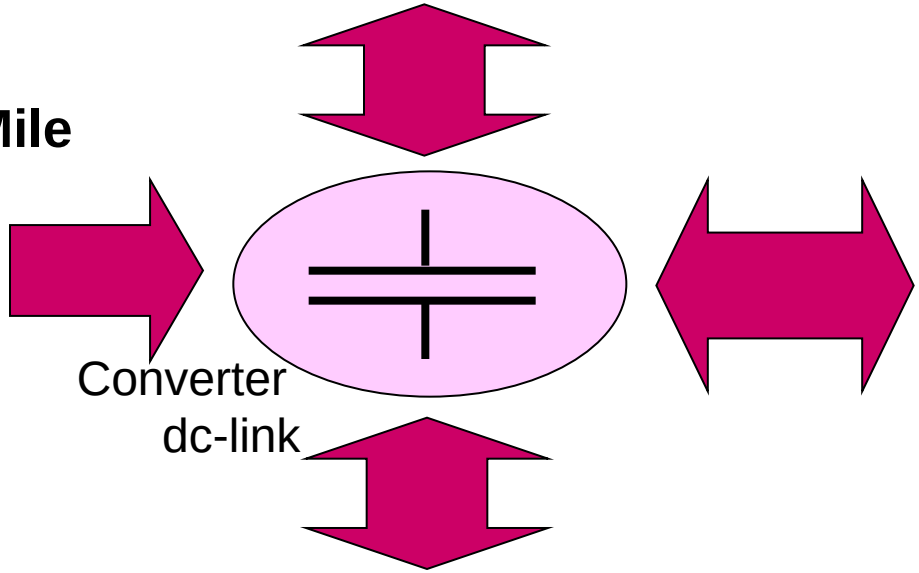
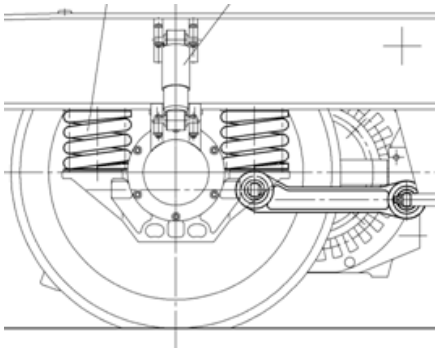
Platform concept for locomotives: TRAXX Last Mile - combines diesel, electric and battery operation

Electric traction

Diesel for Last Mile







Drive system

Energy storage

Battery, Ultracaps

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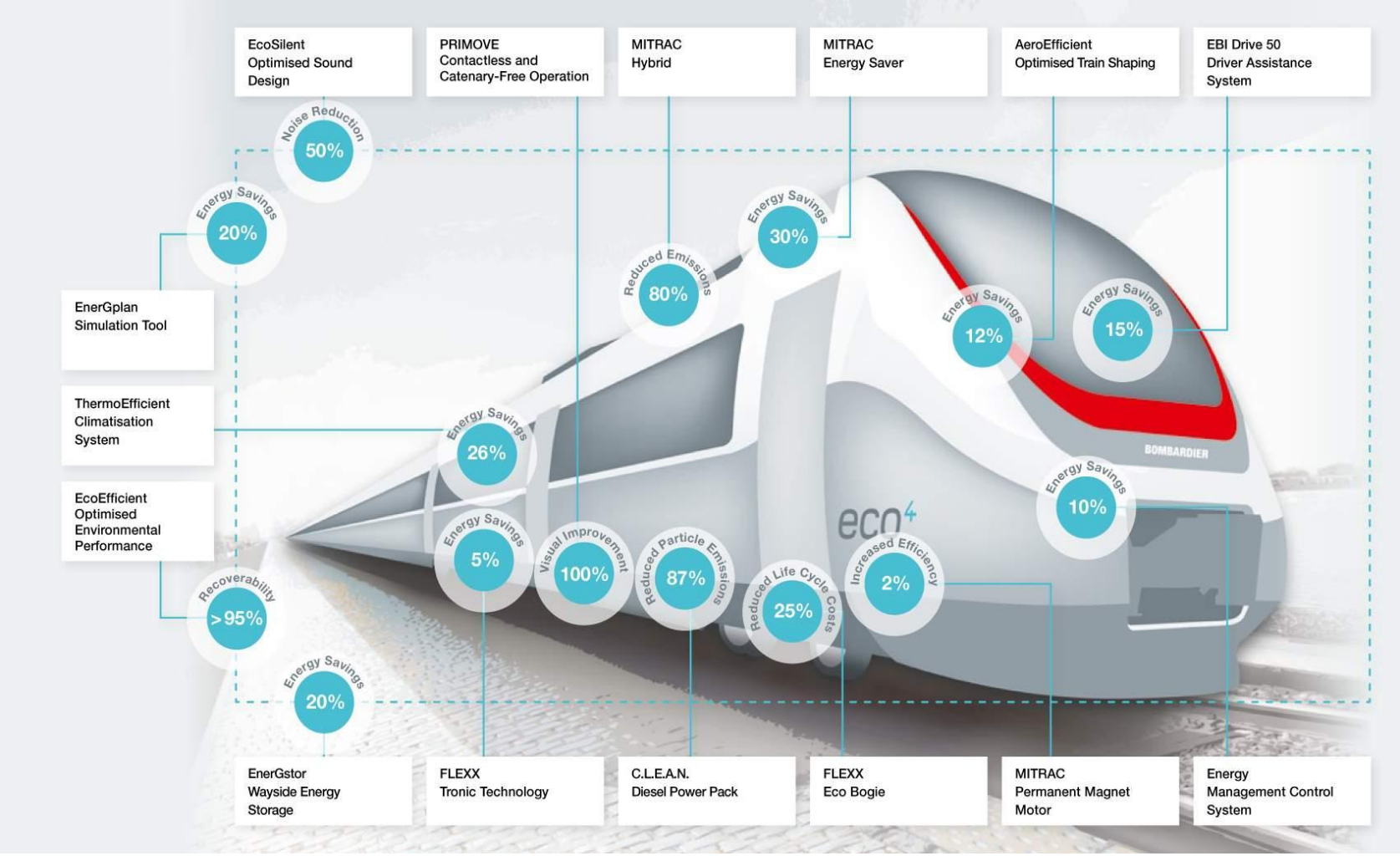
Railways stand for sustainable mobility

