

E-mobility & railways, case of innovative trains

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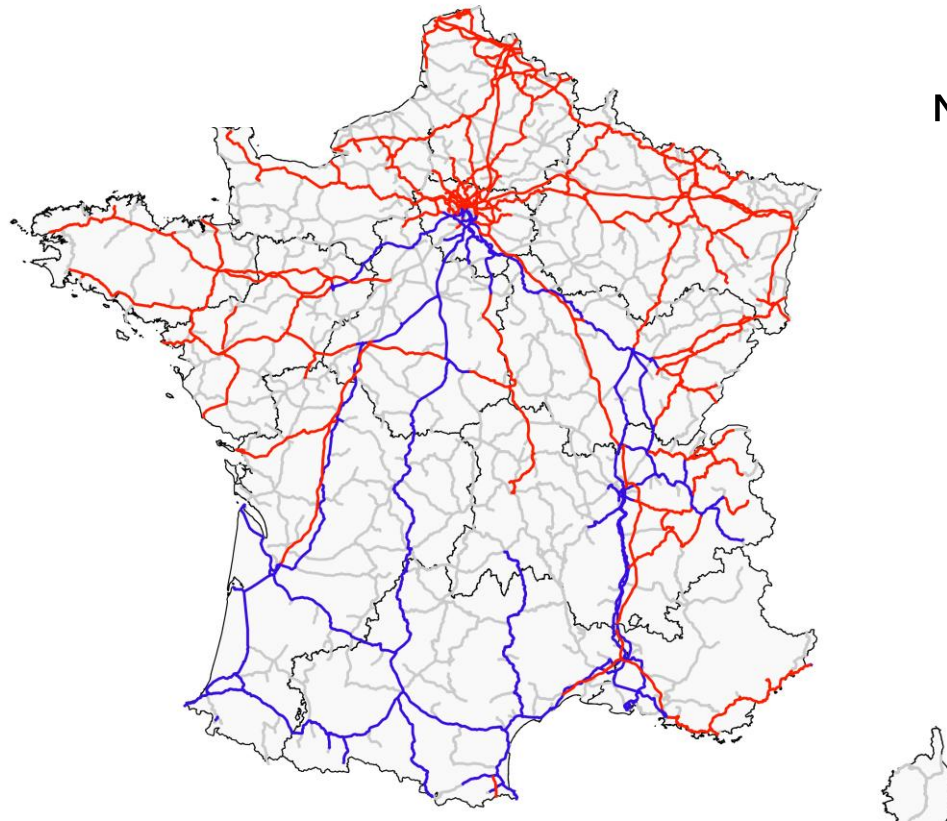
Energy & Decarbonization project manager

9 octobre 2026

GROUPE 

e-Mobility and railway

Railway: a sustainable solution



60%

of the National Rail
Network is electrified (16
123km)

84%

of railway operations are
made by electric trains

50%

Diesel operations account
of the SNCF group's CO2
emissions...

