

There is a new player in the race of EVs, and they are taking our lunch and running away. That new player that joined the EV market is called BYD Auto. They have been taking our market share by offering longer-range vehicles and faster charging. So why do we not have a longer-range vehicle with fast charging in the first place? Finding the right battery does take a time and resources to find the best battery as battery technology is new for the industry. Hence, I made a plan to find the best batteries and to not be out competed with BYD.

Batteries on electric vehicles have not reached their most significant potential as many people are not confident with electric cars. Still, with research funding, it would take a year and a half to build the best battery in the market with the help of the best engineers and the best students from all different colleges and universities. Not only would it increase the sales of electric vehicles, but it would also reduce CO2 emissions. While battery technology has improved so much in the past decade, it still has not yet reached its full potential. As someone who owns a Tesla, the battery is good, with over 300 miles worth of range, and that is without having a home charging but I would have to charge my Tesla every week, and when I was driving a gasoline vehicle, I only would have to fill up every other week. The easy solution would be to set up a home charger, but there is a problem: not everybody lives in a home. A lot of people live in apartments or rentals. According to the National Apartment Association, nearly 39 million people call apartments home. I would not want to fill up a car every week and I would think you also would not want to fill up a car every week. Second, charging an electric car takes around 30 minutes to an hour to charge the car depending on where you charge it and for a lot of people that is a problem and do not want to wait that long to charge. Why wait 30 minutes when you can wait 5 minutes and can drive much longer than an electric car? Speaking of range, owners that drive electric have a thing called range anxiety. Range anxiety is when the owner is

worried that they may or may not have enough battery to reach the next charging station. While in some areas it is not a thing but in others like rural areas it is a thing since there is not much charging station. Being able to have longer range and shorter charging time is possible because a Chinese company was to achieve the impossible. CATL was able to make a battery have a range of 600 miles and charge to 300 miles in 10 minutes. As well as BYD in one of their vehicles, Super e-Platform, they charge up to 5 minutes giving 249 miles and in the case of Tesla charging it would take up 30 minutes to reach the same miles. We also need to install multiple XFC charging stations, which are stations that can not only help us in decreasing demand from the energy grid but can also improve charging times.

We would want to fund a research team to find a way that would not only have a battery of 600 miles or better but also ensure that the charging speed is the same or faster. By doing the research we would test the prototypes to see what would work and what does not. During the prototypes we would try different elements that could not hold more battery but can also be much cheaper than lithium-ion. We would want the batteries to have less battery degeneration. As one study from Collin et al. (2019) said, other elements are underfunded and develop. Having the research to find a new better battery composition would leap us ahead of the competition. We would also need to keep in mind active battery cell balancing to ensure and long range for our vehicle. This method ensures that each battery cell is being used equally so it does not depelts one cell, which can lead to safety hazards. Then, once we have found a prototype that we would like to work on more we would make significant improvements to that prototype and create one that could have a battery range of 1000 miles and have a charge of 600 miles in 10 minutes. Once we can achieve this, people are going to buy electric cars with confidence.

The funding of the research is going to be expensive but it will be worth it in the end. We would split this into two parts. One part would be hiring some of the best engineers to work on researching the different elements to create the best battery composition that can create a range of over a thousand miles. First, they would work creating a small scale for each element like LFP, LMO, NMC, NCA, LOT, and one random element that the researchers would think would have the best shot. This would be completed in three months. Second, they would find an element that would create a longer-lasting battery and make large-scale replicates of our models. This would be completed in one month. The third would be test-driving the car to ensure the range is at our goal. This would be completed in five months. The second part would be sent out to colleges and universities that would like to give their students a chance to work and get experience on the research, and they would be working on the charging speeds. If colleges and universities can make significant progress on the research they would be rewarded both the student or students and the colleges or universities giving them an incentive to pour their hearts and soul on the research. They would focus on the speed of charging, with the goal being less than 10 minutes. We would create a club for the universities who would want to participate and let the engineering students know that there is an opportunity to get some experience. Each university would have a different method to create a fast charging. The student would get to choose their method and their schedule on the project, but we would let them know that they would have to finish in nine months. Once both of the researchers are finished, we would then combine them to test out new produce to ensure that the range is the expected goal and the time for charging. We would finish the research within a year or a year and a half. That would be the goal. The research would cost 100 million dollars. Finding the potential element that would create a longer range for our vehicles as well as creating an XFC station that can withstand the

energy to charge our vehicle to 10 minutes would make us stand out ahead of the competition as well as turn people's heads by giving them no choice but to buy a Tesla vehicle. Even though Elon Musk said that 300 miles is enough for people, the unfortunate part is that for rural communities, that is not enough and for the competition they are beating up in the range and charging speed, which is hurting our market share and will eventually hurt our investors.

Batteries would make or break the electric car industry as many people do not feel confident with them yet because of range anxiety, charging time, and the location of where people live. It is possible as CALT was able to show a 600-mile battery range with a charge of 300 miles in ten minutes and BYD to charge their vehicle 249 miles in five minutes. With the research being funded, we would be able to increase the battery range to 1000 miles with a charge of 600 miles in ten minutes. This plan will ensure that we do not fall behind the competition and keep our market share the same, if not grow even more because that is who we are; we innovate for the next generation. If we are going to want people to make the switch to electric cars to stop climate change then we would have to give the consumer no choice but to choose electric cars.

## Reference

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