Counterpoint
Technology Market Research

Counterpoint Automotive Quarterly

GLOBAL EDITION (Q3 2022)

September 2022

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LiDAR Now High on Automotive Industry Radar

September 7.

LiDAR shipments are expected to cross 100 million units by 2030 driven by the automotive industry. The increase in demand for LiDAR will match the increase in demand for ADAS and automated driving in passenger cars and robotaxis. As the number of LiDAR sensors per car increases, reaching a likely maximum of eight units to enable fully autonomous driving, the LiDAR market is expected to grow at a CAGR of 65.9% to reach $15 billion by 2030.

Level 3 and above automated driving will require a fusion of LiDAR, radar and camera sensors. While a few companies, like Tesla and Wayve, will look to make autonomous driving successful without LiDAR, most car manufacturers, like Mercedes-Benz, Nissan, BMW, Stellantis, Volkswagen and Volvo, have already announced their intention to include LiDAR in their sensor suites for ADAS/AD in upcoming car models.

The biggest threat to LiDAR comes from alternative technologies such as cameras and machine vision. A small number of companies believe that vision-based systems are sufficient to support autonomous driving. This can hamper the growth of LiDAR as the cost of switching to cheaper vision-based solutions is relatively low.

Automotive LiDAR market

The current LiDAR market is crowded as more than 70-80 companies are operating globally, targeting different industries and regions. From 2020 onwards, a total of nine companies – Velodyne, Luminar, Aeva, Ouster, Innoviz, Aeye, Indie Semiconductor, Quanergy and Cepton – have announced listing of stocks through SPAC mergers.

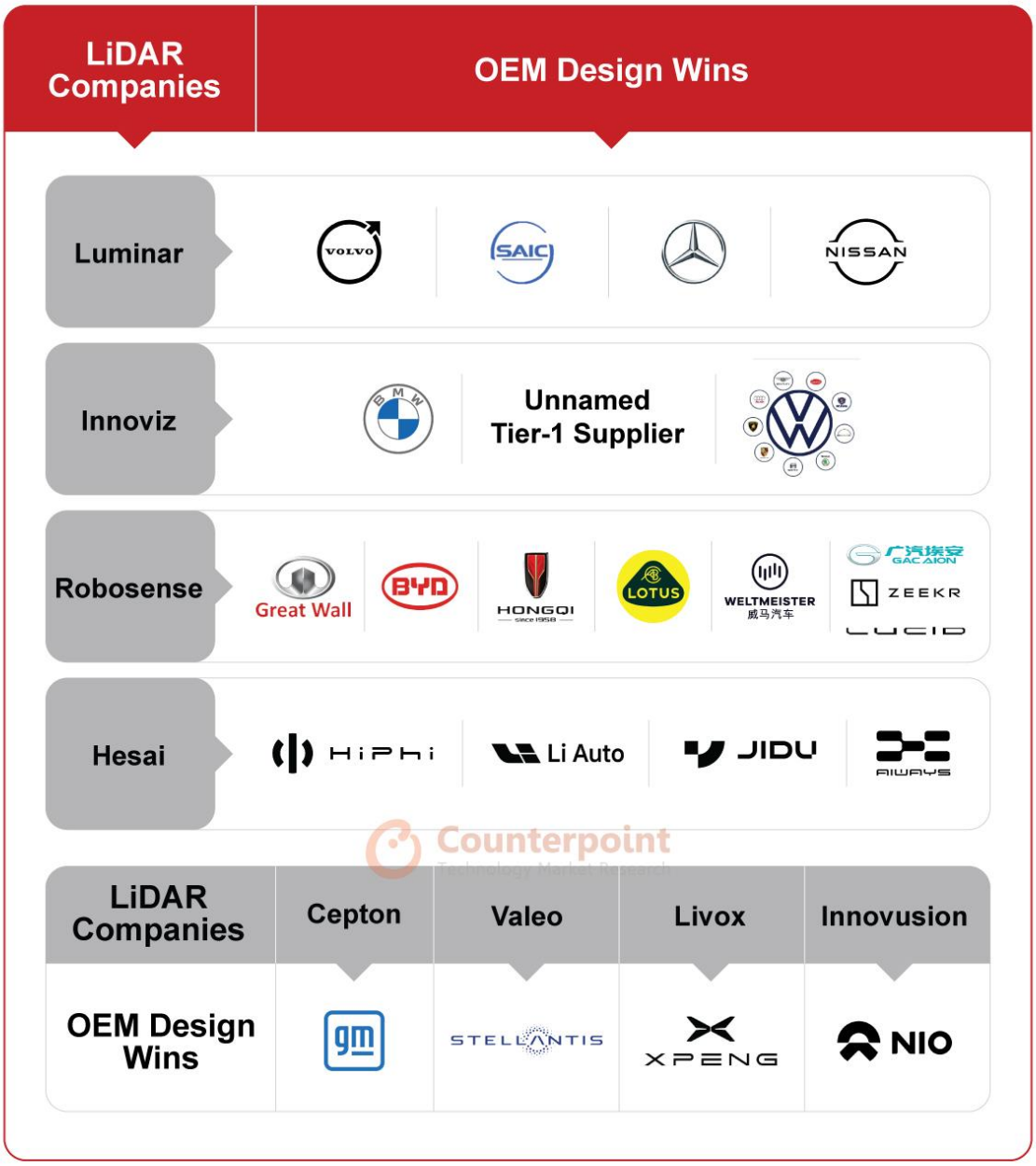
Valeo’s Scala is the world’s first mass-produced LiDAR for cars. In 2021, Mercedes-Benz and Honda introduced Level 3 models S-Class and Legend respectively. Both are equipped with Scala LiDAR. Since 2017, Valeo has shipped more than 170,000 LiDAR units.

