

ELECTRIC ROAD SYSTEMS

Less battery, more range



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THE ENVIRONMENTAL CHALLENGE

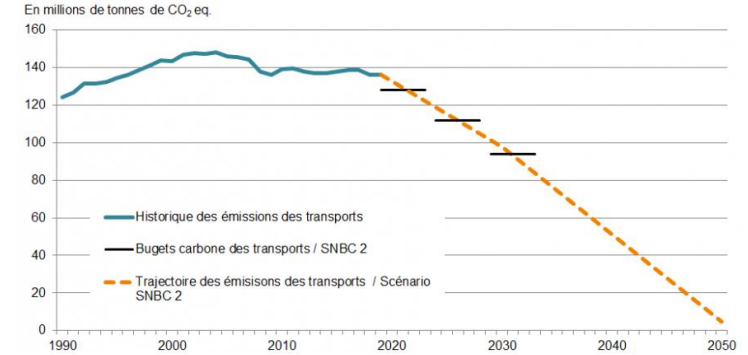


France objective : -40% (soon -55%) in GHG emissions by 2030 (vs. 1990), carbon neutrality by 2050



Transport sector: 31% of GHG emissions

- Road mobility : 94% of emissions of transport sector



GHG emission of transport sector until 2050 (SNBC 2)

6%

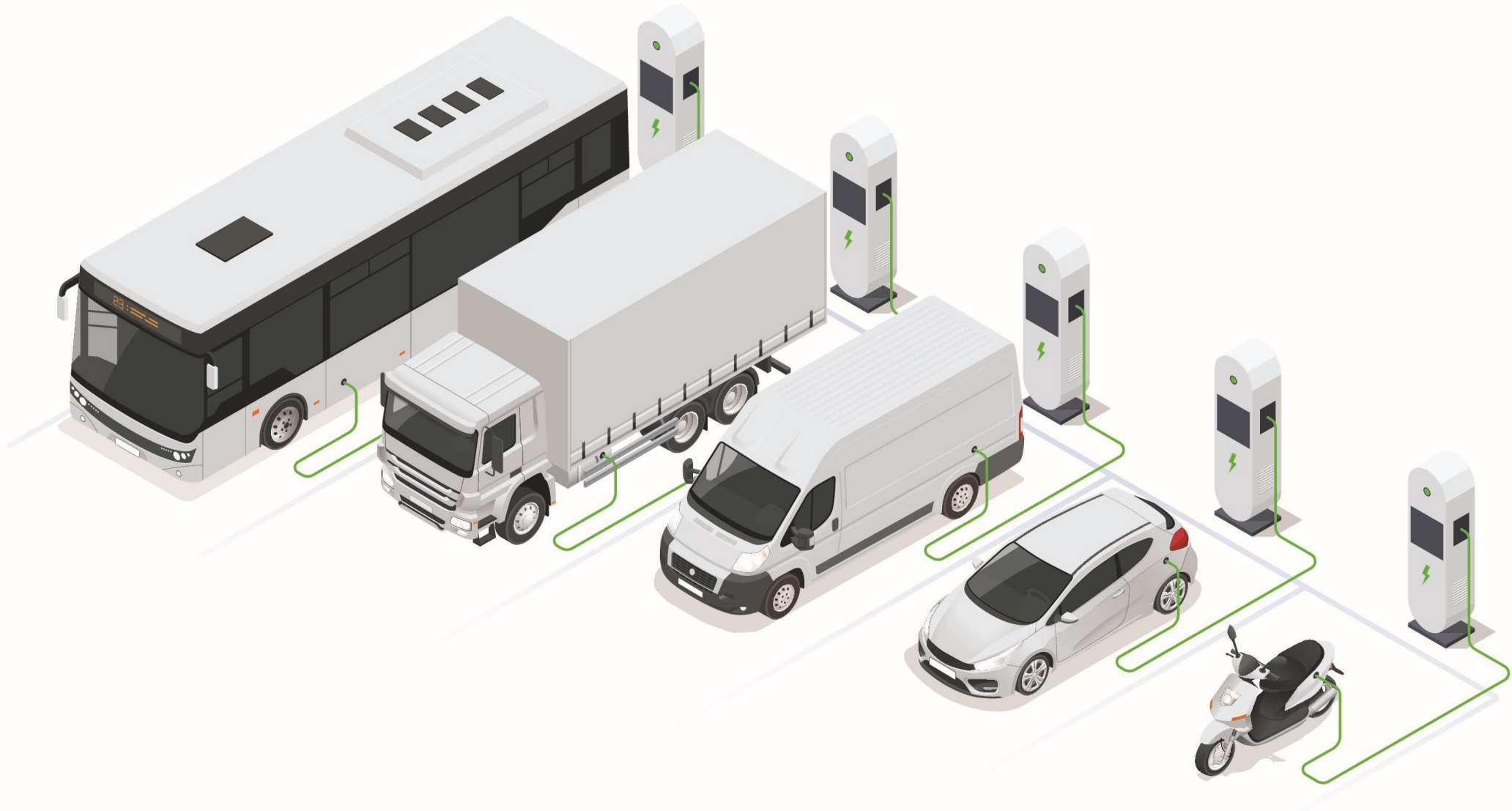
of GHG in France are emitted on highways



