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# Dynamic Charging – Electric Road Systems

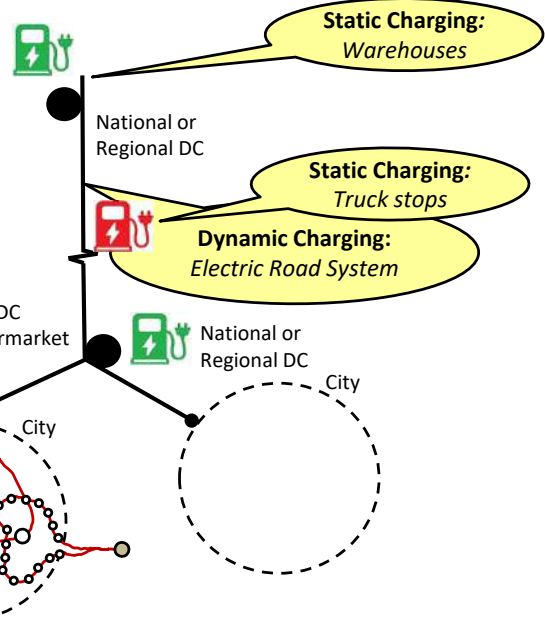
## ALICE Webinar

11 June, 2025

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Centre for Sustainable Road Freight



# Electrification options for Long Haul



Battery swapping maybe an option:

- More expensive than big battery
- Requires standardization of 'secret sauce'
- Not favoured in Europe