- **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 - a Strong Portfolio of Technologies and Solutions



AeroEfficient
Tool for Optimized Train Shaping

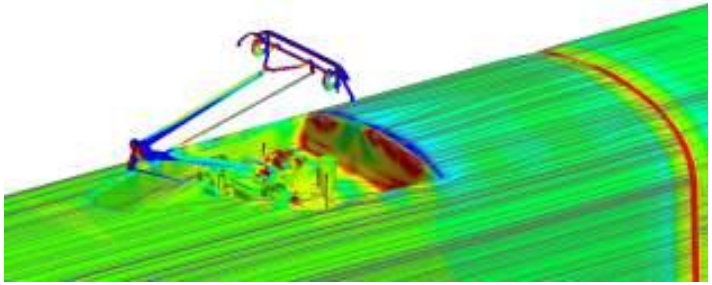
Energy Saving
max. 12%

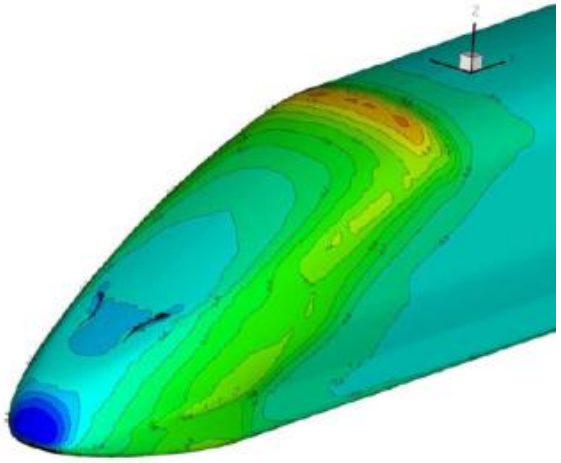
Features

- 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)

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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 CO_2 emissions – profit from payback

eco4 BOMBARDIER

EcoSilent

Minimizing Noise Pollution Impact

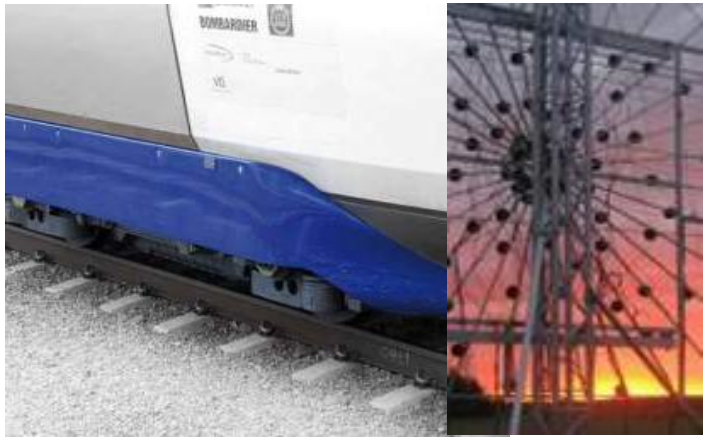
Noise Reduction
max. 50 %

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



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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)

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Expectations of the rail industry

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- **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

Conclusion

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- **Industry provides competitive solutions**
  - Economic,
  - ecologic,
  - efficient
- **Industry drives innovation**

- **But process requires a joint effort of all participants**
  - transport authorities (Verkehrsverbünde),
  - operators,
  - railway authorities (Zulassungsbehörden),
  - rail industry and
  - politics