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Leading the Charge

EVs Finally Delivering the Familiarity Consumers Crave

After decades of false starts, a wholesale shift from polluting fossil fuels to clean renewable energy is very near a global tipping point. Pressured by a changing climate, politicians and business leaders are scrambling to invest in a new energy paradigm, one that promises to upend entrenched interests and radically reformulate how we power our world.

Consider for a moment the fraught positions of the world's major oil companies. The two basic outputs of any oil company are reliable gasoline for transportation and plastics made from petrochemicals. Yet it's hard to imagine two bigger environmental bogeymen than carbon-spewing automobiles and single-use plastic trash clogging up our oceans.

That's why big energy companies have invested so heavily in turning themselves into global electric power distributors over remaining oil extraction companies. By the 2030s, Shell aspires to become the world's largest power company, reports Time.[1] "We have to figure out what are the right bets to take in a world that is completely changing because of society's concerns around climate change," says Shell CEO Ben van Beurden. In 2018, BP acquired Britain's largest electric vehicle charging company, according to Bloomberg News.[2]

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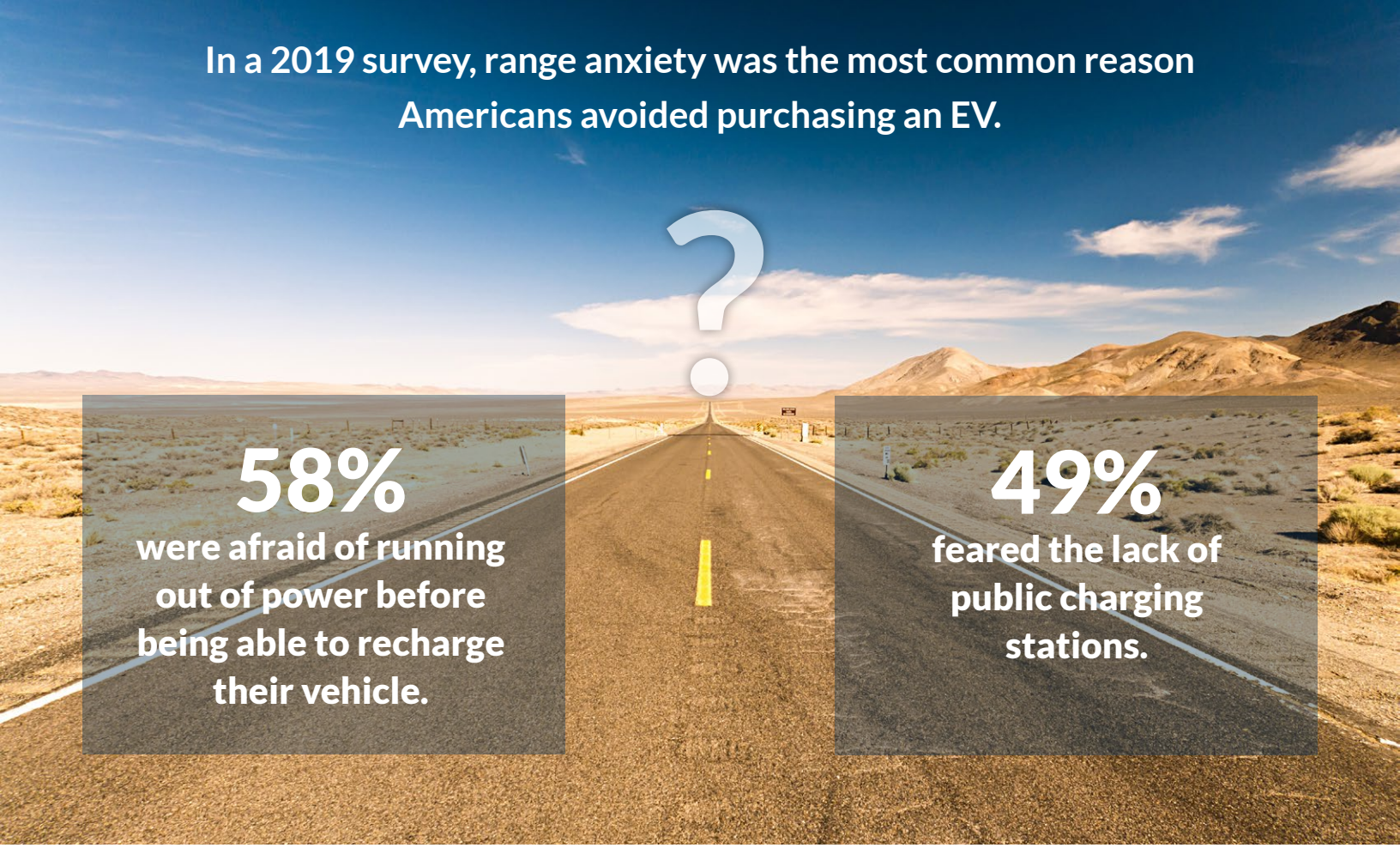

In 2019, BP announced a joint venture with China's ride-sharing giant Didi Chuxing (DiDi) to develop a network of EV charging hubs across China.[3]

Naturally, mass EV adoption creates immediate challenges downstream, including the problem of charging millions of electric vehicles. Early adopters in rich countries have opted to install home charging units in household garages, a solution that is quick, easy and largely unregulated. But that doesn't begin to account for millions of renters, street parkers and other vehicles that cannot easily charge up overnight. In a 2019 survey, range anxiety was the most common reason Americans avoided purchasing an EV — 58% of respondents said they were afraid of running out of power before being able to recharge their vehicle, while another 49% fear the lack of public charging stations.[4]

The solution that immediately springs to mind is the extensive network of gas stations already in place worldwide. Ideanomics, through its Mobile Energy Global (MEG) unit, is taking the challenge of on-the-go EV refueling head-on through a large-scale gas station conversion project in Nanjing, China.

