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Although the United States has long lagged other regions in electric vehicle (EV) adoption, the country is now reporting record growth. EVs represented about 8 percent of all new passenger cars sold in the United States in 2022, up from around 5 percent in 2021.1Maximilian Fischer, Nicolaas Kramer, Inga Maurer, and Rachell Mickelson, "A turning point for US autodealers: The unstoppable electric car," September 23, 2021, McKinsey . By 2030, this figure could rise to 53 percent.

The United States will need about 28 million ports by 2030 to meet the demand for electricity by zero-emission passenger vehicles (Exhibit 1). Private ports are expected to increase in number from around 2.5 million to nearly 27 million, representing about 95 percent of the total.

There are two types of public charging: direct current fast charging (DCFC), which is used on highways and for fast fill-ups, and slower Level 2 (L2) charging, which is available at places such as grocery stores, malls, car dealerships, golf courses, and banks, where people may park for longer periods. L2 charging may also occur next to sidewalks or near street parking. About 150,000 L2 and DC plugs are now available across the United States, but that number is expected to increase to 1.5 million by 2030, when they will represent about 5 percent of the total.

Currently, most EV owners tend to be home owners with access to a home charger, and they often have a second vehicle for long-distance trips. But even people that fit this profile will sometimes need public charging. For instance, they might forget to charge their vehicle overnight and thus need to charge on the road, or they might find that the slow L2 charger at their workplace parking garage, where they usually connect during an eight-hour workday, is out of commission. Additionally, long journeys--those over 150 to 200 miles--will necessitate public charging.

Recognizing the need for public chargers, many new players are now entering the sphere. For instance, some major automakers are banding together to invest a minimum of $1 billion in a joint venture that will build stations with about 30,000 fast chargers in urban and rural areas of the United States.3Mike Colias, River Davis, and Ryan Felton, "Big Automakers Plan Thousands of EV Chargers in $1 Billion US Push," The Wall Street Journal, July 26, 2023.

Regardless of business model, the up-front capital costs for fast charging stations are high. A 150 to 350kW DCFC charging unit can cost anywhere from $45,000 to over $100,000, and installation costs can range from $40,000 to over $150,000. Additionally, grid upgrade and integration costs can amount to millions, depending on the number of fast chargers installed at the location.

We examined the economics for a hypothetical DCFC charging station with an owner-operator business model in California. In line with typical patterns, we assumed the charging station would have 4 150kW

chargers.4FWHA NEVI Formula Program Guidance, US Department of Transportation, Federal Highway Administration, June 2, 2023. In our first analysis, we assumed that the charge-point operator did not receive any government subsidies or credits; in the second, it did.

Even if fast public charging stations do not receive subsidies or credits, they may still be able to improve their bottom line. We have identified several potential levers for driving improvements that span multiple areas: utilization, electricity cost, electricity price, demand charge cost, lifetime hardware costs, and ancillary revenue (Exhibit 5).

While all of these levers are important, charge-point operators would have to apply them aggressively to make a difference. Consider utilization and competitive pricing, which could potentially drive the greatest gains. Using our example of a typical fast public charging station in California, the owner-operator would break even if utilization increased from 15 percent to 20 percent, or if the price for charging customers increased from $0.45/kWh to $0.53/kWh. Profitability would also be possible in other scenarios (Exhibit 6).

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Last year, the average utilization of a US fast-charging station not operated by Tesla Inc. doubled -- from 9% in January to 18% in December, according to new data from Stable Auto Corp., a San Francisco startup that helps companies place EV infrastructure. Put another way: By the end of 2023, every fast-charging cord in the country was plugged in for an average of nearly five hours a day.

"There"s been a noticeable increase," said Brendan Jones, chief executive officer of Blink Charging Co., which operates about 5,600 charging stations in the US. "We"re heading into 9% and 10% market penetration [for EVs]. Even if we stay at 8%, we"re still not going to have enough charging."