According to a Counterpoint study, the value of the automotive LiDAR market reached around $100 million in 2021 as car companies including Toyota, Honda and Chinese companies like Xpeng launched models equipped with LiDAR. Many car OEMs have signed deals with LiDAR suppliers for their upcoming models. Chinese automakers are at the forefront in entering such partnerships.

Car Models Adopting LiDAR

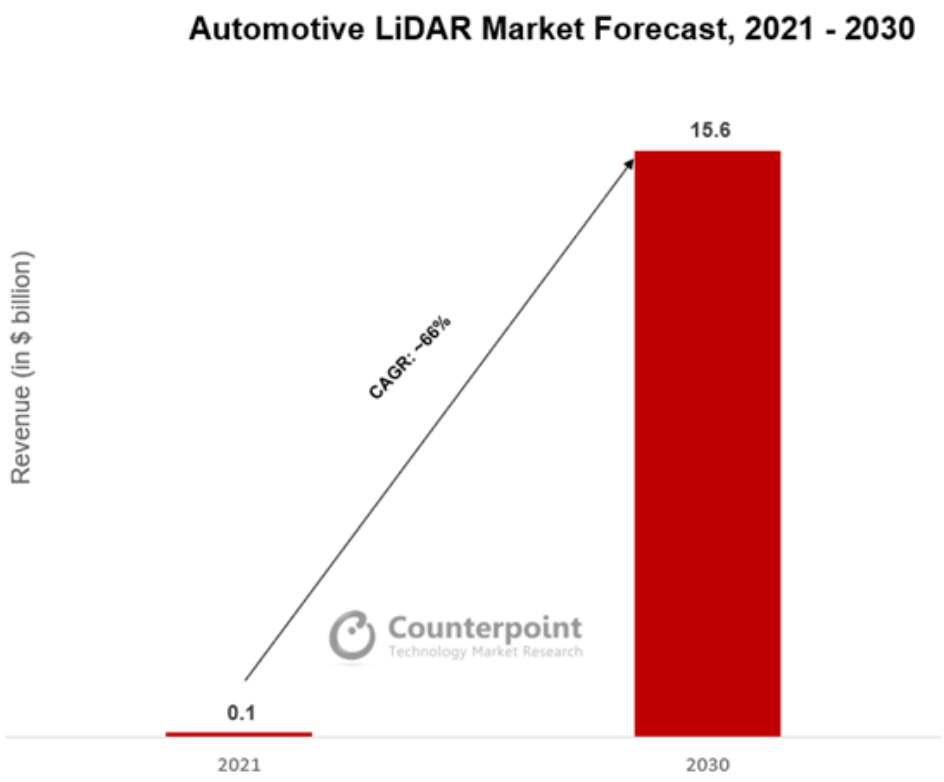
OEM	Model	LiDARs Supplier	Year	No. of LiDARs	LiDAR Placement
TOYOTA		Denso	2021	1	
LEXUS		Denso	2021	1	
XPENG		Livox	2021	2	
LUCID		Robosense	2021	1	
Great Wall		Ibeo	2021	3	
HONDA		Valeo	2021	5	
		Valeo	2022	1	
		Innoviz	2022	1	
NIO		Innovusion	2022	1	
Li Auto		Hesai	2022	1	
WELTMEISTER 威马汽车		Robosense	2022	3	
VOLVO		Luminar	2022	1	
polestar		Luminar	2022	1	

