Overcoming obstacles to electric vehicles: Charging stations and lower prices

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The technology of electric vehicles is poised to displace the internal combustion engine, but like all examples of technological displacement

and diffusion, there are several conditions that must be met before people abandon familiar technologies for new ones: The new technology needs to have features that are superior to the old one; the new technology should be less expensive or at least no more expensive than the old one, and finally; the new technology must be at least as convenient as the old one. A century-old technology like the internal combustion engine is ripe for replacement, but a century of infrastructure and investment is not easily replaced.

One of the most common sights on the American roadway is the gas station. While in the past, they were coupled with auto repair shops, these days, they are often linked to convenience grocery stores where you can fuel your car and fuel yourself. One of the issues that consumers tell us that concerns them about electric vehicles has been termed "range anxiety"—the fear that you could be stranded somewhere without a place to charge your vehicle.

The good news is that many businesses see the opportunity presented by vehicle charging. While a customer's vehicle is charging, that customer is available to sell something else to. Last week, America's largest retailer, Walmart, once again demonstrated its environmental leadership by announcing its plans for electric vehicle charging. According to Vishal Kapadia, Walmart's senior vice president for energy transformation:

"By 2030, we intend to build our own EV fast-charging network at thousands of Walmart and Sam's Club locations coast-to-coast. This would be in addition to the almost 1,300 EV fast-charging stations we already have available at more than 280 U.S. facilities. With a store or club located within 10 miles of approximately 90% of Americans, we are uniquely positioned to deliver a convenient charging option that will help make EV ownership possible whether people live in rural, suburban or urban areas.

"Our goal is to meet the needs of customers and members where they live and open the road to those driving across the country…What's more, with our chargers located on site with our Supercenters, Neighborhood Markets and Sam's Clubs, we can offer customers and members the convenience of being able to pick up essentials for their families or grab a bite to eat while they charge. And in line with our purpose, we aim to offer Every Day Low Price charging—helping ease transportation costs.."

Walmart's leadership provides an obvious business model for other retailers: use charging stations to draw in customers. While no other retailers command Walmart's scale or base of capital, investments in charging stations should be easily recoverable. My guess is that in America, most charging will take place in suburban driveways and garages, followed by retail outlets that mimic the Walmart model. But the rapid adoption of electric vehicles is a critical element of national climate policy, and not everyone has a driveway or lives near a Walmart.

Here in New York City (which has never allowed a Walmart to be built), many people live in private homes, but many of those are row houses without community driveways allowing auto access to their backyards. While many New York homes have driveways and even garages, about 70% of New Yorkers live in apartment buildings. Although lots of New Yorkers get by without cars, many do own cars and will need access to public or commercial charging stations. The Biden administration has anticipated that and has begun a grant program to enable states, tribes, and localities to build public charging stations. According to a U.S. Department of Transportation press release from February 15, 2023:

"Today, the Biden-Harris Administration announced its latest actions to advance the President's vision of building 500,000 EV chargers by 2030 and delivering a convenient, reliable, and Made-in-America electric vehicle (EV) charging network. These next steps—publishing minimum

standards for federally funded EV infrastructure, finalizing the Build America, Buy America implementation plan for EV charging equipment, and announcing that cities, towns, Tribes, and states will soon be able to apply for the first round of $2.5B in competitive grants to build EV charging stations in communities across the country—will electrify the great American road trip."

The closest analogy to this would be the rest stops one sees along interstate highways. These are subsidized with federal funds and greatly appreciated by the traveling public. In addition, some public charging stations will be built in municipal parking structures, and others may even be located on city streets. After prodding by the Biden administration, Tesla agreed to open 7,500 of its charging stations to non-Tesla EVs by the end of 2024. The goal here is to enhance the visibility of charging stations so that potential consumers will see that charging is as easy and convenient as filling up a gas tank.

The business opportunities provided by the transition to electric vehicles are massive, and so is the challenge of attracting the capital and manufacturing capacity to build the new infrastructure. A recent study by PWC indicates the scale of the needed transformation. According to PWC:

"The EV charging market could—and will need to—grow nearly tenfold to satisfy the charging needs of an estimated 27 million EVs on the road by 2030. While building such a national charging network can be challenging and require numerous stakeholders and investments, it will be a necessary step to shape—and determine—the viability of a future of all-electric vehicular transport in the US. Some highlights of our analysis include:

- The number of charge points in the US is poised to grow from about 4 million today to an estimated 35 million in 2030.

- The electric vehicle supply equipment (EVSE) market could grow from $7 billion today to $100 billion by 2040 at a 15% compound annual growth rate.
- The number of EVs in the US is estimated to hit 27 million by 2030 and 92 million by 2040, according to PwC's analysis.
- The at-work and on-the-go EV charging segments are potentially the fastest growing through 2030."

The regulatory structure, especially in states like California and New York, is poised to accelerate the transition to electric vehicles, and so too are the multi-billion-dollar capital commitments of major American auto manufacturers. The technology of building and maintaining electric vehicles is superior to that of the internal combustion engine. There are fewer moving parts, and new electric vehicle factories are being built with the latest automation and artificial intelligence technologies.

A concern that I and many others have is the urgency of ensuring that workers now engaged in building and maintaining today's internal combustion-based vehicles are not discarded, as many workers were ignored in other technological and labor-force transitions. The new green economy will provide lots of opportunities for employment, and it is vital that job training and placement services be added to public policies designed to stimulate the transition to a green economy.

Other than ensuring fair treatment for labor, a vital and too often omitted piece of the transition puzzle, I believe that the transition to electric vehicles is well underway. I see progress on many of the obstacles: particularly charging stations and the price of electric vehicles. According to Peter Grieve of Money Magazine:

"The average price of an EV fell from $62,088 in December to $58,725 in January, a 5.4% decline, according to a new report from vehicle valuation company Kelley Blue Book. New Teslas sold for $59,648 on

average in January, down from $65,080 a month before, which is a drop of $5,432, or 8.4%. The lower sales prices are largely due to Tesla's Jan. 13 price cuts, which were intended to increase sales volumes and make more of their cars eligible for new EV tax credits of up to $7,500. Since then, Tesla has tinkered with its prices several times. Right now, the Model 3 sedan starts at $42,990, down from $46,990 before the cuts, while the Model Y SUV starts at $54,990, down from $65,990."

Electric vehicles attract consumers because they are well-designed and attractive. Soon they will be price-competitive with internal combustion vehicles. Moreover, they are less expensive to maintain and fuel than conventional vehicles. Nevertheless, it is difficult to switch from a technology that many of us are comfortable with and that serves our needs. We should expect that this transition will take a long time to complete. The momentum behind electric vehicle adoption is clear. We will see more and more of them on the road, but the transition will have bumps along that very same road.

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