

A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics.

NIO Inc. Equity Research
The Next Generation of Smart Vehicles

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A Project carried out on the Master's in Finance Program, under the supervision of:

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January 2022

Abstract

Starting from 2019, the world has been facing a big revolution regarding transportation. The challenge lays on offering viable alternatives with the basis of clean energy without jeopardizing performance. NIO's mission rests exactly on those values. The ultimate goal of this report is to assess NIO's intrinsic value.

Keywords (up to four)

NIO, Automotive, Electric Vehicles, China.

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

This report is part of the NIO Inc. (part 2) and should be read has an integral part of it.

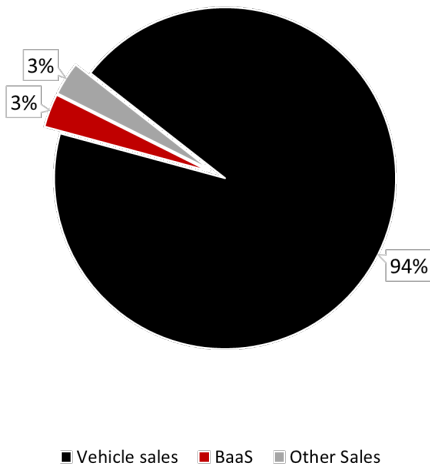
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Company Overview

Background and Business Model

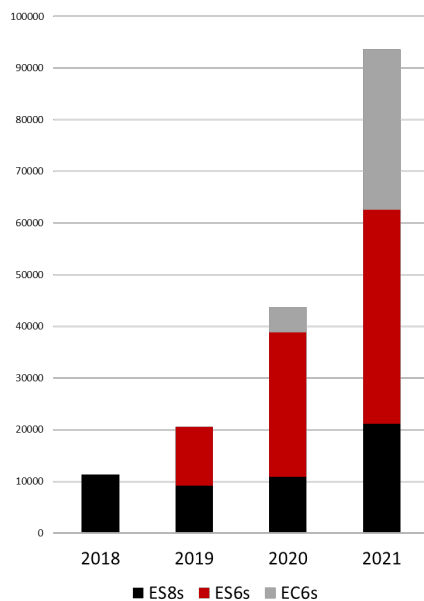
Exhibit 1: Revenues per segment 2021



NIO Inc. (NYSE Ticker: **NIO**) was founded in November 2014 and is a pioneer in China's **premium electric automotive industry**. *Weilai*, NIO's Chinese name, means "Blue Sky Coming", which symbolizes the vision and dedication to a more ecologically and responsible future.

Led by its founder and current CEO, William Li, NIO produces smart and connected premium electric vehicles, advancing into the next generation of technologies in connectivity, autonomous driving, and artificial intelligence: 1) the **ES8**, NIO's first EV model, launched in 2018, is currently the company's flagship SUV with capacity up to 7 seats; 2) the **ES6**, NIO's second SUV model, launched in 2019, is currently known as NIO's smart round-shaped SUV, with an outstanding 4.7s from 0 to 100km/h; 3) the **EC6**, NIO's last SUV model, launched in 2020, is a beautifully designed "Coupe SUV" with a sloped roof, capable of carrying 100-kWh lithium-ion battery packs; 4) and lastly, the **ET7**, NIO's first sedan model and its first fully autonomous electric vehicle, to be launched this year. Moreover, NIO aims at providing its customers with comprehensive, convenient, and creative charging options, as well as other user-centric service offerings, redefining, in this way, the user experience: 1) **Power Home**, NIO's home charging solution; 2) **Power Swap**, NIO's revolutionary battery swapping service; 3) **Power Mobile**, NIO's mobile charging service through charging trucks; 4) **Power Express**, NIO's 24-hour on-demand pick-up and drop-off charging service; 5) **NIO Life**, the company's merchandise brand, including clothing, gadgets, and other accessories; and lastly, 6) **NIO House**, a unique space dedicated solely to improve the company's customer experience and relationship¹.

Exhibit 2: NIO's vehicles sold along the years

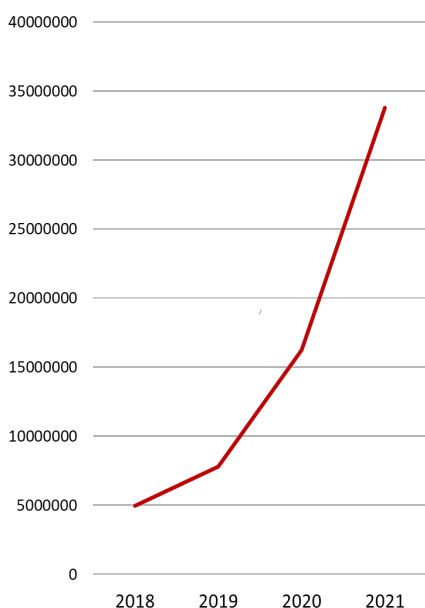


NIO's business model is supported by key strategic partnerships with several techs, manufacturing, and energy suppliers. In the **tech** sector, the partnership with **Nvidia** stands out. The tech giant will provide the advanced **NVIDIA DRIVE² Orin** chip which will power NIO's next-generation autonomous driving system, the *NIO Adam*, integrated in the latest ET7 sedan. In the **manufacturing** branch, **Jianghuai Automobile Group (JAC)** and **CATL** partnerships come next. JAC is a Chinese state-owned company that is currently outsourced by NIO to manufacture its EV models in the city of Hefei (China) with an annual production capacity of 120,000 vehicles. Such manufacturing agreement was recently

¹ Source: NIO 2021. *Company Profile*. <https://ir.nio.com/governance/company-profile>

² Source: DANNY SHAPIRO. NVIDIA 2021. *Adam and EV: NIO Selects NVIDIA for Intelligent, Electric Vehicles*. <https://blogs.nvidia.com/blog/2021/01/09/nio-selects-nvidia-intelligent-electric-vehicles/>

Exhibit 3: NIO's revenue evolution



extended (to be further assessed later on). On the other hand, CATL, the biggest Chinese battery manufacturer, is the supplier to whom NIO outsources the production of its lithium-ion battery packs which integrate every electric vehicle model of the automaker. Lastly, in the **energy** sector, comes **Sinopec** and **Shell** partnerships. These big oil producers have been cooperating with NIO on expanding their Power Swap network in China and possibly in Europe later this year. Additionally, Sinopec and Shell have demonstrated a strong commitment to help NIO develop more advanced power swapping technologies, with the newest software, *the Power Swap Station 2.0*, is already deployed in several stations of these oil powerhouses which will provide a more efficient and user-friendly swapping service.

As a pioneer in the EV business, NIO has taken the first steps to become a competitive agent in the market within the foreseeable future and because of that, it has benefited from early-mover advantages. Since the electric automaker started making deliveries to the public in June of 2018, the revenue growth has been exceptionally positive, with an associated **CAGR of 49%** from 2018 to 2021, having registered 5 billion RMB (**\$770 million**) revenues in 2018, 7.8 billion RMB (**\$1.2 billion**) in 2019, 16.2 billion RMB (**\$2.5 billion**) in 2020 and 33 billion RMB (**\$5.1 billion**) in 2021E. Also, regarding its profitability, the firm has been intensively working on its vehicle margins, which, in 2021, have proven to become effective. Looking thereby at the three quarters of 2020 compared to 2021, NIO has managed to increase its margins from 7,4% to **21.2% in the 1Q**, 9.7% to **21.2% in the 2Q**, and 12.9% to **20.3% in the 3Q**. Such operational efficiency upgrades were mainly motivated by higher vehicle deliveries as well as lower material costs (to be assessed later on).