Design Wins so Far for LiDAR Companies



Future of automotive LiDAR market

According to Counterpoint's Global Autonomous Passenger Vehicle Forecast, by 2025, 10% of the new cars sold globally will have Level 3 driving capabilities. Developed markets like the US and Europe will have a higher percentage of Level 3 cars and will first see the entry of Level 4 cars (subject to regulatory approval). This suggests LiDAR has a considerable growth opportunity as Level 3 and above cars will reach the mass market in unison by 2030. According to Counterpoint's Automotive LiDAR Market Trends and Implications, 2022 study, the LiDAR market is expected to grow from $0.1 billion in 2021 to over $15 billion and over 100 million units shipped in 2030.



Conclusion

After the first use of LiDAR in the automotive segment, it took more than five years for LiDAR to make it to a production vehicle and it still has not been successful at achieving broad market penetration. But it is early days and the scope for LiDAR is considerable. We believe that despite the slow initial diffusion, LiDAR adoption will gather pace.

Read this insight on our website: https://www.counterpointresearch.com/lidar-now-high-automotive-industry-radar/

Global EV Sales up 61% in Q2 2022; BYD Leads Market

August 29.

- Global passenger electric vehicle (EV) sales* reached 2.18 million units in Q2 2022.
- BYD Auto overtook Tesla to become the top-selling EV brand globally.
- The top 10 EV models accounted for more than 30% of global EV sales in Q2 2022.

Global passenger electric vehicle* (EV) sales grew 61% YoY to reach 2.18 million units in Q2 2022, according to the latest research from Counterpoint's Global Passenger Electric Vehicle Model Sales Tracker. In total EV sales, battery electric vehicles (BEVs) accounted for almost 72% and plug-in hybrid electric vehicles (PHEVs) for the rest. China remained the market leader in EV sales, followed by Europe and the US. China's EV sales increased by almost 92% YoY in Q2 2022 to reach 1.24 million units from just 0.64 million units in Q2 2021.

Commenting on the market dynamics, **Senior Analyst Soumen Mandal** said, "As the global semiconductor shortage has eased a bit, automakers are able to cater to the increasing demand for EVs. Moreover, EV sales would have been higher if China had not experienced fresh COVID-19 outbreaks during March. Stringent lockdowns in and around major provinces halted the production ramp-up during April, which resulted in China's passenger vehicle market recording its biggest drop since the COVID-19-hit March 2020. The situation improved only after lockdowns were lifted during the latter half of May. The second half of 2022 is expected to deliver better results, but economic downturns, energy crisis, supply chain bottlenecks and rising geopolitical tensions may hinder the growth of China's automotive market, especially EVs."

