What Will Drive the Automotive Industry of the Future?

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Abstract

Compared to the traditional gasoline and diesel propelled vehicles, hybrid and all-electric vehicles are both better for the environment and the economy. Currently, the target audience for electric cars only makes up less than 5% of the population, but as time progresses, in turn so will the electric vehicles. As electricity becomes easier to produce the efficiency and price will go up and down respectively. Even at their current state, electric cars produce significantly fewer air pollutants than their traditional competitor. Because of the billions of metric tons of tailpipe emissions pumped into the atmosphere, electric cars are the future to a healthy planet.

What Will Drive the Automotive Industry of the Future?

Electric Vehicles, are they the answer to an endangered planet? Since the 1960s Green movement, the general public has pushed for a healthier planet. The environmental impact of traditional vehicles is far more harmful to our home than the alternative electric or hybrid cars. Currently, many reject electric vehicles because they are unconventional in nature; however, as they advance in the near future, they will be widely accepted amongst all. As the general public demands to put a halt on vehicle carbon emissions, High MPG cars (Electric or Hybrid) logically should be the future for the United States. Both the need for more fuel-efficient vehicles, and as the race for a better planet proceeds, open a new road for the electric car. The environmental and economic benefit of electric and hybrid vehicles drives the future of their industry.

An electric car otherwise known as an Electric Vehicle (EV), Battery Electric Vehicle (BEV), or Electric Vehiclego (EVgo) is a motor vehicle that uses an entirely electric motor and battery rather than the typical gasoline engine. They are typically plugin vehicles that require charging regularly because they do not use a form of ethanol propellant (energy.gov, Electric Vehicle Basics, 2016). These vehicles are known for their extraordinarily high MPGe and their environmental benefits. There are other forms of electric vehicles as well, these are commonly referred to as Hybrids, but are also known as HEVs, or BHEVS, use both a battery and an engine to power the vehicle (energy.gov, 2016). Between the two, all-electric vehicles are far more fuel efficient; however, hybrids are quite fuel efficient too.

ECONOMICS:

There are many reasons to switch to an electric or hybrid form of transportation, but the economic benefit of switching is one of the most significant. The need for a more efficient

vehicle is imminent. (See reference 1) According to a MarketLine case study on Electric and Hybrid vehicles, for nearly twenty-five years the average customer requirement for a vehicle was thirty miles per gallon (MPG); however, since 2011 the need for a higher mile per gallon vehicle has skyrocketed (MarketLine Case Study, 2014). This same case study predicts that by the year 2025 the customer need for a high MPG will be tremendously high; they estimate that the average MPG will be between fifty-five and sixty miles per gallon. They rose in efficiency because they are required to do so. They are required by the CAFE regulations of 2011-2012 finalized under the Obama administration in August of 2012 (MarketLine Case Study, 2014). Clearly, the legislation signed under the Obama administration must be effective because according to fueleconomy.gov, the top 25 2018 plugin hybrid vehicles have a Mile Per Gallon-Equivalent (MPGe) higher than eighty miles to a gallon (fueleconomy.gov, 2019). The top 25 2018 plugin hybrid vehicles also have a yearly fuel cost below $1,000; compared to the average yearly fuel cost of a nonhybrid being nearly $1,500. The fuel cost of owning an electric vehicle is even less (fueleconomy.gov, 2019). Another way to reduce fuel cost for plugin vehicles is to use alternative forms of energy to charge them such as wind and solar energy. Use of alternative charging energy reduces the environmental damage that owning a vehicle causes.