Exhibit 4: NIO's most impactful owners in equity terms

OriginalWish Ltd	13.50%
Tencent Holdings Ltd	12.70%
Baillie Gifford & Co	6.66%
BlackRock Inc	2.94%
Vanguard Group	2.76%

Taking all the above into consideration, such performance and the business model certainly gives every NIO investor confidence to believe the Chinese automaker is building its journey to a bright future. Nevertheless, there is still a long way to undergo with many challenges to surpass and a difficult competition to deal with.

Shareholder Structure

Originalwish Ltd, a firm established in the British Virgin Islands whose main investor is NIO's CEO (William Li), owns the biggest stack in NIO's ownership among the public and private companies, having to its name 174.5 million NIO's shares, a representation of **13.5% of shares outstanding**.³ Tencent Holdings Ltd, a China-based multinational technology firm responsible for providing technological services like social networking, e-commerce, mobile games, internet

³ Source: NATHAN REIFF. Investopedia 2021. *Top Nio Shareholders*. <https://www.investopedia.com/top-nio-shareholders-5179413>

services, and more, represents the second biggest NIO’s shareholder with 12.7% of shares outstanding. In fact, NIO is one of its top 10 investments. Baillie Gifford & Co. owns 6.66% of shares outstanding, being, therefore, the third most representative firm in NIO’s ownership pool. BlackRock Inc. represents 2.94% of shares outstanding, and Vanguard Group, 2.76%. Note that institutional holdings represent 488 million shares out of **NIO’s 1.6 billion outstanding shares**.

Exhibit 5: NIO’s evolution share price

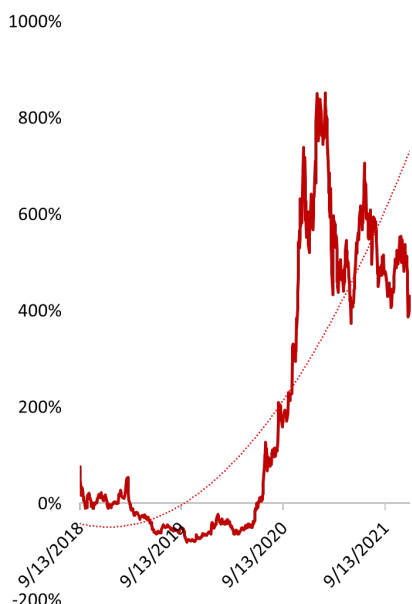


Share Price Performance

NIO shares are listed on Nasdaq. The automaker’s stock performance has been through many ups and downs since the day it was first listed on September 12, 2018, going from an **IPO price of \$6.26** per share all the way down to a closing price of \$1.75 per share on November 14, 2019. It got to a point where NIO had almost no cash available at the same time it was burning more than \$600 million per quarter in net income losses.⁴ Thus, little were the hopes for the business to continue its operations and not be forced to close doors, which consequently drove the top finance executive Dogning Wang to resign.

NIO’s destiny changed forever when the Chinese government stepped in and **bail out the company for \$1 billion** under the condition that NIO would commit its core business and assets to China as well as to R&D and technological improvements⁵. The turning point was such that the stock grew almost consistently reaching an **all-time high of \$62.89** on February 9, 2021, when the automaker announced a record quarter delivery of 20,060 EVs, despite the current pandemic. However, after the hype was settled, the stock price **dipped almost 50%** in a timeframe of only 7 months between March and November 2021. Such drop does not depend on a specific idiosyncratic event, but instead on multiple macro-wise reasons affecting the whole industry and the Chinese economy (to be further assessed later on).

Exhibit 6: Cumulative NIO’s returns

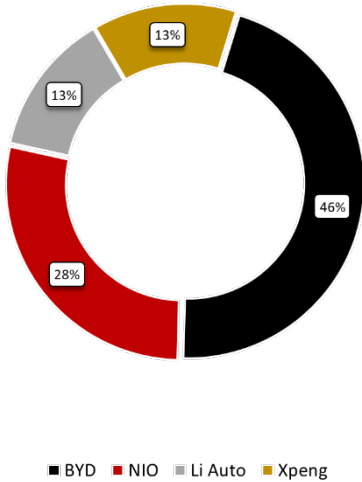


Thus, a better exercise to evaluate NIO’s performance in 2021 would be comparing it with the S&P Kensho Electric Vehicles Index (Index designed to measure the companies involved in the electric vehicle industry performance as well as the ecosystems that support it) rather than just looking at the price fluctuations of the company’s share price. According to this indicator, within a time frame from October 2020 to October 2021, the EV industry registered a rise of 49.35%, while NIO jumped 63.8%, meaning the automaker has overperformed the industry by around 14 percentage points.

⁴ Source: NIO 2020. *NIO Inc. Reports Unaudited Fourth Quarter and Full Year 2019 Financial Results*. <https://ir.nio.com/news-events/news-releases/news-release-details/nio-inc-reports-unaudited-fourth-quarter-and-full-0>
⁵ Source: Kshitija Bhandaru. Nasdaq 2020. *Nio Motors (NYSE: NIO) Has Chinese Government Support: But Do The Risks Outweigh The Benefits?*. <https://www.nasdaq.com/articles/nio-motors-nyse%3A-nio-has-chinese-government-support%3A-but-do-the-risks-outweigh-the>

Expansion Plans

Exhibit 7: Market share among principal Chinese EVs players

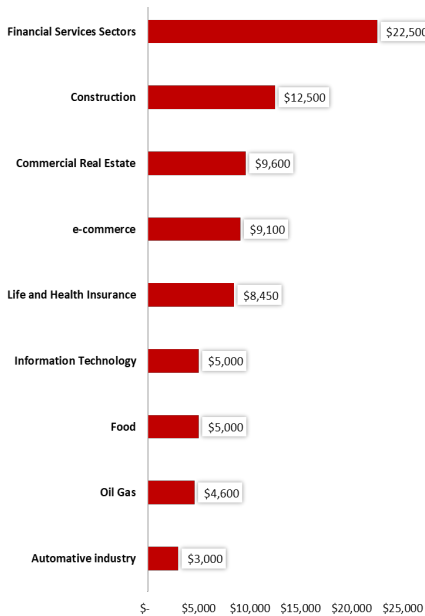


The ongoing rise trajectory of China in the EV business shows noteworthy promise indicators for EV specialists to grow, with NIO’s share growing at a faster pace than its direct Chinese peers, namely Li Auto (NYSE Ticker: **LI**) and Xpeng (NYSE Ticker: **XPEV**). NIO registered a global electric vehicle⁶ market share of **0,7% in 2018, 1.2% in 2019 and 1,8% in 2020**, while LI maintained 0.1% during these 3 years and XPEV owned 0.1% in 2018, 0.6% in 2019 and 1.3% in 2020.

Such global market share wasn’t used by accident, as NIO’s expansion plans go beyond the Chinese regional market with CEO William Li having reportedly confirmed its intentions to **go global by 2030**. For that, the company has already started expanding its electric premium SUVs to **Europe** by not only having approved license plate registration in all European countries but also having already shipped its first model NIO ES8 to **Norway** in September of 2021⁷. Also, the company plans to guarantee Norwegian access to all services NIO offers to its Chinese customers and which many believe are decisive to make the start-up outplay the competition. Such services revolve around the direct sale and network encompassing, NIO House, NIO App for European users, Power Swap Stations, NIO Life, and all the other services previously detailed.