Market Summary

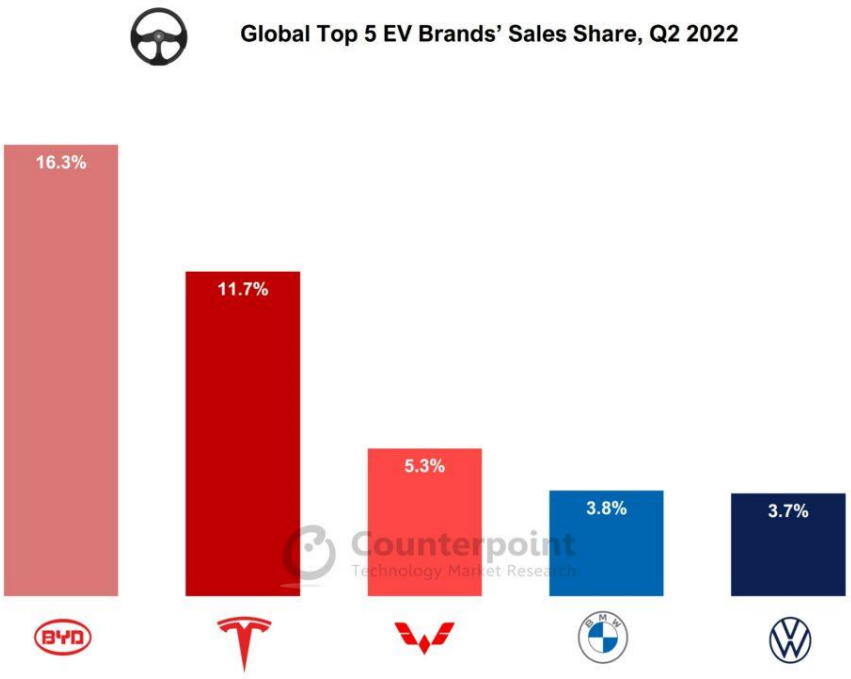
BYD Auto: For the first time, BYD Auto became the top-selling EV brand, dethroning Tesla. During Q2 2022, BYD Auto shipped more than 354,000 EV units, an increase of 266% YoY. The company officially stopped production and sales of internal combustion engine vehicles in March 2022 and has been focusing on the development of BEVs and PHEVs. More than 60% of BYD's sales during the quarter came from its top three models – BYD Song, BYD Han and BYD Qin. The company is slowly penetrating the European market. It has already begun operations in Norway and is looking to start business in Germany, Sweden and the Netherlands.

Tesla: Tesla's global sales during Q2 2022 grew 27% YoY to over 254,000 units, falling short of expectations. Although business in the US increased, its China business was affected by COIVD-19 shutdowns. Tesla sold just 98,000 cars in China during Q2 2022. Cumulative sales in China during April and May fell by 49% YoY. This was the lowest for the automaker since the COVID-19-hit 2020. But its sales during June improved by almost 115% YoY. Despite COVID-19 clouding Tesla's Q2 sales, it remained the global leader in the BEV segment.

Wuling: The joint venture between SAIC, GM and Wuling has proved to be a success as the Wuling Hongguang Mini EV is the best-selling EV model in China. The model has been the undisputed market leader since its release in the second half of 2020. During Q2 2022, Wuling grew by 16% YoY to hold the third rank in the global EV market.

BMW: BMW's EV sales during Q2 2022 increased by 18% YoY. The company has a more prominent presence in the PHEV segment. However, its BEV sales experienced a higher QoQ growth rate (18%) in Q2 2022 compared to its PHEV sales (2%). BMW's aim to have 2 million BEV units on the road by the end of 2025 is motivating it to make significant developments in the EV category. The BMW X3 and i-series models are spearheading the company's push in the BEV segment, while the 5-Series, 3-Series and X5 models are doing the same in the PHEV segment.

Volkswagen: Volkswagen's EV sales declined 9% YoY in Q2 2022. Its shipments across Europe and the US declined by 44% YoY and 74% YoY, respectively. Bottlenecks in the supply of semiconductors and other automotive components due to Russia's invasion of Ukraine, together with rising inflation, pushed EV sales down in these two markets. However, sales in China grew 115% YoY in Q2 2022. Apart from the supply chain crisis, the company's internal issues and failure to develop new proprietary software for its vehicles are impacting the company's EV shipment targets.