ECO-FRIENDLY:

Compared to traditional gasoline and diesel-powered vehicles, electric vehicles are tremendously better for the environment. In 2017 the United States pumped roughly 6.5 billion metric tons of CO_2 Green House Gas (GHG) into our atmosphere (See reference 2). That isn't even the highest yearly GHG emissions; in 2007 the U.S. GHG was nearly 7.5 billion metric tons of carbon emissions. Nearly 1/3 of those emissions came from transportation alone (See figure 3). In 2017 28.9% of all U.S. carbon emissions came from burning fossil fuels for transportation

purposes (epa.gov, 2018). This poses a problem because carbon emissions trapped in our atmosphere cause heat which raises the global temperature causing many negative effects (epa.gov, 2018). To lower those insanely high numbers, drive electric. According to afdc.energy.gov website, in California the all-electric vehicle CO_2 emissions is 1,922lbs; while the average Californian gasoline powered vehicle produces 11,435. A gasoline powered car produces nearly 600% of the carbon emissions that an all-electric vehicle would (afdc.energy.gov, https://afdc.energy.gov/vehicles/electric_emissions.html). This fact alone demonstrates the astronomical environmental benefit provided by electric vehicles. Additionally, these statistics will become more jarring, the dramatic difference between the carbon emissions of both vehicles will increase soon.

As alternative renewable electricity producers such as wind, solar, biomass, and hydrogen fuels become both cleaner and more efficient the environmental cost of electricity will go down significantly. Because electric cars increase the demand for electricity and lower the need for fossil fuels, the electric car movement causes coal plants to shut down. According to fresh-energy.org, “Since 2010, nearly half of the nation’s coal plants have either been retired or have announced a retirement date.” This shows that the coal industries are suffering from the need for renewable energies (Twite, 2017). Not all coal plants are closed because of electric cars; however, the increase in electric vehicles on the road coincide with the downfall of the coal industry (See Reference 4). This can not be a mere coincidence.

There are many health benefits to using alternative transportation and reducing carbon emissions; a 2013 Massachusetts Institute of Technology (MIT) study found that 53,000 American premature deaths come from road transportation emissions. Note: Those deaths are not traffic related, they are purely from Greenhouse gas emissions. This MIT study even claims that

someone who dies prematurely from an air-pollution related death usually dies a decade earlier than they typically would have (Chu, 2013). It is for this reason, this loss of life and time, that we the people need to take action and stop these climate related deaths by buying electric. This shocking news does lead to the question, "Who can afford to buy electric?"

MARKET VALUE:

Electric cars in the past have been denounced as inefficient and unconventional; however, as battery life, cost, and overall quality improves, the market share of electric vehicles will coincide as well. A German case study to determine what percentage of people would be likely to purchase an electric vehicle was conducted in 2011. This study was conducted on a sample size of 922; they used this figure to determine which participants would be likely to purchase an electric vehicle (See Reference 5). They plotted many variables on a spectrum to determine this outcome such as individual preference, ideal vehicle style, size, ranked individual priorities, and even price barriers. Out of the 922 people surveyed, only 14 outright refused to be open to buying an electric vehicle, while many others were open to electric vehicles. 922 people were involved in the case study, but only 4.2% of the participants are classified as ideal customers for electric cars. Even though this study is nearly a decade old, we can see the results of the study approaching the U.S. at a rapid rate; in California, electric vehicle sales (BEV and PHEV) make up 4.74% of all care sales (See Reference 6). The study also notes that if price barriers were not an issue for the 922 participants then an additional 6% of subjects would be the ideal electric car customer (Lieven, Mulhmier, & Walker, 2011). As time progresses and the electric cars are either more economically efficient to drive or manufacturers find a stronger and more efficient way to produce the vehicles the market share for electric vehicles will strategically seize the auto industry.

COUNTER ARGUMENT:

The main counterarguments to electric vehicles are as follows; insufficient battery life, charging cost, and electric cars produce the same amount of Greenhouse gasses. Some of these claims may have been relevant in the past, but since it is no longer the early 2010s, these claims are both blatantly outdated and propaganda. When individuals bring up battery life, they usually bring up the average range in 2011. However, there was a huge average increase in electric vehicle range since then. In 2011 the average range on an EV was 73, but in 2018 the average range increased to 125, which is roughly half the average tank of gasoline. Tesla's Model 3 long range even offers 322 miles to a charge which is higher than the range of most petrol powered cars (energy.gov, FOTW #1064, January 14, 2019: Median All-Electric Vehicle Range Grew from 73 Miles in Model Year 2011 to 125 Miles in Model Year 2018, 2019). Often people complain about the price of a charge, but according to pluginamerica.org, in the U.S. it costs 12 cents per kWh which equates to $540 per year to charge an electric vehicle (Moloughney, 2016). In addition to the low annual cost for charging, for Tesla drivers, according to telsa.com, Tesla Motors has over 15,000 superchargers across the U.S. free to Tesla drivers. Tesla drivers are offered 1,000 free miles of charging and then afterward are charged a low premium (Tesla.com, 2020). Lastly, when people claim that electric cars produce an equitable amount of CO_2 emissions to traditional petrol gasses, they are blatantly wrong. According to the government website, energy.gov, hybrid vehicles produce less than 1/7 of the gas that a fully petrol vehicle would produce, and all-electric vehicles produce next to no carbon emissions (energy.gov, Electric Vehicle Basics, 2016). Plenty of people denounce the need for electric vehicles, but as both the environment and the economy call for more fuel-efficient vehicles, electric cars, both hybrid and all-electric are the answer to the problem.

CONCLUSION:

Electric vehicles are the solution to the problem. The environment is crippled due to the United States pumping billions of metric tons of Greenhouse gasses into our atmosphere. Electric vehicles have the fuel efficiency requirements that both the general public and the environment are begging for. They produce significantly less GHG emissions than their gasoline fueled competitors. Time will only tell as to who will buy electric vehicles. As both the need for higher MPG cars and the need for a healthier environment increases, only one form of transportation can take us there. Electric cars will drive the automotive industry to the future.

