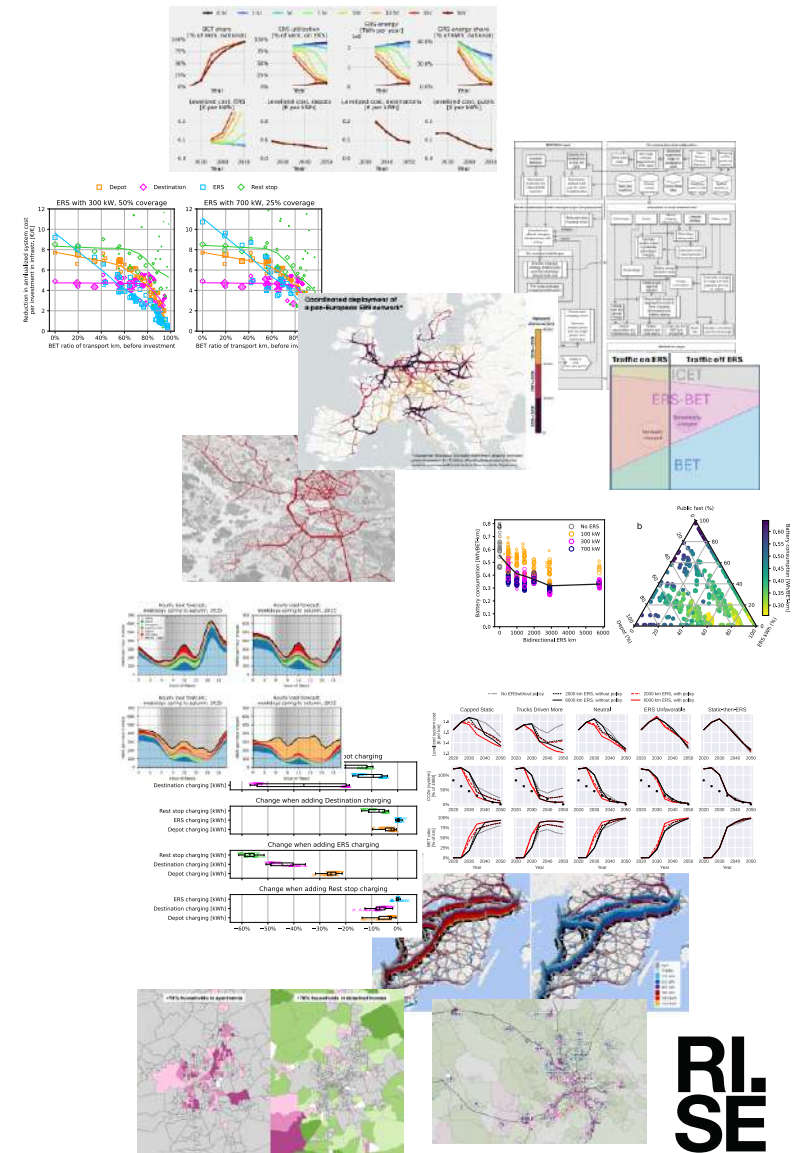


Electric Road Systems Benefits to the Transition

Jakob Rogstadius, Senior Researcher, Sustainable Transports and Systems

Today: Only Findings

- Findings based on eight years of own research into EU road transport decarbonization with and without ERS
- Large-scale agent-based simulations revealing interaction effects between technology, vehicle operation, infrastructure and policy
- Publications are available to support all claims

