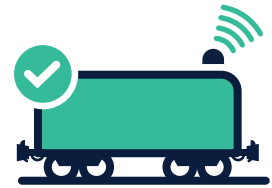


New freight propulsion concepts a 'technological awakening' for rail freight

With the aim of initiating a 'technological awakening' for rail freight transport, Europe's Rail conducted a number of technical demonstrators (TD).

One of those investigated **new freight propulsion concepts**.

Based on this research, the TD delivered 3 concepts that could help define the freight propulsion system of the future.



MULTIMODAL ENERGY SUPPLY AND ENERGY STORAGE UNIT (ESU) DEVELOPMENT

What it does

The multi-system freight locomotive of the future will feature an (optional) energy storage system (ESS), along with a second set of locomotives for catenary-free operation (CFO). The latter will include an ESU can improve overall efficiency, reduce costs, and decrease emissions.

Ultimately, such a locomotive architecture will enable door-to-door freight service without having to change the locomotive.

Maturity level

TRL 4 (technology validated in lab)

CONCEPTS FOR TRACTION/AUXILIARY SYSTEMS BASED ON SIC TECHNOLOGY

What it does

Silicon Carbide (SiC) metal-oxide-semiconductor field-effect transistors (MOSFET) can reduce energy waste – making trains more efficient and cost-effective.

- Better energy performance (2% improvement)
- Reduced size and weight (around 20%) of the necessary on-board power converters

Maturity level

TRL 4 (technology validated in lab)

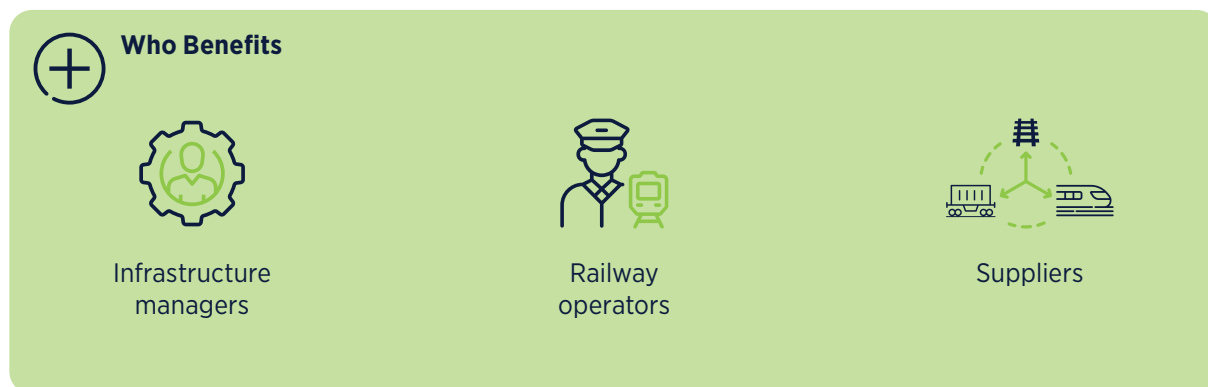
DISTRIBUTED POWER SYSTEM (DPS)

What it does

By making operations more reliable and safer, the use of DPS opens the door to longer freight trains. However, this requires a DPS architecture that removes all wired train-line connections between traction units and that does not restrict the position of the locomotives within the train consist.

Maturity level

TRL 7 (system prototype demonstration in operational environment)



ADVANCED FUNCTIONAL FEATURES, NEW PERFORMANCE SPECIFICATIONS

What the TD's research and findings make clear is that the future freight locomotive will include several advanced functional features and performance specifications:

- Vehicle setup: 4 axles, 2 bogies
- Power rating: 5 to 6 MW (catenary supply)
- Starting tractive effort between 300 and 350 kN
- Equipped with remote control for distributed multiple traction of long trains
- Maximum coupler load of 1000 kN

CONCLUSION

- New freight propulsion concepts can improve the overall performance of today's locomotives by adding and integrating additional functionalities and technologies.
- This will provide extreme flexibility for operation in non-electrified and electrified lines and enable remote control for distributed power.
- It will also increase operational efficiency by automating such activities as train start-up, train preparation, start of mission, stabling, parking, and shunting.

WANT TO LEARN MORE?

rail-research.europa.eu

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

