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U.S. Public Policy and Promotion of Electric Vehicles

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Abstract

There were 17,000 electric cars sold in the United States last year. The President has set a target of one million electric cars by 2015. While there is considerable political debate in the United States over climate change and clean energy, California has set standards for emissions and vehicular miles per gallon which will almost certainly mandate the increased use of electric vehicles to meet those goals. Frequent charging stations, battery exchange facilities, wireless charging, tax credits, carpool and toll lane preferences, and other techniques and programs would assist electric vehicles in obtaining an increased share of the market in the coming years. Improved battery technologies will be an important factor. However, the electric vehicle sector would do well to consider greatly expanding its expectations for the future. There are 250 million cars and light trucks in the United States. By 2050, the target year for reduced global emissions from fossil fuels, there will be two billion vehicles driving the world's roads. None of them are on the road today. Will all or most of them be electric cars? Currently, electric cars and clean energy are viewed separately. The batteries for electric cars are charged primarily by electricity generated from fossil fuels. The extent to which the United States and the world reduce their dependence on fossil fuels in general and oil in particular is inextricably intertwined with the future of electric vehicles. Ultimately, to effectively compete, electric vehicles must cost less to purchase and operate than the internal combustion engine. That depends not only on technological advances but on mass production and distribution. Two billion vehicles would qualify as mass production.

Keywords: Policy, Promotion, EVs, United States of America

1 Introduction

The success of electric vehicles, at least until they obtain a big enough foothold in the market to survive and thrive on their own, depends on political and economic success, as well as support for the development and implementation of clean energy to replace fossil fuels. This is particularly true in the United States, which provides, refines, and uses oil like no other. It is probably not coincidental that the climate change and clean energy debate rages unresolved in Washington, along political and philosophical lines. Meanwhile, much of the rest of the world, particularly nations which import all or most of their oil, have embraced and are implementing solar, wind, and other forms of clean energy.

2 Individual Economics

Ultimately, it will come down to economics for individual consumers. I will like clean energy, either as a solar panel on my roof or through a transmission line, if it lowers my utility bill. I will

like an electric vehicle if it is cheaper to buy and cheaper to operate than the cars I have been driving, assuming I can drive it more than forty miles without taking a two hour break at a charging station.

3 The Role of Governments

For the individual to be able to make that choice, it will be up to government at all levels to protect us from those who would serve themselves, rather than the public interest. Government must regulate industries which would rather not be regulated. Government can set policies and goals, promote and help finance development of new technologies, and clear the way for innovation while removing artificial roadblocks. On the other hand, government can be the bureaucracy that stifles and extinguishes innovation in the emerging technologies of the future. The balance between deregulation and overregulation will be as important to the success or failure of this wave of the future as any technological breakthroughs, some of which we have already seen and some which will develop in the coming years.

4 Electric Vehicle Viability

Electric vehicles should be able to survive and thrive on their own, regardless of the source of electricity. They are on the verge of economically competing right now, despite decades of subsidies for fossil fuels. The U.S. Department of Energy reports that an electric vehicle can be operated at 3.3 cents per mile, while the fuel for a gasoline vehicle costs 15.9 cents per mile, and that's when gasoline was "only" $3.50 per gallon. [1]

Secretary of Energy Steven Chu reports that a battery for an electric vehicle, which cost $12,000 in 2008, will drop to $3,600 by 2015 and drop further to $1,500 by 2020. [2] Meanwhile, the improvements in batteries for electric vehicles have advanced remarkably, reducing the weight and increasing the range.

The supply of lithium for batteries had been a concern, particularly if the number of electric vehicles increases dramatically, but it increasingly appears that the lithium shortfall is not a problem, even if technology is not developed to create batteries without lithium. The Journal of Industrial Ecology reports that the 32 largest known deposits of lithium can provide twice as much lithium as needed for the "highest demand scenario" to the year 2100. [3]

An adequate supply of rare earth minerals needed in hybrid and electric vehicles has been a concern. That's probably why they're called rare earth minerals. However, Malaysia is building a rare earths refinery with the capacity to meet one-fifth of the world's demands. [4] Scientists and engineers are also working on alternatives, and Toyota recently reported that it has developed a way to manufacture electric vehicles without requiring those ingredients. [5]

5 Electric Vehicles and Clean Energy

Yes, electric vehicles should be able to make it on their own, but there are powerful, entrenched interests that don't want that to happen. Thus, the notion that electric vehicles and the development of clean energy are inextricably intertwined is probably good in both the short and long run for both political and economic reasons.