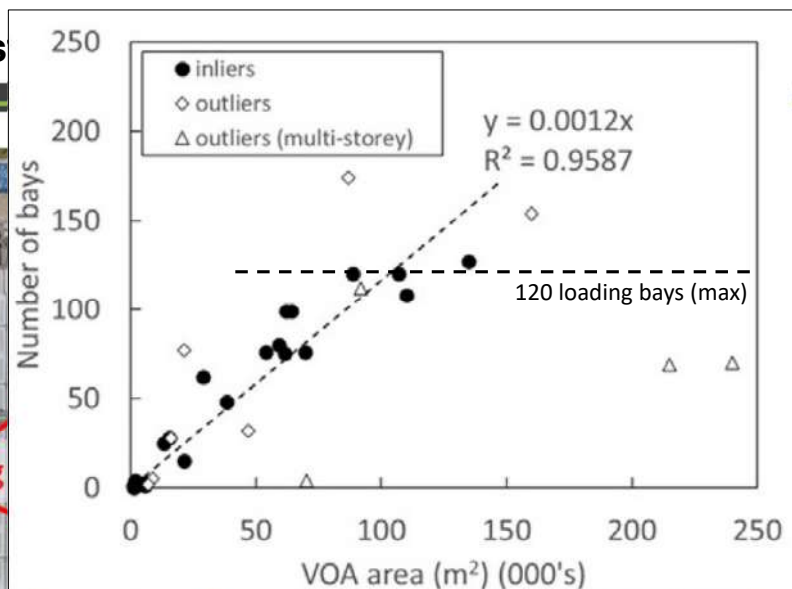


## Logistics Penalties with Battery Electric Vehicles

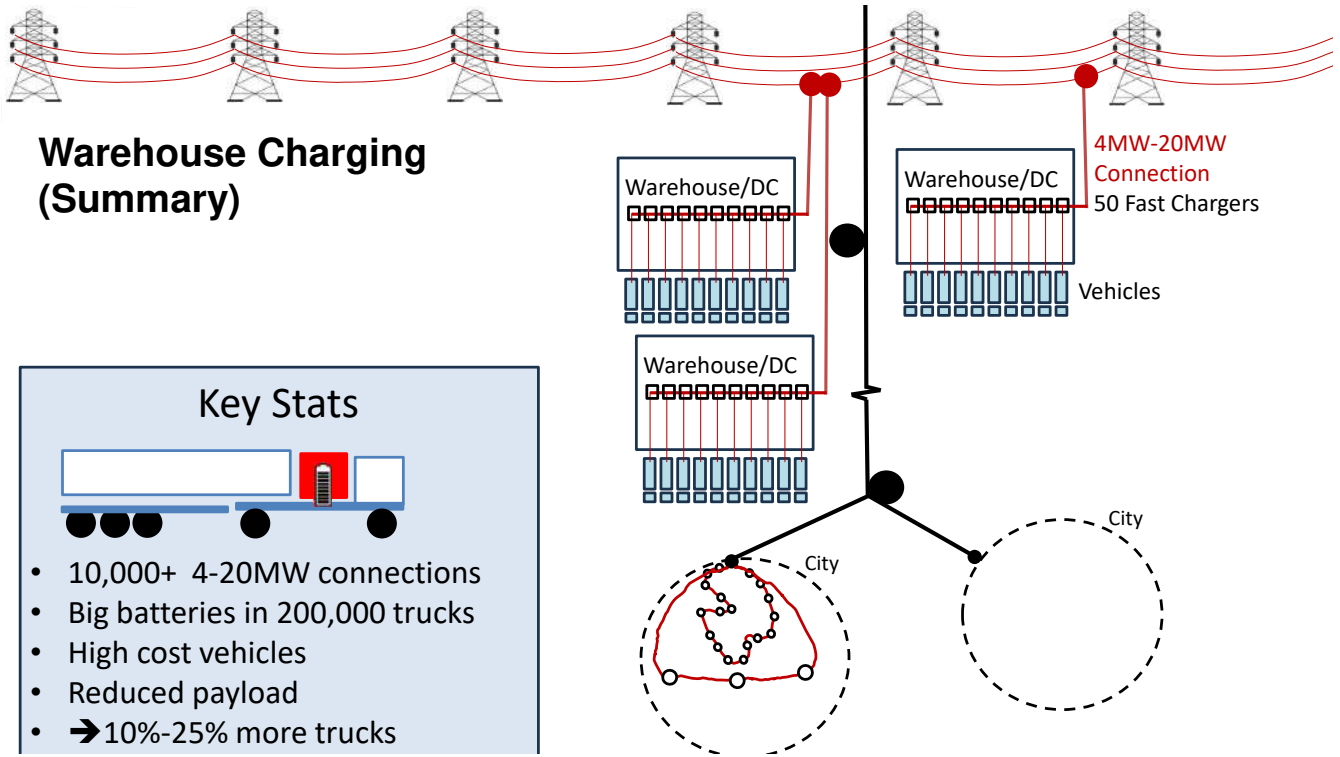
1. Mass Penalty for heavy loads...
  - 44t x 6-axle Diesel artic carries 29t
  - 42t x 5-axle BEV artic carries 22t
  - Payload loss is  $7/29 = 24\%$
  - 4 BEVs to move same freight as 3 Diesels... **33% extra cost**
2. Time Penalty
  - BEV can drive for ~4 hours (320km) between charges
  - Charge for ~1 hour out of 5 hours.... 20% of the time
  - Most driver rest stops in UK occur during logistics stops (unload/load)
  - Outcome:
    - Charge during the driver break at logistics facilities... **large grid connection or**
    - Take an extra stop at a public charging point... **20% additional cost.**



