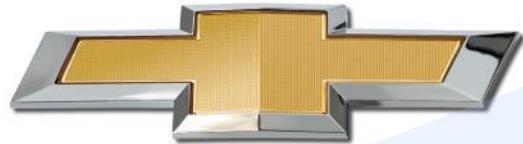
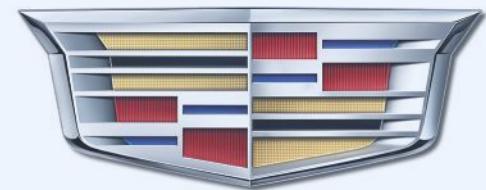


The Cash Cows
Mathias Bohn, Rodrigo Garcia, Marlène Luce, Roman Zanoli
HEC Paris
Paris, March 1, 2019

The Road Ahead



GMC



GENERAL MOTORS

By



The Cash Cows

*“If I had asked people
what they wanted, they
would have said faster
horses...”*

- Henry Ford



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Table of abbreviations

Abbreviation	Explanation	Abbreviation	Explanation
ADAS	Advanced Driver Assistance System	km	Kilometers
AV	Autonomous Vehicle	kWh	Kilowatt hour
BEV	Battery Electric Vehicle	lbs	Pounds
bn	Billion	m	Million
CAGR	Compound Annual Growth Rate	M&A	Mergers & Acquisitions
DCF	Discounted Cash Flow	mph	Miles Per Hour
DOJ	Department Of Justice	NPV	Net Present Value
EBIT	Earnings before Interest and Taxes	OEM	Original Equipment Manufacturer
EBITDA	Earnings before Interest, Taxes, Depreciation, and Amortization	OICA	International Organization of Motor Vehicle Manufacturers
EV	Electric Vehicles	OPEC	Organization of the Petroleum Exporting Countries
EV	Enterprise Value	P/E	Price-to-Earnings ratio
FCF	Free Cash Flow	PHEV	Plug-in Hybrid Vehicle
FTC	Federal Trade Commission	R&D	Research & Development
FY	Fiscal Year	RMB	Renminbi
GM	General Motors	SEC	Securities and Exchange Commission
HHI	Herfindahl-Hirschman Index	SEO	Secondary Equity Offering
HQs	Headquarters	SUV	Sport Utility Vehicle
ICE	Internal Combustion Engine	USD	United States Dollars
IEA	International Energy Agency	WACC	Weighted Average Cost of Capital
IPO	Initial Public Offering	YE	Year Ending
JV	Joint Venture		



EXECUTIVE SUMMARY

The right choice for
General Motors

GM should not acquire Tesla, but instead acquire Rivian, an EV truck manufacturer whose products and brand will have strategic value for GM in the future EV landscape



Should General Motors acquire Tesla?

GM should not acquire TESLA

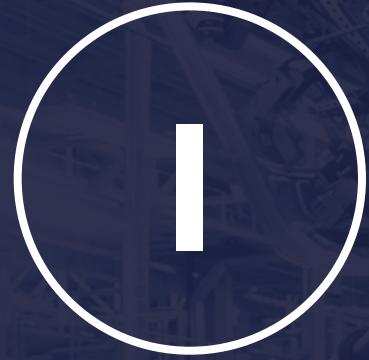


- The capital market currently **overvalues Tesla by 18%**
- Non-substantial synergies between GM and Tesla do not compensate for the high premium that needs to be paid, and an acquisition would, therefore, **destroy USD 26.2bn in value**
- An **acquisition is not feasible from a financial perspective**; a merger would make **Elon Musk the major shareholder** of the conglomerate; and Tesla has preventive measures in place

GM should acquire RIVIAN



- Rivian's **brand and products**, including an **electric pickup truck**, would be a **perfect fit with GM's core customers**
- Rivian's **technologies**, such as battery packs and self-driving tech, could be **pushed by GM's knowledge**
- After analysing the potential price and shareholder's structure, the **acquisition is feasible** for GM



MARKET ANALYSIS

The future of the
automotive industry

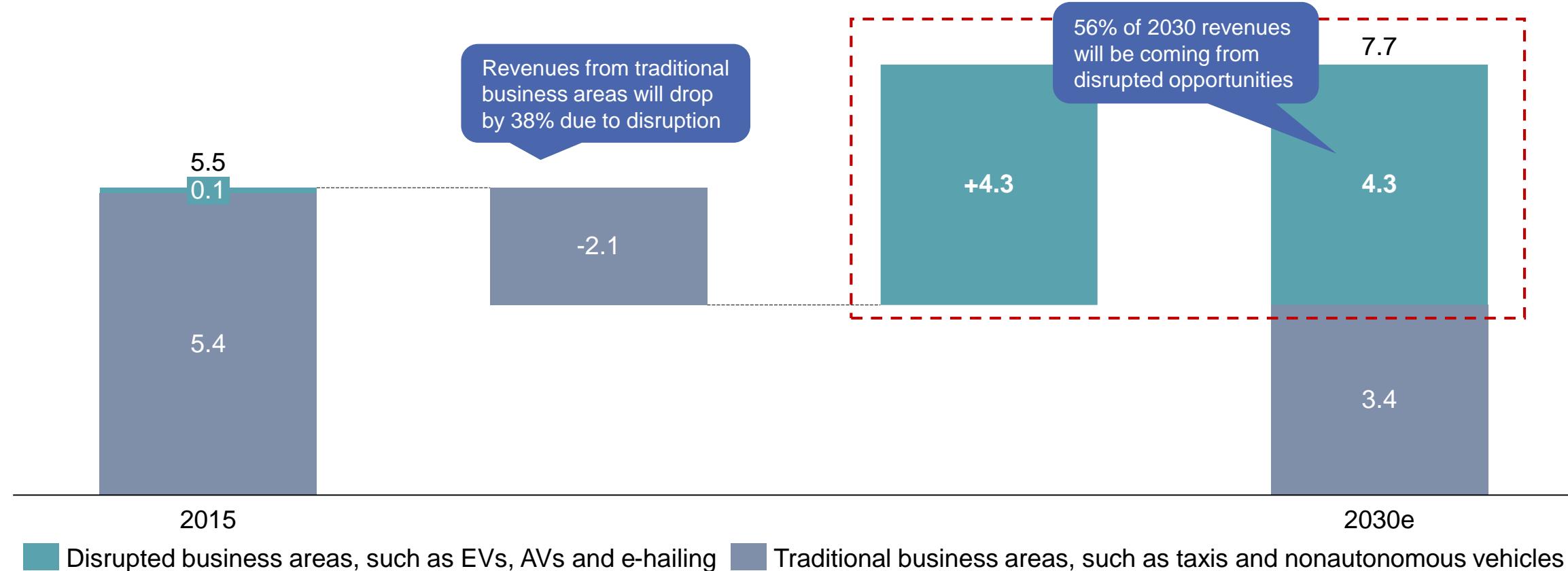
THE FUTURE OF THE AUTOMOTIVE INDUSTRY

By 2030, more than 50 percent of the automotive industry's revenue will be in disrupted business areas, such as electric vehicles (EVs) and autonomous vehicles (AVs)



More than 50 percent of the automotive industry's revenue will be in disrupted business areas by 2030

Global automotive ecosystem revenues, in USD trillion, 2015-2030e



Source: Dhawan, R., Hensley, R., Padhi, A. and Tschiesner, A. (2019, *McKinsey Quarterly*)

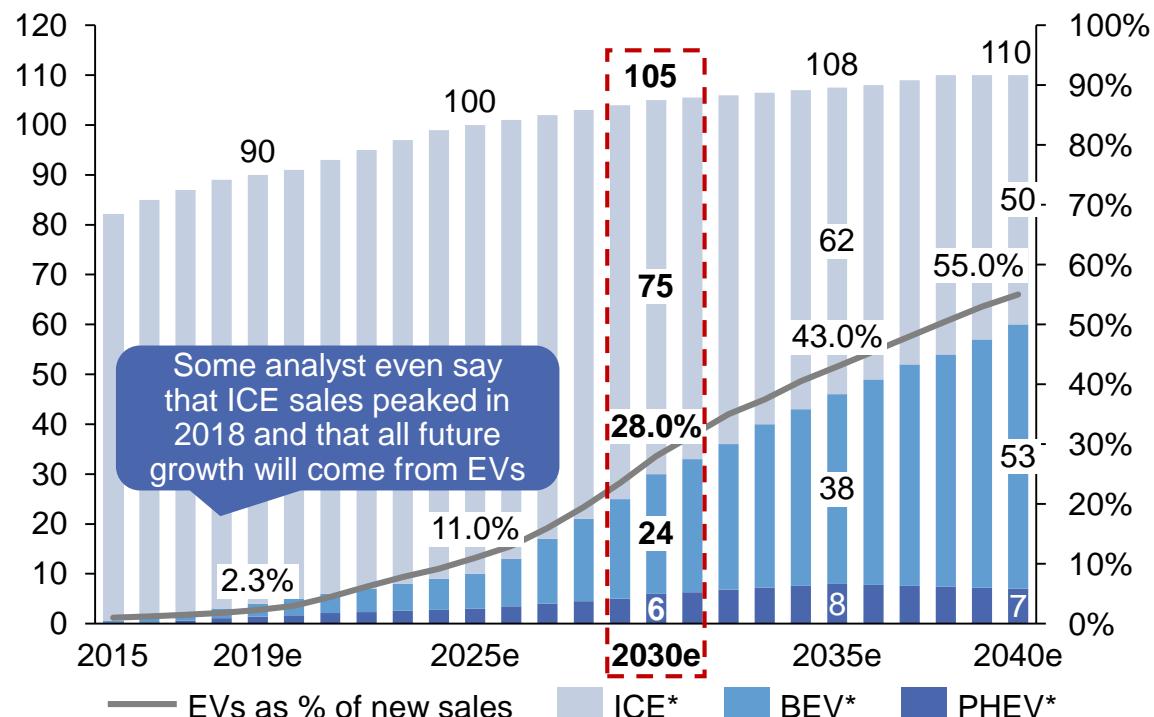
ELECTRIFIED VEHICLE SALES

In the same year, 28% of all new car sales will be electric, but since forecasts have been adjusted upwards every year in the past, this will most likely happen even sooner



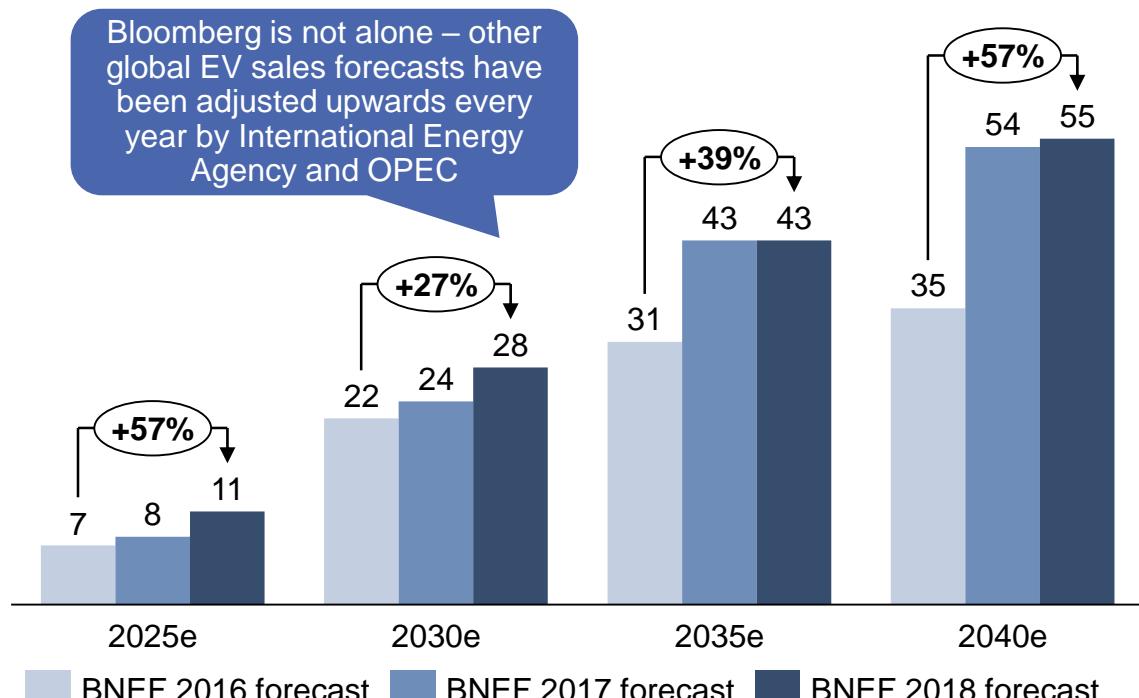
By 2030, more than every fourth car sold will be electric...

Annual global light duty vehicle sales in million cars, 2015-2040e



... and this will likely happen sooner, considering past forecasts

Bloomberg forecasts of new vehicle sales being electric, 2016-2018



By 2040, 55% of all new car sales will be electric, and ~560 million EVs will be on the road, representing 33% of the global fleet

Forecasts have been revised upwards every year in the past couple of years, with the most change in the short and long term

Note: *: ICE: Internal Combustion Engine, BEV: Battery Electric Vehicles, PHEV: Plug-in Hybrid Electric Vehicles

Source: Bloomberg (2017, 2018), MacDonald, J. (2016, Bloomberg), McGee, P. (2018, Financial Times)

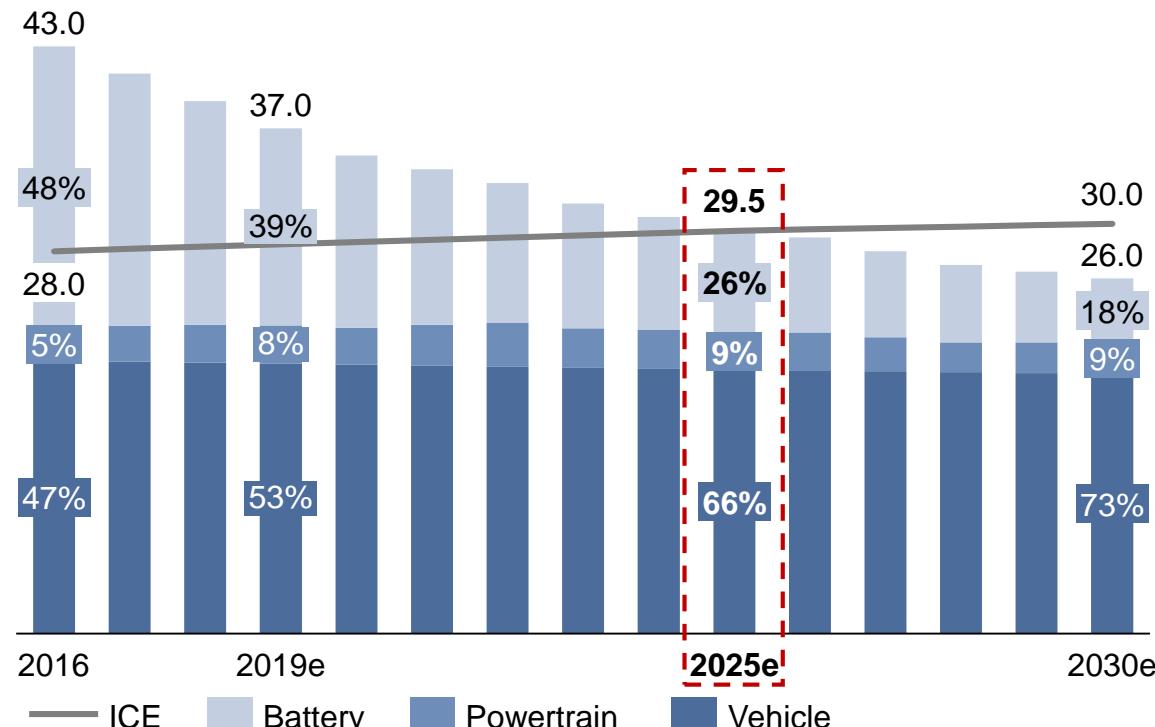
THE PRICE OF ELECTRIFIED VEHICLES

Average purchase prices of EVs have been falling continuously and are now projected to be on par with ICE vehicles around 2025, driven by a dramatic decline in battery cost



Purchase prices of EVs have been falling continuously...

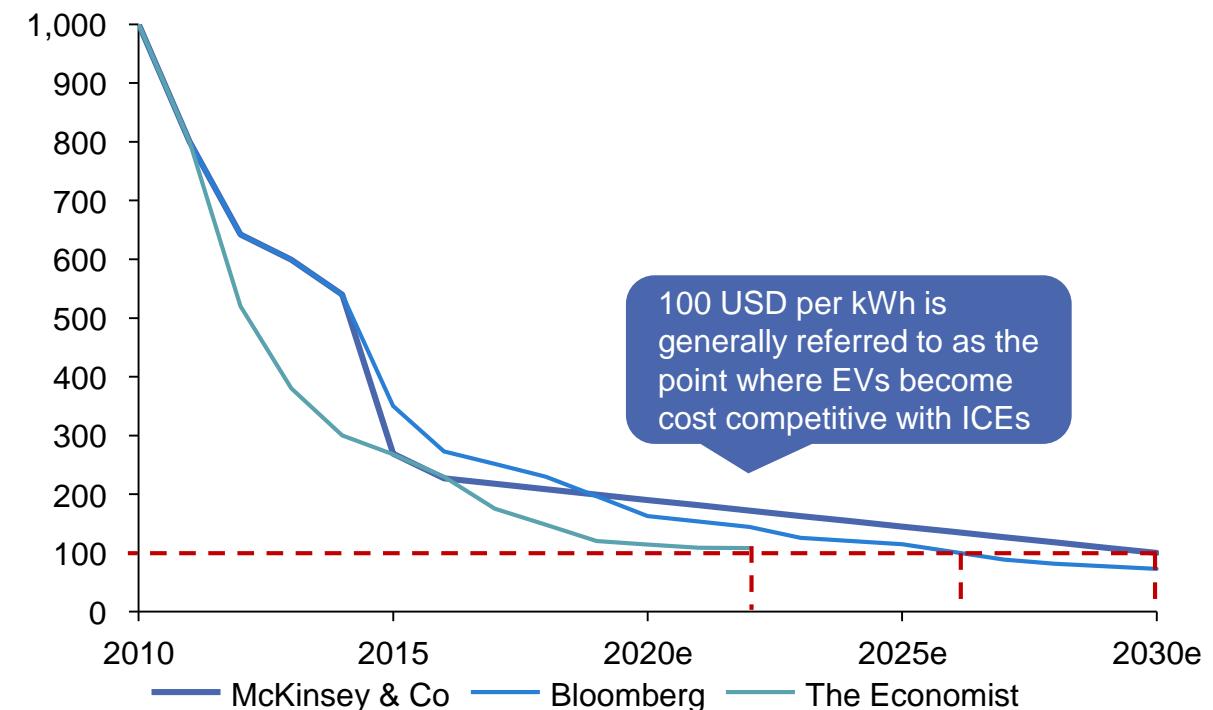
Development in EV purchase price, in USD thousand, 2016-2030e



The average purchase price of EVs is projected to be on par with ICEs in 2025, driven by declining battery cost

... driven by a dramatic decline in battery cost

Lithium-ion battery costs, in USD per kWh, 2010-2030e



Lithium-ion battery cost has decreased dramatically and is projected to reach USD 100 per kWh between 2022 and 2030

Source: Bloomberg (2017, 2018), MacDonald, J. (2016, Bloomberg), McKinsey & Company (2017), The Economist (2017)

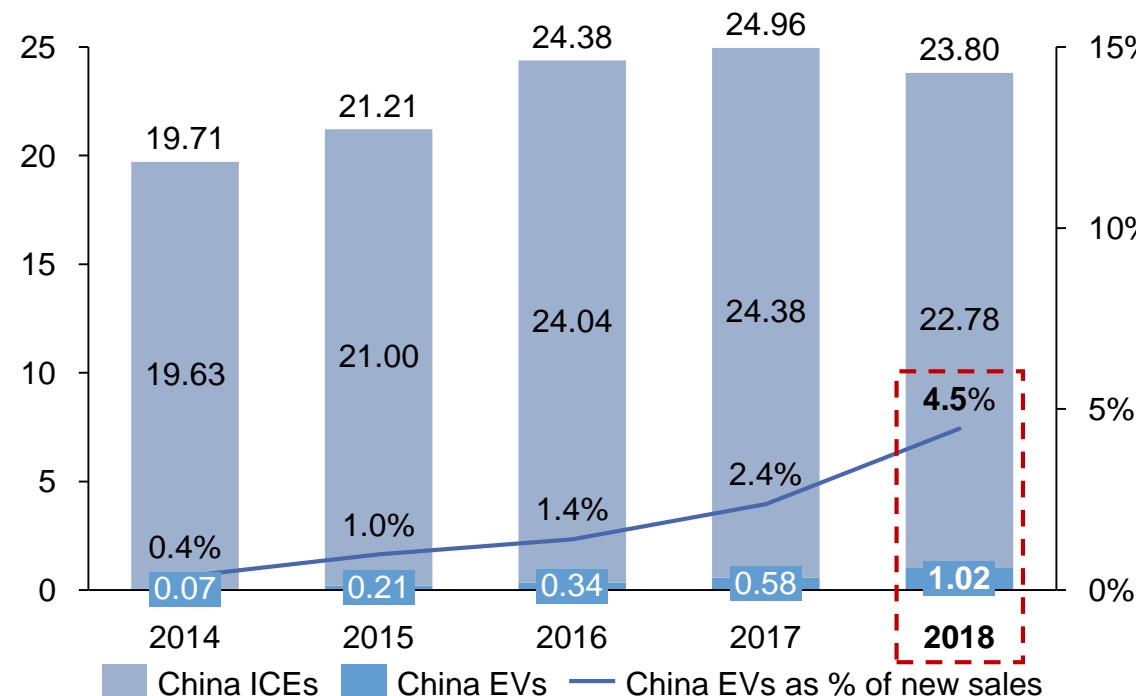
GENERAL MOTORS' CORE MARKETS

CHINA | In 2018, EV sales topped 1m for the first time, outstripping any other country, despite overall vehicle sales shrinking, marking China's projected global lead in EV sales



In 2018, EV sales topped 1m in China for the first time...

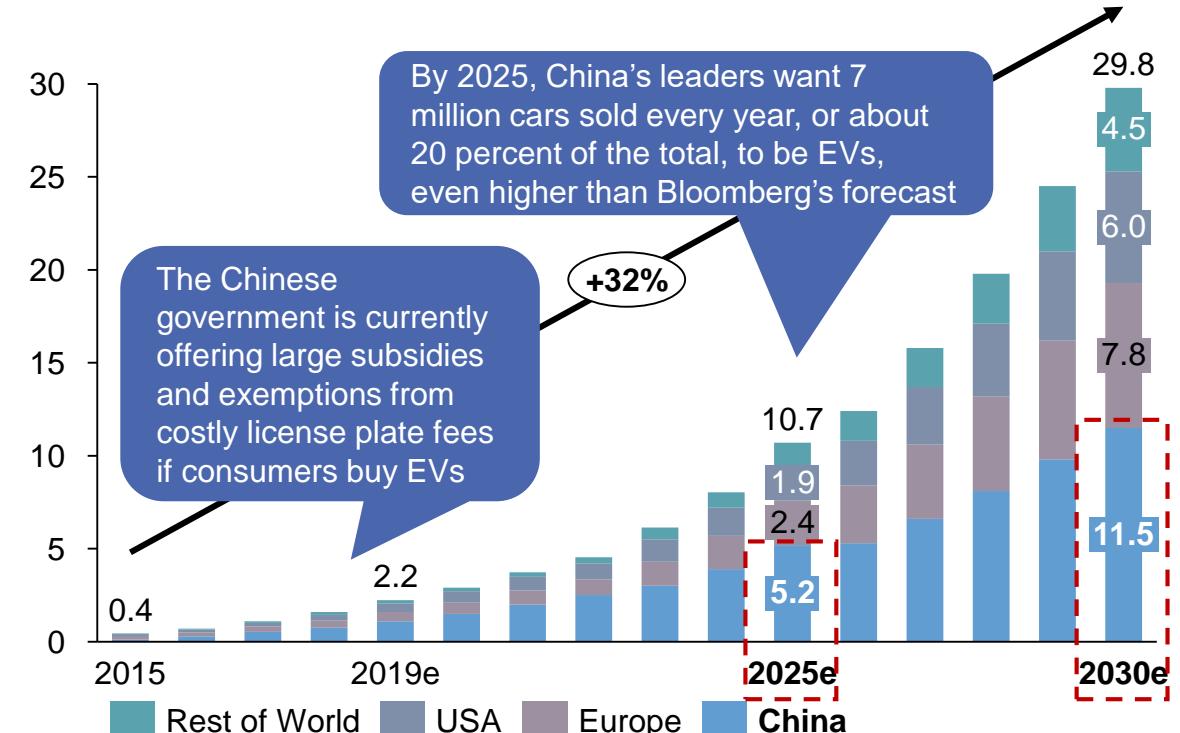
Vehicle sales in China, in million of vehicles, 2014-2018



In 2018, vehicle sales in China, the world's largest car market, shrank for the first time since 1990, but EV sales kept on rising

... and China will lead the charge as EV sales surge globally

Annual global electric vehicle sales, in million cars, 2015-2030



China is not only the biggest global car market today but is also projected to be the world leader in electric vehicles going forward

Source: Bloomberg (2017, 2018), Hancock (2019, *Financial Times*), IEA (2019), InsideEVs (2019d), OICA (2019), MacDonald, J. (2016, *Bloomberg*), Zhang, Y., Naughton, K., Rauwald, C. and Sachgau, O. (2018, *Bloomberg*)

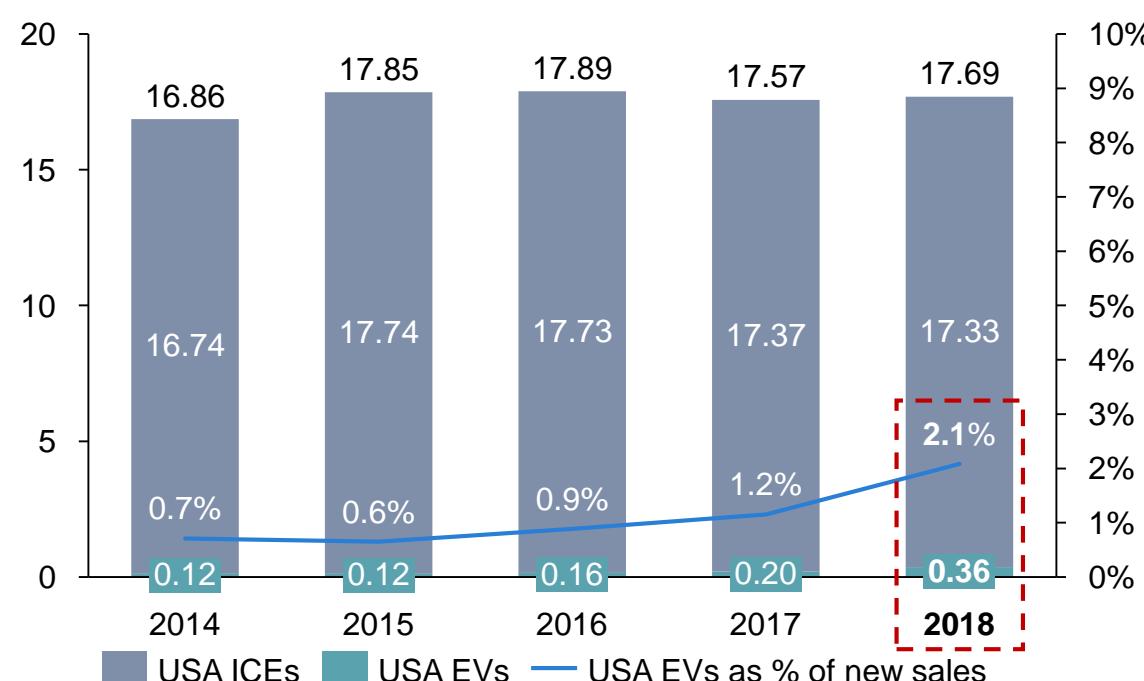
GENERAL MOTORS' CORE MARKETS



USA | In the US, EV sales are not climbing as fast as in China, partly due to a shift in consumer preferences towards pickup trucks and SUVs, which have fewer EV options

EV sales in the US has continued to climb in recent years...

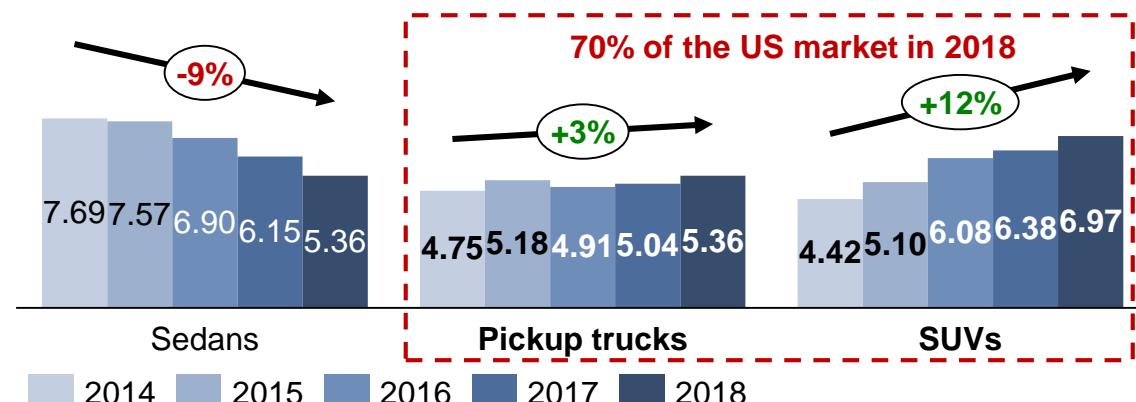
Vehicle sales in the US, in million of vehicles, 2014-2018



Despite overall flat vehicle sales in the US, sales of electric vehicles has continued to climb, but not as much as in China

... however, US consumers are more interested in large cars...

Vehicle sales in the US, in million of vehicles, 2014-2018



... due to a shift in preferences, which is profitable for car makers



Shift in demand

- Low fuel prices and a strong economy are incentivizing consumers to buy larger vehicles



Transaction prices

- SUVs' prices are 39% to 51% higher than sedans, but have minimal additional manufacturing cost



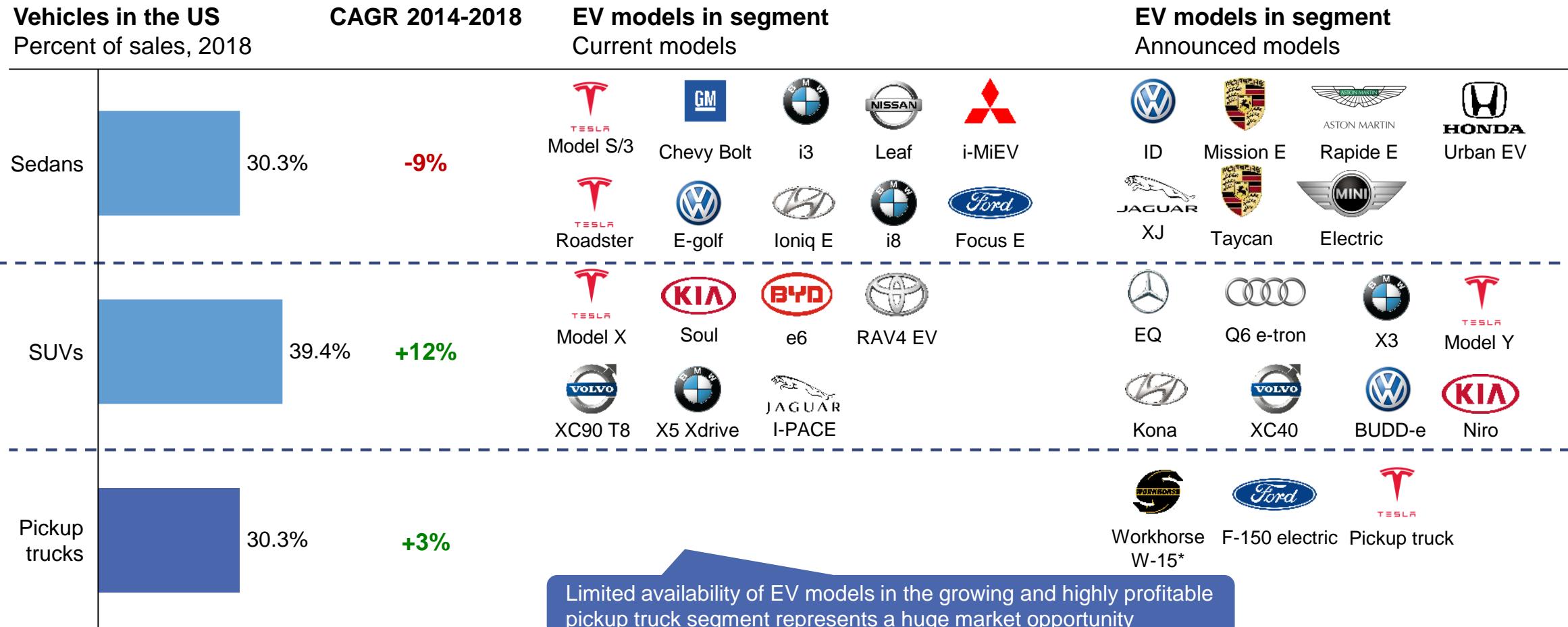
Luxury models

- Consumers are increasingly willing to pay \$70,000 to \$100,000 for modified pickup trucks

Source: Cohen, A. (2018, *Forbes*), Eisenstein, P. (2018, *CNBC*), Ferris, R. (2018, *CNBC*), General Motors (2016, 2019b), Irle, R. (2018, *EVVolumes*), Snyder, J. (2017, *Automotive News*)

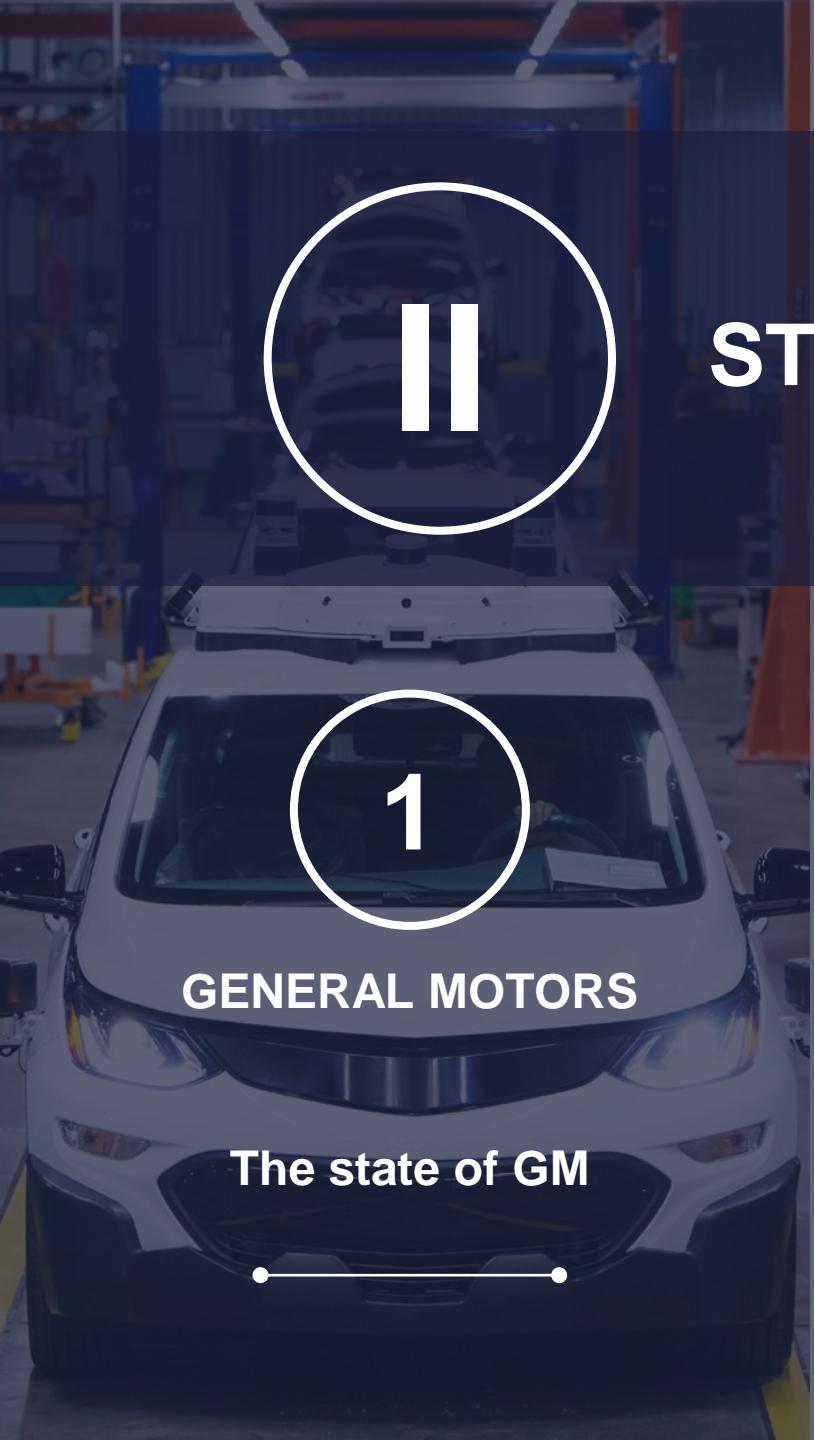
GENERAL MOTORS' CORE MARKETS

USA | Major car manufacturers are, therefore, readying their product portfolios for a soon-to-be-the-present future, in which their core customers want their favorite cars to be EVs



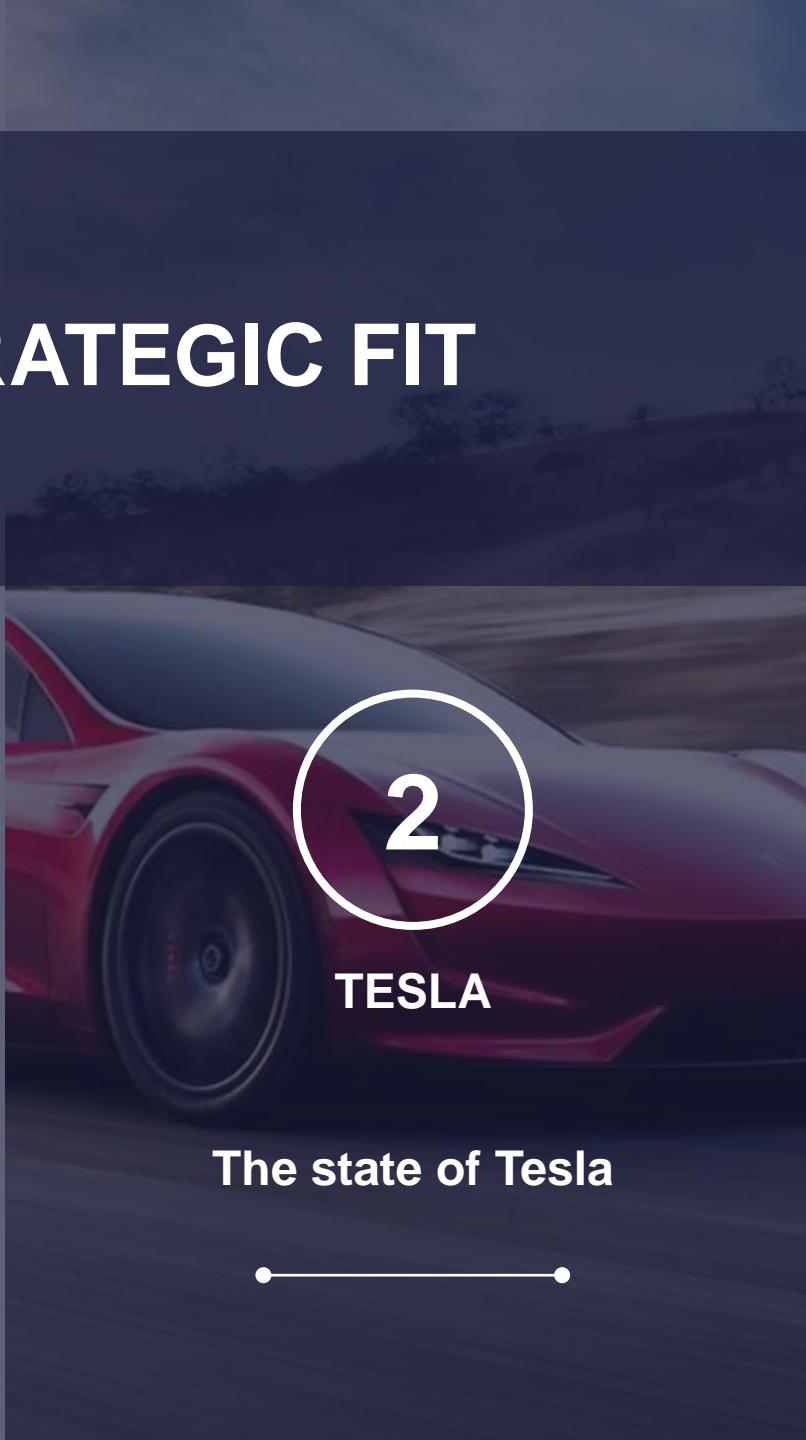
Note: *: The W-15 is not a pure BEV, but a plug-in range extended electric pickup (PHEV) designed for fleets. Workhorse have previously manufactured trucks for Fed Ex and U.S Postal Service;

