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European Clean Transport Network (ECTN) Alliance
Decarbonising long-haul road transport

Executive summary of the feasibility study

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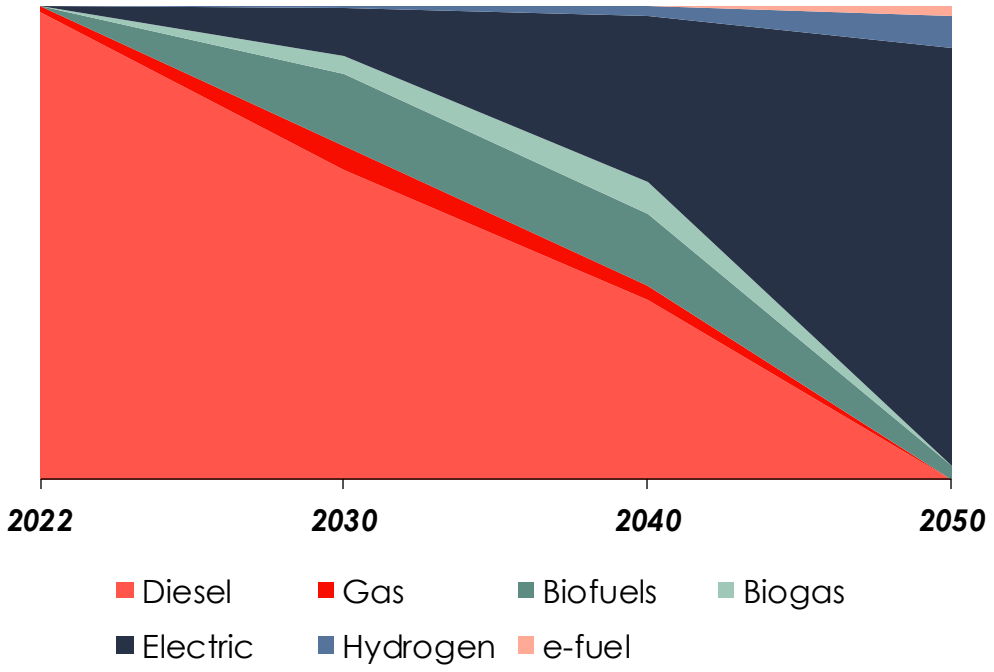
Introduction and background | Electric vehicles will gradually become the preferred alternative for heavy goods vehicles

Among the levers available to decarbonise road transport, changing the powertrain remains the priority.
According to the ADEME's 2050 transitions scenarios, **90% of the effort will be driven by a shift in powertrains**.[1]

*Scenario **for the evolution of the heavy-duty vehicle fleet mix** to achieve carbon neutrality*[2]



For **electric vehicles to become widespread**, we need to **overcome certain constraints**, in particular for long-haul transport:

- Limited **range of** electric trucks
- **Duration of recharge**
- Higher purchase **cost**
- Need for **recharging infrastructure**

Solutions such as **relay systems make it possible to overcome these operational constraints** while effectively decarbonizing long-haul road transport

(1) Combining the levers of vehicle energy efficiency and the carbon intensity of energy. Transition(s) 2050 report. ADEME
(2) Louis Delage, Nicolas Meunier. Quelles technologies pour les poids lourds longue distance de demain ?. Carbone 4. https://www.carbone4.com/publication-transport-routier-longue-distance

The ECTN solution | Decarbonising long-haul freight transport quickly and efficiently without heavy infrastructure