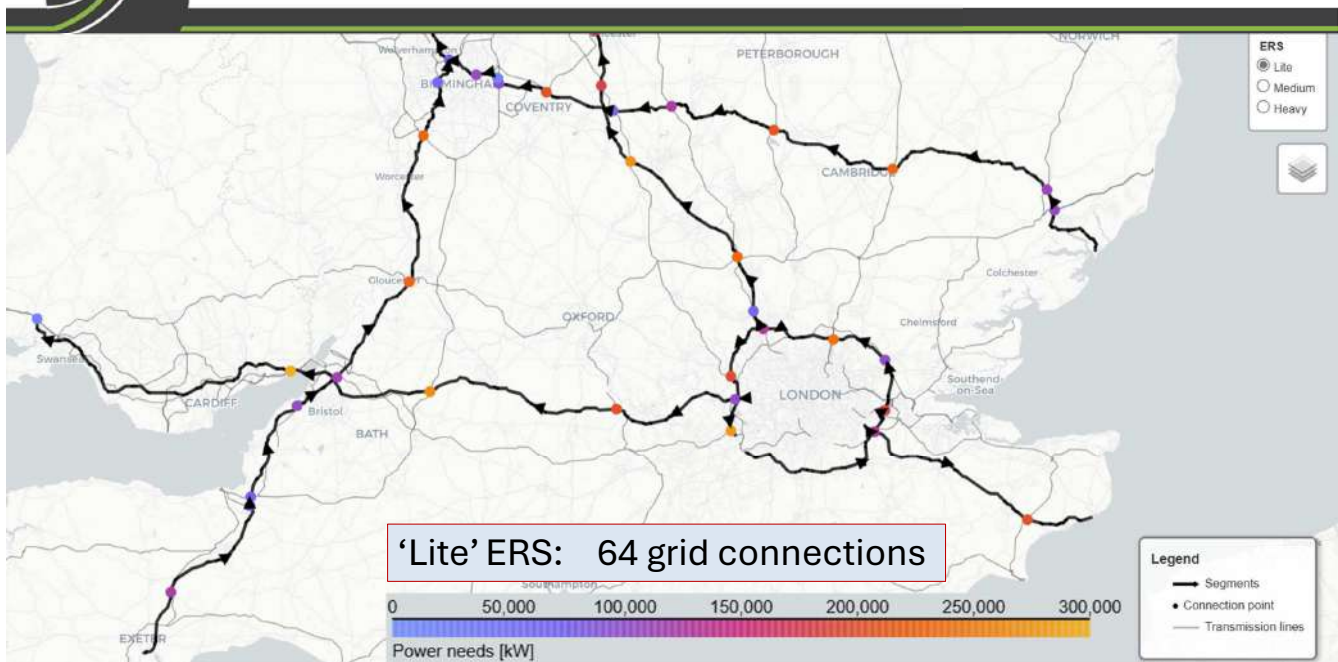
## How many logis



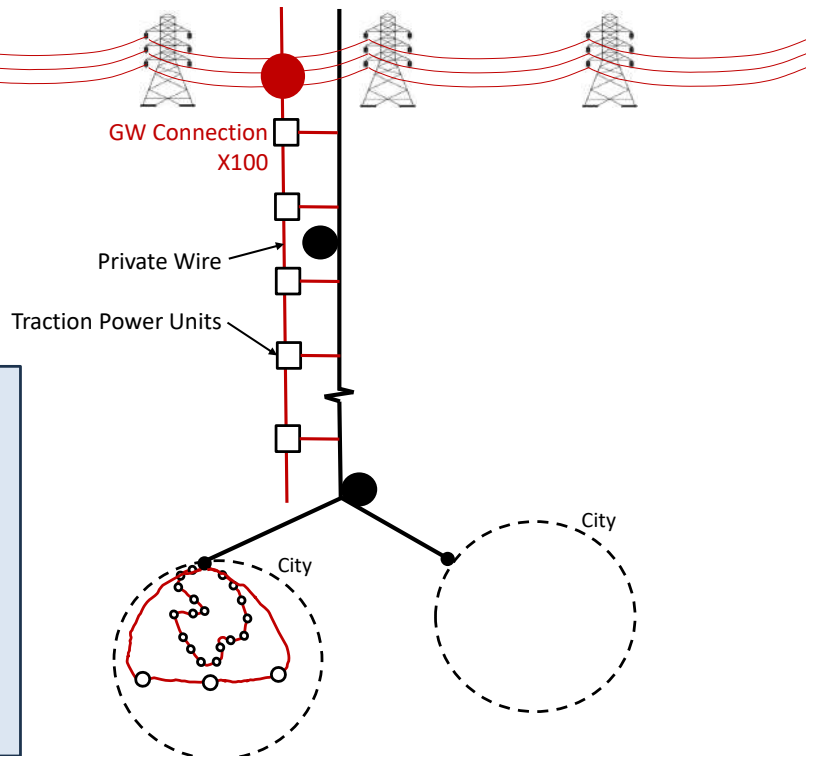
- 20,000 facilities > 2000 m<sup>2</sup>
- 4-20 MW electricity connections needed