Source: General Motors (2016, 2019b), Companies website



GENERAL MOTORS

The state of GM



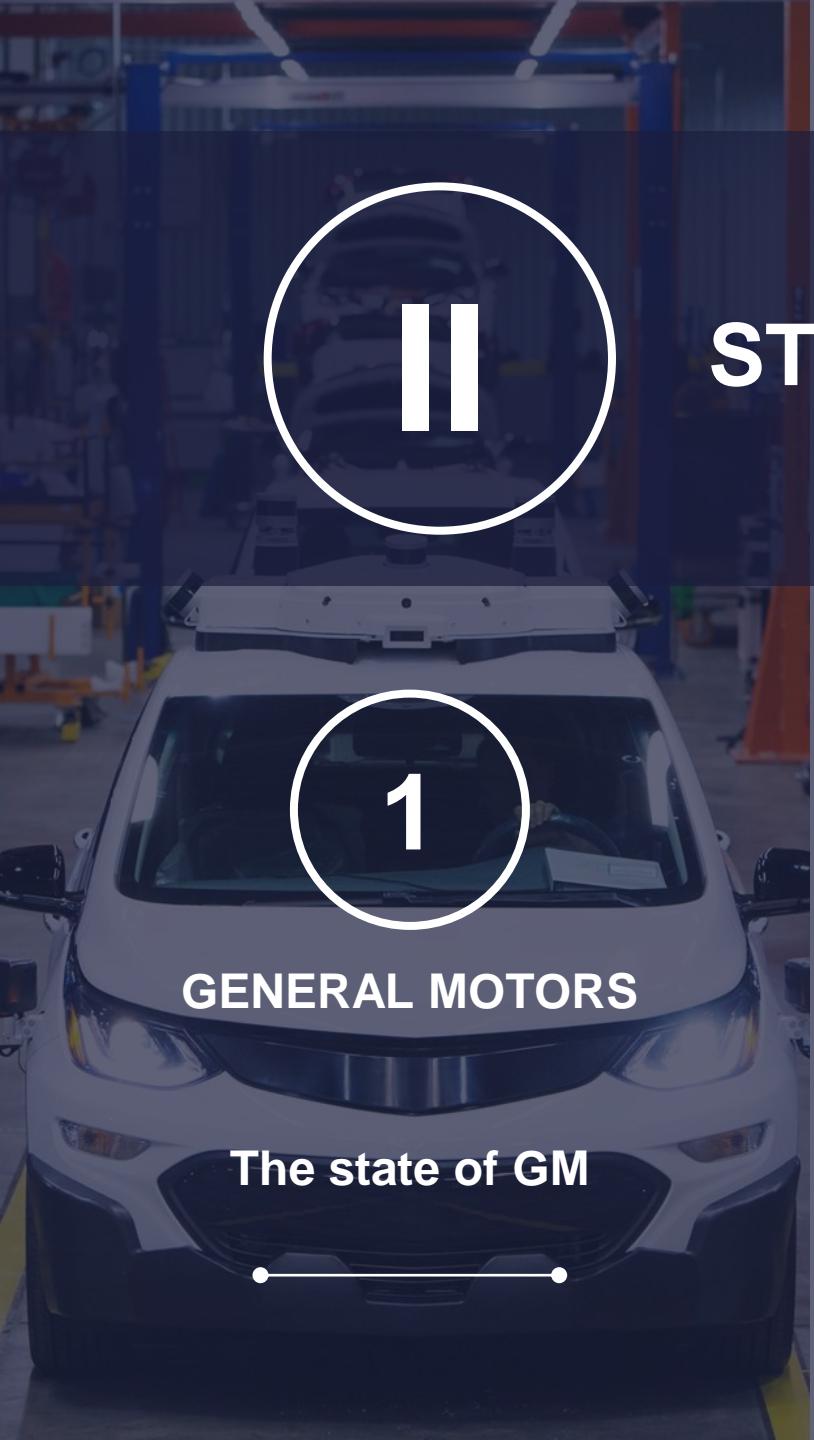
TESLA

The state of Tesla



STRATEGIC FIT

The fit between them



STRATEGIC FIT



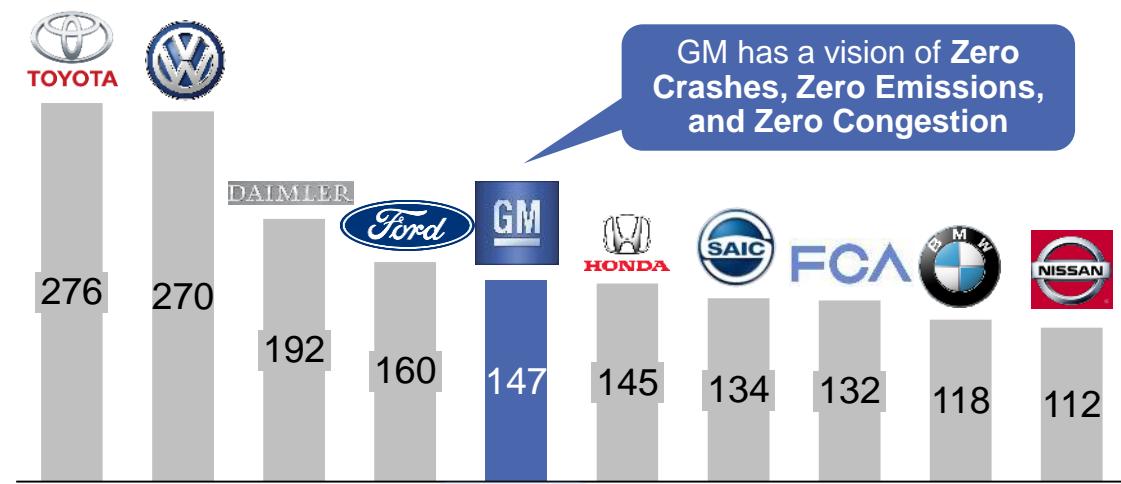
GENERAL MOTORS OVERVIEW

General Motors is one of the largest car manufacturers in the world with a clear vision for the future and holds market leading positions in the US and China



GM is one of the largest car manufacturers in the world...

Revenues of automotive manufacturers, in USD billion, FY2018*



Brand portfolio

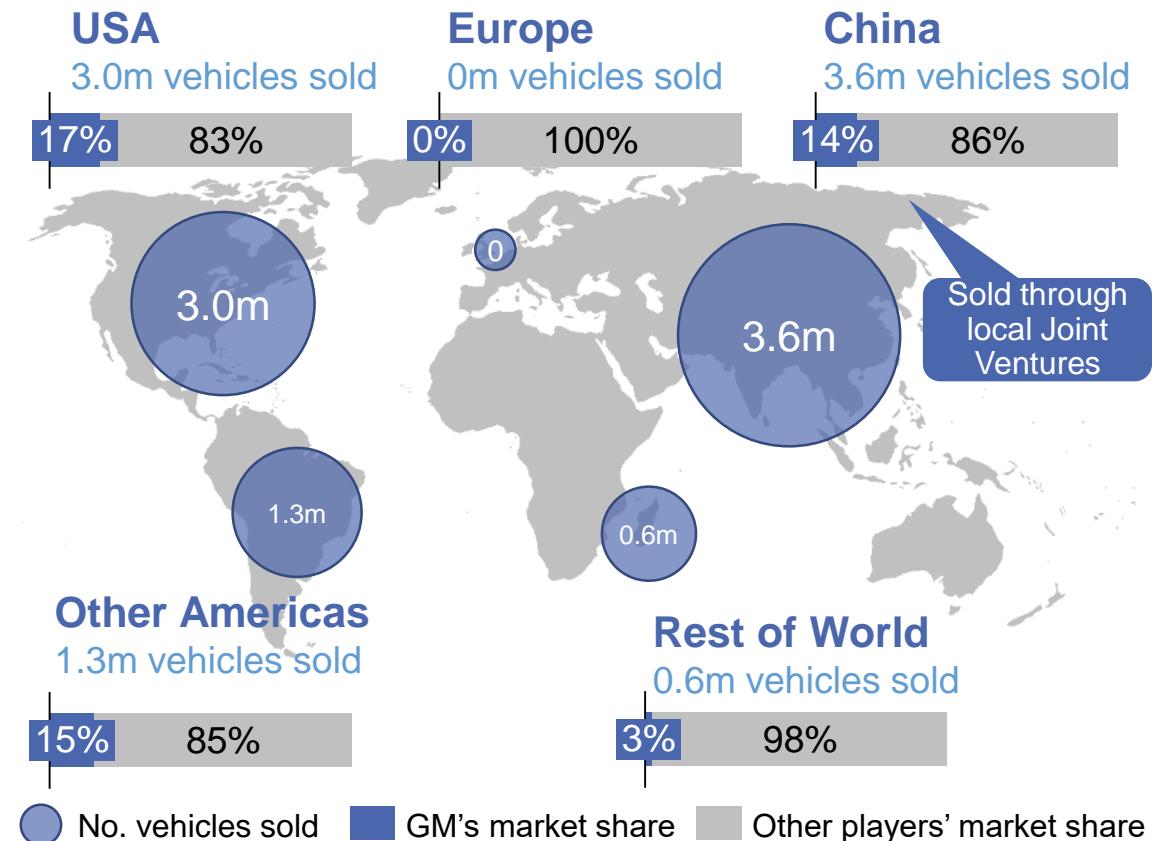


Note: *: FY 2018 or most recent publicly available filing

Source: Thomson Reuters Eikon (2019), General Motors (2019b)

... and is selling most of its cars in the US and China

GM's vehicle sales, in number of vehicles, 2018



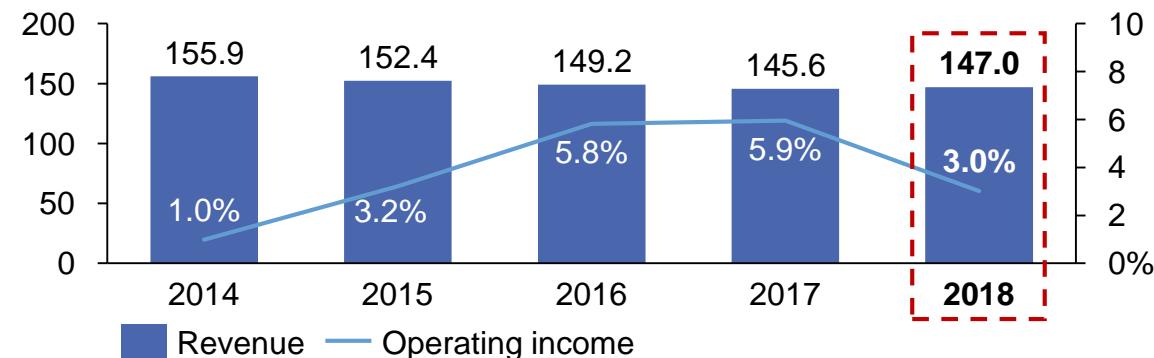
GENERAL MOTORS' PERFORMANCE IN THE MARKET

GM has been showing stable performance, which is largely due to its great performance with its core customers, the truck segment, of which it has a 25% share of the US market



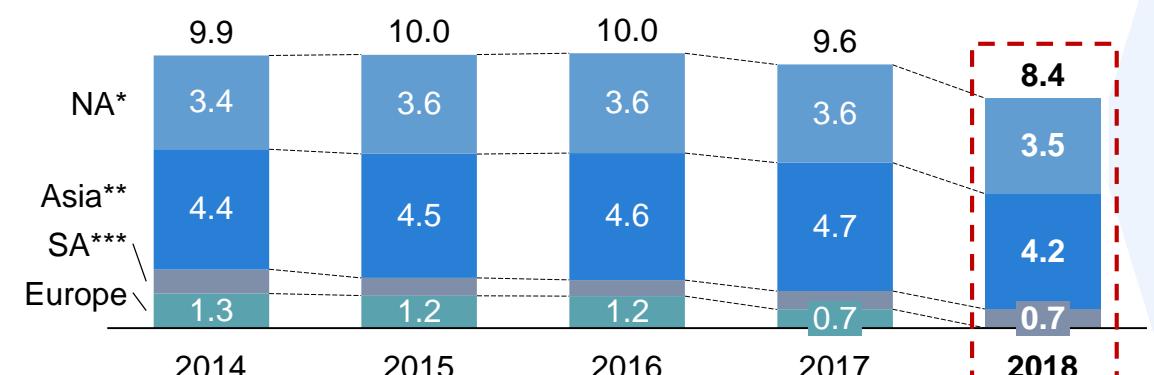
GM has been showing stable performance in the past years...

GM's revenues and operating margin, in billion USD, 2014-2018



... while exiting the European market completely in 2017

GM's vehicle sales, in million of vehicles, 2014-2018

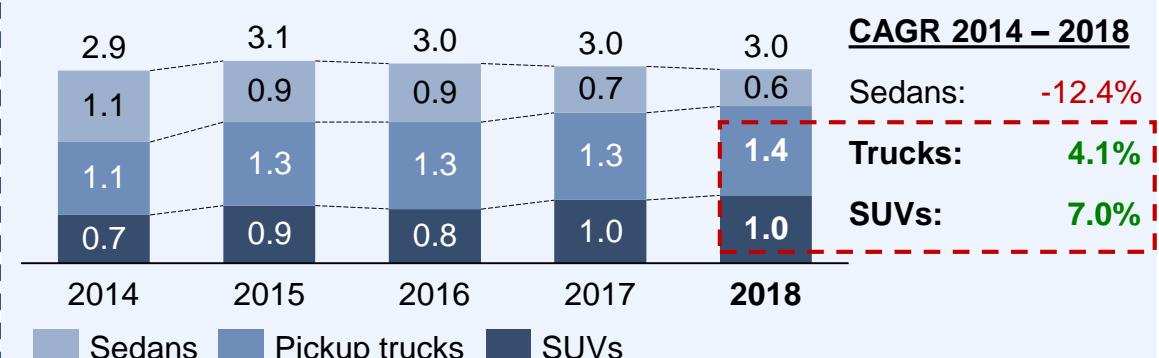


Note: *: North America; **: Asia/Pacific, Middle East, Africa; ***: South America

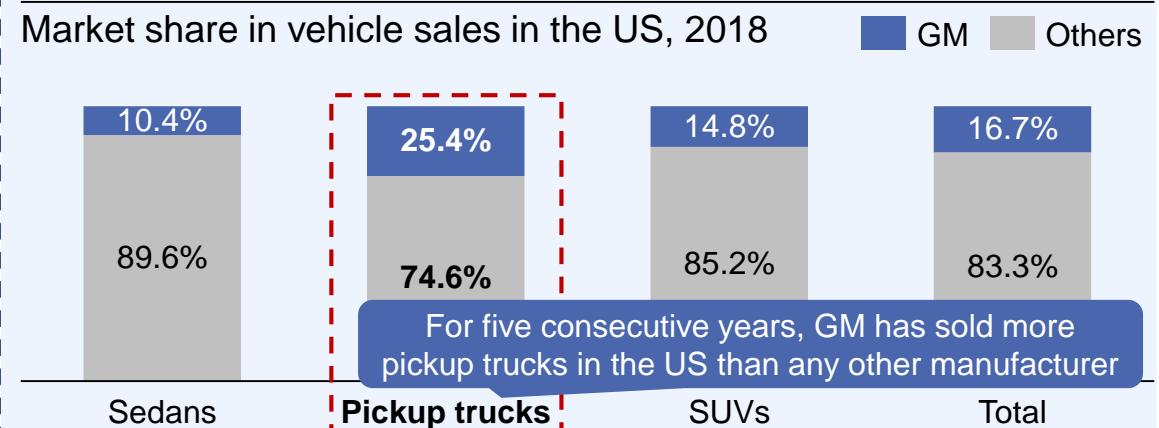
Source: General Motors (2019b)

In the US, GM is doing very well within pickup trucks and SUVs...

GM's vehicle sales in the US, in million of vehicles, 2014-2018



... and is dominating the competition when it comes to trucks



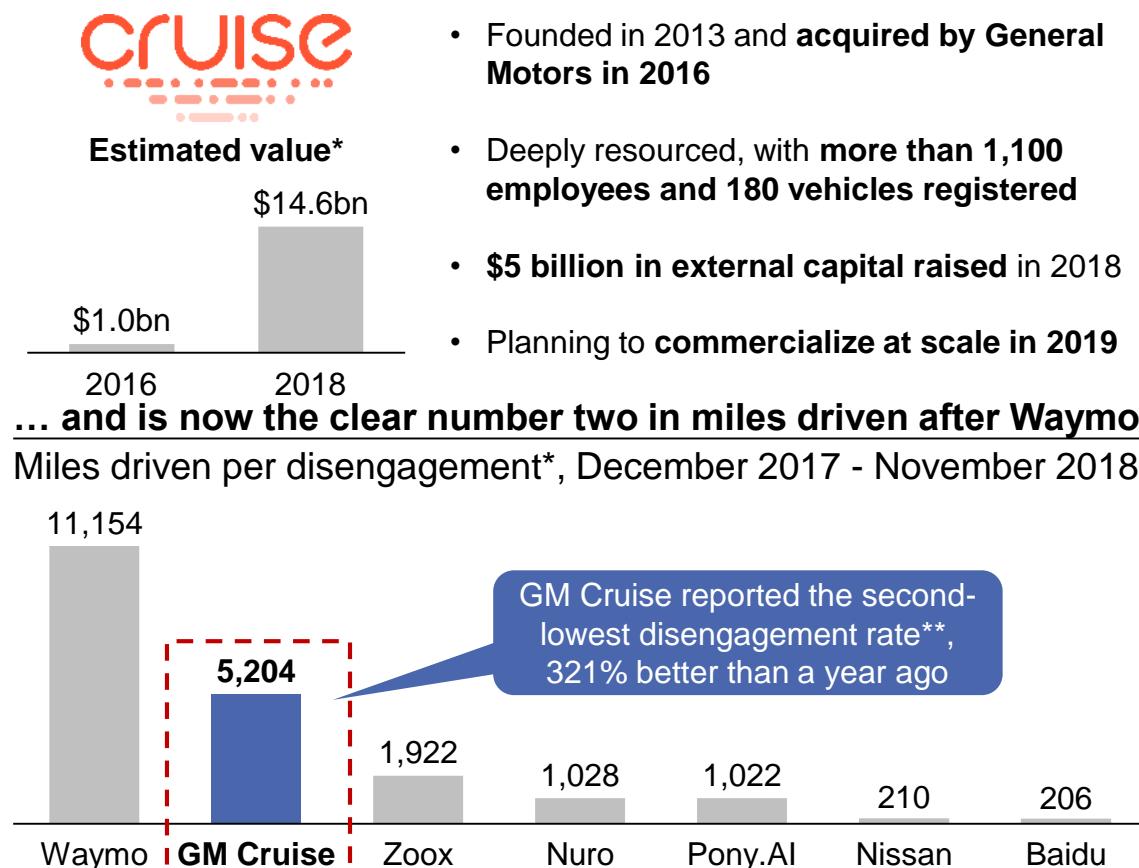
GENERAL MOTORS' RESPONSES TO THE AV AND EV TREND

GM has taken a leading position within autonomous vehicles and had the second largest share of EVs sold in the US last year, having also announced multiple new EV initiatives



GENERAL MOTORS' AV RESPONSE

GM has made headway in the AV market by acquiring Cruise...



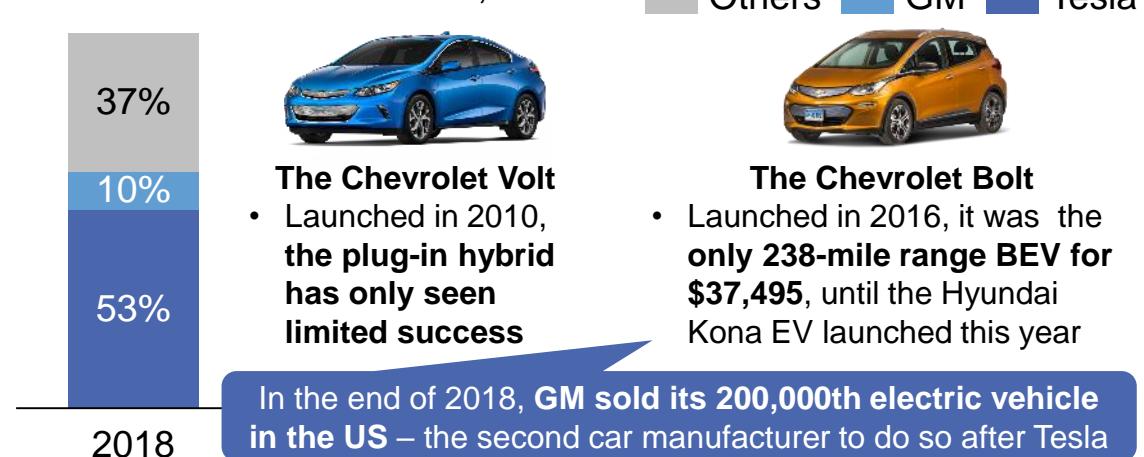
Source: CA.GOV (2019), InsideEVs (2019c), Seeking Alpha (2018a), General Motors (2019a), Bloomberg (2019)

Note: *: Values estimated based on investments of GM in '16 and Honda/Softbank in '18; **: A disengagement means "deactivation of the autonomous mode when a failure of the autonomous technology is detected or when the safe operation of the vehicle requires that the autonomous vehicle test driver disengage the autonomous mode and take immediate manual control of the vehicle."

GENERAL MOTORS' EV RESPONSE

GM holds the second largest EV share, driven by two models...

Share of EVs sold in the US, 2018



... and has announced multiple new EV initiatives going forward



The Cadillac EV

- Cadillac will become the leading electric vehicle brand of GM
- The Cadillac will use GM's "BEV3" next-gen electric vehicle platform, ready by 2021
- GM plans to introduce 20 electric vehicles globally by 2023 in the US and China
- GM aims to sell 1 million electric vehicles a year by 2026, many of them in China

GENERAL MOTORS' STRENGTHS AND CAPABILITIES

GM is also greatly positioned for growth as a share leader in the world's largest markets and is strong within capacity and supply chain management as well as product design



GM is currently a market share leader in the US and China...

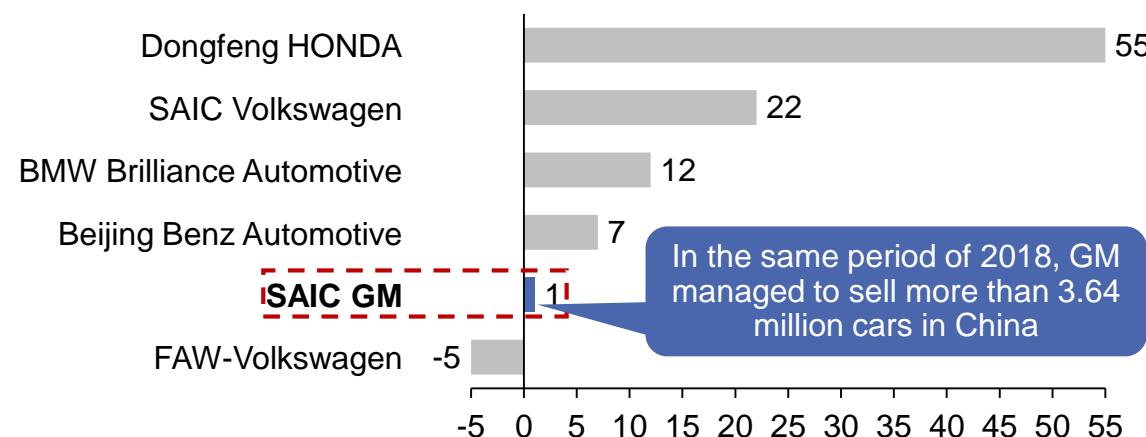
GM ranking in terms of country market share, 2018



- Greatly positioned for growth in the largest car markets in the world
- Largest foreign automaker in China and maintains numerous very successful joint ventures

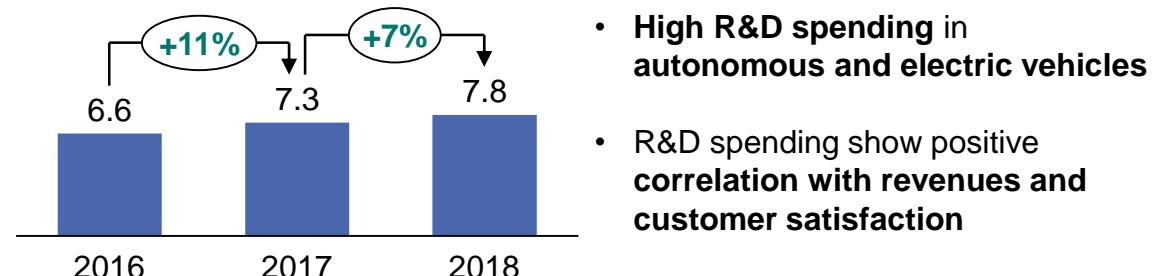
... with great production capabilities and capacity management

Difference production and sales in China, in thousands of cars, 2018



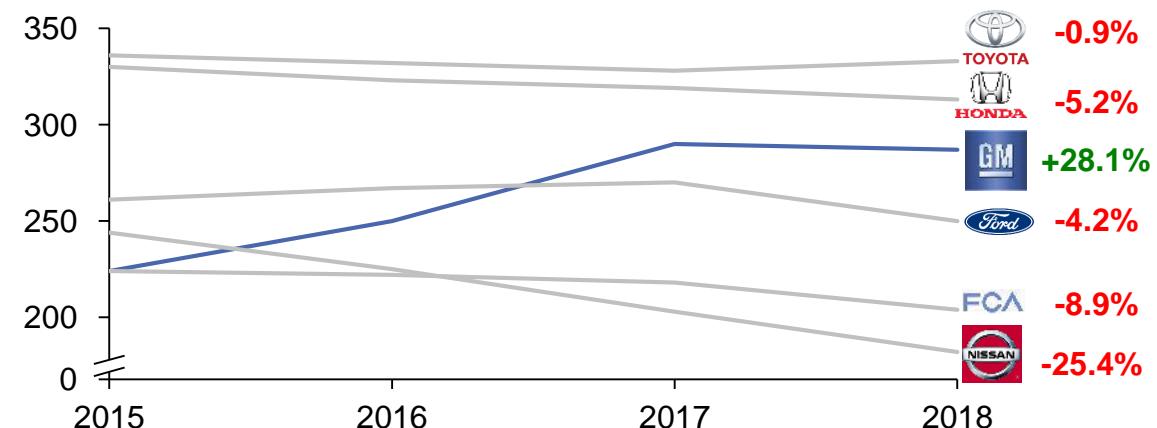
GM also shows great strengths within product design...

Research and development expenditures, in billion USD, 2016-2018



... as well as favorable and improving supplier relations

OEM Supplier Relation Index*, 2015-2018



Note: *: A score above 250 is considered as adequate, and a score above 350 is considered as good to very good

Source: Statista (2019b, p. 22), MarketLine (2018, p. 57), Hancock (2019, *Financial Times*), General motors (2019b), Henke (2017, *Planning Perspectives Inc.*)

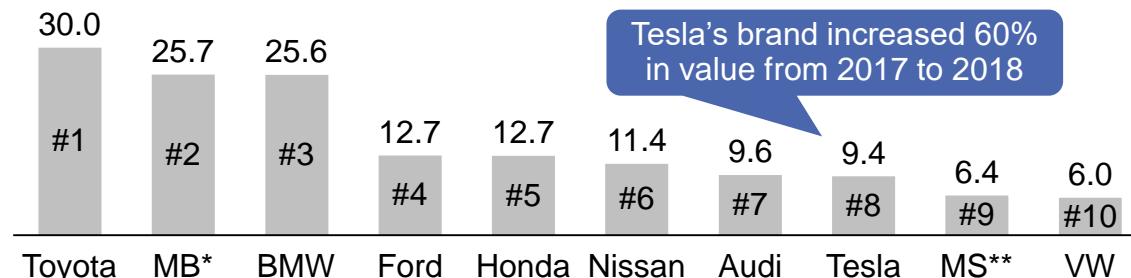
GENERAL MOTORS' KEY CHALLENGES

However, none of GM's brands are among the top in the US, and GM is highly dependent on pickup trucks and SUVs with high emissions for which they do not offer an EV solution



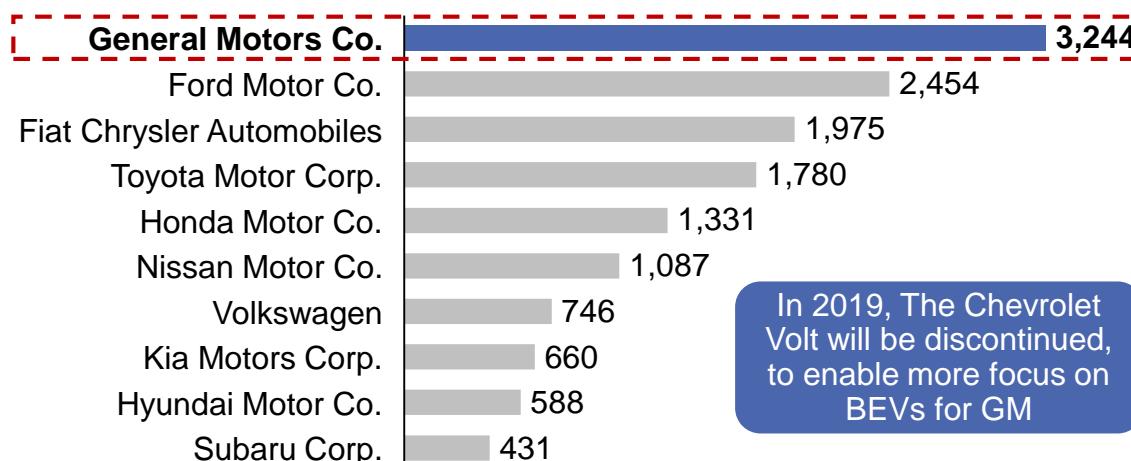
None of GM's brands are among the top ten carmaker brands...

Most valuable global brands for carmakers, in billion USD, 2018



... even though GM is the carmaker that spends the most on ads

Advertising spending in the US, in million USD, 2017

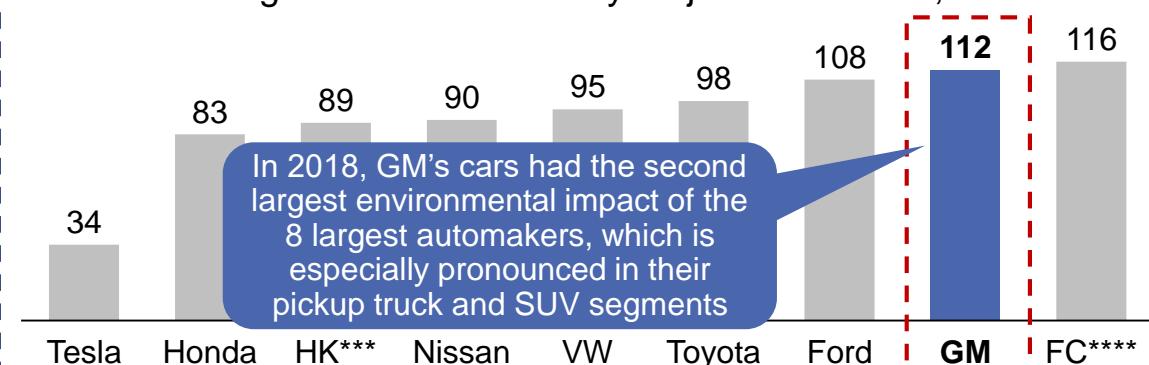


Note: *: Mercedes-Benz; **: Maruti Suzuki; ***: Hyundai-Kia; ****: Fiat Chrysler

Source: Cooke, D. (2018, *Union of Concerned Scientists*), MarketLine (2018), GM Authority (2019a, 2019b), General Motors (2019c), Irle, R. (2018, *EVVolumes*), Statista (2019b), InsideEVs (2019c), Kantar Millward Brown (2018) , Ferris, R. (2019, *CNBC*)

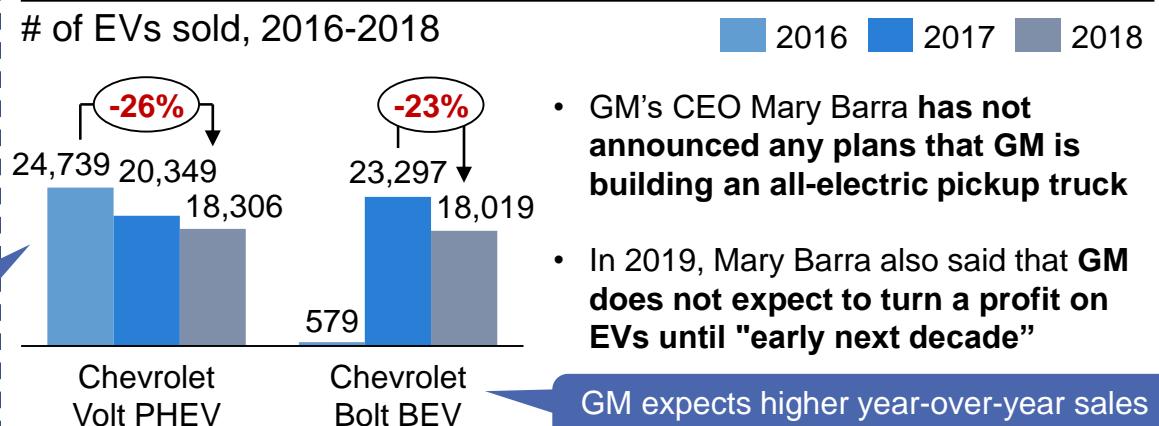
GM is also highly dependent on vehicles with large emissions...

Global warming emissions scores by major automakers, 2018



... and GM does not currently have an EV for its core customers

of EVs sold, 2016-2018





STRATEGIC FIT

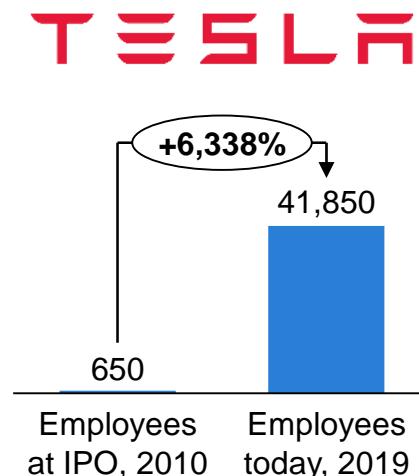


TESLA OVERVIEW AND HISTORY

Tesla was an early pioneer in the EV market, but “production hell” challenged its vision of launching a mass market vehicle with a \$35,000 price tag until the second half of 2018



Tesla was an early pioneer in the EV market and BEV segment



- **Founded in 2003** and joined by current CEO Elon Musk in 2004
- **Popularized EVs in 2008** with its launch of the world's first luxury EV, **the Tesla Roadster**
- **IPO-ed in 2010** and has since then grown from 650 to **41,850 employees**
- **In 2017**, Tesla launched **the Model 3** with the vision of it becoming Tesla's **mass market vehicle with a \$35,000 price tag**

Tesla sells three EVs and offers an extensive charging network



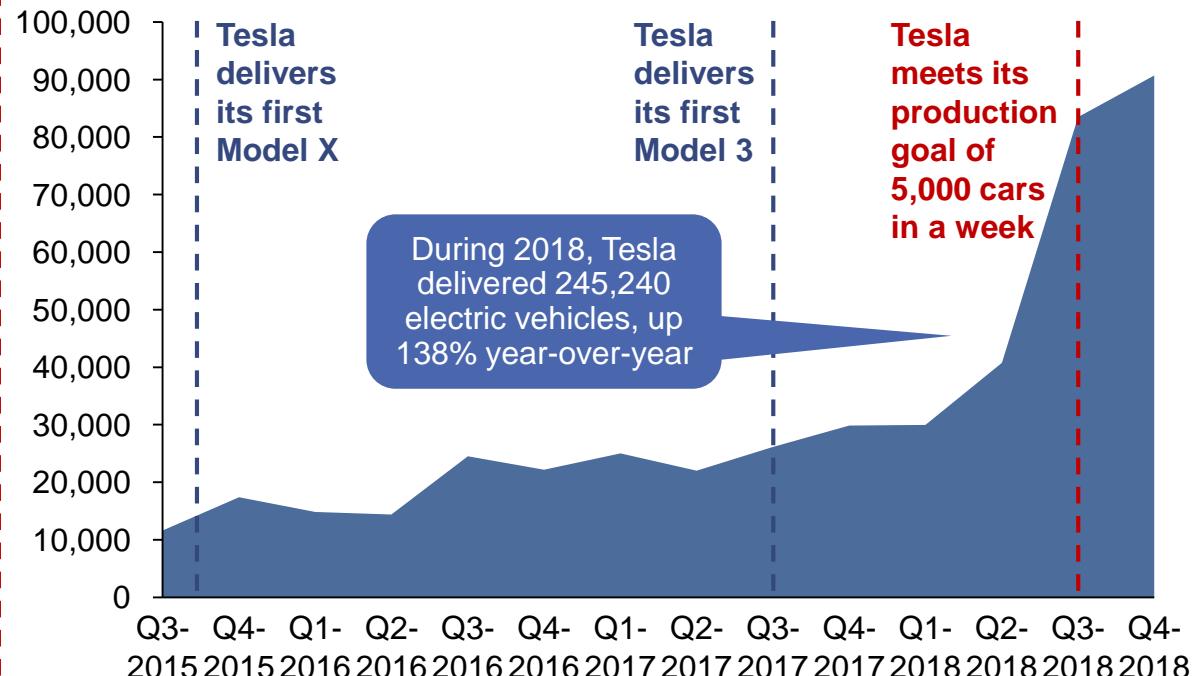
- Tesla's current lineup**
- Tesla Model S: A luxury liftback
 - Tesla Model X: A luxury SUV
 - Tesla Model 3: A luxury sedan



- Tesla's charging network**
- ~13,000 Superchargers globally
 - Aims to cover **95% to 100% of the population in all active markets**

Tesla's “production hell” challenged its scale-up until Q3-2018

Number of Tesla vehicles delivered worldwide, Q3-2015-Q4-2018



In 2017, CEO Elon Musk predicted that Model 3 production would be up to 5,000 units per week by December, however, Tesla did not manage to reach this target before July 2018

Source: Gibbs (2018, *Guardian*), Randall, T. and Halford, D. (2019, *Bloomberg*), Statista (2019d), Tesla Inc. (2016, 2017, 2018, 2019a, 2019b), Vlasic (2017, *New York Times*)

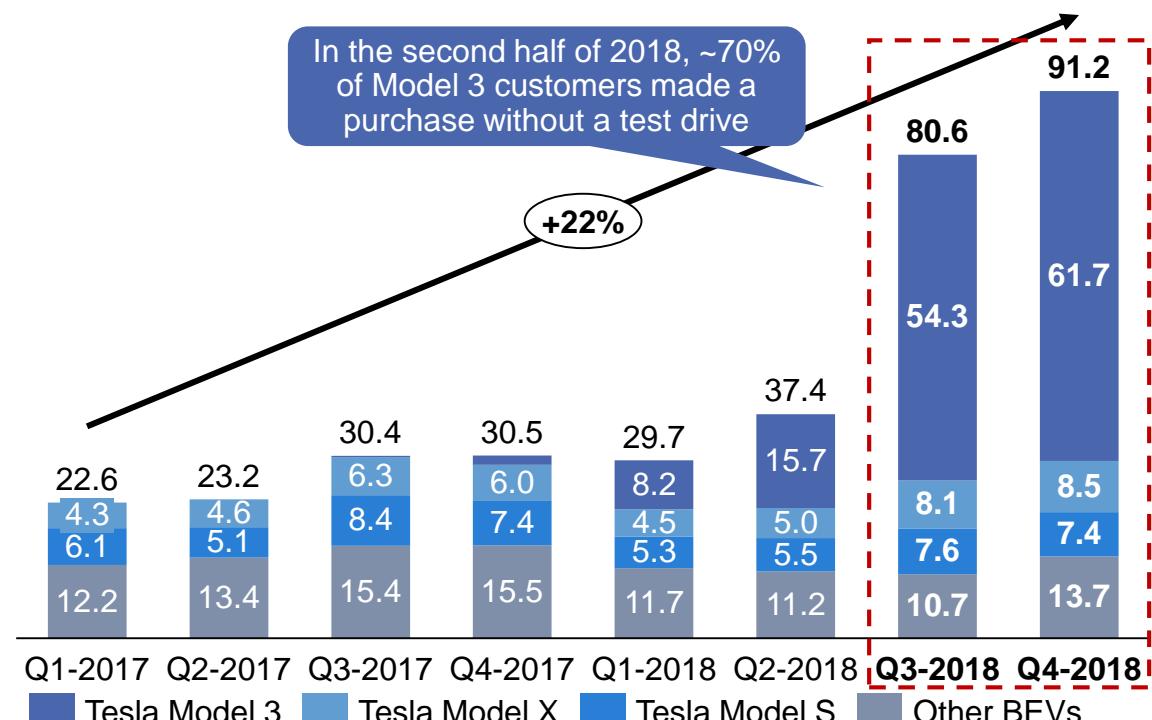
TESLA'S PERFORMANCE IN THE MARKET

After managing to ramp up production, Tesla is not only dominating the BEV segment, but is also threatening conventional carmakers, and sales are expected to grow more in 2019



Tesla is not only dominating the BEV segment...

