CASE 10

Tesla Motors

Disrupting the Auto Industry?

Introduction

Driving down the Silicon Valley corridor from San Francisco to the brown hills of Palo Alto near Stanford University, a casual observer might catch multiple sightings of the Model S, an all-electric vehicle made by Tesla Motors with a range of almost 300 miles. Although the company has many fans in the tech-friendly Valley, it also has its critics, who argue that Tesla loses money on each car sold. Indeed, with losses of $290 million in 2014 and $888 million in 2015, it's unclear if, or when, the company will eventually hit profitability. On the positive side, Tesla was ranked by Forbes as the World's Most Innovative Company in 2015, with a flashy feature on the front cover.[1] This was largely because of the success of its second model, the Model S, named Car of the Year by the magazine Motor Trend in 2013, the only unanimous choice anyone could remember.

Consumer Reports had given it the highest rating ever (99 out of 100) for overall performance. The car could do 0 to 60 miles per hour in just over three seconds (shaved to 2.7 seconds in “ludicrous mode,” a feature launched that summer), was possibly the safest sedan ever built (protected in part by the battery packs that lined the chassis), required less maintenance than a combustion engine (no oil changes, spark plugs, filters, or hoses), and was beautifully designed with curved lines reminiscent of a Maserati or Jaguar. These characteristics combined to garner rave reviews from the media and owners alike.

However, for the car company trying to change the automotive industry, many roadblocks remained. For one, with a price tag of at least $67,500, topping out at $135,000 fully loaded, the Model S was affordable to only a small niche of wealthy owners. Although Tesla executives were pleased with the sales of the Model S, the roughly 20,000 units sold in 2014 represented less than 0.06 percent of the 16.5 million cars sold in the United States that year. Moreover, sales had been boosted by a government subsidy of at least $7,500 per vehicle that could be taken away at any moment and was already scheduled to go away after the company sold 200,000 units.

Furthermore, Tesla was trying to succeed in one of the world's most difficult-to-enter industries, controlled by a

few global players who struggled to squeeze out profitability. Perhaps most telling, the majority of drivers were skeptical about electric vehicles, afraid of getting stranded by a lack of recharging or repair stations. Just a few years earlier, Better Place, a start-up with almost $1 billion in funding, had attempted to introduce electric vehicles in Israel, a smaller and well-defined market, with the backing of Renault and the Israeli government, but had been defeated by the immense costs of building an electric vehicle and the infrastructure to support it. Tesla seemed to be heading down the same path of trying to do it all: creating its own vehicles, charging stations, and a network of company-owned dealerships.

Experienced executives who had toured the Tesla factory whispered behind closed doors that the manufacturing line had major inefficiencies that signaled deeper problems in the production process. Could Tesla really manufacture high volumes efficiently enough to make the company profitable? *New York Times* columnist Joe Nocera voiced concerns about Tesla's profitability, stating that the company "eats through cash, loses money on every sedan it sells, routinely overpromises what it will deliver to Wall Street and is regularly in need of new funding."[2] Indeed, according to analysis by *The Wall Street Journal*, in the past five years, Tesla had fallen short on more than 20 projections made by company CEO Elon Musk, ranging from car-production output to financial targets.[3]

Against this backdrop of enthusiasm and skepticism, the company launched the Model X in fall 2015 with mixed results. The Model X was a $100,000-plus SUV that could take seven passengers, with falcon-winged doors that opened vertically above the top (like the gull-wing doors of the iconic DeLorean sports car), designed to appeal to the same high-end niche of wealthy customers as the Model S. While the car itself received great reviews, Musk admitted that the Model X's advanced technology (notably the falcon-winged doors) caused major delays and was "the most difficult car in the world to build." On a grander scale, it planned to launch Model 3 in 2017, a four-door sedan with a starting price of $35,000. The goal was to build an electric vehicle for the masses and to sell significant volumes—upwards of 500,000 per year—launching electric vehicles into the mainstream of cars in the United States. When Tesla unveiled the Model 3 in March 2016, the company had more than 300,000 customers plop down $1,000 to "reserve" their Model 3 in the first week. The enthusiasm over the Model 3 suggested that that selling upwards of 500,000 per year was not just a pipe dream. But as of 2015 Tesla had not been able to produce more than 50,000 cars per year; so building 500,000 was far more than a "stretch" goal.