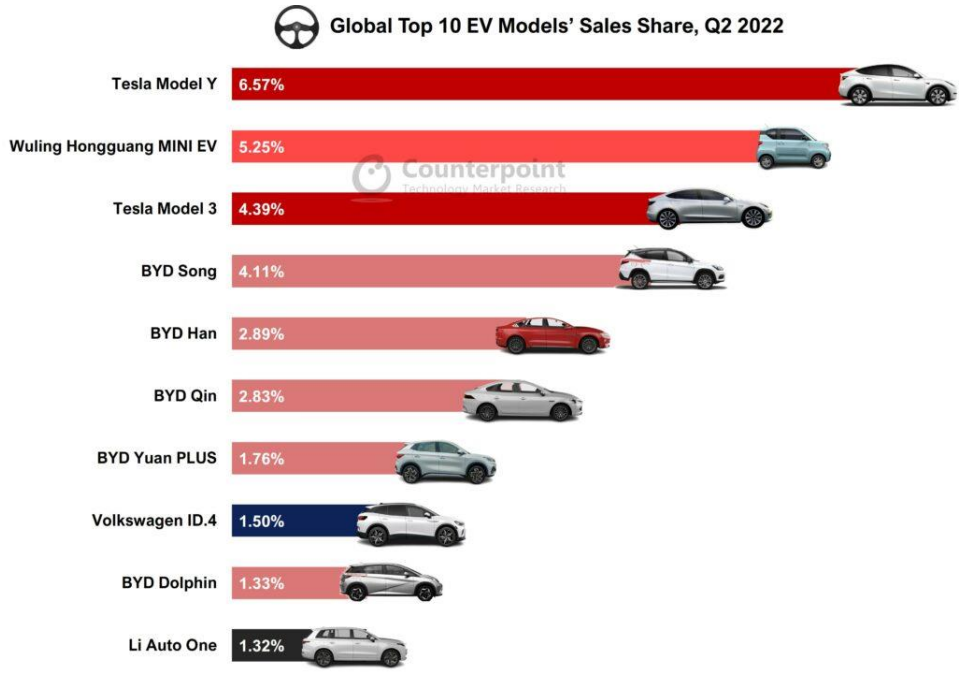
Source: Counterpoint Research Global Passenger Electric Vehicle Model Sales Tracker, Q1 2018 – Q2 2022

Discussing the reasons for the rise in EV sales, **Research Vice President Neil Shah** said, "Incentives play a crucial role in increasing EV adoption. For example, China's strong incentive program for both automakers and consumers has helped the country become the global EV leader. China extended its consumer-side subsidies until 2023, even after deciding to end them in 2021. Moreover, China's dual-credit policy for automakers has been a massive success and the government is planning to phase out consumer-side subsidies as its EV market reaches maturity. In contrast, lower subsidies in European countries have led to slow growth in EV sales. China's EV market grew by over 90% YoY in Q2 2022, whereas Europe's EV market increased by just 16% YoY. Rising EV sales in European nations have led to a discontinuation of many consumer-side subsidies on car purchases with the focus shifting to establishing improved charging infrastructure, including incentives for consumers to install charging points."

Further commenting on EV subsidies, Shah said, "Recently, the US has brought a new EV policy which includes attractive incentives for both automakers and consumers. Benefits upto $12,000 are available for automakers and consumers on the purchase of a new EV. As a result, we expect to see an increase in EV sales in the US. Apart from these big markets, smaller markets like India, Japan, Thailand, South Korea and Malaysia have started providing various benefits for EV buyers and automakers either directly as a rebate in prices or tax exemption."

The top 10 EV models accounted for more than 30% of global EV sales in Q2 2022. Tesla's Model Y remained the best-selling EV model. Wuling's Hongguang Mini EV moved up to the second place, pushing Tesla's Model 3 to third place. The Hongguang Mini EV's long streak of being the best-selling

model in China was broken by the Model Y in June 2022. Six out of the top ten best-selling EV models during the quarter were from Chinese OEMs and are mostly only available in China.



Source: Counterpoint Research Global Passenger Electric Vehicle Model Sales Tracker, Q1 2018 – Q2 2022

Commenting on the market outlook, **Research Vice President Peter Richardson** said, "The automotive industry is unlikely to fully recover from the semiconductor shortages until 2023. We do not expect global passenger EV sales to exceed 10 million units in 2022 considering the COVID-19 outbreaks, production shutdowns due to the power crisis, component shortages and rising consumer price inflation."

*Sales here refer to wholesale figures, i.e., deliveries out of factories by respective brands/companies.

*Under electric vehicles (EVs), we are considering only battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). Hybrid electric vehicles and fuel cell vehicles (FCVs) are not included in this study.

