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# Assessing the risk to Tesla's market value: towards the share price

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**Abstract**

The report evaluates the risks associated with owning Tesla's stock to provide the investors with an informed investment recommendation. Firstly, Tesla may suffer from the competition undercutting its prices by marketing cheaper models. Secondly, the supply of essential battery components puts the penetration of electric vehicles in Europe and America under considerable pressure. Thirdly, the escalating inflation is scaring investors more than how it is impacting Tesla's financials. Finally, before drawing a comparison between the long-term RONIC and the cost of capital, the report provides evidence on how Tesla can navigate the supply chain disruption better than its legacy competition.

**Keywords**

Valuation, Tesla Inc., electric vehicles, operating risk, stock price

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This report is part of the “The fight for market leadership – The competition intensifies” report (annexed), developed by Marco Zaggia and Gianmarco Zuffranieri, and should be read as an integral part of it.

# *Table of Contents*

# *Introduction*

The following is the second part of a joint report on Tesla Inc., an American manufacturer of fully electric vehicles and energy generation and storage products. Its purpose is to perform a detailed analysis leading to an investment recommendation on the company's stock based on the comparison between the closing price on May 13, 2022, and the implied share price yielded by the valuation model.

The joint report is divided into three sections. First, the operating environment for the Austin-based carmaker is introduced. Second, the focus moves to the company and its main products. Lastly, the primary risks associated with owning the security and the valuation drivers are presented to potential investors.

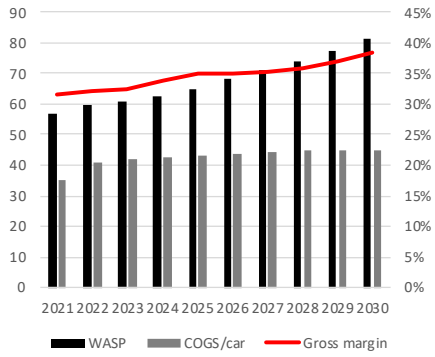
In the first section, the main factors affecting the penetration of electric vehicles into the automotive industry and the primary competitors contending the market leadership are analyzed. Moreover, the upcoming products are presented, and their potential addressable markets are estimated.

In this section, the focus is on the main risks associated with the company's operations and, consequently, how they can affect stock value. Three possible scenarios are evaluated. In the end, the investment recommendation is issued.

## *Prices*

In response to higher raw material costs and **inflationary pressure**, in Q1 2022, Tesla increased the price of all its models in the US by 5% to 10% and by around 5% in China. Being Tesla well positioned to cope with supply chain shortages, we believe it can take advantage of this situation in the short term. Raised prices of metals, palladium, nickel, lithium, and other commodities may delay the plans of traditional automakers that have announced the launch of their electric vehicles. In our view, this will allow Tesla to defend its market share longer. In addition, we believe that those who can afford a Tesla car are not particularly price-sensitive and thus will still be willing to spend 5% to 10% more. Also, they can choose among several models at different price points. Going forward, we expect Tesla not to decrease the price of its currently available models (following the lower cost per vehicle) but rather add cheaper versions and cars to its portfolio.

**Exhibit 1:** Weighted average selling price vs. COGS/car and automotive gross margin
**Source:** Own analysis




Tesla's **weighted average selling price** before incentives almost aligns with the EV industry's mean, and it follows a sector-wide upward trend. This signals that customers consider EVs as high-end products, although their manufacturing cost has decreased. Including all types of vehicles, the average transaction price stands at around $46.000, or 36% less than the electric vehicles. The lower cost of ownership associated with lower fuel and maintenance costs does not offset the price difference yet. Hence, it is not a convincing enough argument for switching to an electric car. From a customer perspective, it is expected that the price-parity with internal combustion engine vehicles will be reached in 2025 when batteries will become cheaper. Tesla reports a **total cost of ownership** (TCO) of $0,62 per mile for a Model 3 RWD, considering 60.000 miles over five years product lifetime. This number compares to almost 85 cents per mile for a BMW Series 3, whose price is comparable. Also, the current price differential between EVs and ICE cars is $16.500, and the savings resulting from the lower cost of ownership are $13.800 ($0.85-$0,62 times 60000 miles). Moreover, because depreciation is a significant component of the TCO, it is still cheaper to own an ICE with a price tag of around $30.000. For example, the Toyota Camry, the best-selling sedan in the US, costs approximately 50 cents per mile.

***Savings from owning an EV do not offset the price differential of $16.500 yet***

So far, the pricing strategy has appeared to be successful and effective, as demonstrated by the leading positions occupied by Tesla's vehicles among the top-selling electric cars in the first quarter of 2022. Going forward, we expect that Tesla's vehicles will become more expensive than the industry average as established carmakers will introduce new cheaper models. In our view, the delays in marketing the $25k model will limit the delivery growth in the second half of the decade.

## *Cost of vehicles sold and Gross Margin*

As reported by Tesla, the average cost to manufacture a vehicle is **$36.000**. The most expansive component is the battery cell, although its cost has constantly decreased over the last years thanks to technological advancements and larger volumes. The high cost of batteries prevents the mass market from affording an electric vehicle, which is the whole purpose of Tesla's existence. Among all the costs associated with battery cell production, the most expansive component is the cathode (35% of the total cost), which contains all the materials that determine the cost, lifecycle, safety of the battery, and the

***The COGS breakdown to change due to improvements in battery technology improvement and changes in the product mix***

**Exhibit 2:** Lithium-ion battery manufacturer market share
**Source:** Own analysis

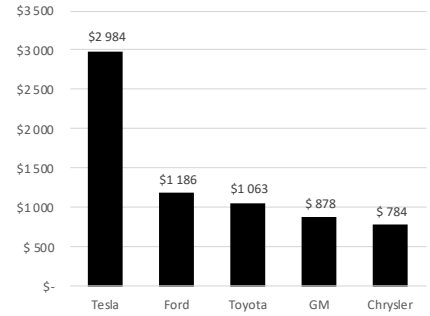

range of the car. We expect the COGS/vehicle to increase due to the supply issues that the electric automotive sector is suffering in the short term. However, going forward, the fact that Tesla is constantly vertically integrating activities into its value chain is likely to cut the cost associated with car manufacturing. The EV maker has secured partnerships with trusted suppliers, but it is also working on expanding its in-house battery production. Since other car manufacturers outsource batteries from established suppliers like **Panasonic**, **CATL**, and **LG**, scaling up in-house production is vital to maintaining a competitive advantage. Together with larger in-house battery production volume, these two drivers will determine a higher gross margin for the automotive sector. In our forecasts, Tesla will follow an increasing trend and peak at 38% in 2030, up from 31% in the latest reported year. However, it will not be able to sustain that level forever, and in the long term, the automotive gross margin will stabilize at 32%-33%.

These figures are well above the industry's mean, slightly higher than 20%. We attribute this superiority to the fact that Model 3 and Model Y, and Model X and S **share the same platform** and many components. While their price is significantly higher, the marginal cost of adding features to the more expansive versions is almost negligible. Additionally, margins benefit from the **focalization on two lines of vehicles**, SUVs, and sedans. All the other legacy car makers offer a much wider variety of passenger and commercial cars, which may operate at lower margins. One last driver is associated with prices. Contrary to established manufacturers who face competition from millions of vehicles across multiple segments, Tesla is the market leader in a relatively small market where prices are substantially higher. As competition increases and the pressure on the prices rise, margins will deteriorate.

***Vehicles sharing the same platform and focalization on two lines of products are the reasons behind superior margins***

With the demand not being a significant problem for Tesla's vehicles historically, the lack of batteries has been why Tesla has not marketed the new models, namely the Semi, Cybertruck, and Roadster, yet. Following the commercialization of these models, the COGS per car will increase sharply due to their additional complexities mainly associated with the bigger sizes and the more extended range needed (Semi) and/or the enhanced performance (Roadster). The change in the product mix related to the commercialization of new models will radically modify the cost breakdown and the vehicles. On the one hand, the cost related to the powertrain and the battery cell will decrease due to in-house production, the resolution of the global supply chain issues, and finally, the increased production capacity of material components in the United States. On the other hand, software and AI systems and the car body will account for the most significant proportion of the cost.

**Exhibit 3:** R&D expenses per vehicle sold
**Source:** Own analysis




## *R&D costs*

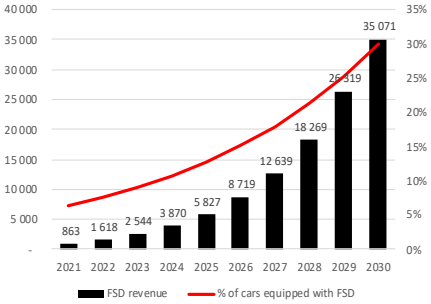
Tesla spends more on research and development per vehicle produced than the established car manufacturers. R&D expenses per car are $2.984, compared to Ford's $1.186, Toyota's $1.063, GM's $878, and Chrysler's $784. On the contrary, with marketing and advertising expenses being almost zero, Tesla is the carmaker that spends less on promotional activities, thus counting on word of mouth and brand awareness to promote its products. R&D expenses are meant to provide clients with the best features possible in a car, especially in terms of technology and safety, and create

a clear sense of differentiation and superiority compared to the competition.

In our estimation, R&D expenses will increase in the following years from the $2.593 reported in 2021, representing a smaller revenue share over time. The main drivers will be:

- **Proprietary battery cells**: Tesla has been working on developing its battery technology that provides the perfect mix between cost and range. These improvements will make EV vehicles cheaper, positively affecting margins while making electric cars accessible to a broader market.
- **Full Self Driving (FSD), autopilot, and artificial intelligence systems**: we believe the FSD and the AI algorithm associated with it to be the main driver of the increase in R&D costs. Tesla's customers pay $12.000 to equip their vehicles with the driver assistance option and then a monthly subscription fee now at $199, which will increase when more features are available. The software component of Tesla vehicles differentiates its cars from most of its competitors while also adding value to the brand. We believe that software is the potential driver of the automotive margin's improvements. Our model forecasted that 30% of Tesla's cars will be equipped with the FSD features by 2030, up from 6% in 2021 when the company ran beta tests. Given the upfront payment and the monthly fee, FSD revenue will be $34 billion in 2030, up from $863 million in 2021. According to these figures, FSD revenue will be even larger than the sales from energy products of approximately $23 billion in 2030.

**Exhibit 4:** FSD revenue and % of Tesla vehicles equipped with FSD
**Source:** Own analysis




The other massive AI-related projects that Tesla is working on are the RoboTaxi, whose launch is expected before 2025.

- **New prototypes**: Tesla has already announced three new models to address three different market segments, namely trucks, sports cars, and pickups. Furthermore, although the R&D team is not currently working on it and will not do so in the next two to three years (at least until the Cybertruck, Semi, and Roadster are marketed), we believe the development of the $25.000 Model will require a considerable effort.
- **Engineering team driving the technological development**: Tesla's ability to scale across new segments and develop reliable autonomous vehicles is dependent mainly on the capabilities of its engineers, who are a pivotal component of the equation.

### *Energy segment*

Tesla's principal source of revenue comes from electric vehicles. However, the company's energy storage and solar businesses have grown in recent quarters. Tesla's energy generation and storage unit generated $2,789 million in revenue throughout 2021, mainly due to its Powerwall and Megapack unit storage devices for homes and businesses. Revenues from the segment have grown more than 32% from 2020, contributing to above 5% of the total income in 2021. Moreover, we see these numbers grow steadily towards 2030 at a CAGR of 27%. In our view, the energy storage industry is predicted to be driven, in the future years, by factors such as the rising renewable energy sector, favorable government policies, schemes for energy storage systems (ESS), and better energy storage economics. As far as the global energy storage market is concerned, numbers have been increasing at the fastest pace for the last three years, reaching a market value of USD 10.37 billion in 2020 and a growth prediction of USD

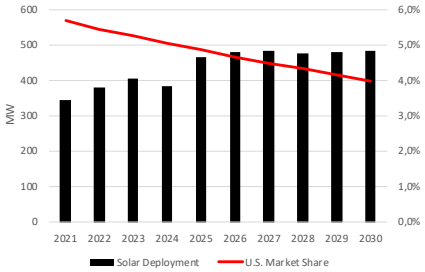
**Exhibit 5:** Tesla's energy segment revenue
**Source:** Own analysis

37.06 billion by 2027, at a CAGR of 19.9% over the forecasted period (2022 – 2027). After a dismal 2019, when installations failed to climb for the first time in a decade, battery storage capacity additions in 2020 increased by 50% to a record-high of 5 GW.

***MW of solar energy generation***

Renewable sources of energy are responsible for around one-third of electricity generation worldwide. Wind and solar photovoltaic systems account for most of it. Solar power accounted for 7% of US electricity generation in 2021[1]. However, this percentage is increasing every year. In 2021, 23.6 GW of solar capacity were installed within the US, representing 46% of all new electricity-generating added capacity. The willingness to reduce the dependency on fossil fuels, supporting policies and incentives, and more favorable economics will make solar energy more affordable and, thus, attractive. Exceptionally high prices of natural gas resulting from the Ukraine invasion will also accelerate the adoption of renewables as a source of electricity. In this context, the 345 MW deployed in 2021 gave Tesla a 5.7% market share in the North American residential and commercial markets. For four years after the acquisition of SolarCity in 2016, Tesla solar quarterly deployments have followed a downward trend until Q2 2020. Since then, Tesla's solar segment has struggled to regain market share and get back to an installation level even close to the quarterly record of 272 MW in Q4 2016.