Tesla executives like to say they are on a mission to transform the automotive industry from one dominated by combustion engines that pollute the air with carbon emissions to one driven by electric vehicles using battery technology charged at Tesla's solar-powered super charging stations. In short, they are out to disrupt and make combustion engine vehicles obsolete. The question is can they do it?

History of Tesla

In 2003, Martin Eberhard, a serial entrepreneur with concerns about global warming and US dependence on the Middle East for oil, decided to build a sports car that was environmentally friendly. He had noticed that many of the driveways of northern California had two cars that didn't seem to go together—a Toyota Prius (which he called a "dork mobile") and an expensive sports car. As he later explained, "It was clear that people weren't

buying a Prius to save money on gas—gas was selling close to inflation-adjusted all-time lows. They were buying them to make a statement about the environment."[4]

After investigating a variety of alternative fuel options, Eberhard concluded that an electric-powered vehicle was the answer to provide the greatest efficiency and performance. During his investigation, he came into contact with Al Cocconi, founder of AC Propulsion (an electric vehicle firm) and one of the original engineers of GM's ill-fated electric vehicle, the EV-1. AC Propulsion had produced an electric car called the tzero, that could go from 0-60 miles per hour in 4.1 seconds. Eberhard was impressed, but because the tzero used heavy lead-acid batteries, he felt that he could improve performance using lighter lithium-ion batteries, which were mass produced for electronics such as laptops. Said Marc Tarpenning, a Tesla co-founder and co-founder of an earlier venture with Eberhard:

"One of the things we kept running across was these articles that would say the reason why electric cars will never succeed is that battery technology has not improved in a hundred years. Literally, articles would say that, and it's true of lead acid batteries. Yet it is not true of lithium-ion batteries… They get better, on average, at around 7% a year…It goes in fits and starts as they roll out new chemistries … They get cheaper and better."[5]

After several failed attempts to talk AC Propulsion into producing the vehicles, Eberhard licensed the electric drive train technology from the company and teamed up with Tarpenning to found Tesla Motors. The company was named after Nicolai Tesla, the inventor who developed the key ideas behind AC electrical systems used in the US today.

About this time, Elon Musk, a co-founder of X.com (the online banking company that later became PayPal) and the space exploration company SpaceX, also became interested in developing electric vehicles based on the tzero. Like Eberhard, Musk had concerns about fossil fuels. He also recognized the speed and performance that was possible with electric vehicles, particularly if technologies such as ultracapacitors (energy storage devices that can store 10-100 times more energy per unit of volume and recharge more quickly and for more cycles than standard batteries) were able to compete commercially against traditional battery technologies. When Musk approached Cocconi to discuss the possibility of buying the tzero and the embedded technology, Tom Gage, then CEO of AC Propulsion, suggested he collaborate with Eberhard because they were trying to achieve the same objective.

Musk was impressed with Eberhard's plan and agreed to put in $6.3 million to fund Tesla's development of a long-range electric vehicle. Musk would become the chairman of the company, while Eberhard would serve as CEO. J.B. Straubel, a young engineer who was fascinated with the idea of building electric-powered vehicles, joined the Tesla team as another co-founder. According to technology writer Ashlee Vance, "Had anyone from Detroit stopped by Tesla Motors at this point, they would have ended up in hysterics. The sum total of the company's automotive expertise was that a couple of the guys at Tesla really liked cars… What's more, the founding team had no intention of turning to Detroit for advice on how to build a car company."[6]

The Tesla Roadster

The first Tesla model, the Roadster, was based on the Lotus Elise, a fast and light sports car that seemed to fit perfectly with the all-electric car vision of Eberhard and Musk. However, the Roadster suffered numerous production delays during development. Its early transmissions could not handle the high-torque gear changes

from the electric motor, resulting in transmission failure within a few thousand miles.[I] Although Tesla worked with multiple suppliers, none were able to resolve the issue. Other delays came from small details such as installing electronic rather than conventional latches on the door. The delays became so long that Musk allegedly forced Eberhard out of the company, a move that prompted legal retaliation from Eberhard, who claimed Musk was at fault.