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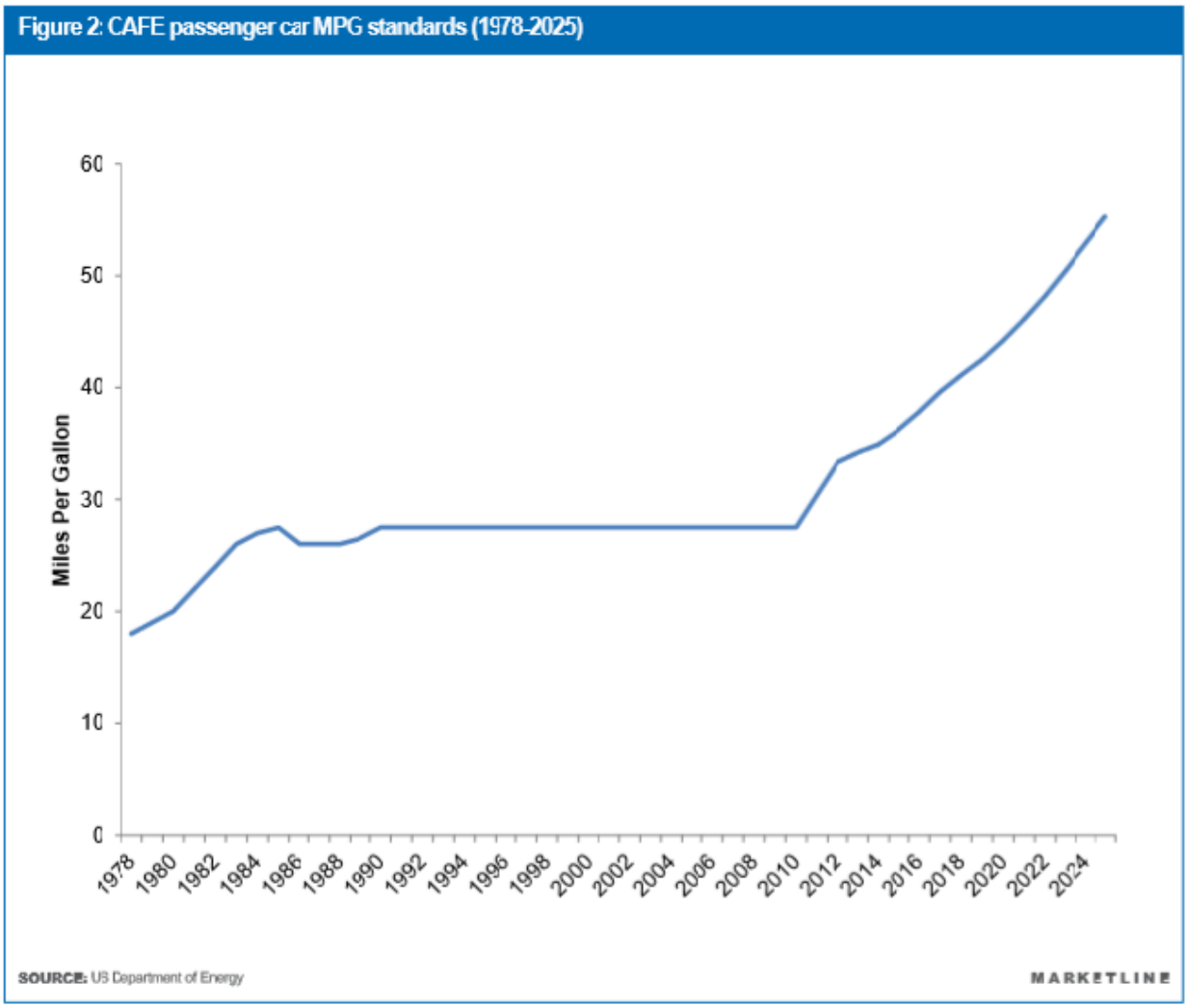
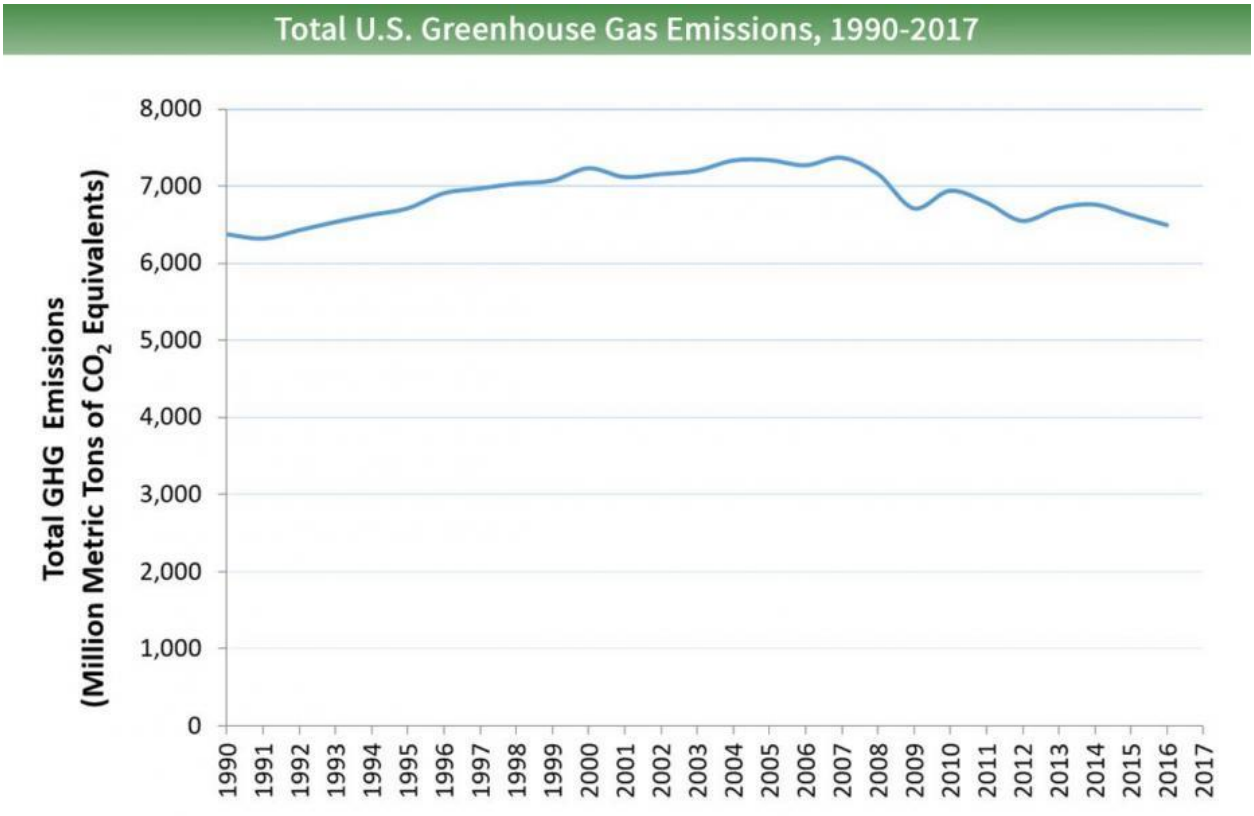