Road accounts for more than 85% of goods and passenger transport

Road usage is here to stay: to meet climate goals, we need to decarbonize road usages

TOMORROW MOBILITY WILL BE ELECTRIC



Zero emission is necessary but not enough

ELECTRIC BATTERY CHALLENGES

Operationnal



Limited range



Downtime for charging



Reduction of payload



Acquisition costs

Environmental



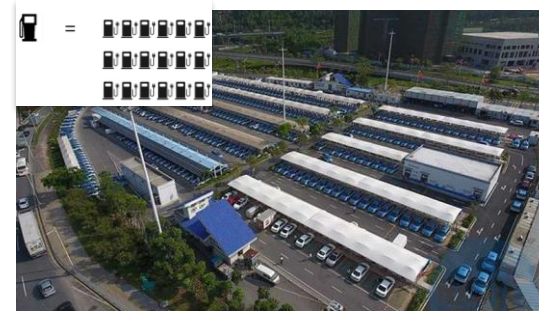
Availability of raw resources
Source: IEA, 2021



Upstream emissions for battery production



Impacts on soils & local biodiversity



Land use for charging infrastructures

3 DYNAMIC CHARGING TECHNOLOGIES

Catenaries



Conductive rail



Induction



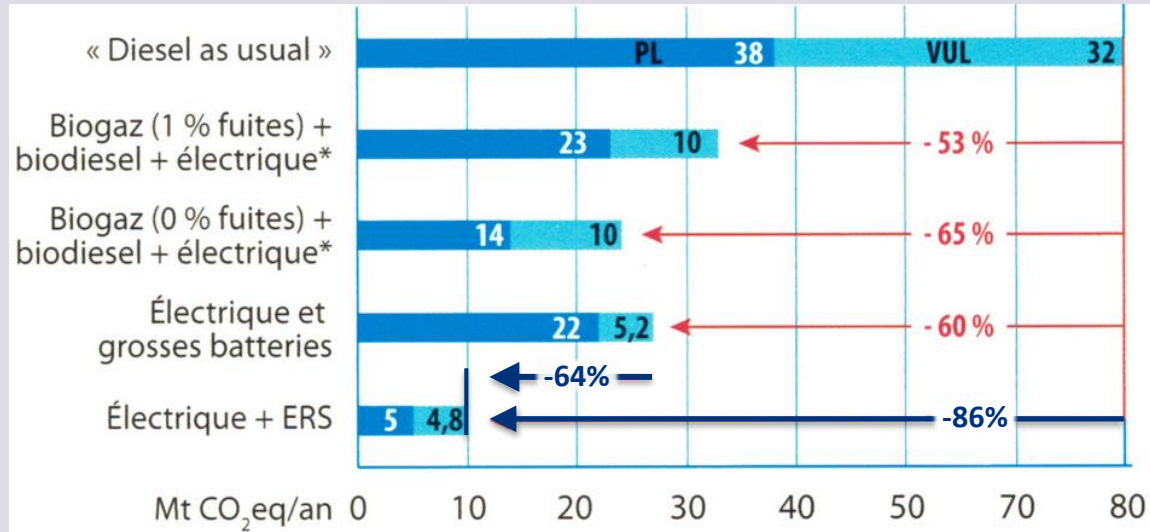
Interoperables



FRANCE MINISTRY OF TRANSPORT STUDY ON *ELECTRIC ROAD SYSTEMS*



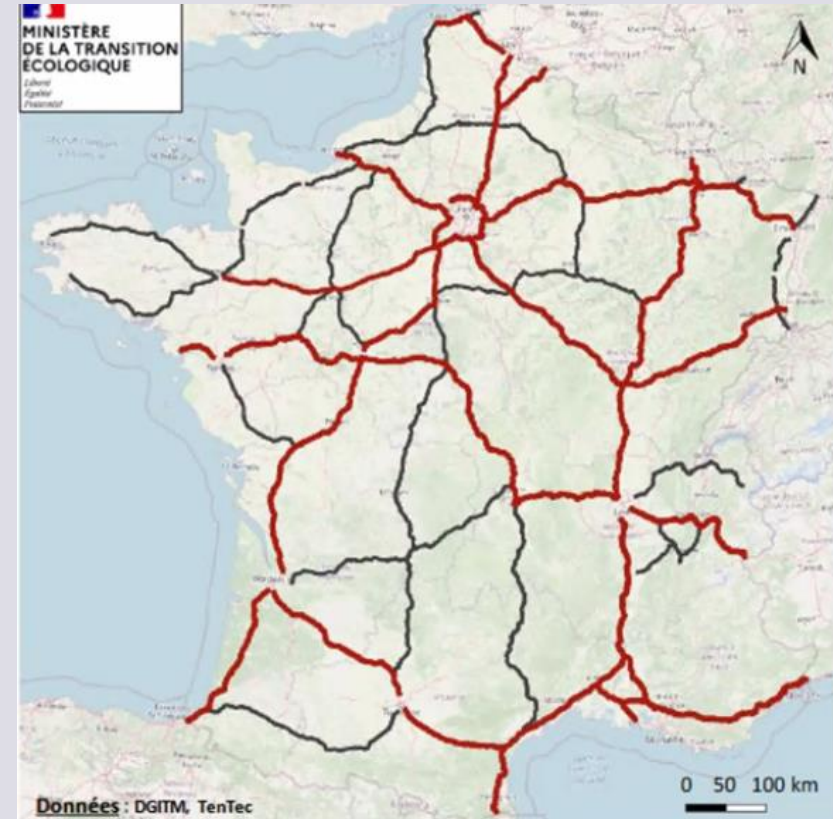
- 64% CO₂ vs. « *Electric trucks w/ big batteries* »



- 1,7 Mt in raw critical materials (lithium, nickel, cobalt) over 20 years vs. « *Electric trucks w/ big batteries* »



