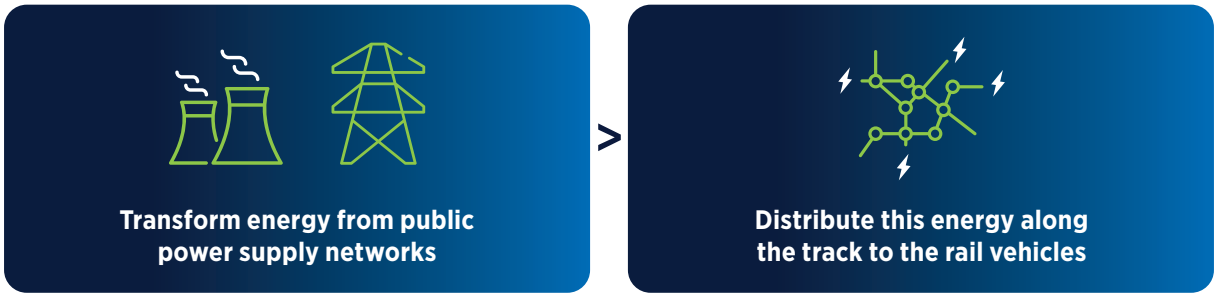
Co-funded by the European Union

Improving rail's energy supply and consumption

Rail infrastructure and rolling stock requires a complex electrical network to:



THE CHALLENGE

Increasing demand for rail-based journeys = an increase in demand for power availability. Combine this with a general shift to making railways even more sustainable, and it is easy to see why. **Rail must address its energy supply and consumption challenge.**

HOW DO WE DO THIS?

A good place to start is to **measure** and **manage** energy use. Leaning into innovation, Shift2Rail delivered 2 Technology Demonstrators that do exactly that:

1. **Smart power supply**
   A smart railway power grid in an interconnected and communicated system
2. **Smart metering**
   Providing real-time information to optimise energy consumption

SMART POWER SUPPLY SOLUTIONS

	Smart Control of Rail Power Supply	Demonstrator for 50 Hz rail power supply	Demonstrator unified DC railway electrification system
What it does	Digital control elements in rail power supply by paralleling an existing solution with a special improved switchgear station	Integrating Flexible AC Transmission Systems (FACTS) equipment into rail power supply networks	New 9 kV DC railway power supply using converter solutions
Who benefits	Infrastructure managers Suppliers	Infrastructure managers Suppliers	Infrastructure managers Suppliers

THE BENEFITS OF SMART POWER SUPPLY

Smart power supply solutions will benefit future and existing electrification schemes

- Enhanced control and protection capabilities for railway power systems
- Boost performance and capacity of existing lines
- Mitigate need for extravagant investment costs

Did You Know?
Conventional 25 kV 50 Hz substations aren't operating to their full potential. Smart control networks can improve asset reliability and increase functionality.

Key Finding
DC electrification schemes can be improved using power electronic converters and 9kV DC coupled with renewable energy sources.

Fast Fact
Improvements to substations can have a significant impact on the power supplied to both AC and DC lines and can reduce both nominal power requirements and energy losses.

SMART METERING SOLUTIONS

	Energy metering services	A communication system to interconnect many devices	Using data to improve the energy efficiency of railway infrastructure
What it does	When connected to multiple sensors via a heterogeneous telecommunications platform to an open data management (ODM) platform, these services can facilitate data collection, analysis and subsequent action.	Located either on-board a vehicle or trackside, with an ODM platform, this system can monitor and analyse collected data.	Forecast energy demand on an infrastructure, estimate a railway system's energy consumption, and predict abnormal patterns in a railway traction system.
Who benefits	Infrastructure managers Railway operators	Infrastructure managers Railway operators	Infrastructure managers Railway operators

THE BENEFITS OF SMART METERING

- Realise rail's energy efficiency potential
- Optimise system performance
- Reduce maintenance effort and costs
- Increase rail's economic and environmental performance

Did You Know?
Smart metering can:

Decrease maintenance cost and efforts by **5 – 15%**

Reduce fault-related costs by **up to 30%**

Key Finding
User applications of smart metering systems allow for a systematic exploitation of a railway system's efficiency and performance potential.

Fast Fact
Smart metering systems optimise infrastructure operations, as well as improve actual performance.

ENHANCING ENERGY MANAGEMENT

Not only do **smart power supply solutions** improve control and protection functionality for railway power supply systems, they also transmit energy data to smart metering platforms. This data then feeds user-centric applications, which in turn directly enhance energy management. Add this up and what you have is **a powerful tool to better understand and improve railway power supply and energy consumption.**

WANT TO LEARN MORE?

Solutions developed by Shift2Rail, Europe's Rail's predecessor programme

rail-research.europa.eu