Note that even though NIO’s CEO William Li has already shown interest in expanding to Germany, no concrete expansion plan had been issued yet besides the one occurring in Norway. Henceforward, everything that surpasses the Norway spectrum is pure speculation.

Exhibit 8: Biggest industries in the world by revenue (in \$ billion)



Automotive Industry

Industry Overview

The automotive industry is, by far, one of the most important market sectors in the world which currently **ranks 9th in terms of market cap**, with a 2021 aggregated capitalization of \$3 trillion, followed by industries like the oil and gas (\$4.6 trillion), food (\$5 trillion), information technology (\$5 trillion), life and health insurance (\$8.45 trillion), e-commerce (\$9.1 trillion), commercial real estate (\$9.6 trillion), construction (\$12.5 trillion) and financial services sectors (\$22.5 trillion)⁸.

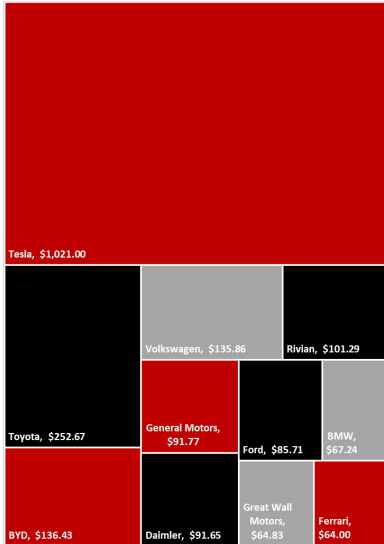
Additionally, the automotive sector addresses climate change like no other, with many big players in the industry having recently delivered strong measures to shift

⁶ Such global EV share accounts for all automakers (traditional OEMs and EV specialists) that have sold an EV during the correspondent year

⁷ Source: electrive.com 2021. *Nio readies for market entry into Europe*. <https://www.electrive.com/2021/05/06/nio-to-launch-in-norway-in-september/>

⁸Source: ereseach 2021. *Sectors & Industries Overview*. https://ereseach.fidelity.com/ereseach/markets_sectors/sectors/sectors_in_market.jhtml

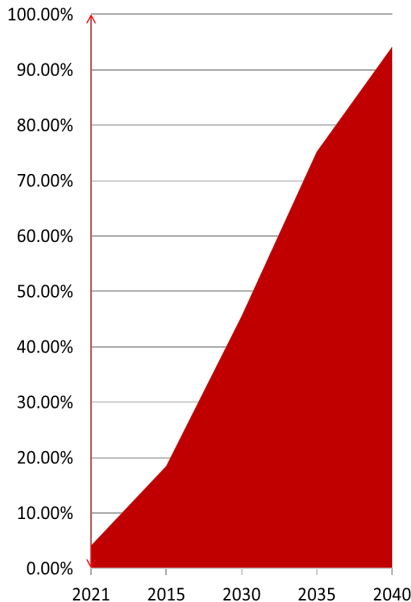
Exhibit 9: Biggest companies in the automobile industry by market cap (in \$ billion)



their core businesses to more environmental-wise ones, by adapting current manufacturing processes from internal combustion engine vehicles (ICEs) to battery electric vehicles, (BEVs), plug-in hybrid electric vehicles (PHEVs) and autonomous vehicles (AVs). This disruptive change has made most **EV automakers** benefit from significant early-mover advantages by gaining market share within the automobile industry at an astonishingly fast pace, having sold **over 3 million units** in 2021, more than double the **1.4 million units in 2018**, corresponding to a CAGR of **33%**. These EV producers are currently led by **Tesla** (790k EV units in 2021 - 23.6% EV market share), followed by automakers like **VW Group, Renault-Nissan-Mitsubishi Alliance, General Motors, and Hyundai** (each sold around 300k EV units in 2021 – around 10% EV market share) and EV start-ups like **NIO and XPeng** (each sold around 100k units in 2021 – 3% EV market share).

If we consider the **automotive market as a whole**, including both EV specialists and matured ICE automakers, a **negative CAGR of 5%** was registered during the same period (2018 -2021), with the total volume of sales has decreased from **94.75 million units in 2018** to **80 million units in 2021**. Gas soaring prices, upward trends of alternative ways of transportation (e.g. e-hailing and car-sharing), and better public transports options were believed to be the principal threats to the sector that lay behind such a downward trajectory. The industry is currently led by automaker giants like **VW Group and Toyota** with each having sold almost 10 million units in 2021, representing an 11% market share⁹.

Exhibit 10: Global prediction electrification rate



Automotive Electrification

The electrification of the automotive industry has still a long way to go. According to data obtained from Deloitte and Piper Sandler reports, the auto industry rate of **electrification in 2021 has reached just 4.1%**¹⁰. In other words, just 3.33 million EVs were sold out of the 80.79 million vehicles sold in 2021. Among the 28 automakers analysed, just 5 of them had their businesses 100% electrified in 2021, namely **Tesla, NIO, Xpeng, Li Auto, and Weltmeister**. If we take a deep look at matured OEMs, **General Motors, VW Group, and Renault-Nissan-Mitsubishi Alliance stand-out**, with each having reached 4.2%, 3.7%, and 3.5% electrification rates in 2021, respectively. Premium European automakers like **Daimler and BW Group** also did a good job at decarbonizing their operations, with each having reached 3.2% electrification rates in 2021. On the negative side,

⁹ Source: Jato 2021. Volkswagen Group secures highest increase in market share in Europe for H1 2021. <https://www.jato.com/volkswagen-group-secures-highest-increase-in-market-share-in-europe-for-h1-2021/>
¹⁰ Source: Deloitte 2021. Full speed ahead Supercharging electric mobility in Southeast Asia. <https://www2.deloitte.com/content/dam/Deloitte/sg/Documents/strategy/sea-strategy-operations-full-speed-ahead-report.pdf>

companies like **Ford, Honda Motor, and Toyota** have only managed to electrify their businesses up to 0.5% in 2021.

Nonetheless, one should note this is still the beginning of what will come in the next two decades: a complete auto-industry revolution. According to the above-mentioned reports, the EV market is expected to reach an electrification rate of **18.5%** in 2025, **45.6%** in 2030, **75.2%** in 2035, and **94.2%** in 2040. In terms of delivery volume, this represents **18.2 million** EVs out of **98.5 million** vehicles sold in 2025, **45.4 million** out of **99.6 million** in 2030, **71.1 million** out of **95.4 million** in 2035, and **81.9 million** out of **87.1 million** in 2040. Such numbers correspond to CAGRs of **33.5% for the EV market** and **2.6% for the industry as a whole** from 2021 to 2030; and **6.1% and -1.3%**, respectively, from 2031 to 2040.

All the info stated above is noteworthy to understand NIO's role in the automotive industry, as, on one hand, will benefit from a growing EV market, but on the other, will suffer from increased competition. Such benefits will be reflected by the **volume of the business**, with revenues estimated to **boost 10x until 2040** (to be further assessed later on) while **increased competition** will be reflected by a slow and steady downward trajectory of NIO's market share, which we estimate to fall from an all-time high of **4.4% in 2023**, fuelled by early-mover advantages and boosted production capacity, to a steady-state share of **2.0% in 2040**, assuming an already matured and completely shifted market by that time.