**Exhibit 6:** Solar deployment in MW and Tesla market share of energy segment
**Source:** Own analysis




***Solar segment not to expand in the future as utility-scale solution are not part of Tesla's energy product portfolio***

Since Tesla does not operate in the utility sub-segment, our forecasts focus only on the residential and commercial installations, which account only for a tiny fraction of the total solar annual additions. We believe that the Austin-based company will not be able to expand its solar business considerably since it is not present in the largest segment within the solar market, the one associated with utility-scale additions.

The $2 per watt that Tesla charges on average for the solar products (depending on the size of the installation and excluding the battery) gives Tesla a price advantage over the competition. Including the Powerwall, which is often paired with Solar Panels and Roof, the price of Tesla's panels ranges between $3.18 and $2.18. The average price per watt in America in 2021 was $3.24[2]. We believe that, albeit at lower prices, Tesla will not be able to gain a significant market share in the US residential and commercial market. Also, according to our estimations, Tesla will not go back to the level of quarterly deployments before the acquisition of SolarCity. In light of the material shortage, Tesla will focus on expanding the automotive and storage business. We do not detect any other competitive advantages other than lower prices that would justify Tesla operating at a higher gross margin than its peers, at around 18%.

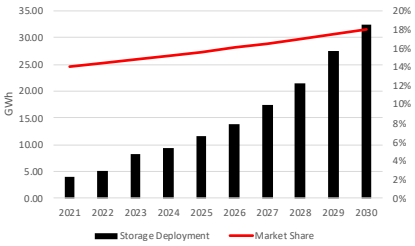
***MWh of energy storage***

Investments in renewables are the primary driver of the growth of energy storage systems (ESS). With the electricity sector planned to be, to a large extent, powered by renewables by 2035, energy storage systems are needed. These batteries allow for storing electricity and thus address wind and solar PV output variability.

Like electric vehicles, the support for energy storage systems will come from governments and their commitment to the climate goals. Policies are already in place

[1] EIA - US Energy Information Administration
[2] Wood Mackenzie, 2022, "Is the end of high US solar system prices in sight?". https://www.woodmac.com/news/opinion/is-the-end-of-high-us-solar-system-prices-in-sight/. Accessed: April 20, 2022.

**Exhibit 7**: Storage deployment and Tesla market share of energy storage segment




in US and China, and several projects have been announced in the major economies worldwide. Australia, for example, is an important end market for Tesla energy products. During the first months of 2022, the company secured two agreements with local partners for 500 MWh. Tesla alone installed 3.92 GWh in Q1 2022, mainly thanks to the *Elkhorn project* in California (256 Megapack for 730 MWh). Europe, instead, is lagging due to the lack of policies and incentives.

We estimated the energy storage industry to grow at a CAGR of 19.6% through 2030, thus reaching annual additions of 180 GWh of storage capacity. This number compares to the 28 GWh deployed in 2021[3]. The 3,92 GWh deployed last year gave Tesla a market share of 14%. We expect this to stand at 18%, driven by the increased capacity following the opening of the Megafactory in Lathrop, California, whose construction started in late 2021. The facility will be exclusively dedicated to energy storage products and should produce 40 GWh each year.

***Utility-scale additions, addressed by Megapack, is the largest and fastest-growing segment within the energy storage market***

We believe Tesla's energy segment will continue to expand slowly until the plant's opening in Lathrop. After launching the energy segment in 2015, Tesla has been focusing on building up capacity for the automotive segment and has dedicated most capital expenditures to its more profitable business. Consequently, the production and delivery volume of the energy products is not big enough for Tesla to operate profitably in this segment. In 2021, Tesla reported a gross margin of -4.6% in the energy segment. As volume expands and Tesla scales up the energy storage segment, we expect the gross margins to align with the ~30% industry average. We do not believe Tesla to outperform its peers in the energy segment since we do not identify particular competitive advantages.

In our view, Tesla will prioritize the Megapack, the energy storage solution intended for utilities and large companies, to drive the growth of the energy business. This would be aligned with how the industry distributes the MWh deployments between utility-scale and residential installations, with the first accounting for around two-thirds of annual additions.

### *Operating margin*

Following the trend observed in recent years, we believe the operating cost associated with personnel-related to stores, marketing, finance, IT and legal services, and respective facilities to decrease relative to total revenue. Although the headcount (excluding the engineers, who are included in the cost of goods sold) will increase to support the growth of the company in the current and new locations, Tesla will realize sizeable economies of scale (from volumes) and scope (from the variety of models). The decremental weight of depreciation, R&D and other operating costs will benefit margins, too. Following the improvements mentioned above in the gross margins, we forecast Tesla to achieve and maintain a 27% operating margin from 2030 onwards.

***Operating margin to achieve benefit from economies of scale and scope and stabilize at 27% in the long term***

# *Risk assessment*

[3] Wood Mackenzie, 2021, "The growth and growth of the global energy storage market", https://www.woodmac.com/news/opinion/the growth-and-growth-of-the-global-energy-storage-market/. Accessed April 5, 2022

Tesla is facing pressure coming from multiple sources. The supply chain issues, which the company has claimed to suffer over the last couple of years, have been exacerbated by Russia's invasion of Ukraine starting on February 24, causing some disruptions in the sourcing of essential components of electric vehicles, such as minerals and semiconductors. Specifically, Ukraine is responsible for around half of the world's neon production. At the same time, Russia exports a large share of the global production of many commodities essential for EV manufacturing, such as 45,6% of palladium, 5,3% of nickel, and 4,2% of aluminum.

Additionally, the EV and energy industries have a massive supply problem when sourcing battery materials, such as lithium, nickel, cobalt, and copper. Their demand is considerably outstripping the available supply, thus preventing the market from booming. If not solved soon, this material shortage will likely represent a bottleneck to the electrification of the automotive industry, thus adversely affecting the ability of Tesla to meet its growth goals, especially in the long term.

### *Inflation*

***Investors fear inflation more than how Tesla's deliveries and margins are affected, as customers are not price-sensitive***

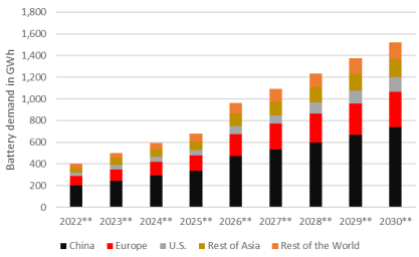
Previously in the report, we mentioned that Tesla has already increased prices for its vehicles to incorporate rising raw materials and commodities costs following the inflation. However, we believe this to be a temporary situation relatively affecting Tesla's deliveries. Customers have not appeared to be particularly price-sensitive despite increasing prices during the last months, and neither sales nor margins have suffered.

In contrast, the same does not apply to Tesla's stock price, which has dropped more than the overall market consequently to recent events within capital markets, suggesting that investors fear escalating inflation. From deliveries to margins, Tesla's fundamentals have all but worsened, and we assess this negative sentiment as not justifiable.

### *Supply chain - Batteries*

The cost of the battery accounts for around 30% of the total cost of an electric vehicle. The material components represent a sizeable share of the cost of a battery, which makes recent cost spikes a legitimate concern.

**Exhibit 8:** Battery demand in GWh by country
**Source:** Own analysis




The American electric vehicle industry faces a battery shortage mainly because East Asian companies have dominated the market for batteries for years. Consequently, there is not enough local battery production to support the electrification plans of most traditional automakers and the growth of EV manufacturers. However, Tesla sits in a favorable position thanks to its long-lasting relationships with leading battery makers such as **Panasonic** and **CATL**.

***Two percentage points in automotive gross margin are on the line if $/kWh increases rather than following the expected downward trend***

We expect Tesla to considerably benefit from reducing the cost per kW/h and an increased average battery capacity. Combining the two effects will determine a lower battery cost in absolute terms and as a percentage of the total COGS. The cost per kWh of BEV packs in 2021 stood at $118, down 917% from the $1.200 in 2010. Recent raw material price surges offset the effect of technological advancements and increased volumes. Hence, we forecasted 135 $/kWh for 2022 and $120 for 2023. The impact on the gross margin is quite significant: by keeping the cost per kWh constant to the 2021 level rather than $135 as forecasted, the margin would be two percentage points higher. As a result, battery prices will rise, profit margins will be slashed, and the coveted $100

per kWh battery, which would have signified the coming of inexpensive green vehicles, will remain on the drawing board. We expect the industry to break down the $100 per kWh threshold in 2025.

Furthermore, our forecasts align with management expectations of achieving a cost per kWh of $60 in 2030. The other player who set this goal is Volkswagen, while Ford and Renault have planned an $80/kWh target. Hence, according to our estimations, Tesla can also be a leader among automakers in battery technology.

Five factors will determine a lower cost per kW/h:

- **In-house battery manufacturing**: Tesla aims to produce 3TWh by 2030, and although this figure seems irrational, at its average car's battery capacity of 75 kWh, it will need 450 GWh to power the 6 million vehicles forecasted; already in 2020, Tesla had an annual production capacity of 100 GWh which would be enough to power 1.3 million cars.
- A **new cell design**, namely the 4680, which can hold five times the energy of the current 2170 cell.
- A **new pack design.**
- An **improved manufacturing process,** called dry electrode coating.
- **Low-cost chemistry,** resulting in a new type of cell (the lithium iron phosphate or LFP) and chemistries high in nickel and rich in manganese.

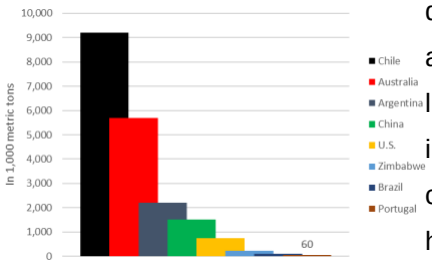
  Finally, the **battery recycling industry** can play a significant role, especially in the US. We expect its expansion to determine additional improvements for battery economics. Since the refining industry is not as developed as in Asia, we believe that this expansion could be rapid, especially in the US. The Biden Administration recently announced a plan to invest $3.1 billion to strengthen the battery supply chain and recycling industry. At the same time, it is worth mentioning that an ex-Tesla executive has founded a battery-recycling start-up named Redwood Materials, which Amazon backs.

***Refined lithium shortage risk***

Lithium is the most crucial component of the battery cathode. Lithium-ion batteries will have the largest share in the battery market due to low maintenance, lightweight, long cycle life, high energy density, and high charge/discharge efficiency.[4] Although there is a massive stock worldwide, its price has spiked recently following the increased demand. The United States has almost 8 million metric tons of reserves, placing it among the top five countries for lithium availability. However, there is only one operating lithium mine in the country. Given the poor development of the lithium refining industry in America, a possible primary concern for Tesla's investors is the likelihood that the company may or may not absorb the rising costs of batteries, probably leading to a higher-than-expected growth of its products' prices.[5]

Furthermore, the problem lies in the fact that China, which is still dealing with lockdowns associated with the pandemic, almost monopolizes the lithium refining industry. Hence,

**Exhibit 9:** Lithium reserves by country
**Source:** Statista and own analysis




[4] Mordor Intelligence, "Energy storage market – growth, trends, covid-19 impact, and forecasts (2022-2027)". https://www.mordorintelligence.com/industry-reports/energy-storage-market
[5] Neil Winton, 2021, Forbes. "Lithium shortage may stall electric car revolution an embed China's lead." https://www.forbes.com/sites/neilwinton/2021/11/14/lithium-shortage-may-stall-electric-car-revolution-and-embed-chinas-lead-report/?sh=7bac65f846ef

***Lithium shortage is caused by lacking refining technology rather than availability itself***

the supply cannot satisfy the need of electric carmakers and storage system manufacturers. Several battery producers plan to build factories outside China to diversify their locations. Since it will take quite some time, we believe the constraints associated with lithium persist in the near term. As mentioned, our model reflects this with an increased $/kWh cost of batteries in 2022 and 2023 compared to 2021.

With lithium prices expected to climb over the next decade if supply does not expand, the electric vehicle and energy sectors will contend with escalating battery costs. These industries in the West will come to a halt if the supply of critical battery materials such as lithium fails to keep pace with the expected surge in demand.

According to experts, the conversion procedures required to generate usable lithium have constraints. Plants take years to achieve volume capacity, and this, along with rising demand, implies that supply will remain scarce and prices will remain high. Thus, the storage deployment segment will likely accelerate slower than initially projected if they pass expenses on to the consumer.

#### *Nickel*

Nickel is one of an EV battery's most critical material components because a higher quantity translates into a higher energy density.

