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Question to audience: How many of you saw an *all*-electric car on the road today? Keep enlarging the time window, back to a week, a month, and then a year. This series of questions shows just how rare an all electric car currently is in today's market.

Often Cited References

"Infographic: Millions of Americans Could Use an Electric Vehicle." *Union of Concerned Scientists*. Union of Concerned Scientists, 2013. Web. 10 Nov. 2015.
"Model S." *Tesla Motors*. Tesla Motors, n.d. Web. 10 Nov. 2015.

References for Images

Image on slide 1: <http://www.autoblog.com/2015/09/03/oprah-loves-tesla/>
Image on slide 4: <http://hybrid-car-resource.blogspot.com/2011/12/considering-buying-hybrid-car.html>
Image on slide 5: <http://www.teslamotors.com/models>
Image on slide 6: <http://www.teslamotors.com/findus#/bounds/49.38,-66.94,25.82,-124.39?search=supercharger&name=us>

Research has clearly shown the positive effects of using electric vehicles

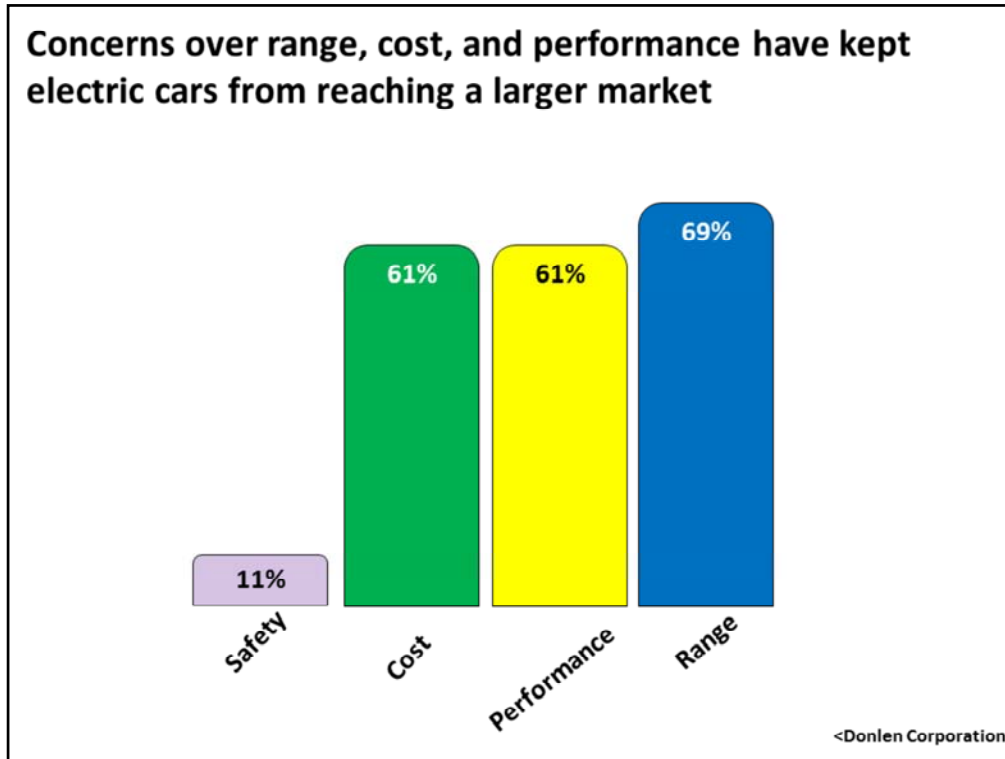


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All-electric vehicles are seldom seen, despite evidence from extremely reputable sources such as the Royal Academy of Engineering and the U.S. Department of Energy that the use of electric vehicles has a positive effect in terms of the environment as well as in energy efficiency.

References

- Elgowainy, A., A. Burnham, A. Rousseau, M. Wang, and J. Molburg. "Well-to-Wheels Energy Use and Greenhouse Gas Emissions Analysis of Plug-in Hybrid Electric Vehicles." *Energy Systems Division* (2009): n. pag. *Argonne National Laboratory*. U.S. Department of Energy, May 2009. Web. 1 Oct. 2015.
- Kemp, Roger, Phil Blyth, and Chris Brace, Dr. "Electric Vehicles: Charged with Potential." *Royal Academy of Engineering* (2010): n. pag. *Raeng.org*. Royal Academy of Engineering, May 2010. Web. 1 Oct. 2015.



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Despite the positive effects that electric cars have, they do not currently have a large enough market share to make an impact due to consumer concerns over range, cost, and vehicle performance. If these positive effects have all been found, why have so few of the audience seen an all electric car recently? Shouldn't almost everyone's hand be up if these cars are so beneficial?

In this talk, I will discuss the three main concerns that consumers currently have which is hindering these vehicles from gaining a larger market share. In a study done by the Donlen Corporation, who manages a large fleet of commercial vehicles, consumers were asked what concerns they would have when it came to purchasing an all electric vehicle. For this talk, I will only talk about the 3 largest responses, which are limited driving range, vehicle performance in comparison to a traditional internal combustion engine, and the cost.

