Transport

Electric trucks expected to follow EVs

Fereidoon Sioshansi

One place to cut down on road transport emissions is targeting heavy duty trucks for electrification. In this article, Menlo Energy Economics' Fereidoon Sioshansi explains what is happening in this space in the US.

In late June 2020, The California Air Resources Board (CARB) voted to require at least 100,000 electric trucks on California roads by 2030 to reduce greenhouse gas emissions. The rule requires that 15% of the truck fleet be electric by the end of the decade. To meet that mandate, manufacturers will have to sell given percentages of zero emission trucks annually starting in 2024. By 2045, the truck fleet in the state is to be zero emissions. The switch from diesel to renewable electricity is expected to cut 17.9mn metric tonnes of carbon emissions by 2040.

Continued advances in battery storage technology promise to make E-trucks cost competitive with internal combustion diesel engine vehicles. This explains a recent plan by a coalition of utilities in California, Oregon and Washington to advance the electrification of medium- and heavy-duty trucks by installing public electric charging stations along a 1,300 mile stretch of Interstate 5 (I-5) – the major north-south artery that stretches from British Columbia to San Diego. The current range of medium-duty E-trucks is 90-120 miles; 230-325 miles per charge for heavy-duty ones. Both can be expected to improve over time.

The plan, described in a West Coast Clean Transit Corridor Initiative Study released in June 2020, proposes installing 27 charging stations, with up to 10 ports each, for medium-duty trucks by 2025 plus another 41 along I-5 feeder routes with a charging station roughly every 50 miles along the heavily used highway.

An estimated 8% of the truck fleet in California is expected to be electric by 2030, which explains why the charging infrastructure is urgently needed. The charging stations for heavy-duty trucks are far more challenging to serve because they draw so much more power from the network – 1-5MW per charger. For a station with multiple chargers, one would need up to 25MW of capacity. Even medium duty truck chargers need 350kW. As a reference point, a large residential rooftop solar PV may generate 15kW.

The initial phase of the installations is estimated to cost $850mn (£644mn), a rough estimate of $210,000 (£160,000) per 350kV charger, with a 10-port station costing about $3.3mn (£2.5mn). Extrapolating that figure to 2MW heavy-duty chargers, the cost would be $600,000 (£454,500), or $17.3mn (£13.1mn) for a 10-port charging station.

Utilities must upgrade their transmission and distribution networks, especially in rural areas, to serve the new demand. According to Katie Sloan, SCE's e-mobility program director, loads exceeding 10MW would normally require extensive grid upgrades as well as new substations. Utilities can generally recover the investments from their ratepayers, as well as the states and the federal government, and some private entities.

Since the three states along the I-5 corridor are investing heavily in renewables, the E-trucks can increasingly charge with clean and cheap electricity. This, however, is only possible if the charging is done when excess solar, wind or hydro generation is available – which is not at all times. Charging in the late afternoon or early evening hours could be problematic as solar generation drops and fossil plants have to fill up the gap. This means that each station – or the network as a whole – must invest in energy storage so that regardless of when the trucks are charged, they run on clean renewables. Otherwise, nothing is gained from switching to E-trucks.

California's big three investor-owned utilities – PG&E, SCE and SDG&E – are investing $776mn (£585mn) in truck electrification.

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