Zero Emission Truck Infrastructure Considerations

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Two fundamental charging location types exist: on-site and on-route local charging and on-route highway charging for long-haul vehicles

Types of charging locations and strategies

Location	Local charging			Highway charging
Strategy	On-site charging		On-route charging	
Description	**Private chargers** installed at fleet's owned depot location	**Shared charging hubs** with dedicated availability for fleet customers	**Fully public-access** chargers for on-route or destination use	**Fully public-access** chargers along the highway network
Typical fleet characteristics	Large national fleets with **sufficient depot infrastructure**	Small to medium sized fleets with **insufficient depot characteristics**	Used by **various** fleet types (esp. for high-mileage use cases)	Used by **long-haul** vehicles (trucks and OTRBs)
Charger configurations[1)]	**Level 2** **Level 3** **DCFC** (limited cases)	**Level 2** **Level 3** **DCFC** (limited cases)	**DCFC**	**DCFC**

1) Level 2 charging refers to AC chargers less than 20 kW. Level 3 refers to DC chargers 50-150 kW. DCFC refers to DC fast chargers 350 kW and above.

Source: Roland Berger 2024

Use Case Segments

	Medium Duty (Class 3-6)		Heavy Duty (Class 7-8)	
Use case segment	1 **Local (low mileage)**	2 **Local (high mileage)**	3 **Local**	4 **Long-haul**
Description	MD vehicles (e.g., P&D, utility service, school buses, walk in vans) where daily driving distance **does not exceed usable range of BEV**	MD vehicles (e.g., P&D, utility service, school buses, walk in vans) where daily driving distance **exceeds usable range of BEV**	**All other Class 7-8** vehicles (e.g., drayage, distribution)	**Over-the-road** vehicles primarily running longer inter-regional routes, incl. trucks and OTRB
Charging locations	**On-site** at depot locations	**On-site** at depot locations, in addition to **on-route** charging at public locations	**On-site** at depot locations, in addition to **on-route** charging at public locations	Both top-up and overnight charging at **highway truck stop** locations
	93%	7%	49%	51%

Source: Roland Berger 2024

Summary

	Charging infrastructure			
Use case segment	**Charger**	**Site**	**Electric service**	**Key findings**
1 **Medium duty – local (low mileage)**	On-site Level 2 chargers sufficient and available at low cost	Upgrade cost is highly site-specific and can be substantial	Minor service upgrades for smaller fleets More extensive service upgrades for larger fleets	Smaller, low mileage fleets with least challenges, but still require significant upfront investment
2 **Medium duty – local (high mileage)**	Only feasible with sufficiently dense on-route charging network	Upgrade cost is highly site-specific and can be substantial	Minor service upgrades for smaller fleets More extensive service upgrades for larger fleets	High mileage medium duty vehicles cannot electrify before a substantial buildout of on-route charging occurs
3 **Heavy duty – local**	High upfront cost for Level 3 and DCFC units	Highly site-specific costs	Expensive utility service upgrades	Heavy-duty local fleets face high upfront costs for chargers and utility service upgrades
4 **Heavy duty – long haul**	Time penalty from on-route charging negatively impact TCO	Parking/space constraints at on-highway charging locations	Long lead time for inter-connection	Long-haul vehicles require increased range AND very high capacity chargers to reduce charging times

Source: Roland Berger 2024

Discussion

A reliable on-route charging network must exist before high mileage vehicles can electrify.

- Should the focus be on local on-site terminals?
- Should public or private charging be prioritized?
- What effect does public charging investment have on adoption?
- What are the impacts of subsidies on fleet adoption?
- What role should the OEM's play in charging development?
- How does the truck parking shortage impact site selection?