Mapping

First, I will speak about the limited driving range of these vehicles. Next, I will discuss how many are worried about the performance of electric vehicles when put up against traditional cars. Lastly, I will be talking about the overall cost of these cars.

Reference

"Donlen Announces Plug-in Electric Vehicle Survey Results." *Automotive Fleet*. Automotive Fleet, 9 July 2010. Web. 1 Oct. 2015.

Government incentives and lack of fuel costs both lower the overall cost of a Tesla



\$70,000
- \$7,500
- \$2,000
- \$10,000
= \$50,500

<Tesla Motors>

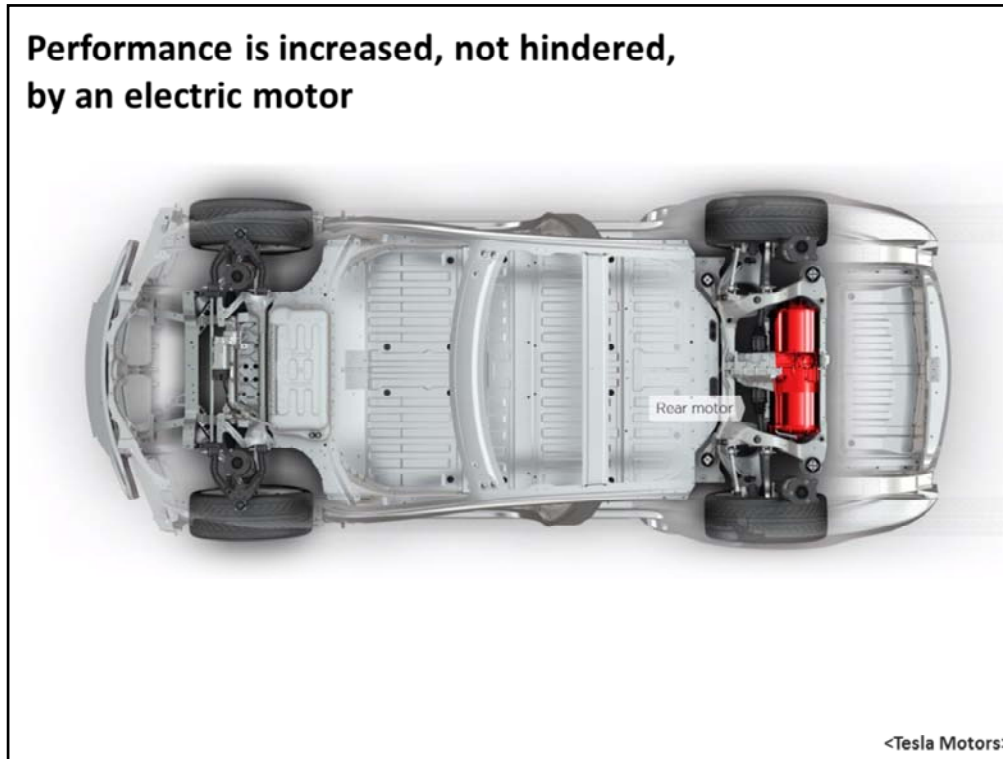
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Through government incentives and lack of paying for gasoline, the cost for a Tesla is reduced nearly 30% from its initial base cost. Because this vehicle is still classified as a “luxury” vehicle, the cost may still seem a bit high to you.

The base cost for the cheapest version of the Model S is \$70,000, which even for a luxury car may seem a bit high. However, the US Federal Government offers a \$7,500 tax credit incentive for purchasing an electric car. Additionally, 15 states currently offer an additional rebate, which in Pennsylvania is \$2,000. The largest reduction however, comes in terms of not paying for gasoline. Tesla Motors has found in their research that over the course of 5 years, a customer will save approximately \$10,000 by not having to pay for gasoline [“Model S”]. Still need to pay for electricity, but cost of driving electric vehicle is only \$0.02 per mile, whereas a gas powered car is \$0.12 per mile [Lee and Lovellette].

References

Lee, Henry, and Grant Lovellette. "Will Electric Cars Transform the U.S. Vehicle Market?" *Energy Technology Innovation Policy* (2011): n. pag. *Belfer Center for Science and International Affairs*. Harvard University, July 2011. Web. 1 Oct. 2015.