The comprehensive and in-depth 'Global Electric Passenger Vehicle Model Sales Tracker, Q1 2018 – Q2 2022' is now available for purchase at report.counterpointresearch.com.

Feel free to reach us at press@counterpointresearch.com for questions regarding our latest research and insights.

Background

Counterpoint Technology Market Research is a global research firm specializing in products in the TMT (technology, media and telecom) industry. It services major technology and financial firms with a mix of monthly reports, customized projects and detailed analyses of the mobile and technology markets. Its key analysts are seasoned experts in the high-tech industry.

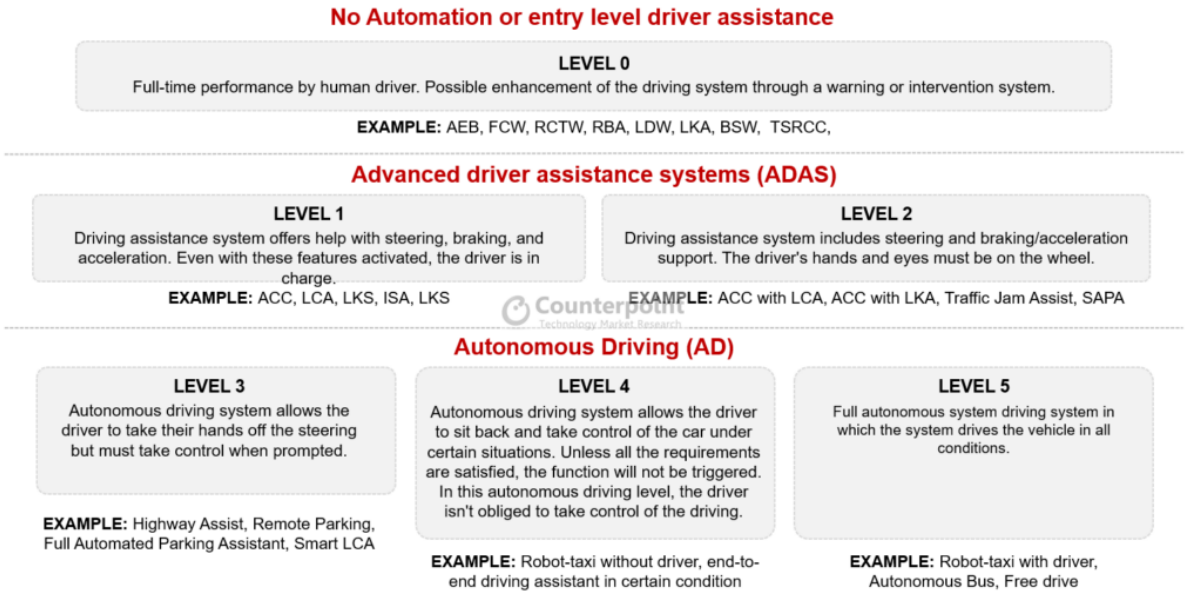
Read this insight on our website: https://www.counterpointresearch.com/global-ev-sales-61-q2-2022-byd-leads-market/

A Promising Yet Challenging Market for Self-driving SoCs

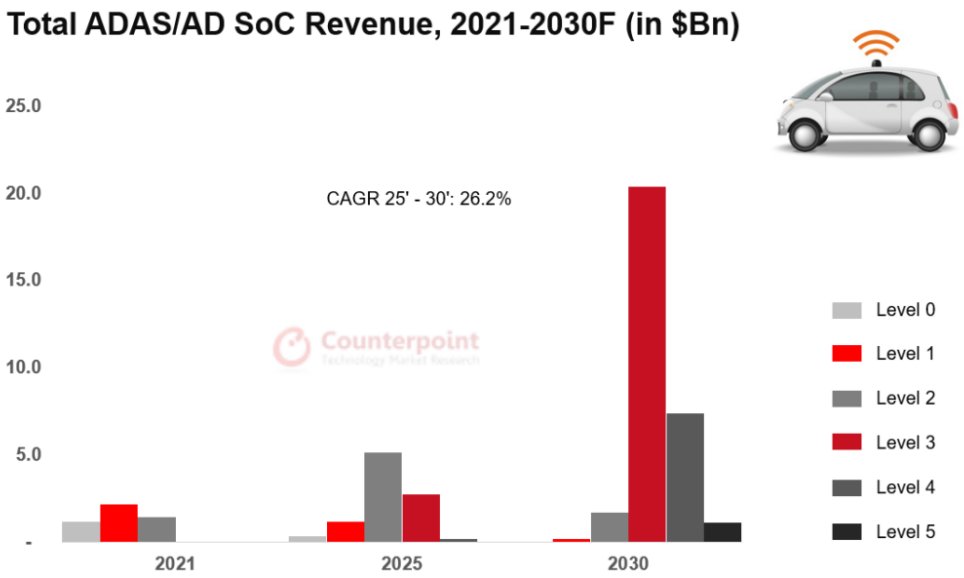
August 22.

