

# TESLA INC.

CONSUMER DISCRETIONARY

STUDENT: ARJEL HENA

# COMPANY REPORT

23 MAY 2018

27186@novasbe.pt

## It is not time to Short Musk

*Ambitious Targets and High Potential Growth.*

- We have a positive outlook for TSLA shares in the long-term and we recommend to BUY the stock with a target of \$342.33, corresponding to a potential gain of 24.5% compared to the current price levels.
- We forecast unprecedented revenue growth from \$17bn in 2018 to \$268bn in 2040 (+13.1% CAGR in 2018-2040). We model Tesla to start generating positive income in 2023.
- The introduction of new models such Tesla Semi and Roadster and expansion of the Energy Generation and Storage segments will boost the revenues, as the customer's environment awareness and the demand for renewable energy resources is globally increasing.
- Capital expenditure, R&D and SG&A will continue to pressure cash flows until all the production issues will be solved and the battery will have a competitive cost.
- While Tesla has consistently missed its near-term targets, it has however accomplished a number of equally optimistic long-term objectives. Tesla consistently missed its quarterly production targets for Model 3 and Model X before, though it ultimately reached all production targets it set in the 2012 plan.

### Company description

Tesla Inc., California based company, engages in the design, development and sale thought its store, fully electric vehicles, energy storage products and solar panels. It also provides a wide range of other services such vehicles service centers, supercharger stations and self-driving capabilities. The company operates through Automotive, Energy Generation and Energy Storage segments.

**Recommendation: BUY**

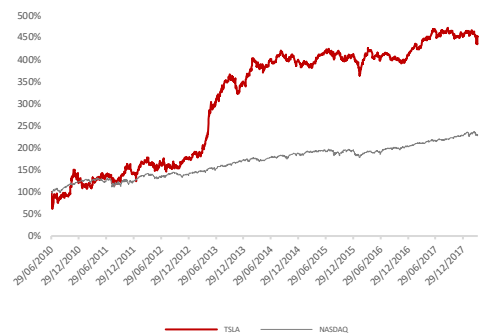
**Price Target FY18: \$342.33**

**Price (as of 23-May-18) \$275.01**

Reuters: TSLA.OQ, Bloomberg: TSLA

52-week range (\$)	244.59-389.61
Market Cap (\$bn)	46.69
Outstanding Shares (mn)	169.79
Potential return	24.5%

Source: Bloomberg



Source: Bloomberg

(Values in \$ billions)	2018E	2019E	2020E
Revenues	17.32	25.74	40.41
EBITDA	(0.77)	(1.92)	(2.75)
Net Loss	(1.11)	(1.9)	(2.55)
Free Cash Flow	(3.01)	(3.61)	(4.69)

### Vehicles Deliveries

Model X	45,415	43,407	39,008
Model S	47,700	48,230	53,636
Model 3	128,790	265,265	489,453

Source: Own estimations

THIS REPORT WAS PREPARED EXCLUSIVELY FOR ACADEMIC PURPOSES BY [INSERT STUDENT'S NAME], A MASTERS IN FINANCE STUDENT OF THE NOVA SCHOOL OF BUSINESS AND ECONOMICS. THE REPORT WAS SUPERVISED BY A NOVA SBE FACULTY MEMBER, ACTING IN A MERE ACADEMIC CAPACITY, WHO REVIEWED THE VALUATION METHODOLOGY AND THE FINANCIAL MODEL. (PLEASE REFER TO THE DISCLOSURES AND DISCLAIMERS AT END OF THE DOCUMENT)

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## Executive Summary

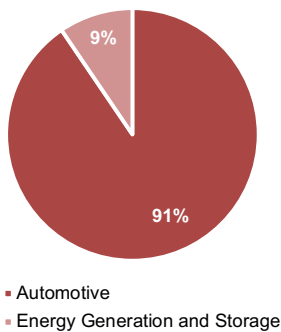
Tesla has a **highly differentiated business model**, **appealing product portfolio** and **leading-edge technology** which are placing the company as a leader in the electric vehicles industry. The company is led by a visionary leader and backed by a management team with solid functional team. We laud the company for its achievements and we believe it definitely has revolutionized competition in the electric vehicle industry. However, the management **has often been too bullish** on setting **ambitious targets** only to revise them to a more practical deadline. We also think that the company's cash needs are **immediate and continuous** to operate in a capital-intensive industry with significant cash outlay required for mass-market volume production of electric vehicle which appears to be Tesla's end-game. The acquisition of SolarCity has created **synergies** between the tree segments, Automotive, Energy Generation and Storage, and has been a crucial move to further verticalize the company. However, the **high debt accumulated by SolarCity** and the **low margins** for the Energy Generation industry are a matter of concern for the future. We project the company to be **profitable** from 2023 and generate positive cash flows from 2025, once Tesla Semi and Roadster are introduced in the market. Moreover, we estimate revenues to growth with a CAGR of +13.3% over the forecasted period, with Energy Generation leading the growth at +20.7% CAGR, benefiting with from the high growth of the Photovoltaic installations sector. The integration with the Energy Generation products and the constantly decrease of the battery production cost (\$95/kWh by 2040) will help the Energy Storage segment to growth at +18.7% CAGR over the forecasted period. Lastly, in our final valuation, we pondered three futures scenarios that are resulting in a final target price **\$342.33 per share** with a potential **12-month return of +24.5%**, enforcing our **BUY** recommendation.

Figure 1: Target price for each Scenario

Scenario	Target Price	Probability
Bad	\$158.66	15%
Base	\$341.95	70%
Good	\$527.81	15%
<b>W. Average</b>	<b>\$342.33</b>	<b>100%</b>

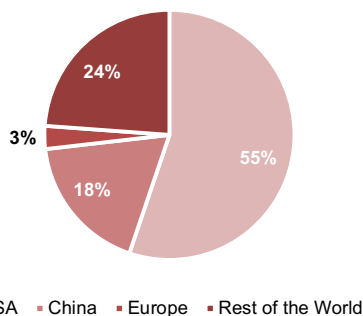
Source: Own estimations

Figure 2: 2017 Revenues by segment (%)



Source: Company Reports

Figure 3: 2017 Revenues by region



Source: Company Reports

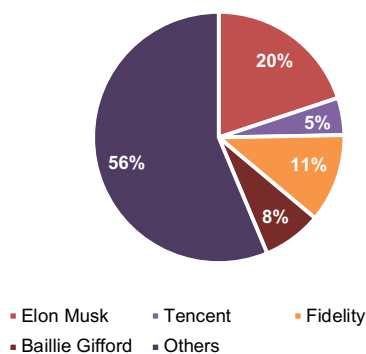
## Company Overview

Tesla Inc., founded in 2003 and headquartered in Palo Alto, is an American electric-manufacturer that **designs and sells Electric Vehicles** (Model S, Model X, Model 3, Tesla Roadster and Semi), **Energy Storage Systems** (Powerwall and Powerpack) and **Solar Energy Systems** (Solar Roof and Solar Panels) through its subsidiary SolarCity, acquired for \$2.6bn in 2016. The company also sells powertrains to other manufacturers and provides leasing and other services related to its cars.

Tesla’s electric vehicles are manufactured at its **main automotive factory in Fremont**, where the vast majority of the components are also made. Supporting Tesla’s automotive components and energy storage products are made in the **Gigafactory 1, the largest lithium – ion battery factory in the World**. Tesla’s **photovoltaics cells and components** for Tesla Roof and Solar Panels are **assembled in the Gigafactory 2**, in Buffalo. In 2016, the company made its most important acquisition to date when it acquired SolarCity with the aim to **achieve cost synergies** in its energy and storage products. Tesla markets and sells cars directly through 330 stores and services locations in more than 25 US states and about 25 countries. In 2017, the USA market accounted for 55% of sales. Other markets for which the company break sales are China and Norway, respectively 18% and 3% of total sales. Moreover, of the total revenues of \$11.8bn, 82% were generated by the Automotive division, 9% by the Energy Generation and Storage division and 9% by the Services division.

### Shareholder Structure

Figure 4: 2017 Tesla’s biggest shareholders



Source: Company Reports

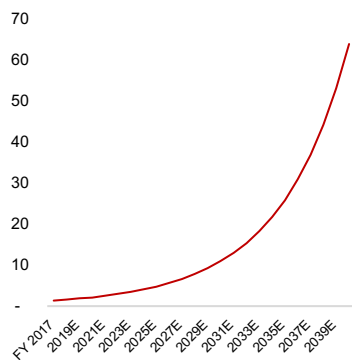
Tesla Inc. launched its Initial Public Offering (IPO) on NASDAQ in June 2010. The IPO raised \$226mn with 13.33mn shares issued to the public at a price of \$17.00. As of May 2017, Tesla held **169.79mn shares outstanding**. The Institutional Investors own 58.5% of total shares with Fidelity Management and Baillie Gifford as the major institutional shareholders with respectively 19.20mn shares outstanding (11.4% of the total) and 12.9mn shares outstanding (7.6% of the total). On the other side, the insider investors own 25.5% of total shares with **Elon Musk standing as the biggest insider shareholder**, owning 33.6mn shares (19.9% of the total) and Tencent Holding in the second position with 8.2mn shares owned (4.8% of the total). We model that in the short-medium term period, **Elon Musk will remain the biggest Shareholder and CEO** because Musk’s leadership and vision will be necessary for the company to reach the mass-market production and compete with the other automotive companies. However, in the long-term period we have some concerns due to the time that the current CEO is giving by serving in other companies such SPACE X. We believe that this may impact in a negative way the future of the company.

## Industry Analysis

### Automotive Sector

In the last few years the automotive industry has faced many challenges and radical changes triggered by development of the emerging markets, in particularly

Figure 5: Annual EV Sales in mn from 2017 to 2040



Source: Bloomberg, Own estimations

Figure 6: Potential cost saving created by the AI in the short-term across the entire value chain

Segment	Cost saving
Supply-chain management	\$51bn
Manufacturing	\$22bn
Procurement	\$61bn
Marketing and Sales	\$31bn

Source: McKinsey

Figure 7: Car sharing users by 2021

Region	Registered users	Monthly heavy users
World	35mn	3.5mn
Europe	14mn	1.4mn
North America	6mn	0.6mn
Asia-Pacific	2mn	0.2mn

Source: The Boston Consulting Group

China, the implementation of new technologies, environmental friendly policies and changing in consumer ownership with the increasing usage of car sharing. In the following years it is expected that the main drivers for the disruption of the automotive sector will be **connectivity, smart mobility, autonomous technology** and **electrification**. According to McKinsey this could create up to \$1.5 trillion by 2030<sup>1</sup>. **Artificial Intelligence (AI)** is the key technology behind **autonomous vehicles**. In fact, Autonomous cars need AI to improve real-time object recognition and make the technology reliable. Companies such as Tesla, Google, and Uber are already using this technology in their cars. In the future, an increasing number of software companies will enter in this particular market by creating joint-ventures, such as the current Google-FCA and Uber-Volvo partnerships. By 2030, we forecast 20% of new cars to be fully autonomous. Currently, AI is **essential** for price optimization, cost reduction and operation efficiency, **changing gradually** the vehicles manufacturing processes and the entire sector. The AI technology is leading to less equipment failure, improving the overall system performance, optimizing the maintenance planning and extending the asset life cycles. The potential impact in the next years is forecasted<sup>2</sup> to be a 20% increase in equipment availability, 25% reduction in inspection costs and up to 10% reduction in total annual maintenance cost. Lastly, AI **will improve** the forecasting models for the supply and demand, giving to AI-powered supply chains the necessary **flexibility needed** to respond to any shift in consumers' preferences. We forecast AI technology to potentially reduce inventories by 12.5% to 30% when fully implemented by automotive makers. **Shared and smart mobility** will slow global vehicles sales but will not outpace them over the next years. **Car sharing** will enable people to **travel faster** and cheaper. This trend will be propelled by the **urbanization expansion** and the changing in consumers' behaviours who will give less importance to the car ownership culture. While there likely will be less new vehicles produced in the future, vehicles sales **will outperform sharing mobility** due to the increasing demand in Emerging Markets and high replacement frequency replacement of car sharing vehicles. Studies<sup>3</sup> indicate that 5-15 cars are replaced for each shared car added to the automotive network, leading however to a consequent depreciation of 5-15 times faster than any other privately-owned vehicle. In line with KPMG<sup>4</sup> we forecast car-sharing to rival the car-owned industry making up to 40% of new vehicle sales by 2040.