Soon after the first vehicles were produced, they had to be recalled for loose hub flange bolts that could cause the car to crash. There were scary stories that if a Roadster was allowed to run its battery to empty, it would become an unusable "brick," requiring a $40,000 replacement of the battery pack at the owner's expense to become operational again. But despite these rumors, as Tesla started to mass produce the first Roadsters in March 2008 (dubbed the "Founder's Series"), enthusiasm was high among celebrities and wealthy individuals for the new car. It was fast, "green," and well designed.

The Model S

Just as the first Roadsters were seen on the highways around California, Tesla announced the Model S—a high-performance sedan, priced at $65,000 to $85,000 to compete with the BMW 5 Series and similar cars. The Model S would have an all-aluminum lightweight body and could run for up to 300 miles on a charge. The cost to develop the Model S was expected to reach $500 million, but Tesla was fortunate to receive a $465 million loan from the US government to build the car as part of an initiative to promote technologies that would help the country achieve energy independence.

To build the Model S, Tesla purchased a recently shut-down automobile plant in Fremont, California. Before it closed, the plant and land had reportedly been appraised at $1 billion, but its fate had compromised future operation (it was labeled by the United Auto Workers Union as the "worst workforce in the automobile industry"). In a bold move, Tesla purchased the factory (which had far more space than needed to manufacture the Model S), at the bargain price of $42 million, and rehired the former workforce.

By May 2012, Tesla was said to have 10,000 reservations from customers hoping to buy the Model S. Although it encountered several challenges in designing the Model S, production went more smoothly than the Roadster, and by June 2012 the first cars were rolling off the factory floor. Critical reception of the Model S exceeded all expectations: The car won virtually every major automobile award in the book. Critics, however, cited reliability issues in the car's electric components (failure of the 17-inch touchscreen, stalling) and design flaws in its uncomfortable rear seats.

The Model X

As the Model S gained prominence, Tesla unveiled the Model X, a full-size crossover utility vehicle that went into production in fall of 2015. The Model X would seat seven and sport falcon-wing doors, making it easy to enter and exit. The initial cost of a Signature Series model was a pricey $130,000.

Like the Model S, the Model X would go from 0-60 in less than three seconds in "ludicrous mode" and would travel roughly 250 miles on a charge. The production date for the Model X had been pushed back numerous times to accommodate increased production of the Model S. As Musk conceded, "The Model X is a particularly

challenging car to build. Maybe the hardest car to build in the world."
With the announcement that the first Model X vehicles would come off the production line in September 2015, Tesla also revealed pre-orders of roughly 23,000 vehicles. Since its 2015 production had already sold out, anyone ordering a Model X would have to wait six months for delivery. At the same time, Tesla also announced that production of the Model 3, its more modestly priced four-door sedan for the masses, would start in late 2017.

The Electric Vehicle Market

Tesla introduced battery electric vehicles (BEVs) (sometimes called plug-in electric vehicles or PEVs) into an electric vehicle market that was virtually non-existent. Although hybrid electric vehicles (HEVs) had gained some traction, notably with the Toyota Prius, as had plug-in hybrid vehicles (PHEVs) with the Chevy Volt and the Prius, Musk claimed that they were "bad electric cars" since they carried around an additional gas engine and drive train, adding weight, cost and parts to maintain and repair. Despite his criticisms, for many customers these vehicles alleviated the concern of being stranded without a charge or service. Unit volumes grew steadily (see Figure 1) and in 2012 Toyota estimated that sales of hybrid models would top 1 million per year going forward, and that it planned to roll out 21 new or redesigned hybrid vehicles by 2015.[7] If HEVs could get fuel economy up to 75 or 100 miles per gallon, some observers thought it would prevent BEVs from gaining traction.

