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# A Free Market Perspective on Electric Vehicles

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“This is the beginning of some fantastic technology [but] it won't happen overnight,” said the President. “It is going to take a fair amount of research and development to make sure hydrogen is attractive and reasonable – is able to be manufactured at reasonable price, distributed in a wide way for consumer satisfaction.”<sup>1</sup>

The President quoted above is not Barack Obama. It is George W. Bush, discussing his plan to fund environmentally friendly vehicles. He was discussing his \$1.2 billion dollar hydrogen fuel initiative, which conventional wisdom at the time held to be the wave of the future. Two years later Ballard Power, the poster child for the hydrogen energy industry, was out of the automobile industry altogether.<sup>2</sup> Its stock, valued at over \$120 in 2000, now languishes below the \$2 mark. The Obama Administration actually cancelled funding to hydrogen vehicles altogether, though they recently reversed this decision.<sup>3</sup> This was likely due to political pressure, rather than because there is any merit to the program.

Unfortunately, the federal government has not learned from its mistakes; and misguided subsidies are being dreamt up every day to pick the new technology that is supposed to reduce reliance on foreign oil and combat climate change. Today, many government officials see the electric car as the “magic bullet” to achieve these goals. The problem with government intervention is that picking technological “winners” is virtually impossible, subsidies can impede the advancement of more viable technologies, and dictating the market is always less efficient and more costly than the natural progression of the free market.

## Government Intervention

There seems to be a presumption that government subsidies are required if the electric car is ever to become viable, a chicken-and-egg-type problem. It is assumed that people want to drive electric cars, but they are currently too expensive, and the necessary infrastructure is not in place to keep them charged. What some fail to realize is that this situation is in no way unique. The automobile industry faced similar hurdles in its quest to replace the horse-drawn carriage as the primary method of transit, yet the market was able to provide the necessary solutions.

Despite the lessons of the past, there recently have been flurries of announcements regarding subsidies to electric vehicles. The \$25 billion Advanced Technology Vehicles Manufacturing Loan Program (ATVMLP) is being eagerly swallowed up by cash-strapped automakers. So far \$8 billion dollars from the fund have been allocated. Ford will receive \$5.9 billion in low-interest loans, while Nissan will receive \$1.6 billion, and Tesla motors will receive \$465 million.<sup>4</sup>

In addition to manufacturer subsidies, the State of Oregon offers up to \$1,500 in tax credits for plug-in hybrids and all electric vehicles,<sup>5</sup> and the federal government tax credits range from \$2,500-\$7,500.<sup>6</sup> While lower prices tend to increase the demand for consumer goods, it is not clear that a tax credit for “green”

vehicles has been successful in convincing the majority of car buyers to purchase the “government-approved” vehicle.

According to a recent study by economists at the University of British Columbia, “the rebate programs subsidized some consumers who would have either bought hybrid vehicles or other fuel-efficient vehicles in any case.”<sup>7</sup> Also, according to J.D. Power and Associates, “While actual hybrid vehicle owners tend to be older (55) than the average new-vehicle buyer and more affluent, with an average annual household income of \$113,400, the study finds that consumers who indicate that they are considering a hybrid tend to be younger (averaging 43 years old), with an average annual household income of \$88,000.”<sup>8</sup> The tax credit for hybrid cars seems to have been nothing more than a tax break for the wealthy to buy a vehicle they were already going to purchase. There is no reason to suggest the tax credit for electric vehicles will be any different.

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Federal, state and municipal governments are also heavily subsidizing a network of charging stations to create a type of “public good” infrastructure for advancing electric vehicle ownership. The theory is that governments need to jumpstart the industry in order to have Americans feel comfortable with buying an electric vehicle (EV). Examples include a French government promise of 400 million Euros<sup>9</sup> for electric car infrastructure and contracts from the Israeli<sup>10</sup> and Danish<sup>11</sup> governments for 500,000 charge stations in each country provided by the California-based company Better Places. Better Places plans to install 250,000 charge stations in the Bay Area<sup>12</sup> and is working with many other regions, such as Ontario<sup>13</sup> and Hawaii<sup>14</sup> to establish similar projects in the future.

Many electric utilities, such as Portland General Electric (PGE), are subsidizing electric car plug-in stations as well. PGE has installed 13 such stations, and plans to install four more.<sup>15</sup> PGE recently announced a partnership with Nissan and Mitsubishi to create an entire network of stations.<sup>16</sup> A representative from PGE, Bill Nicholson, said that “infrastructure needs to lead industry.”<sup>17</sup> In the abstract, this seems like a model for how EV infrastructure should develop. After all, PGE is technically a private company. However, PGE has a legally sanctioned monopoly over electricity in its service area; it doesn't seem fair that PGE is giving this electricity away at no cost, leaving the cost to be borne by the entire customer base.



