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ELECTRIFYING CITY LOGISTICS IN THE EUROPEAN UNION: OPTIMISING CHARGING SAVES COST

BACKGROUND:

The use of electric trucks in urban and regional logistics has great potential to cut emissions in the freight sector and accelerate decarbonisation of transport. A key question for logistics operators is how to optimise charging opportunities in order to take advantage of lower electricity prices and excess renewable energy on the grid. To avoid the significant costs that result from unmanaged or suboptimal charging, depots will need to identify optimisation strategies now, while they have few electric vehicles in their fleets or are planning their purchase. To do so, it is important for operators to analyse what drives charging costs, beyond the electricity consumption of the depots and fleets.

A joint study from the International Council on Clean Transportation and the Regulatory Assistance Project assesses how logistics operators can charge electric trucks most cost effectively at the depot, while also capturing consumer and grid benefits by optimising their charging processes. The authors provide new insights by analysing the costs of charging an electric truck fleet based on an estimation of their energy requirements.

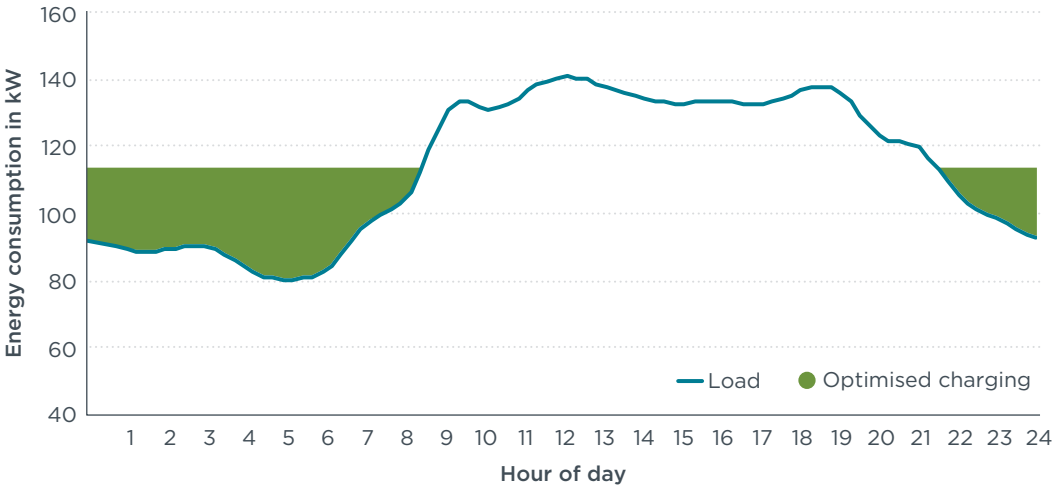

Figure: Illustration of smart truck charging at the depot.

FINDINGS:

- Based on real data from electric trucks used by operators today, the analysis finds that companies would pay between 80,000 and 95,000 euros per year for charging 10 e-trucks at a typical logistics depot in Germany (including a typical depot's electricity consumption and the trucks' modelled charging demand). Charging trucks overnight at the depot is the preferred option. A total cost comparison between two scenarios finds, however, that a charging strategy which combines opportunity charging during the day with overnight charging at lower capacity could be more cost efficient overall than charging overnight at higher capacity.
- Cheaper electricity prices by themselves are not necessarily a solid basis for optimising charging. This is because EV charging for depots is comprised of both the electricity cost and (regulated) network cost. Given that network fees are mainly based on capacity in most EU countries, not on actual consumption, it is possible that raising charging capacity could cancel out savings from charging when the cost of electricity is cheaper.
- Optimisation strategies for transport operators are likely to change with fleet size. Estimates imply that it may be relatively easy to optimise smaller electric truck fleets around the depot's consumption. However, the larger the electric truck fleet, the more important it is to seek comprehensive load management solutions to optimise the fleet's electricity consumption.

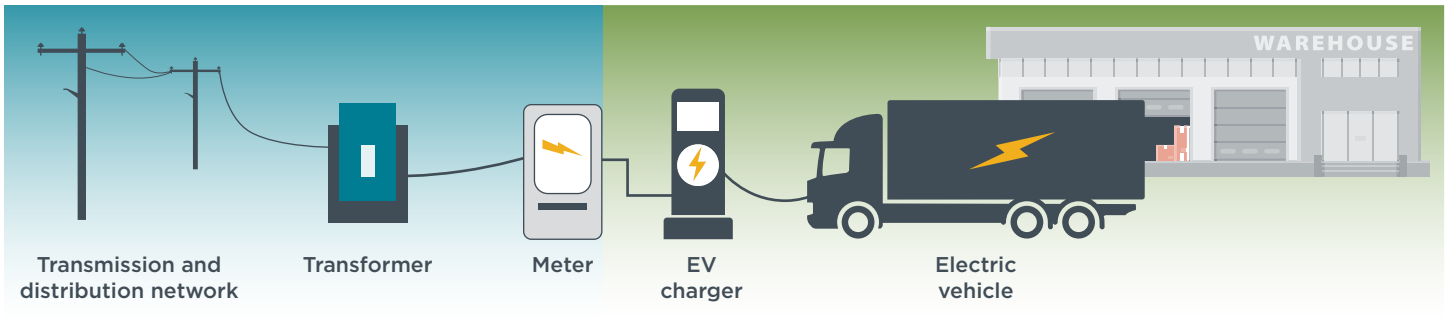

Figure: Overview of heavy-duty vehicle charging at a depot.

RECOMMENDATIONS FOR FLEET OPERATORS:

- Operators should consider that charging at lower capacity may be cheaper if the charging period is sufficiently long, as they can benefit from lower network costs. Based on these insights, depots should study which capacities are required based on when trucks will be parked at the depot. Faster charging is not a guarantee for cost reduction.
- A depot's geographic location is key in determining the magnitude of network costs. Factoring in network connection capacities when planning the site—particularly identifying locations where grid capacity is abundant—can help operators control costs.
- For smaller e-truck fleets, operators need to adjust the charging with the depot's overall consumption. The larger the truck fleet, the less impact the depot's consumption is likely to have. Load management systems can optimise charging automatically for larger truck fleets.

RECOMMENDATIONS FOR POLICYMAKERS:

» Energy regulators can help transport companies to operate electric trucks at least cost. They should make electricity and network pricing more reflective of actual cost to always encourage the cheapest option for operators. This will also bring down costs of the power system as a whole and help integrate renewable energy sources that are cheapest. Member States can accelerate this process by setting ambitions high when implementing recent European electricity market reforms.

» Transport policymakers are currently deliberating on a reviewed legislative framework for charging, the Alternative Fuels Infrastructure Directive. The review includes requirements for facilitating electric truck charging and build-out of infrastructure that will accelerate the electrification of logistics.

PUBLICATION DETAILS

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