***With nickel supply chain being disrupted by the Ukraine-Russia war, Tesla secured deals to source from American and Canadian mines***

The recent **Russian invasion of Ukraine** has jeopardized the global supply of nickel while also spiking prices up to the point where the London Metal Exchange had to suspend its trading on March 8 for more than a week. Russia is the third-largest nickel producer, and the uncertainty associated with the war has forced automakers to look for alternative sources of nickel. Tesla is setting up a local supply chain for nickel, and in our view, local sourcing will be crucial for Tesla to keep up its battery production. Tesla has recently secured a deal with ***Talon Metals***, which, together with the mining giant *Rio Tinto*, has been working on a mining project in Minnesota. The agreement comprises 165 million lbs of US nickel with a nominal value of $1.5 billion over six years. With the *Eagle Mine* (the only one running today) in Michigan closing in 2025, the project represents the only future source of American nickel. The agreement with Talon is not the only one on the table. Tesla has agreed with ***Vale SA***, a Brazilian mining company, to supply Canadian nickel for a multi-year period.

### *Geopolitical risk*

***With each car needing 63kgs of lithium, Tesla used around 58.000 metric tons worldwide***

In the final three months of 2021, US lithium-ion battery imports totaled 320.360 metric tons, up 137% from a year earlier and 24% from the previous quarter[6]. The leading US suppliers are located in China, which accounts for 80% of US lithium-ion battery imports, up more than 30% from the same period in 2020, stressing the dependence on foreign countries. Tesla's investors have to look at possible cost increments and lack of resources closely. Geopolitical risks could impact America as a whole that might create selling pressure within the financial market without a proper solution plan for the production of the raw materials.

It is particularly relevant for the medium- and long-term success of Tesla to have solid relationships with the Chinese government and suppliers because they play a pivotal

[6]Hering, G., 2022. "US lithium-ion battery imports surge as auto, energy sectors race to meet demand". Morningstar. https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/us-lithium-ion-battery-imports-surge-as-auto-energy-sectors-race-to-meet-demand-69048550. Accessed: 17/05/2022.

***China controls 60% of the refining industry of critical battery components but Tesla has good relationship with government and suppliers***

role in the global EV and energy product supply chain. Half of the world's lithium is processed and refined in China, which also controls 80% of the cobalt refining industry, and 60% of the world's battery component manufacturing. It is worth mentioning that Tesla is the only non-Chinese car manufacturer to secure the authorization to build a factory and start the production of its cars without a local partner. The government requires foreign car manufacturers to establish a joint venture with or be a subsidiary of a Chinese auto company to operate. For example, Ford, Suzuki, Mazda, and Stellantis partner with Chang'an, while Mercedes-Benz and Hyundai are with BAIC. This points toward the good relationships between Tesla and Chinese institutions, which will play a decisive role in the penetration of Tesla into the largest market for EVs globally. Having these long-lasting partnerships in place and being less exposed to geopolitical risk in China, Tesla seems to have the supply chain problems figured out better than other competitors.

### *Supply chain - Semiconductors - Ukraine's invasion*

***Tesla is exposed more to chip than battery material shortage***

The COVID-19 pandemic had initiated a global semiconductors supply chain crisis when suddenly, the demand for electronic devices surged as people were confined at home. The recent invasion of Ukraine by Russia has exacerbated the problem. Two Ukrainian companies, namely *Ingas LLC* and *Cryoin Engineering LTD*, are responsible for half of the global supply of neon. **Neon** is a crucial material used in 75% of the lasers that etch circuits onto semiconductors. Palladium is another fundamental component of semiconductor chips, and Russia is responsible for 45% of global production. We believe the chip shortage will persist in 2022, resulting in delays and higher prices.

Semiconductors are crucial for electric vehicles functioning, and the larger the software component in a car, the more chips are needed. Projections about the semiconductor industry show that the automotive sector will take over personal computing as the third largest industry by chip application by 2030, only behind smartphones and data centers. As a result of the recent events in Eastern Europe, the European Union and local governments promote further regulations to incentivize the purchase of electric vehicles rather than traditional combustion-powered cars. A favorable scenario that will likely result from the Ukraine invasion that Tesla can considerably benefit from, especially after the opening of Giga Berlin, is the acceleration of the transition to sustainable energy sources in Europe. As things stand, Europe is largely dependent on Russian oil and gas.

## *Other risks to Tesla's investors*

### *Twitter's buyout by Elon Musk*

***Investors on Tesla proved to be largely sensitive to news about Musk dedicating less time to the company***

Tesla has historically demonstrated to be heavily dependent on its CEO Elon Musk, whose ambitions and vision have driven its massive growth. From this perspective, Twitter's buyout might represent a turning point for the Austin-based company. On the day of the announcement, Tesla shares dropped 12%, suggesting that a considerable part of its market value derives from the role and the active presence in the company of its CEO and *technoking*. That said, we believe that Musk may consider Tesla mature enough to scale even relying less on its leader, which is certainly a positive aspect.

Musk dedicates considerable time to other companies already, such as The Boring Company, Space X, and Neuralink, and, therefore, time allocation should not be a primary concern of Tesla's investors. They should also consider how the relationship with the Chinese government might change. If, until now, Tesla has proved to have solid liaisons with China, Twitter's acquisition might put them at risk, given that the country banned the social network. Alternatively, it might strengthen them since the Communist Party's leaders might get the chance to benefit from the *free-speech* policy and make its political propaganda.

# *Coping with the main risks*

### *Vertical integration*

***While vertical integration was perceived as a bottleneck, it is behind Tesla's ongoing and future success***

Although affected and constrained by them, Tesla has demonstrated to cope with supply chain challenges better than the competition. The almost tenfold increase in deliveries between 2019 and 2021, while the entire automotive market was free-falling, confirms this statement. We believe that **vertical integration** is behind Tesla's resilience. The insourcing strategy initiated years ago with battery production proved successful, and other legacy carmakers launched their projects to enhance control over the supply chain. Such a strategy was perceived as a potential limitation to expansion goals because of the involvement in many activities. The strategy implies sourcing raw materials directly from mining companies, controlling the manufacturing process from the design to the production, and finally selling to customers skipping the dealerships. Today and in the future, Tesla will most likely capitalize on the control over battery production and software development. This will be one of the main factors enabling Tesla to keep its prominent position in the EV market in the years ahead.

### *Localized sourcing and reverse globalization*

Opening several plants across multiple regions expands the production capacity and network of local suppliers close to the factory itself. If Giga Shanghai is in the most fruitful area for battery materials, Giga Berlin grants Tesla access to top-level engineers.

***Salton Lake in California holds enough battery-grade lithium to meet the entire world's demand***

Furthermore, we believe that Tesla is less exposed to battery global supply chain disruptions and geopolitical risk. That is because, over time, it located its operations in a few selected locations. In particular, Australia, Argentina, and the Democratic Republic of Congo are the source of most lithium, nickel, and cobalt as per Tesla's Impact Report. At the same time, China, together with Australia, is responsible for the refining processes. Additionally, the vast stock of lithium at Salton Lake, California, may serve the purpose of locating mining and sourcing closer to production facilities while reducing the dependency on China. While the annual demand stood at around 500.000 metric tons in 2021, the lake could provide the industry with 600.000 metric tons of battery-grade lithium annually. It has not been exploited yet because of the lack of extraction technologies capable of working at scale.

### *Long-term contracts*

It is part of Tesla's strategy to secure long-term contracts with the suppliers of critical raw materials. It established a partnership with **Panasonic** in 2009. The Japanese

conglomerate only provides batteries to Tesla in the United States, where it also partnered with the EV maker in the battery production equipment at Gigafactory Nevada in 2014. Furthermore, in February, Panasonic announced that it will invest $700 million to begin producing for Tesla the 4680 battery cells starting as early as 2023, after expanding its manufacturing facility in Japan for a total energy output equivalent to 150.000 vehicles. Under the agreements with the Japanese company, Tesla will purchase the entire production at pre-determined prices.

Tesla relies heavily on the Chinese Company **CATL**, the world's biggest electric vehicle battery manufacturer. In June 2021, the two companies extended the partnership deal until December 2025. Tesla will be supplied with the battery cells needed for the Model 3 and Y made in the Gigafactory Shanghai.

# *Valuation outcomes*

### *Return On Invested Capital and Cost of Capital*

***Return on capital invested is closer to software industry's average than to automotive's***

Our model yields a **27%** long-term RONIC for Tesla's core business, above the automotive average and closer to the mean of the software sector (~25%). We are confident in the ability of Tesla to defend a sizeable share of the competitive advantage that has been built over time. We believe this value to be sustained by some drivers. First, Tesla is an iconic brand in the electric vehicle space whose strength mainly derives from being the first mover. Innovation and quality are immediately associated with the name. Together, these two factors create the perception of superior value in customers' eyes. Ultimately, this translates into a higher customer willingness to pay. Second, Tesla is entering new markets where the marginal cost of adding customers is almost negligible. This is the case with the RoboTaxi business and the Full-Self-Driving features. In our view, they will be considerably more prominent than the Energy and Service segments. Also, compared to traditional automakers, the extensive software component inside the vehicles enables higher gross margins, significantly above the industry's mean. Compared to legacy carmakers, gross and operating margins are considerably higher, which is again attributable to the high level of innovation that Tesla brings to the market.

***Tesla holds considerably more operating risk than any other legacy carmaker***

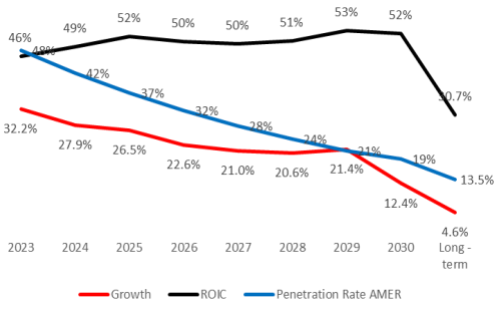
Tesla cannot be considered as any other traditional automaker when it comes to assessing its risk. Its cost of capital, which we estimated to be **9,71%**, is around three percentage points above the industry's average. This is attributable to two main reasons. First, the Austin-based car company is not mature yet, and its performance still depends heavily on external factors. The higher cost of capital reflects our belief in how controversial the stock is from an investor's perspective. Although we are confident in the ability to establish itself as a prominent player in the market, Tesla is still in a ramping-up phase, which makes it all but predictable. Second, contrary to its competition that can offer internal combustion vehicles, if the electric car market slows down, Tesla cannot provide customers with alternative products, and sales will shrink.

### *Scenario analysis*

We created three scenarios to test how the price of Tesla's stock can change. They relate to the penetration rate of electric vehicles in the automotive sector following the

plans of central governments, stating that some percentage of cars sold annually must be electric.

**Exhibit 10:** Tesla's forecasts – Base case scenario.
**Source:** Own analysis




1. The **base case**, which we believe is the most likely to happen: the penetration rate of EVs in AMER, EMEA, and APAC is 35%, 40%, and 45%, respectively. This scenario implies an implied share price of $1,313. It is worth mentioning that this case is already underestimating the ability of the electric automotive industry to penetrate at a level close to governments' announced goals. Major causes of these underestimates come from the supply chain constraints, lack of charging infrastructure, and macroeconomic environment. We believe that the governments will not reach their goals as planned. However, our considerations on the market suggest that semiconductor shortage and lack of battery manufacturing capacity will recover in late 2022/2023 due to considerable flexibility adjustments of the automotive industry towards these problems. EV manufacturers will rapidly redesign old products to reduce or eliminate exposure to component shortages, removing non-essential features, alongside the construction of new production factories and the securitization of the most critical raw materials employed in daily operations. We see Tesla's core ROIC consolidating at 31% in the steady-state in this base case scenario. Our conclusions for this scenario refer to a higher-than-expected growth of vehicles' revenue but with global macroeconomic concerns that will hinder government spending on the EV market.

2. The **optimistic case** will occur if governments accelerate supporting policies and infrastructure development: the penetration rate of EVs in AMER, EMEA, and APAC is 50%, 50%, and 55%, respectively. This scenario implies an implied share price of $1,493. In our view, this is the most plausible optimistic scenario given the current economic constraints and the government's effort toward the growth of the EV market. We prospect China as the leading country in this market, with 30 million vehicles sold in 2030. The US will almost catch up in terms of the penetration rate, and we see Tesla's US market share stabilizing at 19%, which, in our view, will still guarantee the leadership of the company in America. We believe that this scenario will occur if certain circumstances arise: more robust infrastructure, federal tax credits for EV buyers alongside the reduction of vehicles' price, and, lastly, greater initiatives for the reinforcement of battery manufacturing.

3. The **conservative case**, which we believe will occur if the supply chain challenges are not solved soon, primarily affecting the EU and the United States, together with delays in the development of the charging infrastructure: the penetration rate of EVs in AMER, EMEA, and APAC is 30%, 35%, and 40%, respectively. Our projections see electric vehicle global sales shrinking 12% compared to the base case, and 150 basis points less for the CAGR of the penetration rate. This scenario implies an implied share price of $1,241. We consider the pessimistic scenario to be relevant from the investor's perspective, also given the current global macroeconomic and geopolitical events. In our view, there might be chances of rebounding issues in the medium-term future due to the current international

events that are leading companies to struggle.