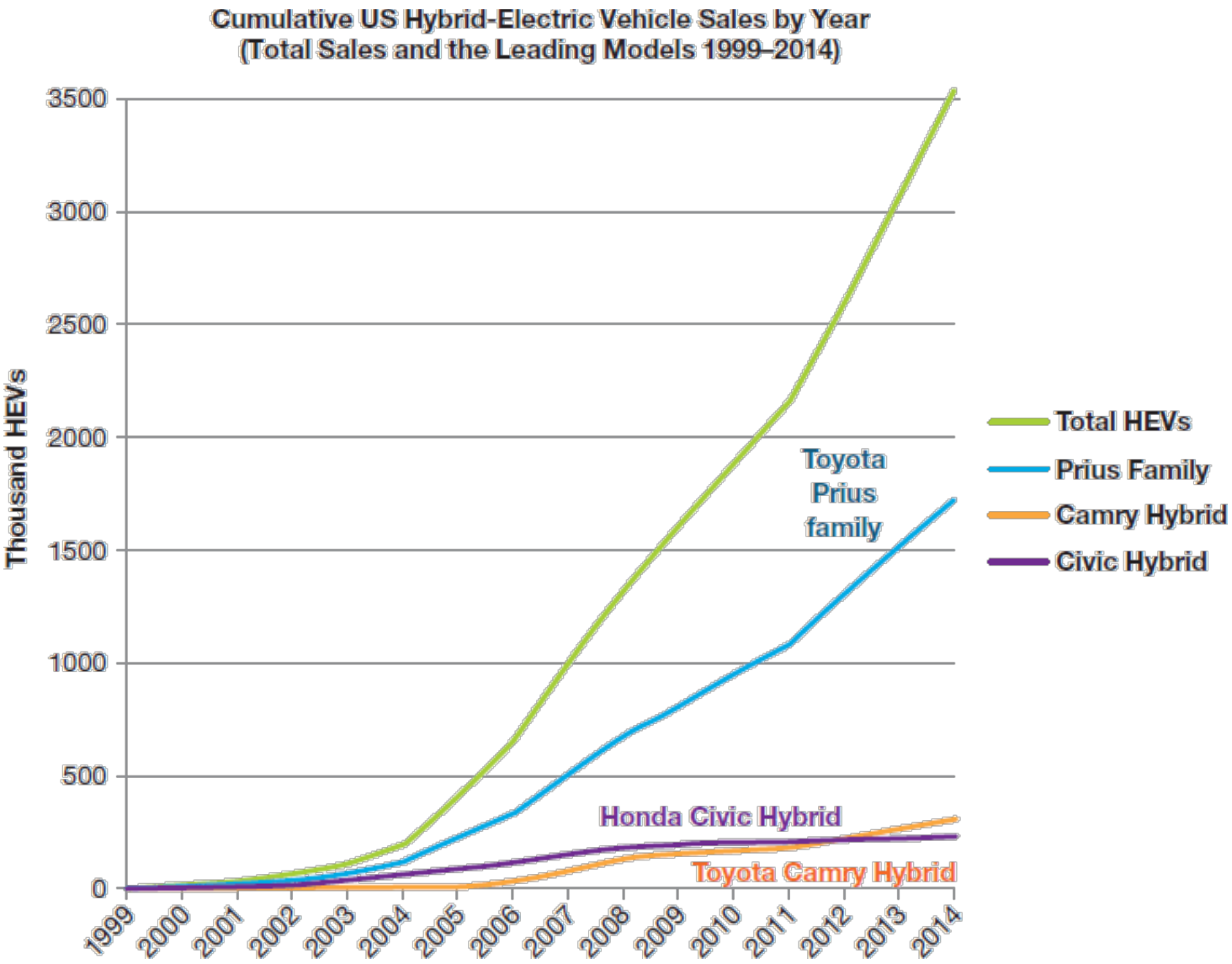

Figure 1Cumulative US Hybrid Electric Vehicles Sales by YearSource: https://en.wikipedia.org/wiki/Hybrid_electric_vehicles_in_the_United_States