1 100

regional trains run on diesel
fuel

0

The SNCF group has
undertaken to end its
direct emissions by 2050₂

e-Mobility and railway

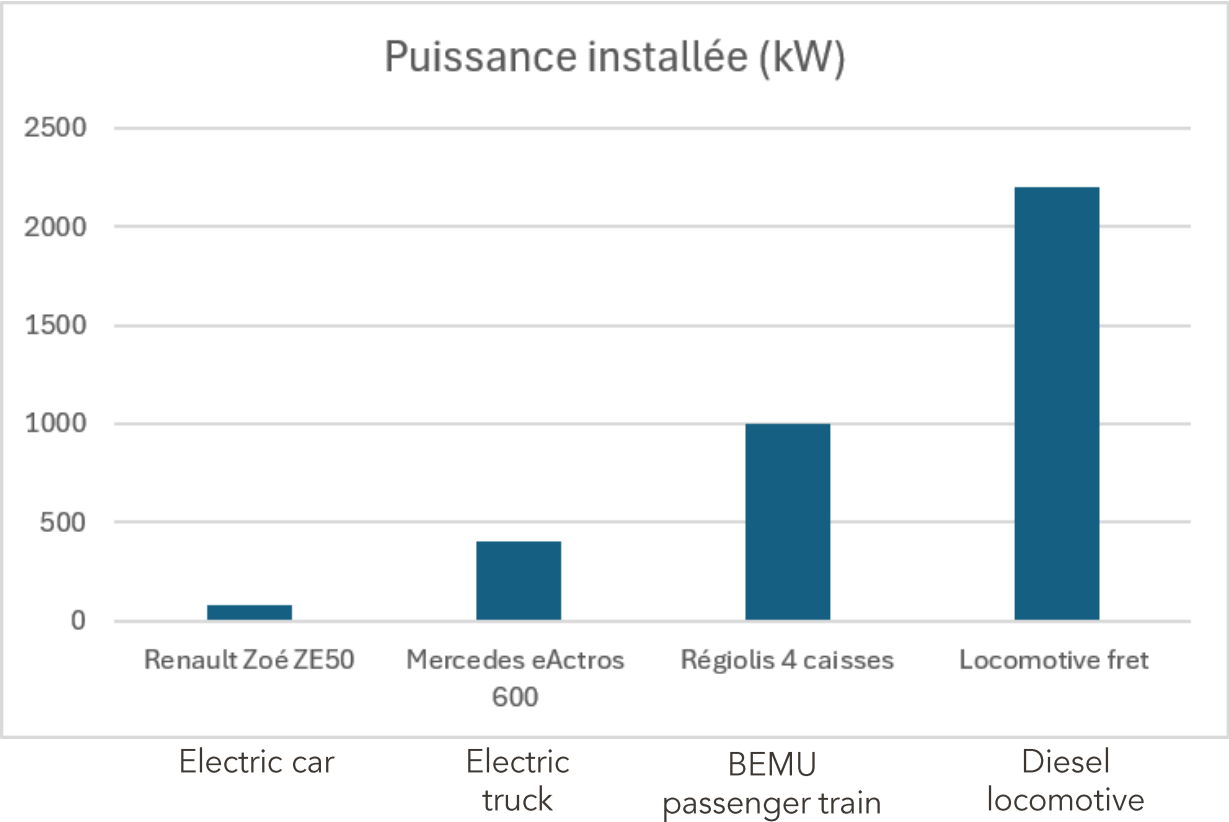
Power ratio



Renault Zoé (www.renault.fr)



Mercedes eActros 600
(<https://media.fr.daimlertruck.com/>)



Régiolis B83500



Stadler Euro 4001

e-Mobility and railway

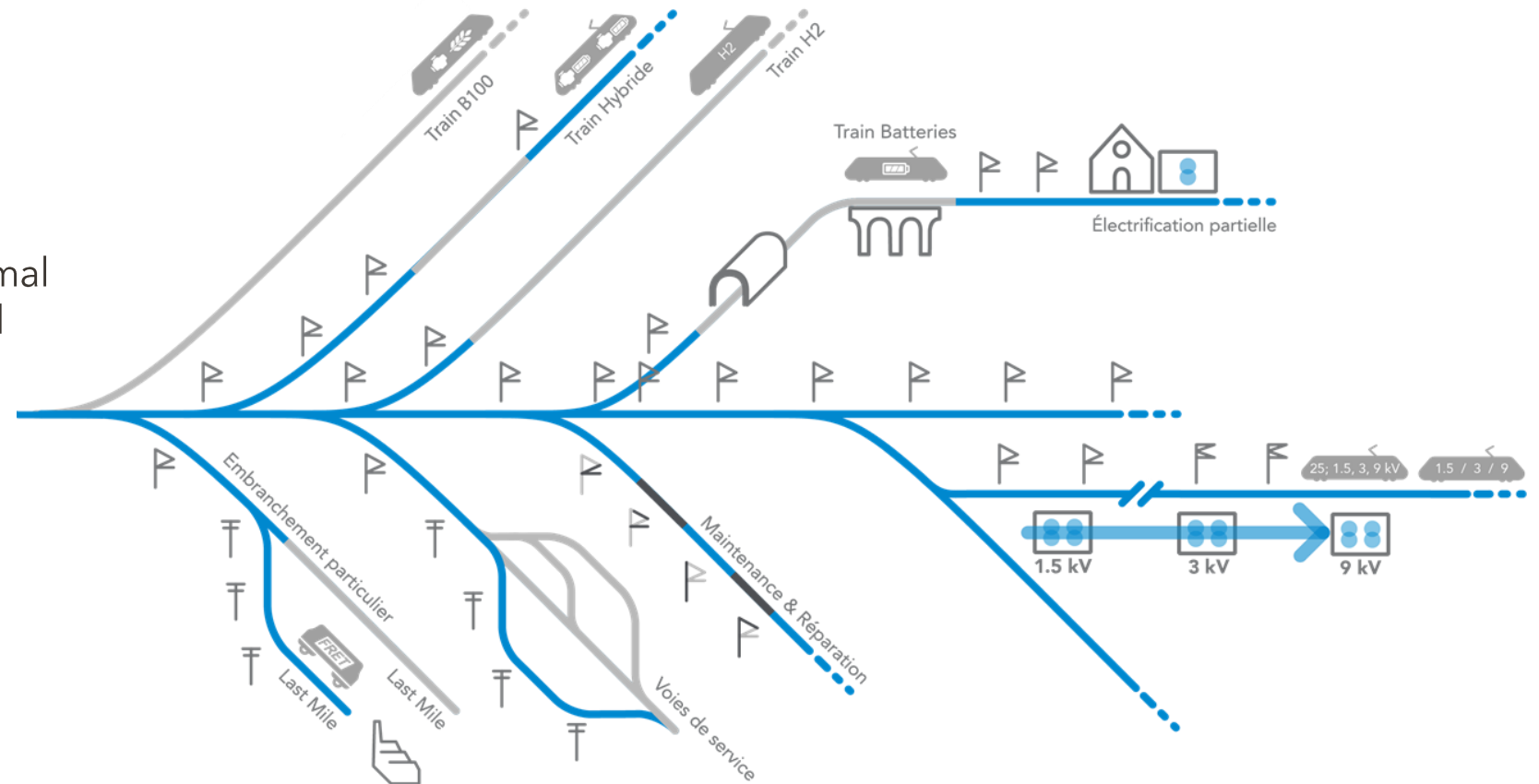
Electrification is the most energy efficient and the least carbon-intensive due to the French energy mix. Electrification, however, is expensive and takes a long time to implement.