<sup>1</sup> Disruptive trends that will transform the auto industry (2016), McKinsey

<sup>2</sup> Building smarter cars with smarter factories: How AI will change the auto business (2017), McKinsey

<sup>3</sup> Does sharing cars really reduce car use? (2017), Transport & Environment

<sup>4</sup> Global Automotive Executive Survey 2018 (2018), KPMG

Figure 8: Phases evolution of the connected car

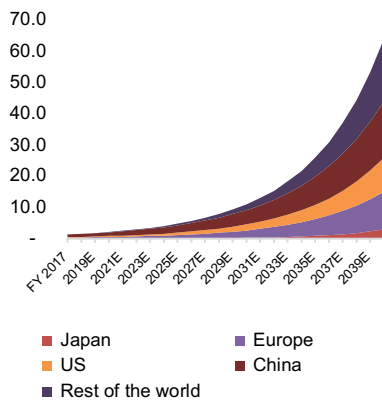
Years	Period	Examples
1966-1995	R&D era	GM DAIR
1995-2002	Embedded	GM Onstar
2007-2012	Infotainment era	Kia UVO
2012-ongoing	V2X era	Tesla app
2020-ongoing	New Mobility era	Tesla Autopilot

Source: Deloitte

**Internet of Things (IoT) and new infotainment systems** will change the customer experience as it is today. The importance of the car as a part of a connected network is growing in the customer’s awareness. It is expected that the percentage of users willing to change car brand for better connectivity will increase in the future, forcing the automakers to install fully connected infotainment systems in their new vehicles in the following years. Moreover, the increase of connectivity will be used to reduce problems related to **vehicle’s security** and **traffic** by providing diverse data sets to third parties and a variety of in-vehicle services.

▪ **Electric-Vehicle Market**

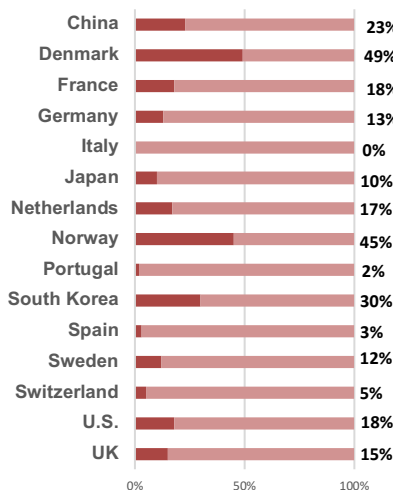
Figure 9: EV Sales projections from 2017 to 20140 by region



Source: Bloomberg, Own estimations

The automotive industry has seen increased movement towards the **hybrid** and **fully electrified segment** in the aiming to reduce the total greenhouse emission and the consequently impact on the environment. Despite challenges, electric vehicles are sponsored as a **key contributor** to build a sustainability mobility system and to overtake the ICE vehicles in the long-term. At the end of 2017, of the 83mn new vehicles produced, 1mn were electric (2% of total). By 2040, of the 120mn cars produced, 54% will be electric, representing 33% of the global car fleet. China will lead this transformation, occupying the first place as **the largest electric vehicle producer** accounting for 31% of annual sales. **China, Europe and U.S.** together will make up over 60% of the global Electric-Vehicle market in 2040. Overall, in the long-term period, the EV penetration of the car sales will reach 69% in Europe, 58% in U.S., 52% in China and 48% in Rest of the World. Moreover, we modelled that the following key drivers will be determinant the EV adoption: **Policy** support, **Battery** cost, **EV commitments** from automakers, **Charging infrastructure**, **Shared mobility** and Consumer **environmental awareness**.

Figure 10: 2017 Total subsidies in EV price in %



Source: McKinsey

▪ **Policy Support**

**Government incentives** forms a key support for the EV market and they are indispensable for lowering barrier to adoption. Policy support can be categorized in four major groups: **R&D**, **Targets**, **Regulation** and **Financial incentives**. **Research and Development incentives** are essential for the developing of new technologies that allow to improve efficiencies and performance and allow to scale-up the production of crucial high technology components such batteries. **Targets** are fundamental for policy makers and for the EV industry, because they help to focus the resources in the aiming of shifting from ICE to electric vehicles. An example of how targets are shaping the future global automotive

market is the EV30@30 campaign, that is supported by many governments and is aiming to have 30% of the vehicles sales electric by 2030. Moreover, Netherlands set target of 10% of new vehicles to be electric by 2020, 50% by 2025 and 100% by 2035, while India aims to have 6mn EV vehicles on road by 2020. Remaining in Asia, China is building 12,000 charging stations across the country to serve 5mn EV vehicles by 2022 **Regulations** provides a definition of what will be the vehicle characteristic in the medium-long term, so the automaker can shape their vision for the future. In this context, is notable to mention how the **Zero-Emission Vehicle (ZEV) mandates** are influencing the current automotive industry. For example, in UK all vehicles on the roads should be ZEV by 2050, while in Norway anticipate this deadline in 2025. These regulatory requirements were firstly created in California, where they will expire in 2025, and expanded in several state of U.S., Canada and China. The ZEV mandates incentive R&D in zero-emission vehicles by allowing automakers to **sell credits to other automakers that are ICE vehicles**. Lastly, in China, the import tax of 25% is forcing established automakers that wants to produce mass market vehicles to build factories in the country or to establish joint-ventures to operate.

Figure 11: Type of policies for EV adoption

Policy	Example
R&D incentives	US R&D tax credit
Targets	China's target of 35mn EV by 2025
Regulations	ZEV credits
Financial Incentives	Norway's tax acquisition exemption for EV

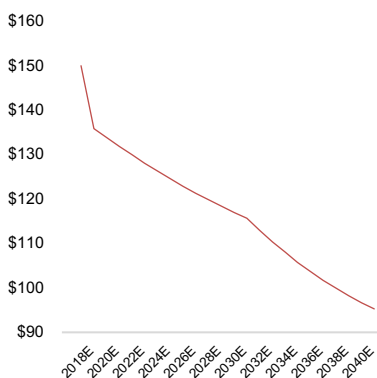
Source: International Energy Agency

**Financial incentives** are essential for reducing purchase cost and ownership cost gap between electric and ICE vehicles. EV incentives can be **price reductions, tax breaks, tax exemptions** or can be **tax differentiation** based on emission. China offers financial and non-financial for EV until \$8500, while in Norway, electric cars are exempt from tax acquisition, representing around \$11600. The German government offers \$4951 direct subsidy for all new purchases, while Japan has introduced an EV subsidy based on range of the car for a maximum of \$7700. Despite Financial incentives are the most powerful mechanism to stimulate the demand for electric cars, many countries such France, Portugal, Denmark and Norway **are being reducing or facing out subsidies** in the aim to delete completely them in the following years.

▪ **Battery cost**

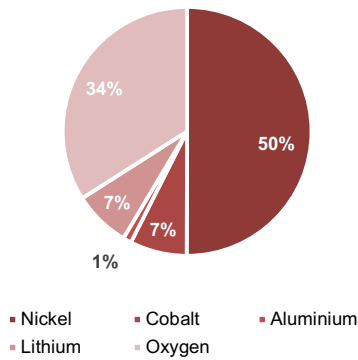
Despite all the technology improvements, the battery remains the most expensive component in the electric vehicle, since it represents **almost 50% of the total EV price**, 18% in 2040 according to our estimations. We project electric vehicles to reach cost parity against ICE vehicles at battery price around **\$100/kWh**. Currently the average cost for automakers is \$260/kWh and is expected to strongly decrease in the future. Tesla's battery cost hovered around \$390/kWh few years ago, got down around \$150/kWh in 2017. We model by 2040 the battery cost for Tesla will be around **\$95/kWh**, with the parity reached in 2030. Moreover, this reduction will come from the Gigafactory 1's capacity to

Figure 12: Tesla battery cost per kWh from 2017 to 2040



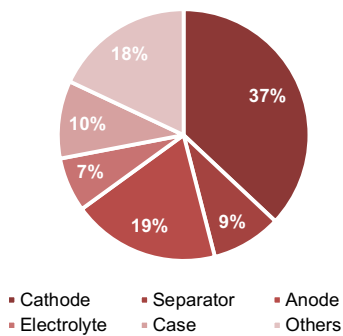
Source: Own estimations

Figure 13: Tesla's Cathode material breakdown in %



Source: Research Gate

Figure 14: Battery Cell material cost breakdown in %



Source: Nomura

Figure 15: Major EV battery producers in 2017

Battery Producer	Carmaker
Panasonic	Tesla, Toyota, Ford and Mercedes
LG Chem	Audi, Chrysler, Ford, GM, Hyundai, Renault, Smart, Volvo, Volkswagen and Nissan
Samsung SDI	BMW, Fiat, Mercedes and Porsche
SK Innovation	Kia and BMW
BYD	BYD
AESC	Nissan
GS Yuasa	Honda, Mitsubishi, Peugeot and Citroen

Source: CleanTechnica

scale the production (30%), the maximization battery's energy density/efficiency and technical improvement in the battery technology (55%), and the reduction of raw material and electronic component prices (15%).

A common type of lithium battery consists three major parts: **anode**, **cathode** and **electrolyte**. Although there are several types of batteries in the market, the most adopted is the Lithium-ion because it **guarantees lightweight, safety, energy storage and is high temperature resistant**. Many experts predict that the future introduction of the **graphene** in the battery chemistry composition will lower the prices as this material is cheap, lightweight, strong and extremely conductive of heat and electricity. Currently, Tesla's is using NCA chemistry consisting in 50% Nickel, 34% Oxygen, 7% Cobalt, 1% Aluminium and 7% Lithium, but in the future, the company will likely migrate to next-generation chemistries such as NMC81 (80% nickel, 10% manganese, 10% cobalt), forecasted to feature higher energy density with more nickel and less cobalt than Tesla's current NCA chemistry in terms of material weights.

The prices for the key metals in EV batteries have been rising dramatically in the last years due to an increase in speculation and demand. 65% of total global supply is mined in the Democratic Republic of Congo making this material **highly price volatile due to the instability in the region**. According to UBS, the global demand of cobalt will double by 2020 to around 200,000 tonnes per year. While lithium is more abundant, Goldman Sachs expects the demand is expected to be **four times greater** in 2025 at 779,000 tonnes per year that will cause an expected supply shortfall in the short term. Since the electric supply will be driven by China, many analysts forecast 60% of global new electric cars to be supplied by lithium-battery maker Chinese companies such BYD and CATL.