- ADAS penetration in global car shipments will reach 78.7% by 2024 as new players help drive the ADAS chip market.
- Level 2 category will have a revenue market share of 44.4% in 2022 and 60% in 2024 due to higher safety criteria and lower component prices.
- The share of Level 4 SoCs in revenue will reach 24% in 2030. These SoCs will be used in luxury automobiles and robotaxis since they have a higher entrance barrier and cost more than Level 3 SoCs.

Semiconductors are becoming more important for automobiles as electrification and intelligence continue to advance. Among these, the level of intelligence has emerged as an essential factor that customers consider when buying a vehicle. The accuracy and efficiency of autonomous driving are determined by the computational capabilities and manufacturing process of the chip. Therefore, the increase in demand for autonomous driving is pushing the demand for advanced processes and will significantly increase the market size of advanced driver assistance systems (ADAS)/Autonomous driving (AD) chips. The computational capability of ADAS/AD processors must meet the requirements of the corresponding autonomous driving level. The Society of Automotive Engineers (SAE) defines the various levels of autonomous driving as follows:



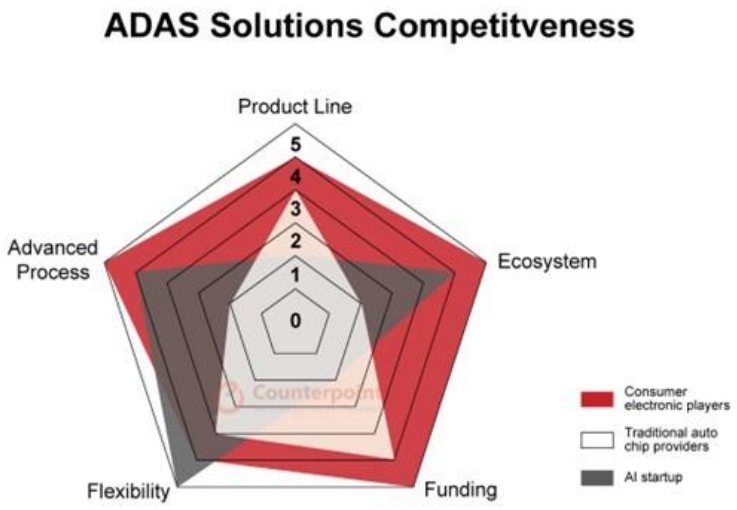
The TOPS (trillion operations per second) of Level 2 ADAS/AD chips is typically between 10 and 100, but the TOPS of Level 3 is between 150 and 200 and the TOPS of Level 4/Level 5 is more than 400 and will reach 1000+. Each level is divided further based on functionality. Basic Level 2 features include only adaptive cruise control (ACC) and lane-keeping system (LKS) and can be achieved by an SoC with only 10 TOPS. However, advanced Level 2 may require up to 75 TOPS to achieve advanced ACC, which can maintain the lane center and pre-control the speed at upcoming curves.



The global ADAS/AD SoC market is expected to reach $30 billion by 2030 with a CAGR of 26.3% between 2022 and 2027. SoCs in the Level 2 category will have a revenue market share of 44.4% in 2022, which will reach a record high of 60% in 2024 due to an increase in safety requirements and a decrease in component prices. Level 3 AD systems will take a few years to gain the public's trust, but by 2027, they will replace Level 2 as the standard. Compared to Level 3 SoCs, Level 4 SoCs have greater computational capability and bandwidth to process more high-resolution images and make a quick response. As a result, the entry barrier and cost of Level 4 SoCs are much higher than those of Level 3 SoCs, hence they will mostly be utilized in luxury vehicles and robotaxis.