Challenges

Decarbonize railways by implementing alternatives to thermal traction that complement the total electrification solution

Increase system robustness and optimize infrastructure costs

Developing smarter energy management





Example of innovative trains

Implementing innovative solutions alongside regional authorities and manufacturers

Hybrid train : Régiolis Hybride

- Half of the diesel engines are removed and replaced by Li-ion batteries
- Recover and use the train braking energy to supply the train and auxiliary equipment
- This energy can be used in combination with diesel or electric power
- Commercial operation since December 2023, achieving the target of a **20% reduction in consumption**



+ A project led by SNCF and ALSTOM CAF
+ With the mobilization of the regional authorities which provide a train as well as their financial contribution





Example of innovative trains

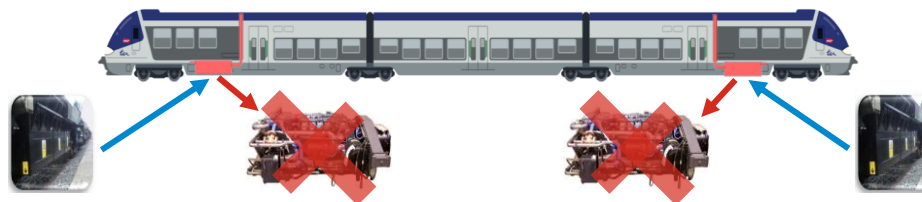
Implementing innovative solutions alongside regional authorities and manufacturers

Battery train : AGC BEMU

- Replacement of 100% of diesel engines by batteries
- 80km range, complementary to partial electrification
- 3 retrofitted BEMU trains in commercial operation since the summer of 2026
- Evaluate the possibilities offered by this technology (including the increase in range through the ability to fast recharge)



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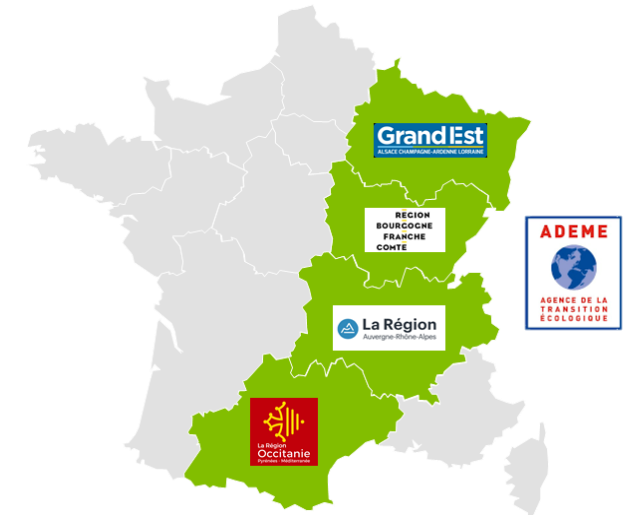