Tesla's BEV sales in the US, in thousand of vehicles, 2017-2018



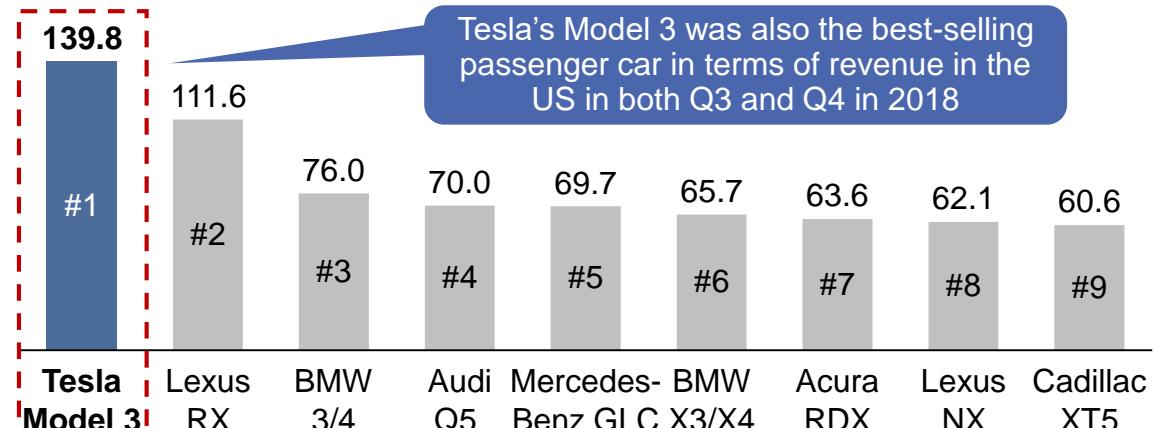
Since it started with volume production in 2018, Tesla has been the largest single contributor to EV growth in the US

Note: *: Tesla sold 140,000 Model 3s in 2018. Pre-orders were around 455,000 after cancellations and confirmed by Tesla to be well over 400,000 in 2018. Tesla will have pre-orders for about 300,000 Model 3s globally to fulfill in 2019.

Source: InsideEVs (2019c), Car and Driver (2019), CarSalesBase (2019)

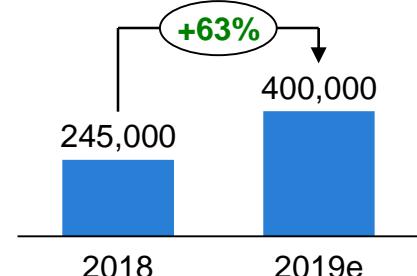
... but also the luxury car segment in the US...

Premium vehicles sold in the US, in thousand of vehicles, 2018



... and sales are expected to grow further in 2019

Number of Tesla vehicles delivered globally, 2018-2019e



- CEO Elon Musk predicts that **Tesla will deliver 360,000 to 400,000 vehicles in 2019**, driven by higher sales of the Model 3
- In addition, **Tesla expects to ramp up Model 3 deliveries and sales in Europe and China**

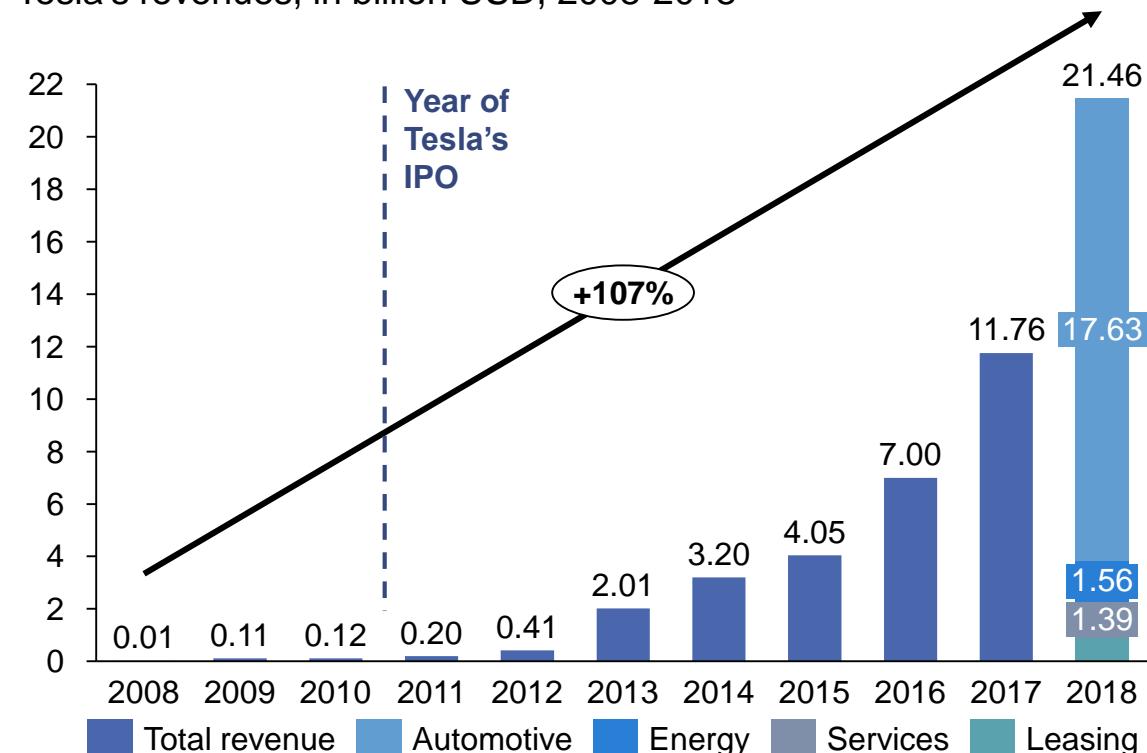
TESLA'S FINANCIAL PERFORMANCE

Due to the success of Model 3, Tesla has seen extraordinary growth, and the BEV maker even managed to turn a profit in Q3 and Q4 of 2018, on-par with other car manufacturers



Tesla's revenues have been increasing exponentially...

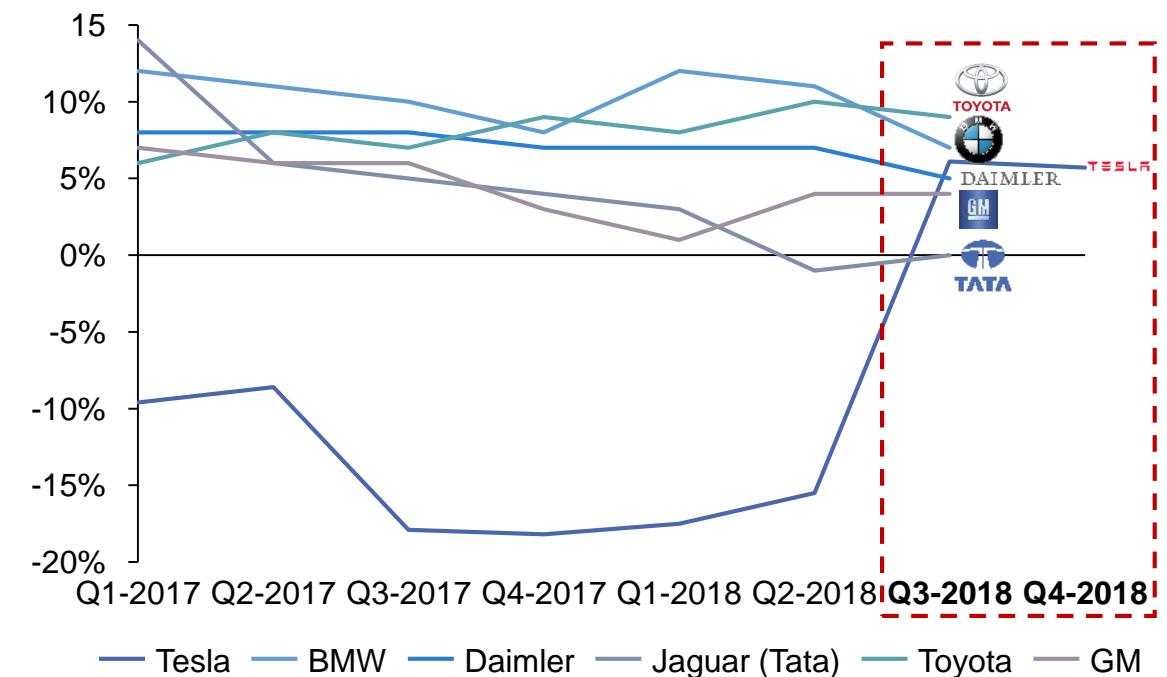
Tesla's revenues, in billion USD, 2008-2018



Source: Tesla Inc. (2016, 2017, 2018, 2019a, 2019b), Thomson Reuters Eikon (2019), Statista (2019e)

... and in Q3 and Q4 of 2018, Tesla also managed to turn a profit

Operating margins of carmakers, in %, 2017-2018



The success of Model 3 carried over to Tesla's financial performance in Q3 and Q4 of 2018, changing its operating margin from being negative to on-par with other carmakers

TESLA'S STRENGTHS AND CAPABILITIES

Tesla's success is based on its strong brand and consumer satisfaction as well as its ability to produce technologically dominant cars that beat every other BEV on the market



Selling more BEVs does not just fill demand for Tesla...



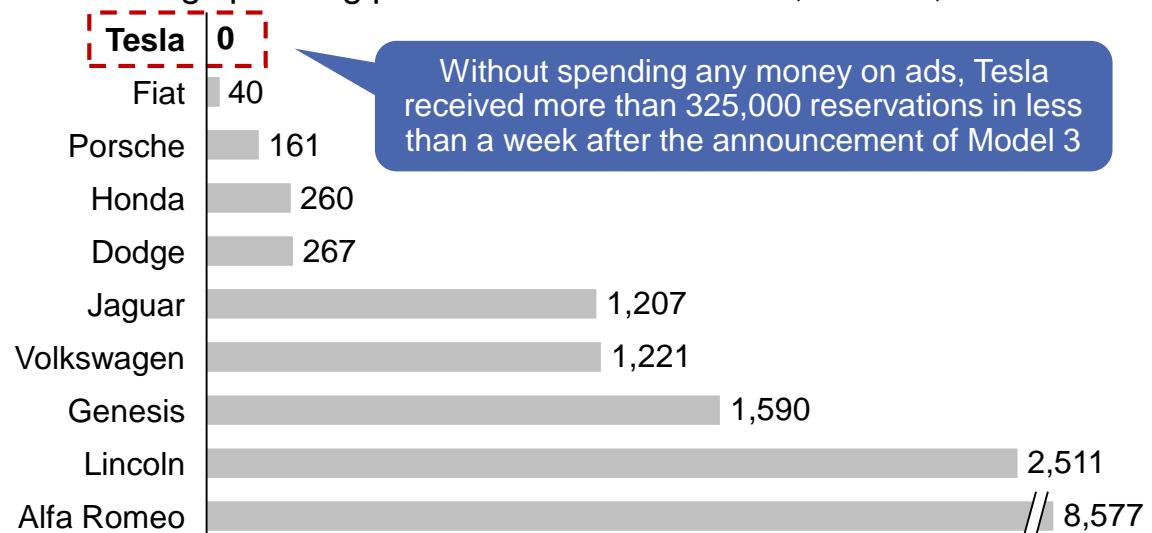
#1 in customer satisfaction of all car brands, according to Consumer Reports



4 in 5 Tesla customers buy or lease another Tesla when they return to market, according to Experian

... it creates demand, reflected in Tesla's ad spending per car

Advertising spending per vehicle sold in the US, in USD, 2017



Note: *: Tesla Model 3 Long Range

Source: Bartlett (2019, *Consumer Reports*), InsideEVs (2019a), Smith (2018, *Experian*), Statista (2019b)

Tesla's vehicles are technically dominant in the BEV segment...

All-electric range in miles for BEVs in the US, 2018-2019



Tesla's range and price per mile dominance is due to its superior battery technology

... And the Tesla's Model 3 LR* is competitive on price as well

BEVs price per mile of range in USD, 2018-2019



Deep dive in appendix

TESLA'S FUTURE AND CHALLENGES

In 2019, Tesla will unveil its pickup truck and begin production of the Model 3 in China, but is still experiencing financial troubles, while competition is coming in fast



In 2019, Tesla will unveil its pickup truck and the Model Y...

Cars models that have already been announced by Tesla



Tesla Pickup Truck
• An all-electric pickup truck
• Will be unveiled during 2019

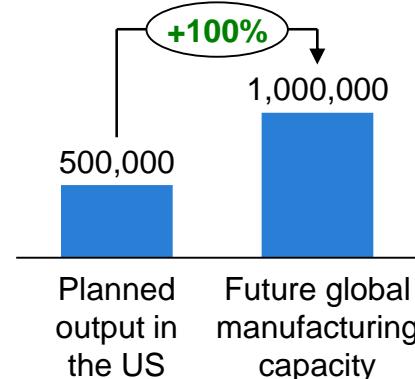


Tesla Model Y
• An all-electric SUV, cheaper than Model X
• Will be unveiled in the first half of 2019



Tesla Roadster
• A new version of Tesla's first-ever electric sports car
• Will launch in 2020

... as well as begin production in China by the end of the year



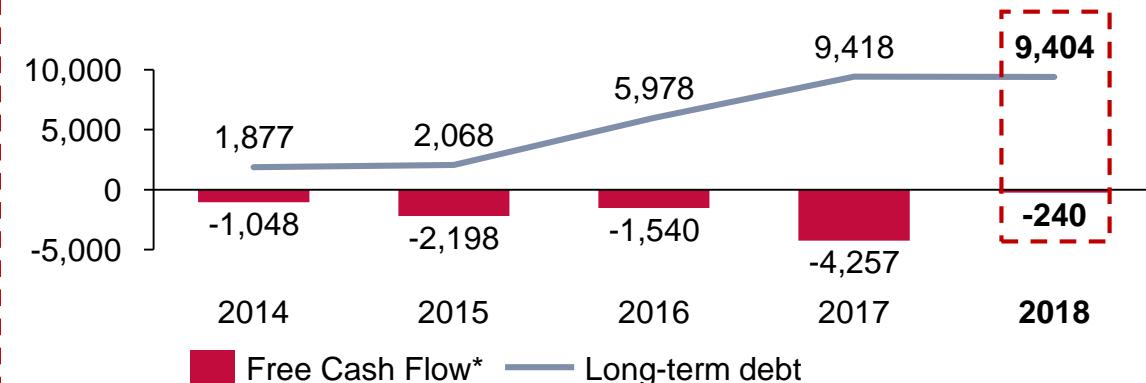
- Chinese Gigafactory will enable Tesla to bypass tariffs and will qualify Tesla's cars for a \$10,000 subsidy from the government
- Tesla plans to be able to begin production of the Model 3 in China by the end of 2019
- The factory will eventually produce 500,000 cars a year, doubling Tesla's projected output

Note: *: Free cash flow figures are accounting numbers; **: BMW and Nissan are not launching new EVs, but the i3 and LEAF models are getting significant enough updates to be mentioned here

Source: Lambert, F. (2018d, Electrek), Tesla Inc. (2016, 2017, 2018, 2019), Zhang, Y. and Hull, D. (2019, Bloomberg), Companies annual report

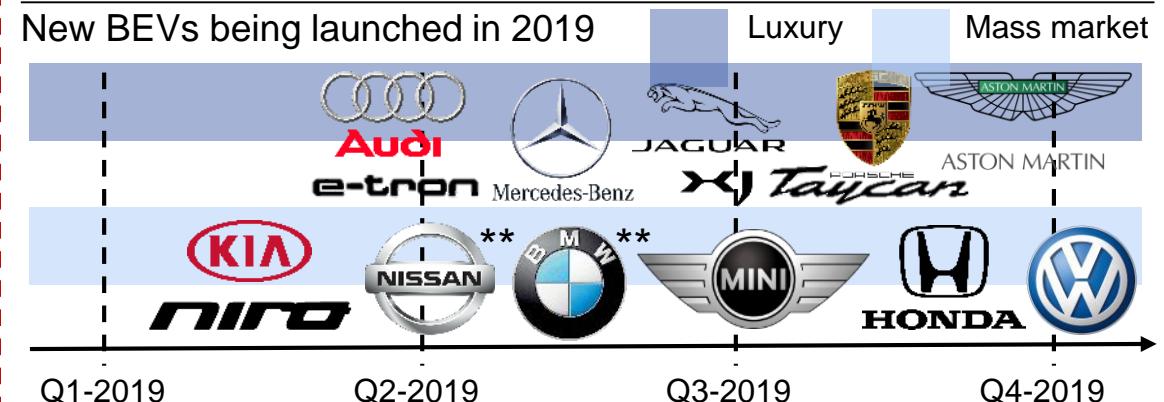
However, Tesla is still burning cash and piling up debt...

Free cash flow and long-term debt, in million USD, 2014-2018



... and new competitors are entering Tesla's segments fast

New BEVs being launched in 2019





The state of GM



The state of Tesla



The fit between them

STRATEGIC FIT

THE STRATEGIC FIT BETWEEN GM AND TESLA

The strategic fit between GM and Tesla is especially promising when it comes to leveraging GM's production expertise in helping Tesla scale



Research and development	Production and sales	Products and brands
Self-driving tech for AVs GM Cruise's self-driving tech is industry leading , whereas Tesla's Autopilot is more uncertain The technologies are also different, and Tesla's cars cannot use GM's tech due to a lack of Lidar* GM's tech could potentially be used in future Tesla cars, but not right now	Production capacity and expertise GM is closing down "one-shift sedan plants", which Tesla could take over, and GM could also offer expertise Tesla is ramping up production and is aiming to double capacity in China in the coming years GM can support Tesla in scaling production and building more factories	Product portfolio GM has announced next-gen electric vehicle platform , which will underly 20 all-electric models However, Tesla has announced an all-electric pickup truck , which GM's platform does not support Tesla's coming pickup truck has a lot of potential among GM's core customers
Batteries for EVs GM has plenty of experience and initiatives within battery making However, Tesla's battery tech is industry leading and could be used in GM's cars as well Tesla's battery advantage could be shared with GM and increased through scale	Sales networks GM's has extensive sales networks in both the US and China However, instead of dealerships, Tesla uses direct sales, showrooms and service centers Tesla's approach to selling is so different from GM's that the potential is limited	Brand portfolio None of GM's brands are as strong as Tesla's brand is, especially within the EV segment However, GM already has plans to make Cadillac its lead EV brand Tesla's brand is still stronger and could be used to increase the sales of GM's EVs

Note: *: Lidar is a surveying method that is used in control and navigation for some autonomous cars, including those of GM Cruise

Source: Team analysis, Goldman (2018, CNN Business), Welch (2018b, Bloomberg), Wayland (2018, Automotive News)

Deep dive on following slide Strategic fit No strategic fit



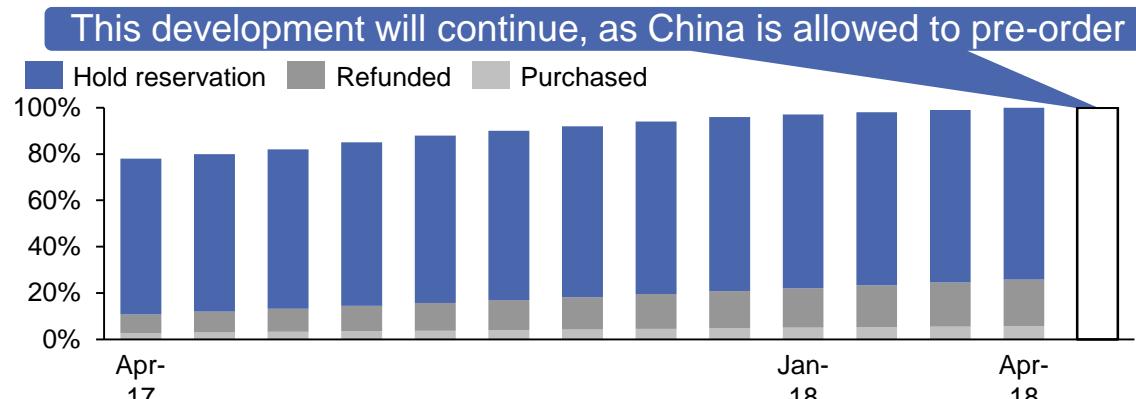
PRODUCTION CAPACITY AND EXPERTISE

The most promising area for a fit addresses the current supply/demand gap by leveraging GM's mass production and delivery expertise, financial resources and empty factories



Tesla has a track record of not being able to meet the demand...

Tesla Model 3 US deposits, in % of Apr 18, April 2017 – April 2018



... and has been going through “logistics hell”



Megan Gale @megangale · 16 Sep 2018

There are 42 Tesla's sitting at the Union Pacific Railroad in SLC. My car is one of these. I've been told I was getting delivery the 8th, then the 15th, then the 20th, then the 22nd, and now my delivery has been delayed indefinite. @Tesla @elonmusk... Please make this right.



Elon Musk @elonmusk · 16 Sep 2018

Replying to @megangale @Tesla
Sorry, we've gone from production hell to delivery logistics hell, but this problem is far more tractable. We're making rapid progress. Should be solved shortly.

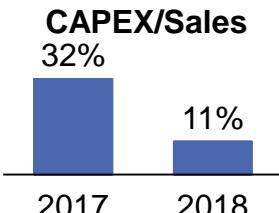
Expertise

- Tesla and GM could combine innovation with mass, as Tesla could eventually **lack the expertise to scale** their production
- GM is currently **producing >30x** Tesla's units, so they have the expertise



Financial resources

- Tesla needs **high levels of CAPEX**, e.g. in order to meet Model Y production targets
- However, last year, their **CAPEX/sales ratio declined** dramatically
- Tesla needs a **capital injection**



Empty factories

- Tesla's main California factory is a former Toyota-GM combined assembly line**
- Tesla could **utilize the factories GM will close in 2019**, as it grows



Source: Barnard (2018, *CleanTechnica*), Gessner (2018, *Second Measure*), Seeking Alpha (2018b), Musk, E. (2018, *Twitter*)



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SYNERGIES

Assessment of
potential synergies

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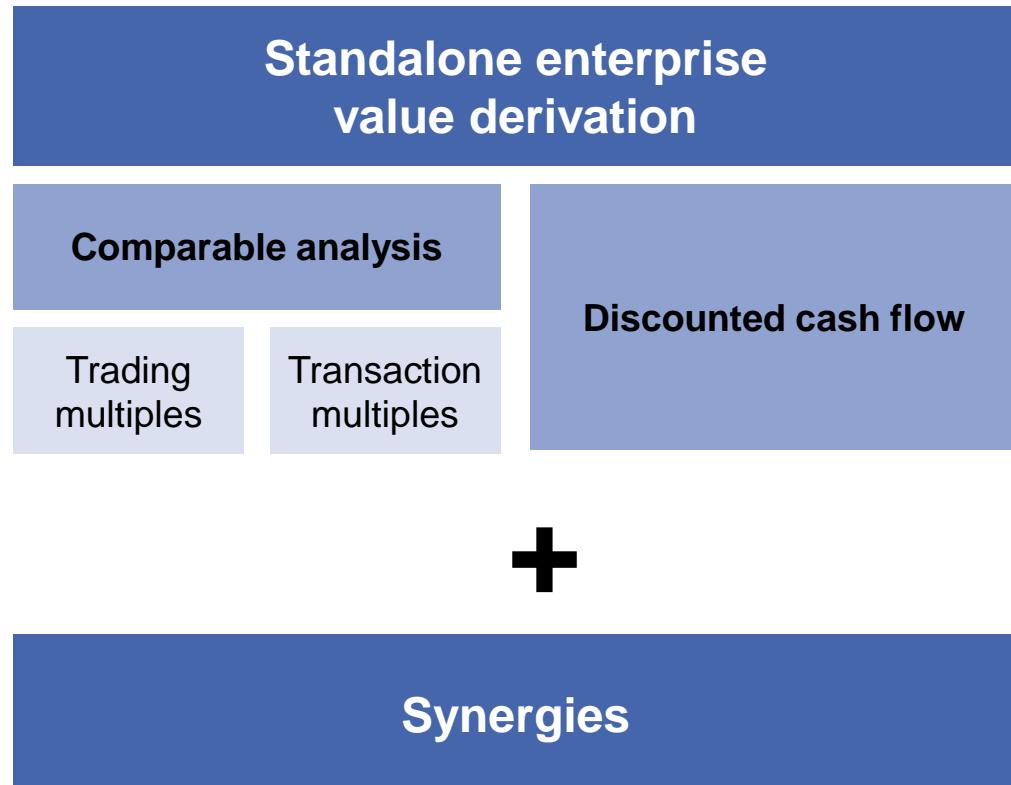
Assessment of
potential synergies

METHODOLOGY OF FINANCIAL ANALYSIS

To assess the financial attractiveness of Tesla, we derive its fair value based on multiple and DCF analyses, estimate synergies and compare them to the purchasing price



GM's shareholder value



Tesla's shareholder value



Source: Own analysis and illustration

POTENTIAL PEER GROUP

We identified traditional automakers, pure EV producers, renewable energy firms and AV tech companies as potential peer groups for Tesla for comparable analysis



Traditional automotive manufacturing

Logic: Tesla competes in automotive sales with traditional OEMs, from which the following have the biggest EV presence



Prospective pure EV manufacturing

Logic: Similar business model in 2025, but different revenue growth



Renewable energies

Logic: Following the acquisition of Tesla of Solarcity, that is active in the production of solar energy and solar cells

Source: Thomson Reuters Eikon (2019), General Motors (2019b), NVIDIA (2019), Stockreports+ (2019), Brinkman (2019, Thomson Reuters), Jonas (2019, Thomson Reuters), Houchois (2019, Thomson Reuters)

SELECTION OF PEER GROUP

Based on an analysis that assesses the CAGR, brand relevance, as well as revenue and cost drivers, pure EV producers are the only peer group that can be retained



	Market size ('18)	CAGR* ('18-'25)	Brand relevance	BIGGEST REVENUE DRIVERS	BIGGEST COST DRIVER	Industry wide analysis		
						Retained		
Tesla	-	15%	●	<ul style="list-style-type: none"> EV vehicle sales Batteries Services Charging stations Other 	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Batteries for production Direct labour R&D Other 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	-
Automotive manufacturing	USD 3.4tn	3%	●	<ul style="list-style-type: none"> EV vehicle sales Batteries Services Charging stations Other 	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Batteries for production Direct labour R&D Other 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	X
Prospective pure EV manufacturing	USD 0.2tn	22%	●	<ul style="list-style-type: none"> EV vehicle sales Batteries Services Charging stations Other 	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Batteries for production Direct labour R&D Other 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	✓
Renewable energies	USD 0.7tn	5%	●	<ul style="list-style-type: none"> EV vehicle sales Batteries Services Charging stations Other 	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Batteries for production Direct labour R&D Other 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	X
Autonomous driving	USD 0.02tn	19%	●	<ul style="list-style-type: none"> EV vehicle sales Batteries Services Charging stations Other 	<input checked="" type="checkbox"/>	<ul style="list-style-type: none"> Batteries for production Direct labour R&D Other 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	X

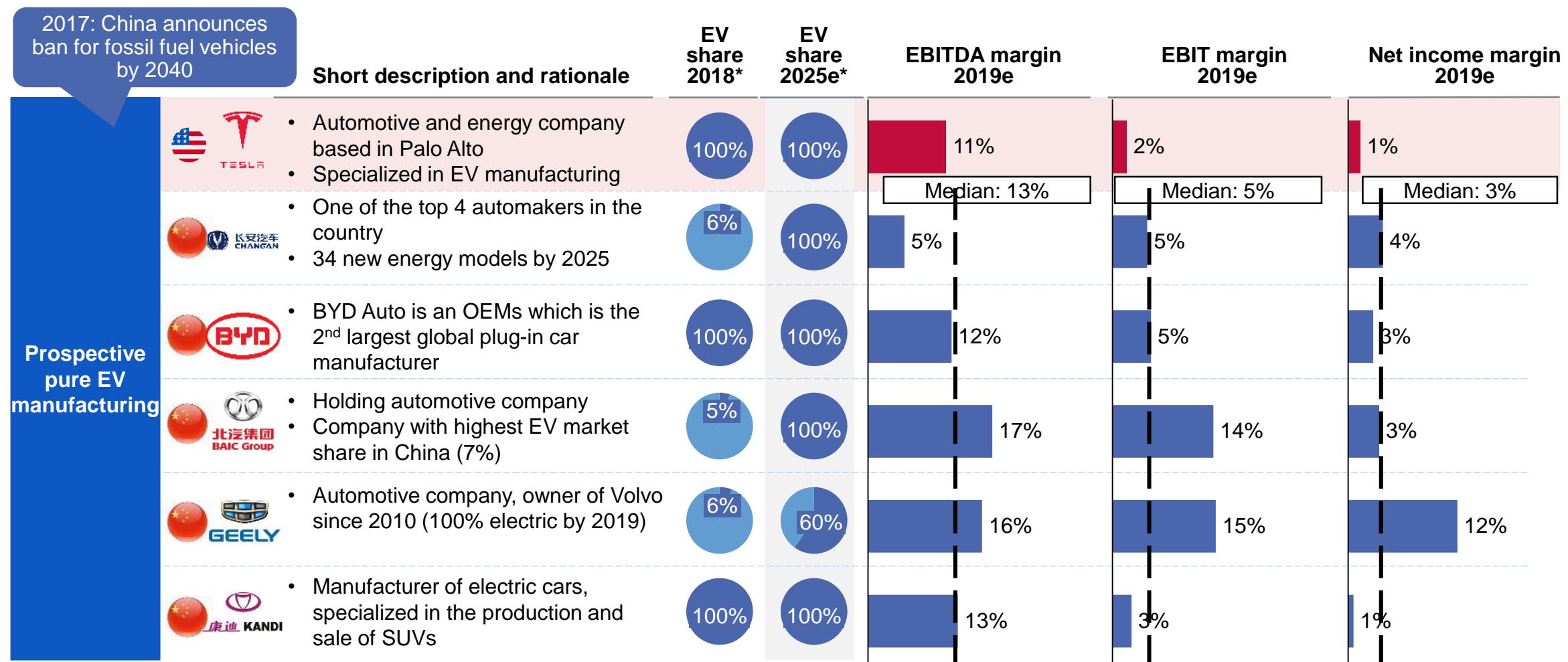
Note: *: CAGR of market size

Source: Xerfi (2018), Grand View Research (2018), Businesswise (2019), Euromonitor (2016), BCG (2018a), UCSUSA (2017), NVIDIA (2019), Allied Market Research (2017)

✓ Yes ✗ No

FINANCIAL ANALYSIS OF PEERS

We identified five prospective pure EV manufacturing peers which are projected to be at least 60% electric by 2025 and show similar margins as Tesla



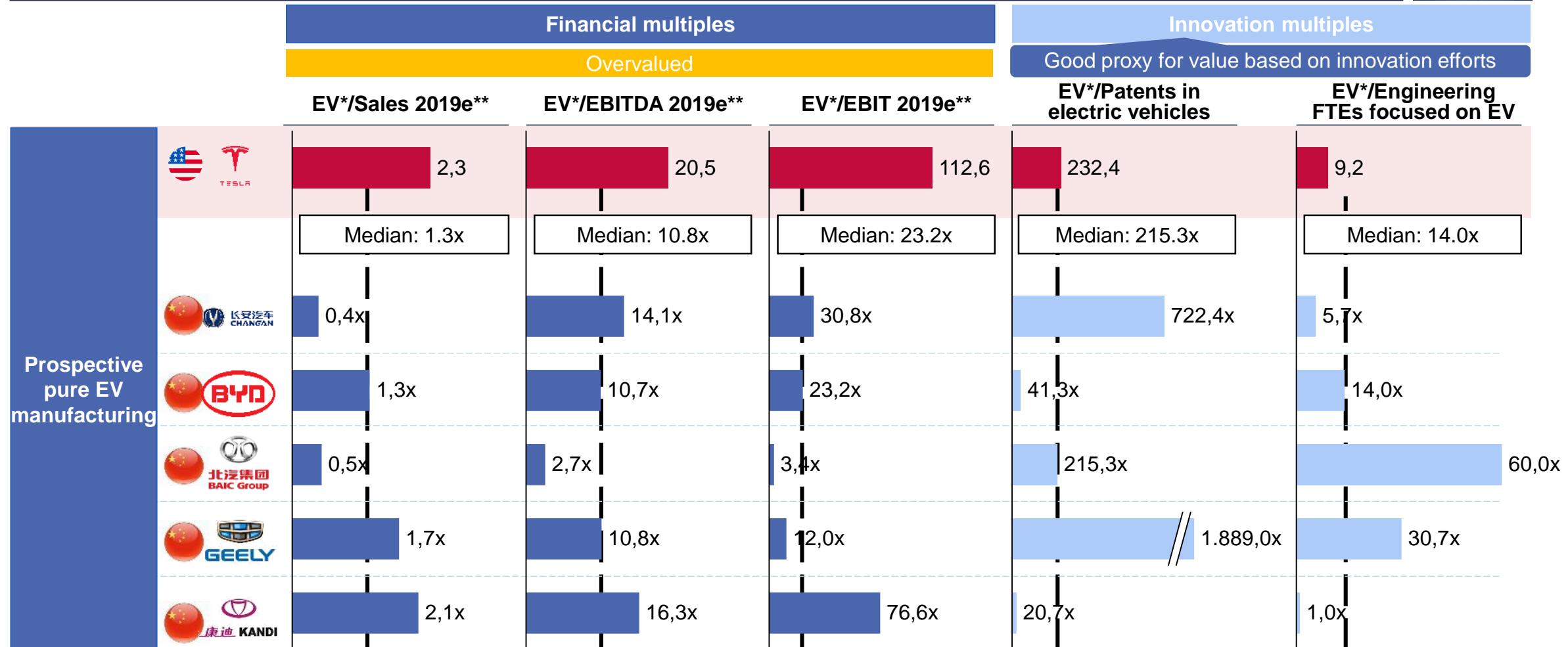
Note: *: EV share representing the share of sales in the respective years that relates to electric vehicles

Source: Hevi (2017), BYD (2018, pp. 1-2), Volvo (2018), Geely (2018)

TRADING MULTIPLES



Based on financial peer group multiples, Tesla appears to be highly overvalued; however, innovation multiples are more in line with market expectations



Note: *: EV aligned with the whole financial analysis as of 22nd of February, 2019; **: Applied multiples based on forecasts due to the growth profile of Tesla

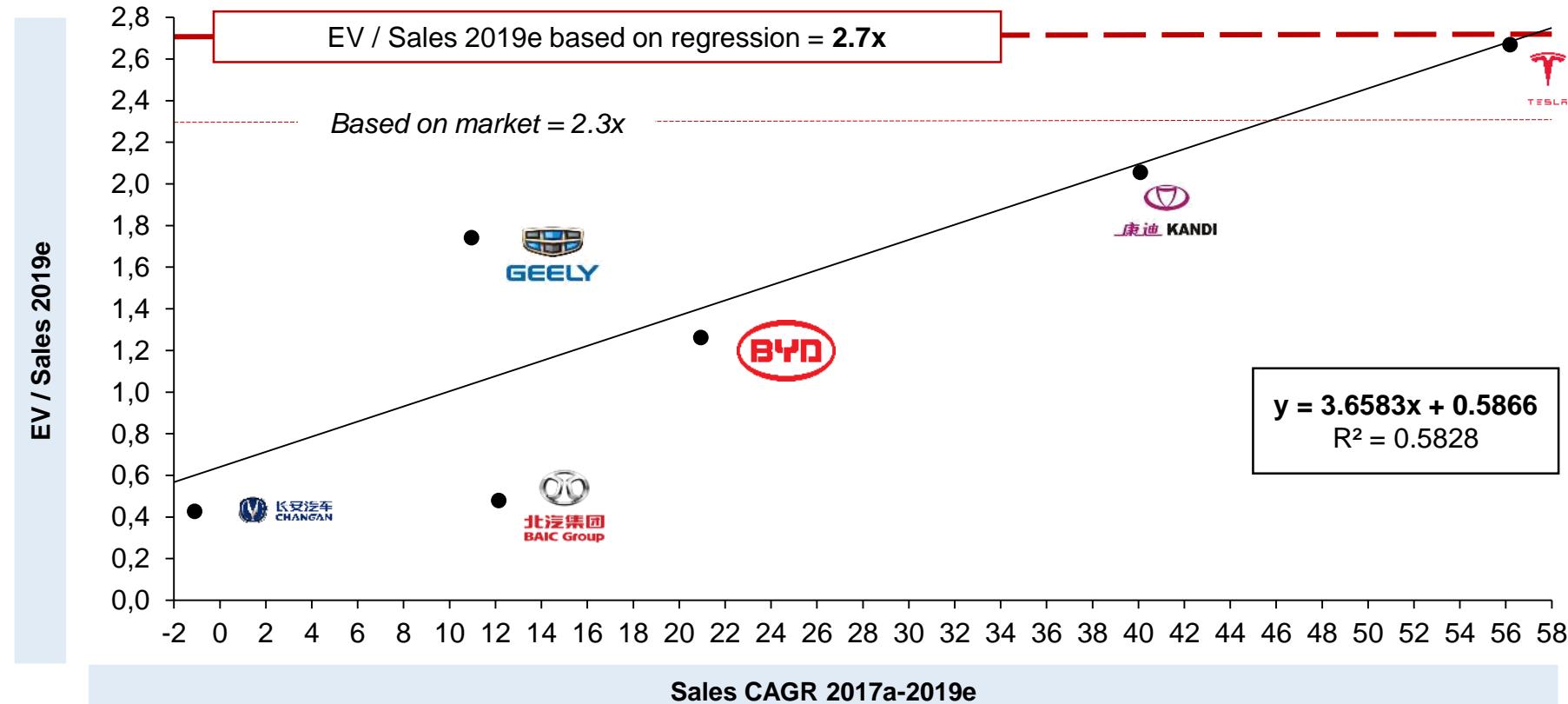
Source: Bloomberg (2019), Thomson Reuters Eikon (2019), Justia (2019), BAIC (2018)

VALIDATION OF TRADING MULTIPLES

Nevertheless, this peer group should have a lower weight in the final valuation than the DCF, as Tesla's growth profile is very differentiated



EV / Sales 2019e vs. Sales CAGR 2017a-2019e



Same analysis based on EBITDA financials not applicable because of decreasing profitability of some of its peers

Key observations

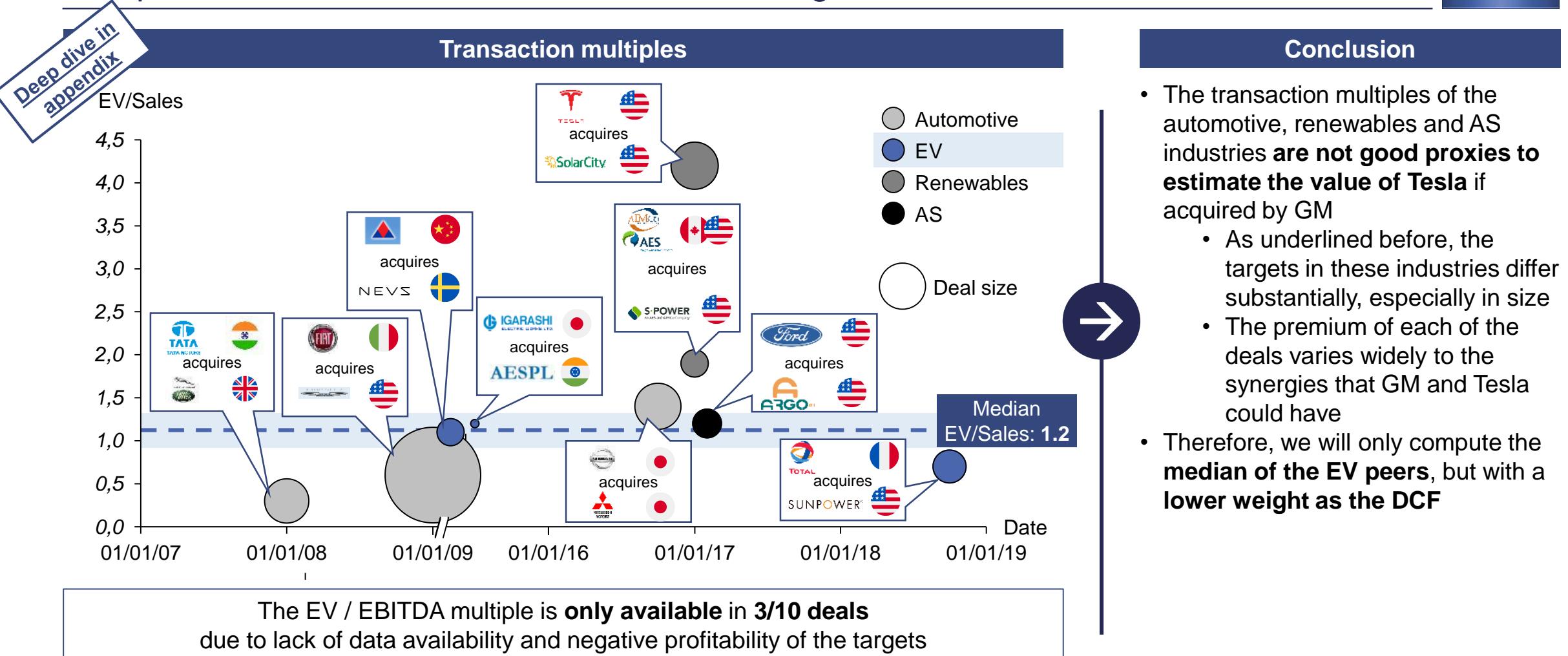
- Peers have significantly different growth profiles compared to Tesla
- Based on the sales CAGR of its peers, Tesla would have a valuation 11% higher than what the market currently expects based on the regression analysis
- There are big gaps between the profiles of the different peers in the sample

Multiples-based valuation should have a smaller weight than the DCF in assessing Tesla's value

Source: Bloomberg (2019), Thomson Reuters (2019)

TRANSACTION MULTIPLES

Through selected transaction multiples in the four industries, we estimate an EV / Sales multiple for Tesla of 1.2x, but we decrease its weight as an estimate for Tesla's valuation



Note: When not available in USD, the Sales and EV were converted to USD using the annual average exchange rate. *Sales multiple for Argo AI is a Bloomberg estimate.