Various goals have been set for developing clean energy. In California, the goal is to reduce emissions by 2050 by 80% of the 1990 emission total, with interim goals along the way. [6] While Congress has not acted, and may never do so, the President has called for 80% clean energy by 2035, also seeking one million electric cars on the road by 2015. [7] New 54.5 miles per gallon requirements and CARB's Advanced Clean Car Standards, which were just adopted in California, virtually dictate a substantial increase in the number of electric vehicles. [8-9] More than half of the venture capital invested in green technology in the U.S. comes to California, creating jobs and cutting edge research and development. [10]

It costs money to require, develop, and implement clean energy, but doing so creates jobs and economic benefits. In "An Inconvenient Truth", former Vice President Al Gore effectively communicated to the world that burning fossil fuels is rapidly causing global warming and represents a serious danger to the planet. [11] Some people didn't believe it. Others believed it but didn't want to deal with it, perhaps hoping the problem would go away. Still others realized that their economic future, and that of their stockholders, wasn't compatible with switching from fossil fuels to solar panels and wind turbines.

However, as the political debate continued to rage in the U.S., economic considerations came to the

forefront. As venture capitalist Steve Jurvetson said, "Green technology is one of the biggest investment opportunities we've ever seen. We're used to investing in billion dollar market potentials, and here we're seeing trillion dollar market potentials. The winners are always the innovators." [12] In other words, green tech and clean energy are the future, a concept fuzzy in the U.S. but clear in other parts of the world.

Transportation represents about 30% of energy use. [13] It is also the most difficult to reach. Houses, buildings, and factories sit still. Vehicles are on the move, and getting power to them in a new way is a tricky and difficult business. However, it can be and is being achieved, and the rewards are huge. Google projected that development of new technology will generate $244 billion for the economy and create two million jobs by 2030. [14] Environment California recently concluded that by 2015 we will reach grid parity, which means solar power will be equal to or less in price compared to the current cost of energy from the grid. They concluded "California can become the Saudi Arabia of the sun." [15]

The point of all this is that clean energy and electric vehicles are here, they're legitimate, they're needed, they're fast becoming the more economical alternative, and government and industry need to work together to achieve the future. Whether the United States will become a leader in either of those fields is not yet clear. California said yes, but the federal government is split and, thus far, not as effective as it can and should be.

6 EV Policies and Programs

There are a variety of policies and programs in place or being developed to encourage electric vehicles. There have been subsidies for the purchase of the vehicles. These have included tax credits, proposals to change that to a rebate at the time of purchase, and, as has been demonstrated in other countries, subsidies or favorable treatment for the manufacturers to bring down the purchase price.

Many businesses and public facilities provide charging stations. Washington, Oregon, and California have launched a program to install fast charging stations along Interstate 5, at forty to sixty mile intervals, to charge electric vehicles in less than 30 minutes. [16] There are tax credits for installing charging stations at home. Europe, and most recently Israel, are developing battery switching stations which are more expensive but can put an electric vehicle back on the road much faster than conventional charging stations. [17] If the batteries are, in effect, rented, this can substantially reduce the purchase price of the vehicle to begin with.

Wireless charging of electric vehicles is a technique developed at MIT and is being tested in London. [18] The concept uses coils and magnetic fields to charge a parked vehicle without wires. Once the technology is refined, the next step could be to install chargers along the road to charge batteries in moving vehicles.

In some localities, electric vehicles are given preferential treatment for carpool lanes, toll roads or bridges, or downtown parking.

Government at every level from local to federal can play a significant role in encouraging the purchase and use of electric vehicles, if the decision makers are convinced that that is the wave of the future.

7 Highway Funding

A major issue which has only recently been addressed and discussed is whether and how electric vehicle operators should pay for the roads and bridges they drive on. The typical funding for transportation at the federal and state levels has been the gas tax augmented at irregular intervals with other funds. However, the federal gas tax has not been increased since the previous millennium. It is not tied to inflation or any other yard stick, and it has eroded in amount of revenue, as well as purchasing power, as requirements to increase miles per gallon on vehicles have been implemented. A proliferation of electric cars would further reduce revenue.

On the one hand, encouraging development of electric vehicles would be hindered by imposing a new tax or fee on them. On the other hand, the cost of maintaining and building roads is the same whether you're driving a gas powered or electric vehicle. Congress is in the process of passing a new multi-year transportation funding bill without addressing this issue, but proposals for a vehicle mile tax or increased vehicle registration fees are being looked at and will probably be addressed in the not too distant future. [19]

8 The Potential Market

Finally, how big is the market for electric vehicles? 17,000 electric vehicles were sold in the United States last year. 100,000 is a frequently mentioned target for 2012. [20] However, there are currently 250 million cars and light trucks on the roads in the United States. [21] By 2050, the number of cars worldwide will increase to 2 billion. [22] The success of electric vehicles doesn't just depend on technology and policies. Its economic viability and success also depend on mass production and distribution. Two billion vehicles would qualify as mass production.

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