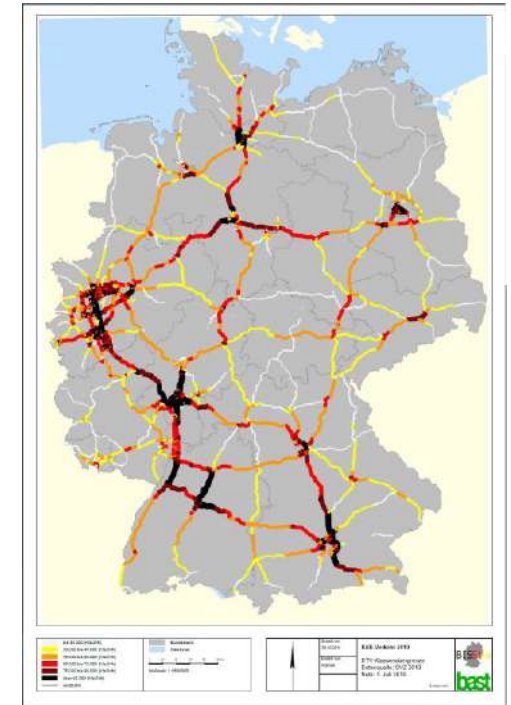


ERS Strengthens Incentives to Electrify Freight

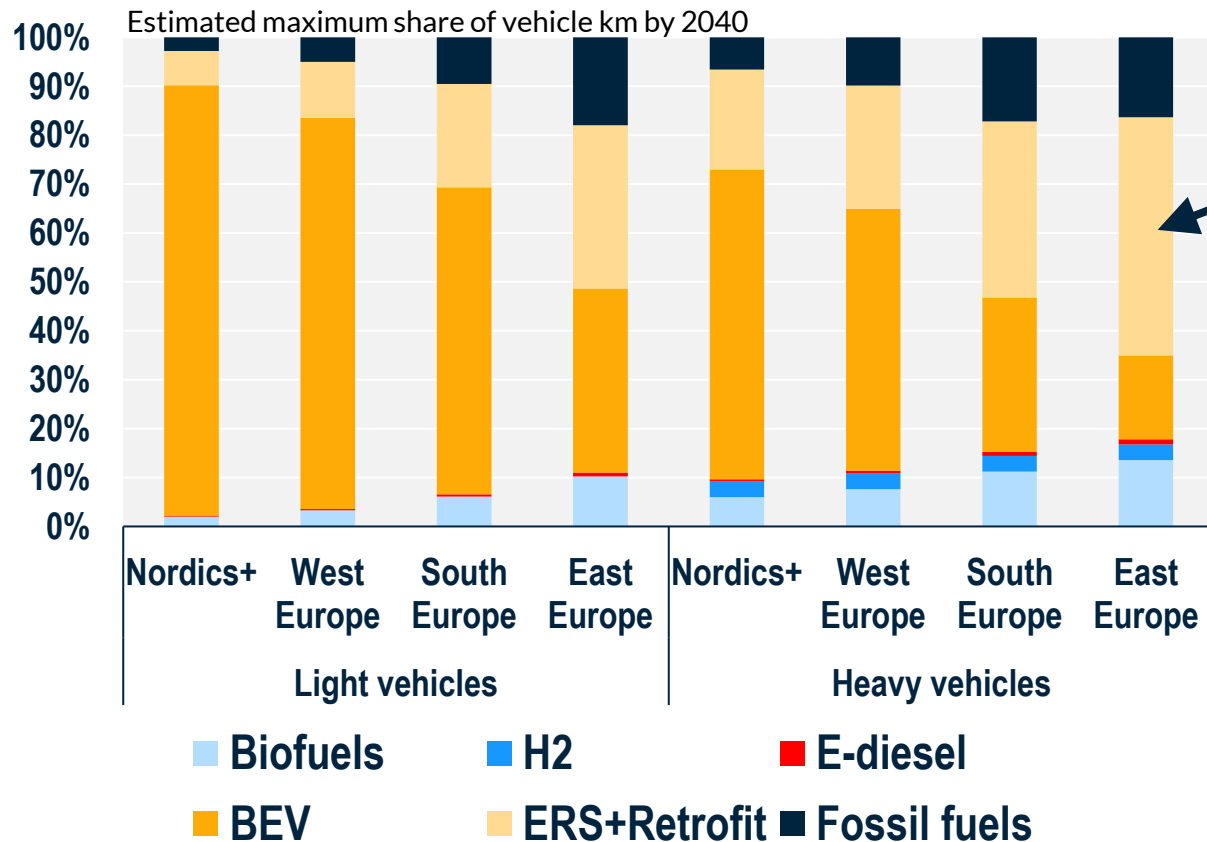
- Lower CapEx
 - Dynamic charging would enable significant battery capacity reductions
 - Cheaper and sometimes fewer trucks
 - Reduced need for private charging infrastructure
- Lower OpEx
 - ERS charging would likely cost around $\sim 0.25\text{--}0.3$ €/kWh if the ERS operator maximizes profit
 - ERS charging never requires queueing or extra stops