Additionally, PGE customers are on the hook for the \$7,000 installation cost for each of these charging stations. Bill Nicholson himself admitted that California had initially overinvested in electric car infrastructure. It seems that PGE is making the same mistake. PGE is not the only one that is providing charging stations and electricity at the expense of the general public. The city of Lake Oswego, Oregon has partnered with PGE to build its first plug-in station last year, even though there was only one plug-in vehicle in Lake Oswego at the time.

The subsidies for electric vehicles and infrastructure are not without a semblance of justification. There are problems with electric vehicle technology that lead politicians and governments into thinking that the assumed “superior” technology just needs a little help to get off the ground.

## Problems with Electric Vehicle Technology

By far the biggest barrier to widespread EV use is battery technology. Batteries comprise roughly half the cost of EVs.<sup>18</sup> Cost estimates vary widely, but the industry rule of thumb is that batteries cost between \$500 and \$1,000 per kW-hr.<sup>19</sup> This means that the battery for a Tesla Model S electric car could cost over \$25,000.<sup>20</sup> Lowering the costs of EV batteries is seen as so crucial that the Obama administration has decided to dole out \$2.4 billion dollars to fund battery technology.<sup>21</sup> However, battery prices may not decline in the near future, even with a massive infusion of government money. Battery technologies require a significant amount of rare earth metals that are getting harder to find; and, quite possibly, the artificial demand created by government intervention is increasing demand pressures that also cause the cost of batteries to increase.<sup>22</sup>

Aside from the cost, likely the biggest barrier to mass-marketing electric cars is a problem colloquially referred to as “range anxiety.” People are concerned that electric vehicles cannot travel far enough on a single charge, and they may have difficulties recharging. Additionally, they are concerned about the time required for a charge, and the potential inaccessibility of charge stations.

All of these are reasonable problems for a newly emerging technology. Cost is often prohibitive, infrastructure is often undeveloped or nonexistent, and consumers are uneasy about purchasing or using a vehicle that is not mainstream.

*“This is exactly what happened when cellular phones and laptop computers hit the market. They began as luxuries and eventually became widely affordable.”*

## Free Market Alternative

The free market can provide answers to all of these problems with more efficiency and less cost than government intervention. The free market has already done so with similar technologies, and the EV market already has progressed without market distortions.

The first problem is whether or not private companies have the financing available or can envision the profit potential in manufacturing electric cars. Advocates of government intervention say public incentives are needed to motivate manufacturers to produce these vehicles, but this is far from the truth. Tesla Motors, incorporated in July 2003, shocked the automobile industry by introducing a version of the electric car called the Tesla Roadster three years later. What was so surprising about the Tesla Roadster was that it is not the typical perception of a slow, clunky electric car. Despite having no ties to the traditional automobile companies, this startup company was able to build a car that could accelerate from zero to 60 miles per hour in a mere 3.9 seconds.<sup>23</sup>

Perhaps more impressive is that Tesla Motors had received no subsidies from the government. By February 2008, Tesla had managed to raise over \$140 million dollars in private equity<sup>24</sup> and has delivered over 500 of its high-end Roadsters,<sup>25</sup> which retail for around \$109,000.<sup>26</sup> This doesn't seem terribly impressive until you consider Tesla's business model. Tesla's CEO, Elon Musk, realized that the sports car was the right platform with which to enter the market because, with new technologies, “the right point to enter is high unit costs, low unit volume.”<sup>27</sup> Since new technologies are always expensive, it makes sense to start out with a high-end model.

This is exactly what happened when cellular phones and laptop computers hit the market. They began as luxuries and eventually became widely affordable. This is a common progression of technologies through the free market. Indeed, the new Model S sedan by Tesla, set to hit the market in 2011, is going to be priced at under \$57,400 (minus a \$7,500 tax credit).<sup>28</sup> Unfortunately, despite the entrepreneurial beginnings, Tesla Motors recently received a \$465 million low-interest loan under the Federal government's \$25 billion Advanced Technology Vehicles Manufacturing Loan Program (ATVMLP).<sup>29</sup> Even if a private company was working towards making the electric vehicle widely available without handouts, why not accept money from the federal government if they offer it?