Tesla faced battery electric vehicle competition from the Nissan Leaf (launched in 2010) and Ford Focus (launched in 2011) and PHEV competition from GM's Chevy Volt (launched in 2007). The Leaf was priced from $22,000 to $29,000 (not including tax credits of roughly $7,500 for which all US buyers of electric vehicles qualified), had a range of 75 miles, and was the largest seller worldwide, selling 80,000 total units in the United States (30,200 units sold in 2014). The Ford Focus, a vehicle with similar price and specifications, was launched in 2011 but had sold fewer than 5,000 units by 2015. The Chevy Volt, priced at $40,000, could do 50 miles on a charge and had a back-up gasoline engine. It sold 23,000 units in 2013 but that figure had dropped 20 percent by 2015, the year that GM launched the Cadillac ELR, another PHEV, priced at $65,000.[8]
Other car manufacturers were getting into the game. In 2014 BMW launched its all-electric i3, a small sedan priced at $43,000 with a range of 80 miles. It also launched the plug-in hybrid i8, a high-performance sports car starting at $136,000 that directly targeted Tesla. In 2015, Porsche announced the Mission E sports sedan concept car, another direct challenger to the Model S.[9] A potential threat at the low end of the electric vehicle market

was BYD, a Chinese manufacturer poised to break into western markets. BYD attracted the attention of Warren Buffett, who had invested some $230 million for a 10 percent equity stake. The price of BYD cars was anticipated to be close to $20,000 for a BEV that would go up to 250 miles on a single charge.

Despite the fanfare for BEV and PHEV vehicles, total unit sales were quite small and some players went out of business (Fisker had launched a beautifully designed high-end electric vehicle in 2011, but declared bankruptcy in 2013 having only sold 3,000). In 2014, there were 119,710 plug-in electric vehicles (BEV plus PHEV) sold in the United States, representing only 0.07 percent of the entire market of 16.5 million vehicles, up 23 percent from the 97,235 sold in 2013.[10]

Tesla's Approach and Strategies

Product Development and Design

On the surface, the Tesla looked much like other cars, but it hid a significant difference that drew praise from some and criticism from others. If you peeled the skin off a Tesla and compared it to a combustion engine vehicle or electric vehicle such as the Nissan Leaf, you would see that the car's architecture is completely different. All major auto manufacturers to date had operated off the traditional combustion engine platform, inserting the battery as a module into the standard platform, which included space in the frame for gear transmission and often for the drivetrain, which created a tunnel through the frame.

By contrast, in designing the Model S, Tesla abandoned the standard car architecture because the systems and drive train were engineered from the ground up around the battery packs. Chief Designer, Franz von Holhausen, described the design process:

"We weren't taking the recipe of what we have known as a car with a big block somewhere in the car in the front, the middle, or the rear and having to work around that. With the new architecture that we created, electric propulsion allowed us to innovate what a car experience could be beyond a normal ICE motor. I think that is something where we were able to give back space and create an experience that you just can't get in another premium sports sedan."[11]

Moreover, some of the car's subsystems, such as traction control, were based on different technologies from those of a standard car. Perhaps most shocking, the Tesla Model S eliminated the transmission. Although its designers hailed the benefits of the new architecture, critics pointed out the challenges, including the unforeseen errors that could crop up in designing a new platform and how to get repairs to an architecture that many mechanics would not understand.

Manufacturing

Tesla manufactured its cars somewhat differently from major automakers. The factory was vertically integrated and automated, with extensive use of 8 10-foot-tall red robots, reminiscent of Transformers. While typical auto factory robots performed one function, Tesla's performed up to four tasks on multiple models: welding, riveting, bonding, and installing a component. "From the manufacturing standpoint, the way we assemble this car is essentially different from any other car," said Gilbert Passin, vice president of manufacturing at Tesla and a 23-

year industry veteran.[12] Other manufacturing executives pointed out serious flaws. For example, employing only one robot per task typically resulted in more efficient manufacturing, which in the hyper cost-competitive auto industry could be a significant disadvantage.

