

Long-haul battery-electric trucks in Europe

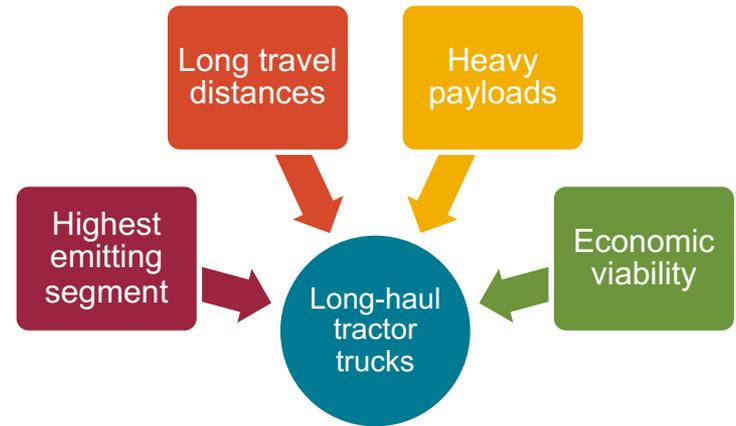
Hussein Basma, Ph.D.

26.April.2022
Berlin, Germany

Decarbonizing long-haul trucks: importance and challenges

- Tractor-trailers are responsible for over half of the CO₂ emissions from road freight transport.
- Tractor-trailers long travel distances and heavier loads make them the hardest truck segment to decarbonize.
- Uncertainties around the total cost of operation of such tractor trailers, impacting their large-scale deployment.

Most challenging and most important segment to **DECARBONIZE**



Scope and objectives

- 1) Quantify and compare the TCO of electric and diesel long-haul tractor trailers in 7 European countries.
- 2) Assess the impact of policy measures on the TCO parity year of electric and diesel trucks

TOTAL COST OF OWNERSHIP FOR TRACTOR-TRAILERS IN EUROPE: BATTERY ELECTRIC VERSUS DIESEL

Hussein Basma, Arash Saboori, and Felipe Rodríguez

Methods

- Evaluate costs and TCO parity time relative to diesel trucks
- Comprehensive TCO assessment
 - Truck retail price
 - Salvage value
 - Diesel fuel costs
 - Electricity costs
 - Maintenance
 - Infrastructure
 - Taxes and levies
 - Premiums
- Assess impact of policy interventions



Bottom-up approach to estimate truck retail price

- Battery
- Chassis
- E-Drive
- Auxiliaries
- Power electronics

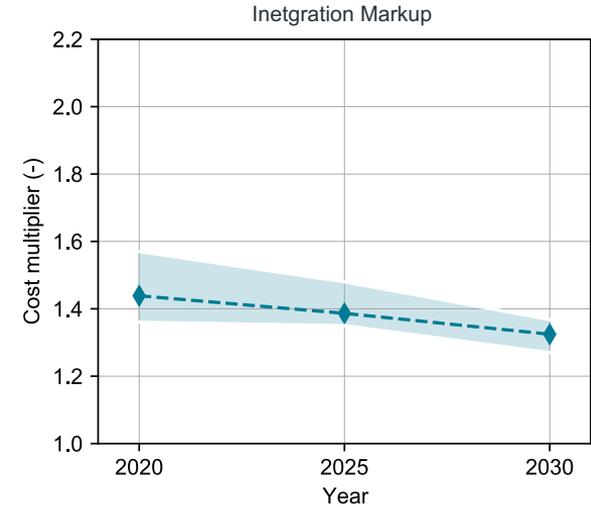
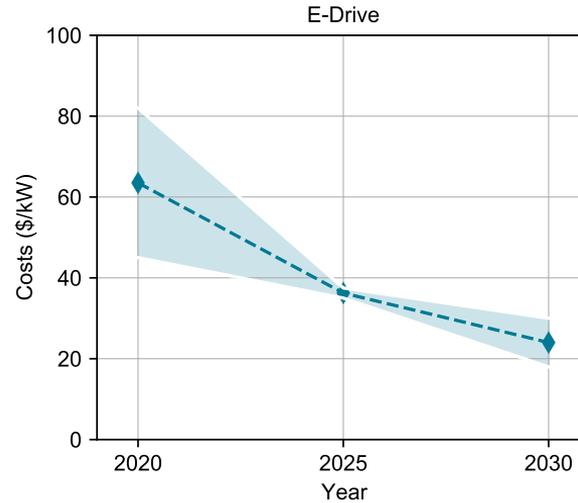
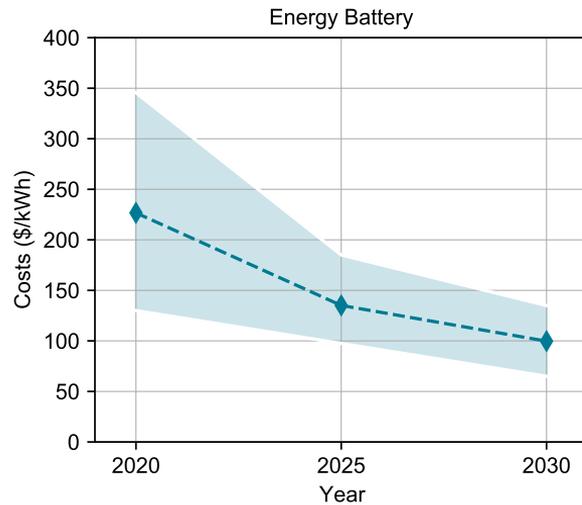