9000 km by 2035

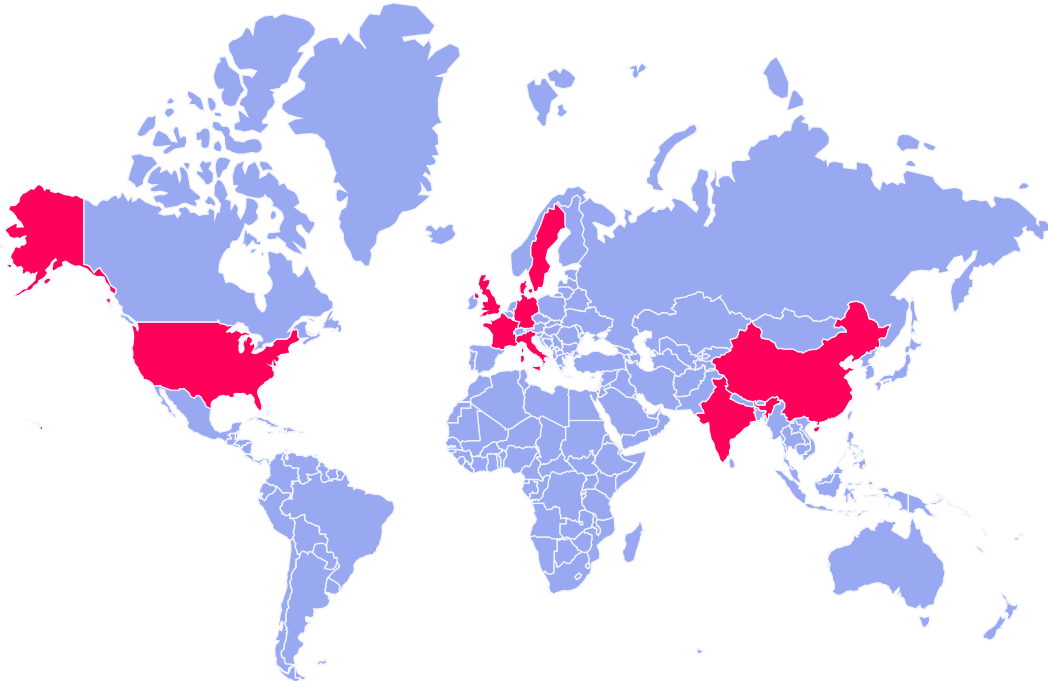


Reduce battery imports, foster local expertise & jobs

ELECTRIC ROAD SYSTEMS AROUND THE WORLD

➤ ERS are accelerating across countries

➤ Strong positioning of induction in several countries, including the USA



- +  **Germany** – 2 clusters with catenary, 4 ongoing projects on induction
- +  **Sweden** – 2 demos + tender for 1st commercial section of 21km
- +  **France** – National roadmap + ongoing tender to test technologies
- +  **UK** – Catenary ERS near Glasgow + plans for broader deployment