ERS Enables Synergies with Other Traffic

- ERS cost scales with road distance, while revenue scales with traffic
- Long-haul trucks pass through cities, where they share roads with local trucks, cars, buses, taxis, and vans
- Urban cars drive 30–50% of distance on motorways – ERS is enough
- ERS is **motivated** by electrification of long-haul trucks, **BUT**, if ERS is built in and near cities, other traffic has economic incentives use it. Cost sharing enables cheaper charging, or an ERS network of greater scope



ERS Reduces CO₂ Emissions (mainly if it enables e-retrofits)

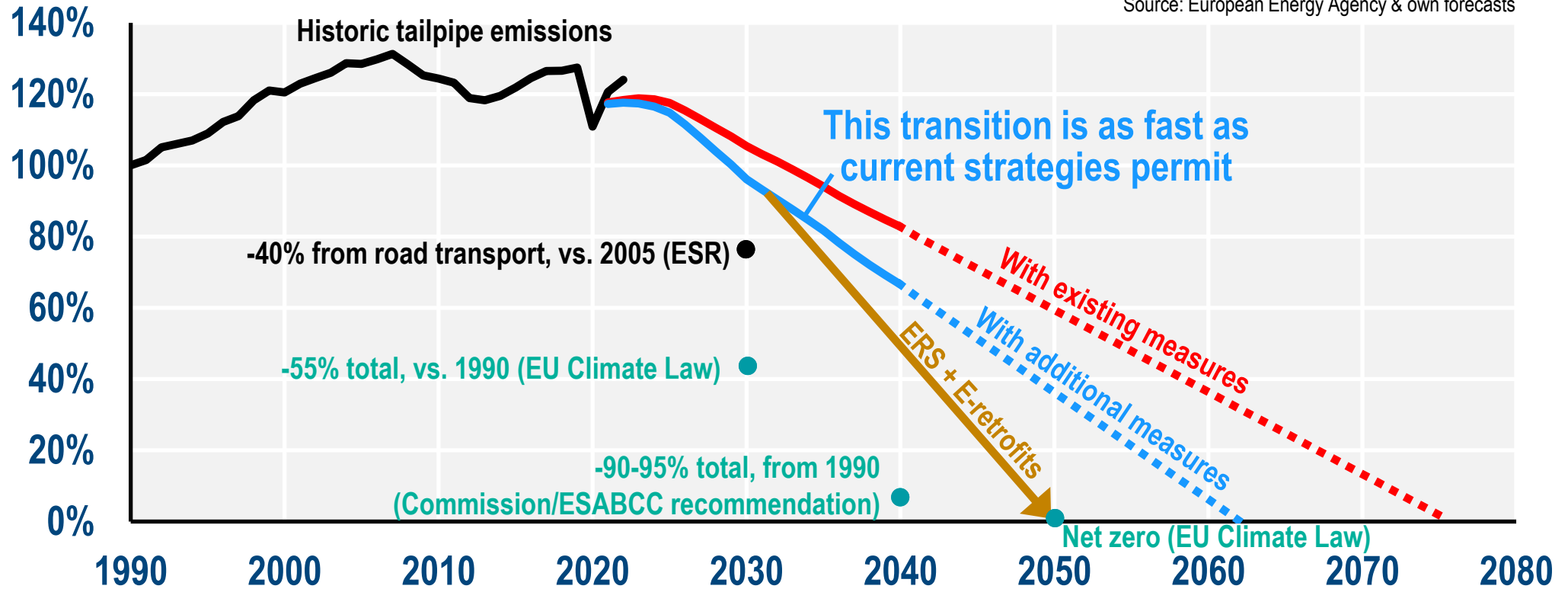


ERS may accelerate BET sales, but only if construction starts now

Small batteries being cost-optimal
+ reduced charging costs
+ continuous power delivery
= Better ROI for e-retrofits

ERS Reduces CO₂ Emissions (cont.)