Moreover, the conservative scenario would imply a slower than expected slowdown of inflation during the next years, thus impacting the batteries' price per KWh, which, in our view, will not pass the threshold below $100 as in the base case. We do see very few chances for this scenario to happen. However, if this occurs, significant risks to the general operating environment would cause a massive change in the way companies do business, mostly leading to the disruption of Tesla's company valuation in the medium term rather than in the short one.

# *Investment Recommendation*

All in all, we are confident that Tesla will become a prominent player in the automotive industry while expanding fast-growing and high-margin businesses such as the Full-Self-Driving features and the RoboTaxi service, which will boost the company's growth in the longer term.

***Markets being in the midst of an extended sell-off since mid-April justifies the low reference price and the high return***

As of May 13, 2022, Tesla's stock closed at $769.59, down 33% from April 19, when the price was $1,028. Over the same period, the NASDAQ Index moved down 15%. Since then, a lot has happened in the market. First, the evolution of the supply chain is all but certain in light of the Ukraine-Russia war and lockdowns in China. Second, investors have demonstrated to fear Musk dedicating less time to Tesla after the announcement of Twitter's buyout. Lastly, the whole market is falling following the interest rate increase by the Federal Reserve to fight inflation, which adversely affected all tech stocks. In our view, this points toward the negative sentiment in the whole stock market rather than specific concerns over Tesla's ability to grow in the future. Merely from a value perspective, the strategic and financial performance suggests positive evolution for the security. Our valuation model yields a target share price of $1,313 on December 31, 2022, providing investors with an annualized return of 150%.

***The market is overestimating the impact of inflation while underrating the ability to navigate the supply chain shortage***

In our view, the market is not correctly assessing Tesla's future potential. The Austin-based carmaker has proved to be resilient to the recent adverse events, and deliveries increased tenfold during the pandemic. Hence, we believe that the investors' concerns over Tesla's ability to cope with the supply chain challenges in the future are justifiable only in part. The power of brand awareness and the vertical integration strategy will offset the inflationary pressure in the short term. Moreover, although their massive investments, peer companies are not ready to take over Tesla as the market leader shortly. Also, we believe that the stock market is underestimating the possible implication of Ukraine's invasion. Despite, in the short term, the semiconductor shortage (which Tesla has effectively navigated through historically) might exacerbate, central governments will likely promote policies to boost renewable energy sources to reduce dependencies on Russian oil in the medium term.

In light of these analyses, we issue a **BUY** recommendation.

# *Appendix*

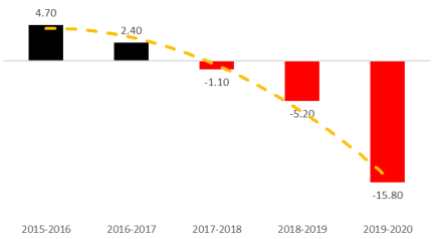
## *Company Description*

Tesla Inc. is an American manufacturer of electric vehicles, solar panels, and energy storage products. It was named after Serbian American inventor Nikola Tesla and was founded in 2003 by American entrepreneurs Martin Eberhard and Marc Tarpenning. After the resignation of the two founders, Elon Musk took over as CEO in 2008, pushing for the realization of the initial public offering of Tesla that occurred lately in 2010 with a total amount raised of $226 million. The company has concentrated its effort on car manufacturing for the first ten years, then expanded the business into the energy sector on April 30, 2015, when a dedicated subsidiary was announced. The strengthening of "Tesla Energy" happened with the acquisition of *SolarCity*, an American company involved in constructing solar energy systems, in a $2.6 billion deal.

Tesla's business model is based on three pillars: selling strategy, servicing, and charging network. Unlike other automakers that sell their vehicles through dealerships, Tesla owns the shops and focuses on direct sales. This means that all Tesla stores are subsidiaries of the corporation. Furthermore, the corporation maintains service centers in all the locations where it sells its cars. Finally, Tesla also offers an extensive network of supercharger stations where cars may get a full charge in as little as 30 minutes for free. Besides these three factors, the company differs from the competitors because of the heavy investments in research and development processes, focusing on hardware, software, and digital technology. [7]

## *Automotive Sector*

**Exhibit 11:** Worldwide motor vehicle production growth (in percentage %)
**Source:** Statista and own analysis



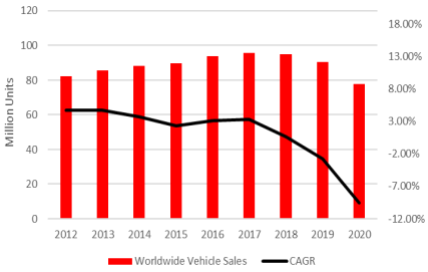

The automotive sector includes several organizations and companies involved in designing, developing, manufacturing, and selling motor vehicles. The industry comprises companies that fall into two main categories: car manufacturers and car parts manufacturers. The increasing complexity of cars led to a rise in the number of components manufactured by suppliers rather than manufacturers themselves. In this regard, Tesla differentiates itself from the competition as it is vertically integrated. Moreover, this sector has five key segments ranging from light to autonomous vehicles. The latter, combined with electric cars, have been capturing an increasing market share for the last five years.

In 2020, global automobile sales declined by 14%, marking the third consecutive year of a downward trend in demand. Sales dropped even more after the Coronavirus outbreak in 2020 and the 2008-2009 financial crisis. Worldwide production growth has also seen a real struggle since 2018, falling by more than

[7] Pereira, D., 2022. "The business model analyst". "https://businessmodelanalyst.com/tesla-business model/#:~:text=Tesla%20Business%20Model%20operates%20as,its%20own%20charging%20station%20network".

15% year over year between 2019 and 2020. The downturn comes after a slight drop in output in 2017 due to lower-than-expected vehicle demand. While commercial vehicle sales climbed from 2017 to 2019, the pandemic impacted the segment, with sales declining by 9% in 2020.[8] In this unfavorable context, Tesla set the ground for its growth by building its factories in California and Shanghai, which served as the basis for the exponentially growing deliveries observed in the last three years.

**Exhibit 12:** Worldwide vehicle sales
**Source:** Statista and own analysis



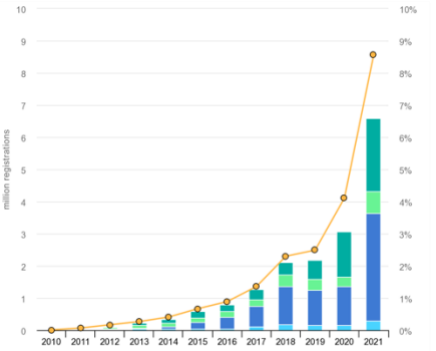

A better-than-expected recovery happened in 2021 when car sales worldwide increased by 4%. China faced the most vigorous growth (6%), corresponding to 21 million vehicles.[9] Car sales in India expanded at a quicker rate of 27%, although the entire vehicle market remained tiny. Global car sales in the main worldwide markets were 58 million units, up from 2020 but down from any other year since 2013. Finally, statistics illustrate that the global automotive market's sales are still roughly 10 million vehicles lower than their highest level in 2017 and 2018 (as described in Exhibit 3).

## *Electric Vehicles Market*

***Battery supply chain strengthening, government policies and charging infrastructure to drive the EV penetration***

While the traditional gasoline vehicles faced a demand and production slowdown in recent years, alternative fuel cars have been taking an increasing portion of the market share mainly thanks to the lower environmental impact and the non-usage of high-priced gasoline. After a decade of solid expansion, electric vehicle sales more than doubled to 6.6 million in 2021, accounting for nearly 9% of the global car industry and tripled their share of the total market two years ago. On top of that, monthly electric car sales in 2021 were regularly at least 50% greater than the same month in 2020. With its 936.222 deliveries, Tesla holds a 14,4% market share of the EV market and 1,3% of the total automotive market.

**Exhibit 13**: Worldwide EV sales
**Source:** International Energy Agency, 2022




According to our forecasts, the global automotive market will grow at a CAGR of around 4% to 5% by 2030. However, compared to how the sales split today, there will be a radical shift thanks to the penetration of electric vehicles.

We believe multiple drivers will affect the penetration rate of EVs worldwide. In the short term, the **supply chain issues** related to raw materials sourcing and semiconductors will affect the ability of the US and European markets to transition towards electric vehicles. Europe has no mining or refining activities for critical minerals and counts on China and Russia for 70% of them. Similarly, although the soil is richer, the US sources its materials abroad. We expect those problems to affect the penetration rate of EVs in Europe and America. The report dedicates an extended section to the matter.

The **regulation and policies** from international and local institutions greatly influence electric vehicles' growth and penetration rate. Many governments and central

[8] Statista, 2020
[9] Car sales statistics: "2021 International: Worldwide car sales"; January 18th, 2022

***Regulation to force manufacturers to convert production lines to electric vehicles***

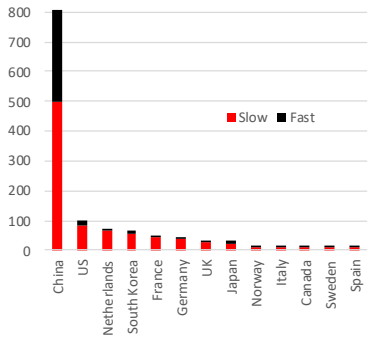
institutions have announced their ambitious plans to achieve some percentage of electric cars by 2030 or 2035 over the total number of units sold by phasing out internal combustion vehicles. The goal of the policies is to establish strict criteria to force carmakers to pivot the production lines to electric cars. However, recent adverse and unforeseeable events, such as COVID-19 and Ukraine-Russia war, have probably made these goals hard to achieve, and we consider them quite optimistic.

While consumers are spending more on electric vehicles, governments in Europe and China are spending less than before to subsidize the EV market. Europe and China have brought up a novelty in subsidies by adopting the "*price cup"* scheme that redefined the threshold of cars' prices below which certain state aids are given. By establishing tighter eligibility requirements for incentive programs, this mechanism points toward a downward trend in prices in the future, thus boosting the demand for EVs. Globally, the share of government incentives over total spending for EVs has halved from 2015 to 2020. On the contrary, the US has recently launched an incentive package to support the industry. As of 2021, 17 countries in the European Union offer tax benefits and purchase incentives.

***On average, tax credits make electric vehicles 3% to 10% cheaper***

However, there are significant differences across countries depending on the list price (net of VAT) and the battery's capacity. The incentives range from €1.500 to €10.000. Provided that Model X and S are not eligible due to the high price, Model 3 complies with the requirements in the largest markets (Germany, Italy, France, Portugal, and Spain)[10]. With an average price of €50.000, the incentive would cover 3% to 10%. The Model Y is eligible for purchase incentives in some European countries, such as Germany (€2.500) and France (€2.000). Tax credits in the US expired for Tesla's vehicles, but they are considerably cheaper than in Europe. With all the other battery electric vehicles (except for General Motors') being eligible for a tax credit of up to $7.500, we estimated a decreasing market share in the regional EV market for the Austin-based company[11]. Incentives amounting to $1.500 are available in China, or 3.5% of the selling price of the base version.

**Exhibit 14**: Number of charging stations by type and country, 2020
**Source:** IEA*

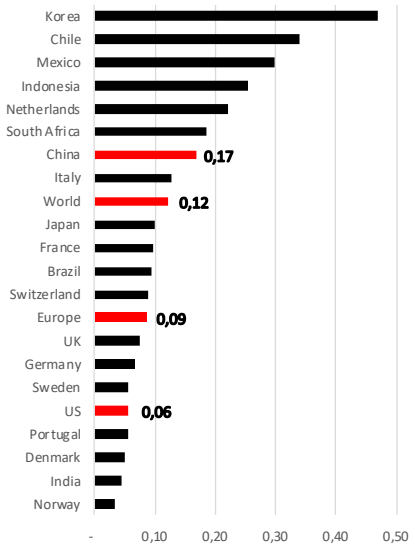



***China is the only large market to comply with the 10-to-15 charging stations per EV requirement for an extensive penetration***

Third, the **EV charging infrastructure** represents one of the most influential factors when deciding whether to buy an electric vehicle. From an automaker's perspective, the lack of charging stations across the countries will likely affect the demand negatively. Contrary to the implementation of supporting policies that Tesla has no influence on, the carmaker can accelerate the sales of EVs by deploying more of its Superchargers. At the end of FY21, 31.498 Tesla connectors were available globally, 35% more than in 2020 and more than double that in 2019. This is a point in favor of Tesla going forward, which does not have to rely on third parties to develop the charging infrastructure wholly. Estimates suggest that ten to fifteen charging stations per electric vehicle are needed for the EV industry to develop

[10] Source: ACEA - European Automobile Manufacturers' Association
[11] Source: US Department of Energy
*IEA. (April 29, 2021). Number of publicly (EVSE) in 2020, by major country and type [Graph]. In Statista. Retrieved May 18, 2022.

**Exhibit 15:** EVs to charging port stations by country/region
**Source:** IEA




appropriately. As the chart on the left shows, only China satisfies the criterium among the largest markets, while the US lags tremendously[12].