Exhibit 11: NIO's prediction global market share

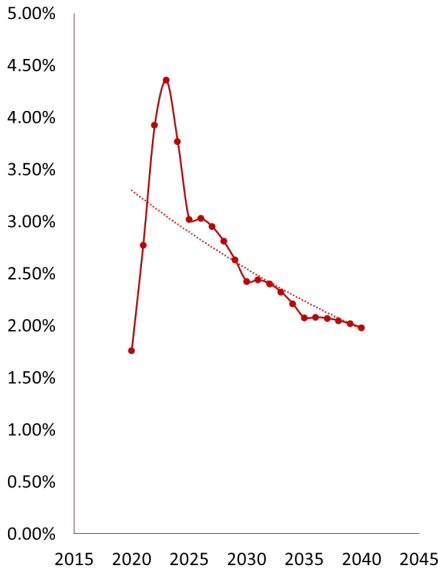
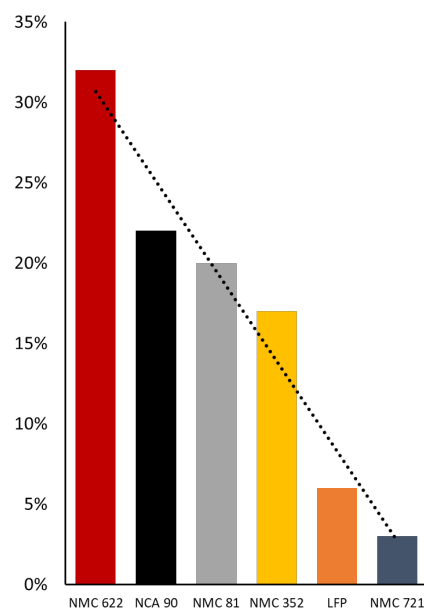


Exhibit 12: Global bev and battery chemistry 2020



EV Batteries

The effectiveness and availability to charge an electric vehicle have always been a concern to customers. **Long-lasting charging times, poor charging compatibilities, and lack of available charging infrastructures** are some of the examples of the main concerns regarding the preference of ICE vehicles over EVs. However, recent battery developments have proven fast EV-charging and other alternatives are indeed possible, with Tesla and NIO leading the way.

- **Battery deep-dive and the reliance on Cobalt**

Firstly, we should be starting by understanding the science behind vehicle battery packs, including their main components and the charging process. EV batteries are composed of thousands of lithium-ion cells which are responsible not only to retain but also to release energy at the same time. Each of these cells is made of three main components: **two electrodes** (a metal negative-end named **anode** and a graphite positive-end named **cathode**); and a liquid **electrolyte** that conducts an electric current between these electrodes. When the battery is being used (or discharged, let's say), the charged lithium-ion cells, stored in the anode, are

Exhibit 13: Difference in price between cobalt and other present battery's chemicals y

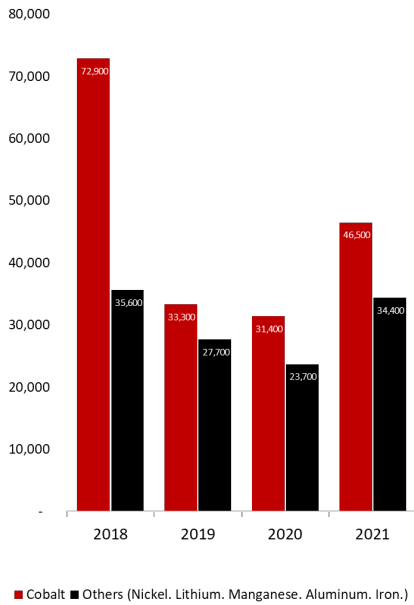
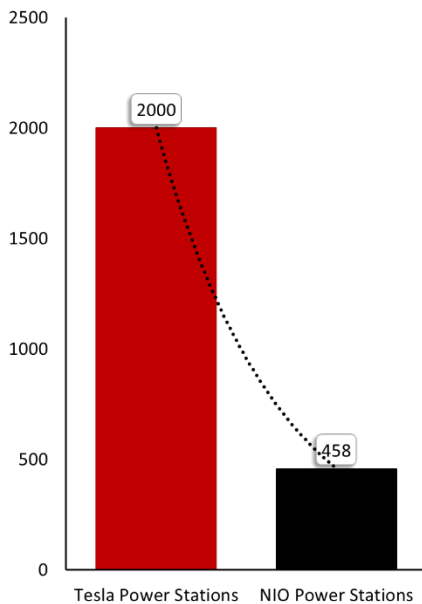


Exhibit 14: Tesla's and NIO's power stations available



transferred to the cathode component through the electrolyte, generating free electrons that carry the electric current used to power the EV through an external circuit. On the other hand, when the battery is being charged, the process reverses. The lithium-ion cells are transferred back from the cathode component through the electrolyte which will then be stored in the anode and charged up again¹¹.

There are several different types of lithium-ion batteries, which are distinguished by the metals that compose the cathode component. Nowadays, a **metal combination of nickel, manganese, and cobalt** is normally used, with different weights of each component having different impacts on the battery and vehicle. For instance, a higher percentage of nickel in the cathode normally increases energy density which boosts EV ranges. However, more nickel usually requires less cobalt which is responsible for battery stability that prevents, for example, batteries from getting burnt or exploding¹².

Considering the above, EV battery manufacturers have been trying to balance the usage of these three metals in the cathode to optimize cost-effectiveness, range, stability, and safety. However, cobalt is still the most used metal, with around 14kg of it is usually inserted in a typical lithium-ion battery pack. Nonetheless, cobalt is something that the EV industry wants to avoid for two main reasons. First, its extraction causes overwhelming environmental impacts and is largely driven by child labor in Congo. And second, it is still very costly representing **almost 30% of the total electric vehicle's cost**.

As a solution, **LFP batteries (Lithium Iron Phosphate)** are a reliable alternative to completely disseminate cobalt¹³. These are composed of significantly cheaper and easily available materials which might be the turning point on guaranteeing lower-priced and more environmentally sustainable EVs. Although being much less competitive in terms of autonomy than the ones composed of cobalt, experts believe that it is a matter of time until the LFP technology completely substitutes the current one, with companies like Tesla, Ford, and Volkswagen have already inserted these batteries in their EV models.

- Charging options outlook

Although there is still a long way to go regarding the increased availability of EV-charging infrastructures around the world, some companies like Tesla and NIO

¹¹ Source: Science.org 2021. A DEAD BATTERY DILEMMA. <https://www.science.org/content/article/millions-electric-cars-are-coming-what-happens-all-dead-batteries>

¹² Source: DANIEL OBERHAUS. Wired 2021. This Cobalt-Free Battery Is Good for the Planet—and It Actually Works. <https://www.wired.com/story/this-cobalt-free-battery-is-good-for-the-planet-and-it-actually-works/>

¹³ Source: Iadimir Karimov. OneCharge 2021. New Tests Prove: LFP Lithium Batteries Live Longer than NMC. <https://www.onecharge.biz/blog/lfp-lithium-batteries-live-longer-than-nmc/>