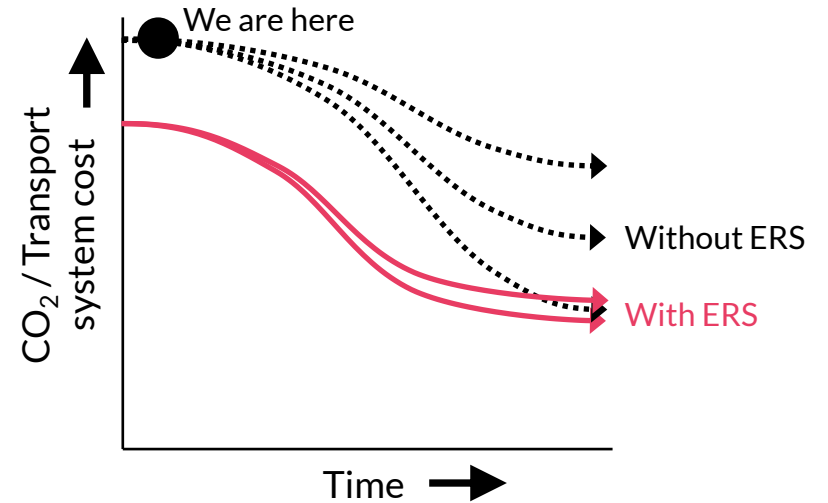
Source: European Energy Agency & own forecasts



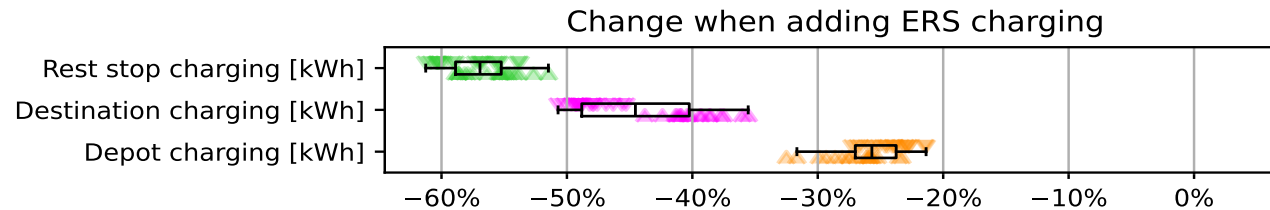
Cumulative post-2020 road transport GHG emissions still 2-5x more than the EU's global fair share

ERS is an Insurance Policy

- ERS decisions must be made under great uncertainty
- Significant spread in 2050 outcomes without ERS
- Low spread in 2050 outcomes with ERS
- To delay ERS construction is a decision, with an outcome that is worse than early ERS construction in all simulated scenarios