- +  **Israel** – Inductive ERS in Tel Aviv with plans for 200 bus
- +  **USA** – Focus on induction, R&D on high power induction (up to 1 MW) , approx. 10 ongoing projects
- +  **Italy** – 1 km long inductive loop for highway use case
- +  **India** – Plans for ERS between Delhi and Mumbai, 250km
- +  **China** – Testing inductive systems

INDUCTION



electreon

 HUTCHINSON®

CONDUCTIVE RAIL

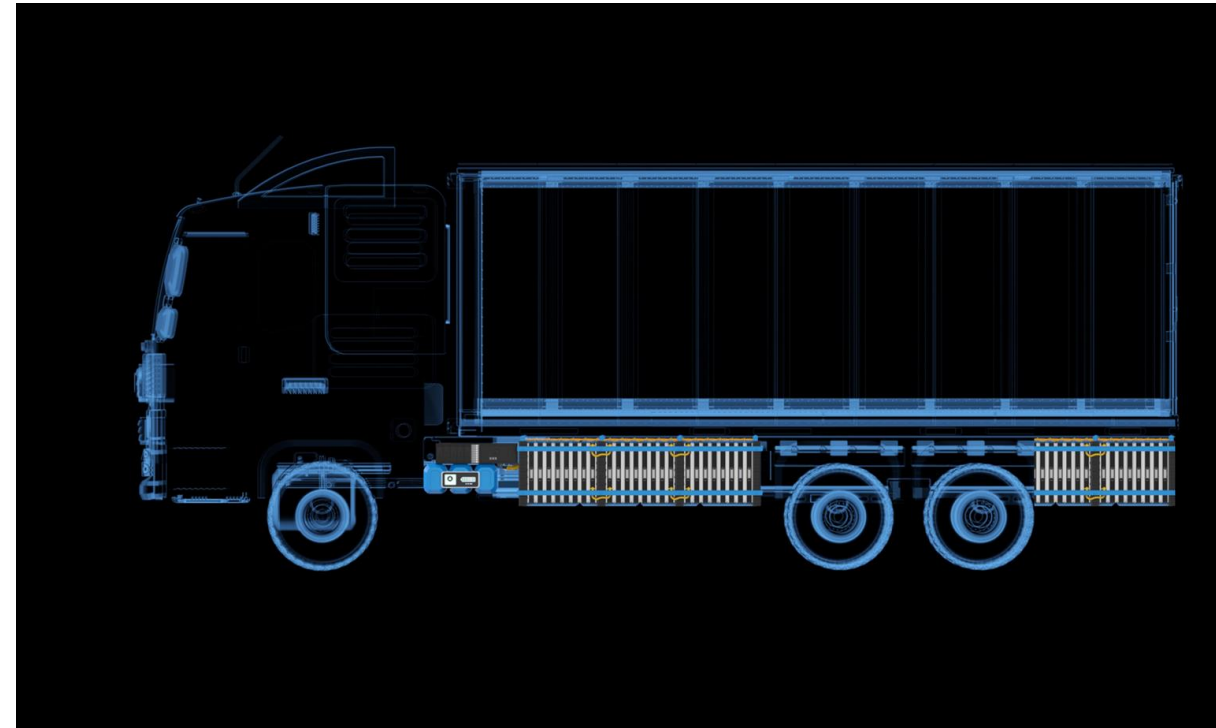


ELONROAD

THE PROMISE OF *ELECTRIC ROAD SYSTEMS*



Electric vehicles ?



Big batteries ?