Exhibit 15: China's charging and gas stations available

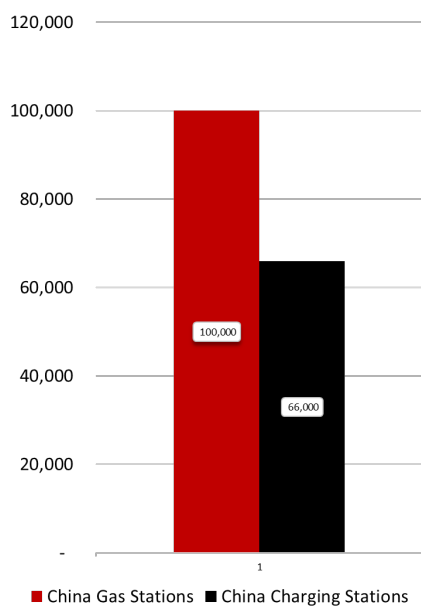
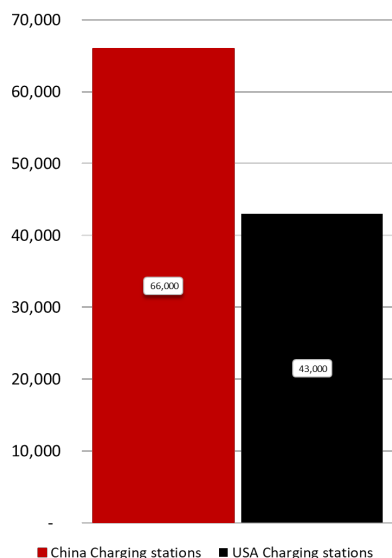


Exhibit 16: Charging stations in USA and China



have already made huge progress to provide more efficient and reliable charging solutions.

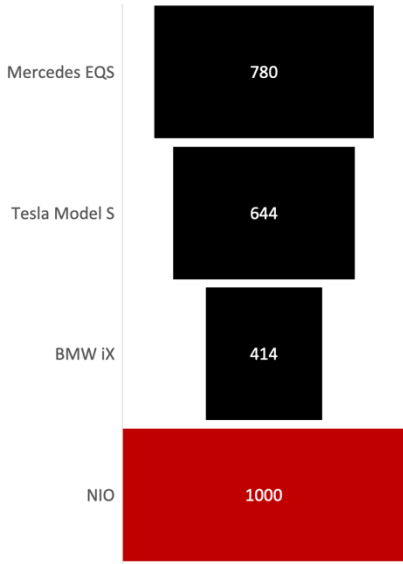
Starting with Tesla, as of November 2021, the American automaker accounts with more than **25,000 Superchargers** to its name and **more than 2,000 power stations** of which around 1,000 are located in the US, **520** in Europe, and **about 400** in the Asia/Pacific region. Conclusively, this is not good news for NIO investors as it means more competition for **NIO Power Chargers**, a serious competitor to Tesla Supercharger as capable of charging up **from 20% to 80% in just half an hour** and universally compatible, meaning they work with NIO and non-NIO vehicles. Comparing the two chargers, Tesla Supercharger is capable of **powering up to 250kW**, and offers a recharge **up to 200 miles in just 30min**, while NIO Power Charge can only deliver **180kW**.

However, here comes the twist: NIO early understood charging was the main concern regarding the EVs' potential customers, and therefore, the Chinese automaker has developed an effective and creative alternative that may surpass Tesla's Superchargers, namely the **NIO Power Swap**. This technology has **over 1,400 patent technologies** and is the only option available within the space and consists of swapping used batteries for new ones. The key point is the fact that it takes, on average, **just 3 minutes to swap a fully charged battery**. Hence, in practical terms, NIO Power Swap has two advantages: (1) is much easier and faster compared to a normal charger; and (2) is **much more reliable and sustainable** as the battery will not ever go old and therefore the possibility of damaging the EV range during the battery lifetime is very unlikely. Also, NIO goes beyond by offering another charging alternative: **Power Mobile**. This service is used as a **last resource** consisting of a **flexible and convenient portable bank** that comes to the vehicle and charges **up to 100km range in just 10 min¹⁴**. In the event of running out of battery and no charging options nearby, the customer simply clicks one button on the NIO app, and the Power Mobile will come and charge the vehicle right on the spot.

Nonetheless, the availability of these innovative charging solutions is still lacking. For example, in China, there are only around **700 NIO Power Swaps**, **458 NIO Power Charger stations**, and **900 Tesla Superchargers**, which is very far away from the more than **100,000 gas stations** across the country. However, China, better than all the competition, is leading the transition from ICE to EVs at an extremely rapid pace. As of June 2021, China had around **1.947 million EV charging piles**, reflecting a **47.3% growth** compared to the cumulative number of

¹⁴ Source: NIO 2021. *The Current State of EV Battery Swapping*. <https://www.nio.com/blog/current-state-ev-battery-swapping>

Exhibit 17: List of most advanced electrical vehicles in terms of autonomy (km)



the previous year. Additionally, China accounts with more than **66,000 charging stations**. Meanwhile, the United States, the second biggest country in terms of charging solutions, has just **43,000 public charging stations** and **around 120,000 charging ports**, according to the U.S Department of Energy data. Given this, it is safe to say there is still a lot of growth potential within the electric charging market, which will certainly benefit both Tesla and NIO in the foreseeable future.

- Battery ranges outlook

Battery range is probably the most important feature when opting for an EV. For instance, Lucid Motors CEO (Peter Rawlinson) during an interview with Forbes said the following: “*range and efficiency are widely recognized as the most relevant proof points by which EV technical prowess is measured*”. On the other hand, according to Tesla’s CEO, Elon Musk, during the second quarter 2020 earnings call, recent range improvement efforts have made customers reluctant towards EVs with less than 300 miles of range (480km). Given this, we clearly see an emphasis on the importance for cars to guarantee a certain range of autonomy.

Henceforth, NIO plans to completely offset the competition with its most recent model, the **NIO ET7**, which will integrate a 150KWh battery capable of an extra-long NEDC¹⁵ range of **over 1,000km**. The new model is already available on pre-order and it is predicted to go on sale in the first quarter of 2022 in China and by the end of 2022 in Germany. Moreover, together with the presentation of the new model, NIO launched also an **ultra-high energy density battery of 360Wh/kg**. This battery is compatible with all NIO models and capable of reaching an ultra-long NEDC range of **more than 800 km** for the ES8 models, **more than 900km** for the ES6 and EC6 models, and restating the above information of around **1,000 km** for the ET7.

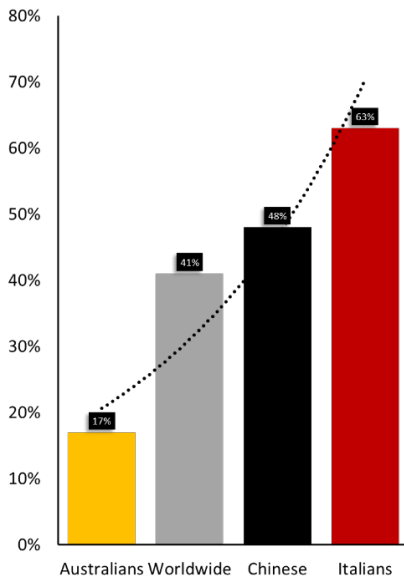
Exhibit 18: Nations’ targets to reduce combustion by 2030

China	Automotive electrification rate	40%
United States	Automotive electrification rate	50%
Europe	Reduce net greenhouse gases	55%

Such battery ranges will certainly disrupt the market one which is currently led by the following models: 1) Mercedes EQS, which is at the moment the longest-range electric car **with 485 miles (780km)** of autonomy thanks to the battery **pack of 107.8 kWh** and **low coefficient drag**; 2) Tesla Model S which offers an **autonomy of 420km** with **72.5 kWh battery** and **around 644km** with **100 kWh battery**; 3) BMW iX, a premium SUV that is capable of ranging around **257 miles (414km)**, nonetheless most experts consider an autonomy of **380 miles (612 Km)** due to its rapid charging tech that allows the SUV to charge up to 80% in around half an hour.