**Battery provision** is a critical point for any company trying to enter in the EV market. Many established automakers and companies have tried or are trying to produce batteries for their vehicles. On February 2018, Bosch was the latest of many companies and start-ups to struggle with battery manufacturing, due to rising competition from Asiatic companies and the high investments needed to have a significant manufacturing capacity. GE abandoned the EV battery manufacturing in 2017, concentrating only on energy storage segment, while on a smaller side, batteries producers Acquion and Alevo went in bankruptcy on the same year. On the other side, Volkswagen announced a \$25 bln investment plan to build 16 battery production factories by 2022, with its subsidiary Scania, aiming to rival Tesla's Gigafactory and to become the largest battery cell



manufacturer in Europe with a target of 32 GWh a year by 2023. Since the battery market for EV it's on an early stage and requires large investments to scale the manufacturing process, the majority of automakers, have outsourced the production to other companies with Panasonic Sanyo, BYD and LG Chem being the top manufacturers of lithium-ion battery, having a respectively market share of 33%, 18% and 17%.

▪ EV Market Competition

Currently Tesla is producing **3 main models**: Model X and Model S for the **Luxury market** and Model 3 for the **Mass market**. Moreover, the company announced in October 2017, the electric truck Tesla Semi for the **Truck market** and Tesla Roadster for the **Sportscar market** that will begin the production respectively in 2019 and 2020. The mass market SUV Model Y and an electric pickup model are expected to be launched in the following years but there are announcements yet. With Semi, Tesla is not aiming to transform the actual large scale semi-truck segment due to the prospect small volume opportunity, but to bring additional value with its model by **lowering the fuel cost and cost of ownership**. Many automakers have announced new electric models in the upcoming years. In the luxury segment, Model X and Model will face competition from several automakers. **Jaguar** announced the sale of i-Pace, in direct competition with Model X. In 2019, Volkswagen's premium brand **Audi**, will launch the e-tron Quattro crossover for the SUV segment, while 2020 will be the year of the e-tron GT as rival of Model S. Another Volkswagen brand, **Porsche**, announced Mission E, an all-electric sedan expected to go in production by 2019. The Bavarian automaker **BMW** promised on 2017 a new series of all electric cars, starting with iNEXT in 2020, which the German automaker as positioned as a Model 3 competitor. BMW's competitor, **Mercedes-Benz**, plans to gradually introduce new electric models after the launch in 2019 of the electric SUV EQC and in the 2020 of the electric sedan EQS. On the other hand, in the mass market segment, Model 3 is facing or will face competition from several models: BMW i3, Nissan Leaf (2019), Kia Soul, Hyundai Kona, Toyota Prius, Volvo XC40 (2019), Chevrolet Bolt, e-Golf, Ford Fusion Model E and BYD e6. Despite all the upcoming rivalry in the EV market, Tesla automotive business is being challenged by the **ICE and Hybrid vehicles**. In the sedan luxury segment Lexus RS and LS. In the SUV luxury segment Model X is facing competition from Land Rover, Mercedes M-Class, Porsche Cayenne, Volvo XC90 and Porsche Cayenne. Although almost all the biggest automakers are making mass market vehicles, we believe that the final decision of the consumer whether to

Figure 16: Model 3 characteristics

Model 3	
Type	Four-door Sedan
Average Range	400km
Production year start	2017
Average Battery capacity	63 kWh
Average Price	\$45,000
Awards	"Design of the year"
Market	Mass market

Source: Company Reports

Figure 17: Model S characteristics

Model S	
Type	Luxury Liftback
Average Range	360km
Production year start	2012
Average Battery capacity	88 kWh
Average Price	\$71,140
Awards	"Car of the year 2013"
Market	Luxury

Source: Company Reports

buy an electric vehicle or ICE car will based on the **quality-cost, incentives, cost of ownership** and charging infrastructure.

Figure 18: Model X characteristics

Model X	
Type	Luxury Crossover
Average Range	390km
Production year start	2015
Average Battery capacity	88 kWh
Average Price	\$91,000
Awards	"Golden Steering Wheel"
Market	Luxury

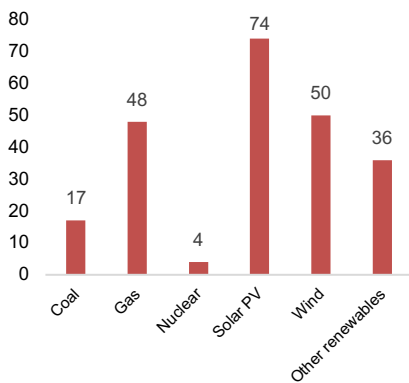
Source: Company Reports

According to Consumer Reports<sup>5</sup>, Tesla ranked first in the owners’ satisfaction survey with an average score for all models of 90%. Tesla’s vertical integration of batteries and vehicles manufacturing process offers to the company a **competitive advantage**, enabling in the long-term to leverage development capabilities and **improve manufacturing efficiency**, while in the same time having a **less battery cost** compared to the competitors. Regarding the mass market, many are the challenges for the future, such the slow production of the Model 3 and the current battery cost. We model that, once all the production issues are solved and the battery has a competitive cost, Tesla will be able to **efficiently compete** with ICE cars.

### Energy Generation Sector

World primary energy has grown by an annual average of 2% since 2012 and it is expected to growth by 30% until 2040, although the pace of growth **will gradually slow**. The demand will be driven mainly by **China and India**, the most populous countries in the World. Factors that will contribute to this raise are the expected growth in population from 7.4bn of today to 9.0bn of 2040, the high rate of urbanization and the expected growth of the World GDP at 3.0%.

Figure 19: Global average net capacity addition by energy resource type from 2017 to 2040

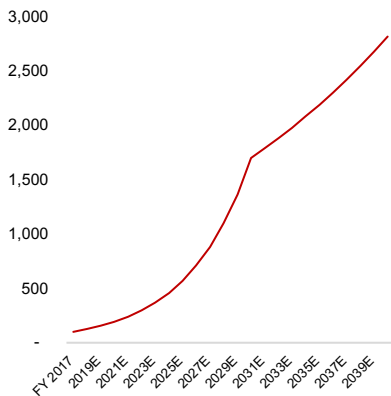


Source: Ren21

Global energy-related carbon dioxide emission from fossil fuels and industry were nearly flat in 2017 at 35bn metric tons and are expected to raise at by 43bn metric tons 2040, with petroleum being the main contributor. The slowing in emission average growth rate with an expected trend in annual increase a 2.2%, is due largely to **reduction of coal as power resource**, but also to improvements in **energy efficiency** and to increasing power generation from **renewable resources**. As of 2017, several countries (e.g. Canada, Norway, Finland, France, the Netherlands) are committed to move away from fossil fuels for electricity generation towards renewable energies. Despite this trend, many other countries, in particularly the US, have announce plans to expand coal production and use. In particular, **numerous barriers** remains for the renewable resources to compete against traditional energy fuels. The average cost in 2017 for large Solar PV installations was \$2000 per kWh whereas a new gas plant cost \$1000 kWh. Moreover, additional large infrastructure investments are needed to properly connect to the grid the various renewable energy stations. In this context, is reasonable to think that several countries will wait an improvement of the current

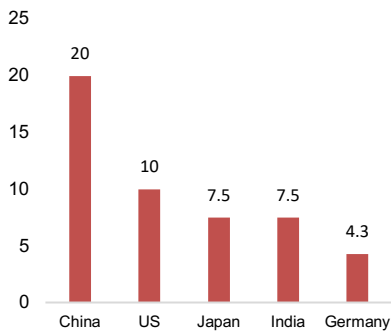
<sup>5</sup> Car Brands Ranked by Owner Satisfaction (2017), Consumer Reports

**Figure 20:** Global annually PV deployment in GW



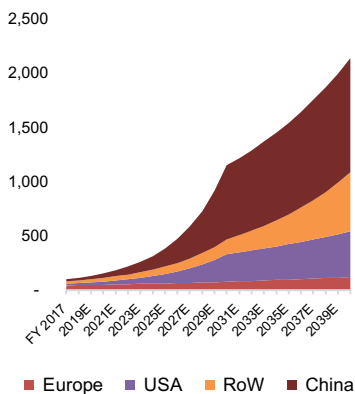
Source: International Energy Agency, IRENA, Own estimations

**Figure 21:** Cumulative waste volumes of top five countries for end-of-life PV panels in 2050, in million t



Source: IRENA

**Figure 22:** Global annually PV deployment by region, in GW



Source: International Energy Agency, IRENA, Own estimations

technology and a decrease in the overall installation cost before shifting from traditional energy resources to renewable energy resources. However, in the past ten years, improvement in efficiency, declining in cost and environmental awareness have contributed to a **rapid increase** of renewables as an important energy source to meet the global demand for energy. Many Government will continue to support renewable electricity worldwide, increasingly through **competitive auctions** rather than feed-in tariffs, and the conversion of the power sector from coal and oil to zero-emission energy sources, will amplified by millions of households, communities and businesses investing directly in distributed Solar PV.

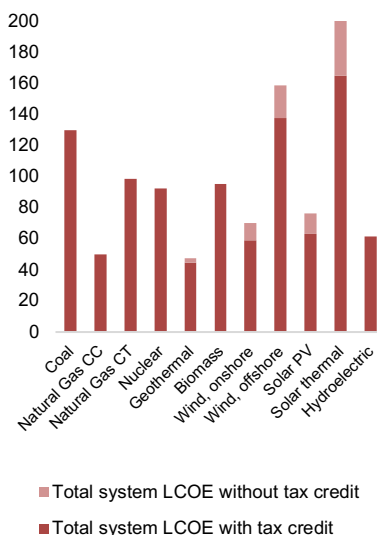
▪ **Solar PV Deployment**

The photovoltaic installations have been rising with an exponential growth over the past decade, estimated to supply between 1.5% and 2.1% of global electricity demand. On 2017, **Solar PV was the leading source** of additional GW deployment. Growth in the photovoltaic industry is **extremely dynamic** and varies across the countries. Top installers of 2017, that accounted for 85% of the additional power generating capacity, were Europe with 44 GW followed by China with 18 GW and USA with 15 GW. Nevertheless, Emerging countries contributed significantly to the global growth, as many authorities are starting to see Solar PV as a **cost-competitive resource** compared to the traditional for producing electricity. However, for most of the countries, the tremendous growth is driven by **government incentives**. The residential market experienced a **slower expansion** due the approaching saturation of the part of the markets among early adopters. In line with **the International Energy Agency (IEA)**, we forecast total Solar PV annual deployment to grow from 124 GW of 2018 to 2,818 GW of 2040. China is expected to overtake Europe as the largest producer of PV electricity after 2021, increasing from 19% of annual deployment of 2018 to 40% by 2030 then slowly decreasing at 37% by 2040. By contrast, the share of USA is expected to remain constant at 15% while for Europe we model to experience a decrease from 37% of 2018 to 4% of 2040. Utility and Industrial installations will have the largest share in PV installations, with 54 GW annual deployment in 2018 and 1,346 GW in 2040.

▪ **Photovoltaics Incentives**

As of 2018, **nearly all of the countries** have adopted policy in favour of Solar PV or any other renewable source deployment directly through some **mix of incentives** legislated at the national and local level. Governments use **financial**

**Figure 23:** Estimate LCOE for new generation resources entering in service in 2022 (\$/MWh) in US

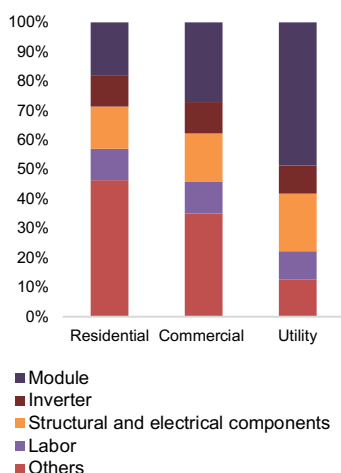


Source: US Energy Information Administration

**incentives** for photovoltaics installations when there is no parity cost with the energy generate from traditional resources. Such policies are often aiming to promote energy independence from other countries or to **reduce emission** of carbon dioxide. When the “**grid parity**” is reached, meaning the levelized cost of energy (**LCOE**) from Solar PV installations is equal or less to the price of purchasing power from the grid, these financial incentives are **no more needed**. Currently, the most common used financial incentives are **Subsidies, Feed-in Tariffs** and **Net Metering**. With the first one, the governments refund in form of tax credits part of the total cost for PV installations while with Feed-in Tariffs (FITs), the authorities pay the producers of energy at a cost-based price for the PV energy they supply to the grid. Similarly, the Net Metering allows the consumers to rebuy the excessive energy by paying only the **net consumption** (the amount of energy they bought minus the amount of energy they produce). While the majority of European countries, Australia, China and Russia FITs and government subsidies, in the U.S. the most used incentives are the Net Metering and a 30% Federal Tax credit on residential and business PV installations, planned to drop at 22% by 2021 and 10% from 2022 onward. However, **tenders** (competitive bindings or auctions) are quickly expanding as a form of support for Solar PV deployment of large-scale projects.