Source: MergerMarkets (2019), Thomson One (2019), Bloomberg (2019)





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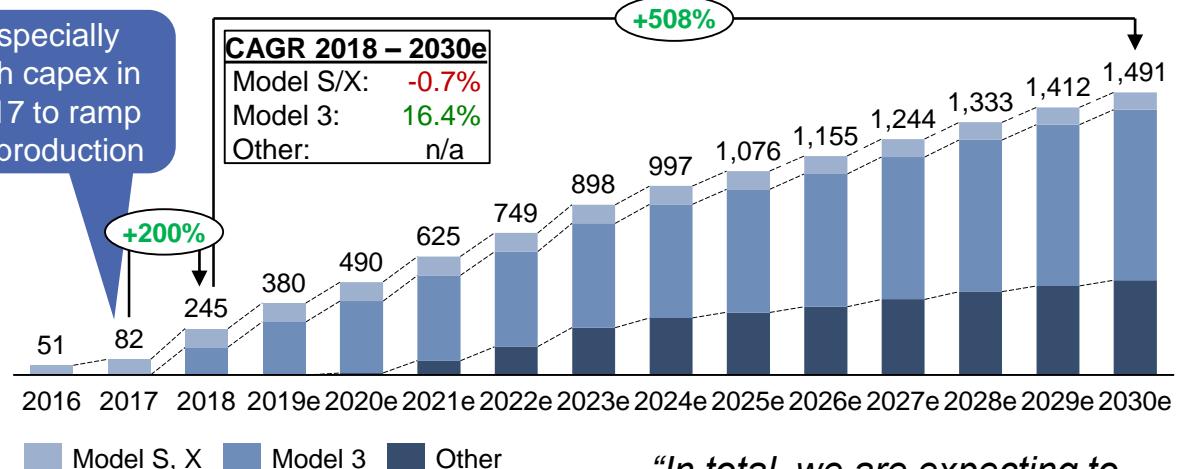
BUSINESS PLAN FORECASTING



We expect Tesla's production capacity to increase by 508% between 2018 and 2030e, while its margins will increase to industry levels

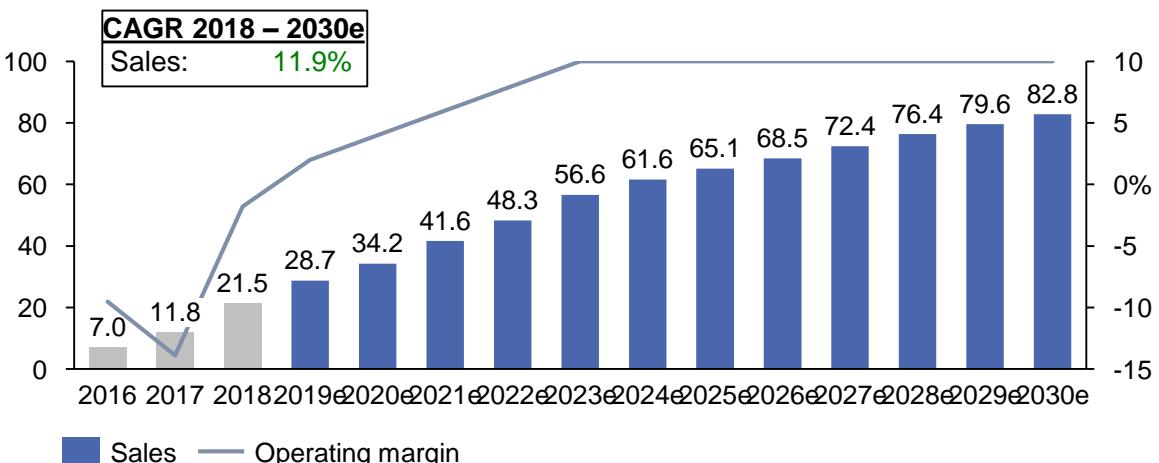
Tesla's production capacity is expected to increase by 508%...

Vehicle production* of Tesla, in thousand cars, 2016-2030e



..., revenues to grow accordingly and margins to improve

Revenue and margins of Tesla, in USDbn, 2016-2030e



- Previously poised by production issues, Tesla **managed to ramp up capacity in 2018**
- Given the **vast amount of pre-orders** for the Model 3 and the **growing market demand**, vehicles sold is constrained by production capacity

In total, we are expecting to deliver 360,000 to 400,000 vehicles in 2019.

Tesla, 2019

This year [2019] we will start tooling for Model Y to achieve volume production by the end of 2020.

Tesla, 2019

- Revenues grow alongside the increase in production capacity, despite somewhat **decreasing prices** due to lower production costs and increasing competition
- Tesla works towards a **gross margin target of 25%** which seems to be feasible given the recent developments, increasing economies of scale and productivity benefits
- The **operating margin** is expected to **increase up to 10%** which is in line with high-end car manufacturer peers

Note: *: Potential adaptions to the Model S/X or 3 would still be considered under the respective category

Source: Own analysis based on financial statements from Thomson Reuters, Quotes from Tesla Form 8-K filed on January 30, 2019; Tesla Inc. (2019)

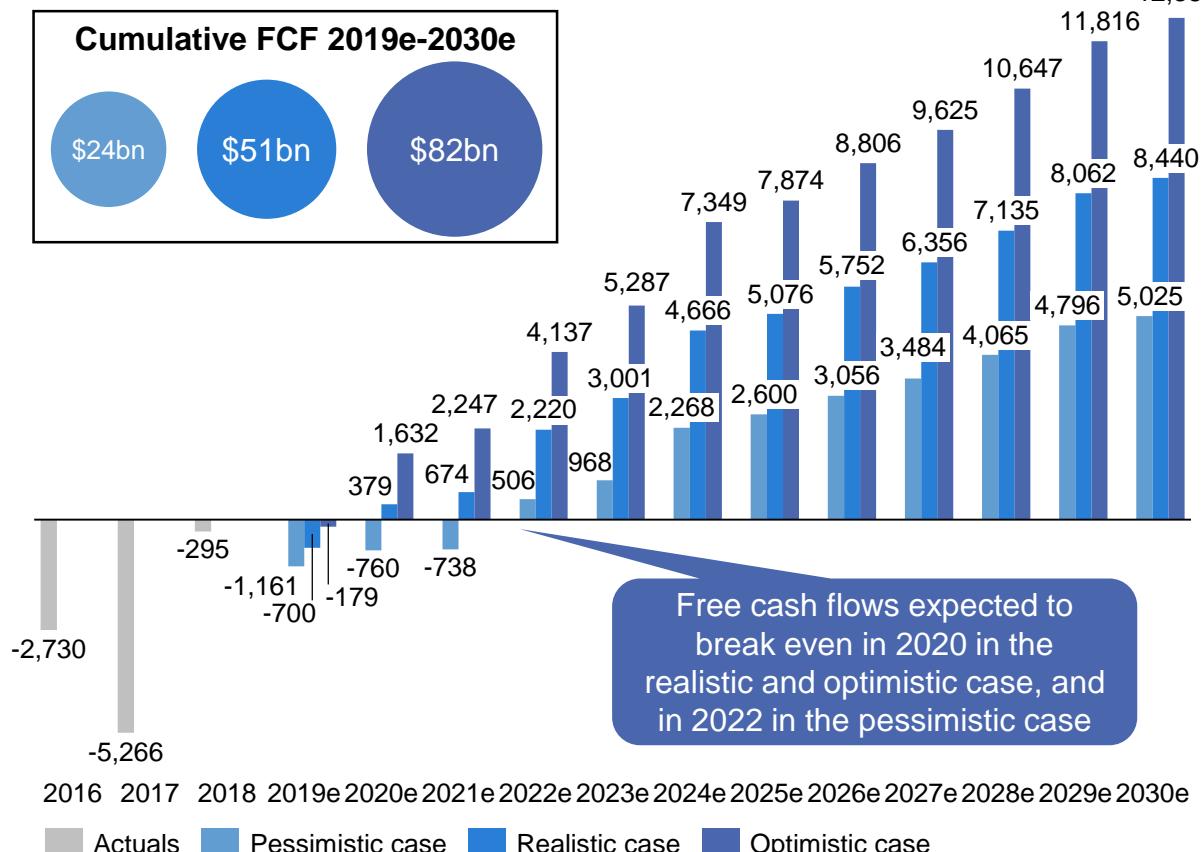
SCENARIO ANALYSIS

We forecast Tesla's cumulative free cash flow to differ from USD 24bn to 82bn in a scenario analysis primarily based on vehicle production and prices as well as margins



Scenario analysis of free cash flow to equity projection

Free cash flow to equity of Tesla, in million USD, 2016-2030e



Pessimistic case		
Production capacity	Vehicle prices	Margins
+16.1% p.a. Revival of production issues that prevent capacity expansion	-1.9% p.a. Drop faster due to higher than expected competition	9% target Under pressure due to missing productivity and scale gains
Realistic case		
Production capacity	Vehicle prices	Margins
+16.2% p.a. Capacity expansion is in line with expectations	-1.2% p.a. Drop in line with expectations	10% target Become sustainable and in line with car industry
Optimistic case		
Production capacity	Vehicle prices	Margins
+16.3% p.a. Capacity expansion is faster than expected	-0.9% p.a. Drop less due to lower than expected competition	11% target Develop more favorably and reach an above-industry level

Source: Own analysis based on financial statements from Thomson Reuters

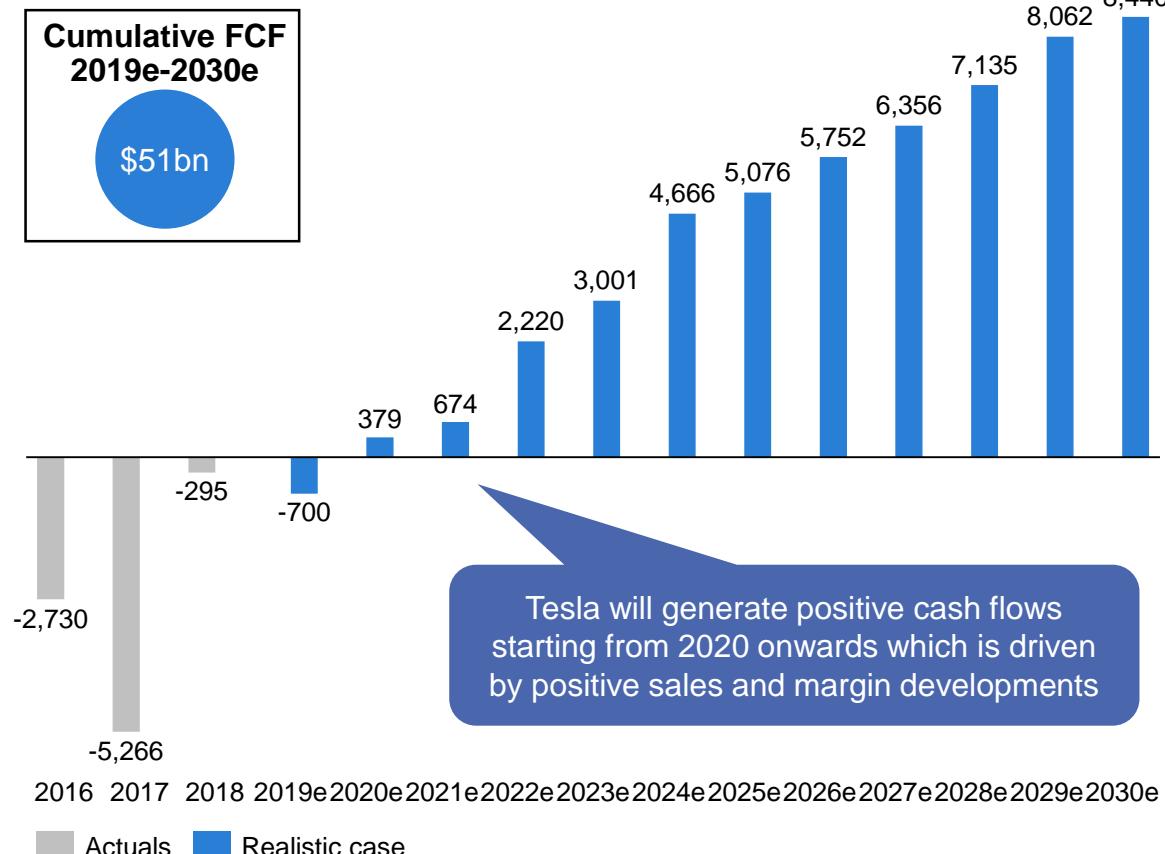
DCF ENTERPRISE VALUE DERIVATION

Discounting the cash flows of the realistic scenario, Tesla's fair EV is USD 55.8bn which translates into an equity value of USD 42.3bn that is 17% below Tesla's market cap



Realistic free cash flow to equity projection

Free cash flow to equity of Tesla, in million USD, 2016-2030e

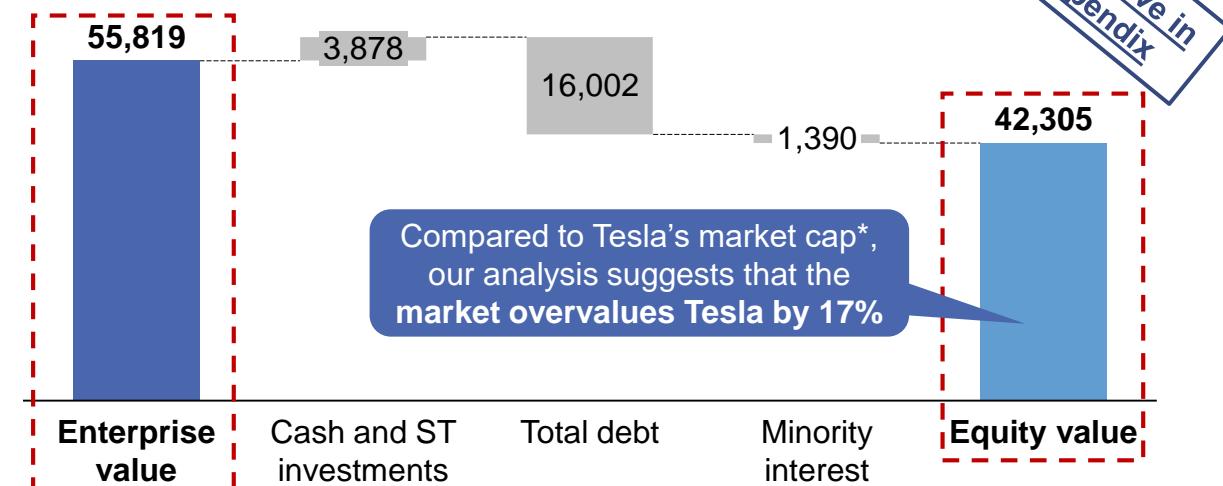


Note: *: Based on market cap on 02/22/2019

Source: Own analysis based on financial statements from Thomson Reuters

Enterprise to Equity Value bridge

In USDm



Key valuation parameters

Balance sheet date	12/31/2018
Valuation date	02/22/2019
WACC	10.3%
Terminal growth rate	2%
Terminal value EBIT margin	10%



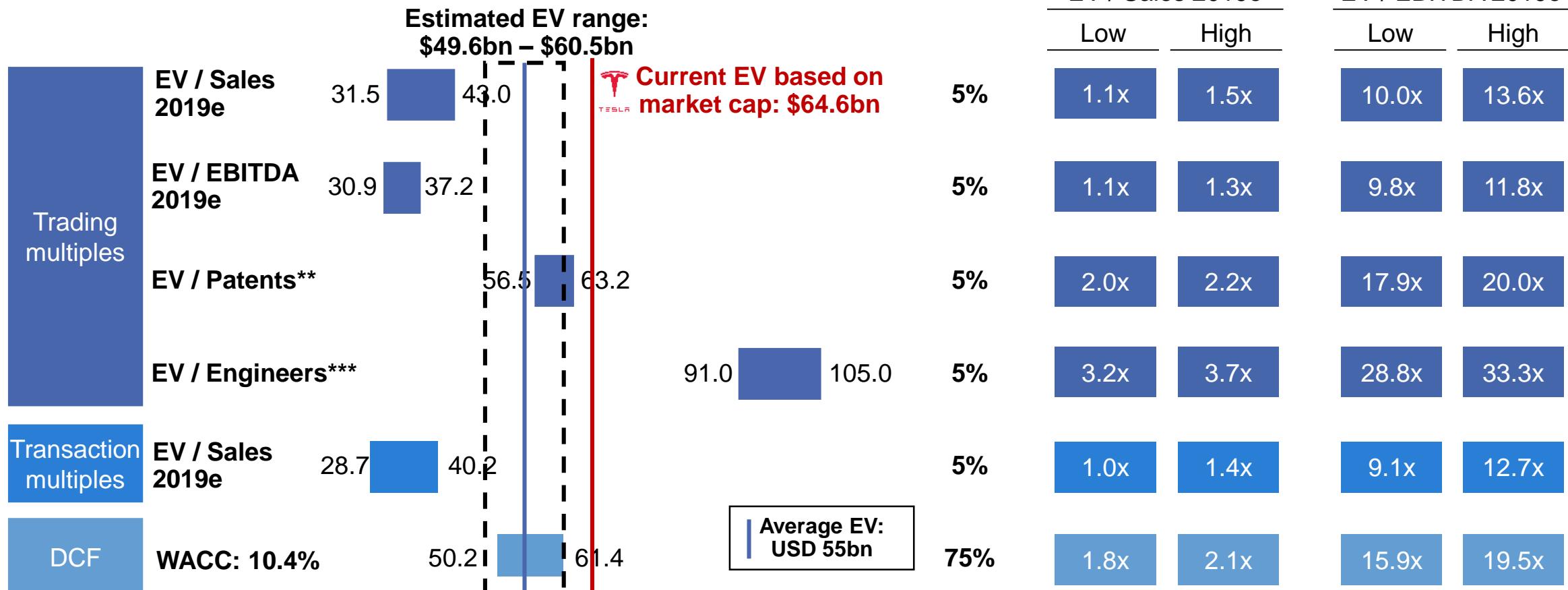
FAIR ENTERPRISE VALUE



Based on the multiple and DCF valuation, the fair EV of Tesla is USD 55bn that translates into an equity value of USD 41.5bn which is 18% below the current market valuation

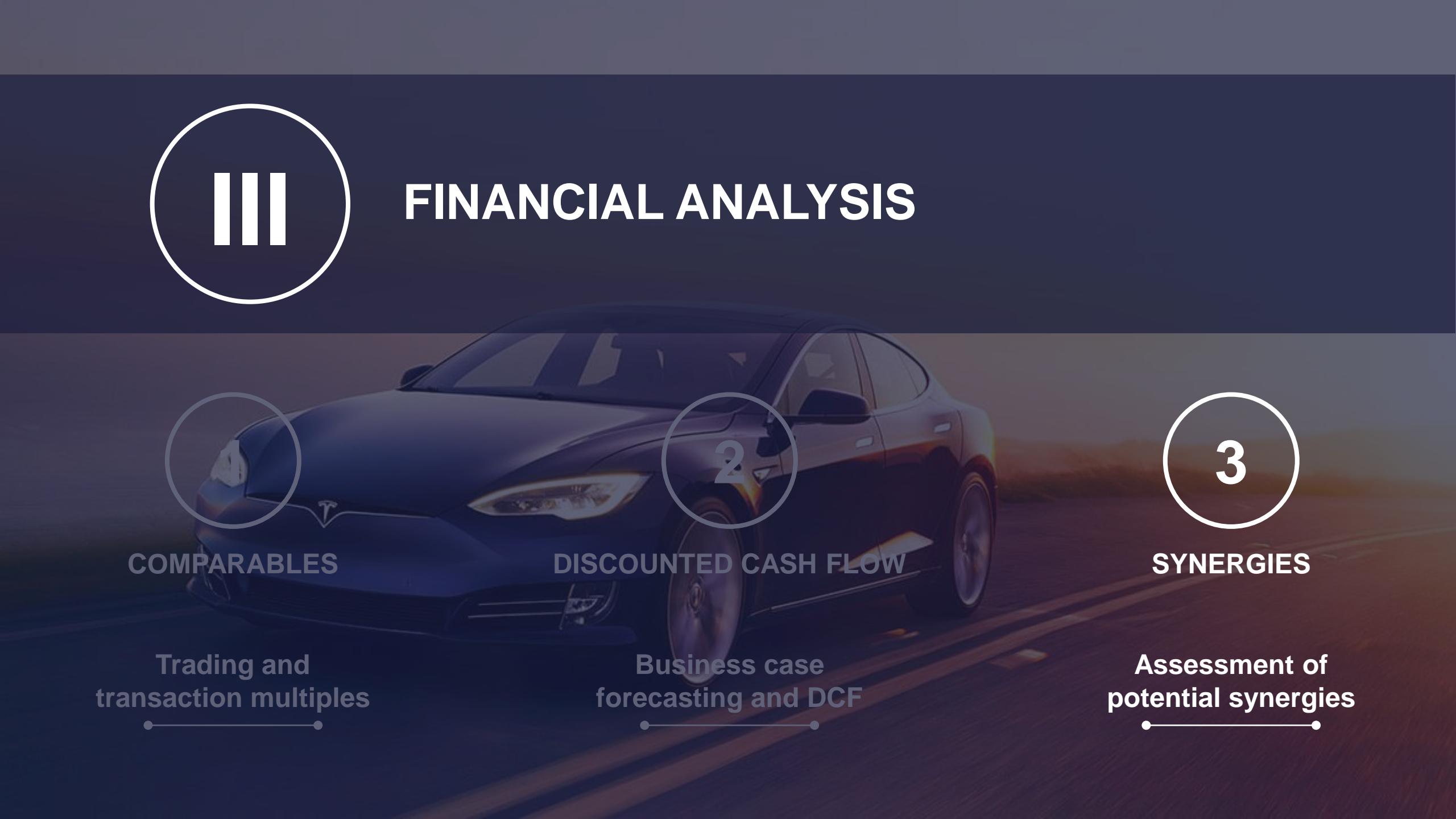
Football field

Tesla's Enterprise Value, in billion USD, as of February 22, 2019



Note: *: Weight assigned in calculation of final EV range; **: Number of patents related to EVs; ***: Number of engineering FTEs dedicated to EVs

Source: Team analysis based on financial statements from Thomson Reuters



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OVERVIEW SYNERGIES

Reducing management headcount, using Tesla's battery technology and scaling up to decrease supply/demand gap are the most tangible synergies that can be quantified



Synergies based on GM and Tesla merger		GM Tesla	Quanti-fication	Rationale
Administration	<ul style="list-style-type: none"> Real estate costs through shared headquarters Analyze management headcount and reduce organizational chart 		<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<ul style="list-style-type: none"> Strategic relevance for Tesla Relevant - To be explored further
R&D	<ul style="list-style-type: none"> Profit from Cruise technology in Tesla's cars Use of Tesla's battery technology in GM's EV models (Chevrolet Bolt, Cadillac, etc.) Shared information technology 		<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<ul style="list-style-type: none"> Inherently different technologies Relevant – To be explored further Long-term, hard to quantify
Production & Assembly	<ul style="list-style-type: none"> Scale-up Tesla's production to fully satisfy current demand and maximize capacity profiting from GM financial backing and expertise 		<input checked="" type="radio"/>	<ul style="list-style-type: none"> Relevant - To be explored further
Distribution	<ul style="list-style-type: none"> Start of Tesla products being sold through traditional distribution channels, with higher negotiation power from GMs experience for scale-up 		<input type="radio"/>	<ul style="list-style-type: none"> A USP of Tesla is their fully owned distribution network with specialists not commissioned based on sales for objectivity purposes
Post-sale	<ul style="list-style-type: none"> Similar maintenance procedures Reduce customer service teams 		<input type="radio"/> <input type="radio"/>	<ul style="list-style-type: none"> Only overlap in EV maintenance Specialized Tesla's customer service would be difficult to replicate

Few potential Tesla and GM synergies based on their respective strategic profiles are quantizable

Source: Own analysis

Deep-dive in and detailed quantification in next slides



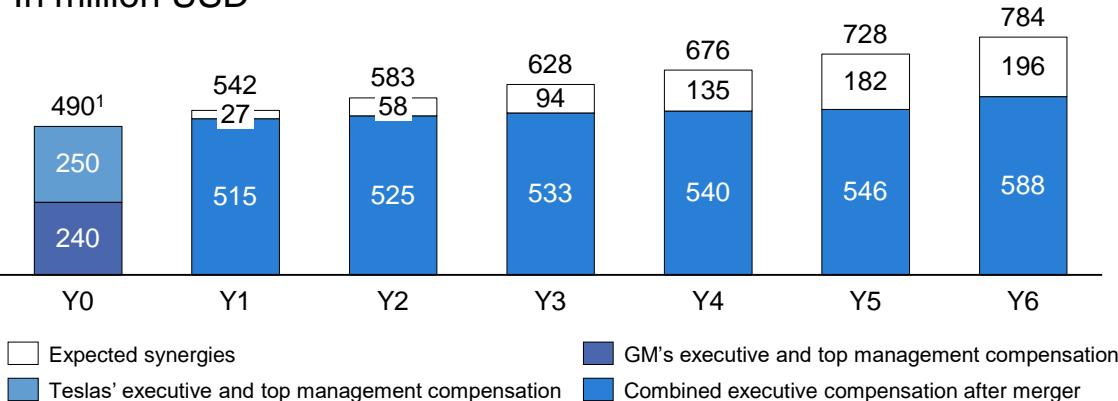
ADMINISTRATIVE AND PRODUCTION SYNERGIES

Reducing administrative headcount and managing Tesla's supply and demand gap could yield up to USD 4.5bn in synergies after a GM-Tesla merger

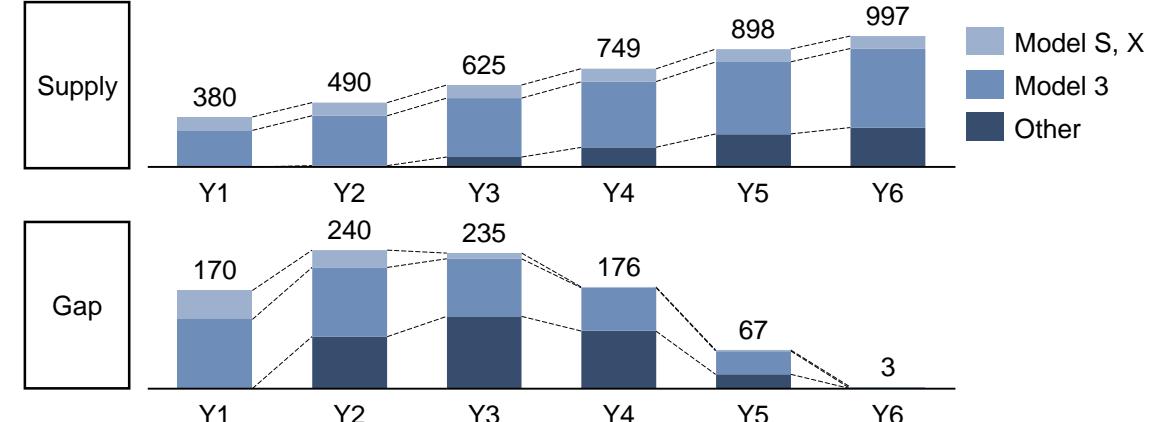


Savings in executive and top management compensation

In million USD



Management of Tesla's demand and supply gap



Main assumptions and valuation*,**

- A certain share of general, administrative and management functions will overlap between both organizations and bear potential for elimination
- Some compensation, such as the Elon Musk salary, cannot be addressed in this exercise based on feasibility constraints
- This overlap will be **restructured from 10% in Y1, up to 50% in Y6**

\downarrow
NPV = \$2.2bn

Main assumptions and valuation**

- Currently, the gap of Tesla is rooted in the **penetration of key markets**
- GM would be able to **reduce Tesla's mismatch** between demand and supply by **20% in Y1, vs. 70% in year 6**
- The gap will be smaller as Tesla becomes more mature**, and so will the synergies between both entities

\downarrow
NPV = \$1.7bn

\downarrow
NPV = \$2.5bn

\downarrow
NPV = \$2.9bn

Note: *: Estimated based on executive's compensation schemes from the annual report and press research; **: Discounted at a WACC of conglomerate which equals 7.1% (see excel model)

Source: Thomson Reuters (2019), Tesla (2018), General Motors (2018a), New York Times (2018)

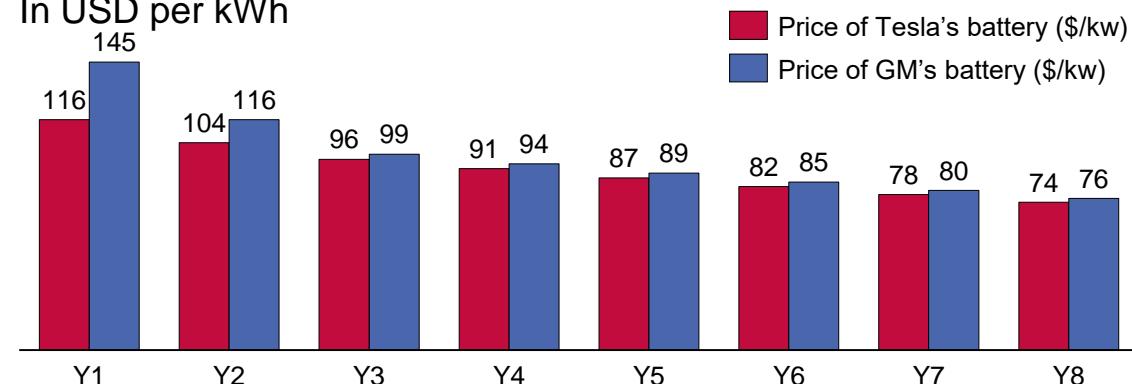
TECHNOLOGICAL SYNERGIES

Applying Tesla's battery technology, which has been proven to be the most advanced in the market, to all GMs EVs could yield synergies of USD 2.7bn following the merger



Comparing the price of Tesla's batteries vs. GMs...

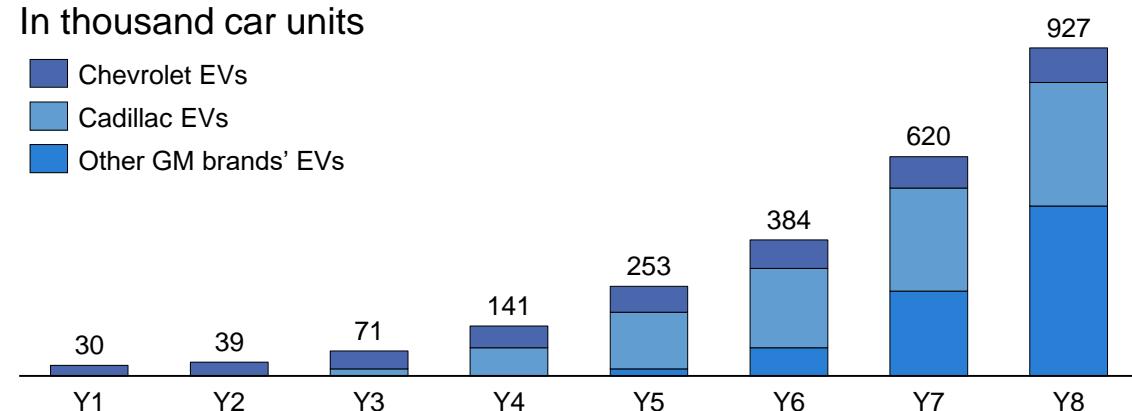
In USD per kWh



... and estimating to which models it would apply

In thousand car units

- Chevrolet EVs
- Cadillac EVs
- Other GM brands' EVs



Note: *: Discounted at a WACC of conglomerate which equals 7.1% (see excel model)

Source: Own analysis, InsideEVs (2019b)

Main assumptions and valuation*

- Tesla's batteries are the **most advanced** large-scale lithium **batteries** in the market at the moment, following a cooperation with Panasonic
- GM's battery prices, while less efficient than Tesla YTD, are expected to **go under USD 100/kWh in 2021**, following efforts of the company to develop an all-new platform
- The **difference in performance** will be much **smaller in the future**, but applicable to more car units. Nevertheless, we expect Tesla to be able to retain its competitive advantage in the years to come
- At the same time, GM is planning a **full scale of its BEV production**:
 - Cadillac will release its first EV model in 2021
 - GM plans to bring to the market 20 new electric vehicles by 2023, and produce around 1m units by 2026
 - Its 2019 Volt, the PHEV option, has been discontinued

NPV = \$2.7bn



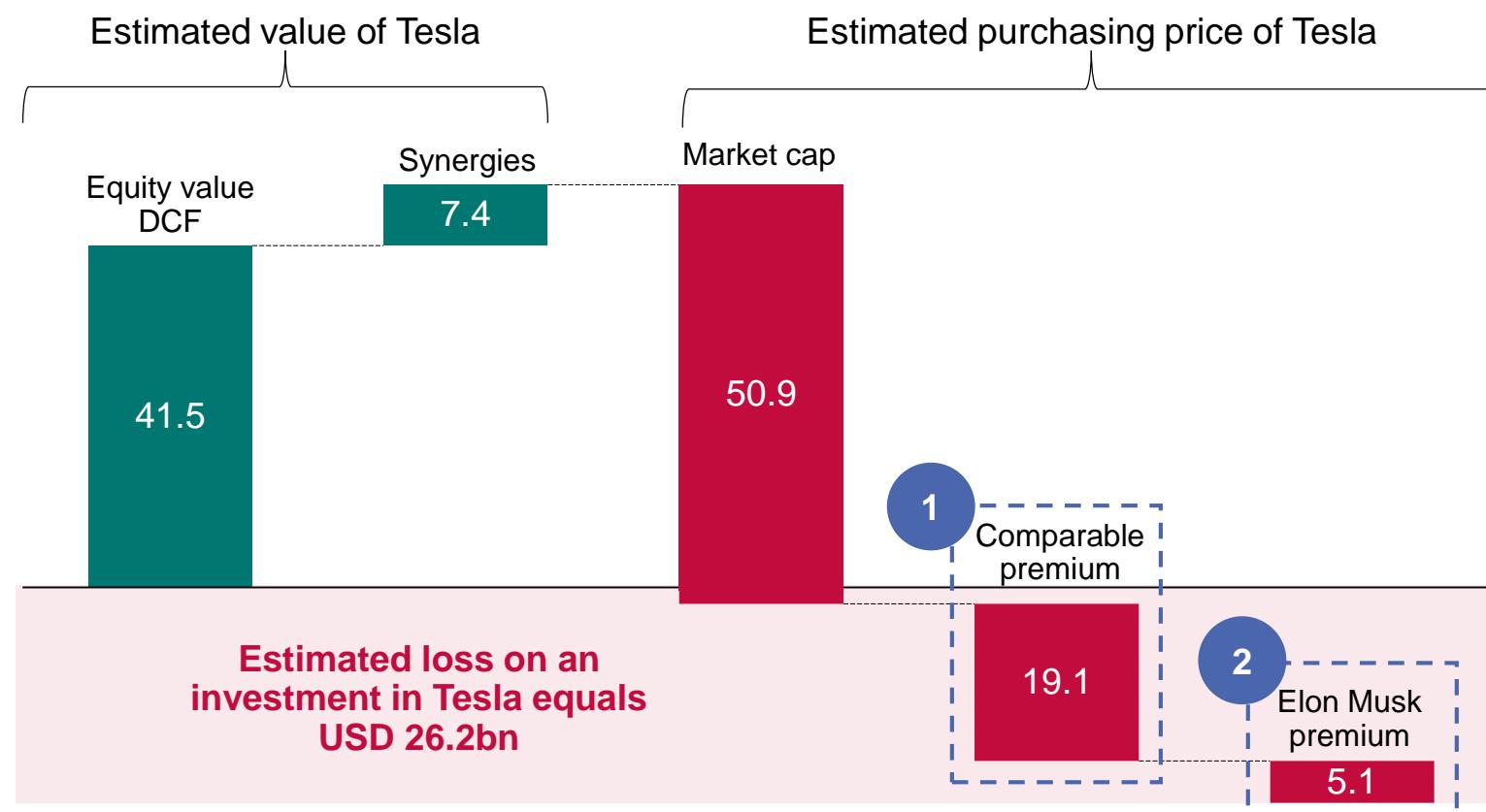
EV – PURCHASING PRICE COMPARISON

GM would lose around USD 26.2bn on the acquisition after accounting for a premium over Tesla's current market capitalization that is required to convince shareholders to sell



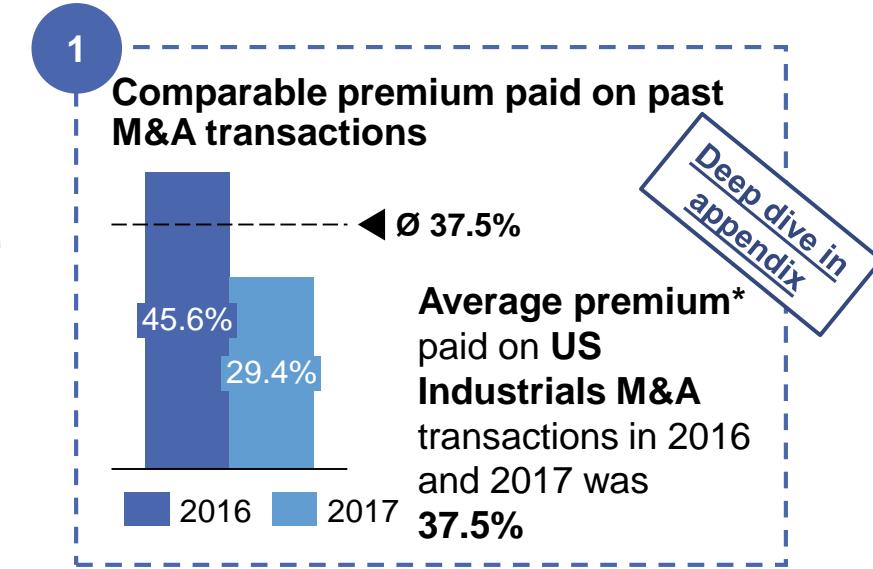
The price to be paid for Tesla is significantly higher than its added value for GM

In billion USD



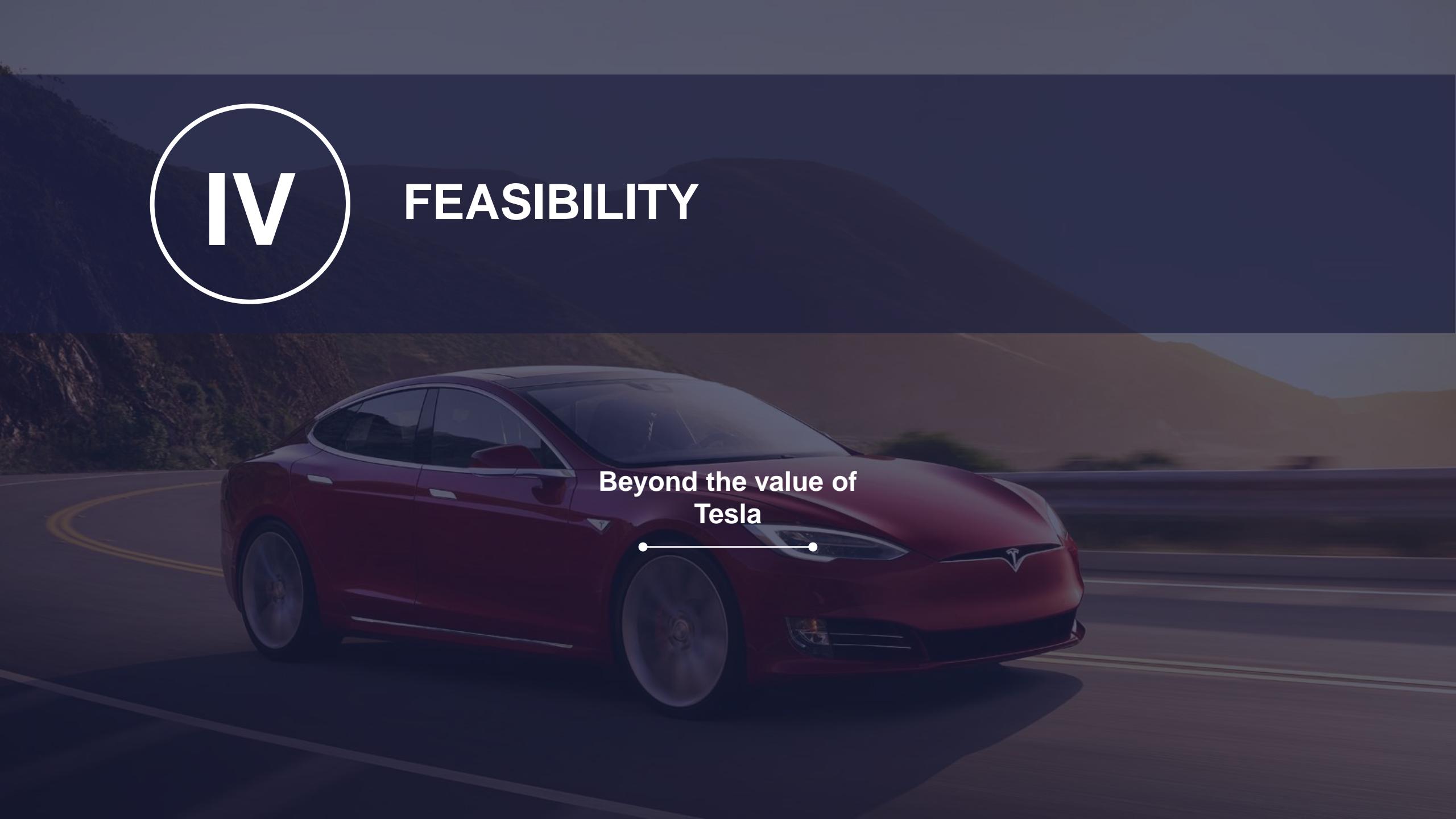
Note: *: Premium calculated to four week stock price

Source: Hershorn (2018, Thomson Reuters)



- 2** **Elon Musk premium**
- Elon Musk holds 20% of Tesla and is its **biggest shareholder**
 - Tesla shareholders are often **attached to Musk's vision**
 - Might require an **additional premium of 10%**



A red Tesla Model S electric car is shown from a side-front angle, driving on a winding road. The background features a range of mountains under a clear sky.