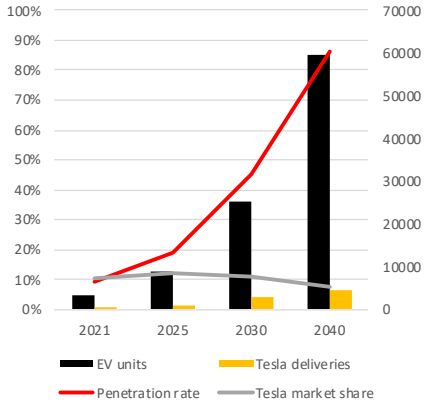
Fourth, **lower prices**, mainly driven by cheaper batteries, and the **lower cost of ownership** than ICE vehicles will support the EV penetration in the automotive industry. Although the average transaction price of electric cars has increased recently, consumers appear not to be sensitive. Considering 2020, consumers spent USD 120 billion on electric vehicle purchases, up 50% from 2019. This increment is attributable to a 41% increase in sales and only a 6% increase in average price.

We also believe that **other trends** may affect the penetration of EVs in the future. Growing population and urbanization will increase the density of cities worldwide and, consequently, the traffic. It will be most likely the case for Asia rather than Europe and the United States. Although traffic is one of the main reasons Musk believes self-driving cars are needed to enhance safety for drivers and pedestrians, it will probably be the driver of the growth of car-sharing services, affecting the number of vehicles sold. However, this trend will be advantageous for the upcoming autonomous ride-hailing vehicle (RoboTaxi). In the long run, fierce competition may also arise from hydrogen-powered cars, especially if battery technologies do not develop as planned.

## *APAC*

***China is by far the largest market for EVs thanks to supporting government policies and a developed charging infrastructure***

**Exhibit 16**: Penetration of EV and market share in APAC
**Source:** Own analysis




In 2021, China topped the world in electric vehicle sales, nearly tripling to 3.4 million units. In other words, China alone sold more electric automobiles than the rest of the world combined. The annual increase is the fastest since 2015 in the country's electric car sector. According to the Chinese government's official aim, electric cars are on track to reach a market share of 20% for the entire year in 2025. Other than the larger population, several factors helped the Chinese EV market grow exponentially. First, the government extended the subsidies for another two years after the pandemic. These incentives were promoted for the first time well in advance compared to the rest of the world. Second, the production of small-size cars accelerated the country's sales of electric vehicles as observed to be more affordable, for instance, compared to Tesla's main products. The third is the availability of raw materials and China's control of a sizeable share of the global supply chain of many critical components of battery cells. Fourth, China has the highest number of charging stations, representing 67% of all the available stations globally. In our view, the advanced charging infrastructure and the access to raw materials will be the drivers of the Asian EV market's leadership in the years ahead.

[12] IEA, Ratio of public chargers per EV stock by country, 2020, IEA, Paris. https://www.iea.org/data-and-statistics/charts/ratio-of-public-chargers-per-ev-stock-by-country-2020

However, the APAC market is the most competitive for car manufacturers' presence, price sensitivity, and diversity of demographic and income groups. In comparison, European and American markets are way more concentrated. Although it offers a wide variety of models at different price points to meet the diversified needs of its customers, we believe Tesla is yet well-positioned to serve the Asian market. The introduction of the $25k model in China will provide potential customers with another alternative at the lower end of the spectrum while granting Tesla access to the mass market, which is currently being served by the Tesla Model 3.

In our model, the region will reach a penetration rate of 45% in 2030 and 86% in 2040 in the base case. This figure gives Tesla a potential addressable market of more than twenty-five million vehicles. In this context, we estimated an electric vehicle market share for the Austin-based carmaker of 11% in 2030 (5% of the entire Asian market), and Asia will be the vastest end market. For a comparison, SAIC, Toyota, and GM hold an estimated 15%, 10%, and 9.5% of the market, respectively, considering all kinds of vehicles.

**Exhibit 17:** Summary of APAC market

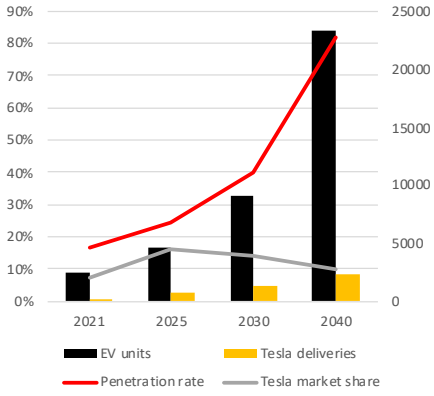
| Maker | Share | Deliveries |
|---|---|---|
| SAIC | 15% | 5,6M |
| Toyota | 10% | 3,7M |
| GM | 9.5% | 3,4M |
| Tesla (2030) | 5% | 2,6M |

**Note:** excluding Tesla, all the other figures refer to 2021 data, and thus, do not account for market growth

### *EMEA*

In Europe, electric car sales surged by about 70% to 2.3 million in 2021, with plug-in hybrids accounting for about half of the total. Although expanding at a double-digit, annual growth was slower than in 2020 due to the disruptive recovery from the pandemic. In 2021, total car sales were 25% lower than in 2019, even though purchase subsidies increased in most major European markets. Monthly sales in 2021 peaked in the fourth quarter, with electric car sales in Europe surpassing diesel vehicles for the first time with a 21% market share in December. These increases followed the introduction by the European Union of $CO_2$ emission standards per kilometer driven for new cars, which forced car manufacturers to accelerate their plans of electrification.

**Exhibit 18**: Penetration of EV and market share in EMEA
**Source:** Own analysis




Additionally, many governments across the region introduced subsidies to incentivize the purchase of electric vehicles. The policies resulted in a 16% penetration rate of EVs over the total cars sold, the highest compared to APAC and AMER. However, there are massive differences among European countries. Germany is the largest market based on total sales, with more than one-third of new cars sold being electric. Norway at 72%, Sweden and the Netherlands at 45% and 30%, respectively, sat atop global rankings. The European Automobile Manufacturers' Association (ACEA) statistics show a clear correlation between GDP per capita and electric vehicles market share.

In countries like Sweden, the Netherlands, Finland, Denmark, and Germany, EV penetration is the highest. This makes the price a critical determinant in the purchasing decision and, as things stand, a limiting factor to EV penetration in the region.

However, massive improvements are needed to expand the charging infrastructure to support EV growth in Europe in the years ahead. EU does not meet the ten-to-fifteen charging stations per vehicle requirement. Also, of the almost 225.000 charging stations available, 70% are in the Netherlands, France, and Germany, which account for 23% of the EU's total surface area[13].

The compact SUV is the segment with the highest number of units sold. For Tesla's Model Y, it means a potential addressable market segment of more than 2.5 million vehicles based on 2021 sales. The higher selling price may hinder the penetration of mid-size SUVs in the European market compared to the competition. If the Model Y is priced at around €60.000 (with tiny differences across countries), most of its available competitors have a €5.000 to €15.000 lower price tag. Upcoming models appear to be even cheaper, and deliveries may suffer in the decade's second half.

In our model, the region will reach a penetration rate of 40% in 2030 and 82% in 2040 in the base case. This figure gives Tesla a potential addressable market of more than nine million vehicles. In this background, we estimated an electric vehicle market share for the Austin-based carmaker of 14% in 2030 (6% of the entire European market). For a comparison, VM Group, Stellantis, and Renault hold an estimated 26%, 21.5%, and 8.3% of the market, respectively, considering all kinds of vehicles.

**Exhibit 19:** Summary of EMEA market
**Source:** Own analysis

| Maker | Share | Deliveries |
|---|---|---|
| VW | 26% | 3,7M |
| Stellantis | 21,5% | 3,0M |
| Renault | 8,3% | 1,0M |
| Tesla (2030) | 6*% | 1,25M |

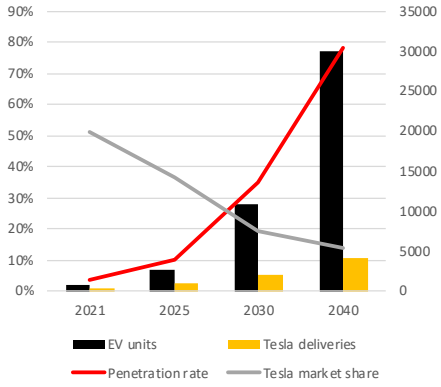
**Note:** excluding Tesla, all the other figures refer to 2021 data, and thus, do not account for market growth

### *AMER*

In 2021, the United States made a strong comeback in the electric car market, with sales doubling to more than half a million units. The entire car market in the United States improved, but electric vehicles increased their penetration to 4.5% (742.000 units). Tesla continues to dominate the electric car market in the region, accounting for more than half of all-electric vehicles sold.

There are numerous reasons behind the limited growth of the EV market in the United States. First, compared to European Union and China, the US has the lowest EVs to charger ports ratio. Second, they have been suffering from the problems associated with the supply chain, which represents the most pressing problem. The American electric vehicle industry faces a battery shortage mainly because East Asian companies have dominated the market for years (and still do). The trade war against China has not favored the growth of the battery industry in the US, which is over-reliant on foreign sources.

**Exhibit 20:** Penetration of EV and market share in AMER
**Source:** Own analysis




[13] Source: ACEA

Additionally, the federal government has been late promoting policies and incentives to boost electric vehicle purchases. While China, the United Kingdom, and some other countries in Europe have been phasing out direct-purchase support for EVs since 2018, America is now discussing the *Build Back Better* plan, which includes a federal income tax credit for electric cars customers. As of today, there is a $7.500 purchase incentive, but it does not apply to Tesla. Although we expect the subsidies not to last long as the market expands, we believe they will help the EV industry take off, like what happened in China and Europe.

In our model, the penetration rate over total vehicles for the AMER region will reach 35% (11 million units) in 2030 and 78% (30 million) in 2040 in the base case. This figure gives Tesla a potential addressable market of more than ten million vehicles. In this context, we estimated an electric vehicle market share for the Austin-based carmaker of 19% in 2030 (7% of the entire American car market), and the USA will represent the second-largest end market. For comparison, GM, Toyota, and Ford hold 15%, 15%, and 12.6% of the market, respectively, considering all kinds of vehicles.

**Exhibit 21:** Summary of AMER market
**Source:** Own analysis

| Maker | Share | Deliveries |
|---|---|---|
| GM | 15% | 2,6M |
| Toyota | 14% | 2,3M |
| Ford | 12% | 1,9M |
| Tesla (2030) | 7% | 2,06M |

**Note:** excluding Tesla, all the other figures refer to 2021 data, and thus, do not account for market growth

### *Emerging Markets*

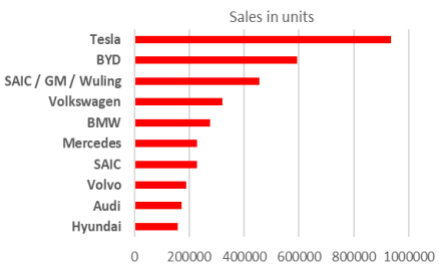
***High prices and absent charging infrastructure make the penetration of EVs in emerging countries difficult***

Electric cars make less than 2% of overall sales in most other markets. In large growing economies like Brazil, India, and Indonesia, the percentage is still around 1%, with no substantial improvement in the past year. While sales of electric scooters and buses are increasing in these nations, the high cost of electric cars and a lack of charging infrastructure are significant factors in the slow adoption. In contrast with the already mentioned countries, Korea has seen an enormous rise in electric vehicle sales, reaching 8% in 2021, after two years of steady growth, mainly thanks to high GDP per capita and a developed charging infrastructure.[14] The country has, in fact, the highest EV-to-charge-port ratio globally.

### *Competitors Overview*

Based on market shares and total 2021 EV sales, Tesla's main competitors are based in Europe and Asia. Nonetheless, the American company can still guarantee the highest global market share. The leading European competitor, Volkswagen, intends to overtake Tesla as the world's top EV maker by 2025.

**Exhibit 22:** Total EV sold by company
**Source:** Statista and own Analysis




The German car manufacturer plans to become the most prominent electric car producer by investing $178 billion by 2025 in batteries, software, and the construction of six large battery factories in Europe by 2030. As for competition coming from Asia, China took over the electric market with a few high-quality brands (mainly BYD and Saic) that, in 2021, had a more significant increase in sales compared to US-based companies (excluding Tesla). The acceleration of electric car production in China has been strengthened by the strict policies made for gasoline vehicles.