Operational expenses (distance-dependent)

- Annual vehicle kilometers travelled
- Country-specific fuel and electricity prices
- Country-specific taxes and road tolls

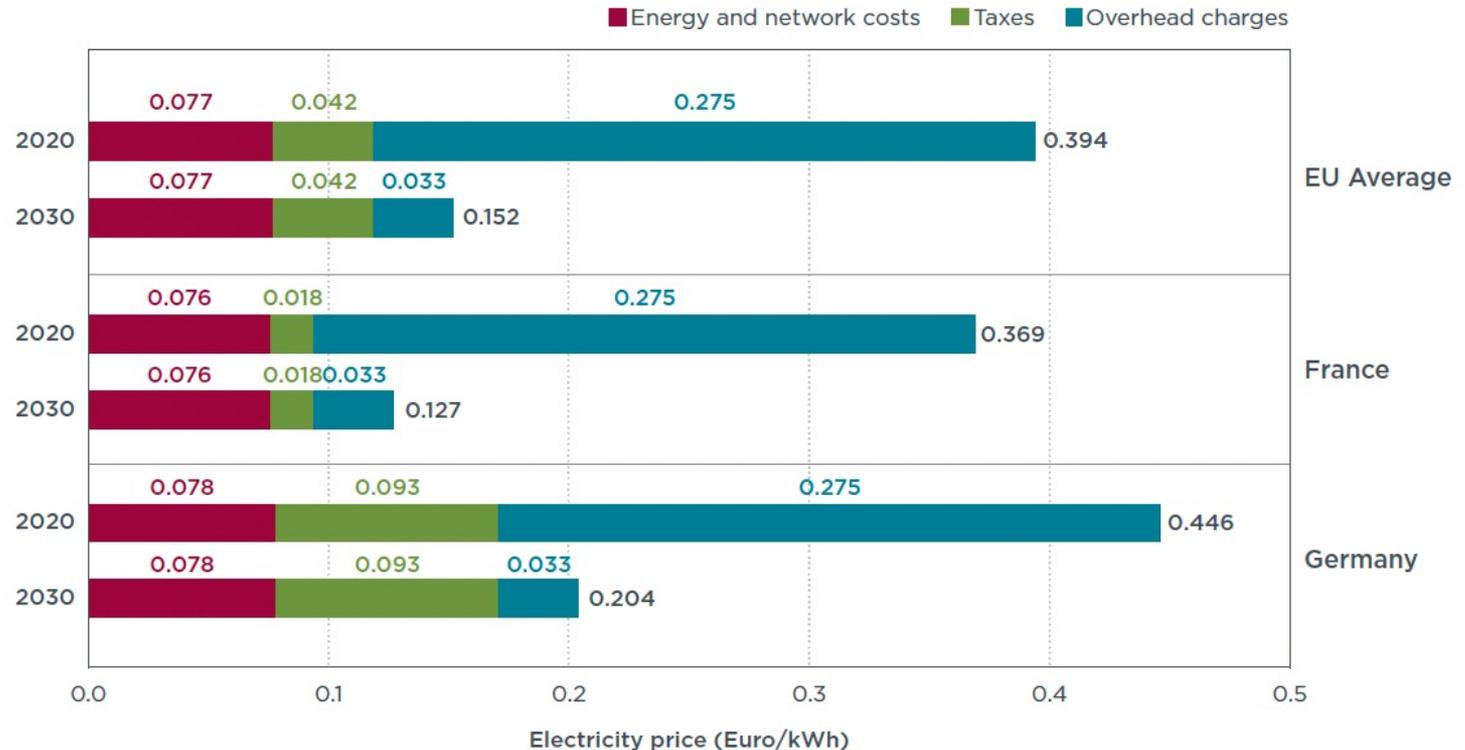
Methods

Component direct manufacturing costs forecast between 2020-2030



Methods

Electricity costs including overheads to account for infrastructure investment



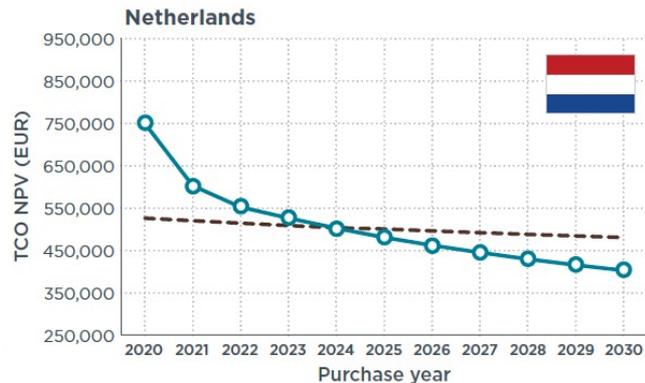
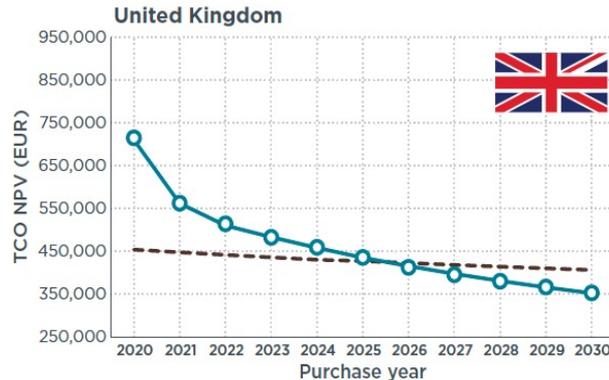
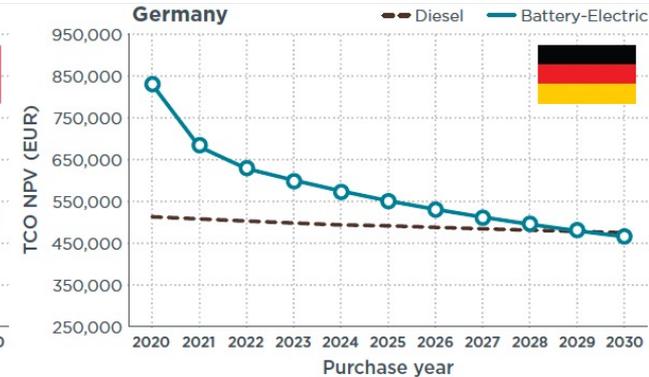
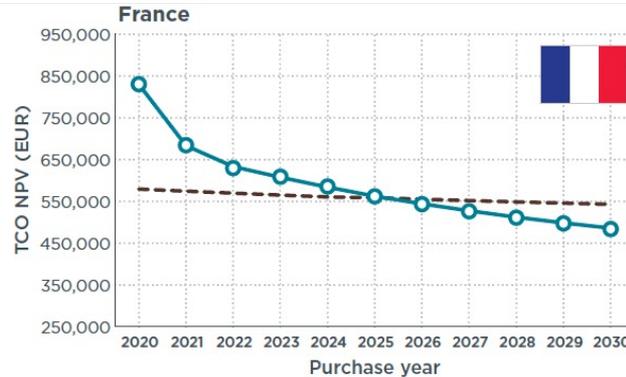
Results: current policy interventions

- Battery-electric trucks operating in Germany, France, and the Netherlands achieve TCO parity today under current policy interventions implemented in these countries.
- Germany offers generous purchase incentives reaching € 450,000 per truck. France offers € 50,000 per truck and the Netherlands covers 40% of price difference with diesel trucks.
- 100% road tolls waiver for electric trucks in Germany.
- National CO₂ prices implemented in Germany including transport.