IV

FEASIBILITY

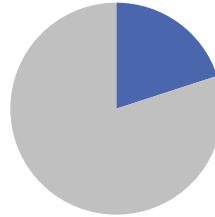
Beyond the value of
Tesla

ACQUISITION/CASH DEAL

Acquiring Tesla by means of cash is not a viable option because either there would be no synergies, or GM would overstep its financial capacity



Acquiring a minority stake lacks benefits



- A minority stake could allow to pressure for a **seat on the board of directors**, access to insider information, and the like
- Yet, Elon Musk has a lot of **decision power** and would most likely not approve GM to exercise power
- Therefore, **none of estimated synergies would materialize**



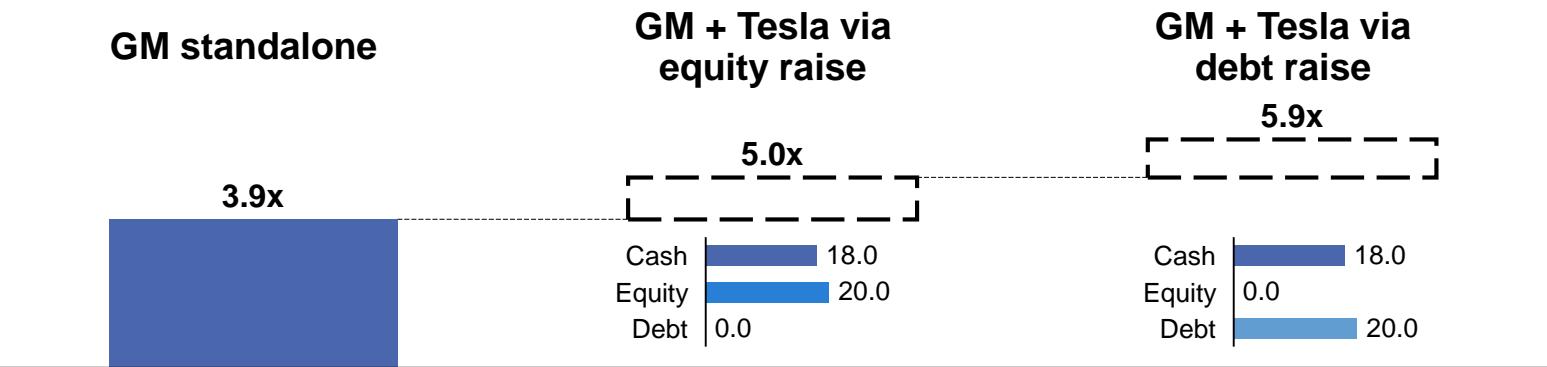
No synergies to be realized, therefore, unviable option for GM

Note: *: Overview about the biggest deals can be found in the appendix

Source: Ouimet (2012), Bloomberg (2019)

GM's financing capacity does not allow to acquire a majority stake of Tesla

Net debt / EBITDA ratio; Below mix of financial sources for payment



- GM is already **highly levered**
- In order to control Tesla, GM needs to **acquire 51%** of Tesla's equity, i.e. a **purchasing price of \$38.3bn** (incl. premium)
- GM has **USD 26.8bn cash** as of YE2018

- Requires one of the **largest equity issuances ever***
- Shareholders would be massively **diluted**
- **Leverage increases** to an unsustainable level

- Requires one of the **largest debt issuances ever***
- GM might **lose its investment grade** credit rating
- **Leverage increases** to an dangerous level

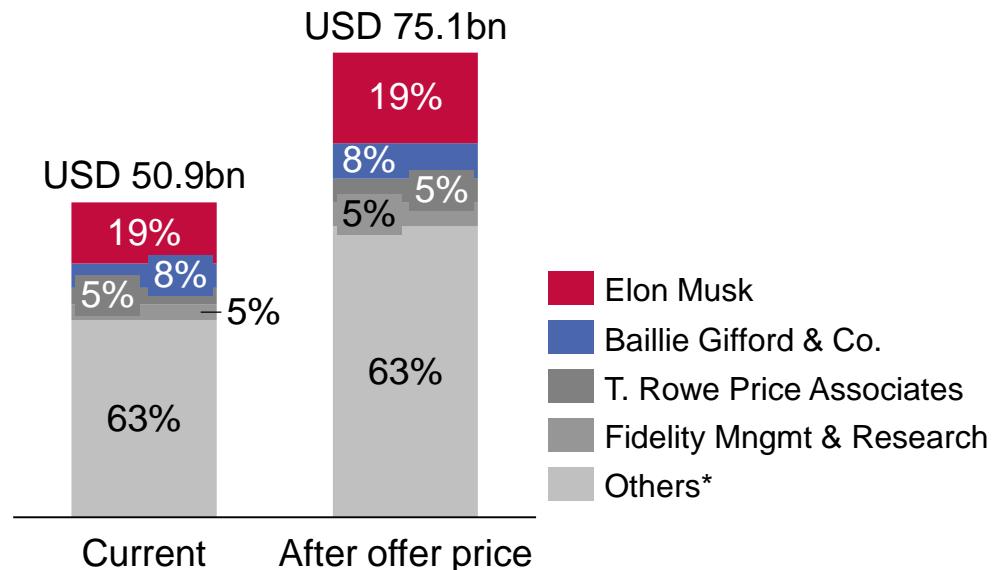
MERGER/EQUITY DEAL

A merger would result in an ownership structure with Elon Musk as the major shareholder, which may not be desirable for GM



Tesla's ownership structure

In % of its market capitalization as of February 22, 2019



Assumptions

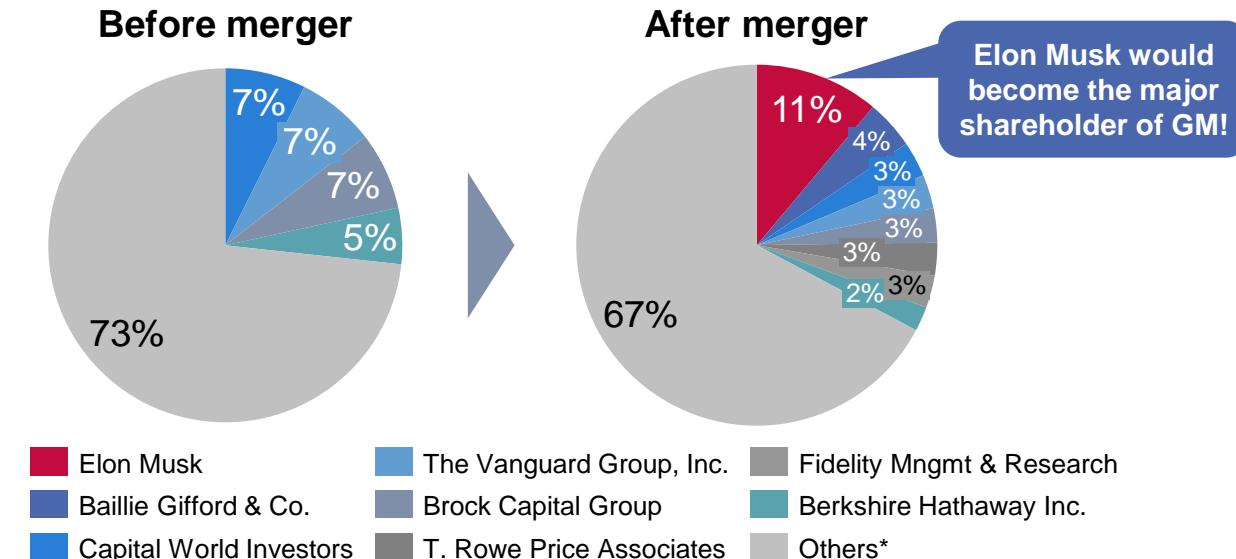
Tesla market capitalizaton	USD 50.9bn (as of 02/22/2019)
GM market capitalization	USD 56.3bn (as of 02/22/2019)
Acquisition premium	47.5%**

Note: *: Parties holding less than 5% of outstanding shares; **: Average premium to 4 week stock price for M&A transactions in the US Industrials sector between 2016 and 2017

Source: Thomson One (2019), Nasdaq (2019), Hershorn (2018, *Thomson Reuters*)

Evolution of GM's ownership structure

In % of its market capitalization as of February 22, 2019



Concerns

- Elon Musk has been Tesla's CEO since 2008, and emotionally very involved in his company
- Musk lacks professionalism, e.g. he was punished by the SEC because of a tweet about his desire to make Tesla private (fine of \$20m for both Tesla and Musk)
- **Can GM allow itself to have a person with such an unpredictable behavior as major shareholder?**



OTHER DIMENSIONS

The acquisition is threatened as well in other dimensions, especially regarding the post-merger integration and the measures set by Tesla to avoid unwanted M&A operations



	Description	Areas of concern following GM's acquisition of Tesla	Threat assessment		Overall threat
			Descriptive assessment	Threat level	
Antitrust regulation	<ul style="list-style-type: none"> Willingness to prevent M&A operations that lead to a monopoly or drastically reduce competition (Sherman Act & Clayton Act) 	<ul style="list-style-type: none"> Already concentrated market Strong increase of the market concentration Resulting monopoly in the EV segment 	<ul style="list-style-type: none"> HHI* lower than 1,500 Increase of HHI* of less than 200 points Rising players in the EV segment, but strong leadership of Tesla 	Low Low Medium	
Post-merger integration	<ul style="list-style-type: none"> Merging different organizations (culture, values) can cause uncertainty among workers, leading to lower productivity and failure of the acquisition 	<ul style="list-style-type: none"> Difficulty to engage the teams of the acquired company Difficulty to align management teams' interests 	<ul style="list-style-type: none"> Tesla & GM's values differ which may hinder employee's engagement Elon Musk acting as a charismatic and strongly independent leader: may be reluctant to follow GM's objectives 	High High	
Preventive measures set by Tesla	<ul style="list-style-type: none"> Defense strategies set up by Tesla's management in advance to deter unwanted acquisitions 	<ul style="list-style-type: none"> Voting structure preventing acquisitions Resistance of shareholders 	<ul style="list-style-type: none"> Supermajority voting structure (two thirds of the shares required for any major change, e.g. acquisitions) Elon Musk owns c. 19% of Tesla and considered getting the company private 	High High	
Conglomerate discount	<ul style="list-style-type: none"> Tendency of markets to value a diversified group at less than the sum of its parts – as issues arising from an M&A operation can offset the benefits of controlling several companies 	<ul style="list-style-type: none"> Strong diversification Limited strategic rationale for the acquisition Different management styles 	<ul style="list-style-type: none"> Acquisition within the auto industry Limited synergies (cf. financial analysis) Tesla puts emphasis on a very flat management style, which may be hard to achieve in a bigger structure 	Low Low Medium	

Note: *: The Herfindahl-Hirschman Index is a measure commonly used in economics to assess the concentration of a market

Source: Xerfi (2018), DOJ (2019), FTC (2019), Korus (2016, Ark Invest), Boudette (2018, New York Times), Thomson One (2019)



General Motors should not acquire Tesla

An acquisition of, or merger with, Tesla would destroy around USD 26.2bn of value

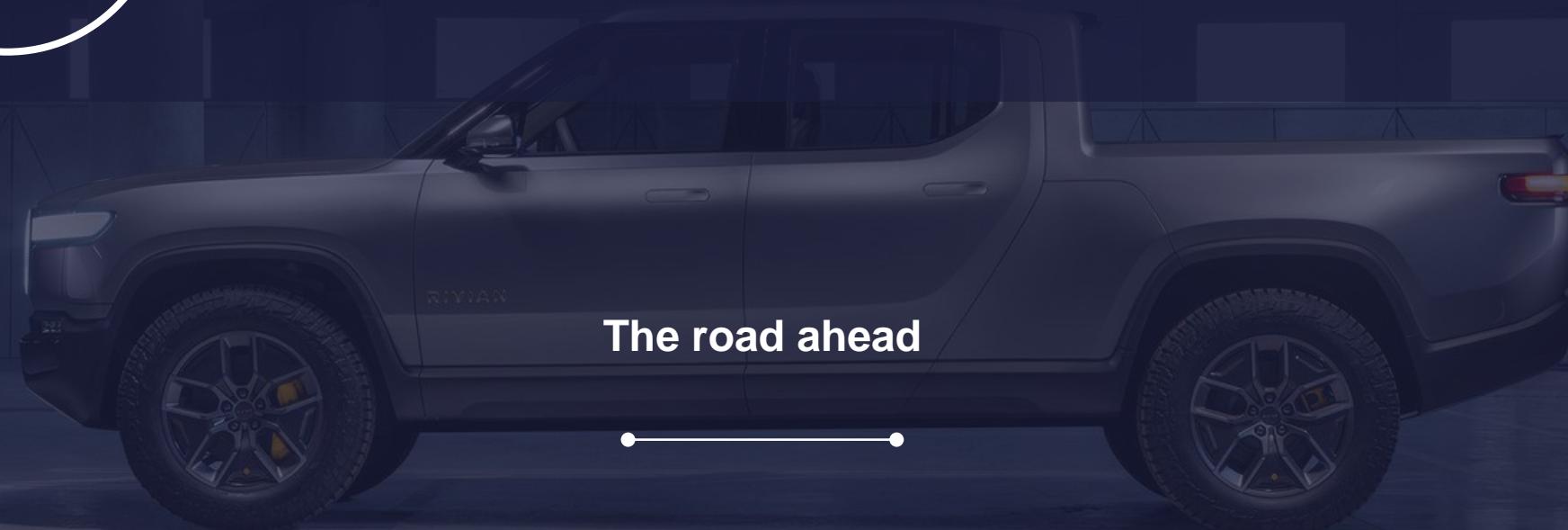
- Our multiples and DCF valuations suggest that **Tesla's equity is currently 18% overvalued**
- Tesla's shareholders likely **require a premium of 47.5% on top** of the current market cap in order to sell their shares
- This purchasing price does **not justify USD 7.4bn in estimated synergies**

Several challenges fundamentally question the feasibility of such a transaction

- Using cash to acquire a minority stake of Tesla would **lack synergies**, and a majority stake would **overstep GM's financial capacity**
- Merging with Tesla would result in an ownership structure where **Elon Musk is the major shareholder** of the conglomerate
- Additionally, there is a risk of **post-merger integration** and **preventive measures** put in place by Tesla



ALTERNATIVE SOLUTION



The road ahead



WAYS TO EXPLOIT PRODUCT OPPORTUNITY

GM could either develop an EV truck by itself, acquire an EV truck producer, or design a truck in a partnership, but acquiring an existing EV truck maker holds the most promise



Develop	Acquire	Cooperate
Develop the EV pickup truck alone • Would allow GM to develop an EV pickup truck from the ground up and be in full control of the design • However, it would take time to develop the EV powertrain , and in the meantime GM's competitors might launch EV trucks	Buy a company that produces one • Will allow GM to rapidly bring electric powertrain technology into its top-selling truck line and potentially a hyped brand as well • However, it might be expensive , and difficulties with integration could limit the potential upside	Establish a joint venture or an alliance • Would allow GM to design the EV powertrain technology for trucks cheaper and with less risk • However, it would involve sacrificing control over a key part of the EV truck and sharing the gains with a partner as well
Feasibility of developing alone • GM is already the largest pickup truck maker and also has plenty of experience producing EVs • However, GM would risk losing the opportunity for a "first mover advantage" in making EV trucks	Feasibility of acquiring a producer • GM ended 2018 with ~USD 23.5bn in cash and has more experience than most in buying and integrating companies and brands • However, GM risks overpaying for technology that is not good enough	Feasibility of cooperating with partner • GM has plenty of experience in establishing JVs, also within research and development • However, GM would risk that its partner breaks up the agreement to exploit the tech by itself
GM is greatly positioned to build an EV pickup truck, but it would take too long	Acquiring an EV pickup truck maker is very attractive, if a target can be found	Developing an EV truck in a partnership is too risky and limits the upside

Source: Team analysis, General Motors (2019b)

Deep dive on following slide

POTENTIAL ACQUISITION TARGETS

Multiple companies are currently trying to bring EV trucks to market, but only Rivian is far enough in the development process and attractive enough to consider for an acquisition



Company	EV Truck model	Specifications	Launch date and price	Operations and finance	Verdict
ATLIS MOTOR VEHICLES	 The XT Pickup	<ul style="list-style-type: none"> 0-60 MPH in 5 seconds 120 mph top speed 500 miles of range 5,000 lbs payload 17,000 lbs tow capacity 	<ul style="list-style-type: none"> Production of the XT might begin in 2020 No price has been announced 	<ul style="list-style-type: none"> Does not plan to make more than 100 units at the beginning Funding still not fully secured to launch 	
BOLLINGER MOTORS	 B2 Pickup Truck	<ul style="list-style-type: none"> 0-60 MPH in 4.5 seconds 100 mph top speed 200 miles of range 5,000 lbs payload 7,500 tow capacity 	<ul style="list-style-type: none"> Production of the B2 might begin in 2020 The B1 is supposed to start around USD 60,000 	<ul style="list-style-type: none"> Only renderings of the B2 exist right now Is still looking for partners to get its first vehicle into production 	
RIVIAN	 Rivian R1T	<ul style="list-style-type: none"> 0-60 MPH in 3 seconds 125mph top speed 400 miles of range 1,763 lbs payload 11,000 lbs tow capacity 	<ul style="list-style-type: none"> Production of the R1T will begin in 2020, together with Rivian's R1S SUV model R1T will start at \$69,000 	<ul style="list-style-type: none"> In January 2019, Rivian secured USD 700m of funding by Amazon It already has a functional factory 	
WORKHORSE	 The W-15*	<ul style="list-style-type: none"> 0-60 MPH in 5.5 seconds 80 miles of electric range Gasoline range extender 2,200 lbs payload 5,500 lbs tow capacity 	<ul style="list-style-type: none"> Production of the W-15 will start in 2019 The W-15 has a planned starting price of \$52,000 	<ul style="list-style-type: none"> In January 2019, Workhorse secured USD 35m in financing from Marathon Asset Management 	

Note: *: The W-15 is not an actual pure BEV, but a plug-in range extended electric pickup (PHEV)

Source: Atlis Motor Vehicles (2019), Bollinger Motors (2019), Lambert, F. (2018f, 2018g, Electrek), O'Kane, S. (2018, Verge), Randall C. (2019, Elective.com), Rivian (2019), WorkHorse (2019)

Deep dive on following slide
  Very attractive  Not attractive

ATTRACTIVENESS OF RIVIAN AS TARGET

Rivian's products are a perfect fit with GM's customers, and its skateboard platform can be used for future GM vehicles as well, while its brand is already hyped by customers



Rivian's products would be a perfect fit with GM's customers...



Rivian R1T
• All-electric
5-passenger pickup truck

Rivian's skateboard platform
• Is built from a clean sheet
• Can be modified and used for future GM vehicles too

Rivian R1S
• All-electric
7-passenger SUV

Because of the shared electric powertrain, the R1T and R1S have 91% shared components – future GM vehicles could have the same

... and Rivian is already very far in the development process



RIVIAN

10 years of experience in building cars

- Founded in 2009 by M.I.T. engineer
- **Has been working on EVs since 2011**

Already owns a fully functional factory

- Bought auto plant in 2017, previously owned by Mitsubishi Motors
- **Employs 700 people**



Both vehicles will go on sale in 2020

- Rivian aims to sell a total of **20,000 vehicles in 2021** and **40,000 in 2022**

electrek

"I am stunned by the specs here. We are talking about a best-case scenario for an all-electric pickup truck"

- Fred Lambert
Editor in Chief, Electrek

WIRED

"If Rivian can deliver on its promise... then the EV market will surely gain itself a whole new sector"

- Wired's best EVs from the LA Motor Show

Morgan Stanley

"Tesla's domination of the electric vehicle market is unsustainable and will soon be disrupted by start-up Rivian"

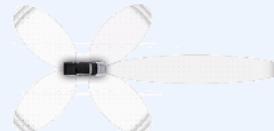
- Adam Jonas
Morgan Stanley Analyst

... and Rivian's technologies are also quite attractive for GM



Battery packs

- Battery sizes all the way **up to 180 kWh**
- **Have the highest capacity of any other passenger EV**



Self-driving tech

- Hardware suite enables "Level 3*" and includes Lidar, making it compatible with GM Cruise's technologies



Connected car

- Cloud-based platform that learns driver's preferences and adapts to his or her driving habits

Note: *: Level 3 ("eyes off") automation: The driver can safely turn their attention away from the driving tasks, e.g. the driver can text or watch a movie

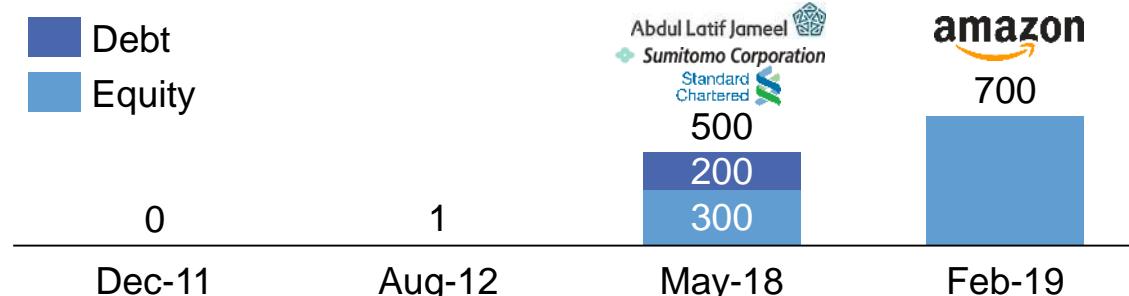
Source: Charlton, A. (2018, *Wired*), Lambert, F. (2018h, *Electrek*), Loveday, S. (2018, *InsideEVs*), Rivian (2019), Seppala, J. (2018, *Engadget*) Sheetz (2019, *CNBC*), Tannert, C. (2019, *Forbes*)

VALUATION AND FEASIBILITY OF ACQUIRING RIVIAN

To acquire Rivian, GM must account for the varied profiles of the investors, especially since Rivian's valuation is very uncertain and ranged between USD 1.2bn and 4bn

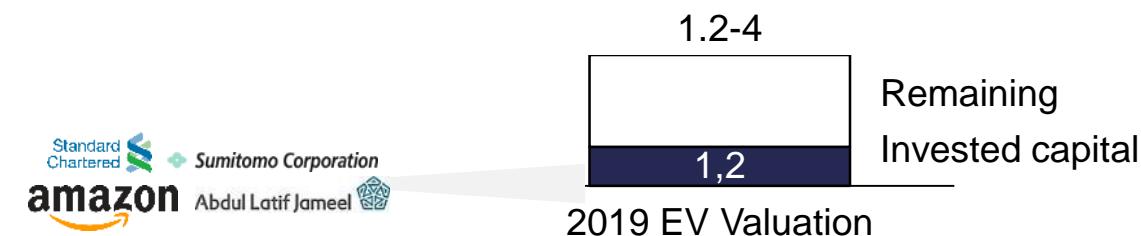


Rivian has gone through two major financing rounds...



- Rivian has gone through **two major financing rounds** in the last 12 months to be able to expand capacity by buying a factory and employing more talent

... But this has not made its valuation any clearer...



- While past investments provide an idea of the value of Rivian, the **share acquired by Amazon** in its February 2019 investment round has **not been officially disclosed**

Source: Pyper (2019, GTM), Prenzler (2018, AdaptBN)

... And the acquisition has to account for different shareholders

Official shareholders based on currently publicly available data



- According to the **current situation**...
 - Rivian does **not require additional liquidity** to de-risk its goal of producing an all-electric pickup by 2020
 - Shareholders are **committed to seeing the company succeed** and would not part with their shares lightly
- **But...**
 - Rivian will still need an **automaker's expertise** to fully **scale its production** in the next years, as Amazon is looking at Rivian as a partner to develop its delivery vehicles
 - **GM has the financial capabilities** to go through the acquisition, even with a **substantial premium**, which is justified based on its strategic relevance

POST-ACQUISITION STRATEGY

Rivian's brand should be positioned as a premium brand, while its underlying architecture should be used to develop cheaper electric trucks under the Chevrolet and GMC brands



Rivian's brand should be positioned as a premium brand...

RIVIAN

The world's first Electric Adventure Vehicles



The R1T pickup truck and the R1S SUV should be branded as premium vehicles

- The starting price should be kept around USD 70,000
- The brand should be used only for premium EVs
- Focus should be on delivering the highest quality

... and be promoted as part of GM's portfolio of core brands



GMC



G E N E R A L M O T O R S

Rivian's logo

Source: Eisenstein (2019, CNBC), General Motors (2018b), Smith, A. (2019, PonyParts)

Rivian's powertrain technology should be used extensively...



CHEVROLET

The Chevrolet Silverado pickup truck

- Starting price: \$28,285
- The Silverado is labeled as the more affordable truck



Rivian's platform

- Will serve as GM's next-generation battery-electric architecture for EV pickup trucks

The GMC Sierra pickup truck

- Starting price: \$29,000
- The GMC Sierra is known for being a bit more luxurious truck

The GMC Sierra and the Chevrolet Silverado already share the same underlying platform, as well as conventional internal combustion powertrains

... in order for GM to maximize the value of the Rivian acquisition



No development cost

- Will eliminate cost of developing powertrain

Economies of scale

- Will decrease vehicle production cost

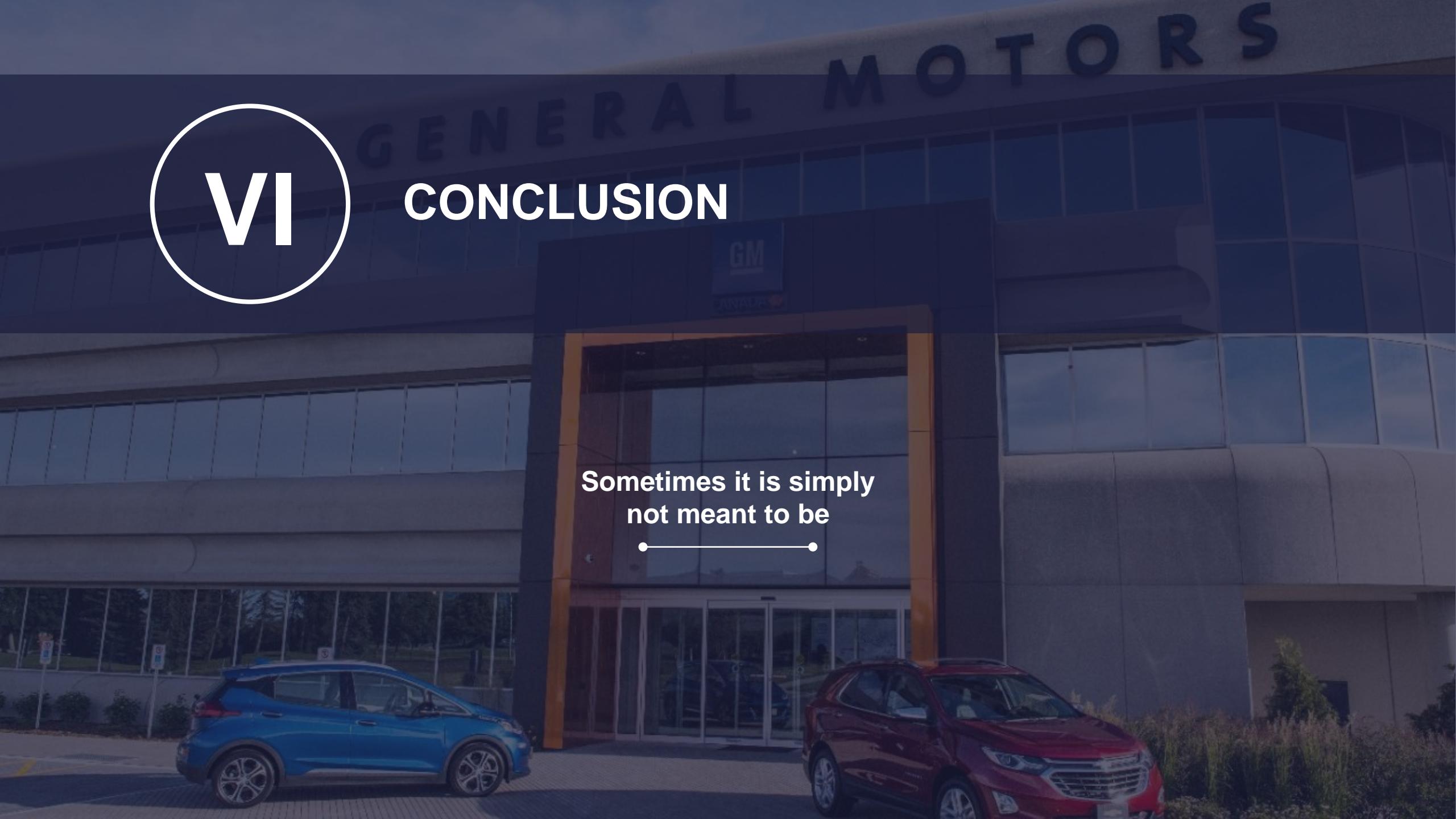
Choice for the consumer

- "The GMC is a GMC"
- "The Chevy is a Chevy"



VI

CONCLUSION



Sometimes it is simply
not meant to be

GM should not acquire Tesla, but instead acquire Rivian, an EV truck manufacturer whose products and brand will have strategic value for GM in the future EV landscape



Should General Motors acquire Tesla?

How is GM's and Tesla's strategic fit?

- Despite having the **second largest share of EVs sold** in the US in 2018, GM is still highly **dependent on pickup trucks and SUVs that are causing very high emissions**
- GM could use **Tesla's brand and products**, while Tesla could **leverage GM's expertise** in scaling

How much is Tesla worth?

- **Tesla's fair valuation** is estimated at an **EV and Equity Value of USD 55bn and 41.5bn**, respectively
- GM would **lose around USD 26.2bn on the acquisition** after accounting for synergies and a reasonable premium over Tesla's current market capitalization that is required to convince shareholders to sell

How feasible is an acquisition?

- Acquiring Tesla by means of cash is not viable due to either the **lack of synergies or financial capacity**
- A merger would result in an ownership structure where **Elon Musk is the major shareholder**
- There are concerns about the **post-merger integration** and **Tesla's preventive M&A measures**

GM should not buy Tesla

What should GM do instead?

- **Acquiring an existing EV pickup truck maker** is the most promising solution for GM
- **Rivian is the most attractive target** due to its product portfolio and brand
- The Rivian brand should then be kept as a **premium brand**, while its **underlying powertrain technology** should be used **to develop cheaper electric pickup trucks** under the Chevrolet and GMC brands



APPENDIX

More insights
(yes, more)



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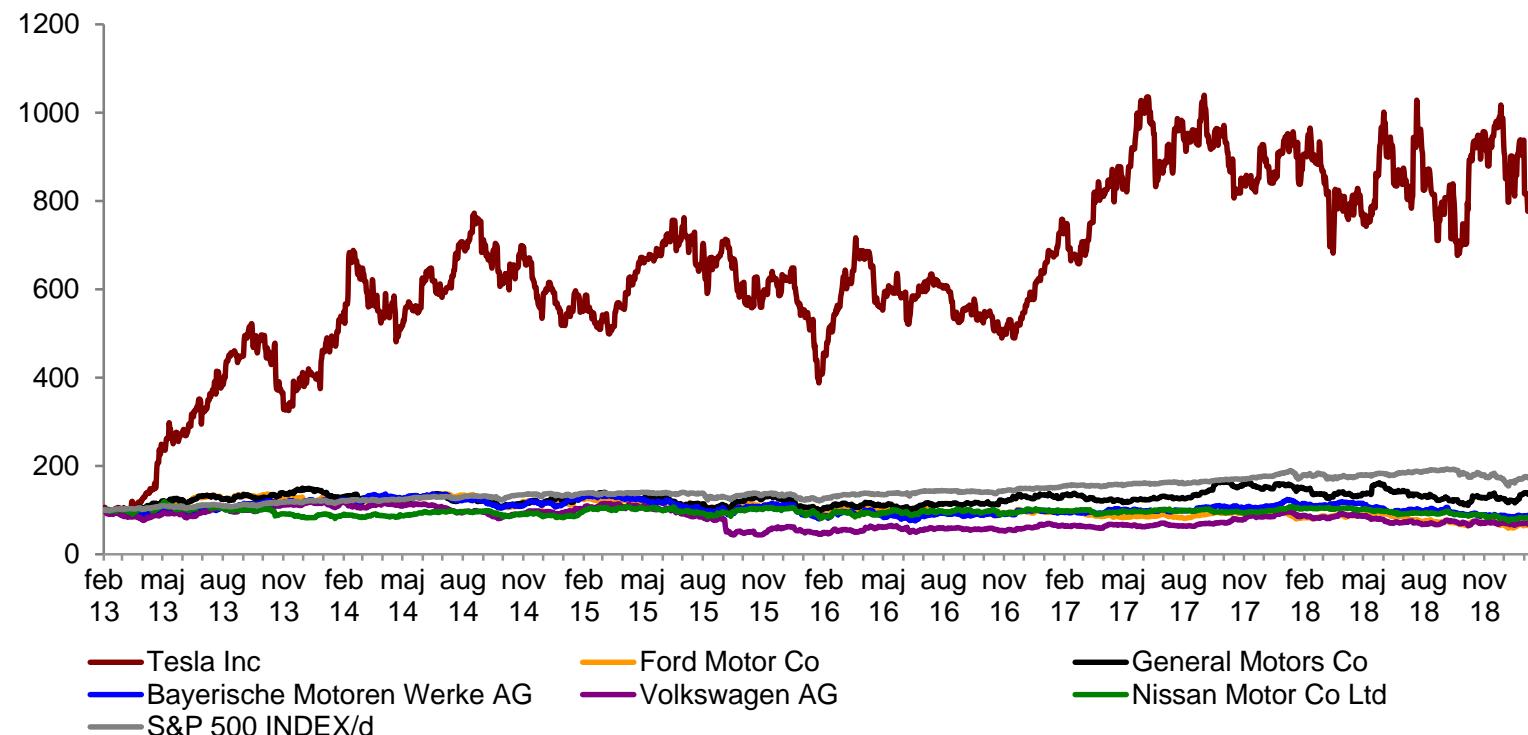
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FINANCIAL ANALYSIS – TRADING MULTIPLES

Based on 5 key differences between Tesla and traditional OEMs, we reach the conclusion that this peer group should not be retained as a peer



Stock prices of traditional automotive manufacturers peer group



Return
13a-18a

5 key differences between
Tesla and traditional OEMs

- The **growth profile** of Tesla is vastly different, with part of the demand for their cars still unmet
- Tesla just became **EBITDA positive** in 2018, vs. the rest of the industry that shows rather stable profitability
- The **scale** of traditional OEMs dwarfs Tesla's current production
- Tesla constantly **remodels its assembly** line, vs. other automakers that keep it the same for years
- Fast vehicle updates** are common in Tesla, realizing fixes via overnight software download or make physical changes fast

Based on this evidence, traditional automakers are **not retained** as a peer

Source: Bloomberg (2019)



FINANCIAL ANALYSIS – TRANSACTION MULTIPLES

Through selected transaction multiples in the four industries, we estimate an EV / Sales multiple for Tesla of 1.2x



M&A transactions

#	Date	Target company	Description	Buyer	Deal value (\$m)	EV/Sales	EV/EBITDA
1	Jan-08	Jaguar Land Rover	Automotive manufacturer	Tata Motors	2,300	0.3	Negative EBITDA
2	Jan-09	Chrysler	Automotive manufacturer	Fiat	10,400	0.6	3.2
3	Mai-15	National Electric Vehicle Sweden	Company engaged in the manufacturing of electric automobiles	GaoXin BoHua Investment Co	930	1.1	n.a.
4	Jul-15	Agile Electric Sub Assembly	Indian eletric motor manufacturer	Igarashi Electric Works	118	1.2	n.a.
5	Oct-16	Mitsubishi Motors Corporation	Automotive manufacturer	Nissan Motor Co	2,486	1.4	6.0
6	Jan-17	SolarCity	Manufactures and installs residential and commercial solar panels	Tesla	2,600	4.2	Negative EBITDA
7	Jan-17	SPower	Private owner of operating solar assets	AES/AIMCO	853	1.9	Negative EBITDA
8	Feb-17	Argo AI	Start-up developing softwares for self-driving technology	Ford	1,000	1.2*	n.a.
9	Oct-18	SunPower	Energy company that designs and manufactures crystalline silicon photovoltaic cells and solar panels	Total	1,300	0.7	Negative EBITDA
Max						4.2	
Average						1.4	
Median						1.2	
Min						0.3	

Note: When not available in USD, the Sales and EV were converted to USD using the annual average exchange rate. *Bloomberg estimate

Source: MergerMarkets (2019), Thomson One (2019), Bloomberg (2019)



FINANCIAL ANALYSIS – DCF VALUATION

In the realistic scenario of our DCF analysis, we value Tesla at an EV of USD 55.8bn which translates into an equity value of USD 42.3bn