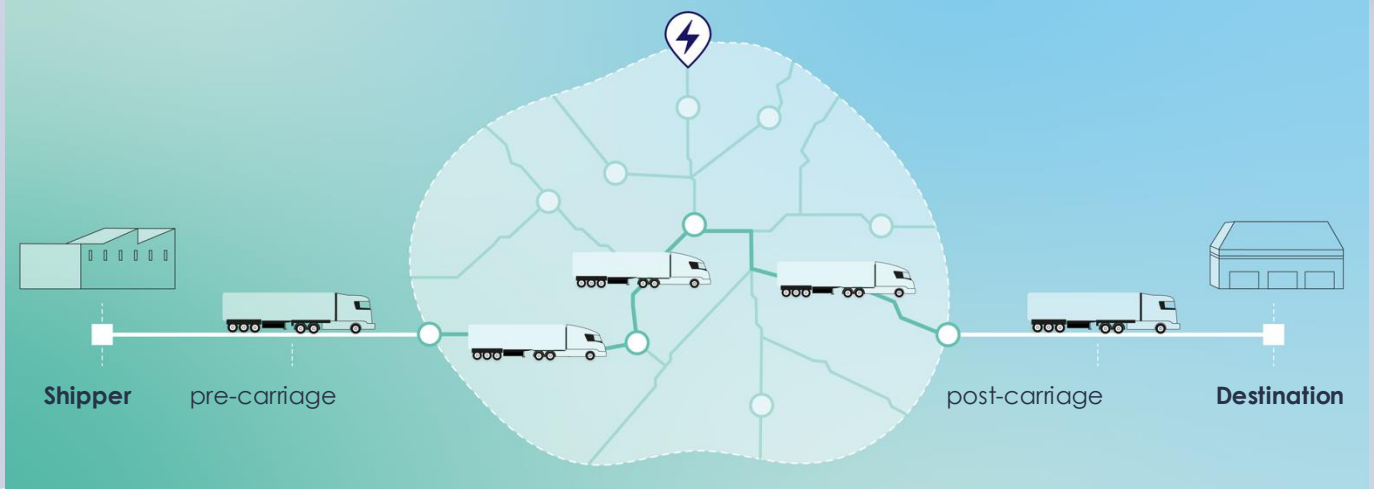
ECTN proposes to dissociate the trailer from the tractor unit

ECTN stations

Interchange terminals every 300 km

Tractor

In the ECTN model, tractors and their drivers make daily round trips between two interchange terminals on a defined segment.



Trailer

At each terminal, the trailer is taken over by another, recharged electric tractor (and another driver).

This means that the trailer is almost always on the move.

Key benefits of the ECTN solution:

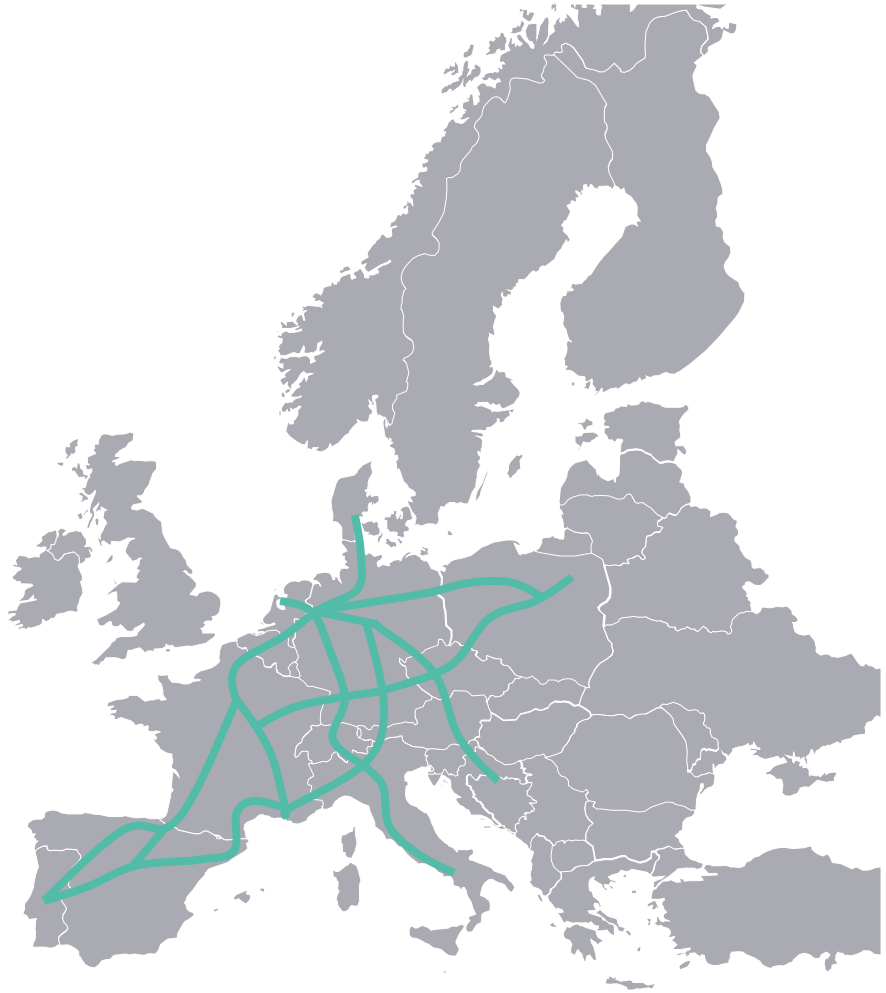
- **Range no longer an issue:** allows long-haul transport using electric trucks with limited range
- **Reduced transit time:** as the night break is eliminated, trailers can be transported faster
- **Infrastructure availability and amortisation:** this means that refuelling/charging infrastructure can be grouped together to ensure maximum use (up to 16 hours a day for an electric charger).

