

## AMAZON.COM, INC.

Amazon Delivery Electrification

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In February 2019, with the announcement of Shipment Zero, **Amazon** committed to the ambitious goal of delivering 50% of its shipments with net zero carbon by 2030. Electric Vehicles (EVs) have zero tailpipe emissions, and offer operating savings of up to 65% in per mile energy costs and 47% in maintenance costs. Last Mile delivery electrification is the cleanest and most practical solution that will enable Amazon to reach this goal. Therefore, as soon as electric delivery vans are available at scale in North America, Amazon must be operationally prepared to deploy an electric fleet at scale.

EVs are a new technology in the last mile delivery world and come with range limitations, overnight charging requirements, and slightly different operating procedures. Further complicating things, EV range limitations vary given outside temperature, route topography, traffic profile, and driver behavior. Customer obsession is Amazon's number one priority, and thus the company will not deploy any technology that may hinder customer delivery experience. The 2019 Tauber team was tasked with determining holistic requirements to successfully deploy, route, and operate an EV fleet.

The Tauber team provided three main deliverables that allow Amazon to expand EV testing and deployment in 2019, while simultaneously providing a scalable product for routing a larger EV fleet. First, the team wrote Standard Operating Procedures for delivery providers and drivers to ensure EV delivery success under all foreseeable scenarios. Second, the team created a simulation model that predicts EV delivery success in North America, and implemented the process to limit EV routing to solely in-range zip codes. Third, the team provided other immediate next steps to ensure the successful integration of EV delivery vehicles in Amazon's last mile fleet, including recommendations on future deployment locations that will enhance both deliverables by increasing the size and variability of the EV operational data set.

With the 2019 Tauber Team's deliverables, Amazon will be able to immediately convert a significant share of their Internal Combustion Engine (ICE) routes to EV routes as soon as vehicles are available at scale, with 99.4% confidence in delivery success. If scalable EV delivery vans existed in North America today, the projected total cumulative tailpipe emissions reductions from this deployment model would be 3.9 million metric tons of CO<sub>2</sub> over the next three years. The Tauber team also identified the ideal EV battery size and efficiency profile required for electrifying a majority of Amazon's last mile routes, in support of near and long-term vehicle deployment planning.