Reference 2: Epa.gov, Source of Greenhouse Gas Emissions, Total U.S. Greenhouse Gas Emissions, 1990-2017, 2017



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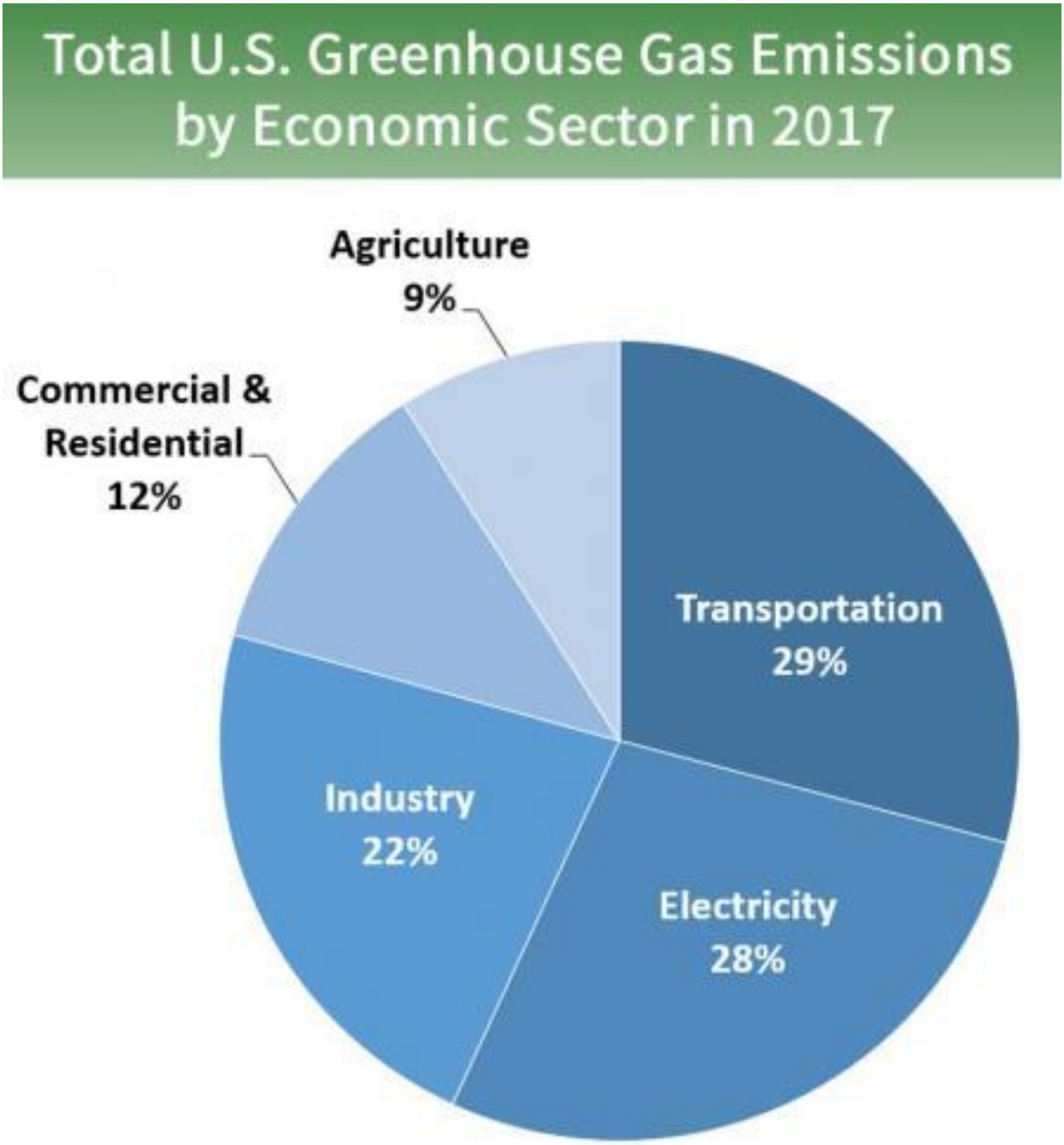