FYE 31/12 - USDm	Actuals						Realistic case										Norm.	
	2014a	2015a	2016a	2017a	2018a	2019e	2020e	2021e	2022e	2023e	2024e	2025e	2026e	2027e	2028e	2029e	2030e	
Sales	3'198	4'046	7'000	11'759	21'461	28'680	34'199	41'587	48'275	56'643	61'618	65'093	68'492	72'416	76'360	79'630	82'827	84'484
growth%	58.8%	26.5%	73.0%	68.0%	82.5%	33.6%	19.2%	21.6%	16.1%	17.3%	8.8%	5.6%	5.2%	5.7%	5.4%	4.3%	4.0%	2.0%
EBITDA	45	-294	280	4	1513	3155	4104	5406	7241	9063	9859	9764	10274	10862	11454	11945	12424	12588
% margin	1.4%	-7.3%	4.0%	0.0%	7.0%	11.0%	12.0%	13.0%	15.0%	16.0%	16.0%	15.0%	15.0%	15.0%	15.0%	15.0%	14.9%	
EBIT	-187	-717	-667	-1632	-388	574	1368	2495	3862	5664	6162	6509	6849	7242	7636	7963	8283	8448
% margin	-5.8%	-17.7%	-9.5%	-13.9%	-1.8%	2.0%	4.0%	6.0%	8.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Tax rate	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%	27.9%
(-) Tax on EBIT	52	200	186	455	108	(160)	(381)	(695)	(1'076)	(1'579)	(1'717)	(1'814)	(1'909)	(2'018)	(2'128)	(2'220)	(2'309)	(2'355)
NOPAT	-135	-517	-481	-1177	-280	414	987	1800	2786	4086	4444	4695	4940	5223	5508	5743	5974	6094
(+) D&A	232	423	947	1636	1901	2581	2736	2911	3379	3399	3697	3255	3425	3621	3818	3982	4141	4140
% Capex	23.4%	25.3%	66.9%	39.0%	81.3%	90.0%	84.2%	77.8%	82.4%	75.0%	80.0%	71.4%	76.9%	83.3%	90.9%	100.0%	100.0%	98.0%
(+) Stock-based compensation	156	198	334	467	749	1147	1368	1663	1931	2266	2465	2604	2740	2897	3054	3185	3313	3379
% sales	4.9%	4.9%	4.8%	4.0%	3.5%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	2.0%
(-) Capex	(990)	(1'674)	(1'416)	(4'196)	(2'337)	(2'868)	(3'249)	(3'743)	(4'103)	(4'531)	(4'621)	(4'556)	(4'452)	(4'345)	(4'200)	(3'982)	(4'141)	(4'224)
% sales	31.0%	41.4%	20.2%	35.7%	10.9%	10.0%	9.5%	9.0%	8.5%	8.0%	7.5%	7.0%	6.5%	6.0%	5.5%	5.0%	5.0%	5.0%
(-) Change in trade working capital	(442)	(345)	(2'113)	(1'995)	(327)	(1'974)	(1'463)	(1'958)	(1'773)	(2'217)	(1'318)	(921)	(901)	(1'040)	(1'045)	(867)	(847)	864
% sales	13.8%	8.5%	30.2%	17.0%	1.5%	6.9%	4.3%	4.7%	3.7%	3.9%	2.1%	1.4%	1.3%	1.4%	1.4%	1.1%	1.0%	1.0%
Unlevered free cash flow	-1178	-1915	-2730	-5266	-295	-700	379	674	2220	3001	4666	5076	5752	6356	7135	8062	8440	10253
Present value of free cash flows						30%	16'634											
Present value of terminal value						70%	38'398											
Enterprise value 31.12.2018							55'032											
Future value factor							1.01											
Enterprise value 22.02.2018								55'819										
EV - EquityV bridge																		
+ Cash and ST Investments									3'878									
- Total Debt									(16'002)									
- Minority Interest									(1'390)									
Total EV-EqV adjustments									(13'514)									
Equity value									42'304.9									

Source: Own analysis based on financial statements from Thomson Reuters

Perpetual growth rate	Enterprise Value (€\$bn)					
	WACC					
55.8	9.27%	9.77%	10.27%	10.77%	11.27%	
1.0%	61.2	56.0	51.4	47.4	43.8	
1.5%	64.1	58.4	53.5	49.2	45.3	
2.0%	67.4	61.2	55.8	51.1	47.0	
2.5%	71.2	64.3	58.4	53.4	48.9	
3.0%	75.6	67.9	61.4	55.8	51.0	

Key valuation parameters

Balance sheet date	12/31/2018
Valuation date	02/22/2019
WACC	10.3%
Perpetual growth rate	2%
Perpetual EBIT margin	10%





The equity betas for Tesla and General Motors were derived based on CAPM regressions

Tesla CAPM regressions

Return frequency Weekly

Sample period (31/12/2018 - x years)	S&P 500			Nasdaq		
	Beta	t statistics	R-squared	Beta	t statistics	R-squared
1 year	1.3263965	3.2003615	0.1700186	1.1333018	3.7209910	0.2168628
2 years	1.3470997	4.0339210	0.1375850	1.1567973	4.6897035	0.1773750
3 years	1.5920039	5.9509014	0.1869628	1.3926345	7.0206576	0.2424601
4 years	1.5066548	6.8463311	0.1853594	1.3577518	8.0359592	0.2386630
5 years	1.5416553	7.4947275	0.1787910	1.4330957	9.0284881	0.2400893
Average beta	1.4627620			1.2947162		
Average beta S&P500 and Nasdaq	1.3787391					

General Motors CAPM regressions

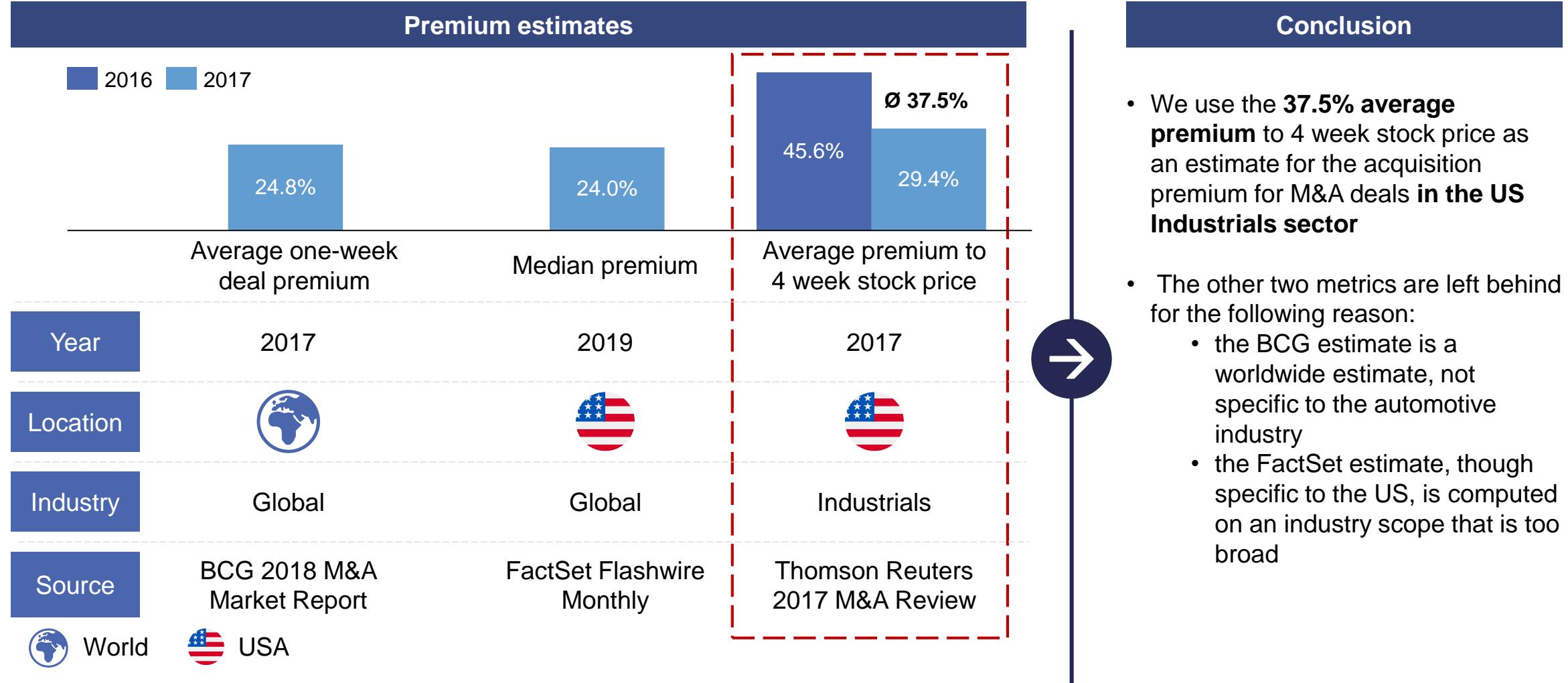
Return frequency Weekly

Sample period (31/12/2018 - x years)	S&P 500			Nasdaq		
	Beta	t statistics	R-squared	Beta	t statistics	R-squared
1 year	1.0076880	3.6675755	0.2119917	0.7081105	3.3454446	0.1828997
2 years	1.1156166	5.3102361	0.2165815	0.7716598	4.7503322	0.1811547
3 years	1.1839723	7.5532588	0.2703210	0.8400113	6.7938874	0.2306036
4 years	1.2286241	9.4530649	0.3025471	0.8775339	8.1694879	0.2447034
5 years	1.2354371	10.9813061	0.3185223	0.8820318	9.3305158	0.2523007
Average beta	1.1542676			0.8158695		
Average beta S&P500 and Nasdaq	0.9850686					

Source: Own analysis based on financial statements from Thomson Reuters

FEASIBILITY – PREMIUM

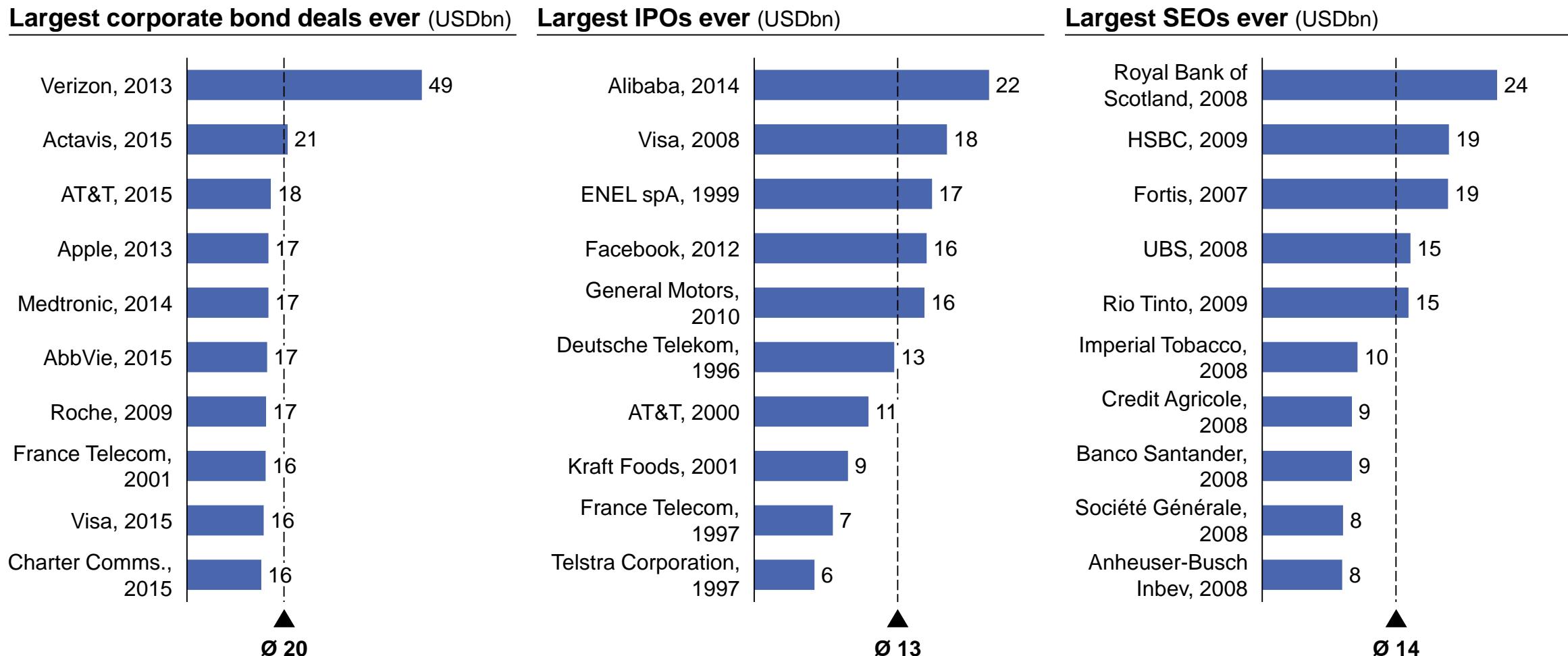
The acquisition premium for M&A deals in the US Industrials sector is estimated at a value of 37.5%



Source: BCG (2019), Hershorn (2018, *Thomson Reuters*), FactSet (2019)



Overview about the largest equity and debt issuances of all time

Source: Backman (2016, *Atlas*), Renaissance Capital (2019), Statista (2019c)

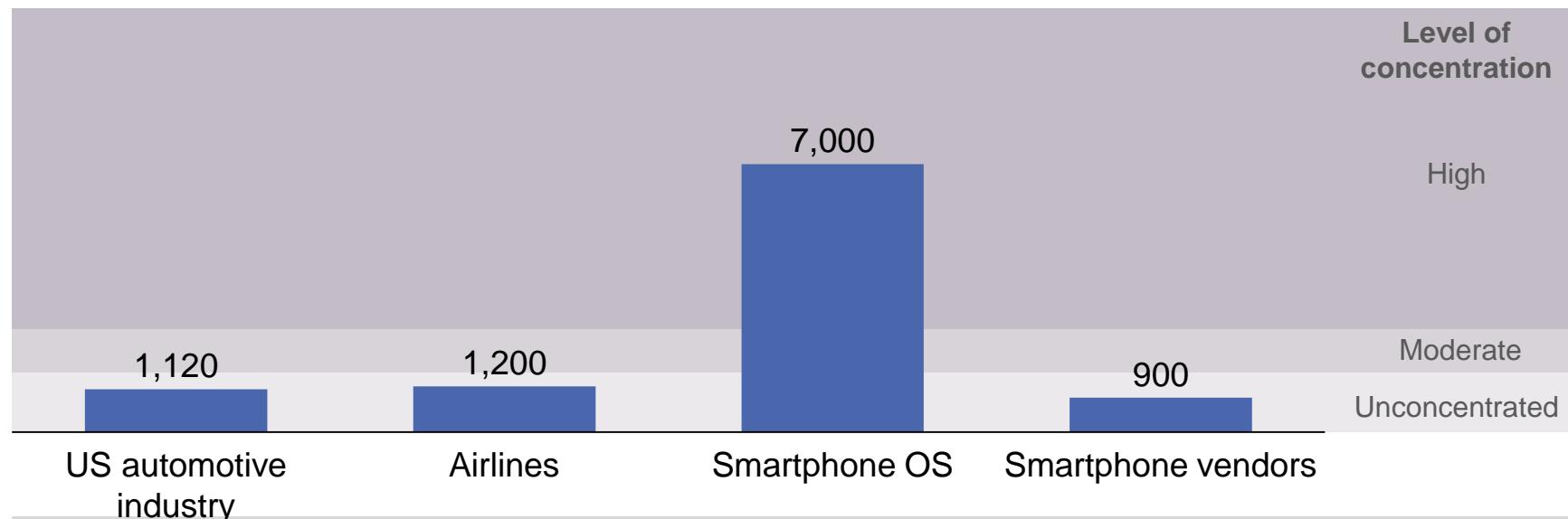
FEASIBILITY – OTHER DIMENSIONS – ANTITRUST REGULATION



The US automotive industry is considered an unconcentrated market by the US antitrust regulators: an acquisition is quite unlikely to fall under scrutiny

Concentration analysis

Herfindahl-Hirschman index for selected US markets



Conclusion

- The automotive industry has a Herfindahl-Hirschman Index below 1500, which means that the **industry is considered by the antitrust regulators as an unconcentrated market**
- Therefore, the **likelihood that a merger in this industry would fall under the DOJ or the FTC scrutiny is quite low**

Note: The Herfindahl-Hirschman index for selected industries is based on market shares of 2018 (for the automotive industry) and of 2016 (all other industries)

Source: Xerfi (2018), DOJ (2019), FTC (2019), Korus (2016, *Ark Invest*)



ALTERNATIVE SOLUTION – R&D OPPORTUNITY

Batteries are a crucial part and key challenge for EVs, but thanks to early efforts in solid-state batteries and successful partnerships GM is already very well positioned



New battery technology is needed

Lithium-ion batteries



- Hit limit of storage capacity and charging speed
- Not capable of travelling 500 miles on a single charge

Solid-state batteries



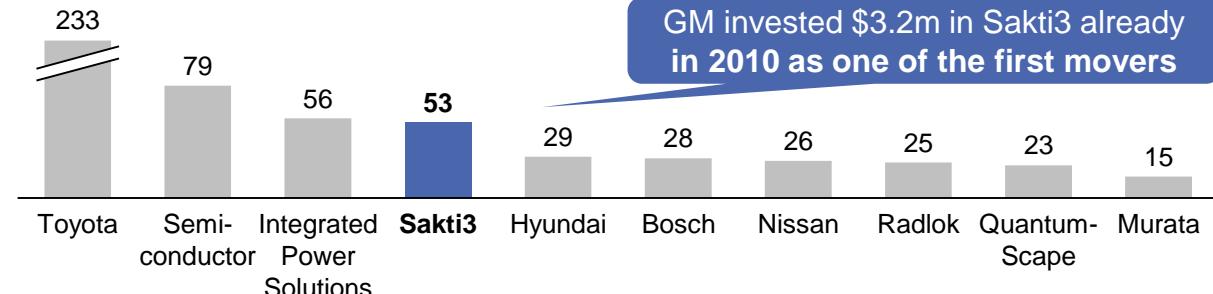
- Cheaper and safer
- Capable of travelling 500 miles on a single charge and allow faster charging

Battery production is very competitive

- Batteries are increasingly becoming the **leading power source for mobility**
- Battery manufacturers are expanding production capacity significantly to capture market share and economies of scale
- However, BCG expects that **battery cell production will exceed demand by 40% in 2021**, which will lead to tremendous price pressure

GM is a leading player and early mover in battery technology...

Patent filings related to solid-state EV batteries



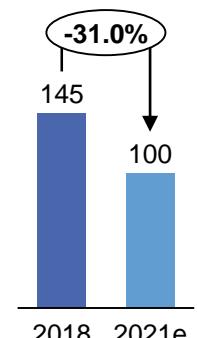
GM invested \$3.2m in Sakti3 already in 2010 as one of the first movers

... and is maintaining very successful partnerships

Battery technology



Cost per kWh

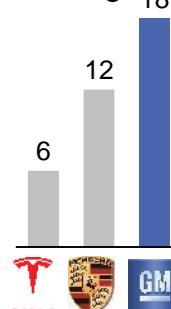


- GM develops, LG Chem produces and Honda sources the batteries
- Higher storage capacity and faster charging

Charging systems



Miles per minute of charge



- Development of **solid-state fast charging system**
- GM expects to have vehicle fleet ready with it by 2023

Source: Welch (2018a, Bloomberg), Lienert, P. and White, J. (2018, Thomson Reuters), Greenwood (2018, Engineering.com), Stringer, D. and Buckland, K. (2019, Bloomberg), Motavalli (2010, New York Times), Lambert (2018c, Electrek), BCG (2018c)



Table of contents

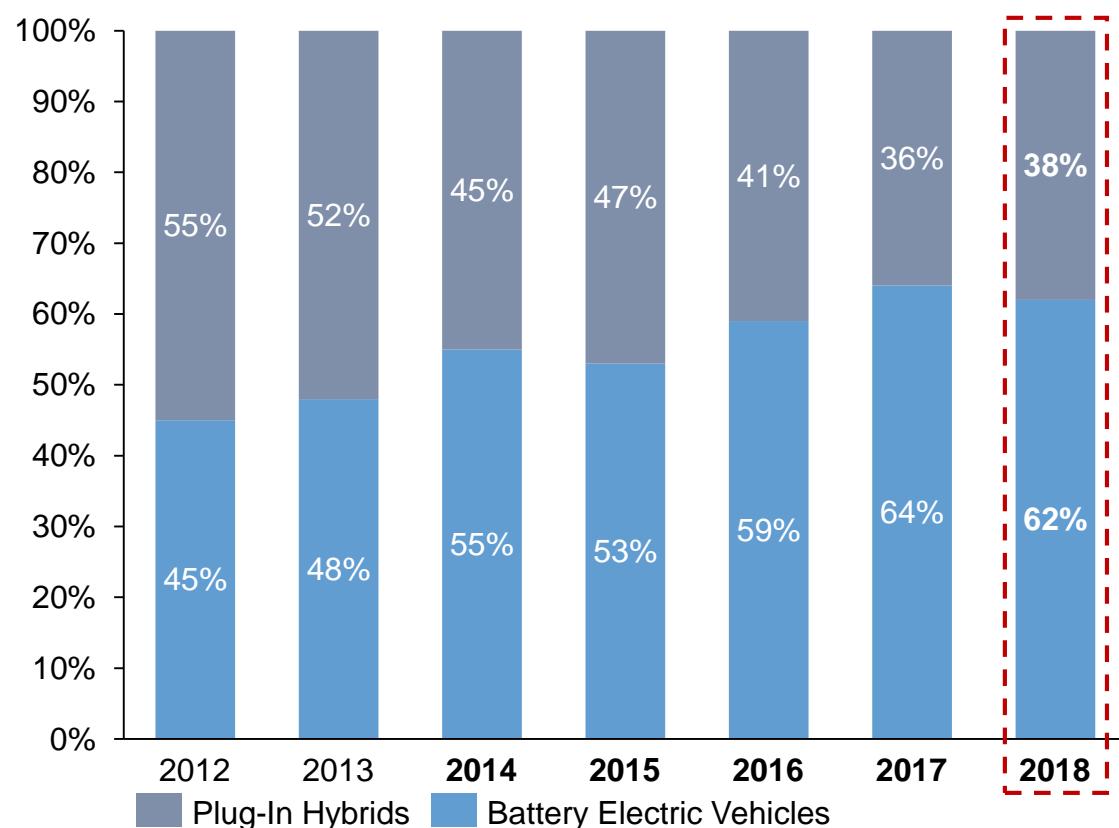
I. Referenced deep dives	p. 67
1. Strategic fit	
2. Financial analysis	
3. Feasibility	
4. Alternative solution	
II. Additional insights	p. 76
1. Market analysis	
2. Strategic fit	



Globally, as well as in the US, the plug-in sales mix has been pushed towards BEVs

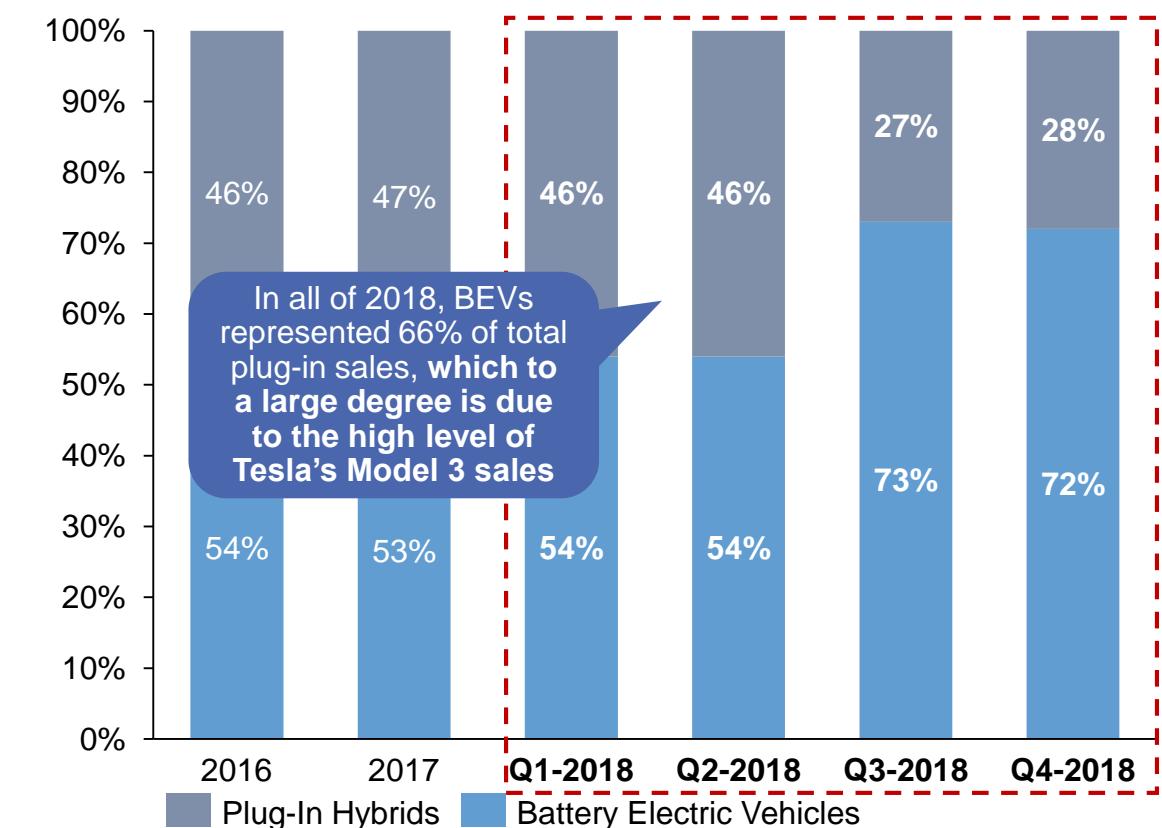
Globally, the plug-in sales mix has been pushed towards BEVs

Plug-in sales mix globally, 2012 – 2018



In the US, the mix has been pushed towards BEVs as well

Plug-in sales mix in the US, 2016 – 2018



Source: Irle, R. (2018, EVVolumes)



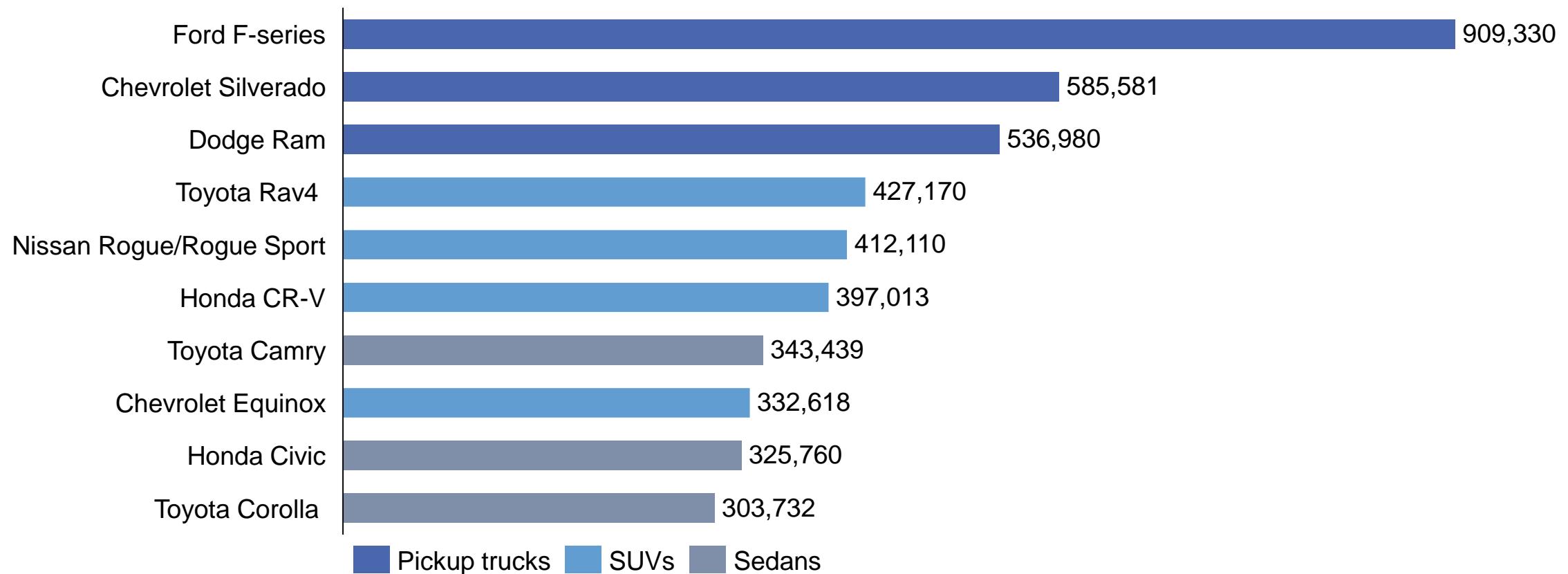
MARKET ANALYSIS

Americans bought over 17 million vehicles in 2018, 68 percent of which were pickup trucks and SUVs, continuing a years-long trend away from cars



The best-selling cars in the US are mostly pickup trucks and SUVs

Top 10 best-selling cars in # of vehicles sold in the US, 2018



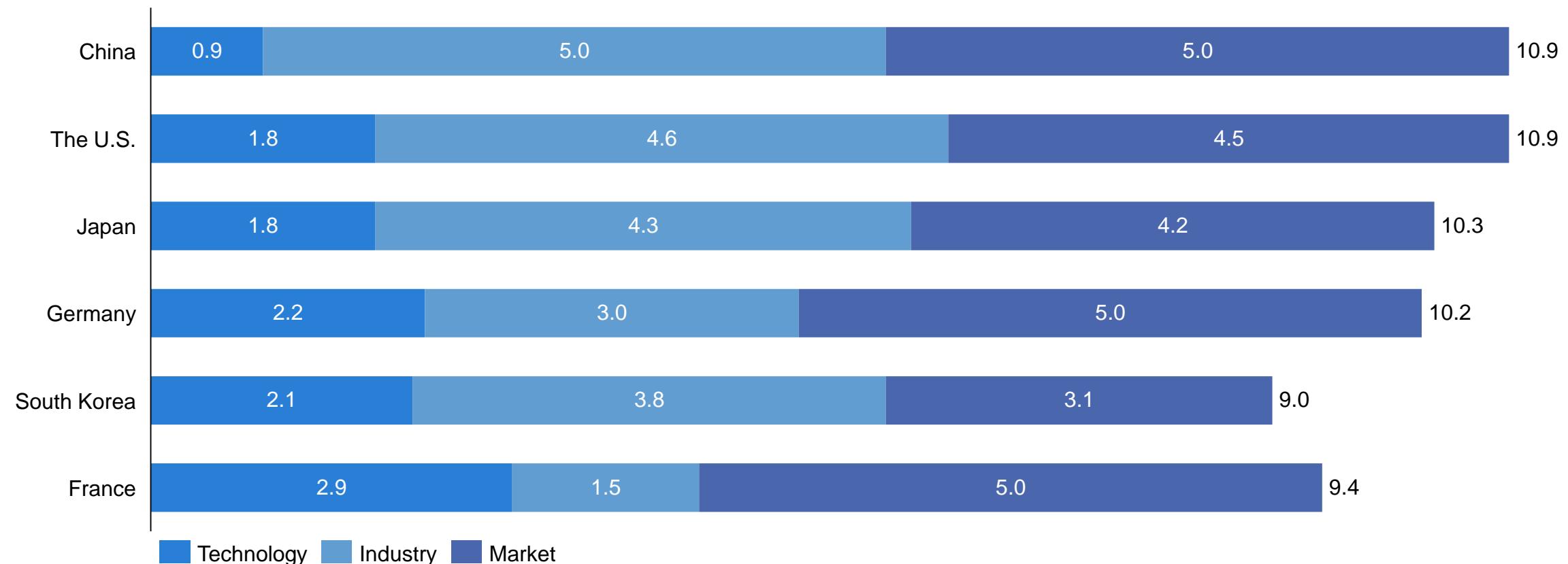
Source: Capparella, J. (2019, *Car and Driver*), Focus2Move (2019), Gastelu, G. (2019, *Fox News*)



China is in a leading position in the field of e-mobility

China is in a leading position in the field of e-mobility

Leading countries, Roland Berger's E-mobility Index 2018



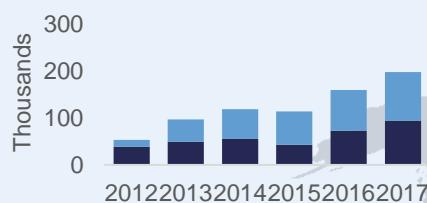
Source: Roland Berger's E-mobility Index 2018

An overview of car markets and the EV segment in various regions from 2012 – 2017

Global car registration and sales by region

USA – EV segment

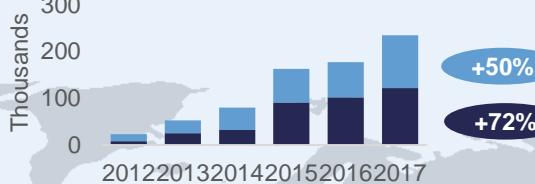
- Market share: 1%
- CAGR₁₂₋₁₇: +30%



17.6m
+3.5%

EUROPE – EV segment

- Market share: 1%
- CAGR₁₂₋₁₇: +59%



20.9m
+2.3%

CHINA – EV segment

- Market share: 2%
- CAGR₁₂₋₁₇: +126%



29.1m
+8.6%

OTHER AMERICAS – EV segment

- Market share: less than 1%
- CAGR₁₂₋₁₇: +51%



8.2m
-1.6%



Appendix

REST OF WORLD – EV segment

- Market share: less than 1%
- CAGR₁₂₋₁₇: +32%



| 79

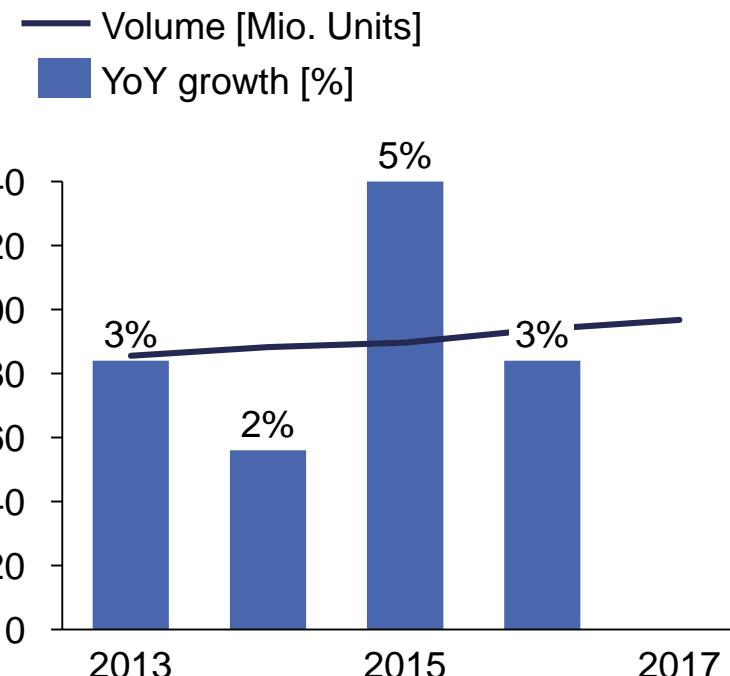
MARKET ANALYSIS

Car manufacturers need to find new sources of profits as their core business is doomed to sluggish revenue growth and more heated competition coming from consolidation



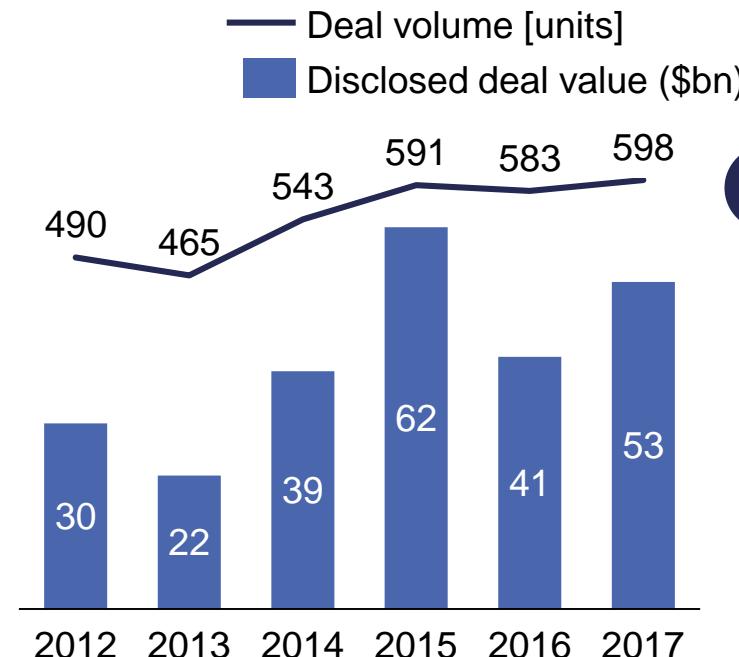
The growth sales of passenger cars and commercial vehicles is sluggish...

Global car & vehicles registration and sales (2012-2017) [Mio. Units and %]



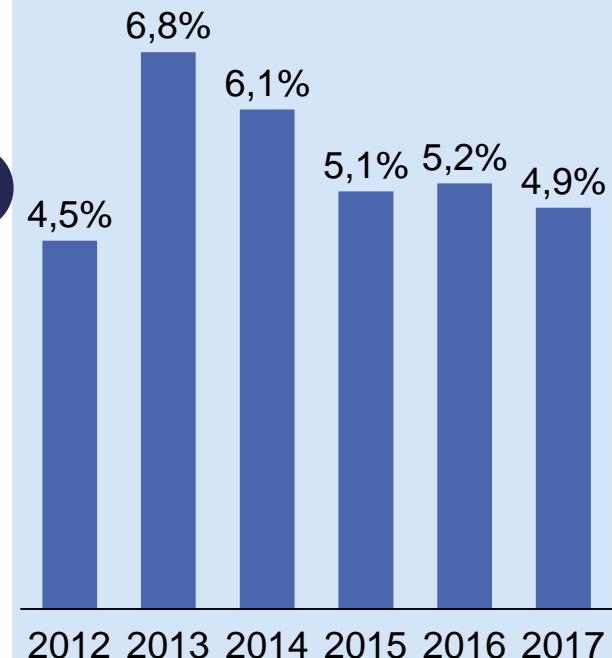
...while the industry consolidates, leading to more heated competition...

Global automotive M&A deal volume and value (2012-2017)



... which has put profits on a downward trend since 2013

Operating margin of 2016 top 10 players (2012-2016)¹⁾



Source: OICA (2019), Xerfi (2017, pp. 16-46), Thomson One (2019)

MARKET ANALYSIS

The automotive industry is currently converging to a software-driven industry where the value chain is expanded to incorporate digital services, and hardware/software providers



From supply and manufacture of cars ...