In addition to the body, Tesla had to manufacture or purchase the battery. Batteries had been a concern for EVs for some time. In addition to being heavy, volatile, and expensive, chemical batteries had limited storage capacity, and dealers reported that their greatest challenge with customers was the fear of running out of power. Tesla invested heavily in developing the battery, starting construction of a Gigafactory, intended to produce more batteries in 2020 (when at full production) than in the entire world in 2013. Like most Tesla moves, it drew praise as well as criticism.

Hitherto, lithium-ion batteries were produced in a complex supply chain, with raw materials mined in South America, shipped to North America for processing, then shipped to Japan for further processing and back to North America. Tesla hoped to save on costs by bringing all these operations under one roof—saving an estimated 30 percent—in a net zero-energy factory. It also had plans to sell batteries for other applications, including a "Powerwall" for home use— marketed as a money-saving device because it recharged when utility rates were low.[II] To achieve its ambitious goal, Tesla committed to build a $5 billion factory, operational by 2017—a massive investment for a new company, even with Panasonic putting up 30–40 percent of the capital (see section on Tesla's Strategic Partnerships).

Overshadowing Tesla's massive investment, a Japanese company announced it would commercialize an aluminium-air battery 40 times more efficient than Tesla's within the next couple of years. If true, this could make the Gigafactory obsolete before it even started production.[13] An analysis published in Forbes magazine estimated that consumers would pay 30 cents/kWh for energy with a Powerwall, whereas grid power was often much cheaper (an average of 12.5 cents/kWh in the U.S.), arriving at the conclusion that the Powerwall was "just another toy for rich green people."[III]

Despite the challenge, Tesla invested significantly to improve the performance of lithium-ion batteries, developing its own techniques for linking the battery cells together and cooling them. The battery cells were designed to vent heat in a proprietary way and employ coolant running through the entire pack to maintain optimal temperature. It also invested heavily in protecting its innovations, refusing to let outsiders tour battery production and heavily patenting its innovations. Musk insisted that: "We felt compelled to create patents out of concern that the big car companies would copy our technology and then use their massive manufacturing, sales, and marketing power to overwhelm Tesla." However, in a surprise move in 2014, he renounced patent control in a blog post titled, "All Our Patents Belong To You," making them "open" for use.[IV] Following this invitation, Nissan and BMW reportedly contacted Tesla to potentially cooperate on charging networks. As the *Huffington Post* commented, "That pretty much validates why the Silicon Valley company freed up its patents in the first place: Tesla wants its superchargers to become the industry standard."[14]

Marketing

Tesla was unusual in that it spent no money on advertising, nor planned to use TV or print advertising in the future. As spokesperson Alexis Georgeson explained: "Right now, the stores are our advertising. We're very

confident we can sell 20,000-plus cars a year without paid advertising…. It may be something we will do years down the road." Early on, when Eberhard hired PR professionals to build publicity for the Tesla Roadster, Musk reportedly fired them because he felt his involvement would generate enough publicity.[15] As of 2015, marketing at Tesla was done by a relatively small team of fewer than 10 individuals. Its marketing and advertising budget was miniscule compared to major automotive companies (General Motors spent more than $3 billion on advertising and marketing in 2013; Nissan spent $25 million advertising just the Leaf).[16] But whether Tesla could realistically sell more than 20,000–30,000 vehicles per year without significant advertising was unclear. It might work as long as Tesla was focused on the niche market at the high end, but not for the Model 3, which targeted the mass market.

Distribution and Service

Rather than follow the typical franchise-dealership arrangements used by traditional automakers to sell cars, Tesla chose instead to own and operate all of its own dealerships, located in high-end malls or affluent suburbs, not far from the Apple stores on which they were modeled. In fact, now you can also shop for your Tesla while you browse for suits at Nordstrom. In 2016, a Tesla Gallery store opened inside the high-end retailer, located in the men's department at the Grove in Los Angeles. Walk-in customers to a Tesla store would see one or two Model S cars plus an exposed version of the car's chassis near the back of the store to show off the battery pack. They could order a car from the store or online, and it would be delivered to their home. Without a large inventory of cars or salespeople, Tesla stores were far less expensive than typical dealership. Moreover, because electric vehicles had so few moving parts compared to a combustion engine, they didn't require a service bay at the store; servicing typically would be done by technicians at the customer's home. But the question was how this could possibly work if a large number of customers bought Tesla vehicles? Because electric vehicles were so different from combustion engines, customers could neither service their own vehicles nor tap into the ubiquitous auto service shops.