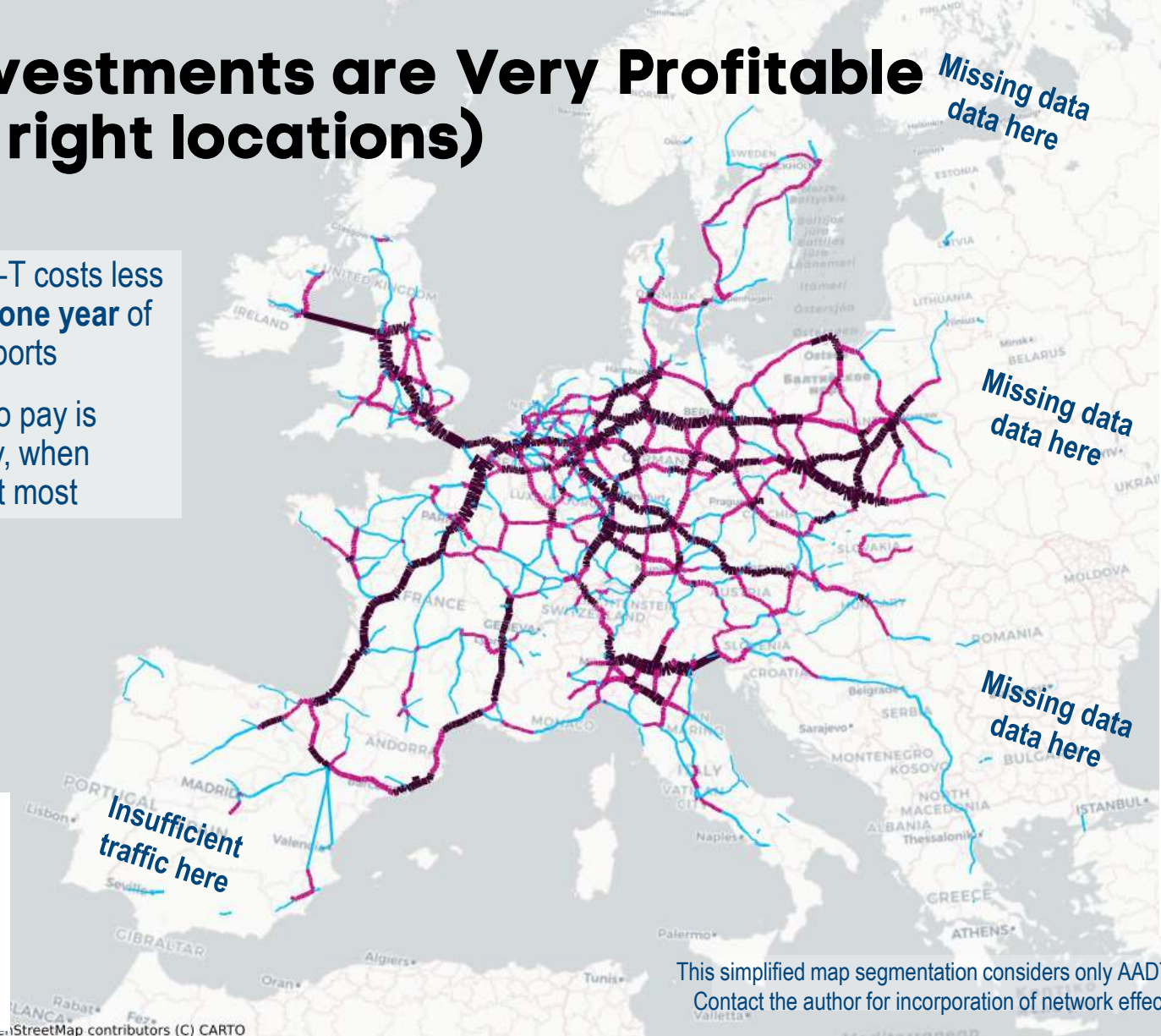
ERS Reduces Need for Static Charging and New/Upgraded Grid Connections



	ERS infrastructure	Static charging infrastructure
Without ERS	n/a	200 000–400 000 truck depots @ 0.5–20 MW 3 000–10 000 truck stops @ 1–20 MW 0.5–2 million warehouses @ ??? MW 2.5–10 million chargers for cars without private parking ??? years to build
With ERS	20 000–50 000 km ERS (TEN-T) Grid connection every 10–20 km 1 000–5 000 grid connections @ 10–20 MW → ~50% of all energy to trucks 10–15 years to build	~50% less ...of MW? ...of chargers? ...of grid connections?

ERS Investments are Very Profitable (in the right locations)

- ERS on TEN-T costs less to build than **one year** of fossil fuel imports
- Willingness to pay is highest today, when batteries cost most



Great ROI today,
even with only HDV traffic
(2028-2033)

10 000 km, \approx 6000 AADT (HDV)

Viable with HDV+LDV
or HDV+price cap
(2031-2036)

30 000 km, \approx 2000 AADT (HDV)

Only viable
with HDV+LDV
(2034-2039)

50 000 km, \approx 1000 AADT (HDV)



This simplified map segmentation considers only AADT.
Contact the author for incorporation of network effects.

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