Results: fixed energy prices 2020-2030 (No Policies)

- Case of a long-haul tractor-trailer equipped with a battery large enough to cover 500 km on a single charge
- Battery-electric trucks can reach TCO parity with diesel trucks by the mid of the decade:
 - Higher energy efficiency
 - Lower energy costs (depends on diesel and electricity prices)
 - Lower maintenance costs



Results: impact of policy implications

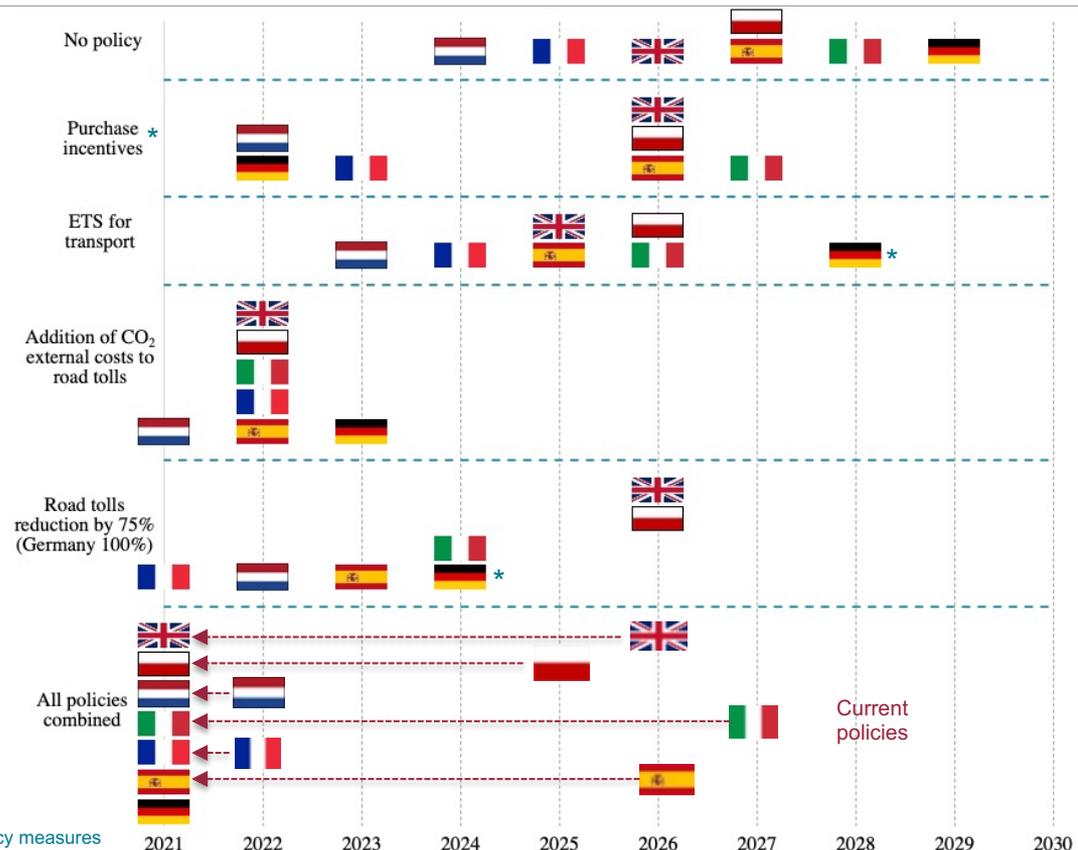
Set of policy interventions

Purchase incentives

Emission Trading System for transport

Reduce road tolls for electric trucks

Addition of CO2 external costs to road tolls



Takeaways

- From a first-user perspective, BETs can achieve TCO parity with diesel tractor-trailers during this decade without any additional policy support:
 - Electric trucks operating in Germany, France, and the Netherlands are already at TCO parity with diesel tractor-trailers.
- Regulatory support can reduce the cost gap between battery-electric and diesel tractor trucks:
 - Implement the Eurovignette directive into national law as expeditiously as possible
 - Extend the European Emissions Trading Systems (ETS) to include transport
 - Purchase premiums for trucks should be limited to incentivize the purchase of zero-emission trucks in the near term and exclude all combustion-powered truck

Questions

Hussein Basma
h.basma@theicct.org