What about the problem of “range anxiety” and the supposed need for public infrastructure? The theory is that making charging stations widely available is a necessary step towards popularizing electric vehicles. The presumption is that without government involvement, these stations will never be built. What most forget is that this situation is neither new nor unique. The exact same problem existed when the automobile first became economically viable. In 1900, there were 18 million horses and 8,000 automobiles on the road in America.<sup>30</sup> As of 2007, there were just fewer than 136 million cars in America,<sup>31</sup> and

around 60,000 of them were electric.<sup>32</sup> In other words, there are about as many electric cars per conventional car than there were automobiles compared to horses on the road in 1900. But the better, more environmentally friendly technology took hold; and by 1905 there were 77,000 passenger cars in America, which increased to 17.5 million by 1925.<sup>33</sup>

*“The free market continues to provide natural incentives for entrepreneurs to develop the next best technology that better serves consumers.”*

In the early stages of automobile development, the same type of concerns were raised regarding gasoline fueling stations as are now raised regarding charging stations. The automobile was not a proven technology, it was more expensive than the horse carriage, and fueling stations were few and far between. Because of this, the automobile was at first a mere hobby toy for the wealthy. Automobile owners relied on bulk gasoline retailers, which were typically located outside major population centers. These retailers did not have specialized equipment to deliver gasoline; so like today's EV owners, automobile owners had to manage with contrivances designed for other purposes.<sup>34</sup>

The first true service station was built in 1905 in St. Louis.<sup>35</sup> Around 1910, service stations started to become popular; and by 1920 there were 15,000 service stations in America.<sup>36</sup> By 1930, that number increased to around 100,000.<sup>37</sup> This represented around half the peak number of gas stations in America, around 200,000, which was reached in 1970.<sup>38</sup> During this transition, there were no government subsidies for service stations. In fact, the Department of Energy wasn't even formed until 1977. Even without government assistance for the vehicle or the infrastructure, the better technology won out.

Aside from specific charging stations, a number of other options could become available to EV users. Parking garages, restaurants and other commercial establishments likely would be enticed to provide plug-ins for their customers once EVs are popularized, just as some establishments provide free wireless services and outlets for laptops. McDonalds currently has a pilot project in Cary, North Carolina, where they will offer free charging stations for electric vehicles.<sup>39</sup> If electric cars become widespread, it seems logical that businesses would provide plug-in facilities. Indeed, it could be profitable for them in view of charging for the electricity, or simply because of the added benefit of having electric car owners shop at their businesses.

Advocates of government intervention state that government “investment” in battery technology is needed for EV technology

to be viable on the wider market. Yet, before “investing” billions of dollars, perhaps it would be wise to see what the private market is capable of producing. Given that EVs are starting to trickle onto the market, it is possible that the price of batteries will decline. New technologies tend to decrease in cost as they become available to the mass market, though the rapidity with which this would happen is difficult to gauge.

Often a free market progression based on true market demand will lead to decreased costs for products, but a market distorted to create artificial demand can have the opposite effect. EEstor, based in Cedar Park Texas, claims to have invented a revolutionary EV battery that has 10 times the energy density of a lead acid battery and is only 1/10th the weight and volume.<sup>40</sup> If their claims are substantiated, the industry could see a substantial decline in battery costs in the next few years. This technology was advanced through profit-seeking individuals, not government handouts. The free market continues to provide natural incentives for entrepreneurs to develop the next best technology that better serves consumers.

Another innovation that may solve the battery problem is the introduction of battery swap stations. Better Places has designed a system of battery swapping stations that could alleviate the problems associated with charging time.<sup>41</sup> John Murphy of the *Wall Street Journal* describes the system as functioning “like the mobile-phone industry, with drivers subscribing to plans that bill them for the miles they drive each month, just as mobile phone users are charged for minutes.”<sup>42</sup> Although the system has free-market roots, Better Places recently signed onto a public/private partnership with the State of California. They plan to create a network in the Bay Area which they estimate will cost one billion dollars.<sup>43</sup> They also plan to raise \$1 billion (Australian) for a network in Australia,<sup>44</sup> and they have partnerships with the State of Hawaii and the province of Ontario.<sup>45</sup> It is unclear to what extent these governments will involve themselves in the process, but it is certain they will be involved. Shai Agassi, CEO of Better Places, claims that each station will be priced at half the cost of a conventional gas station.<sup>46</sup> Given the modest unit cost, there does not seem to be a plausible reason why government would need to be involved.

Even without government involvement, impressive progress has been made in the development of electric vehicles. There exists no compelling reason for the government to intervene with direct expenditures or tax credits to aid the development of the industry. As we saw with the example of hydrogen cars, governments are not very good at picking winners. Electric cars are currently a luxury, just as conventional automobiles were when they were first developed. Only by allowing engineers and entrepreneurs to experiment with them will we ever know if they are financially and technologically viable. Luckily, the free market has an uncanny ability to progress technologies at the right pace through the economy to minimize financial burdens, limit risk and distinguish the good from the bad. The electric vehicle is no exception.

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