¹⁵ Source: TransportPolicy.net 2021. EU: LIGHT-DUTY: NEW EUROPEAN DRIVING CYCLE. <https://www.transportpolicy.net/standard/eu-light-duty-new-european-driving-cycle/>

Exhibit 19: % of those inclined to go electric by nation



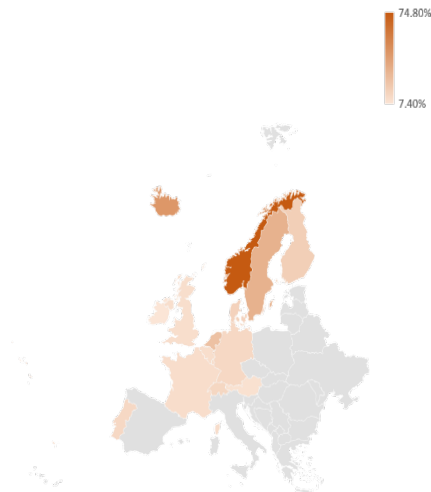
The big take here is that there are no competitors in the EV market at the moment that can compete with what NIO is creating in terms of battery ranges. The Chinese automaker is completely revolutionizing the industry and prospects are it will be a leader in the market with its compact new battery changing completely the **efficiency of its EVs**.

Regulation, Consumer Behaviour, and Tech

Based on a McKinsey report on “Why the automotive future is electric”¹⁶, there are three crucial changes we believe are key to transforming the way we transport ourselves: 1) **regulation**, 2) **consumer behavior**, and 3) **technology**. Under these three pillars, the report expects **EV adoption to reach 45%** at a global scale by 2030.

Regarding **regulation**, China has recently announced its plan to reach **carbon neutrality by 2060**¹⁷. Such a plan is what triggered several financial actions to support the EV industry in succeeding and reaching rapid growth by overcoming the major concern surrounding the automotive industry, namely pollution. With this, the government has been using all its powers to give a competitive advantage to electric car producers by pulling a significant number of policies such as **purchase rebates** and **tax exemptions**. One demonstrative example is the limitation regarding the access of license plates for ICEs of which new electric vehicles are exempt. Additionally, China has recently set an **automotive electrification rate goal of 40% by 2030**, meaning 40% of the cars sold in China will be electric by that time. To achieve this milestone, Chinese policymakers have issued a mandate that requires all automakers to electrify their business up to a certain percentage each year, facing penalties otherwise. Moreover, regulations concerning emission targets are getting stricter with time. On the other hand, the European Union has also come up with a “**Fit for 55**” program that seeks to reduce net greenhouse gases by at least **55% by 2030**. Also, in the US, the Biden administration presented a **50% electric vehicle target for 2030**. All in all, there has been a common ground among governments and administrations around the world to offer EV subsidies and fiscal benefits together with mandates to incentivize this electric transition in the automotive industry.

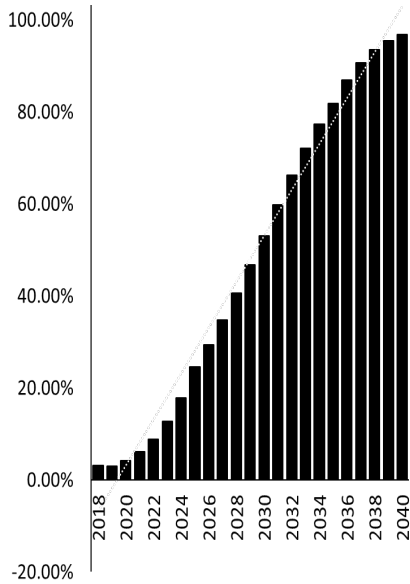
Exhibit 20: Europe – Highest penetration rates of electric vehicles



¹⁶Source: McKinsey & Company. 2021. *Why the automotive future is electric*. [https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/why-the-automotive-future-is-electric#:~:text=%E2%80%9D%20August%202021\).](https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/why-the-automotive-future-is-electric#:~:text=%E2%80%9D%20August%202021).) - , Technology, %2C%20autonomous%2C%20and%20shared%20mobility.&text=Such%20technology%20innovations%20will%20help, alternative%20to%20owning%20a%20car.

¹⁷ Source: Matt McGrath. BBC News 2020. *Climate change: China aims for 'carbon neutrality by 2060'*. <https://www.bbc.com/news/science-environment-54256826>

Exhibit 21: China Electrification Rate



Consumer behavior is also changing. A study conducted by Ernst & Young¹⁸ suggests that, in 2021, **41% of the people looking to buy a car are inclined to go electric**. Furthermore, EY’s results considered customers from different major markets which found a big discrepancy in responses, yet very positive. Australians ranked in the last position with **only 17%** thinking of going electric compared to **48% in China**, for example, or even **63% in Italy**. The study conducted by EY concludes that overall, there is an impactful **shift of 11%** in EV interest from the same study in 2020.

Finally, **technology** is considered, by most, the major driver for electric mobility, having the industry attracted more than **\$400B** in investments during the last decade to push further the development of advanced driver-assistance systems (ADAS) and autonomous driving systems (ADs) which will certainly change the whole automotive industry we know today into a more efficient, safer and sustainable one.

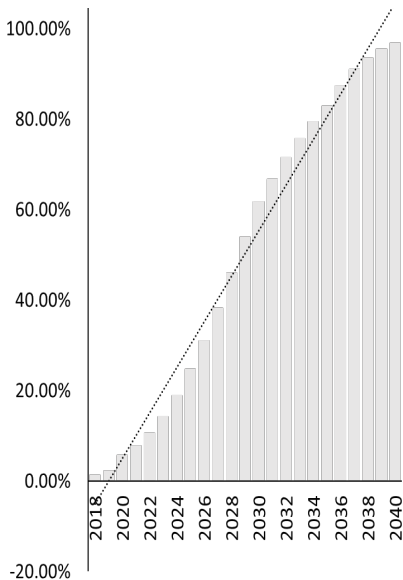
Market Analysis and Policies by Geography

In the process of understanding the outlook for the EV industry and, especially NIO, it is important to comprehend the incentives, benefits, carbon neutrality targets, and entry facilitators for each region that will directly affect the demand for the EV sector and therefore NIO’s sales. This way, we are focusing on the three main regions **China, Europe, and the US** during this section.

- **China**

In 2020, China represented **42.2% of the total market share** for EVs, growing at a **CAGR of 6,34%** since 2018, strongly backed up by the Chinese government. On one hand, the massification of EVs **reduces China’s dependence** on imported oil and thereby contributes to the ultimate country’s plan to become energetically and technologically independent. On the other hand, as China deals with a huge pollution problem, the Chinese government has been making all efforts possible to tackle such issues by incentivizing the EV industry since it is indeed one of the possible tangible solutions. For instance, from 2019 onwards, it has been mandatory for every Chinese vehicle producer and importer to produce and import **at least 10%** of electric cars out of all its available cars. In 2020 this policy **increased to 12%**¹⁹. Additionally, the Chinese government has been **offering subsidies** to electric vehicle manufacturers. However, these are expected to incrementally decrease once the government believes the Chinese automakers

Exhibit 22: Europe Electrification Rate



¹⁸ Source: EY. 2021. *Four in ten consumers plan electric vehicles purchase as market moves into high gear*. https://www.ey.com/en_ps/news/2021/07/four-in-ten-consumers-plan-electric-vehicle-purchase-as-market-moves-into-high-gear
¹⁹ Source: Chinese Climate Policy 2021. *Guide to Chinese Climate Policy*. <https://chineseclimatepolicy.energypolicy.columbia.edu/en/electric-vehicles>