Example of innovative trains

Implementing innovative solutions alongside regional authorities and manufacturers

Hydrogen train : Régiolis H2

- Put 12 new trains into commercial circulation in 2027 (with green H2)
- Contribute to the development of a territorial ecosystem (development of local energies)
- Develop a solution to then transform existing trains into H2 trains by replacing diesel engines
- 600 km of autonomy (400 km minimum at end of life of fuel cells)



+ 12 new trains ordered by SNCF from ALSTOM for 4 regional authorities



Relevance for every technology

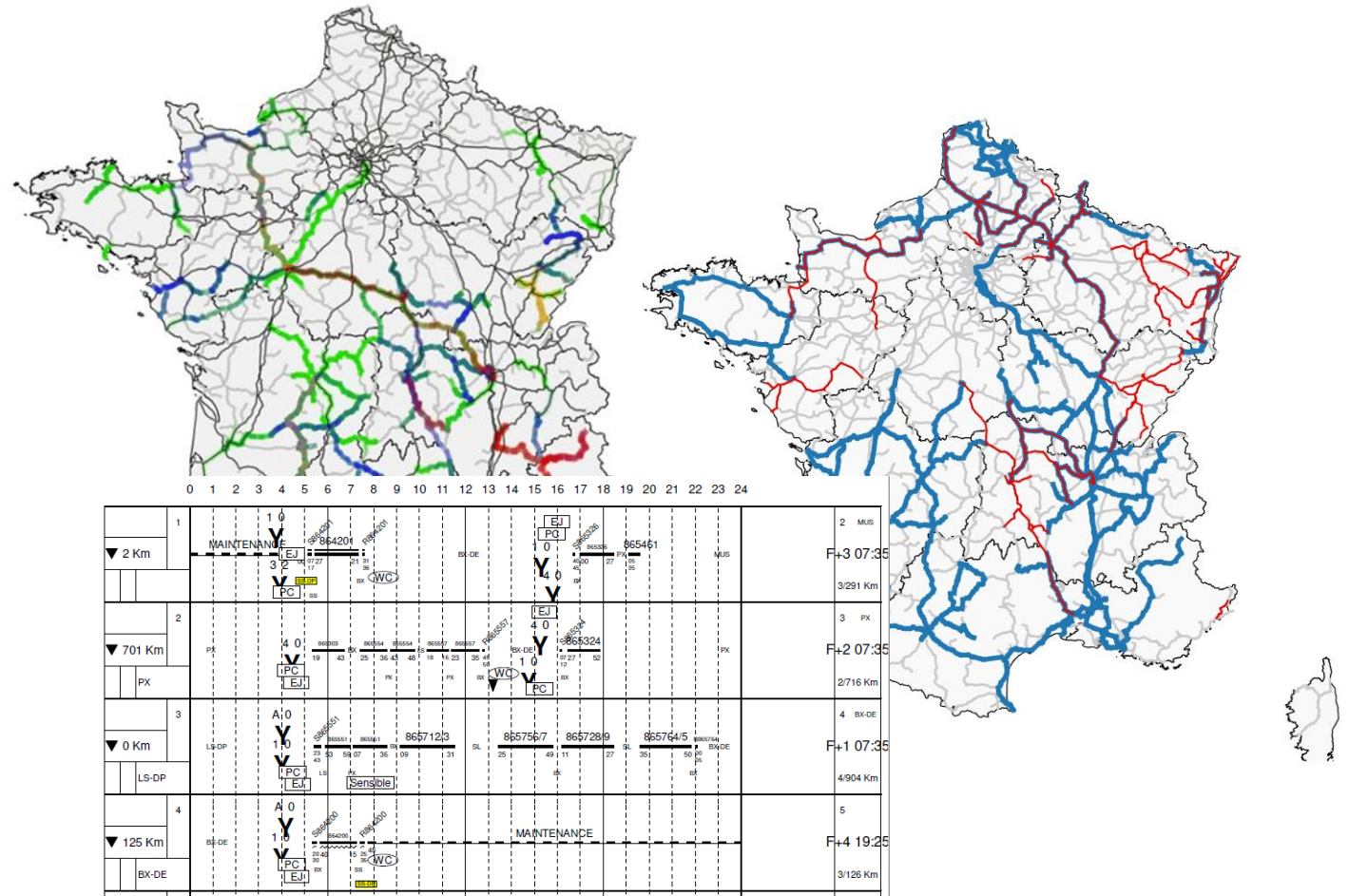
There is no one-size-fits-all solution to decarbonize rail transport

Operation diagnosis

Which territories? What transportation/service needs? What is the topology of the sections? What are the energy requirements? Etc.