▪ **Solar Panels Costs**

**Figure 24:** Cost structure of PV installations by segment in %

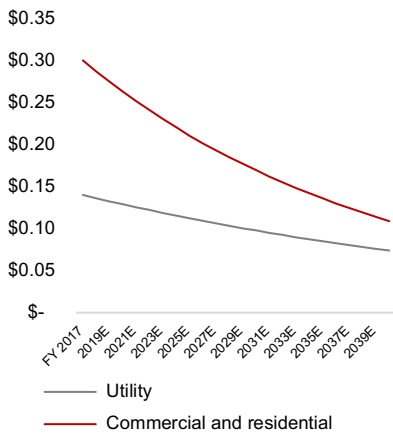


Source: NREL

Solar panels cost is continuously **decreasing** over the past year. The main expenses differ from the type of the PV installation, (Utility, Commercial and Residential), but we can regroup in five different categories: **Other soft costs** (Land acquisition, Taxes, Overhead, etc.), **Labour costs, Hardware** (Structural and Electrical components), **Inverter** and **Module**. We forecast module cost in particular, that accounts for the majority of the total cost, to decrease from \$0.76 per watt to \$0.28 per watt by 2040, in line with the NREL agency, since the efficiency improvement will decrease the number of modules required to construct a system of a given size. The other costs, summed, will decrease at \$0.08 per watt and \$0.14 per watt by 2040, respectively for Utility and Commercial and Residential.

The reductions in installed cost, along with improvements in operations, system design and technology will result in a **significant decrease** in the cost of electricity and the range of LCOE (levelized cost of energy) across the countries will continue to **narrow**, helping to make Solar PV **increasingly competitive** with fossil power resources. We model a decrease from \$0.14 per watt of Utility and \$0.29 per watt of Commercial and Residential installations of 2018 till \$0.07 per

**Figure 25:** Average electricity price per kWh from PV plants from 2017 to 2040



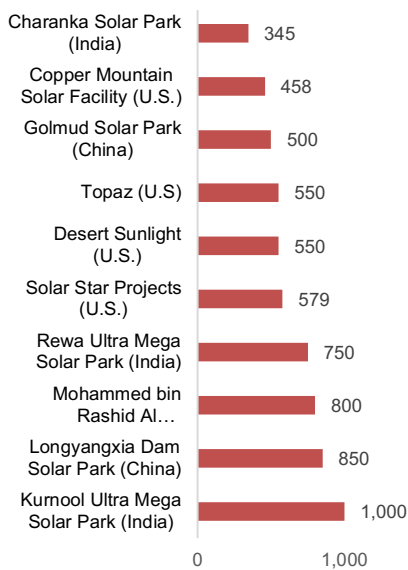
Source: NREL, Own estimations

watt \$0.11 per watt by 2040. The average LCOE of new-built PV plant is expected to fall below \$100 per MW by 2025 and decreasing \$60 per MW by 2040. We project also the average LCOE of new-built rooftop PV system to fall on average below \$100 by 2030 and gradually reach \$80 by 2040.

▪ **Competition**

China accounts for **more than half** of global module productions with top manufacturer being the Chinese company JinkoSolar, the Canadian company Canadian Solar, followed other two Chinese companies, Trina Solar and JA Solar. Overall, **consolidation** in the Solar PV manufacturing industry is continuing by **lowering the prices** and the margins, forcing many companies to go in bankruptcy, especially in US and Europe. For example, SunEdison, once one of the biggest solar panels producers in the countries, declared insolvency in 2016, after a rapid growth and a significant debt accumulation, while in 2017 emerged from the bankruptcy procedure.

**Figure 26:** Largest Solar PV plants worldwide as of June 2017, by capacity in MW



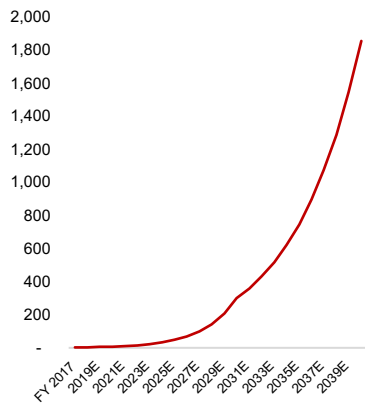
Source: Institution of Mechanical Engineers

On the other side, the Solar PV installation segment has shown **new players** facing in the market, such Foxconn, GE, Gamesa, Goldwind and Mindgyang. Moreover, **electric utilities** are financing large-scale Solar PV and other renewable projects, with the goal to be free from fossil energy resources. For example, Tata Power commissioned a 50 MW solar plant in India; Innogy, renewable subsidiary of RWE, is planning to further expand its business in Germany, the Netherland and the U.S. by building new large-utility photovoltaic systems; EDF intends to develop and build 30 GW of solar plants in France by 2035. Even **traditional oil companies** are moving toward the PV sector: BP has increased its stake at 43% in the Europe’s biggest solar developer Lightsource; Total continues to build solar plants through Total Solar while the other subsidiary SunPower is supplying solar panels; Shell acquired 44% stake of the U.S. solar project developer, owner and operator Silicon Ranch Corporation.

**Energy Storage Sector**

As energy renewables grow, **electricity need to be stored** over days, weeks or months. Storage systems can guide the energy industry to an entire decarbonisation and help to transform the entire society. Thus, the Energy Storage will play a **crucial role** in the future both economically and environmentally and the adoption will be led by three main drivers: **affordability**, **reliability** and **sustainability**. Stationary electricity storage can provide a wide range on energy services in an affordable way, while batteries are crucial element

**Figure 27:** Global annual energy storage deployment in GW, from 2017 to 2040



Source: IRENA, Own estimations

in transforming the actual cars in a zero-emission and electrified vehicles. Electricity storage technologies are becoming as a **solution** increase the **adoption** and the access to electricity in conjunction with Solar PV in solar house systems. According to the International Energy Agency<sup>6</sup>, Electricity storage products can increase the fraction of renewable energy stored in solar home systems and mini-grids as high as **100%**.

▪ **Energy Storage Deployment**

Energy Storage has been principally used as **support** of electricity grid by providing **backup** energy during power outages and other energy scarcities. Energy storage systems can accumulate energy when the demand is low and the supply is high, and release the stored energy when the demand is high. Storage batteries can provide system **benefits** and **flexibility** for business and individuals performing as a direct energy provider. In agree with the IRENA’s forecast, we model the annual deployment of energy storage products to pass from 4 GW of 2018 to 1,858 GW of 2040. We calculate that 25% of all deployment will be done in U.S and the remaining to be across China, Japan, Australia, UK and India.

▪ **Energy Storage Market Competition**

**Tesla is a leading company** in providing energy storage systems for residential and utility-scale projects. On 2017, the company built a 129 MW battery backup system in Australia, the biggest at the date, entirely made with assembled powerpacks. As of 2017, Tesla has 360 MW worth of battery-powered storage system across 20 countries, while direct competitors **AES** and **Siemens** have deployed 463 MW across 13 countries, with their joint-venture **Fluence**. Tesla is not the only company to operating in energy storage system for residential and business application. Many start-ups and established automakers are entering or will enter in the market. On 2017, **Daimler AG** started delivery home battery storage systems, firstly designated for automotive use. However, in May 2018, the company bows out from the sector due to the difficulty of adopting EV batteries to suits the necessities of the residential market. German’s electricity utility **E.ON** is offering solar storage solution and products for its clients while another German company, **Sonnen**, launched in 2016 battery systems for residential use, priced way below and company’s existing similar products. In 2017, **Sonnen** dominated the European PV storage market with 22% market share, followed by Seneca at 12% and LG Chem with 10%. We believe Tesla to increase its market share in Europe once it will ramp the production of storage batteries in the Gigafactory 1.

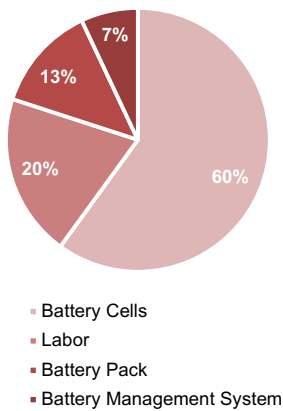
**Figure 28:** Tesla’s Competitors in the Energy Storage segment

Utility & Commercial	Residential
Fluence	BMW
E.ON	BYD
Sonnen	Sonnen
NEC Energy	Daimler AG
Samsung	Nissan
LG Chem	Sunverge

Source: Research Gate, CleanTechnica

<sup>6</sup> Global EV Outlook 2017 (2017), International Energy Agency

Figure 29: Energy Storage System cost breakdown by component, in %

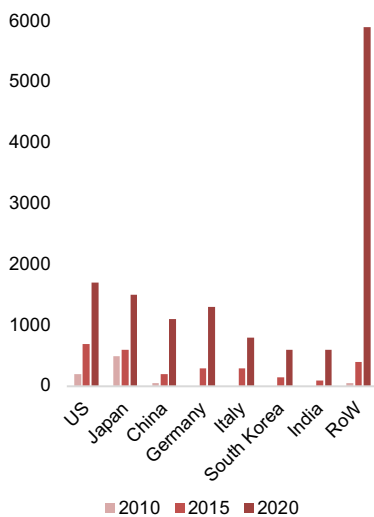


Many are the partnerships that were launched in 2017, such the joint venture between Samsung and the Solar PV inverter producer Sungrow, with the aim to create energy storage systems. Moreover, the US company Emphase Energy entered in the Australian market, competing with Tesla and LG Chem in the surge of rooftop solar panels installations in the country. Regarding the **large scale utility projects**, Tesla is facing a rising competition from different international companies. On 2018, The Japanese NEC Energy solutions, owned by NEC, announce to supply Orsted Energy UK with a 20 MW Grid storage solution by the end of the year, while Fluence declared in the same year that will build a 100 MW system in California.

On the other side, Panasonic Sanyo, is **dominating the production** of lithium-ion batteries for EV, **with double the output** of its nearest competitor (33% market share). The company is collaborating with Tesla for the mass production of lithium batteries in Gigafactory 1. Other leading companies of batteries for EV are South Korean companies Samsung (9% market share) and LG Chem (17% market share) and Chinese companies Wanxiang (5% market share), GS Yuasa (3% market share) and Lishen (3% market share).