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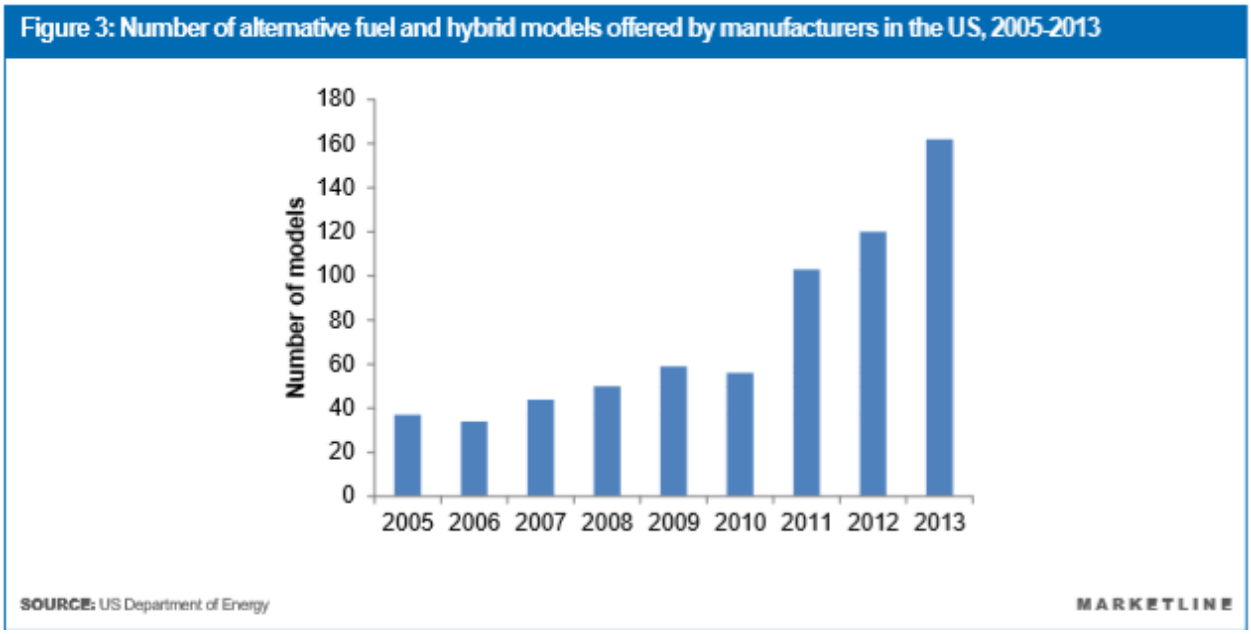

Reference 5: Who will buy Electric Cars? Theo Lieven; Silke Mühlmeier; Sven Henkel; Johann F. Waller, May 2011