Charging Stations

At the core of transforming the auto industry from gas to electric engines was ensuring that customers could conveniently charge the battery when traveling. To address that issue, Tesla started building solar-powered "supercharging" stations where customers could charge their battery when on the go.

Tesla claimed that it took 30 minutes to charge a battery up to 175 miles or 45 minutes to get a full charge. Self-service charging stations were located on major freeways and at locations near restaurants or malls so that customers could do other things while the car charged. By late 2015, Tesla had built more than 500 supercharging stations—most with 6–8 chargers—with many more planned. These worked only with Tesla cars and were provided for free—for life. This was promoted as a major advantage over gas vehicles, with an estimated $6,000–$8,000 of gas savings over 4-5 years.

Some questioned whether Tesla could—or should—afford to provide free charging for the life of their vehicles. If, as one estimate reckoned, Tesla allocated roughly 5 percent of its capital budget of $1 billion to $1.5 billion to expand its charging stations by 50 percent in 2015[17], each charging station must cost $200,000 to $300,000.

What would happen if the Tesla Model 3 became so popular that there were long queues at supercharging stations—further increasing the time needed to charge up? Tesla had not announced what Tesla Model 3 owners would pay for a charge, but it was not expected to be free as it was for Model S and X owners.

Partnerships

Like many start-ups, Tesla formed important partnerships to help it access key resources. The battery technology partnership with electronics giant Panasonic was perhaps the most important because battery technology was critical to Tesla's ultimate success. Not only did Panasonic bring years of experience with lithium-ion battery technology, it also brought significant financial resources to the table. Tesla also developed a partnership with Dana Holdings, the first company to introduce battery-cooling technology for electric vehicles.[18]

In addition to R&D alliances, Tesla struck deals with two major automakers: Daimler and Toyota. In 2009, Daimler purchased roughly 10 percent of Tesla for $50 million.[19] Musk and the Tesla team reportedly amazed skeptical Daimler executives by modifying a stock Daimler Smart car into an all-electric vehicle in less than two months. This was followed by a Tesla announcement in 2012 indicating a deeper relationship with Daimler: "We are pleased to announce the start of a development program with Daimler for a new Mercedes-Benz vehicle with a full Tesla powertrain."[20] Toyota reportedly purchased 3 percent of Tesla's stock for $50 million in 2010. This sparked negotiations for Tesla to purchase the NUMMI manufacturing plant in Fremont, California, which ultimately became Tesla's car factory. Tesla agreed to provide parts to power the electric version of Toyota's crossover SUV, the RAV4.[21]

Tesla's Strategy

According to Elon Musk, Tesla's strategy was to start selling vehicles in the high-end niche and gradually move downmarket. If all went according to plan, the Model S and X would be followed in 2017 by a far less expensive Model 3, starting around $35,000 (though many observers questioned whether the Model 3 could really hit this price point given that the Model X came in higher than expected, at around $130,000). And even if it did, they wondered whether it would succeed given that gas prices looked set to remain low for some time and overall sales for electrics and hybrids were basically flat.

Even Musk had been unsure whether Tesla would work at the beginning: "I didn't ask for outside money for Tesla—and SpaceX—because I thought they would fail." While it now seemed unlikely to fail, whether Tesla could be sold to the masses—and truly disrupt industry incumbents by making the internal combustion engine obsolete—was unknown.