▪ Energy Storage Policies

Figure 30: Battery storage market value, top seven countries and rest of the world, 2010, 2015 and 2020, in mn



Source: IRENA

Policies in support for the energy storage deployment includes **mandates, targets, tenders, utility mandates** as well as **financial incentives** and **tax credits**. As of 2018, few countries have adopted policies in favour of energy storage sector, however this technology is receiving increased attention and support from policy makers all around the world. Mandates have been a **common** form of incentives for **large scale utility projects** while tenders have been applied in presence of Solar PV projects that included battery storage. Some states use financial incentives to improve the competitiveness of the emerging energy storage technology. Germany has implemented a guaranteed **feed-in tariff**, low-interest loans and grants and other incentives for PV systems with battery storage. Moreover, many countries in Europe offers **tax credits** and subsidies for the customers that are installing energy storage systems in addition to Solar panels, while Sweden announced on late 2016 support for energy storage and smart grid technology to **facilitate** the deployment of home energy storage systems, covering 60% of the cost of the installation, up to \$5600. In Japan, leading producer of batteries, is present a **subsidy** for residential storage products, while China had implemented a **similar approach** by offering incentives, such grants and domestic quotas, to expand the development of domestic storage systems. In the U.S. is **present a tax credit**, up to 30%, for qualified energy storage systems.

# Company Analysis

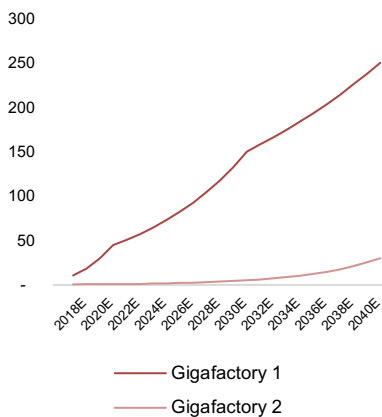
## Automotive division

- Automotive Revenues

We believe that Tesla’s capability to meet its target will depend on how will improve its **production efficiency** in its main automotive Factory in Fremont and in Gigafactory 1 in Nevada. Currently the bottleneck for the Model 3 scalability is the battery assembly; we modelled that Tesla will ramp-up and solve the production’s issues by 2020, when it will reach its maximum output at 45 GW/year. Moreover, to accomplish its targets, Tesla will need to **expand** the Gigafactory 1 or build more Gigafactories; we model that by 2040, the company’s annual batteries production will be 250 GW/year, split in 70% for vehicles and 30% for storage batteries. We estimate that the total annual vehicle sales will be 221,900 (company’s target is 500,000) in 2018 and 592,217 (company’s target is 1,000,000) by 2020, reaching 1,911,347 in 2040 with a CAGR over the forecasted period of 10.3%. Overall, we believe that Model 3 **will increase its weight** in the total annual sales at 83% (1,244,478 vehicles) in 2030 and will gradually decrease in 2040 at 80% (1,519,559 vehicles) due to the growing importance of Tesla Semi (5% in 2040) that will start the production in 2020. Model S, Model X and Roadster will reach 6%, 9% and 1% of the total sales by 2040. The main market for the company will still remain U.S. due to its dominant position and few competitor (61% in 2018, 75% in 2040), followed by China (24% in 2018, 10% in 2040), Europe (14% in 2018, 8% in 2040) and the remaining countries (1% in 2018, 7% in 2040).

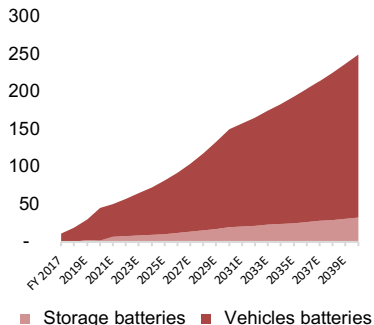
We believe that for Tesla **will be hard to increase** its sales in China due to the competition of many EV markers such BYD and Great Wall, while in Europe, consumers will prefer established automakers such Volkswagen Group, Fiat-Chrysler Group and PSA group. In total, we estimate revenues from vehicles, including leasing, for \$103bn in 2040 against the \$13bn of 2018 with an overall CAGR of 9.7%. Moreover, leasing will have a notable positive impact in the overall revenues. We believe that 36% of Model S, 39% of Model X and 44% of Model 3 sales will be complete trough Tesla’s leasing program, generating \$26bn in 2040 (\$1.4bn in 2018). We estimate that thanks to the reduction in the battery cost and improvement in production due to the Gigafactory 1, **gross margins** for the automotive division will increase up to 25% in 2035 and gradually decrease at 21% in 2040 due to the raising in competition from several established and new automakers.

Figure 31: Gigafactory 1 & 2 annual deployment in GW, from 2017 to 2040



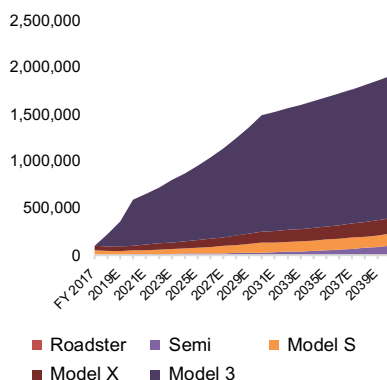
Source: Company Reports, Own estimations

Figure 32: Gigafactory 1 production by type, in GW, from 2017 to 2040



Source: Company Reports, Own estimations

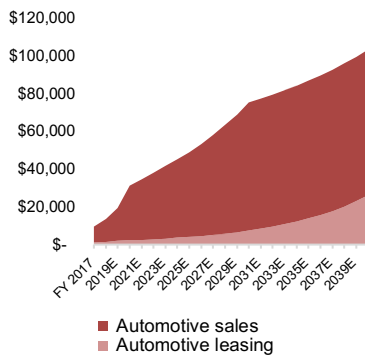
Figure 33: Annual deliveries by model, from 2017 to 2040



Source: Company Reports, Own estimations

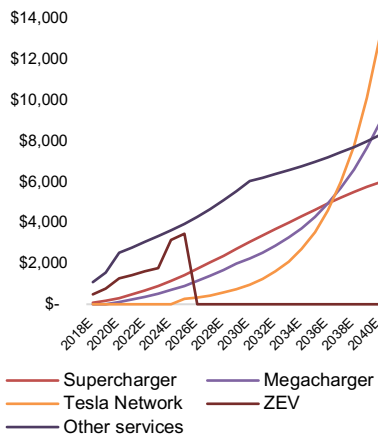


**Figure 34:** Total Automotive Revenues breakdown, in mn, from 2017 to 2040



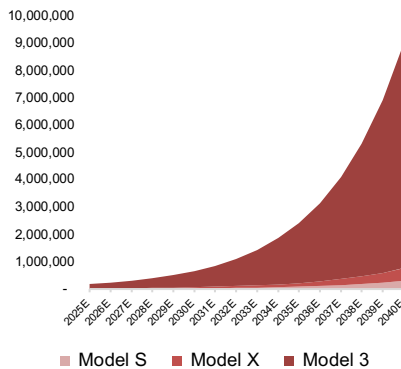
Source: Company Reports, Own estimations

**Figure 35:** Services and other revenues breakdown by type, in mn, from 2018 to 2040



Source: Company Reports, Own estimations

**Figure 36:** Cumulative Tesla Network fleet, from 2025 to 2040



Source: Own estimations

▪ **Services and Regulatory Credits**

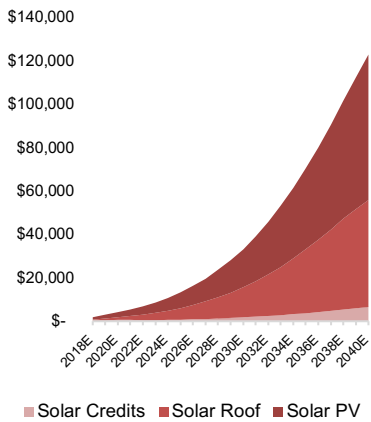
In 2016, Tesla announced that every model bought from January 2017 would not have any more the right to use the Supercharger for free but would have 1,000 miles (400 kWh) as credit, and then have to **pay a fee per each kWh extra**. We modelled that, on 2018, Tesla will generate \$75mn (\$231 per Supercharger’s user), taking in account that the car’s owners will use charging stations 15% of their time (13% in 2040) and a price per kWh at \$0.26 (\$0.37 in 2040). **With the introduction of Megachargers** in 2020 (output till 1MW) for Tesla Semi, we forecast that on 2040 the revenues from Supercharger’s stations will be \$6bn and the revenues from Megachargers’ stations will be \$8bn, forecasting a 48% usage (50% in 2020) and a price per kWh at \$0.12 (\$0.10 in 2020).

**Due to technical improvements in the autopilot technology** (currently Tesla has Level 4), we estimate that the new models that will be produced after 2025 will have Autopilot Level 5 or fully autonomy. In consequence, many people will start using Tesla’s car sharing model or Tesla Fleet, where the car owner will share its fully autonomy vehicle with other people when he it is not using the car. Comparing current car sharing companies’ prices, we estimate that the total fee per mile charged by the car’s owners to the users will be \$0.75 with Tesla keeping 20% (\$0.15). We assumed that 10%, 15% and 20% respectively of Model X, Model S and Model 3 in circulation after 2025 will be used for the Tesla Fleet network, increasing to 20%, 25% and 40%. Moreover, we model that an average user will use Tesla’s car sharing network for an amount equal at 19% of its annual miles, gradually increasing at 34% in 2040, when the overall technology will be fully tested and perfected. Overall, we estimate in 2025, \$256mn revenues for Tesla Network growing with an annual CAGR of 30% at \$13bn in 2040. In addition, **Tesla is offering maintenance and additional repair services for its customers**. We forecast this value to 1% of the automotive sales in 2018 and consequently growing at the same of the vehicles sales. Another significant source of revenues are the sales of ZEV credits attributed to the cars sold in U.S. With an average ZEV credit market price of \$1,000, we estimate Tesla to generate \$468mn in 2018, growing till \$3bn in 2025 and after this period, we believe that these incentives will totally expire.

**Energy Generation and Storage division**

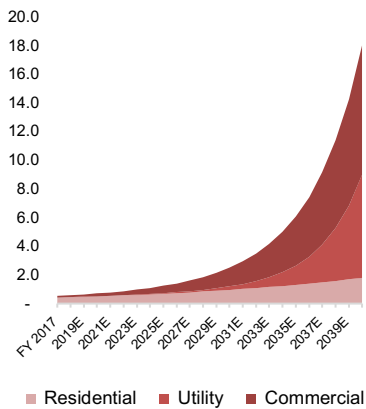
Tesla acquired SolarCity, market leader in U.S. for solar panels installations, in 2016, to create synergies with its automotive and energy storage division and to better accomplish the **long-term vision**. In the same year, the company

**Figure 37:** Energy Generation sales breakdown by type, in mn, from 2017 to 2040



Source: Company Reports, Own estimations

**Figure 38:** Solar PV annual deployment in GW by segment, from 2017 to 2040



Source: Company Reports, Own estimations

announced **Tesla Roof**, a particular type of solar shingles designed look like a functional and aesthetical normal roof. Currently, the company is proposing four types of purchasing model for solar panels installations: **Direct Cash, Power Purchase Agreements, Leasing and Loans**. We forecast SolarCity division to **expands its services** in Europe and China, thus part of revenues will come from government credits due to PV installations. Taking in account the current environmental policies and solar subsidies, we calculate credits to be 34% of total user’s installation in 2018, down to 22% in 2021 and stabilizing at 10% until 2040, generating revenues for \$402mn in 2018 growing to \$7bn in 2040. Overall, we estimate the Energy Generation and Storage division sales for \$2bn in 2018, growing at \$129bn in 2040 with a CAGR of 21% over the forecasted period.