Exhibit 23: USA Electrification Rate

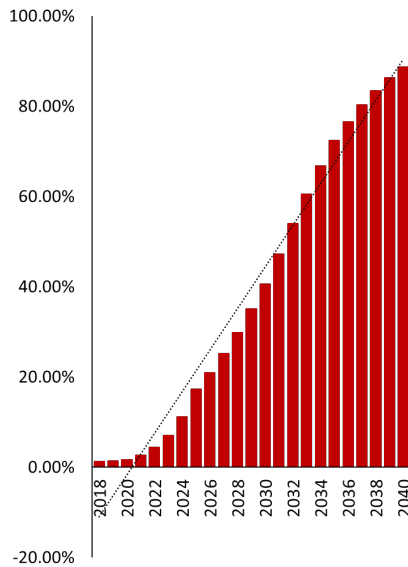
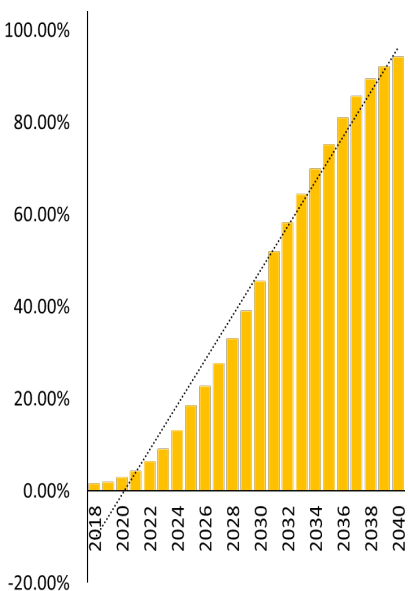


Exhibit 24: Global Electrification Rate



are **self-sustainable** since, with time, monetary subsidies can be very costly and ineffective. Thus, China’s finance ministry in 2021 cut EVs subsidies **by 20% from the year before**²⁰. Pure electric vehicles (PEVs) with an autonomy between 300 to 400 km were **lowered to 13,000 yuan** (\$2,013) from **16,200 yuan** (\$2537), while PEVs with distance ranges above 400km were **lowered to 18,000 yuan** (\$2819) **from 22,500 yuan** (\$3523). As a result, and confirming with what was stated above, the Chinese government shifted its attention to no monetary policies by reserving license plates annually to EVs and exempting EVs from traffic restrictions along with dedicated parking lots. Those were some of the solutions the government came up with to foster a faster transition.

- Europe

Europe EV market was the one that grew the most in the last 3 years with an **associated CAGR of 50.24%**, mainly due to many European countries setting deadlines to reduce fossil-fuel cars completely and the European Commission planning an **effective ban on carbon vehicles from 2035 onwards**²¹. Europe has also developed subsidies along with enforced carbon emissions targets for both automakers and consumers which highlights the European commitment on combating **global warming**.

The average market share of new plug-in electric cars **reached 9.8%** in the third quarter of 2021, **up from 4.9%** in the same quarter last year. Additionally, Tesla is currently the sector’s leader raising its sales by **77%** compared to 2020. Tesla Model 3 is the best-selling EV in the continent **with 24,419 units sold** followed by Tesla Model Y and Volkswagen ID.3 (the only European manufacturer in the top 3 electrical cars delivered in Europe) with **8,906 and 8,263 deliveries**, respectively.

As of January 2021, Norway is the sector’s leader with an astonishing **EV market penetration of 82.1%** followed by Iceland **with 51.6%** and Sweden **with 35.6%**. Germany ranks fifth **with a 21.08% EV market penetration**²². Given these numbers, there is no wonder why NIO decided to expand its distribution channels to Norway and possibly Germany later this year, as already mentioned above in the report. The secret behind such a tremendous success in Norway’s case resonates in making these vehicles cheap enough. The Norwegian government similar to the Chinese strategy, **lowered taxes** on EVs to keep the price of these **cheaper** than ICEs along with exempting road tolls as an extra incentive. Also, an

²⁰Source: metalbulletin 2021. Home China cuts EV subsidy for 2021; market downplays impact on lithium, cobalt prices. <https://www.metalbulletin.com/Article/3969254/China-cuts-EV-subsidy-for-2021-market-downplays-impact-on-lithium-cobalt-prices.html>

²¹ Source: European Environment Agency 2021. New registrations of electric vehicles in Europe. <https://www.eea.europa.eu/ims/new-registrations-of-electric-vehicles>

²² Source: INSIDEEVs 2021. European Countries Listed By Plug-In Car Market Share In Q1 2021. <https://insideevs.com/news/506478/european-countries-plugin-share-2021q1/>

Exhibit 25: Best-selling electrical vehicles (units sold)

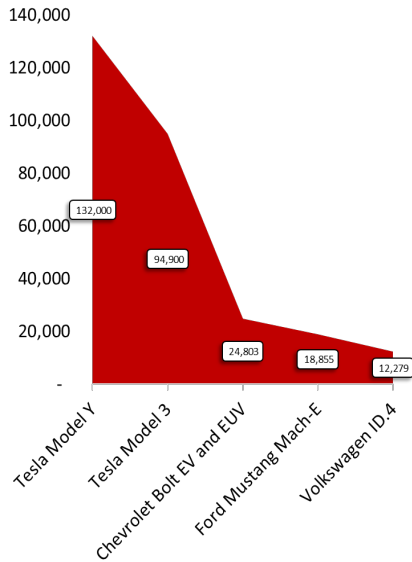
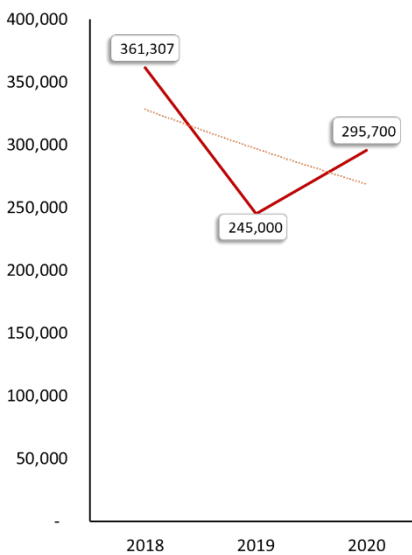


Exhibit 26: EVs sold in the United States (units sold)



opposite law to ICEs was imposed, the government called it pollution tax composed by the **traditional 25% VAT²³** (around 20% carbon tax, together with smaller amounts for weight tax, NOX tax, and finally car scrapping fee). Moreover, Norwegians are culturally more environmentally aware, which was also an important factor for the significant EVs market penetration success. Grabbing all the evidence, Norway seems the perfect market entry for NIO in Europe.

In our model, we expect a **CAGR of 42.17%** between 2020 and 2025 that is based on Europe's ambitious goal to be **climate-neutral by 2050**. Therefore, to achieve the proclaimed target, the European Commission is looking to have by the end of this decade **30 million EVs in the streets** – a massive step from the current 1.4 million EVs. Likewise, out of Europe's **750 billion euros stimulus check** to fight the crisis caused by the restrictions implement to prevent the COVID-19 transmission, **20 billion euros** is solely to boost the sales of clean vehicles. Moreover, 1 million electric stations are **planned to be implemented by 2025**.