Transition

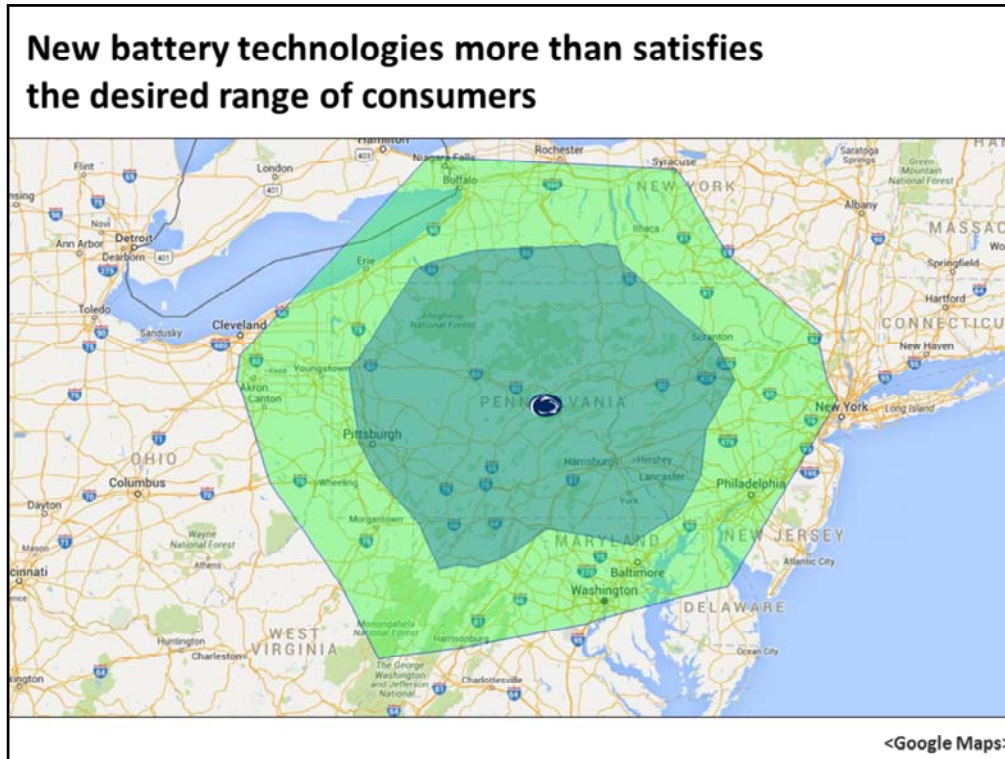
Now, we are going to address the performance of these vehicles. Everyone in the room picture the fastest car you can think of. Now picture opening up the hood of that car and looking at the engine. You're probably imagining some massive engine block, roaring loudly and throwing heat and exhaust everywhere. Okay, now keep that image in the back of your mind. Because this little red motor in the back is what powers this entire car, some of you might think that this car could never compete.

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However, this truth is actually the exact opposite, because performance is in many ways enhanced by an electric motor, not hindered. The Model S scored a 99 out of 100 on consumer reports. In the acceleration test, the lowest model of the Model S recorded a 5.5 0-60 mph time, and the highest model recorded a time of only 2.8 seconds [Weisenthal]. The Model S was named 2013 Motor Trend's Car of the Year, and given a 5 Star Safety rating which is awarded to only 1% of vehicles. Moreover, 97% of Tesla owners said they would purchase another [Lee and Lovellette].

References

- Lee, Henry, and Grant Lovellette. "Will Electric Cars Transform the U.S. Vehicle Market?" *Energy Technology Innovation Policy* (2011): n. pag. *Belfer Center for Science and International Affairs*. Harvard University, July 2011. Web. 1 Oct. 2015.
- Weisenthal, Joe. "The Tesla Model S Just Got The Best Safety Rating Of Any Car In History." *Business Insider*. Business Insider, Inc, 20 Aug. 2013. Web. 10 Nov. 2015.



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Through new battery technologies as well as placing charging stations across the country, the range of the Model S more than satisfies the desired range of consumers. In a survey done by Cnet where consumers were asked what their desired range for an electric car would be on a single charge, the average was anywhere between 100-200 miles [Berman]. Currently, the lowest version of the Model S can do 230 miles on a single charge, well exceeding what the average consumer desires.

Charging takes about 1 hour per every 5 miles of driving range if you are using a standard house ["Model S"]. That translates to roughly 52 hours for a full charge on a standard outlet 110V outlet, and on a 240V outlet less than 9 hours which may seem like much, but when you break it down actually is not that bad. Also, 69% of drivers report driving less than 60 miles per day, and 54% report driving less than 40 miles ["Infographic"]. In other words, for the average consumers, when done driving for the day, if they plug in their vehicle, their car will be completely charged by the time they need it again in the morning. Tesla is implementing Supercharging Stations all across the country along major highways and travel destinations. These superchargers can charge a vehicle from completely dead to 100% in just over an hour, and can provide 170 miles of driving range after just half an hour ["Model S"].

References

Berman, Ben. "Survey: To Be Satisfied, Electric Car Drivers Want 150 Miles of Range." *PlugInCars.com*. PlugShare, 17 May 2013. Web. 13 Jan. 2016.

In conclusion, by addressing consumer concerns, Tesla is creating a larger audience for electric vehicles



Conclusion

By addressing all three of the major concerns that consumers have and implementing practical engineering solutions, Tesla Motors is creating a larger potential audience for Electric Vehicles. It is hoped that with these advancements in cost, performance, and range, you and I will be seeing a lot more electric vehicles out on the road.

References

Cunningham, Wayne. "Tesla Increases Model S Range." *CNET*. CNET, 17 July 2015. Web. 10 Nov. 2015.