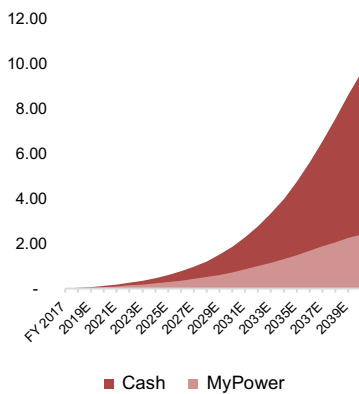
▪ **Solar PV**

Since the creation, **Solar City has targeted only the U.S.**, having 31% market share in 2017. We model Tesla to **expand** its operation firstly in **Europe** and later in **China** and in the **Rest of the World**, although we forecast U.S. to remain the biggest market. Globally, we estimate a total deployment for the Energy Generation division of 624 MW in 2018, up to 30 GW in 2040, reaching 1% of global market share (0.5% in 2018). We calculate 574 MW deployed from Solar PV, rising up to 18 GW respectively in 2040. **Main drivers for the revenues will be the payment type mix**; since in 2017, Tesla decided that will push the buyers of Solar PV systems to use Cash or PPA as a payment model, we calculate for 2018, 56% of the revenues (70% in 2040) to come from Cash, 19% (17% in 2040) from MyPower, 15% (8% in 2040) from PPA and 10% (5% in 2040) from Leasing. Overall, we estimate Solar PV segment to generate revenues for \$842mn in 2018, rising to \$11bn in 2040. Moreover, in 2018, 77% of total revenues will come from Residential installations, 22% from Commercial and 1% from Utility. We project a reduction in share from Residential installations till 10% by 2040, due to cannibalization from Tesla Roof, while we calculate 50% of revenues to come from Commercial and 40% of revenues come from Utility installations.

▪ **Tesla Roof**

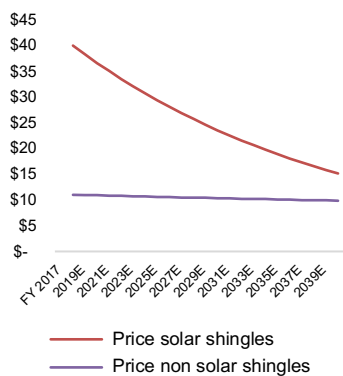
On 2016, Tesla unveiled a new product for its Energy Generation segment: The **Tesla Roof**, a new type of solar shingle designed to look like and integrate with conventional asphalt roof shingles. **The product is designed for customers** who would like to have solar panels on their homes without committing to the **questionable aesthetics of traditional photovoltaic systems**. The company states Tesla Roof to be manufactured in the

**Figure 39:** Tesla Roof GW annual deployment by payment type from 2017 to 2040



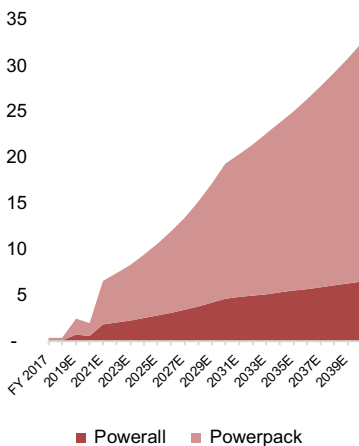
Source: Own estimations

**Figure 40:** Price of solar and non-solar shingles per square feet from 2017 to 2040



Source: Own estimations

**Figure 41:** Energy Storage deployment in GW by product, from 2017 to 2040



Source: Company Reports, Own estimations

Gigafactory 2. We estimate Tesla deploying 50 MW of solar shingles in 2018, increasing to 12 GW by 2040. Since Tesla Roof will target the Residential segment of PV installations, will be offered only two payment options: **Cash and MyPower**. We calculate the first to generate 60% (80% in 2040) of total annual sale, corresponding to \$351mn in 2018, growing at \$55bn at the end of the forecasted period. Main driver of revenues will be the total percentage customers' roof covered with solar shingles, estimated at 35%, with the price of those decreasing from \$40 per square foot in 2018 to \$15 in 2040, in line with the price of solar panels evolution. Overall, **Tesla Roof margins will be negative till 2026**, reaching 14% in 2040, due to an increase in the solar shingles coverage and a decrease in production costs.

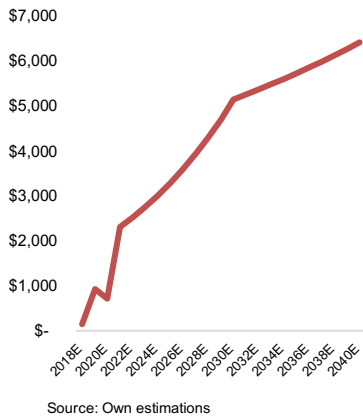
▪ Energy Storage

When examining what are the **main drivers** for the customers in choosing Tesla's storage products, we have to take into account several factors, such as **efficiency and performance, battery size, aesthetics, energy consumptions and grid connection**. Currently, Tesla is producing **two types of storage products** targeting two different markets: the Powerwall 2 is a 13.5 kWh battery priced around \$5,900 addressed to the residential market, while the Powerpack 2 is used to create battery storage power stations. Having a single capacity of 200 kWh and priced around \$398 per kWh, the Powerpack 2 can be assembled with other Powerpacks, creating an extended storage facility, ideally for the commercial and utility large scale projects. Although, Tesla has many competitors in the Energy Storage sector, especially **LG, BYD, Enphase Energy** and many other automakers are entering or have entered in the market such **BMW**, the first mover-advantage, the price-quality, the brand awareness and the feasibility of the construction of storage power stations with Powerpacks, are **will be a crucial element for Tesla revenues**. We think that Gigafactory 1 will remain the main factory for battery production dedicated to the Energy Storage and Vehicle division. We estimate for 2018, 110 MW and 270 MW total deployment for Powerwalls and Powerpacks, increasing by 2040 at 7 GW and 26 GW annual deployment, respectively. Main drivers for the growth will be the implementation with SolarCity's PV systems for Powerwalls installations, while for Powerpacks installations will be an increasing demand from large scale energy projects. We estimate in 2018, the Energy Storage division will have a margin of 20% out of \$340 mn revenues, increasing in 2040 to 23% out of \$6 bn revenues, due to a further expansion of Gigafactory 1 and a decreasing cost for the battery production.

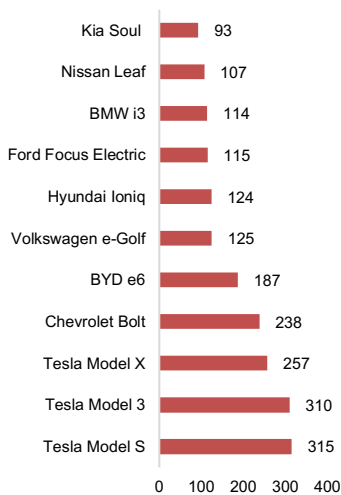
# Company Valuation

## Risk and Competitiveness Analysis

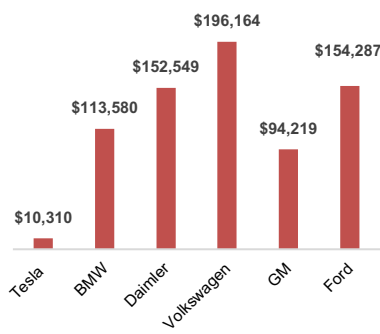
**Figure 42:** Energy Storage revenues, in mn, from 2018 to 2040



**Figure 43:** Average range in miles for the best-selling EV models



**Figure 44:** 2017 Debt comparison between automotive peers



Tesla sells its vehicles, energy generation and storage products exclusively through **Tesla Stores**. While in the long-term this can save SG&A costs, however, may slow the sales due to the not extensive geographical coverage of its stores. Moreover, since the beginning of its history, Tesla has been focusing on **design and technology of its products**, implementing new production processes through advanced engineering. Nonetheless, the company has never seen a profitable year despite the exponential increase of the revenues. Facing a high demand, an R&D and SG&A, historically Tesla has **been struggling to scale up the manufacturing processes of its products**. Since the introduction of Model 3, the company has never meet the demand, consistently not hitting its production targets.

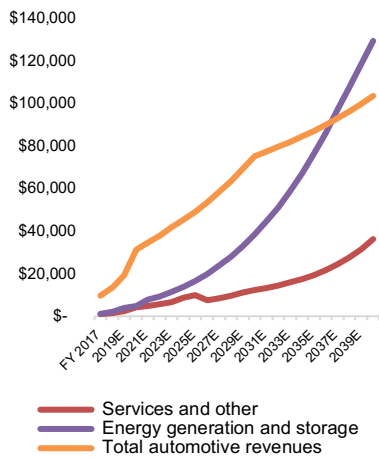
At Gigafactory 1, Panasonic is in charge of manufacturing the battery cells for Model 3, which Tesla assembles into battery modules and ships to the Fremont factory, where they will be mounted in the vehicles. In order to support its targets, Panasonic needs to reach a rate over 15 GWh per years of battery cells to fix be able to solve the Model 3 shortfall. We model, Gigafactory 1 to produce 19 GWh of batteries by the end of 2018, thus fixing the current bottleneck in the manufacturing process. We model also, the company to be profitable on 2023, once will fix all production issue and will receive the **positive of effects** of the economy of scale from Gigafactory 1, the **introduction of new services** such Tesla car sharing network (Tesla Fleet) and the **reduction of cost** of total R&D and SG&A caused by synergies between the divisions. However, the company’s burning cash rate is high and if the company will not fix the Model 3 shortfall, will lose credibility in front of the investors and the consumers.

Since Tesla will compete against more established companies, we believe that the high targets that the company is setting, the diversity of its division and the competition from companies that are only focusing in one sector, may have a negative impact into the market penetration for all its operating segments. Lastly, the current CEO Elon Musk is spreading in many different projects and has proven to overestimate company’s performance and targets, leading in our opinion to an excessive enthusiasm from the investors, even though we believe the clean energy will have a highly significant impact in all industrial sectors. **In the long-term**, if the company consistently does not meet its announced targets, will create

a disbelief in both its customers and investors and eventually will generate a liquidity problem that could trigger the bankruptcy.

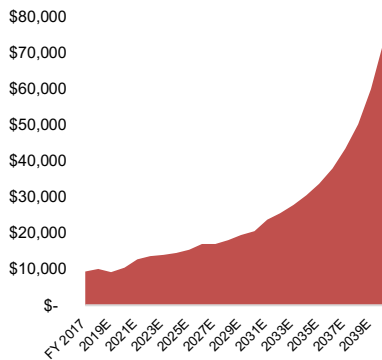
### Financial Forecast

**Figure 45:** Revenues breakdown by segment, in mn, from 2017 to 2040



Source: Company reports, Own estimations

**Figure 46:** Debt projection in mn, from 2016 to 2040



Source: Company reports, Own estimations

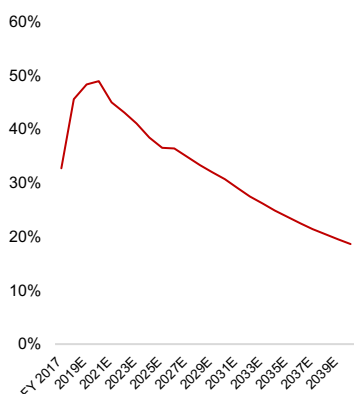
We estimate Tesla’s revenues to growth through the analysed period at annualised compound growth rate of 13.3%, with the Energy Generation segment leading the increase (20.7% CAGR), followed by the Energy Storage segment (18.7% CAGR) and lastly the Automotive Segment (9.7%). We model Vehicles sales and leasing to generate 78% of revenues while gradually slowing at 38% in 2040 with Energy Generation growing importance from 9% of 2018 till 46% of 2040. A crucial factor for the profitability of the company are its Operating Expenditures such Research & Development (R&D) and Selling, General & Administrative expense. We estimate Opex to account for 46% of total revenues in 2018, increasing at maximum of 49% in 2020 and steadily decreasing at 19% by 2040.