[14] Paoli, L., Gul, T. 2022. "Electric cars fend off supply challenges to more than double global sales". International Energy Agency. https://www.iea.org/commentaries/electric-cars-fend-off-supply-challenges-to-more-than-double-global-sales

## *Tesla vs. Competitors: Past performance*

**Exhibit 23:** Volkswagen – ROIC and WACC
**Source:** Own analysis

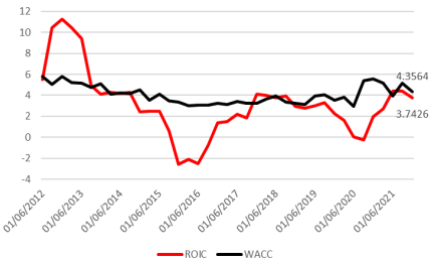



**Exhibit 24:** Volkswagen – Price and ROIC
**Source:** Own analysis

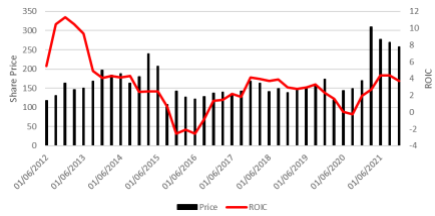



**Exhibit 25:** Tesla – Price and ROIC
**Source:** Own analysis

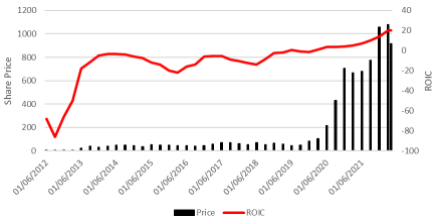



**Exhibit 26:** BYD – WACC and ROIC
**Source:** Own analysis

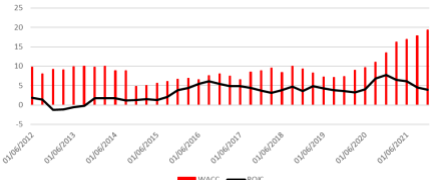


**Exhibit 27:** Tesla's forecast
**Source**: Own analysis

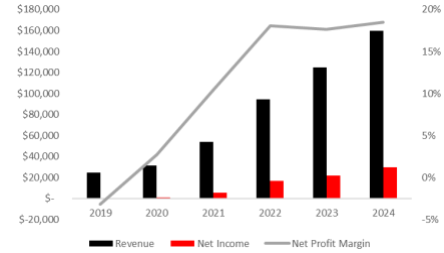
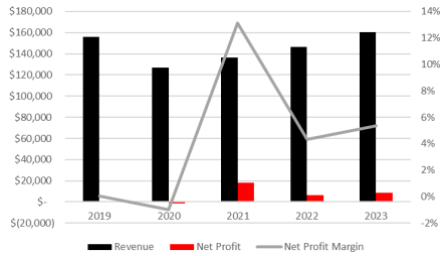



**Exhibit 28:** Ford's forecast
**Source:** Own analysis




The supremacy of Tesla regarding EV deliveries has had an incredible impact on the company's reputation and growth. In the end, the company's valuation has benefited a lot. However, we believe that one should analyze ratios, such as delivery growth, return on invested capital, and asset turnover, for a proper comparison against its peers and better understand its performance. As the strongest European competitor, Volkswagen faced a steeper-than-expected rise in EV deliveries, amounting to 214,000 vehicles in 2020, up 161% from the previous year, in contrast with a growth of "just" 35.9% of Tesla. During 2021, both companies have had almost the same increment reaching a strong double-digit result (73% for Volkswagen and 87% for Tesla). The same conclusions do not apply to the Return on Invested Capital (ROIC), consistently low for Volkswagen, reaching 3.74% in 2021. Even though the VW's ROIC aligns almost with the industry, the relationship between WACC and ROIC does not signal an ideal situation for value creation, as the latter is extremely low compared to the cost of capital. On the other hand, Tesla showed strong results in terms of ROIC in the last two years (8.5% in 2020 and 20.74% in 2021), indicating heavy capital investments and shareholder wealth creation.

As for Chinese competitors, Tesla has been facing stronger-than-expected barriers in Asia, given the prominent rise of China-based companies in the EV market. The largest is BYD, which sold over 590,000 plug-in cars in 2021 with year-over-year growth of 232% (in Renminbi ¥). The in-house development of power control software to master the manufacturing capability of controlling software and hardware and government incentives on the electric vehicles market in Mainland China have driven this outstanding result. The rise of BYD is also linked to its battery subsidiary, "Fudi Battery", which helps the company produce batteries to boost efficiency. BYD's installed battery capacity accounted for 14.2% of China's total capacity, whose output reached 31.6 GWh in 2021, soaring 109% year over year. ROIC's figures for BYD did not follow sales and production results across the years. As the company growth will surge in the future, we believe that fewer investors will be available given the Chinese firm's low quality of value creation.

Competition is also coming from other famous Asian brands such as Saic – GM – Wuling Automobile, which sold 449,553 electric vehicles in 2021 with a market share in China of 13%. Strong expectations and new competitors might create obstacles in the future. However, financial productivity ratios look strong enough to say that Tesla has overperformed its peers in recent years.

## *Tesla vs. Competitors: Forward-Looking Performance*

We expect the competition in the EV market to grow consistently over the next 3-4 years, given the high number of new models in production and futuristic technologies that will shape a new perception of experience. Based on our projections, Tesla will

still have a competitive advantage from strong operating margins and revenue growth. Our Tesla's revenue forecast reflects a 76% increase in 2022, building up on the supply chain constraints in 2021, and an average rise of 22% toward 2030. We also expect the Net Income to be roughly 20% of revenues, representing a substantial upward curve recovering from the Covid-19 crisis. These results stand out compared to peer companies, such as Ford for the American market and BYD for the Chinese market, because of the astonishing differences in financial ratios. Ford Motors achieved revenue growth of 7% in 2021 and a net profit margin of 13%, where the latter should decrease to 5% in 2023 and then remain stable over the medium-term future. In the next 3-4 years, we believe that these numbers will still chase Tesla's margins due to the vertical integration strategy behind the American company's business.

**Exhibit 29:** BYD and Tesla – Price to Sales
**Source**: Own analysis

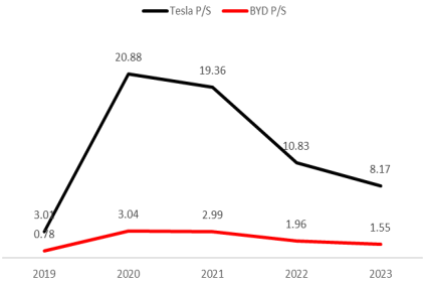
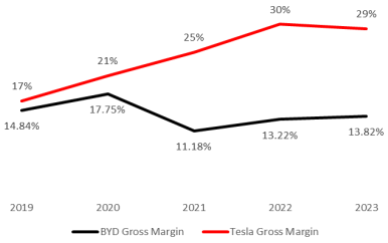
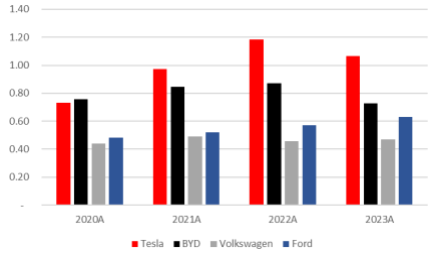



**Exhibit 30:** BYD and Tesla – Gross Margin
**Source** Own analysis




China leads the worldwide EV market with a market share of 34%. The Shenzhen-based company named BYD holds a fat 20% of market share within the country itself, representing a primary competitor in the time to come for Tesla. In terms of profitability ratios, in our view, Tesla will outperform BYD in the coming years, given the forecasted gross margin ratio. Moreover, when comparing the historical financials of BYD and Tesla, it becomes clear that Tesla has adopted a riskier path to sales growth than BYD. The fact that BYD's financials have been more stable than Tesla's supports this claim, and we see this trend to continue in the near future also based on the Price to Sales ratio. Generally, high P/S ratios might indicate a lack of fairness in a stock's price or that a company is not efficiently using investors' funds to drive revenue. However, we believe that Tesla's outstanding revenue growth and profit margins performance justify the high company's P/S ratio. Moreover, the projections of the asset turnover ratio in comparison with peers, which defines the robustness of the Austin-based company in generating revenue per dollar of assets, support our view of the solid future performance of Tesla.

**Exhibit 31:** Asset turnover comparison
**Source:** Own analysis

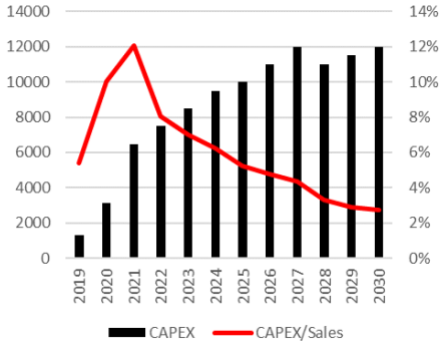



# *Company perspective*

## *Production and capacity*

Today, Tesla operates its automotive business across four Gigafactories, located in Fremont (California, US), Austin (Texas, US), Shanghai, and Berlin. As of the date of this report, Tesla is operating at its total available capacity, which stands at around one million vehicles, although the company has the capabilities to extend production lines in all four locations further. Expanding the production capacity is Tesla's short-term main goal, which plays an even more critical role than the launch of new products. Together with supply chain disruptions, the need to expand the capacity is the reason why the management team decided to postpone the launch of the already announced models. If traditional carmakers have production lines that can be converted to EVs, Tesla must build new facilities from scratch. Ramping up the

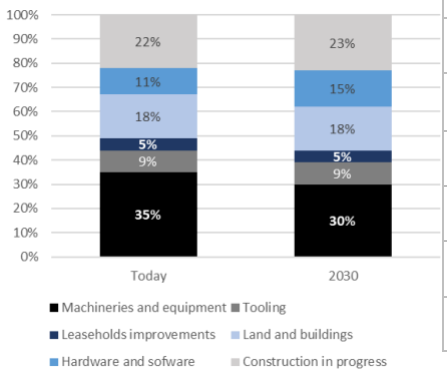
**Exhibit 32:** CAPEX and Capital efficiency
**Source:** Own analysis



capacity is a necessary step to fuel the growth. Being at this stage makes owning Tesla's stock riskier than established peers.

We estimated capital expenditures of around 115 billion over the next decade. These investments will be mainly associated with expanding the manufacturing facilities for vehicles, batteries, energy products (items referred to as "Construction in progress"), and hardware and software developments. The management team expects annual capital expenditures to be between $5 to $7 billion until 2024. In our model, CAPEX will exceed seven billion each year by 2024.

**Exhibit 33:** Gross CAPEX breakdown, today vs 2030
**Source:** Own analysis




| Company | 2021 CAPEX (% of sales) | Announced CAPEX | Investment horizon |
|---|---|---|---|
| Volkswagen | $10,5 billion (4,2%) | $83 billion | 2025 |
| Mercedes-Benz | 6,6 (5,9%) | 46 | 2030 |
| GM | 7,5 (6,2%) | 35 | 2026 |
| Stellantis | 8,7 (5,8%) | 34 | 2025 |
| Ford | 6,2 (4,5%) | 30 | 2025 |
| **Tesla** | **6,5 (12%)** | **55** | **2026** |

***Giga Shanghai is the main export hub, and the ongoing expansion will double its capacity to almost 1 million cars***

**Giga Shanghai** has been the central export hub for Tesla since its opening in 2019 and thus represents a strategic location. The latest company report shows that the Tesla Giga Shanghai capacity is more than 450.000 vehicles per year. The output in 2021 was 470.000 cars, but according to the EVs assembled in December 2021, amounting to 70.000 units, the total potential production could be 850.000. In November 2021, Tesla invested almost $190 million to expand the factory output to one million vehicles per year, completing the construction in April 2022. However, Tesla started working on a second plant in Shanghai at the end of March. At the completion, the capacity will be twice the current one (450.000), thus increasing the presence in the largest market for electric vehicles and other export markets in Asia. From a medium- to long-term perspective, Giga Shanghai will represent even more of a strategic plant, as Tesla plans to launch a $25.000 model in the coming years, whose production will take place in China and achieve a large scale.

On March 22, Tesla launched its **first European Gigafactory in Berlin**. That day represents a crucial milestone as it takes some of the pressure off the other factories in the United States and Shanghai. Other than expanding the total capacity by around 500.000 vehicles, Giga Berlin will allow for cutting costs related to transportation and delivery to Europe. Before the opening, the cars for European customers were coming from the Shanghai Gigafactory. However, Tesla will not be able to produce the potential factory output in 2022. The reason is the supply chain disruptions associated with the conflict between Russia and Ukraine and the dependence of Europe on Russian materials. Therefore, it is likely to see financial benefits from mid-

2023 as soon as challenges are over and Tesla can produce at its total capacity. As transportation costs are a component of COGS, we expect improvements in the gross margin of the automotive sector. It is worth mentioning that, according to the current strategic plan, only the Model Y will be produced at Giga Berlin. Therefore, Europe will still count on Model 3 shipments from Shanghai in the foreseeable future.

2022 is a game-changer year for Tesla, thanks to Giga Berlin and the opening of the **second American factory in Austin, Texas**. As of the end of March, the factory is up and running, and production of Austin-made Model Y started in late 2021. Giga Texas will also host the production of the new Cybertruck in 2023 and the autonomous RoboTaxi in 2024.