Deployment of ECTN | Total deployment in Europe will include 190 terminals, enabling the transit of 5k trucks and 15 billions of tkm per year

A scenario for gradual deployment in 4 main stages has been developed

ECTN network and corridors

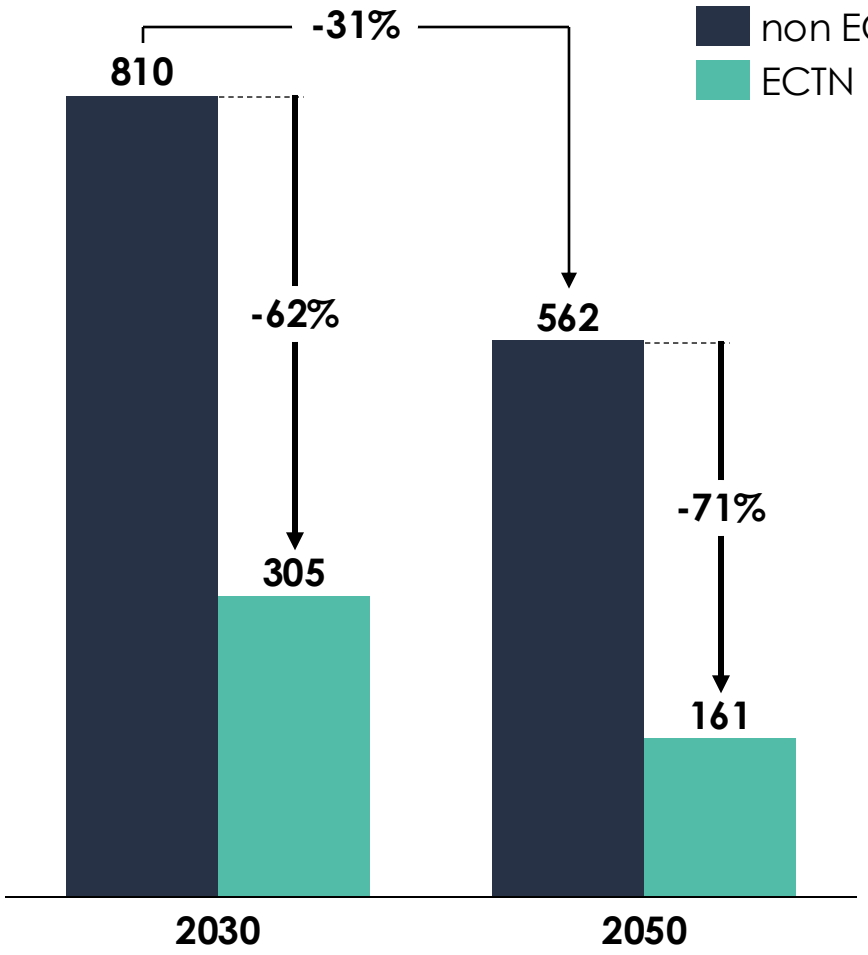
- > 6 000 low-carbon corridors throughout Europe
- Routes on average +9% longer compared with direct ones
- Average distance between terminals: 285 km
- Average corridor distance: 1,230 km
- The ECTN service makes economic and environmental sense for **all freight corridors over 750 km.**



These figures correspond to a 20% market share scenario. With a 50% market share, the number of trucks would be 12,300 and the number of tonne-kilometres (tkm) 37 million per year.