... to mobility as a software-driven service

Traditional automotive industry

2015 share of profits: 68%

2030 share of profits: 49%

Vehicle sales



Aftermarket



Financing



New ecosystem

2015 share of profits: 32%

2030 share of profits: 51%

Hardware & software



Shared mobility



- Representation of “**Freedom**”
- Strategy focused on individuals’ parts quality, safety, performance and mass production
- R&D focused on performance-oriented features, such as horsepower and gadgetry
- Sold mostly for retail customers

- Representation of “**Efficiency**”
- Strategy focused on data gathering, integration of multiple technologies, connectivity and the larger mobility network
- R&D focused on content requirements, emissions reduction and safety
- Sold to fleets that provide mobility as a service

Source: Xerfi (2017), PwC (2017a)

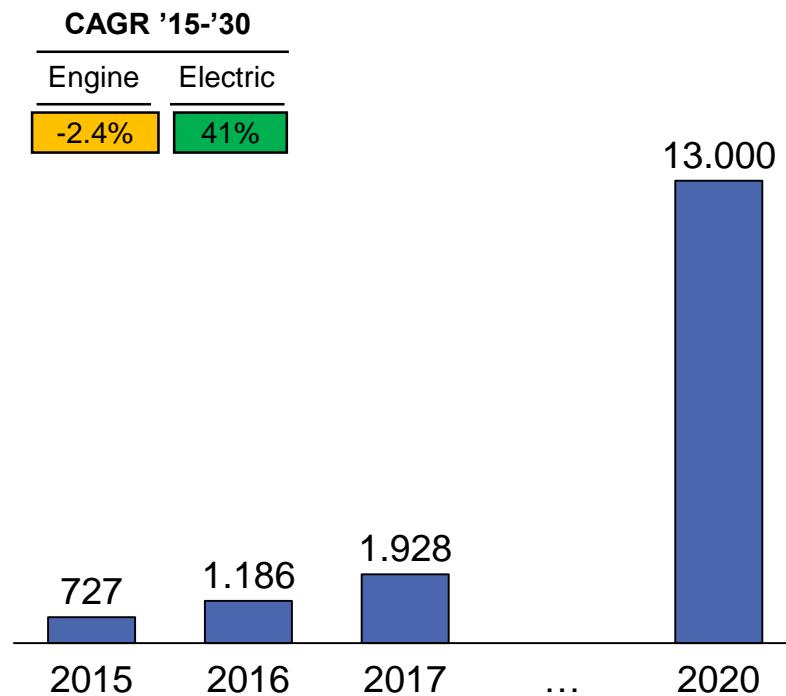
MARKET ANALYSIS



Becoming a key player in the BEV market will become a necessity for automakers in 10 years, based on increasing regulatory pressure and customer preferences

Very attractive prospects for BEVs worldwide

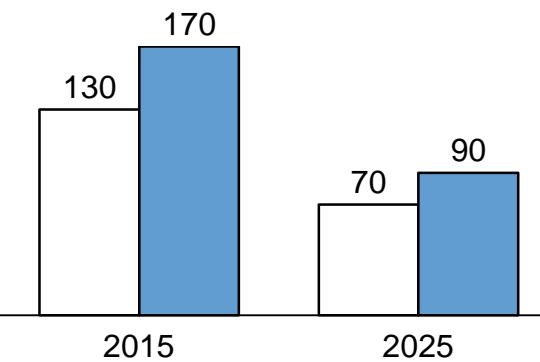
Number of BEVs in use worldwide [in '000]



Source: McKinsey & Company (2018), Deloitte (2018)

Decreasing CO₂ emission targets

EU China



- **Fuel economy regulations** in major markets
- **Financial incentives**, such as subsidies, VAT and vehicle registration tax exemptions
- **City access** restrictions in 20 major cities worldwide

Resolved customer expectations

- **Driving range constantly improving:** Several EV models have a 250-mile-plus range, with 95% of car journeys are under 25 miles
- **Costs are coming down:** Increase in grants and break-even point turning lower, as operating an EV currently at a cost of 2 cents per mile
- **Increased public charging points** for EVs: As there are currently 16,000 charging points and 340 added monthly

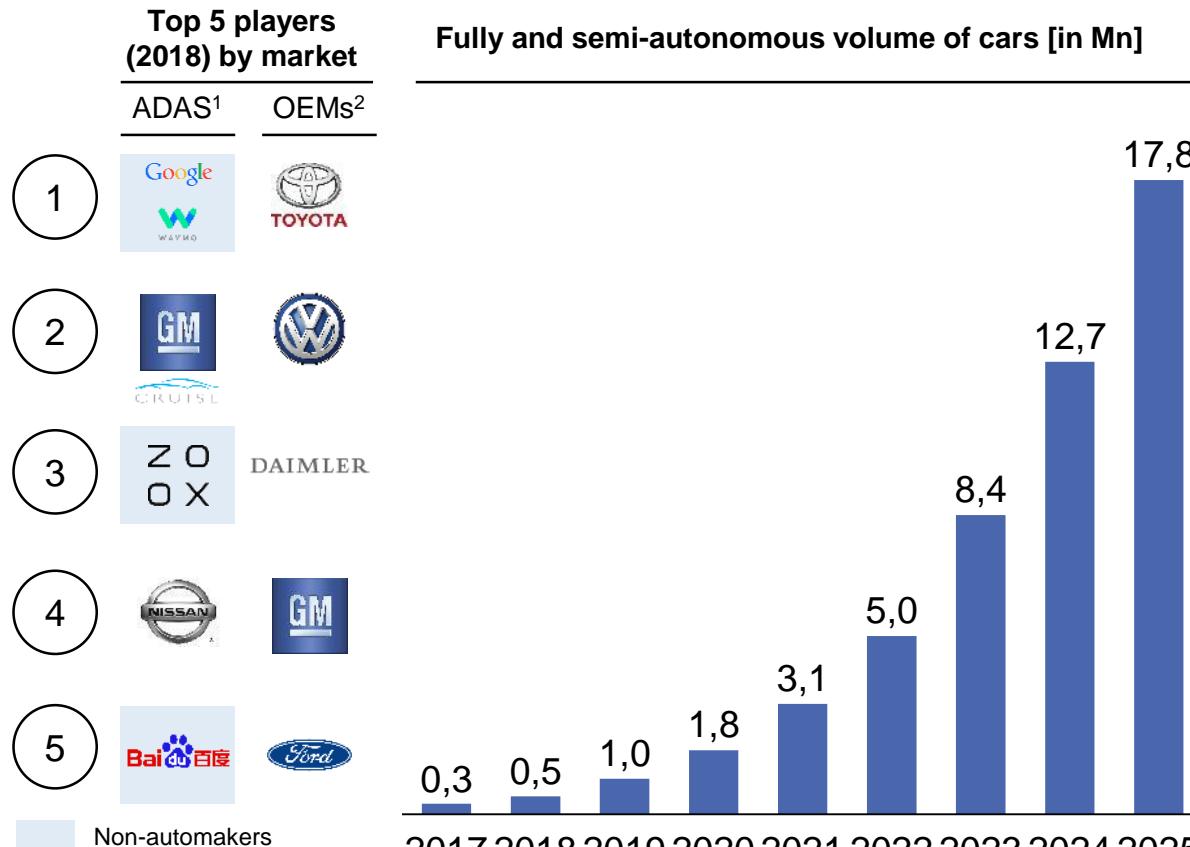


MARKET ANALYSIS

The ADAS market is exponentially growing giving rise to new players and disrupting traditional industries such as mobility, logistics, insurance or entertainment



The growing autonomous market is giving birth to new players that don't regularly play in the automotive industry...

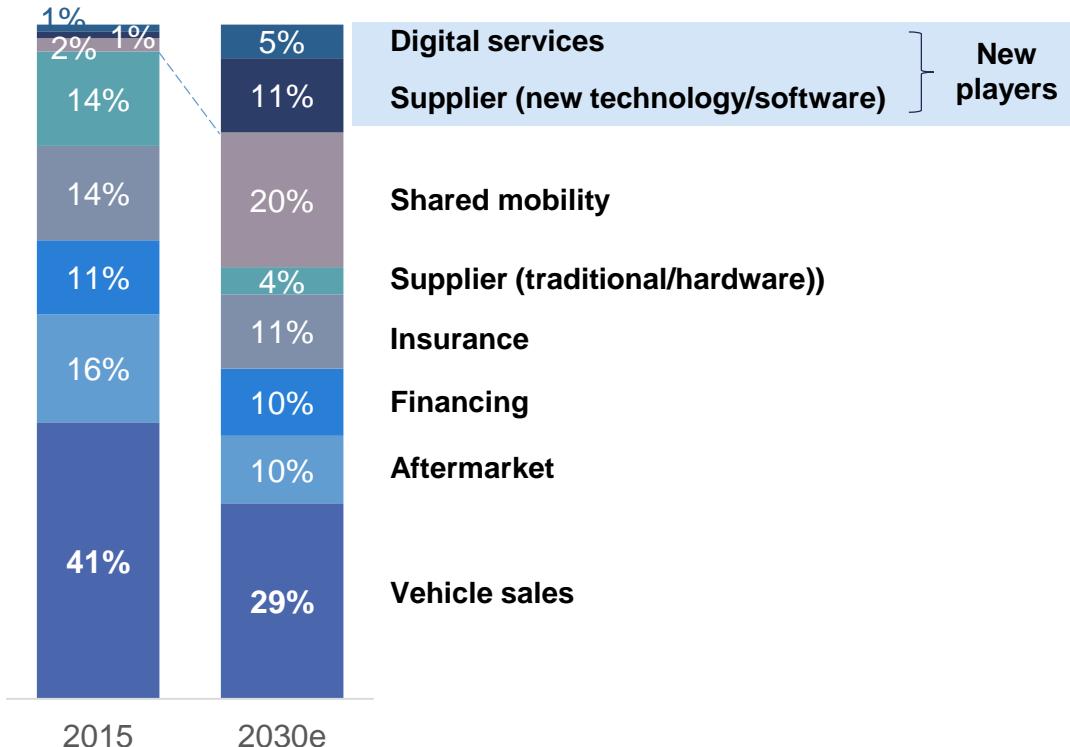


Note: 1. By average number of miles driven in autonomous mode without human intervention in 2018; 2. By revenues; 3. Based on a PwC scenario with a non-consolidated view: supplier value pools not eliminated from vehicle/ aftermarket revenues to show full industry value pools

Source: Backman (2016, *Atlas*), PwC (2017a)

... and shifting the profit pools towards providers of ADAS technology, software and digital services

Scenario for profit shifts in the automotive industry, 2015–2030 [%]³

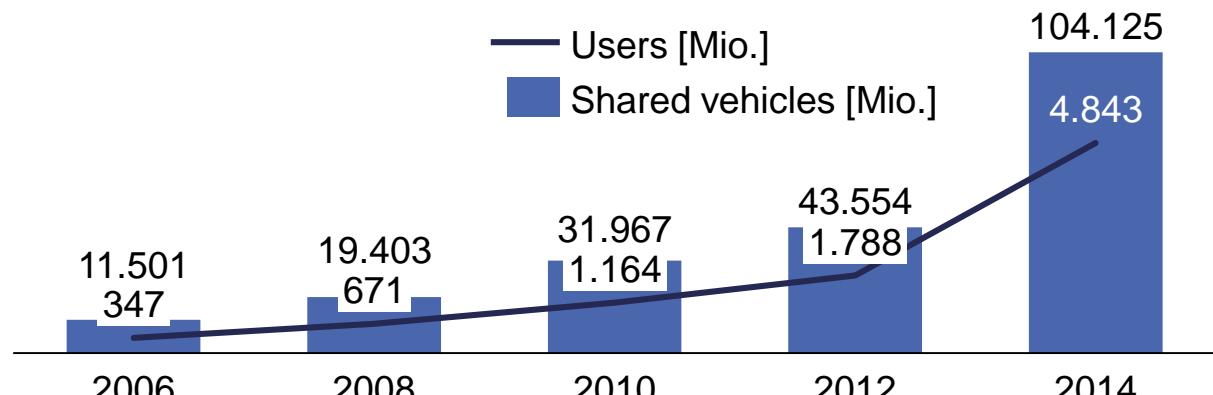


MARKET ANALYSIS

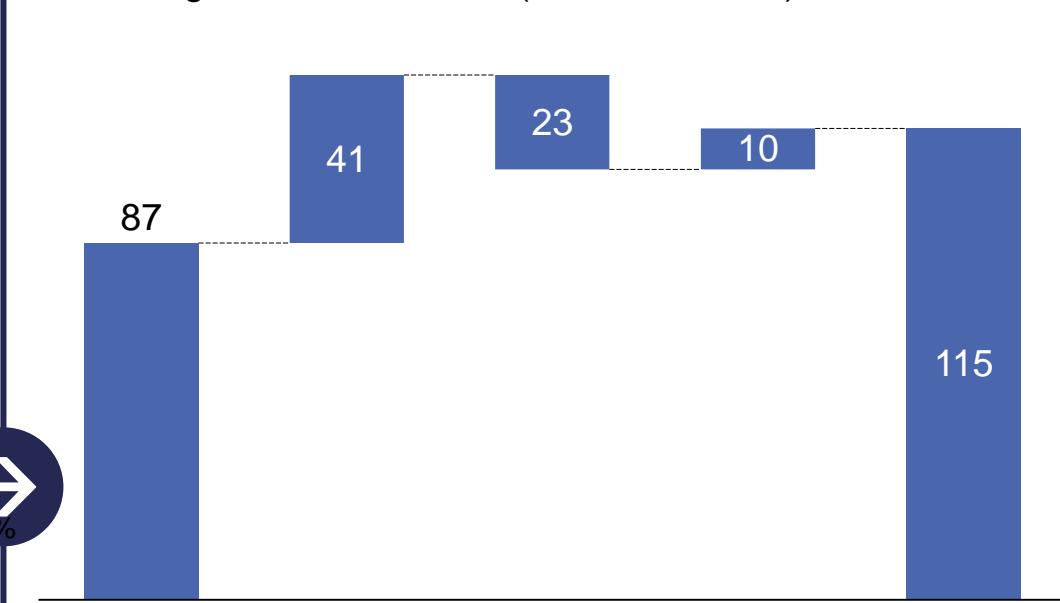


Because of carsharing and changing customers' behaviors, the expected increase in private vehicle-sales will be dampened worldwide

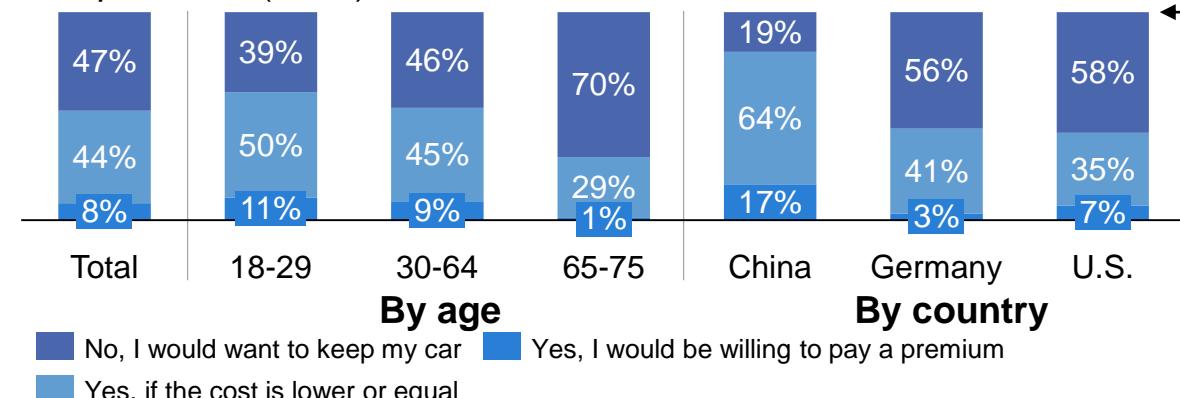
Global carsharing growth worldwide (2006-2014)



Annual global vehicle sales (millions of units)*



Willingness to trade in own car and use a robo-taxi in % of respondents (2018)



*in high disruption scenarios, McKinsey Shared Mobility Report

Source: Goodall, W., Dovey Fishman, T., Bornstein, J. and Bonthon, B. (2017, Deloitte Review), Grosse-Ophoff, A., Hausler, S., Heineke, K., and Möller, T. (2017, McKinsey)

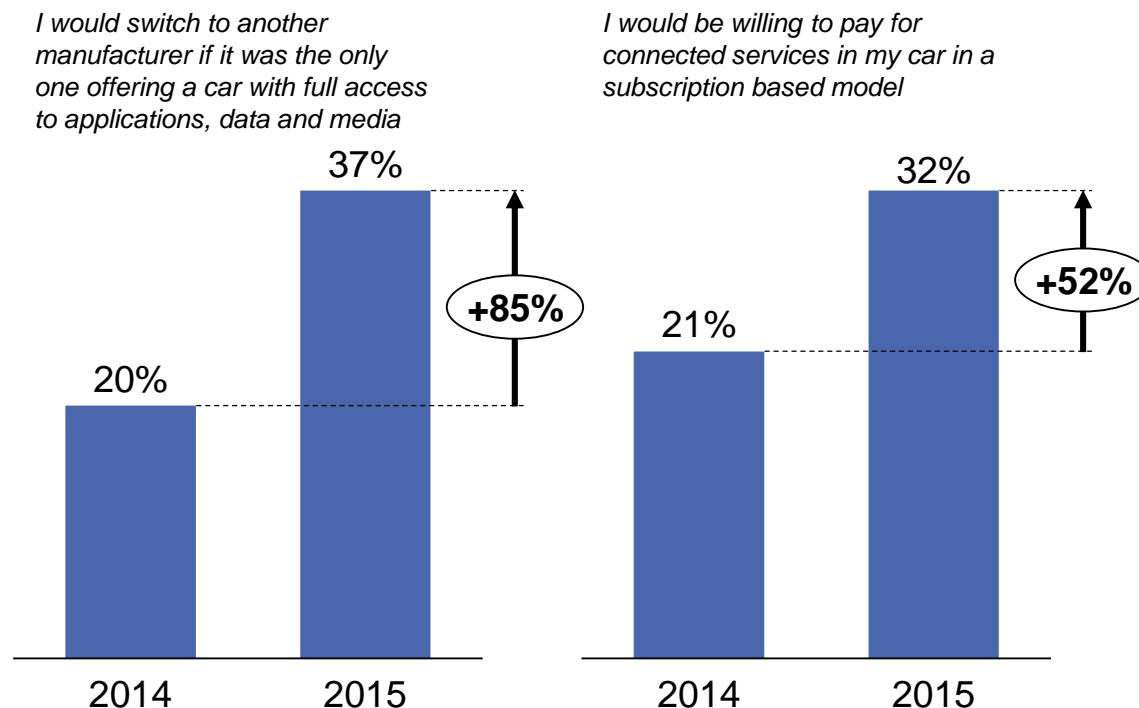


MARKET ANALYSIS

Individuals are likely to switch from manufacturers or pay a premium to have the right applications and media on the car – which gives rise to new business models



Preferences of individuals regarding connectivity services [% of respondents answering “yes”]



Both **willingness to switch manufacturer** and **to pay a subscription fee** for connected car services has increased significantly year after year

McKinsey (2018)

New business models arising by providers and customer segments

Providers of...	Customer segments			
	Drivers/ passengers	Governments/ municipalities	Dealers/ aftersales	
Cars	Connected navigation (real-time traffic, weather, road conditions) Remote preventing diagnostics and maintenance based on car/fleet data	Consolidated vehicle data-based road maintenance (deicing, snow clearance)	Diagnostic and ordering (remote checkups)	
Content/ Services	For drivers: Phone, office, e-mail For passengers: Internet, social media, video games	Content feed by linear providers (cable networks) and dynamic streaming services (Spotify, Netflix)	Traffic management and V2I communication (usage-based tolling, adaptive traffic control)	Data-driven connected marketplace for repair/maintenance
Mobility	Personalized dynamic car pooling	Taxi/e-hailing/ride-sharing	Enhancement of public transport with car sharing fleet	
Infra.	SIM cards and LTE sites along highways to enable broadband traffic		Networked parking	
Insurance	Personalized insurance policies based on driving behavior/pattern analysis			Further extensions possible



MARKET ANALYSIS

All major OEMs are already making big bets in carsharing, AV and EV technology, and car connectivity, to stay relevant when this future arrives



Initiatives taken by the 2018 Top 5 car manufacturers, for EVs, AVs, car sharing and connectivity

	VOLKSWAGEN	TOYOTA	RENAULT NISSAN MITSUBISHI	HYUNDAI	Ford
Electric vehicles	✓	✓	✓	✓	✓
JV with JAC to mass-market electric cars in China (2016)	Collaboration with Mazda on electric vehicles (2017)	12 new BEVs announced to be available by 2022 (2018)	Hyundai's Kona EV to be on sale in the US early 2019	Announced investment of \$11bn in EVs by 2022 (2019)	
Autonomous vehicles	✓	✓	✓	✓	✓
Collaboration with Ford to develop autonomous vehicles (2019)	Autonomous prototype based on a Lexus model (2019)	ProPilot driver assist system available on Nissan Leaf and Infiniti Q50 sedan (2017)	Hyundai and Aurora will develop level 4 autonomous vehicles by 2021 (2018)	Acquisition of Argo AI to add to Ford's self-driving technology (2017)	
Carsharing	✓	✓	✓	✓	✓
"We Share" offering in selected major cities (service to begin in 2019)	Yuko car-sharing services in Europe, to be launched in 2019	Carsharing service launched by Renault (Moov'in Paris)	Tested carsharing system with 100 fully electric Ioniqs in Amsterdam (2017)	Ford Credit Link: group-lease of Ford vehicles (2016)	
Connectivity	✓	✓	✓	✓	✓
Integration of Siri in the car connectivity VW Car-Net mobile app	Addition of Android Auto and Apple CarPlay to Toyota's trucks and SUVs (2019)	Microsoft teams up with Renault-Nissan on in-car productivity and connectivity	Hyundai Tucson integrating connectivity features (Apple CarPlay, Android Auto)	Partnership with Vodafone on 4G LTE connectivity with the FordPass Connect modem (2017)	

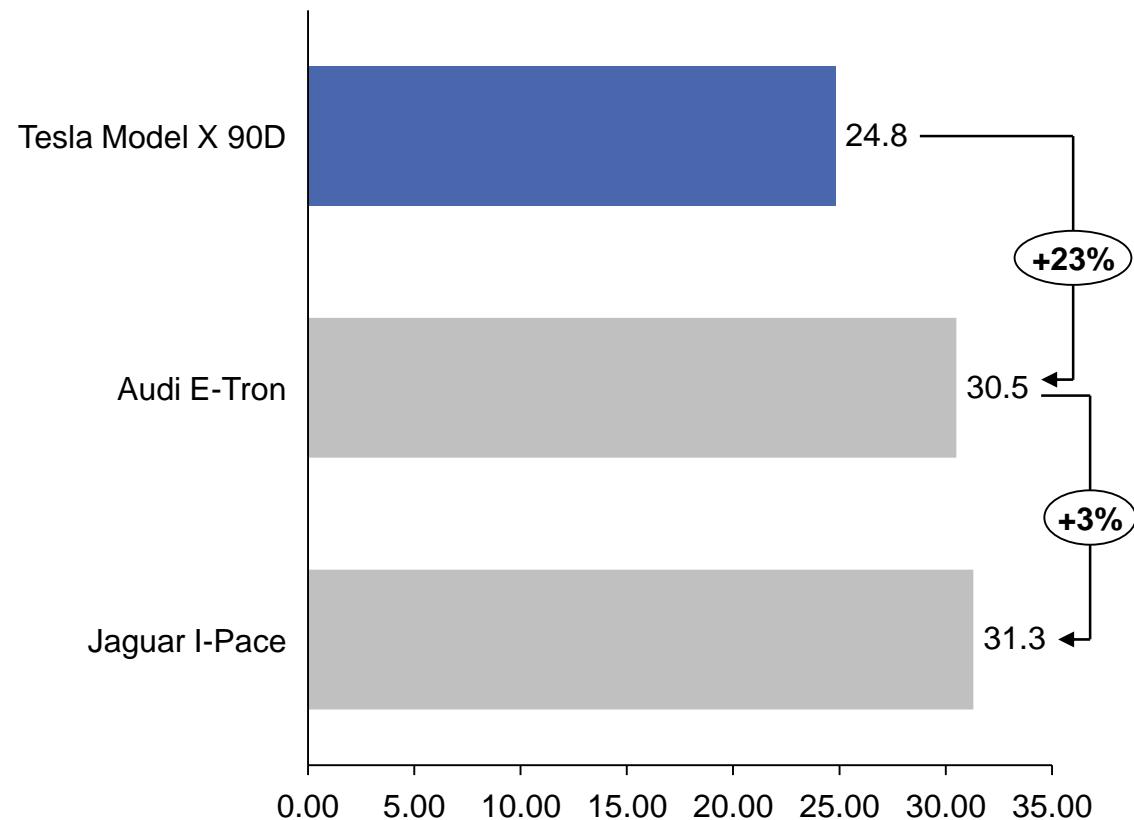
Source: Xerfi (2017)



Tesla trumps Audi and Jaguar EVs in independent efficiency test

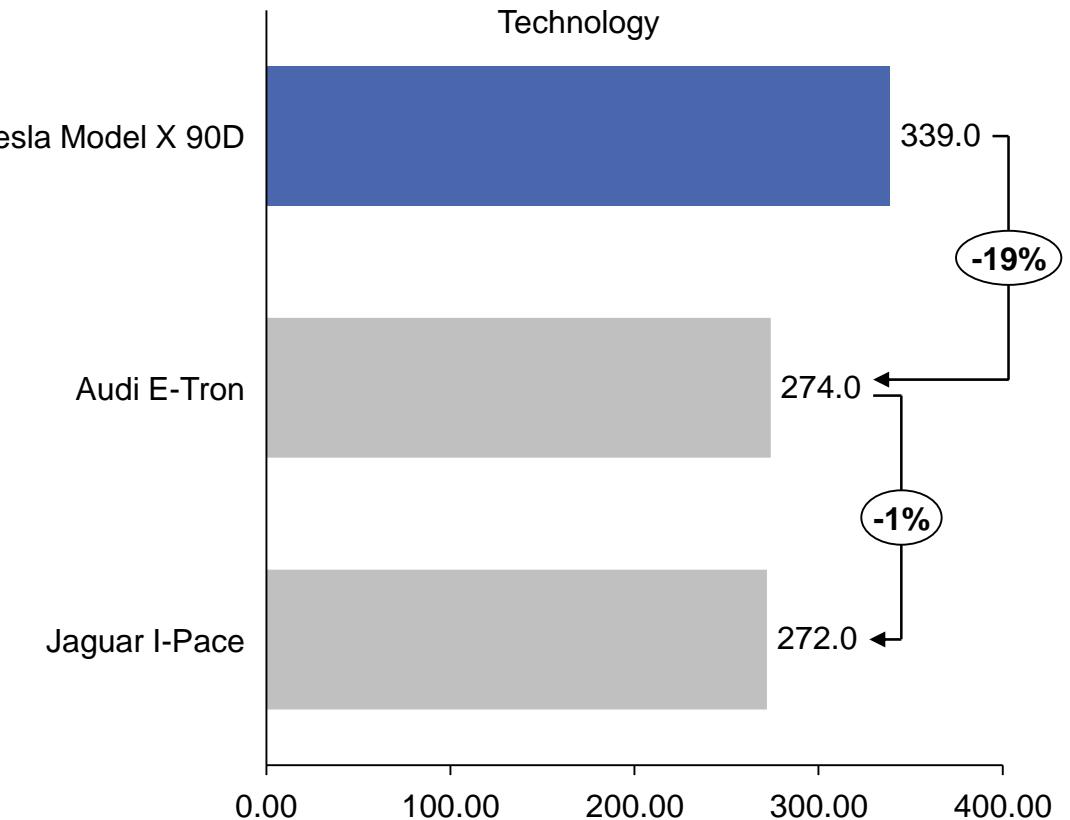
Audi and Jaguar consume a quarter more energy than Tesla

Consumption KWH/100 KM at average speed of 120 KM/H



Tesla also takes the lead with regards to range

Range in KM at average speed of 120 KM/H



Source: NextMove (2019)

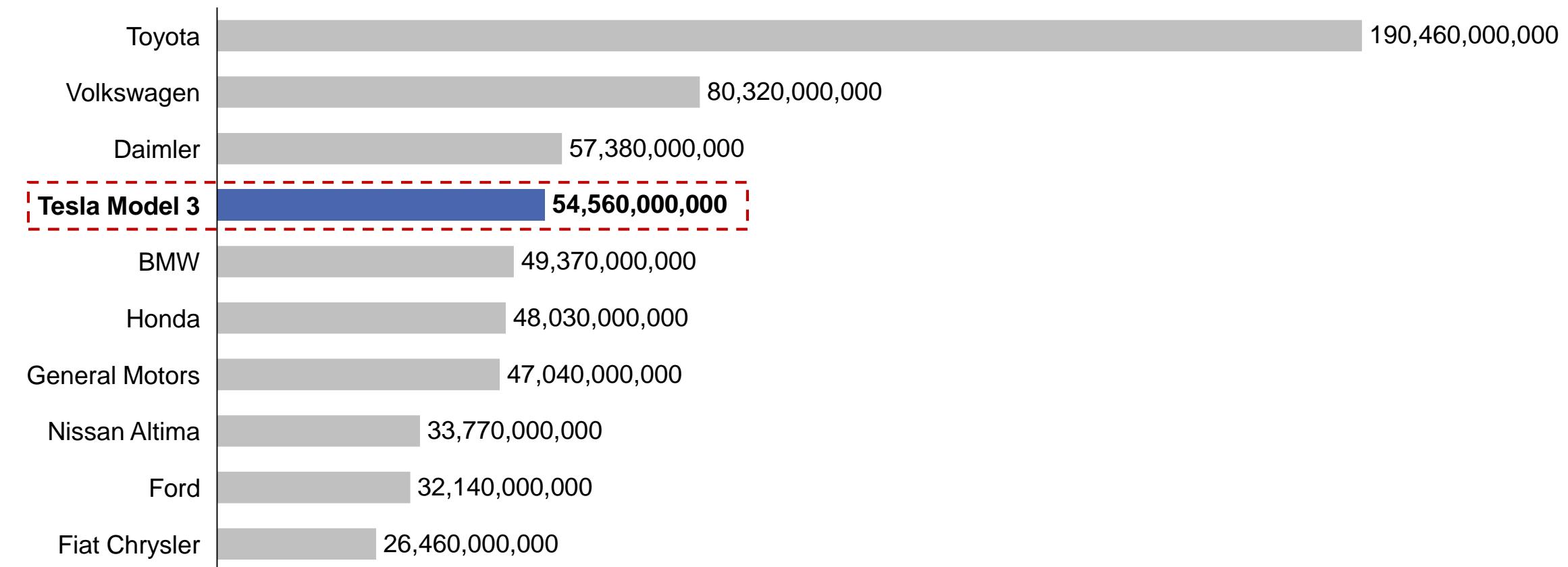
STRATEGIC FIT – TESLA

In the end of 2018, Tesla's market capitalization overtook Daimler as the third most-valuable automaker, but has now fallen back to a fourth place



Tesla is now the fourth most valuable automaker in the world

Market caps of the world's most valuable car companies, 2019



Note: Stock values in USD, as of Jan. 6

Source: Bloomberg (2019)



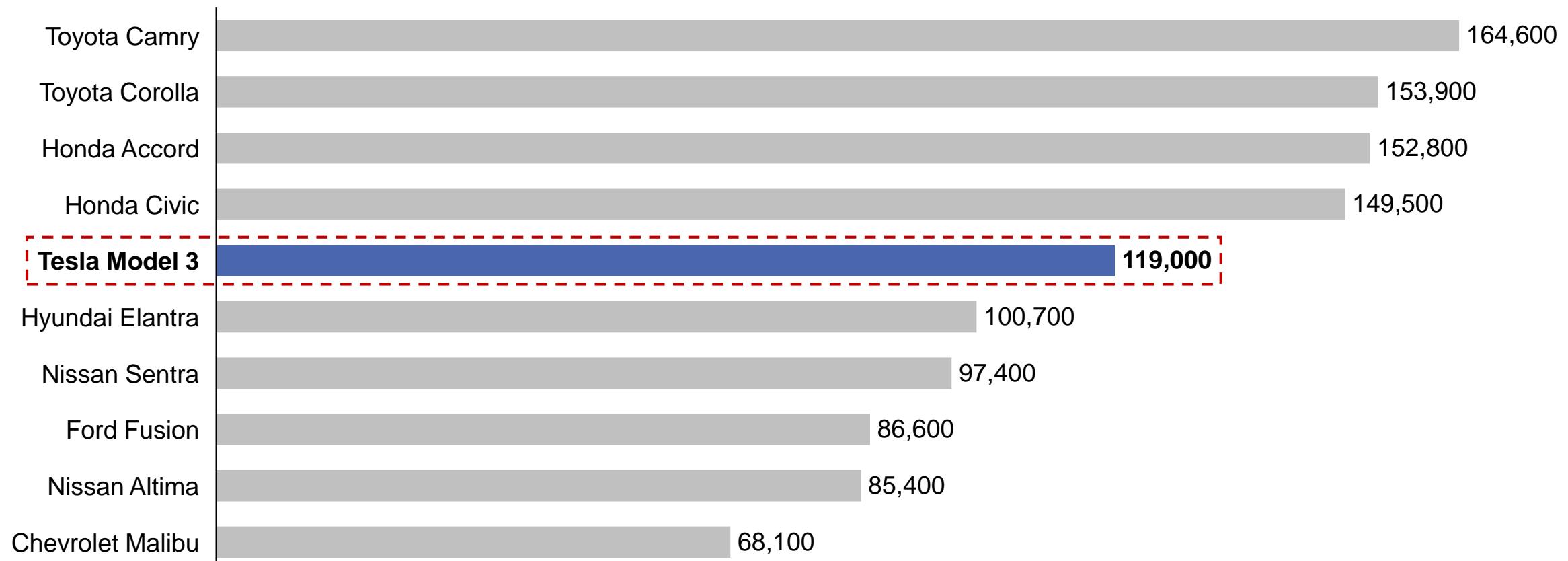
STRATEGIC FIT – TESLA

In the second half of 2018, Tesla became a “real car company” by breaking into America’s top ten in terms of sedan sales



In the second half of 2018, Tesla broke into America’s top ten...

US sedan sales in number of cars sold in the second half of 2018



Note: Tesla's Model 3 tally includes some deliveries in Canada

Source: Bloomberg (2019), Tesla (2019a)

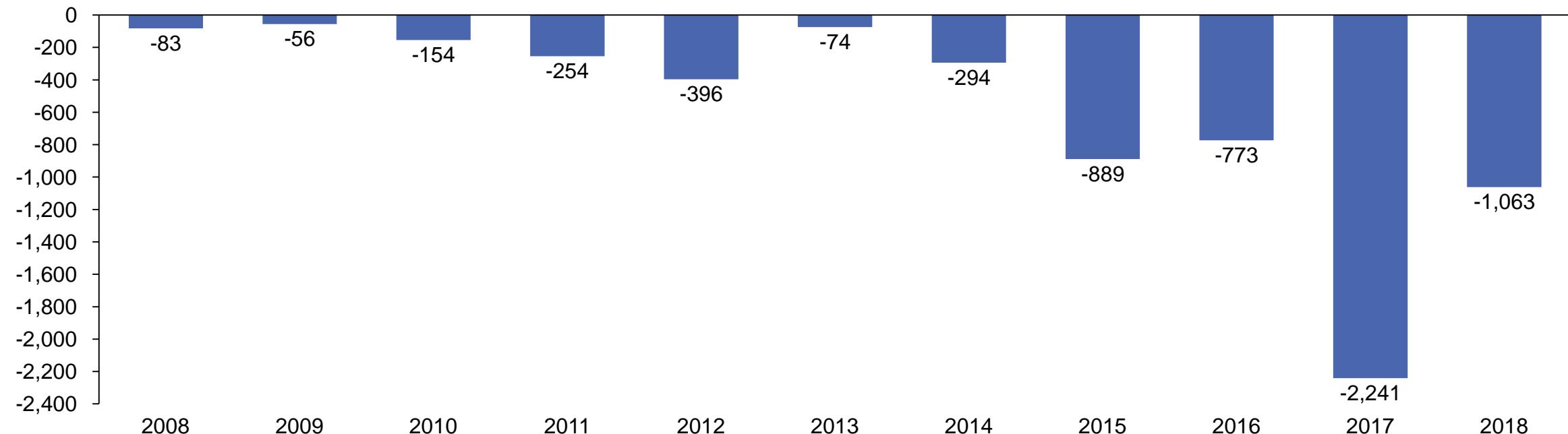




Tesla has made net losses in every year that it has existed

Tesla has made net losses in every year that it has existed

Tesla's net loss in million US dollars, FY 2008 to FY 2018



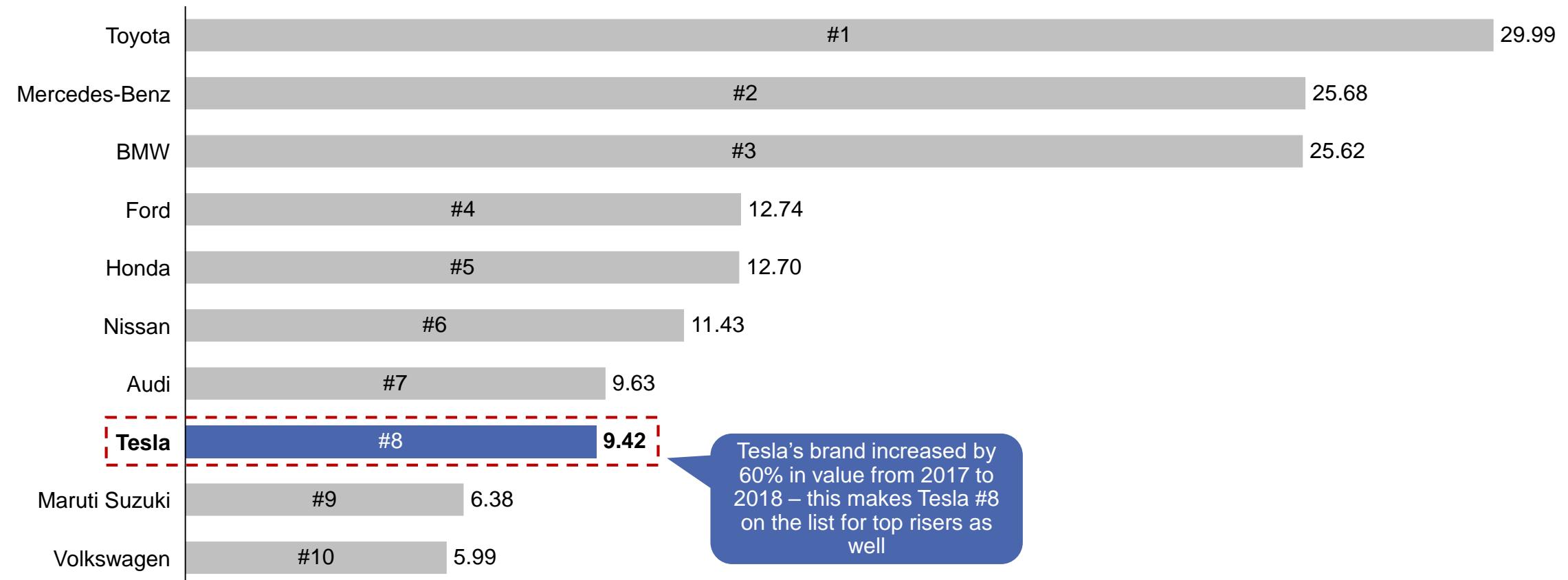
Source: Tesla (2011, 2015, 2016, 2017, 2018, 2019a)



Tesla's brand is the 8th most valuable globally in the automotive sector

Tesla is the 8th most valuable brand in the automotive sector

Most valuable global brands for carmakers in billion US dollars, 2018



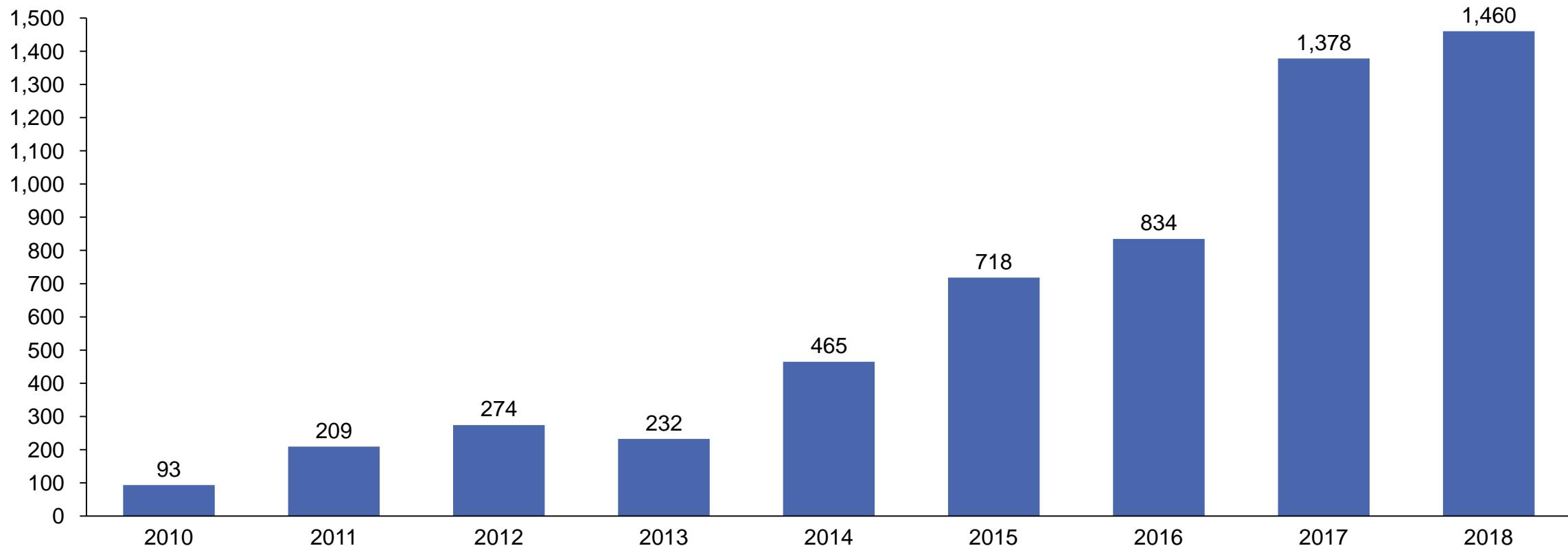
Source: Kantar Millward Brown, the 2018 BrandZ™ Top 100 Most Valuable Global Brands ranking and report, Tesla; FY 2010 to FY 2018



Tesla's R&D development expenses have increased steadily

Tesla's research and development expenses has increased...