Since the IPO, Tesla **has raised a considerable amount of debt** to finance its activities, but due to its non-profitability, **its credit rating has been constantly decreasing over the years**. In 2016, 85% of Shareholders supported the acquisition of SolarCity, in attempt to rescue the company from its swelling debt as integrating its Solar PV business with Tesla. However, SolarCity debt is mostly non-recourse and Tesla does not guarantee the repayment. Of \$10 bln total debt in 2017, around \$3 bln is non-recourse debt, which is for the major part attributed to SolarCity. Mounting financial pressures and Model 3 production delays, caused a downgrade in rating from the major rating agencies. We project over our forecasted period that the excess cash this will be used for the debt repayment and additional operating investments. We model also the company to become profitable on 2023, once will ramp up the production of Tesla Semi and Roadster and the issues will Model 3 production will be completely fixed. **Lastly, we believe Tesla’s technological product superiority and its brand awareness**, will help the company to raise funds from investors, reaching a Debt-to-Enterprise Value ratio at 40% by 2040 (17% in 2018), in line with the automotive industry levels.

### Operational Efficiency and Investments

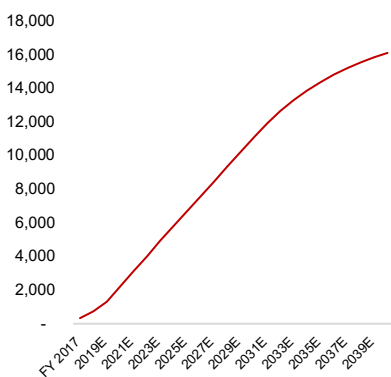
We believe in the medium-long term the main drivers for Tesla’s profitability will be the reduction of the costs in the automotive segment. We estimate that the excessive automatization **will decrease the efficiency in the short-term**, due to problem with synergies on the diverse assembly platforms, but in the long-term

**Figure 47:** Opex as % of Revenues, from 2017 to 2040



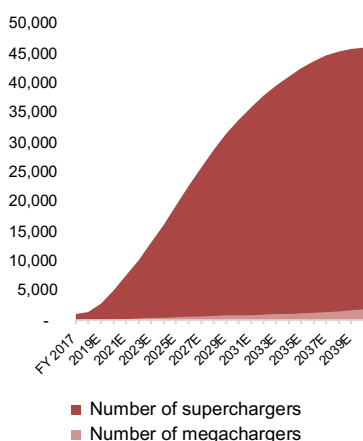
Source: Company reports, Own estimations

**Figure 48:** Number of stores from 2017 to 2040



Source: Company reports, Own estimations

**Figure 49:** Number of charging stations from 2017 to 2040



Source: Company reports, Own estimations

this will constitute a **main advantage** compared to the peers. When fully implemented, the Gigafactory 1 will **significantly lower** the battery cost, and further improvements in material usage and in the equipment, **will gradually increase the automotive division margin**. For the automotive division, we evaluate R&D and SG&A not as a % of revenues, but rather as **\$ per vehicle sold**, to better capture the value that these 2 variables have in the Income Statement. Considering the historical values and the automotive peers, we model in 2018 R&D at \$12,440 per car and SG&A at \$22,655 per car, gradually decreasing in 2040 at \$3000 and \$12,000 per car respectively, in line with industry. We applied the same reasoning while forecasting R&D and SG&A for the Energy Generation and Storage segment, by considering **\$ per watt deployed**. We estimate R&D to be \$0.02 per watt and SG&A \$0.13 per watt in 2018, decreasing overtime at \$0.01 per watt and \$0.06 per watt respectively by 2040. **R&D and SG&A are important drivers for an highly-tech company such Tesla**. In the past years, these values impacted negatively in the business, creating a negative Cash Flow situation for the company. Since the company own its stores and has very low expense in marketing, we model SG&A costs to slightly decrease overtime, while for R&D expenses, we will decrease as the company matures, reaching industry values.

In recent years, Tesla **has rapidly increase its number of stores** but still the company as the lowest car per store (306 in 2017) compared to the competitors. We model that the company will continue to build new stores around the markets where it is operating, targeting 1900 car per store by 2040. Consequently, in line with the vehicles sale growth, we estimate a total 16,095 stores by 2040 compared to the 330 of 2017 with a total investment of \$10 billions over the forecasted period. Furthermore, a **crucial aspect for EV adoption is infrastructure**. As Tesla’s owns its supercharging stations, in 2017 there were in total 1,045, with an average 6 stalls per stations. We forecast the company to have 1,335 in 2018, growing up to 45,942 in 2040. Additionally, we model 92 Megachargers to be built in 2020, raising to a total of 1,824 stations in 2040. We estimate \$18 billion total investment for Tesla throughout the forecasted period.

Gigafactory 1 and Gigafactory 2 were built to with **the aim of solving all supply and logistic issues** by producing batteries and other equipment for EV, Powerwall/Powerpacks and Photovoltaic systems in a single location. To meet the demand for its energy systems and electric vehicle we forecast a further expansion of both Gigafactories. We estimate a total expenditure of \$40bn for the Gigafactory 1 expansion and \$5bn for the Gigafactory 2 expansion by 2040. Including Tooling, equipment and building acquisitions, we calculate CAPEX to be

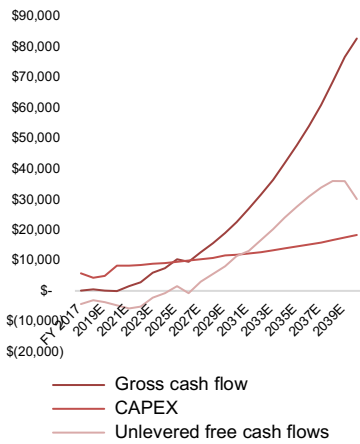
\$3.6bn in 2018, up to \$15bn in 2040 with an overall expense of \$211bn over the forecasted period.

### Valuation

In order to evaluate Tesla, we used **Discounting Cash Flow method** for the fundamental analysis. The explicit forecast period ranges from **2018-2040**, since we model Tesla’s cash flows to be negative till 2024. We estimated current Debt-to-Equity ratio to reach industry levels by 2040, thus we unlevered the current Beta and we adjusted it with the target **Debt-to-Equity** ratio of 67%.

We computed the new **Cost of Equity** value at 12.3% using the Capital-Asset-Pricing-Model and a Market-Risk premium of 5.1%. Therefore, we estimated the weighted average Cost of Capital at 8.9%, taking in account as Risk Free rate (2.8%) the 10-y Treasury Bond yield, as Cost of Debt (5.05%) the Bloomberg forecasted debt yield of firms with Rating B-, adjusted<sup>7</sup> with the Annualized Default Rate (0.4%) and the Recovery Rate (31.5%) for companies of the same Rating, given by Moody’s. For the terminal growth rate, we used the Global GDP long-term forecast by the World Bank of 1.8% and we added the global expected long-term inflation of 2.0%, achieving a growth rate in perpetuity of 3.8%. By summing all the present values of the unlevered free cash flows we estimate an Enterprise Value of \$52bn, that added to the terminal value of \$14bn results in final Enterprise Value for the forecasted period of \$67bn. Thus, subtracting the Net Debt, we calculated an Equity value of \$59bn resulting in a share price equal to \$348.38. Moreover, to further finance the production of Model 3, we estimate Tesla to raise \$1.1 bln in equity during the 2018, issuing 3 mln shares at a target DCF price of \$348.38. Given forecasted 173mn shares outstanding by the end of the year, we calculated a new target price of \$341.95 per share, with a potential 12-month gain of 24.3% over the current share price of \$275.01 (as of May 23). Based on this **Base Case scenario** we recommend a **BUY position** on the stock.

Figure 50: Cash flow performance from 2017 to 2040



Source: Company reports, Own estimations

Figure 51: Share Sensitivity Analysis on WACC and Terminal g

		WACC				
		8.4%	8.9%	9.4%	9.9%	10.4%
Terminal g	2.8%	\$ 382	\$ 327	\$ 281	\$ 242	\$ 208
	3.3%	\$ 392	\$ 334	\$ 286	\$ 245	\$ 211
	3.8%	\$ 404	\$ 342	\$ 291	\$ 249	\$ 213
	4.3%	\$ 419	\$ 352	\$ 298	\$ 254	\$ 217
	4.8%	\$ 439	\$ 364	\$ 306	\$ 259	\$ 220

Source: Own estimations

<sup>7</sup> We applied the following formula: Rd = Yield – Probability of Default x (1 – Recovery Rate)

## Scenario Analysis

We modelled one **Good** and one **Bad** scenario besides the **Base**, taking in consideration the global market share achieved by the three-business segment, the battery cost decrease and the cash weight of the payment mix for the Solar PV division. In the **Good Scenario** we assume Tesla to solve all the issues regarding the production of the vehicles and batteries thus achieving 4.2% of global annual EV sales in 2040, increasing with an annual CAGR of 11.8% over the forecasted period. In the Energy Generation segment, we model Tesla to deploy 40 GW of Solar PV installations by 2040, with a CAGR of 20.8%, due to a constantly increase in demand for Tesla Roof, achieving 1.4% global market share on total PV deployment. In the Energy Storage business, Tesla will deploy 45 GW of batteries by 2040, with a CAGR of 24.2%, achieving a global market share of 2.4%, in result to the positive effects of a decrease in battery cost and the willingness of the Energy Generation costumers to integrate to their PV system the Tesla's battery products. Moreover, we assume that the cash percentage on total payment mix for Solar PV installations will be 77% and the battery to cost 40% less at the end of the forecasted period, following positive effects from economy of scale, leading in a final valuation of \$527.81 per share with a potential 12-month return of 92%.

In the **Bad Scenario** we assume Tesla to not be able to meet its target and demand, having constant problems with scaling production and manufacturing processes and struggling in competing against other automakers. The battery cost will decrease by 28% and the company will not achieve the cost parity with the ICE vehicles. We model in this scenario that the company's automotive global market share will be 2.1% by 2040. In the Energy Generation sector, the company will struggle to compete against more established firms, especially from Asian companies that will produce at lower cost, achieving a global market share of 0.7% of the total PV deployment, increasing with a CAGR of 17.2% over the forecasted period. In the Energy Storage segment, we project the company to increase at a CAGR of 20.4%, resulting in a global market share of 1.3%. We also estimate that the cash percentage on total payment mix for Solar PV installations to be 63%. The resulted final valuation for this scenario is \$158.66 per share leading to a potential 12-month loss of 42%.

Taking in consideration all the above-mentioned scenarios with 15% probability for Good and Bad scenario and 70% probability for Base scenario, we project a final valuation for 2018 of **\$342.33 per share**, thus resulting in a **BUY recommendation for the stock**.



Figure 52: Scenario Analysis

	2040 Automotive (A), Energy Generation (G), Energy Storage (S) Global Market share	Battery Cost decrease in %	2040 Cash weight on Energy Generation payment mix	Valuation Price	Probability	12-month return	Recommendation
<b>Bad Case</b>	A: 2.1%, G: 0.7%, S:1.3%	28%	63%	\$ 158.66	15%	-42%	SELL
<b>Base Case</b>	A: 3.0%, G: 1.1%, S:1.7%	36%	70%	\$ 341.95	70%	24%	BUY
<b>Good Case</b>	A: 4.2%, G: 1.4%, S: 2.4%	40%	77%	\$ 527.81	15%	92%	BUY
				<b>\$ 342.33</b>		<b>24%</b>	<b>BUY</b>

Source: Own estimations

## Comparable Analysis

**Tesla has a unique business model among its peers.** The company is highly verticalized since it produces most of the components for its products. Moreover, is not possible to identify its business model with one sector, but its comparable are identified in 4 types of industries: **Disruptive Technology, Auto suppliers, Clean Technology, Luxury automotive and High Growth Automakers.** Since EBITDA, EBIT and Net Income stand negative for Tesla in 2018, we used Price-To-Book and Price-To-Sales comparable’ multiples to evaluate the company. Currently Tesla’s P/B ratio is 13.7x and P/S is 4.9 against the peer’s average of respectively 3.1x and 1.94x. We forecast market capitalization to be 13.0x its book value and 4.7x its revenues. Out multiple-based valuation suggests a share price of \$106 resulting in a **SELL recommendation.** We believe that this result is biased due to the fact that apart for the High Growth Automakers peers, the rest of the companies are matured and established in the sector where they operate, leading to low trading multiple. The higher trading multiples for Tesla are a result of the currently growing stage of the company and we consider that this multiple will lower with the increasing of Revenues.