Technical context and associated opportunities

- Presence of catenaries? What rolling stock fleets? Planned maintenance operations (rolling stock - infrastructure)?
- Energetical ecosystem or regional will?



Levers for decarbonizing rolling stock

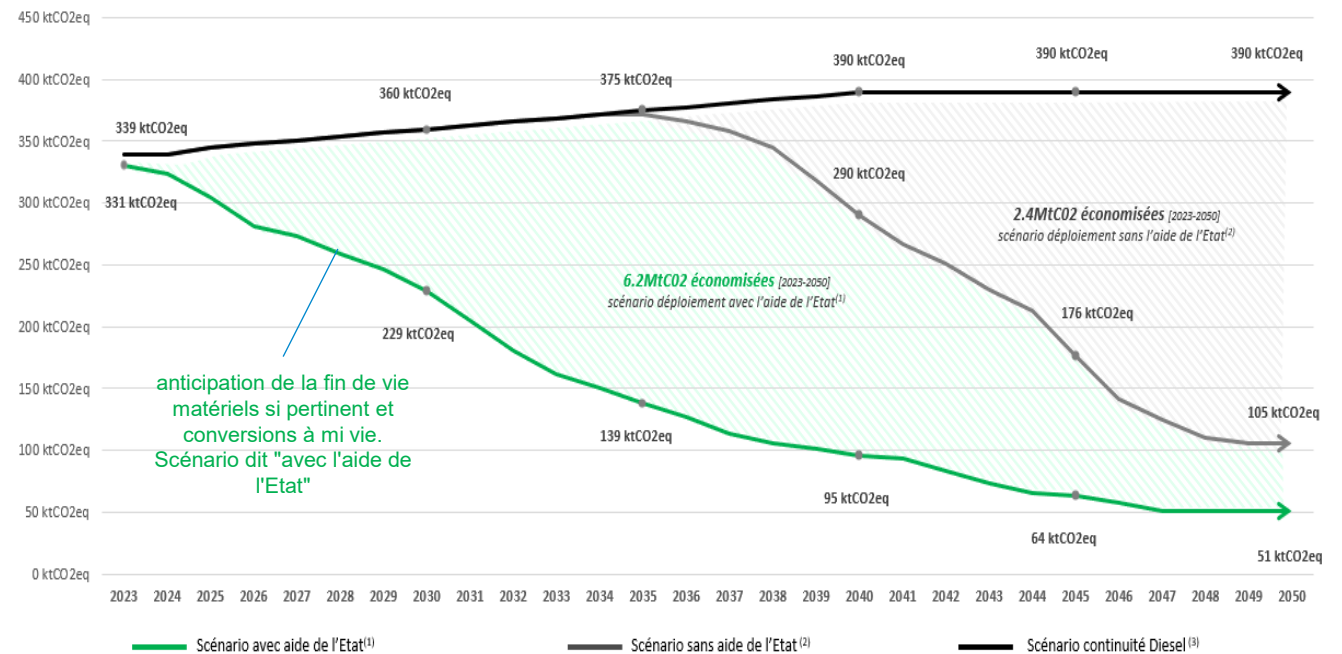
Fleet trajectories depend on financial capacity and decarbonization feasibility

There has **already been support**, such as the Plan de Relance Ferroviaire: modernization and electrification of existing rail lines, H2 train, CORIFER.

But what's missing is a boost for industrialization. The **financial hurdle**, a brake on public procurement and the industrialization of low-carbon trains.

Further work is needed to **match the performance of diesel** and cover the needs of the entire rail system.

For example, more autonomous and powerful hydrogen trains (freight) and battery-powered trains with 200km range.



Source: Excerpt from the CORIFER note "zero-emission iron" - November 2023

Thank you