Carbon impact analysis | ECTN solution reduces GHG emissions by 60% compared with current road transport

Average carbon intensity (gCO_2e/km) of the ECTN and non-ECTN fleet (2030 and 2050)



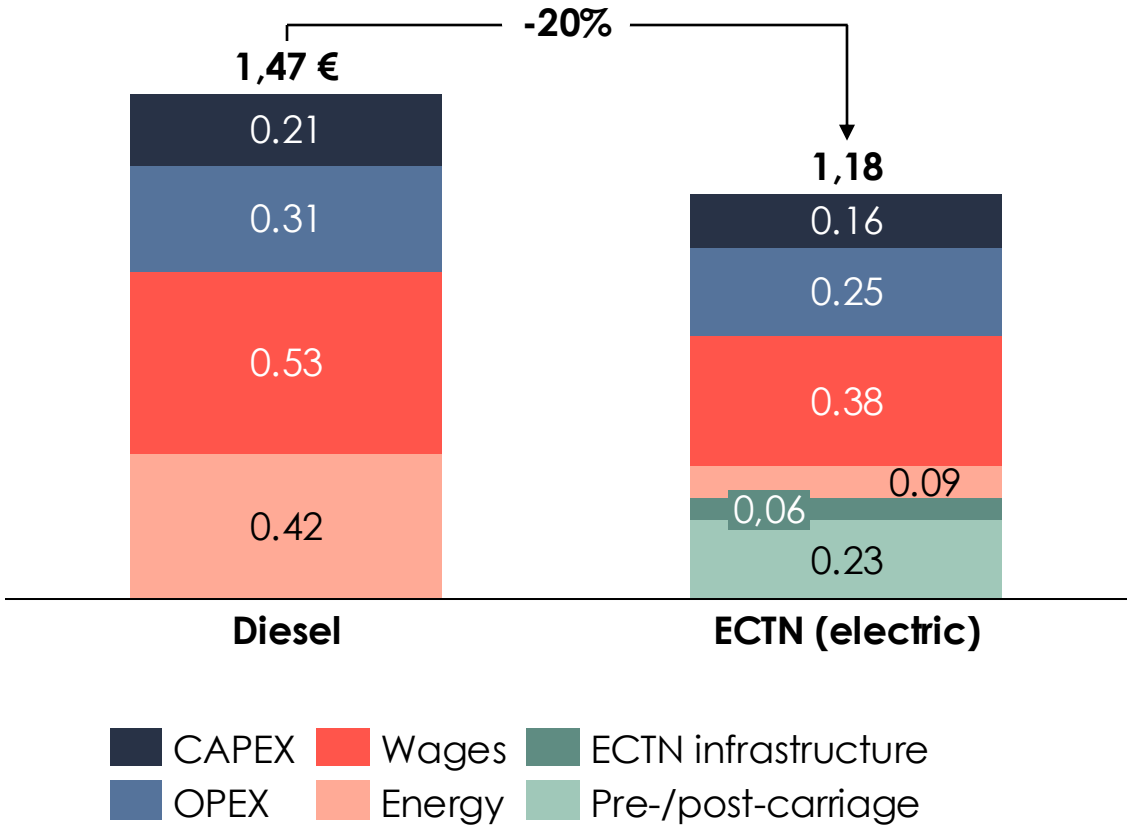
Even taking into account the gradual introduction of electric trucks into the vehicle fleet, **the ECTN solution significantly accelerates the decarbonisation of long-haul road transport.**

This calculation takes into account :

- gradual improvements in the energy efficiency of diesel and electric trucks
- the gradual electrification of the non-ECTN fleet
- decarbonisation of the European electricity mix
- a longer Origin-Destination distance in the case of ECTN, because of the short detours to stop at the terminals

Economic feasibility | Electric trucks operating within the ECTN network are more cost-effective than diesel trucks