In China today there are more than 100,000 gas stations. Most are operated by state-owned entities; some are owned and operated by foreign oil companies new to the China market. Comparatively, in 2018 there were 70,000 EV charging stations in the country but only a small fraction of them were at gas stations, and most were single or twin charging facilities. Importantly, just 36% were DC fast-charging, a necessity in terms of replicating the ease of experience for consumers compared to traditional gasoline and diesel refueling.[5]

Fast charging matters. In China, most EV charging takes place at 220 volts on an AC current, known as Level 2

charging. For a 30kWh battery it takes about six hours to go from 20% to a full charge using a Level 2 charger, the typical overnight home-charging experience. In comparison, DC fast chargers operate at up to 400kW and can charge batteries from 20% to a full charge in an hour and in as little as 10 minutes — far closer to the typical "fill up" gas station experience.

However, fast-charging stations are expensive to build. Tesla's Supercharger network, for instance, which charges at a maximum of 120kW, costs an estimated $150,000 to $250,000 per station. In August 2018, the China Electricity Council (CEC) announced a memorandum of understanding with the CHAdeMO network to jointly develop ultra-fast charging with the hopes of expanding the standard to countries beyond China and Japan.[6]

Fueling stations must rapidly evolve. Mass adoption of EV transportation means gas stations risk becoming obsolete, detrimental to energy companies and national economies.

The problem for China's fueling stations is that reallocating space at existing stations to charging requires gas station operators revisit their entire business model. Nevertheless, they must evolve, and do so rapidly. Mass adoption of EV transportation means gas stations risk becoming obsolete, detrimental not only to the energy companies but also to national economies heavily reliant on taxes and tariffs collected from gasoline consumption.

Moreover, charging innovation continues to evolve, quickly making existing technologies obsolete. Nanjing is thus a perfect testbed for converting gas stations to EV. A mid-sized city by China standards, Nanjing nevertheless has the population of New York City at around 8.5 million people. It is the capital of China's eastern Jiangsu province and the second-largest city in the East China region, as well as a significant commercial center.

Nanjing also is home for the first major pilot project on EV refueling, launched in partnership with MEG and one of China's largest energy companies, PetroChina. PetroChina is the world's third-largest oil company and plays a leading role in energy distribution throughout China. The company operates gas stations throughout Jiangsu province.

The joint venture between MEG and PetroChina entails swapping out existing gasoline fuel pumps for charging ports, creating hybrid gas-EV stations. Those ports do not need to be powered from the grid, which requires heavy capital investment in high-tension power lines and substations. Rather, they can be powered by onsite energy generation and storage systems that run on methanol.

Methanol is produced as a by-product from natural gas supplied by PetroChina. It offers a significantly lower carbon footprint compared to traditional fossil fuels and represents a cost-efficient alternative in this first phase of transition. Using methanol also keeps oil and gas

companies on a profitable path toward transition since they will still be in the fuel business, though those fuels will be used to produce electricity instead of burning it in an engine.

We will tweak the program based on feedback from consumer and commercial users, seeking to optimize efficiencies and determine which elements of the pilot to accelerate and which to discontinue, all the while experimenting with various charging technologies in order to maximize return on investment. "This deal puts down a marker for the energy industry, with a major energy provider truly embracing the future adoption of EV, and the infrastructure required to meet the consumption needs of both commercial vehicle operators and consumers alike," said Alf Poor, CEO of Ideanomics.

"We are extremely pleased to be working with a major global energy supplier such as PetroChina on the future of energy needs for auto motive transportation. Our MEG Group is focused on innovation and partnership with market leaders, and this agreement serves as the most compelling example to date of the size and scope of our capabilities as a catalyst throughout the EV value chain."

China is the world's largest EV market and home to the largest concentration of EV manufacturers and some of the world's leading technologies. Given the scale and resources of the undertaking in the Nanjing gas station conversion pilot, the world's energy companies could learn valuable lessons on how to make the transition to charging stations cost-efficient and scalable. Ideanomics will publish updates on our progress as the Nanjing pilot continues to evolve.

It's easy to underestimate the value of this incremental approach to EV conversion. More than a century of consumer familiarity with gas stations means they'll be able to conveniently refuel no matter which direction or distance their journey requires. Instead of a gas pump nozzle it will be a charging plug, but for the consumer the experience will remain the same. The goal of MEG and Ideanomics is to use the experiences gained in Nanjing to expand a winning model for gas station conversion within China and export it to the rest of the world.

(1) Why Fossil Fuel Companies Are Reckoning With Climate Change, Time, Jan. 16, 2020

(2) BP Buys Britain's Largest Electric Vehicle Charging Company, Bloomberg News, June 28, 2018

(3) BP and DiDi join forces to build electric vehicle charging network in China, Press Release, August 2019

(4) Americans Cite Range Anxiety, Cost as Largest Barriers for New EV Purchases: Study, The Drive, February 26, 2019

(5) Electric Vehicle Charging in China and the United States, Center on Global Energy Policy, February 2019

(6) CHAdeMO, Press Release, August 22, 2018

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