Introduction ProRail

• Independent
• Railinfrastructure manager
• Railinfra network operator

Our Mission

ProRail connects people, cities and businesses by a dense, intensively used rail network.

ProRail provides a secure, reliable, punctual and sustainable rail network and comfortable stations, in conjunction with operators and partners.

Our professionals work efficiently and cost-consciously on a rail network focused on pleasant passenger travel and unobstructed freight transport.

ProRail. Certainly on the track.

24/7

Population 16.7 M
4 M local residents

Energy efficiency by increasing the traction supply voltage
Facts & Figures

- 1500 V Power Supply
- 2100 km electrified.
- 243 substations (2.5 – 12 MVA).
- 130 track sectioning stations.
- Distance between substations 3 – 21 km, average 6 km.
- Trains max: 4000 A.
- Energy use yearly: 1400 GWh.
History of traction energy
Analysis of Energy Effects

Energy usage / balance

Energy from public grid

- Energy for pantograph
- Energy losses
- energy use of assets in the railway

- auxiliary systems train
- Power for Traction
- Power supply Catenary earthing

- Energy needed for driving
- Power efficiency installation

- energy uses air-resistance
- energylosses during braking
- energy uses mass, friction
Re-evaluation of traction system 2011/2012
Analysis of Energy Effects

- Power consumption substation
- Power consumption train
- Regen. break
- System losses
- Power cons. substation
- Regenerative braking
- Popwer consumption train

- Savings at substation by regenerative breaking at 3 kV
- 1500 V Current situation 50% regenerative breaking
- 3 kV 100% regenerative breaking

Less energy consumption
- More traction power at 3 kV
Analysis of Travel Time Savings Effect

Power per train  

Achievable acceleration

![Graph showing power and speed relationship for different systems.](attachment:image.png)

- **Traction power limit 1500V system**
- **SLT16 1500V**
- **SLT16 3 kV**
- **SLT16 3000V+20%**

**Difference in time until maximum speed of 140 km/h referred to 1500V:**

- **3 kV:** 41 sec
- **3 kV + additional motor:** 51 sec

![Graph showing time in seconds vs. speed.](attachment:image2.png)
Monetary Benefits (indicative)

**Energy**
- Efficiency
- More recuperation
- 20 - 22% saving
- 290 GWh/yr or 133 kton CO2/yr

€.. mio/yr

**Travel time**
- Travel time savings (passenger)
- Excl benefits intercity trains
- Rolling stock reduction
- 7 - 14 sec saving in timetable per stop

€.. mio/yr

- Excluding freight and regional traffic
Migration plan

Omschakelplan van 1500V naar 3kV

1,5 kV dc
2013

Ombouw

2025
Costs (indicative)

Excluding freight and regional traffic
Conclusion

- Increasing power supply voltage effects energy and travel time savings.
- A decision has not been made yet.