## Final Considerations

Over the years, **Tesla has definitely demonstrated to bring radical changes and innovation in the automotive and energy sector.** Under the lead of Elon Musk, the company is setting ambitious targets by bringing a mass model such Tesla Model 3, a new electric truck and a new sports car such are Tesla Semi and Roadster, with the aim to implement in all its vehicles a fully autonomy guide system. The race for a highway capable autonomous vehicle is already on and it is a crowded field with technology and automobile companies vying to get their products out as soon as possible. We think Tesla has a considerable advantage in that, because has already implemented its **semi-autonomous software** update on several cars and the more cars it sells the more data it collects. Combining this with an affordable car driven by people everywhere and the data collection, the

subsequent learning curve to **fully autonomous implementation** could be very short. The problems with the **production ramp-up** of Tesla Model 3 will affect Tesla's sales in the short and medium term in a market highly competitive with many established and mature automakers. In addition, SolarCity's acquisition will play a **central role** in Tesla's strategy in creating a unique ecosystem where all its products are integrated. However, will take some time to PV solar and battery systems to have high margins, but the company is shifting toward this direction by privileging cash payments instead of leasing or loans. All the above-mentioned factors combined with the segments' unbalanced customer portfolio and operational inefficiencies will contribute to generate negative cash flows in the short-term period. Even if Tesla will benefit for its customer satisfaction, brand commitment and government incentive, will not be sufficient for the company to generate profits and positive FCF in the next 5 years.

After the ponderation of the base, good and bad case scenarios, our valuation model calculates a **target price for 2018 of \$342.33**, which means that, in our opinion, currently the market is **undervaluing** the company. This leads to our **BUY recommendation** on the stock with a potential +24.5% 12-month return.





## Cash Flow Statement

in million																								
Tesla Motors - Cash flow statement	FY 2017	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E	2036E	2037E	2038E	2039E	2040E
EBIT	\$ (1,632)	\$ (769)	\$ (1,919)	\$ (2,715)	\$ (1,204)	\$ (77)	\$ 1,689	\$ 5,069	\$ 7,862	\$ 6,718	\$ 9,709	\$ 13,138	\$ 17,054	\$ 21,356	\$ 26,626	\$ 32,313	\$ 38,474	\$ 45,180	\$ 52,502	\$ 60,506	\$ 69,269	\$ 78,841	\$ 89,291	\$ 100,674
Adjusted taxes	\$ (170)	\$ (111)	\$ (430)	\$ (634)	\$ (205)	\$ 107	\$ (587)	\$ (1,504)	\$ (1,980)	\$ (1,971)	\$ (2,464)	\$ (3,381)	\$ (4,425)	\$ (5,578)	\$ (6,973)	\$ (8,492)	\$ (10,136)	\$ (11,922)	\$ (13,870)	\$ (15,993)	\$ (18,311)	\$ (20,836)	\$ (23,571)	\$ (29,593)
Depreciation	\$ 1,636	\$ 1,224	\$ 1,524	\$ 2,060	\$ 2,573	\$ 3,066	\$ 3,543	\$ 4,008	\$ 4,463	\$ 4,915	\$ 5,357	\$ 5,793	\$ 6,265	\$ 6,706	\$ 7,160	\$ 7,613	\$ 8,067	\$ 8,528	\$ 8,998	\$ 9,487	\$ 9,991	\$ 10,513	\$ 11,057	\$ 11,625
<b>Gross cash flow</b>	<b>\$ 174</b>	<b>\$ 565</b>	<b>\$ 36</b>	<b>\$ (21)</b>	<b>\$ 1,574</b>	<b>\$ 2,882</b>	<b>\$ 5,819</b>	<b>\$ 7,573</b>	<b>\$ 10,345</b>	<b>\$ 9,661</b>	<b>\$ 12,602</b>	<b>\$ 15,550</b>	<b>\$ 18,894</b>	<b>\$ 22,484</b>	<b>\$ 26,814</b>	<b>\$ 31,434</b>	<b>\$ 36,406</b>	<b>\$ 41,786</b>	<b>\$ 47,630</b>	<b>\$ 54,000</b>	<b>\$ 60,949</b>	<b>\$ 68,518</b>	<b>\$ 76,777</b>	<b>\$ 82,705</b>
Change in net working capital	\$ (1,767)	\$ (1,568)	\$ (2,511)	\$ (3,757)	\$ (1,855)	\$ (1,609)	\$ (1,899)	\$ (2,203)	\$ (2,239)	\$ (1,670)	\$ (2,729)	\$ (3,053)	\$ (3,407)	\$ (3,767)	\$ (2,860)	\$ (3,202)	\$ (3,580)	\$ (3,995)	\$ (4,443)	\$ (4,918)	\$ (5,413)	\$ (5,908)	\$ (6,382)	\$ (6,798)
Change in other assets and liabilities	\$ (435)	\$ (279)	\$ (1,065)	\$ (744)	\$ (129)	\$ (33)	\$ (100)	\$ (169)	\$ (131)	\$ 130	\$ (142)	\$ (134)	\$ (93)	\$ 5	\$ 826	\$ 1,204	\$ 1,775	\$ 2,631	\$ 3,916	\$ 5,849	\$ 8,762	\$ 12,709	\$ 19,371	\$ 29,519
Change in operating lease vehicles	\$ 983	\$ 1,125	\$ 2,211	\$ 911	\$ 1,030	\$ 1,165	\$ 1,319	\$ 1,494	\$ 1,693	\$ 1,919	\$ 2,177	\$ 2,471	\$ 2,806	\$ 3,188	\$ 3,623	\$ 4,119	\$ 4,685	\$ 5,332	\$ 6,069	\$ 6,911	\$ 7,872	\$ 8,969	\$ 10,223	\$ 11,655
CAPEX	\$ 5,726	\$ 4,299	\$ 5,010	\$ 8,263	\$ 8,241	\$ 8,489	\$ 8,844	\$ 9,212	\$ 9,564	\$ 9,885	\$ 10,384	\$ 10,789	\$ 11,688	\$ 11,842	\$ 12,293	\$ 12,769	\$ 13,283	\$ 13,853	\$ 14,468	\$ 15,200	\$ 15,913	\$ 16,671	\$ 17,475	\$ 18,323
Invested capital	\$ 4,506	\$ 3,576	\$ 3,645	\$ 4,673	\$ 7,287	\$ 8,012	\$ 8,164	\$ 8,334	\$ 8,888	\$ 10,265	\$ 9,690	\$ 10,074	\$ 10,994	\$ 11,268	\$ 13,882	\$ 14,890	\$ 16,163	\$ 17,821	\$ 20,010	\$ 23,042	\$ 27,133	\$ 32,441	\$ 40,687	\$ 52,700
<b>Unlevered free cash flows</b>	<b>\$ (4,332)</b>	<b>\$ (3,011)</b>	<b>\$ (3,609)</b>	<b>\$ (4,694)</b>	<b>\$ (5,713)</b>	<b>\$ (5,130)</b>	<b>\$ (2,345)</b>	<b>\$ (761)</b>	<b>\$ 1,457</b>	<b>\$ (604)</b>	<b>\$ 2,912</b>	<b>\$ 5,476</b>	<b>\$ 7,900</b>	<b>\$ 11,216</b>	<b>\$ 12,932</b>	<b>\$ 16,544</b>	<b>\$ 20,243</b>	<b>\$ 23,965</b>	<b>\$ 27,620</b>	<b>\$ 30,958</b>	<b>\$ 33,815</b>	<b>\$ 36,077</b>	<b>\$ 36,090</b>	<b>\$ 30,006</b>
Net financial result	\$ (577)	\$ (358)	\$ (325)	\$ (366)	\$ (445)	\$ (472)	\$ (484)	\$ (500)	\$ (529)	\$ (583)	\$ (584)	\$ (615)	\$ (665)	\$ (697)	\$ (801)	\$ (862)	\$ (935)	\$ (1,023)	\$ (1,132)	\$ (1,272)	\$ (1,450)	\$ (1,671)	\$ (1,992)	\$ (2,440)
Tax shield	\$ (202)	\$ (97)	\$ (88)	\$ (99)	\$ (120)	\$ (127)	\$ (131)	\$ (135)	\$ (143)	\$ (157)	\$ (158)	\$ (166)	\$ (179)	\$ (188)	\$ (216)	\$ (233)	\$ (252)	\$ (276)	\$ (306)	\$ (343)	\$ (391)	\$ (451)	\$ (538)	\$ (468)
Change in cash	\$ 150	\$ (3,045)	\$ 320	\$ 551	\$ 255	\$ 214	\$ 255	\$ 300	\$ 298	\$ 194	\$ 359	\$ 400	\$ 446	\$ 490	\$ 341	\$ 379	\$ 421	\$ 467	\$ 515	\$ 564	\$ 613	\$ 658	\$ 696	\$ 720
Change in debt	\$ 3,302	\$ 704	\$ (1,003)	\$ 1,270	\$ 2,393	\$ 821	\$ 390	\$ 475	\$ 872	\$ 1,653	\$ 40	\$ 946	\$ 1,519	\$ 978	\$ 3,190	\$ 1,859	\$ 2,217	\$ 2,697	\$ 3,327	\$ 4,264	\$ 5,429	\$ 6,753	\$ 9,802	\$ 13,679
Change in non controlling interests	\$ 243	\$ (1,395)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Change in convertible notes	\$ (9)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Change in equity (in cash)	\$ 1,725	\$ 1,112	\$ 5,345	\$ 4,440	\$ 4,140	\$ 5,122	\$ 2,825	\$ 1,222	\$ (1,360)	\$ (116)	\$ (1,851)	\$ (5,241)	\$ (8,130)	\$ (10,819)	\$ (14,764)	\$ (16,929)	\$ (20,851)	\$ (24,896)	\$ (28,994)	\$ (33,043)	\$ (36,790)	\$ (40,050)	\$ (42,666)	\$ (40,057)
<b>Cash flow from financing</b>	<b>\$ 4,332</b>	<b>\$ 3,011</b>	<b>\$ 3,609</b>	<b>\$ 4,694</b>	<b>\$ 5,713</b>	<b>\$ 5,130</b>	<b>\$ 2,345</b>	<b>\$ 761</b>	<b>\$ (1,457)</b>	<b>\$ 604</b>	<b>\$ (2,912)</b>	<b>\$ (5,476)</b>	<b>\$ (7,900)</b>	<b>\$ (11,216)</b>	<b>\$ (12,932)</b>	<b>\$ (16,544)</b>	<b>\$ (20,243)</b>	<b>\$ (23,965)</b>	<b>\$ (27,620)</b>	<b>\$ (30,958)</b>	<b>\$ (33,815)</b>	<b>\$ (36,077)</b>	<b>\$ (36,090)</b>	<b>\$ (30,006)</b>

## Disclosures and Disclaimers

### Report Recommendations

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<b>Sell</b>	Expected negative total return (including expected capital gains and expected dividend yield) over a 12-month period.

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