Tesla's R&D expenses million US dollars, FY 2010 to FY 2018



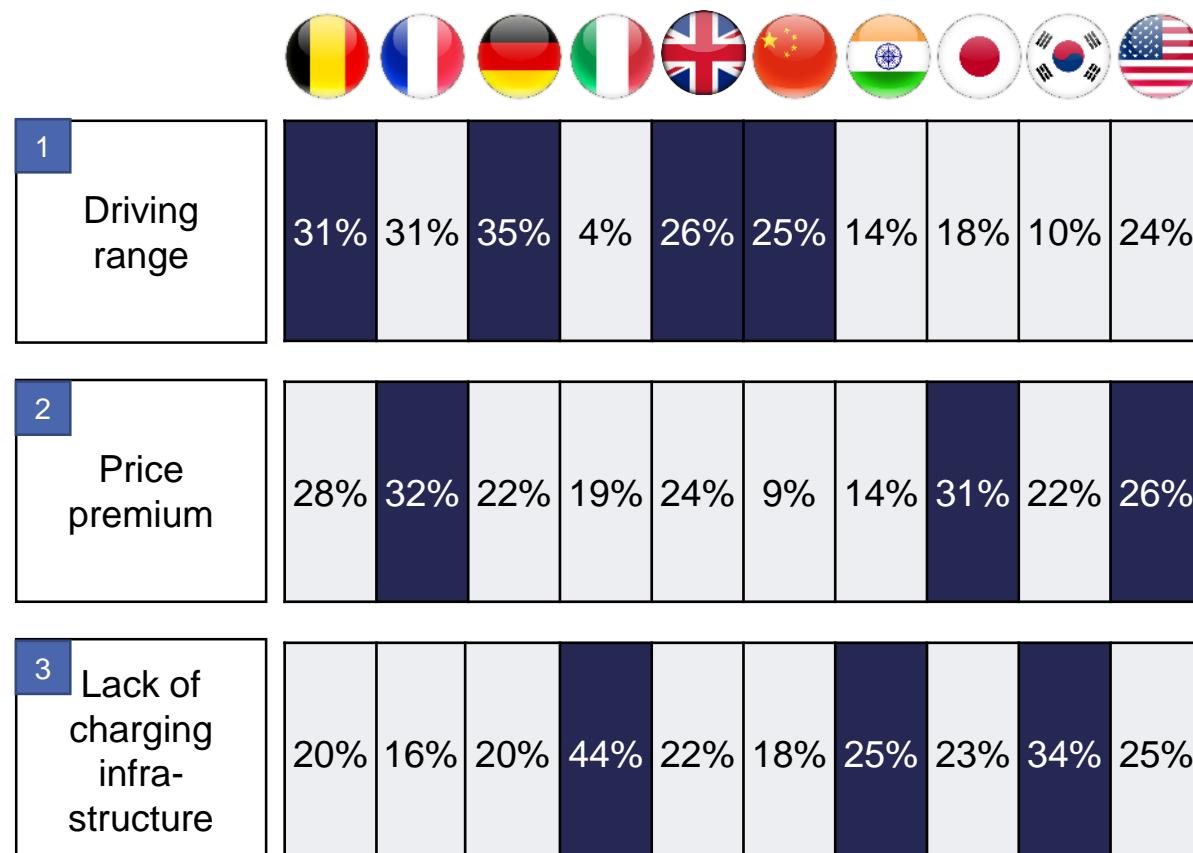
Source: Kantar Millward Brown, the 2018 BrandZ™ Top 100 Most Valuable Global Brands ranking and report, Tesla; FY 2010 to FY 2018

STRATEGIC FIT – TESLA

Tesla is currently addressing the main concerns regarding EVs and has been a key driver in the rise of acceptance of EVs



Customer concerns regarding BEVs [% of respondents]



Tesla has created the following solutions:



Tesla's Next Gen Roadster



Tesla's Model 3



Tesla's Supercharger

- The upcoming Tesla Roadster (2020) is the BEV with the **highest driving range**
- Range to keep progressing based on new components in batteries
- Premium EV's model 3 released at \$35,000 (with governmental subsidies), the **cheapest premium BEV** and 50% cheaper than the second cheapest Tesla model
- Tesla's Supercharger infrastructure **grew ten-fold** from 119 in 2014 to 1,063 station in 2017

Source: Deloitte (2018)





BIBLIOGRAPHY

What inspired us along
the way



Bibliography

- Allied Market Research. (2017) Renewable Energy Market by type. *Allied Market Research* [online]. Available at: Subscription Service (Accessed: 9 February 2019)
- Atlis Motor Vehicles. (2019) Company website. *Atlis Motor Vehicles* [online]. Available at: <https://www.atlismotorvehicles.com/> (Accessed: 20 February 2019)
- Backman, M. (2016) The 10 largest corporate bond deals of all time. *Atlas* [online]. Available at: <https://www.theatlas.com/charts/NkxGaqJOx> (Accessed: 26 February 2019)
- BAIC. (2018) Annual report 2017 [online]. Available at: http://www.baicmotor.com/Uploads/file/20180425/20180425182120_51593.pdf (Accessed: 15 February 2019)
- Barclays. (2019) Tesla Inc. Debat shifts to Model 3 run rate. *Thomson Reuters, Barclays*, 31 January [online]. Available at: Subscription Service (Accessed: 18 January 2019)
- Barnard, M. (2018) Will Tesla Sales Plummet In 2019 With Loss Of Tax Credit & Backlog Filled? *CleanTechnica*, 23 December [online]. Available at: <https://cleantechnica.com/2018/12/23/will-tesla-sales-plummet-in-2019-with-loss-of-tax-credit-backlog-filled/> (Accessed: 19 February 2019)
- Bartlett, J. (2019) Car Brands Ranked by Owner Satisfaction. *Consumer Reports*, 5 February [online]. Available at: <https://www.consumerreports.org/car-reliability-owner-satisfaction/car-brands-ranked-by-owner-satisfaction/> (Accessed: 13 February)
- BCG. (2018a) Batteries for Electric Cars: Challenges, Opportunities, and the Outlook of 2020. *BCG* [online]. Available at: <https://www.bcg.com/documents/file36615.pdf> (Accessed: 20 February 2019)
- BCG. (2018b) The Future of Battery Production for Electric Vehicles. *BCG*, 11 September [online]. Available at: <https://www.bcg.com/publications/2018/future-battery-production-electric-vehicles.aspx> (Accessed: 16 February 2019)
- BCG. (2019) The 2018 M&A Report. *BCG* [online]. Available at: http://image-src.bcg.com/Images/BCG-Synergies-Take-Center-Stage-Sep-2018_tcm9-202243.pdf (Accessed: 17 February 2019)
- Bloomberg (2017) Electric Vehicle Outlook 2017. *Bloomberg* [online]. Available at: https://data.bloomberglp.com/bnef/sites/14/2017/07/BNEF_EVO_2017_ExecutiveSummary.pdf (Accessed: 25 February)
- Bloomberg (2018) Electric Vehicle Outlook 2018. *Bloomberg* [online]. Available at: <https://bnef.turtl.co/story/evo2018?teaser=true> (Accessed: 25 February)
- Bloomberg. (2019) Bloomberg Professional [Online]. Available at: Subscription Service
- Bollinger Motors. (2019) Company website. *Bollinger Motors* [online]. Available at: <https://www.bollingermotors.com/> (Accessed: 20 February 2019)



Bibliography

Boudette, N. (2018) Tesla Turns Back Rare Challenge From Shareholders. New York Times, 5 June [online]. Available at: <https://www.nytimes.com/2018/06/05/business/tesla-once-a-wall-street-darling-faces-investor-challenge.html> (Accessed: 27 February 2019)

Brinkman, R. (2019) Tesla Inc. See Negative Reaction After 4Q Free Cash Flow Impresses But Aspects of 2019 Outlook and CFO Departure Disappoint. Thomson Reuters, J.P. Morgan, 31 January [online]. Available at: Subscription Service (Accessed: 13 February 2019)

Businesswise. (2019) Businesswise [online]. Available at: <https://www.businesswise.com/> (Accessed: 19 February 2019)

BYD. (2018) Annual report 2017 [online]. Available at: <http://www3.hkexnews.hk/listedco/listconews/sehk/2018/0327/ltn201803271463.pdf> (Accessed: 12 February 2019)

CA.GOV. (2019) Autonomous disengagement report. *State of California, Department of Motor vehicles* [online]. Available at: https://www.dmv.ca.gov/portal/dmv/detail/vr/autonomous/disengagement_report_2018 (Accessed: 10 February)

Campbell, P. (2018) Should you buy an electric car? *Financial Times*, 31 August [online]. Available at: <https://www.ft.com/content/6940cbaar-a7b7-11e8-8ecf-a7ae1beff35b> (Accessed: 10 February 2019)

Capparella, J. (2019) The Best-Selling Cars, Trucks, and SUVs of 2018. *Car and Driver*, 3 January [online]. Available at: <https://www.caranddriver.com/news/g25558401/best-selling-cars-suv-trucks-2018/> (Accessed: 12 February 2019).

Car and Driver. (2019) The Best-Selling Luxury Cars and SUVs of 2018. *Car and Driver* [online]. Available at: <https://www.caranddriver.com/news/g25741172/best-selling-luxury-cars-suv-2018/> (Accessed: 26 February 2019)

CarSalesBase. (2019) US Car Sales Data. *CarSalesBase* [online]. Available at: <http://carsalesbase.com/us-car-sales-data/> (Accessed: 26 February 2019)

Changan. (2018) Brand new EV model EADO EV460 Launches in Beijing. *Changan website*, 24 October [online]. Available at: http://www.globalchangan.com/article/news_content_395.html (Accessed: 26 February)

Charlton, A. (2018) The best electric cars and hybrids from the LA Motor Show. *Wired*, 1 December [online]. Available at: <https://www.wired.co.uk/article/best-electric-cars-at-la-motor-show> (Accessed: 21 February 2019)

CNBC. (2019) GM's Cadillac is said to plan to introduce electric vehicle in fight against Tesla. *CNBC website*, 10 January [online]. Available at: <https://www.cnbc.com/2019/01/11/gms-cadillac-is-said-to-plan-to-introduce-ev--in-fight-against-tesla.html> (Accessed: 10 February 2019)





Bibliography

Cohen, A. (2018) GM Must Adapt Or Die: A Lesson For U.S. Automakers. *Forbes*, 30 November [online]. Available at: <https://www.forbes.com/sites/arielcohen/2018/11/30/gm-must-adapt-or-die-a-lesson-for-u-s-automakers/#1eb3eb932c2d> (Accessed: 25 February 2019)

Cooke, D. (2018) Automakers Rankings 2018. The Environmental Performance of Car Companies. *Union of Concerned Scientists* [online]. <https://www.ucsusa.org/sites/default/files/attach/2018/06/cv-automaker-rankings-2018-report.pdf> (Accessed: 10 February 2019)

Cox Automotive. (2017) EV Consumer study. *EIA Energy Conference*, 27 June [online]. Available at: https://www.eia.gov/conference/2017/pdf/presentations/rebecca_lindland.pdf (Accessed: 16 February 2019)

Customer Guru. (2019) General Motors net promoter score 2019 benchmarks. *Customer Guru* [online]. Available at: <https://customer.guru/net-promoter-score/general-motors> (Accessed: 26 February 2019)

Dhawan, R., Hensley, R., Padhi, A. and Tschiesner, A. (2019) Mobility's second great inflection point. *McKinsey Quarterly* [online]. Available at: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/mobilitys-second-great-inflection-point> (Accessed: 28 February 2019)

DOJ. (2019) *Department of Justice* [online]. Available at: <https://www.justice.gov/> (Accessed: 13 February 2019)

Edelstein, S. (2018) GM to Expand Michigan Battery Lab Ahead of Electric Car Push. *The Drive*, 7 September [online]. Available at: <http://thedrive.com/tech/23424/gm-to-expand-michigan-battery-lab-ahead-of-electric-car-push> (Accessed: 13 February 2019)

Eisenstein, P. (2018) Luxury car owners trade up for American pickups as Ford, GM and Ram trucks dominate market. *CNBC*, 5 November [online]. Available at: <https://www.cnbc.com/2018/11/03/luxury-car-owners-trade-up-for-us-pickups-as-ford-gm-dominate-market.html> (Accessed: 22 February 2019)

Eisenstein, P. (2019) General Motors is looking at building an all-electric line of GMC SUVs, Sierra pickup trucks. *CNBC*, 24 January [online]. Available at: <https://www.cnbc.com/2019/01/23/pickups-ready-to-plug-in.html> (Accessed: 26 February 2019)

Euromonitor. (2016) Evolution of Cost Drivers in the Auto Industry. *Euromonitor* [online]. Available at: <https://blog.euromonitor.com/evolution-cost-drivers-auto-industry/> (Accessed: 20 February 2019)

FactSet. (2019) US M&A News and Trends. *FactSet Flaswhire US monthly* [online]. Available at: https://www.factset.com/hubfs/mergerstat_em/monthly/US-Flashwire-Monthly.pdf (Accessed: 25 February 2019)

Ferris, R. (2018) The steadily disappearing American car. *CNBC*, 7 April [online]. Available at: <https://www.cnbc.com/2018/04/06/the-steadily-disappearing-american-car.html> (Accessed: 23 February 2019)





Bibliography

Ferris, R. (2019) GM is going 'all-electric,' but it doesn't expect to make money off battery-powered cars until early next decade. *CNBC*, 6 February [online]. Available at: <https://www.cnbc.com/2019/02/06/gm-doesnt-expect-to-make-money-off-electric-cars-until-next-decade.html> (Accessed: 23 February 2019)

Ferris, R. and LeBeau, P. (2018) Elon Musk could make more than \$50 billion from pay plan shareholders approved...but he has a lot to deliver. *CNBC*, 21 March [online]. Available at: <https://www.cnbc.com/2018/03/21/tesla-shareholders-approve-elon-musks-multibillion-dollar-compensation-plan.html> (Accessed: 16 February 2019)

FTC. (2019) *Federal Trade Commission* [online]. Available at: <https://www.ftc.gov/> (Accessed: 13 February 2019)

Gastelu, G. (2019) The 10 best-selling vehicles in the United States in 2018 were mostly trucks and SUVs. *FoxNews*, 4 January [online]. Available at: <https://www.foxnews.com/auto/the-10-best-selling-vehicles-in-the-united-states-in-2018-were-mostly-trucks-and-suvs> (Accessed: 15 February 2019)

Geely. (2018) Annual report 2017 [online]. Available at: <http://www.geelyauto.com.hk/core/files/financial/en/2017-02.pdf> (Accessed: 14 February 2019)

General Motors. (2016) Annual report 2015 [online]. Available at: http://www.annualreports.com/HostedData/AnnualReportArchive/g/NYSE_GM_2015.pdf (Accessed: 24 February 2019)

General Motors. (2018a) Annual report 2017 [online]. Available at: http://www.annualreports.com/HostedData/AnnualReports/PDF/NYSE_GM_2017.pdf (Accessed: 24 February 2019)

General Motors. (2018b) General Motors Accelerates Transformation. *General Motors*, 26 November [online]. Available at: <https://media.gm.com/media/us/en/gm/news.detail.html/content/Pages/news/us/en/2018/nov/1126-gm.html> (Accessed at: 26 February 2019)

General Motors. (2019a) General motors strengthens core business and future mobility. *General Motors* [online]. Available at: <https://media.gm.com/content/dam/Media/gmcom/investor/2019/jan/Press-Release-1-11-19.pdf> (Accessed: 26 February 2019)

General Motors. (2019b) Annual report 2018 [online]. Available at: <https://investor.gm.com/static-files/cbb78eee-fd3b-47bc-93c8-2c73c4800042> (Accessed: 24 February 2019)

General Motors. (2019c) GM's U.S. Crossover Sales Topped 1 million in 2018. *General Motors*, 3 January [online]. Available at: <https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2019/jan/0103-gmsales.html> (Accessed: 1 March 2019)

Gessner, K. (2018) Tesla faces accelerating rate of Model 3 refunds. *Second measure*, 4 June [online]. Available at: <https://secondmeasure.com/datapoints/tesla-faces-accelerating-rate-of-model-3-refunds/> (Accessed: 14 February 2019)

Gibbs, S. (2018) Tesla finally hits weekly production target for Model 3 cars. *Guardian*, 2 July [online]. Available at: <https://www.theguardian.com/technology/2018/jul/02/tesla-finally-hits-weekly-production-target-for-model-3-cars> (Accessed: 27 February 2019)





Bibliography

- GM Authority. (2019a) Chevrolet Bolt EV Sales Numbers. *GM Authority* [online]. Available at: <http://gmauthority.com/blog/gm/chevrolet/chevrolet-bolt-ev/chevrolet-bolt-ev-sales-numbers/> (Accessed: 24 February 2019)
- GM Authority. (2019b) Chevrolet Volt Sales Numbers. *GM Authority* [online]. Available at: <http://gmauthority.com/blog/gm/chevrolet/volt/chevrolet-volt-sales-numbers/> (Accessed: 24 February 2019)
- Goldman, D. (2018) GM is reinventing itself. It's cutting 15% of its salaried workers and shutting 5 plants in North America. *CNN Business*, 26 November [online]. Available at: <https://edition.cnn.com/2018/11/26/business/gm-oshawa-plant/index.html> (Accessed: 12 February)
- Goodall, W., Dovey Fishman, T., Bornstein, J. and Bonthron, B. (2017) The rise of mobility as a service. *Deloitte Review* [online]. Available at: <https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/consumer-business/deloitte-nl-cb-ths-rise-of-mobility-as-a-service.pdf> (Accessed: 10 February 2019)
- Grand View Research. (2018) ADAS market report. *Market Research Reports* [online]. Available at: Subscription Service (Accessed: 10 February 2019)
- Greenwood, M. (2018) Honda and GM Partnering on Next Gen Battery. *Engineering.com*, 27 June [online]. Available at: <https://www.engineering.com/AdvancedManufacturing/ArticleID/17078/Honda-and-GM-Partnering-on-Next-Gen-Battery.aspx> (Accessed: 13 February 2019)
- Grosse-Ophoff, A., Hausler, S., Heineke, K., and Möller, T. (2017) How shared mobility will change the automotive industry. *McKinsey* [online]. Available at: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/how-shared-mobility-will-change-the-automotive-industry> (Accessed: 11 February 2019)
- Hancock, T. (2019) Carmakers face cuts and gloom as China sales shift into reverse. *Financial Times*, 16 January [online]. Available at: <https://www.ft.com/content/bcb902e4-1895-11e9-9e64-d150b3105d21> (Accessed: 10 February)
- Harper, G. (2014) *The role of business model innovation in transitioning ULEVs to market* (Doctoral dissertation, Cardiff University)
- Henke, J. (2017) 17th Annual North American Automotive OEM – Tier 1 Supplier Working Relations Index Study. *Planning Perspectives Inc.*, 16 May [online]. Available at: https://societyofautomotiveanalysts.wildapricot.org/resources/Documents/SAA%20-Presentation-5-16-17_Henke.pdf (Accessed: 9 February 2019)
- Hershorn, G. (2018) Merger & Acquisition Review. Full Year 2017. Thomson Reuters [online]. Available at: <https://www.thomsonreuters.co.jp/content/dam/openweb/documents/pdf/japan/market-review/2017/ma-4q-2017-e.pdf> (Accessed: 13 February 2019)
- Hevi, X. (2017) Inauguration speech. *New Energy Vehicle Technology Innovation Centre*, Beijing, 4 September [online]. Available at: <http://sse.cuhk.edu.cn/en/news/3848> (Accessed: 15 February 2018)



Bibliography

- Holland-Letz, D., Kässer, M., Müller, T. and Tschesner, A. (2018) Profiling tomorrow's trendsetting car buyers. *McKinsey & Company* [online]. Available at: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/profiling-tomorrows-trendsetting-car-buyers> (Accessed: 10 February 2019)
- Houchois, P. (2018) Tesla Inc. Playing a positive sum game - Upgrade to Buy from Hold. *Thomson Reuters, Jefferies*, 7 December [online]. Available at: Subscription Service (Accessed: 10 February 2019)
- IEA. (2019) Global EV Outlook 2018. *IEA Website* [online]. Available at: <https://www.iea.org/gevo2018/> (Accessed: 24 February 2019)
- InsideEVs. (2019a) Compare Plug-ins. *InsideEVs* [online]. Available at: <https://insideevs.com/compare-plug-ins/> (Accessed: 23 February 2019)
- InsideEVs. (2019b) GM's Electric Future – 300 Miles Of Range, Desirable And Affordable. *InsideEVs* [online]. Available at: <https://insideevs.com/gm-electric-future-300-miles-range-desirable-affordable/> (Accessed: 11 February 2019)
- InsideEVs. (2019c) Monthly plug-in EV sales scorecard: Historical charts. *InsideEVs* [online]. Available at: <https://insideevs.com/monthly-plug-in-ev-sales-scorecard-historical-charts/> (Accessed: 15 February 2019)
- InsideEVs. (2019d) China Electric Car Sales Soar To Almost 160,000 In December. *InsideEVs*, 15 January [online]. Available at: <https://insideevs.com/china-electric-car-sales-december/> (Accessed: 16 February 2019)
- Irle, R. (2018) Global Plug-in Sales for the 1st Half of 2018. *EVVolumes* [online]. Available at: <http://www.ev-volumes.com/country/total-world-plug-in-vehicle-volumes/> (Accessed: 10 February 2019)
- Jonas, A. (2019) Tesla Inc. Can Tesla be self-financing in 2019? *Thomson Reuters, Morgan Stanley*, 5 February [online]. Available at: Subscription Service (Accessed: 10 February 2019)
- Justia. (2019) *Justia* [online]. Available at: <https://patents.justia.com/> (Accessed: 15 February 2019)
- Kandi Technologies. (2018) Annual report 2017 [online]. Available at: <https://www.sec.gov/Archives/edgar/data/1316517/000106299316008324/form10k.htm> (Accessed: 17 February 2019)
- Kantar MillwardBrown. (2018) Brandz Top 100 Most Valuable Global Brands 2018. *Kantar MillwardBrown* [online]. Available at: http://brandz.com/admin/uploads/files/BZ_Global_2018_DL.pdf (Accessed: 23 February 2019)
- Korus, S. (2016) The automotive industry is on the threshold of massive consolidation. *Ark Invest*, 26 August [online]. Available at: <https://ark-invest.com/research/automotive-consolidation> (Accessed: 11 February 2019)



Bibliography

Lambert, F. (2018a) Tesla Model 3 reservations keep growing but 23% were refunded, report says. *Electrek*, 4 June [online]. Available at: <https://electrek.co/2018/06/04/tesla-model-3-reservations-refunded-report/> (Accessed: 19 February 2019)

Lambert, F. (2018b) Tesla's Gigafactory 1 battery cells have a 20% cost advantage over LG, new report says. *Electrek*, 20 November [online]. Available at: <https://electrek.co/2018/11/20/tesla-gigafactory-battery-cells-made-cost-advantage-panasonic-lg-report/> (Accessed: 13 February 2019)

Lambert, F. (2018c) Volkswagen becomes latest automaker to invest in solid-state batteries for electric cars. *Electrek*, 22 June [online]. Available at: <https://electrek.co/2018/06/22/volkswagen-invest-solid-states-batteries-electric-cars/> (Accessed: 16 February 2019)

Lambert, F. (2018d) What to expect from Tesla in 2019: Model Y, Model S/X Refresh, and more. *Electrek*, 31 December [online]. Available at: <https://electrek.co/2018/12/31/tesla-2019-model-y-model-s-x-refresh/> (Accessed: 37 February 2019)

Lambert, F. (2018e) GM and Honda are partnering to build next-generation batteries for electric vehicles. *Electrek*, 7 June [online]. Available at: <https://electrek.co/2018/06/07/gm-honda-partner-next-gen-batteries-electric-vehicles/> (Accessed: 11 February 2019)

Lambert, F. (2018f) Closer look at Rivian's R1T all-electric pickup truck and why I ordered it. *Electrek*, 29 November [online]. Available at: <https://electrek.co/2018/11/29/rivian-r1t-electric-pickup-truck-order/> (Accessed: 11 February 2019)

Lambert, F. (2018g) A \$52,000 plug-in electric pickup truck w/ range extender receives over 5,000 fleet orders, opens reservation to the public. *Electrek*, 9 January [online]. Available at: <https://electrek.co/2018/01/09/workhorse-opens-reservation-electric-pickup-truck/> (Accessed: 13 February 2019)

Lambert, F. (2018h) Rivian unveils all-electric pickup truck with unbelievable specs. *Electrek*, 26 November [online]. Available at: <https://electrek.co/2018/11/26/rivian-r1t-all-electric-pickup-specs/> (Accessed: 13 February 2019)

Lienert, P. and White, J. (2018) GM races to build a formula for profitable electric cars. *Thomson Reuters*, 9 January [online]. Available at: <https://www.reuters.com/article/us-gm-electric-insight-idUSKBN1EY0GG> (Accessed: 12 February 2019)

Loveday, E. (2019) Might there be a competitor for the Rivian R1T electric pickup truck? *InsideEVs*, 6 January [online]. Available at: <https://insideevs.com/video-atlis-xt-electric-pickup-truck-500-mile-range/> (Accessed: 16 February 2019)

Loveday, S. (2018) In-Depth Look At Rivian's History, Funding & Present. *InsideEVs*, 26 November [online]. Available at: <https://insideevs.com/rivian-automotive-history-future/> (Accessed: 22 February 2019)



Bibliography

- MacDonald, J. (2016) Electric vehicles to be 35% of global new car sales by 2040. *Bloomberg*, 25 February [online]. Available at: <https://about.bnef.com/blog/electric-vehicles-to-be-35-of-global-new-car-sales-by-2040/> (Accessed: 28 February 2019)
- MarketLine (2018). Company Profile: General Motors. MarketLine, 16 November [online]. Available at: Subscription Service (Accessed: 10 February 2019)
- Maynard, M. (2015) 4 Differences Between Tesla And Other Carmakers. *Forbes*, 19 August [online]. Available at: <https://www.forbes.com/sites/michelinemaynard/2015/08/19/4-differences-between-tesla-and-other-carmakers/> (Accessed: 17 February 2019)
- McGee, P. (2018) Combustion engine car sales to hit peak demand in 2018, say analysts. *Financial Times*, 30 December [online] Available at: <https://www.ft.com/content/62506c24-0aae-11e9-9fe8-acdb36967fcf?sharetype=blocked> (Accessed: 25 February 2019)
- McKinsey & Company. (2017) Electrifying insights: How automakers can drive electrified vehicle sales and profitability. *McKinsey & Company* [online]. Available at: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/electrifying-insights-how-automakers-can-drive-electrified-vehicle-sales-and-profitability> (Accessed: 26 February 2019)
- MergerMarkets. (2019) *MergerMarkets* [online]. Available at: Subscription Service (Accessed: 13 February 2019)
- Motavalli, J. (2010) G.M. Ventures Invests \$3.2 Million in Battery Company. *New York Times*, 9 September [online]. Available at: <https://wheels.blogs.nytimes.com/2010/09/09/g-m-ventures-invests-3-2-million-in-battery-company/> (Accessed: 16 February 2019)
- Musk, E. (2018) 16 September. Available at: <https://twitter.com/elonmusk/status/1041500594467270656?lang=en> (Accessed: 19 February 2019)
- Nasdaq. (2019) *Nasdaq* [online]. Available at: <https://www.nasdaq.com/> (Accessed: 13 February 2019)
- NVIDIA. (2019) Annual report 2018 [online]. Available at: [https://s22.q4cdn.com/364334381/files/doc_financials/annual/2018/NVIDIA2018_AnnualReview-\(new\).pdf](https://s22.q4cdn.com/364334381/files/doc_financials/annual/2018/NVIDIA2018_AnnualReview-(new).pdf) (Accessed: 20 February 2019)
- O'Kane, S. (2018) Bollinger Motors teases a rugged electric pickup truck with 200 miles of range. *Verge*, 10 October [online]. Available at: <https://www.theverge.com/2018/10/10/17961494/bollinger-motors-b2-electric-pickup-truck> (Accessed: 16 February 2019)
- OICA. (2019) *International Organization of Motor Vehicle Manufacturers* [online]. Available at: <http://www.oica.net/> (Accessed: 12 February 2019)
- Ouimet, P. (2012) What Motivates Minority Acquisitions? The Trade-Offs between a Partial Equity Stake and Complete Integration. *EFA 2007 Ljubljana Meetings Paper*, 20 October [online]. Available at <http://dx.doi.org/10.2139/ssrn.966700> (Accessed: 12 February 2019)



Bibliography

Prenzler, C. (2018) Rivian announces “Half a Billion” in Funding, Including \$200M in Debt from London-based Bank. *AdaptBN*, 23 May [online]. Available at: <https://www.adaptbn.com/home/2018/5/23/rivian-announces-half-a-billion-in-funding-raising-200m-in-debt-from-london-based-bank> (Accessed: 16 February 2019)

Pressman, M. (2018) Tesla’s Business Model More Similar To Amazon’s Than You Think. *CleanTechnica*, 30 June [online]. Available at: <https://cleantechnica.com/2018/07/30/teslas-business-model-more-similar-to-amazons-than-you-think/> (Accessed: 17 February 2019)

Pulliam, S., Ramsey, M. and Mullins, B. (2016), Elon Musk Supports His Business Empire With Unusual Financial Moves. *The Wall Street Journal*, 27 April [online]. Available at: <https://www.wsj.com/articles/elon-musk-supports-his-business-empire-with-unusual-financial-moves-1461781962> (Accessed: 14 February 2019)

PwC. (2017a) Connected Car Report 2016. PwC [online]. Available at: <https://www.strategyand.pwc.com/media/file/Connected-car-report-2016.pdf> (Accessed: 9 February 2019)

PwC. (2017b) The 2017 Strategy & Digital Auto Report. PwC [online]. Available at: <https://www.strategyand.pwc.com/media/file/2017-Strategyand-Digital-Auto-Report.pdf> (Accessed: 11 February 2019)

Pyper, J. (2019) A Q&A with Rivian, the Amazon-Backed Electric Truck Startup. *GTM*, 20 February [online]. Available at: <https://www.greentechmedia.com/articles/read/rivian-amazon-backed-electric-truck-startup#gs.6FUn46T8> (Accessed: 21 February 2019)

Randall, C. (2019) Atlis presents electric pickup with 800 km range. *Electrive.com*, 7 January [online]. Available at: <https://www.electrive.com/2019/01/07/atlis-presents-electric-pickup-with-800-km-range/> (Accessed: 25 February 2019)

Randall, T. and Halford, D. (2019) Tesla Model 3 Tracker. *Bloomberg*, 27 February [online]. Available at: <https://www.bloomberg.com/graphics/2018-tesla-tracker/> (Accessed: 27 February 2019)

Renaissance Capital. (2019) All Time Largest U.S. IPOs. *Renaissance Capital* [online]. Available at: <https://www.renaissancecapital.com/IPO-Center/Stats/Largest-US-IPOs> (Accessed: 25 February 2019)

Rivian. (2019) The world’s first Electric Adventure Vehicles. *Rivian* [online]. Available at: <https://products.rivian.com/> (Accessed: 22 February 2019).

Seeking Alpha. (2018a) Cruise Valuation up to \$15bn. *Seeking Alpha*, 3 October [online]. Available at: <https://seekingalpha.com/news/3394743-cruise-valuation-15b> (Accessed: 9 February 2019)

Seeking Alpha. (2018b) Tesla’s Low 2019 Capex Could Harm Its Growth Story And Brand Value. *Seeking Alpha*, 25 February [online]. Available at: <https://seekingalpha.com/article/4243835-teslas-low-2019-capex-harm-growth-story-brand-value?dr=1> (Accessed: 26 February 2019)

Seppala, J. (2018) Inside the automotive startup taking EVs off-road. *Engadget*, 21 May [online]. Available at: <https://www.engadget.com/2018/05/21/rivian-ev-truck-suv-detroit/?guccounter=1> (Accessed: 23 February 2019)



Bibliography

- Sheetz, M. (2019) Tesla's electric vehicle dominance is about to have 'serious competition,' Morgan Stanley says. *CNBC*, 11 February [online]. Available at: <https://www.cnbc.com/2019/02/11/morgan-stanley-serious-tesla-electric-vehicle-competition-from-rivian.html> (Accessed: 20 February 2019)
- Smith, A. (2019) Silverado vs. Sierra. *PonyParts*, 13 February [online]. Available at: <https://www.cjponyparts.com/resources/chevy-silverado-vs-gmc-sierra> (Accessed: 15 February 2019)
- Smith, B. (2018) The future of EVs: "greener pasture". *Experian*, 2 November [online]. Available at: <http://www.experian.com/blogs/insights/2018/11/future-evs-greener-pastures/> (Accessed: 12 February 2019)
- Snyder, J. (2017) Crossovers and SUVs fatten profit margins. *Automotive News*, 24 July [online]. Available at: <https://www.autonews.com/article/20170724/RETAIL01/170729911/crossovers-and-suvs-fatten-profit-margins> (Accessed: 22 February 2019)
- Soule, M. (2019) Cadillac Shows Brand's First Fully Electric EV. *Cadillac website*, 13 January [online]. Available at: <https://media.cadillac.com/media/us/en/cadillac/news.detail.html/content/Pages/news/us/en/2019/jan/0114-cadillac-ev.html> (Accessed: 12 February 2019)
- Statista. (2019a) US light truck retail sales from 1980 to 2018. *Statista* [online]. Available at: Subscription Service (Accessed: 10 February 2019)
- Statista. (2019b) Car brands: General Motors. *Statista* [online]. Available at: Subscription Service (Accessed: 10 February 2019)
- Statista. (2019c) Volume of the ten largest secondary equity offerings until June 2009. *Statista* [online]. Available at: Subscription Service (Accessed: 24 February 2019)
- Statista. (2019d) Number of Tesla vehicles delivered worldwide from 3rd quarter 2015 to 4th quarter 2018. *Statista* [online]. Available at: Subscription Service (Accessed: 27 February 2019)
- Statista. (2019e) Tesla's revenue from FY 2008 to FY 2018. *Statista* [online]. Available at: Subscription Service (Accessed: 27 February 2019)
- Stockreports+. (2019) Tesla Inc. Detailed Stock Report. *Thomson Reuters*, 14 February [online] Available at: Subscription Service (Accessed: 18 February 2019), pp. 3-5.
- Stringer, D. and Buckland, K. (2019) Before the Electric car takes over, someone needs to reinvent the battery. *Bloomberg*, 6 January [online]. Available at: <https://www.bloomberg.com/news/articles/2019-01-06/before-the-electric-car-takes-over-someone-needs-to-reinvent-the-battery> (Accessed: 12 February 2019)
- Tannert, C. (2019) Meet R.J. Scaringe, Founder Of Rivian Automotive—And Tesla's Worst Nightmare. *Forbes*, 8 February [online]. Available at: <https://www.forbes.com/sites/chucktannert/2019/02/08/meet-rj-scaringe-founder-of-rivian-automotiveand-teslas-worst-nightmare/#75b90e617113> (Accessed: 23 February 2019)
- Tesla Inc. (2011) Annual Report 2010 [online]. Available at: http://www.annualreports.com/HostedData/AnnualReportArchive/t/NASDAQ_TSLA_2010.pdf (Accessed: 20 February)



Bibliography

Tesla Inc. (2015) Annual Report 2014 [online]. Available at: http://www.annualreports.com/HostedData/AnnualReportArchive/t/NASDAQ_TSLA_2014.pdf (Accessed: 20 February)

Tesla Inc. (2016) Annual Report 2015 [online]. Available at: http://www.annualreports.com/HostedData/AnnualReportArchive/t/NASDAQ_TSLA_2015.pdf (Accessed: 20 February)

Tesla Inc. (2017) Annual Report 2016 [online]. Available at: http://www.annualreports.com/HostedData/AnnualReportArchive/t/NASDAQ_TSLA_2016.pdf (Accessed: 20 February)

Tesla Inc. (2018) Annual Report 2017 [online]. Available at: http://www.annualreports.com/HostedData/AnnualReports/PDF/NASDAQ_TSLA_2017.pdf (Accessed: 20 February)

Tesla Inc. (2019a) Annual Report 2018 [online]. Available at: <http://ir.tesla.com/static-files/15df7636-8cd8-4b18-989b-4badeeda806c> (Accessed: 25 February)

Tesla Inc. (2019b). Company website. *Tesla Inc.* [online]. Available at: <https://www.tesla.com/>

The Economist. (2017) After electric cars, what more will it take for batteries to change the face of energy? *The Economist*, 12 August [online]. Available at: Subscription Service (Accessed: 25 February 2019)

Thomson One Banker. (2019) Thomson One Banker. *Thomson Reuters* [Online]. Available at: <http://banker.thomsonib.com/>

Thomson Reuters Eikon. (2019) Thomson Reuters Eikon. *Thomson Reuters* [Online]. Available at: Subscription Service

UCSUSA. (2017) Barriers to Renewable Energy Technologies. *UCSUSA*, 20 December [online]. Available at: <https://www.ucsusa.org/clean-energy/renewable-energy/barriers-to-renewable-energy> (Accessed: 20 February 2019)

Vlasic, B. (2017) In Pivotal Moments, Tesla Unveils Its First Mass-Market Sedan. *New York Times*, 29 July [online]. Available at: <https://www.nytimes.com/2017/07/29/business/tesla-model-3-elon-musk.html> (Accessed: 27 February)

Volvo. (2018) Annual report 2017 [online]. Available at: <https://www.volvogroup.com/content/dam/volvo/volvo-group/markets/global/en-en/investors/reports-and-presentations/annual-reports/annual-and-sustainability-report-2017.pdf> (Accessed: 15 February 2019), pp. 20-30.

Wayland, M. (2018) Unlike 2008, GM cutting jobs, plants proactively. *Automotive News*, 3 December [online]. Available at: <https://www.autonews.com/article/20181203/OEM/181209962/unlike-2008-gm-cutting-jobs-plants-proactively> (Accessed: 27 February 2019)

Wedbush. (2019) Tesla Inc. Company report. *Thomson Reuters, Wedbush*, 11 February [online]. Available at: Subscription Service (Accessed: 19 January 2019)



Bibliography

Welch, D. (2017) GM Sees Path to Elusive EV Profits, 1 Million Sales a Year. *Bloomberg*, 15 November [online]. Available at: <https://www.bloomberg.com/news/articles/2017-11-15/gm-forecasts-1-million-electric-car-sales-by-2026-as-costs-drop> (Accessed: 12 February 2019)

Welch, D. (2018a) GM Races Tesla to Quicker Electric-Car Battery Recharging Times. *Bloomberg*, 30 August [online]. Available at: <https://www.bloomberg.com/news/articles/2018-08-30/gm-races-tesla-to-quicker-electric-car-battery-recharging-times> (Accessed: 10 February 2019)

Welch, D. (2018b) GM Plans More than 14,000 Job Cuts, Seven Factory Closing. *Bloomberg*, 26 November [online]. Available at: <https://www.bloomberg.com/news/articles/2018-11-26/gm-to-cut-10-000-jobs-targets-5-factories-for-closing-next-year> (Accessed: 12 February 2019)

Welch, D., Bergen, M. and Barinka, A. (2018) GM is exploring listing shares of cruise self-driving unit. *Bloomberg*, 15 June [online]. Available at: <https://www.bloomberg.com/news/articles/2018-06-15/gm-is-said-to-explore-listing-shares-of-cruise-self-driving-unit>. (Accessed: 9 February 2019)

WorkHorse. (2019) Company website. *WorkHorse* [online]. Available at: <https://www.bollingermotors.com/> (Accessed: 20 February 2019)

Xerfi. (2018) The Global Carmaking Industry: The Market, *Xerfi Market Research*. Available at: Subscription Service (Accessed: 10 February 2019)

Zhang, Y. and Hull, D. (2019) Elon Musk in China to Break Ground for First Tesla Factory Outside U.S. *Bloomberg*, 7 January [online]. Available at: <https://www.bloomberg.com/hyperdrive> (Accessed: 27 February 2019)

Zhang, Y., Naughton, K., Rauwald, C. and Sachgau, O. (2018) China is Leading the World to an Electric Car Future. *Bloomberg*, 14 November [online]. Available at: <https://www.bloomberg.com/news/articles/2018-11-14/china-is-leading-the-world-to-an-electric-car-future> (Accessed: 27 February 2019)