- **United States**

The United States is the third market with the biggest share when it comes to EVs with a weight of 10.7% and an expected 11.6% in 2021. From 2018 as expected, the market share dipped from 14.5% to 10.7% due to the increasing position of China in the market, plus in great part explained by the declining popularity of plug-in EVs and the decreasing incentives of federal tax credits related to the most popular EVs within the sector during the period. Thereby, as a reflection of this, around **230,000 EVs were sold in 2020, a reduction of 3.2% from 2018**. Nonetheless, even though the US was not as successful as Europe and China regarding the penetration of EVs concerning the automobile industry, we are convinced there will be a turning point for the country. Thus, our model predicts a **CAGR of 63.45% between 2020 and 2025** and a **CAGR of 20.63% at a steady state**. The sudden switch in trajectory is mainly motivated by the change of government, with the Biden administration having a much different approach when it comes to clean energy. This new government is very keen to incentivize EVs sales as part of the projected \$555 billion investment to combat climate change. Additionally, the rise of clients' awareness combined with upgrade technology and availability of a greater variety of models also contributed to such an environmental shift.

²³ Source: Elbil 2021. Norwegian EV policy. <https://elbil.no/english/norwegian-ev-policy/>

Comparable Companies

Tesla

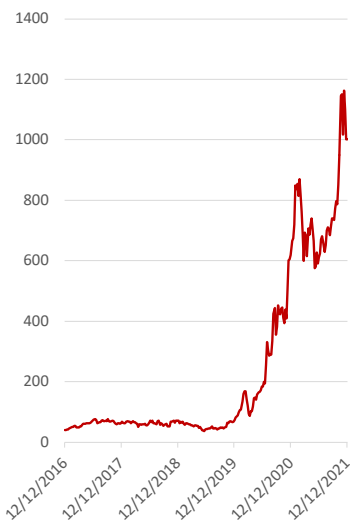
Exhibit 27: Biggest companies across the world by market cap

Apple	\$2.883 T
Microsoft	\$2.548 T
Alphabet	\$1.941 T
Saudi Aramco	\$1.865 T
Amazon	\$1.719 T
Tesla	\$970.52 B

Tesla, Inc²⁴ (TSLA) was founded in 2003 in California and is a well-known car manufacturer in the premium electric vehicle segment, with an attractive portfolio of sedans, namely the Model S and the best-seller Model 3; and sport utility vehicles (SUVs), namely the Model X and Model Y. The American automaker also operates in the energy generation and storage sector with products like Powerwall, Powerpack, and Megapack at their disposal.

Tesla is currently the EV industry leader in terms of market share, having sold **500,000 electric vehicles in 2020**, which represents 22% of the total global EV deliveries. However, if we consider the automotive sector as a whole, including ICEs and EVs, Tesla’s market share is not even close when compared to the big and mature players like Volkswagen, Toyota, and General Motors. These three powerhouse OEMs aggregated market share surpassed 30% in 2020 (25 million vehicles delivered), **while Tesla’s 500k units represented just 0,6% of the world’s total deliveries**. However, due to strong recent earnings and growth prospects, the bullish environment surrounding TSLA’s stock skyrocketed, raising more than **1000% since the beginning of 2020**, trading from a low \$100 per share in January 2020 up to \$1000 per share in late 2021. This made Tesla not only the most valuable automaker but also the 4th most valuable company in the world, with a current market cap of over \$1 trillion. Only Apple, Microsoft, and Amazon are worth more than the EV automaker, which is astonishing.

Exhibit 28: Tesla’s share price since 2016 (\$)



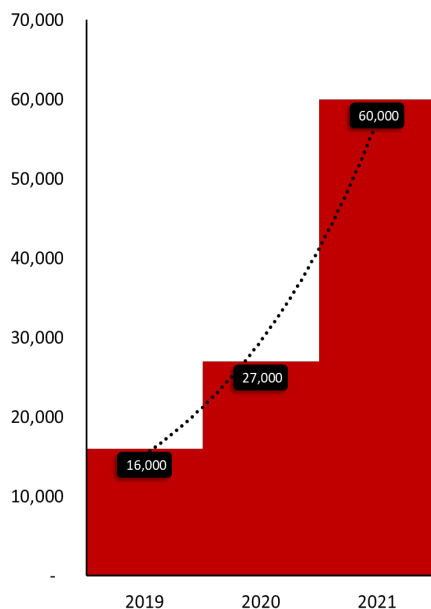
Although Tesla is a much bigger and matured EV automaker than NIO, which currently trades at a **\$70 billion valuation**, both automakers share many similarities: 1) compete on the same premium EV market; 2) have similar business models (reduced portfolio of EVs, composed by less than 5 sedans and SUVs); and 3) similar future plans related to the automotive mass-market penetration, with both companies planning to **roll out cheap \$25,000 EVs by 2024**. The main difference besides their size regards their charging offerings, as already discussed before, with Tesla relying on traditional rechargeable battery solutions whereas NIO relies on battery-swapping ones.

Xpeng

Xpeng is an automotive start-up founded in 2014 in the city of Guangzhou, China, that manufactures and sells premium electric vehicles²⁵. Just like NIO, Xpeng

²⁴ Source: Tesla 2021. *Tesla’s mission is to accelerate the world’s transition to sustainable energy.* <https://www.tesla.com/about>
²⁵ Source: XPENG 2021. *About XPeng Motors.* <https://en.xiaopeng.com/about.html>

Exhibit 29: XPENG's vehicles deliveries in the last 3 years (units sold)



launched its first electric SUV, the G3, back in 2018, and now has two additional EVs in its portfolio, both electric sedans, the P7 and P5. The automaker also provides several other services, such as maintenance, charging, ride-hailing, leasing services, etc, and is currently running towards the development of advanced autonomous driver-assistance systems (ADAS), some of which are already included in their latest model, the P5.

Regarding Xpeng's financials, just like the majority of EV start-ups, revenue growth has been tremendous, with deliveries doubling year by year from **16k units in 2019, to 27k in 2020, and over 60k units in 2021**. However, similarly to NIO, Xpeng hasn't been profitable yet, mostly due to high investments made in R&D and CapEx. Still, expectations remain high for the automaker in terms of future growth expectations within the EV industry: 1) a 3rd manufacturing plant has recently been acquired which generates 100k additional units per year for the automaker; and 2) an expansion plan towards Europe is being undertaken, with Xpeng having shipped its first P7 sedan to Norway last August, curiously just as NIO did.

As to Xpeng's valuation, most analysts believe Xpeng's stock is currently underpriced along with many other Chinese companies²⁶ who have been facing the same economic uncertainties surrounding Evergrande's crisis (more on this below in chapter "2.5. Risks"). Such uncertainty reflects the recent volatility of Xpeng's, with a 52-week high of \$75 and a 52-week low of \$22. NIO, on the other hand, has ranged similarly, from \$30 to \$66 in the past 52 weeks. Nonetheless, Xpeng continues to trade at a high market cap when compared to other companies within the automotive industry. For instance, **Xpeng's \$50 billion valuations** is just half of what General Motors trades for (\$90 billion). This clearly shows how far the bullish speculation towards EV specialists like Tesla, NIO, Xpeng, and Li Auto has gone, which in our view is expected to continue, given the tremendous upside potential the EV industry has to offer.

²⁶ Source: Bears of Wall Street. Seeking Alpha 2021. *XPeng: Leader Of Chinese Vehicle Electrification Efforts*. <https://seekingalpha.com/article/4438413-xpeng-leader-of-chinese-vehicle-electrification-efforts>