TCO (€/km) for an average journey in 2030 for a diesel truck and an ECTN truck

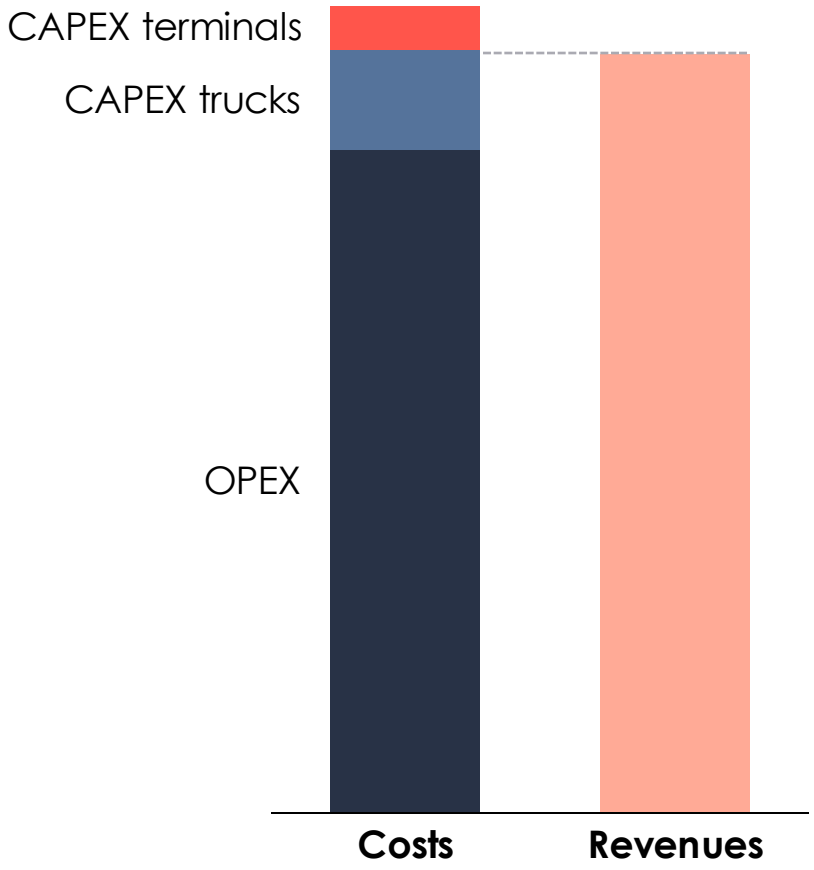


Comments

- From 2030, the ECTN solution will offer carriers an economic advantage over traditional long-haul diesel transport.
- The lower TCO per kilometre offsets the +9% additional mileage due to required stops at terminals.

Economic feasibility | ECTN will be profitable for operators provided that the initial investment for the terminals has been covered

Cumulative costs and revenues (2027-2050)



Economic feasibility of the ECTN solution

The ECTN solution is profitable as soon as a sufficient number of terminals and journeys are made.

On the other hand, the solution requires public investment to cover the initial cost of the terminals.

This public financial investment is below €1 billion for the deployment of all terminals required in France to reach the desired territorial coverage.

ECTN increases the utilisation rate of each electric truck, accelerating electrification

An electric truck used in the ECTN network has a much lower average carbon intensity per kilometre than a combustion truck (-57%). In theory, the same truck used outside ECTN would have an even lower intensity (-65%) due to more direct journeys.

However, an electric truck outside ECTN will only travel around 108,000 km per year, whereas an electric truck inside ECTN will travel in average of 225,000 km.

A fleet of electric trucks used in the ECTN network therefore enables more diesel trucks to be replaced more quickly[1] , and therefore maximises the avoided emissions:

+82% ***diesel kilometers*** *avoided*

+59% ***avoided*** *emissions*

(1) for a given fleet over the same period of time

Conclusions | Setting up relay facilities for long-haul transport is essential for decarbonisation

A **social progress** for drivers (who benefit from regular working hours and who no longer have to make overnight stops), which supports local employment and makes the profession more attractive.

An immediate response to the technical constraints of electric trucks dedicated to long-haul transport, **accelerating the electrification of road haulage**.

A solution that allows **intensive use of recharging infrastructure** and **rolling stock**.

A project that **benefits the environment** by **reducing air pollution**, **the use of materials** and **greenhouse gas (GHG) emissions**.

Limited initial investment justified by the environmental and social benefits. ECTN provides an economically attractive option**, provided that the CAPEX cost of deploying the terminals is not borne by customers**.

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