***Announced capacity expansion plans will be capable of supporting the short-term delivery projections***

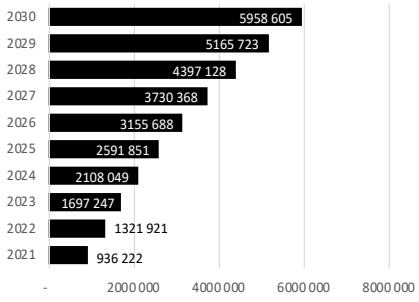
In light of the announced expansion plans at Giga Shanghai, Berlin, and Austin, we view Tesla as well-positioned to meet its short-term delivery goals and achieve more than 2.6 million deliveries by 2025. Specifically, driven by the factors mentioned in the previous section, we forecasted the deliveries to grow from around 930.000 in 2021 to 6 million in 2030.

Looking at the main competition and which are the electrification goals for their fleet, assuming that current units are converted into electric vehicles, in 2030, this would approximately be the following:

| CARMAKER | Units target/goal of total sales | Year | Deliveries/share* |
|---|---|---|---|
| **Volkswagen** | 50% US, 70% Europe, 50% China | 2030 | 5M |
| **Mercedes** | 50% | 2025 | 1.05M |
| **Stellantis** | 40% US, 70% Europe | 2030 | 3,6M |
| **GM** | 1 million units | 2026 | 2% |
| **Ford** | 40% | 2030 | 1,6M |
| **Tesla** | **100%** | **2030** | **5,95M** |

**Exhibit 34:** note that deliveries and share (excluding Tesla) are based on 2021 units and, thus, do not take into account the growth of the company in the automotive market

**Exhibit 35:** Tesla forecasted annual deliveries by 2030
**Source:** Own analysis




Following this assessment, we believe the management goal of manufacturing up to 20 million cars to be irrational. First, Tesla should be twenty times bigger in capacity (compared to ~1 million reported in 2021), implying new and larger gigafactories. Although the amount of capital expenditure needed may not be a significant constraint, time will most likely be one considered the two-year time that historically took Tesla to move from the selection of the location to the final certifications and production. Second, according to our estimations, 20 million vehicles would imply a market share of around 18% of the entire automotive industry, compared to the 1,3% in 2021 and 50% of the EV sales. For comparison, that amount would be twice as large as the production of the largest carmaker, Toyota, which now produces ten million vehicles. The ten-million target is still quite optimistic for the developments we

have projected in the industry. Finally, the supply chain is not ready to support such an extreme scale.

## *New products*

### *Cybertruck*

We estimated the deliveries of Tesla's Cybertruck will be 610.000 in 2030. These figures imply Tesla would be the second-largest seller of pickups, according to the deliveries in 2021.

***Together with crossovers, pickups are the largest car sub-segment in the US, accounting for 18% of total sales***

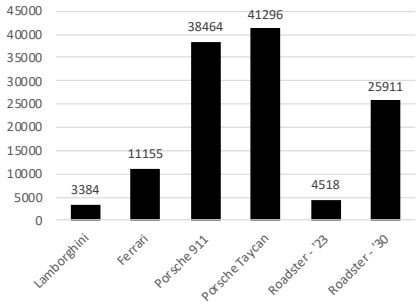
Tesla plans to launch its pickup in 2023, starting the production at Giga Austin and marketing it mainly in the US. American customers are attracted by larger cars, as demonstrated by the share of crossovers and pickup trucks sold in the US, which in 2019 accounted for 40.4% and 17.6% of the total sales, respectively. Furthermore, among the 2021 American top-selling vehicles, the top-3 positions are occupied by pickup trucks, namely the Ford F-series, the Dodge Ram, and the Chevrolet Silverado. In 2021, the units of the three models sold were 726.004, 569.388, and 519.774, respectively.

According to the sales of pickup trucks in the United States in 2021, an approximation of the **total addressable market** would be around 2.1 million units. However, monitoring the sales evolution over the last three years, one can observe a decreasing trend from the 2.5 million units in 2019 and 2.2 million units in 2020. Ford and Chevrolet are launching the electric version of their **F-150** and **Silverado** by the end of 2022, one year before Cybertruck. That is to say that marketing a pickup model does seem to make perfect sense for Tesla, according to both the market's preferences and where the competition is moving. However, Tesla will not benefit from the first-mover advantage as it did with its previous electric models. We believe the already-available competition can hinder the delivery growth of the Cybertruck. Our model reflects this by forecasting annual units sold comparable to best-selling vehicles eight years from now. The selling price will be essentially the same, at around $39.000. Many orders (unofficial and unconfirmed sources say they are approximately 1 million, which given the figures presented above, we believe are unreliable) have been placed after its unveiling in November 2019, suggesting there is much enthusiasm around the new model among customers. However, given its capacity constraints (expected at ~2.5 million in 2023, when the launch will happen) and the current market dynamics, we do not see how Tesla can satisfy them all in a short period without cannibalizing Model Y and 3.

### *Tesla Roadster*

The launch of the electric sports car is expected for 2023. Right now, the market for such vehicles is relatively small, and the Porsche Taycan and the Audi RS E-Tron GT are the only models available from established carmakers. However, historic brands such as Ferrari and Lamborghini will launch their models within the decade's first half.

**Exhibit 36:** Roadster vs Sport cars
**Source:** Own analysis

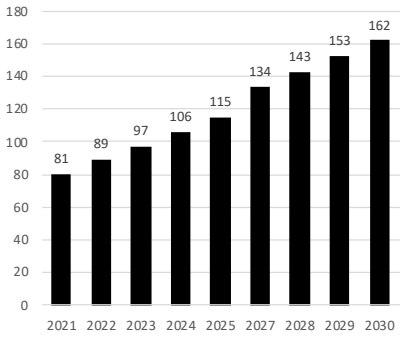



In our estimations, the Tesla Roadster will weigh 0,4% in the product mix, which translates to around 4.500 units sold in 2023 (the first year of production, according to the management's product roadmap) and about 26.000 in 2030. That implies the Roadster will be able to outsell legendary models such as Ferrari, not dethroning Porsche Taycan and 911. We attribute these figures to the different marketing strategies. If, on the one hand, luxury brands such as Ferrari and Lamborghini will keep their cars exclusive to a limited number of customers, Tesla, like Porsche, will try to reach a much broader customer base.

***Tesla Semi***

Averaging 2019, 2020, and 2021 units sold, the Tesla Semi has a **potential addressable market of close to two million vehicles**. The electric sub-segment represents a negligible share.

**Exhibit 37:** Truck drivers needed by 2030
**Source:** Own analysis




Global electric heavy-duty truck (HDT) registrations in 2020 (7.400 units) show that the segment has a long way before most HDT can be electrified. However, on the one hand, manufacturers such as Daimler, Scania, and Volvo have shown their commitment to the electrification of trucks. Also, an increase in the number of models has been observed in the last years. On the other hand, shipping companies set goals to electrify their commercial fleet. We believe there are still some barriers to deploying electric trucks on a large scale. First, the lack of charging infrastructure prevents drivers from charging their vehicles over the long distances they cover. Second, the electric HDT can be up to twice the cost of a conventional truck. Third, the operational changes arising from the shift to electric vehicles, such as the necessity to charge the truck, may affect the efficiency and timeliness of deliveries. Fourth, the appropriate truck type is unavailable, and manufacturers and shipping companies cannot find the right combination of cost and range. There is another major limitation to the growth of the heavy-duty truck segment: a massive shortage of truck drivers in the United States is adversely affecting the shipping industry and further causing supply chain disruptions. With the industry being short 80.000 drivers in 2021[15] (reaching 162.000 in 2030), the companies are trying to retain their drivers by increasing their salaries and benefits. The US government wants to recruit veterans and women to fill the gap. Although the deficiency can accelerate the transition to self-driving trucks, the technology is not there yet and will not be in the foreseeable future.

These problems translate into a low number of heavy electric truck sales, representing 1% of the total. For these reasons, we believe that once it is introduced, the weight of Tesla Semi in the product mix will be 0,2%, corresponding to 3.600 units in its first year on the market and 97.000 units in 2030.

***$25.000 model***

[15] Statista. "Truck driver shortage in the United States from 2011 to 2030 (in 1,000s)." Chart. February 2, 2022. Statista. Accessed May 14, 2022. https://www.statista.com/statistics/1287929/truck-driver-shortage-united-states/

Although it has not been officially unveiled, we factored in the valuation model the low-priced vehicle that the management team aims to produce during the second half of the decade, most likely at Giga Shanghai.

***Although the addressable market is the largest, most competition, especially in China, is priced well below $25.000***

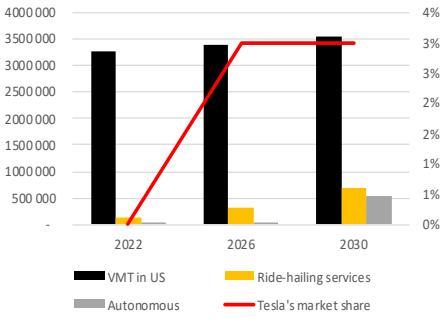
High prices for EVs are one of the significant barriers to EV penetration. The lower cost of the batteries will allow cheap vehicles to be profitable while offering good enough cars in terms of range and performance. By looking at how the market for EVs is evolving, one can observe the introduction of cheaper and more accessible vehicles by other automakers. The introduction of the $25k will preserve Tesla's competitiveness without risking the market share to be hurt. More importantly, by introducing a cheap model, Tesla would be able to capitalize on a trend started a couple of years ago in China and Europe, namely the reduction of government spending on direct purchase incentives and tax deductions. By establishing a price cap, governments do not give subsidies to electric vehicles whose price is above a certain threshold. However, the economics of EVs make a model that cheap unprofitable, and thus further technological advancements are necessary before such a vehicle can be launched.

***RoboTaxi***

***The lack of drivers and the fees given to them prevent companies such as Uber and Lyft to operate profitably: self-driving taxis to solve the problem***

In the Q1 2022 earnings call, Tesla's management team announced that a dedicated vehicle as a self-driving taxi will be in production by 2024, aiming to serve ride-sharing customers' needs. As of the date of this report, a market for self-driving taxis almost does not exist. The companies operating in the sector have been running tests, and they are not yet allowed to drive passengers and charge a fee for the service. We assumed a scenario where regulators will authorize the ride-hailing services to be driverless by the time Tesla launches its RoboTaxi. This implies that Tesla's self-driving taxis will be on the roads in 2024. In our forecasted scenario, the ride-hailing market will grow at a CAGR of 24,7%, reaching 20% of the total miles driven in the US (706.000 million) in 2030. 75% of them will originate from self-driving taxis (530.000 million).

**Exhibit 38:** Ride-hailing services segment overview
**Source:** Own analysis




We estimated the revenue from the RoboTaxi business on a per-mile basis and a market share of 3% in the US market. We calculated that Tesla would charge $0,62 per mile ("less than a subsidized bus ticket", as the management team said), thus achieving a 50% gross margin (COGS of $0,31 per mile). The calculation of the COGS per unit factors in depreciation, financing, energy, insurance, maintenance, repair, parking, and cleaning. We also expect Tesla to deploy two vehicles in its RoboTaxi fleet. First is a dedicated car with no pedals and steering wheel whose mass-volume production should start in 2024. The second is the Tesla Model 3 which will go off-lease and be converted to be part of the fleet.