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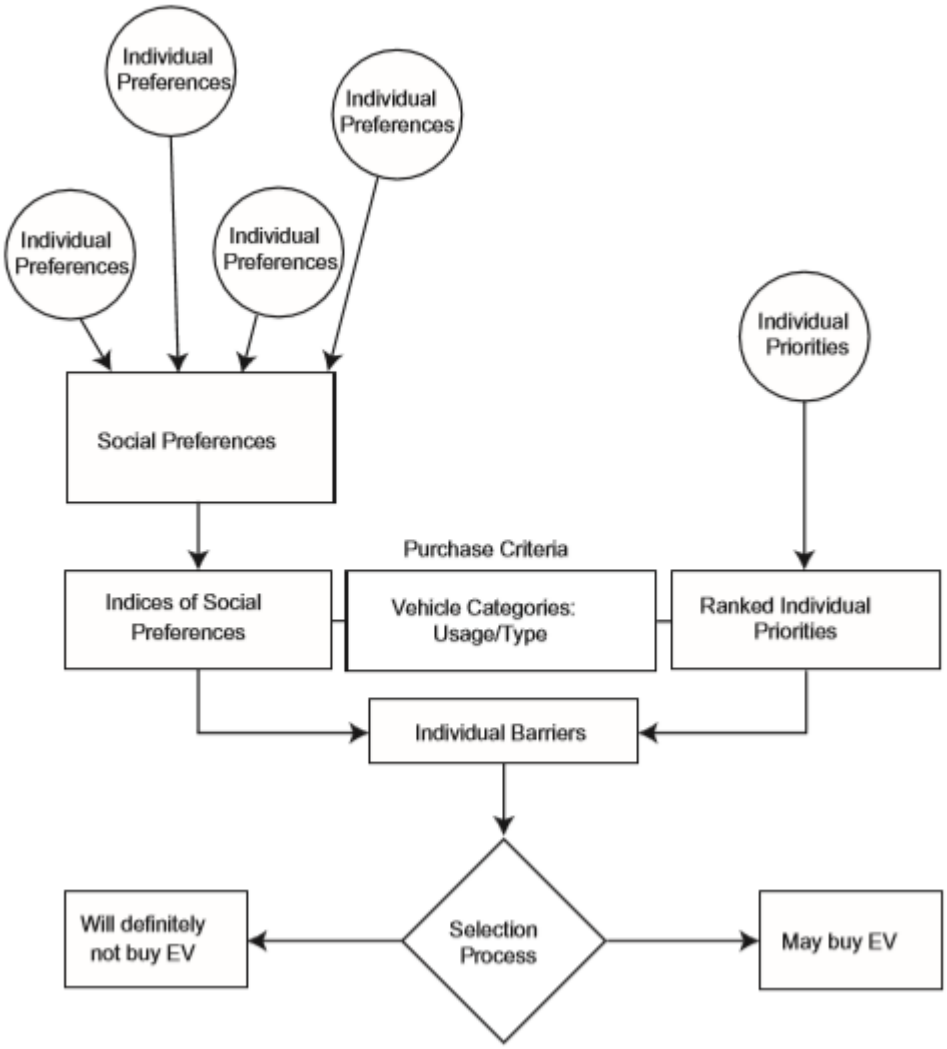

Reference 6: AutoAlliance.org, Electric Vehicle Sales Ranked by State, December 31, 2018

Position	State	EV Sales 2017	EV Sales 2018	2018-2017 YOY Sales Increase	2017 EV Market Share W/in State	2018 EV Market Share W/in State	2018 vs 2017 YOY Share % Increase
2	New York	10,090	15,752	56.11%	1.03%	1.56%	51.46%
3	Washington	7,068	12,650	78.98%	2.51%	4.28%	70.52%
4	Florida	6,573	13,705	108.50%	0.52%	1.03%	98.08%
5	Texas	5,419	11,764	117.09%	0.39%	0.78%	100.00%
6	New Jersey	5,033	9,230	83.39%	0.91%	1.59%	74.73%
7	Massachusetts	4,632	8,990	94.08%	1.35%	2.53%	87.41%
8	Colorado	4,156	7,051	69.66%	1.57%	2.61%	66.24%
9	Oregon	3,988	5,976	49.85%	2.36%	3.41%	44.49%
10	Illinois	3,812	7,357	93.00%	0.62%	1.20%	93.55%
11	Pennsylvania	3,346	6,063	81.20%	0.55%	0.92%	67.27%

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