## Powering a UK ERS



## Dynamic Charging (Summary)

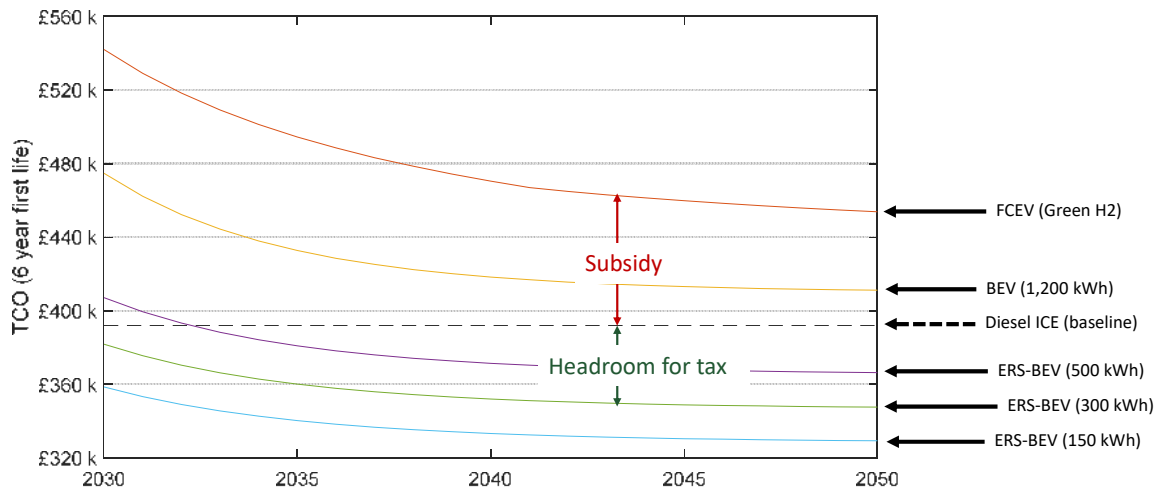


### Key Stats



- < 100 x 300MW grid connections
- Small batteries in 200,000 trucks
- Low cost vehicles
- Full payload
- Logistics as per today

## Total Cost of Ownership (TCO)





## Summary: Best Guess Operational Costs in 2035 (c/f Diesel)

	Vehicle TCO	Energy Infrastructure	Logistics	
			Weight	Time
Hydrogen FCEV		?	~0% No cost change	~0% No cost change
Static Charging BEV (Big battery)			+6-10% Higher cost	+20% Higher cost
Dynamic Charging BEV (ERS)	-20% Lower cost		0% No cost change	0% No cost change

Annotations:

- £ CAPEX x2  
£ Energy x3  
**BLOCKER** (points to Vehicle TCO for Hydrogen FCEV)
- Unknown (Major challenges) (points to Energy Infrastructure for Hydrogen FCEV)
- Headroom for Tax (points to Vehicle TCO for Dynamic Charging BEV)
- 10,000+ Grid Connections **BLOCKER** (points to Energy Infrastructure for Dynamic Charging BEV)
- Privately Financeable (points to Energy Infrastructure for Dynamic Charging BEV)
- Current Industry Trajectory (points to Time for Dynamic Charging BEV)



## Conclusions

- Battery Electric Vehicles (BEV)
  - 42t BEVs are available now, but with substantial payload loss 29t → 22t
  - Electric logistics is doable with time and weight penalties: 10% to 25% increase in logistics costs
- Charging is the challenge!
  - Truck Stop Charging is necessary, but not sufficient.
  - Warehouse Charging is essential to reasonable journey durations.
  - 10,000+ electricity connections to logistics facilities is very challenging – Potential blocker
- BEV + ERS
  - Lowest cost, lowest carbon, lowest weight
  - Reduces battery size/cost/weight by 1/2 to 1/4
  - Eliminates loss of payload on mass-limited of trucks
  - Logistics essentially as now.
  - Headroom for fuel tax recovery by Government
  - Eliminates most static charging and 10,000+ large grid connections at warehouses
- Logistics cost penalties must be overcome for widespread roll-out of EVs