## Income statement

| | 2021A | 2022E | 2023E | 2024E | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E |
|---|---|---|---|---|---|---|---|---|---|---|
| **CORE BUSINESS OPERATIONS** | | | | | | | | | | |
| **Revenue:** | | | | | | | | | | |
| *Automotive revenue* | *47 232* | *78 673* | *103 297* | *132 258* | *167 630* | *203 877* | *243 687* | *290 338* | *344 639* | *401 525* |
| *FSD revenue* | *Not available* | *1 519* | *2 390* | *3 629* | *5 456* | *8 122* | *11 739* | *16 919* | *24 303* | *34 276* |
| *Energy revenue* | *2 798* | *3 624* | *5 395* | *6 068* | *7 245* | *8 749* | *11 149* | *13 773* | *17 892* | *21 531* |
| *Service and oher revenue* | *3 802* | *5 190* | *6 588* | *8 346* | *9 456* | *10 714* | *12 138* | *13 128* | *14 198* | *15 355* |
| *Robotaxi* | | | | *74* | *225* | *601* | *1 666* | *3 250* | *8 114* | *11 723* |
| **Total Revenue** | **53 823** | **89 006** | **117 669** | **150 375** | **190 011** | **232 062** | **280 379** | **337 408** | **409 145** | **484 411** |
| **COGS:** | | | | | | | | | | |
| COGS automotive | (33 393) | (54 341) | (71 514) | (90 055) | (112 462) | (137 794) | (165 633) | (196 808) | (232 217) | (268 573) |
| COGS - Energy segment | (2 918) | (2 882) | (4 291) | (4 710) | (5 483) | (6 407) | (7 908) | (9 397) | (12 329) | (14 910) |
| COGS - Service | (3 906) | (5 332) | (6 768) | (8 574) | (9 715) | (11 007) | (12 470) | (13 487) | (14 586) | (15 775) |
| COGS - Robotaxi | | | | (37) | (112) | (300) | (833) | (1 625) | (4 057) | (5 862) |
| **Total COGS** | (40 217) | (62 555) | (82 572) | (103 376) | (127 772) | (155 508) | (186 845) | (221 317) | (263 189) | (305 120) |
| **R&D** | (2 145) | (3 062) | (3 847) | (4 511) | (5 203) | (5 843) | (6 362) | (6 903) | (7 234) | (7 541) |
| **G&A** | (3 265) | (5 093) | (6 704) | (8 907) | (11 693) | (14 453) | (17 609) | (21 342) | (24 181) | (27 397) |
| **D&A** | | (2 092) | (2 868) | (4 010) | (4 824) | (6 524) | (7 767) | (8 613) | (9 590) | (11 449) |
| **Core profit before taxes** | **8 196** | **16 205** | **21 678** | **29 571** | **40 519** | **49 734** | **61 797** | **79 233** | **104 952** | **132 904** |
| **Statutory taxes** | **(1 729)** | **(3 418)** | **(4 573)** | **(6 238)** | **(8 547)** | **(10 491)** | **(13 036)** | **(16 713)** | **(22 139)** | **(28 035)** |
| **Core adjustments** | **968** | **1 023** | **1 431** | **2 024** | **2 845** | **3 524** | **4 408** | **5 673** | **7 539** | **9 438** |
| **Total Core after tax** | **7 435** | **13 810** | **18 536** | **25 357** | **34 817** | **42 767** | **53 169** | **68 192** | **90 353** | **114 307** |
| **NON-CORE BUSINESS OPERATIONS** | | | | | | | | | | |
| **Interest income** | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 56 | 56 |
| **Other income (expense), net** | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 |
| **Restructuring and other** | 27 | (45) | (59) | (75) | (95) | (116) | (141) | (169) | (205) | (243) |
| **Stock-based compensation** | (2 121) | (1 000) | (1 000) | (1 000) | (1 000) | (1 000) | (1 000) | (1 000) | (1 000) | (1 000) |
| **Non-Core profit before taxes** | **(1 903)** | **(854)** | **(868)** | **(884)** | **(904)** | **(925)** | **(950)** | **(978)** | **(1 014)** | **(1 052)** |
| **Statutory taxes** | 401 | (180) | (183) | (187) | (191) | (195) | (200) | (206) | (214) | (222) |
| **Non-core adjustments** | (318) | 3 583 | 5 010 | 7 088 | 9 962 | 12 339 | 15 434 | 19 864 | 26 398 | 33 049 |
| **Other comprehensive income** | (309) | 171 | 226 | 289 | 366 | 446 | 539 | 649 | 787 | 932 |
| **Total non-core after tax** | **(2 129)** | **2 720** | **4 186** | **6 306** | **9 232** | **11 665** | **14 824** | **19 328** | **25 957** | **32 707** |
| **FINANCIAL RESULT** | | | | | | | | | | |
| **Interest expense** | (371) | (222) | (177) | (74) | (30) | (23) | (20) | (15) | (9) | (4) |
| **Lease expense** | | (1 045) | (936) | (747) | (421) | (277) | (151) | (151) | (151) | (1 923) |
| **Financing profit before taxes** | **(371)** | **(1 267)** | **(1 113)** | **(821)** | **(451)** | **(300)** | **(171)** | **(166)** | **(160)** | **(1 927)** |
| **Statutory taxes** | 78 | (267) | (235) | (173) | (95) | (63) | (36) | (35) | (34) | (406) |
| **Financing adjustments** | (11) | (24) | (24) | (24) | (24) | (24) | (24) | (24) | (24) | (24) |
| **Total financing after tax** | **(304)** | **(1 559)** | **(1 372)** | **(1 019)** | **(571)** | **(388)** | **(232)** | **(225)** | **(219)** | **(2 357)** |
| **Total result** | **5 335** | **14 971** | **21 350** | **30 645** | **43 478** | **54 044** | **67 761** | **87 295** | **116 091** | **144 657** |

## Balance Sheet

| | 2021A | 2022E | 2023E | 2024E | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E |
|---|---|---|---|---|---|---|---|---|---|---|
| **INVESTED CAPITAL - CORE** | | | | | | | | | | |
| **Assets:** | | | | | | | | | | |
| **Operating cash** | 2 691 | 4 450 | 5 883 | 7 519 | 9 501 | 11 603 | 14 019 | 16 870 | 20 457 | 24 221 |
| **Accounts receivable, net** | 1 913 | 3 407 | 4 827 | 6 993 | 11 439 | 17 149 | 24 560 | 36 027 | 51 533 | 70 303 |
| **Inventory** | 5 757 | 8 912 | 11 990 | 15 294 | 19 253 | 23 859 | 30 202 | 37 594 | 46 148 | 55 172 |
| **Prepaid expenses and other current assets** | 1 723 | 2 452 | 3 359 | 4 443 | 5 804 | *7 320* | 9 125 | 11 318 | 14 133 | 17 218 |
| **Property, plant and equipment, net** | 17 348 | 22 981 | 28 870 | 34 651 | 40 152 | 44 985 | 49 610 | 52 421 | 54 790 | 55 832 |
| **Intangible assets, net - Developed Technology** | 257 | 262 | 270 | 278 | 289 | 304 | 325 | 348 | 382 | 421 |
| **Operating lease vehicles, net** | 4 511 | 7 460 | 10 039 | 13 054 | 16 780 | 20 842 | 25 602 | 31 315 | 38 587 | 46 412 |
| **Solar energy systems, net** | 5 738 | 6 513 | 7 255 | 7 964 | 8 640 | 9 282 | 9 890 | 10 466 | 11 008 | 11 517 |
| **Other non-current assets** | 2 138 | 3 560 | 4 942 | 6 617 | 8 741 | 11 139 | 14 019 | 17 545 | 22 094 | 27 127 |
| **Operating lease right-of-use assets** | 2 016 | 4 047 | 5 351 | 6 838 | 9 020 | 11 481 | 14 432 | 18 042 | 22 696 | 27 840 |
| **Finance lease assets - PP&E** | 1 536 | 1 984 | 2 637 | 3 338 | 4 069 | 4 784 | 5 523 | 6 099 | 6 648 | 7 054 |
| **Finance lease assets - Solar System** | 27 | 31 | 35 | 38 | 42 | 45 | 48 | 51 | 53 | 56 |
| **Liabilities:** | | | | | | | | | | |
| **Accounts payable** | (10 025) | (14 568) | (16 967) | (19 826) | (22 754) | (25 563) | (29 179) | (32 743) | (37 495) | (41 797) |
| **Accrued liabilities and other** | (5 335) | (8 822) | (11 428) | (14 304) | (17 694) | (21 146) | (24 988) | (29 058) | (34 009) | (38 812) |
| **Deferred revenue, current portion** | (1 447) | (2 393) | (3 046) | (3 742) | (4 538) | (5 311) | (6 136) | (7 047) | (8 136) | (9 148) |
| **Deferred revenue, net of current portion** | (2 052) | (3 115) | (4 118) | (5 263) | (6 650) | (8 122) | (9 813) | (11 809) | (14 320) | (16 954) |
| **Customer deposits** | (925) | (1 441) | (1 787) | (2 133) | (2 505) | (2 828) | (3 136) | (3 437) | (3 758) | (3 965) |
| **Other long-term liabilities** | (1 875) | (3 101) | (4 099) | (5 239) | (6 619) | (8 084) | (9 767) | (11 079) | (12 617) | (13 969) |
| **Total core invested capital** | **23 996** | **32 621** | **44 013** | **56 521** | **72 967** | **91 738** | **114 336** | **142 923** | **178 196** | **218 526** |
| **INVESTED CAPITAL - NON CORE** | | | | | | | | | | |
| **Marketable Securities** | 131 | 131 | 131 | 131 | 131 | 131 | 131 | 131 | 131 | 131 |
| **Digital assets, net (crytpocurrencies)** | 1 260 | 1 260 | 1 260 | 1 260 | 1 260 | 1 260 | 1 260 | 1 260 | 1 260 | 1 260 |
| **Goodwill and Acquired Intangibles** | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| **Total non-core invested capital** | **1 591** | **1 591** | **1 591** | **1 591** | **1 591** | **1 591** | **1 591** | **1 591** | **1 591** | **1 591** |
| **Total Invested Capital** | **25 587** | **34 212** | **45 604** | **58 112** | **74 558** | **93 329** | **115 927** | **144 514** | **179 787** | **220 117** |
| **FINANCING - NET DEBT AND OTHER CLAIMS** | | | | | | | | | | |
| **Excess Cash** | 14 885 | 23 255 | 32 992 | 52 797 | 83 510 | 123 067 | 173 180 | 237 442 | 324 970 | 434 763 |
| **Debt** | (5 342) | (4 247) | (1 791) | (731) | (553) | (489) | (357) | (226) | (94) | |
| **Finance lease liabilities:** | *(1 492)* | (1 514) | (1 646) | (1 970) | (2 602) | (3 274) | (4 015) | (4 591) | (5 141) | (4 903) |
| **Operating lease liabilities** | (2 039) | (3 955) | (4 847) | (5 968) | (7 831) | (10 060) | (12 862) | (16 323) | (20 829) | (24 696) |
| **Accrued interest** | (16) | (25) | (11) | (4) | (3) | (3) | (2) | (1) | (1) | |
| **Noncontrolling interests in subsidiaries** | 826 | (826) | (826) | (826) | (826) | (826) | (826) | (826) | (826) | (826) |
| **Redeemable noncontrolling interests in subsidiaries** | 568 | (568) | (568) | (568) | (568) | (568) | (568) | (568) | (568) | (568) |
| **Convertible senior notes** | | () | () | () | () | () | () | () | () | () |
| Total debt | 10 283 | 11 135 | 9 688 | 10 067 | 12 383 | 15 220 | 18 630 | 22 535 | 27 458 | 30 993 |
| Net debt | (4 602) | (12 119) | (23 304) | (42 730) | (71 127) | (107 847) | (154 549) | (214 907) | (297 512) | (403 771) |
| **Financing Invested Capital** | **(4 602)** | **(12 119)** | **(23 304)** | **(42 730)** | **(71 127)** | **(107 847)** | **(154 549)** | **(214 907)** | **(297 512)** | **(403 771)** |
| **EQUITY** | | | | | | | | | | |
| **Total equity** | **30 189** | **46 331** | **68 907** | **100 841** | **145 685** | **201 176** | **270 476** | **359 420** | **477 299** | **623 888** |

## *Cash Flow Map*

| Free cash flow map | 2021A | 2022E | 2023E | 2024E | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E |
|---|---|---|---|---|---|---|---|---|---|---|
| **Core business** | | | | | | | | | | |
| Core NOPAT | 7 435 | 13 810 | 18 536 | 25 357 | 34 817 | 42 767 | 53 169 | 68 192 | 90 353 | 114 307 |
| Core invested capital | 23 996 | 32 621 | 44 013 | 56 521 | 72 967 | 91 738 | 114 336 | 142 923 | 178 196 | 218 526 |
| **Core FCF** | **2 460** | **5 185** | **7 144** | **12 849** | **18 371** | **23 996** | **30 571** | **39 605** | **55 079** | **73 977** |
| **Non-core business** | | | | | | | | | | |
| Non-core result | (2 129) | 2 720 | 4 186 | 6 306 | 9 232 | 11 665 | 14 824 | 19 328 | 25 957 | 32 707 |
| Non-core invested capital | 1 591 | 1 591 | 1 591 | 1 591 | 1 591 | 1 591 | 1 591 | 1 591 | 1 591 | 1 591 |
| **Non-core FCF** | **(3 513)** | **2 720** | **4 186** | **6 306** | **9 232** | **11 665** | **14 824** | **19 328** | **25 957** | **32 707** |
| **Financing** | | | | | | | | | | |
| Financial result | (304) | (1 559) | (1 372) | (1 019) | (571) | (388) | (232) | (225) | (219) | (2 357) |
| Changes in net debt | (1 605) | (7 518) | (11 184) | (19 426) | (28 398) | (36 720) | (46 702) | (60 357) | (82 605) | (106 259) |
| **Debt-related CF** | **(1 908)** | **(9 076)** | **(12 556)** | **(20 445)** | **(28 969)** | **(37 107)** | **(46 934)** | **(60 583)** | **(82 824)** | **(108 616)** |
| Changes in equity | 7 964 | 16 142 | 22 576 | 31 934 | 44 844 | 55 491 | 69 301 | 88 944 | 117 878 | 146 589 |
| Comprehensive income | 5 335 | 14 971 | 21 350 | 30 645 | 43 478 | 54 044 | 67 761 | 87 295 | 116 091 | 144 657 |
| **Equity-related CF** | **2 629** | **1 171** | **1 226** | **1 289** | **1 366** | **1 446** | **1 539** | **1 649** | **1 787** | **1 932** |
| **Financing CF** | **721** | **(7 905)** | **(11 330)** | **(19 156)** | **(27 603)** | **(35 661)** | **(45 395)** | **(58 933)** | **(81 037)** | **(106 684)** |