As Tesla prepared to launch the Model 3, onlookers tended to polarize into the idealists who believed it would change the industry and the skeptics who doubted its ability to change one of the oldest technology paradigms in recent history. Displacing the internal combustion engine (ICE) would require significant technology advancements, changes in customer preferences, infrastructure enhancements, and changes to government policy—well beyond the reach of a start-up with limited capital. Tesla seemed to be too thinly spread—developing multiple lines of vehicles, then adding home energy storage, Gigafactory1, charging stations and

dealerships. Moreover, in early 2017 the company decided to acquire Solar City, a company dedicated to putting solar panels and shingles on commercial and residential homes. Some questioned this expansion of activities when the company was trying to ramp up production. Indeed, Tesla's manufacturing appeared inefficient compared to incumbent auto manufacturers who had been working for years to shave cents off the production. Indeed, many hybrids had become comparatively less attractive as ICE engine efficiencies increased globally, a fate that might befall electric cars. In this context, could Tesla ever make money?

Idealists pointed to the incredible strides made from the Roadster to the Model S, which seemed to be selling well, and now the Model X, with plans for the Model 3-n the pipeline. Clearly investors believed in Tesla's innovations, judging by the premium paid by-investors betting on its future growth. But would Tesla ever make a profit? And if so, when? Tesla's income statement showed large losses and growing liabilities and Tesla's production costs, not including costs for R&D, sales and distribution, general and administrative and the Gigafactory were just shy of revenue in 2015 (See Figures 2 and 3). Was its business model sustainable or would it eventually become yet another electric vehicle failure like Better Place or Fisker?

Fiscal Year	2015	2014	2013	2012	2011	2010
Income Statement Items						
Revenues	$4,046,025	$3,198,356	$2,013,496	$ 413,256	$ 204,242	$ 116,744
Automotive sales	3,740,973	3,007,012	1,921,877	385,699	148,568	97,078
Cost of revenues	3,122,522	2,316,685	1,557,234	383,189	142,647	86,013
Selling, general and administrative	922,232	603,660	285,569	150,372	104,102	84,573
Total operating expenses	1,640,132	1,068,360	517,545	424,350	313,083	177,569
Operation Income	$(716,629)	$(186,689)	$(61,283)	$(394,283)	$(251,488)	$(416,838)
Interest expense	(118,851)	(100,886)	(32,934)	(254)	(43)	(992)
Income tax	13,039	9,404	2,588	136	489	173

Net loss	$(888,663)	$(294,040)	$(74,014)	$(396,213)	$(254,411)	$(154,328)
Balance Sheet Items						
Cash and cash equivalents	$1,196,908	$1,905,713	$ 845,889	$201,890	$255,266	$ 99,558
Total current assets	2,791,568	3,180,073	1,265,939	524,768	372,838	238,886
Property, plant and equipment, net	3,403,334	1,829,267	738,494	552,229	298,414	114,636
Total assets	$8,092,460	$5,830,667	$2,416,930	$1,114,190	$ 713,448	$ 386,082
Current liabilities	2,816,274	2,107,166	675,160	539,108	191,339	85,565
Total liabilities	$7,003,516	$4,918,957	$1,749,810	$ 989,490	$ 489,403	$ 179,034
Total equity	$1,088,84	$911,710	$667,120	$124,700	$224,045	$207,048

Sources: https://www.sec.gov/Archives/edgar/data/1318605/000156459016013195/tsla-10k_20151231.htm
http://ir.teslamotors.com/secfiling.cfm?filingid=1564590-15-1031&cik=1318605
http://ir.teslamotors.com/secfiling.cfm?filingid=1193125-13-96241&cik=
Figure 2Tesla Financials (in thousands)

Quarter	Revenue*	Production Costs**	Units Produced***
3Q 2012	$50,023	$58,865	250
4Q 2012	294,377	268,333	2,400
1Q 2013	555,203	461,818	4,900
2Q 2013	401,535	303,599	5,150

3Q 2013	430,196	324,883	5,500
4Q 2013	610,852	453,578	6,892
1Q 2014	588,871	462,471	6,457
2Q 2014	727,829	554,104	7,579
3Q 2014	849,009	598,472	7,785
4Q 2014	814,303	694,964	9,834
1Q 2015	893,320	631,745	10,045
2Q 2015	878,090	666,386	11,532
3Q 2015	852,555	628,729	11,597
4Q 2015	1,117,008	896,442	17,400

Figure 3Unit Volume and Cost of Revenue