The entry barrier to Level 1 and Level 2 ADAS SoC is low. Therefore, ADAS penetration can increase significantly when the cost of ADAS sensors, such as cameras and radars, continues to decline. Counterpoint expects that the global penetration of ADAS in car shipments will reach 78.7% by 2024. At the same time, multiple new players will enter the ADAS chip market. These startups are capable of AI chip design and mass production, and their solutions can swiftly fulfill localized requirements, such as local language and localization algorithms, at competitive prices. Therefore, emerging car OEMs will favor these new solutions. However, traditional automotive chips, such as Renesas and NXP, are also providing solutions. Level 3 employs more sensors and more efficient computing units than Level 2. The most significant difference between Level 3 and Level 4 is the improvement in artificial intelligence, as Level 4 autonomous vehicles must be able to take rapid decisions.

On the other hand, the development of autonomous driving (AD) chips is primarily driven by established consumer electronics giants such as NVIDIA and Intel (Mobileye). The R&D expenditures and entry barriers for AD chips are significantly greater than those for ADAS. In addition to the core AI chip, AD solutions should also incorporate connectivity, sensing systems, image training models, ADAS map development, route planning, vehicle control, driver monitoring systems (DMS), natural language processing (NLP) and intelligent cockpit solutions. Moreover, the AD chip must be able to deliver tailored and region-specific algorithms. This must be accomplished through the collaboration of automotive OEMs and AD chip companies. All of these factors make it challenging to create a good AD chip and the payback time is also lengthy.



Advantages, Disadvantages Faced by 3 Primary ADAS/AD Chip Vendors

In the past, there used to be a distinct division of labor between car OEMs, Tier 1 suppliers and chip vendors (Tier 2). The chip vendors might be either fabless firms or IDMs, and both would place orders to the foundry. Since the demand for semiconductors in the automotive industry was modest and all semiconductors used in automobiles were manufactured with mature processes, the foundry was less important. However, the performance and features in future automotive processors will play a crucial role in migrating to autonomous driving and electrification. Consequently, the ecosystem of collaboration between OEMs, Tier 1 suppliers and chip manufacturers is beginning to shift. Chip providers which were once Tier 2 are beginning to collaborate directly with OEMs. In addition, these three types of companies may engage directly with foundries to secure chip sources.

Competitor landscape

Mobileye is the leading Level 1 and 2 supplier due to its early entry. However, because of a lack of flexibility and superior alternatives, Chinese automakers want to replace Mobileye with NVIDIA or Horizon robots. Additionally, its solution has less computational power than those of its competitors. To keep up with other companies, Mobileye also introduced at CES 2022 its EyeQUltra, EyeQ6 Light and EyeQ6 High SoCs for L4, L2 and L1/L autonomous driving, respectively.

NVIDIA has aggressively entered the automobile autonomous driving market with its expertise in GPUs for the AI business. The benefits of NVIDIA's AD processors include high computational power, extensive software tools and a complete environment allowing clients to create their own algorithms. In terms of clientele, NVIDIA works with the majority of automakers and Tier 1 suppliers worldwide. Atlan, the most recent AD chip from NVIDIA, has been released in 2022 with 1000 TOPS of computational capacity and is expected to enter mass production by 2025, aiming at L4/L5 autonomous driving solutions.

Qualcomm is a pioneer in smart cockpits but a follower in autonomous driving technology. Qualcomm's Snapdragon Ride, a high-performance, low-power autonomous driving solution that supports L1-L5 degrees of autonomy, is aimed at the mid-to-high-end autonomous driving market.

Horizon Robotics, one of the few autonomous driving chip solution vendors in China, will likely supply to Chinese automakers in the coming years. Horizon has positioned itself as a competitor to Mobileye and NVIDIA. A new participant in the industry, it has introduced many products that correspond to Mobileye's solution. In contrast to NVIDIA's general-purpose processors, Horizon's AD SoCs are ASICs,

which consume less power and are more efficient than general-purpose CPUs. However, they are less flexible and may experience the same difficulty when moving to Level 3 and beyond.

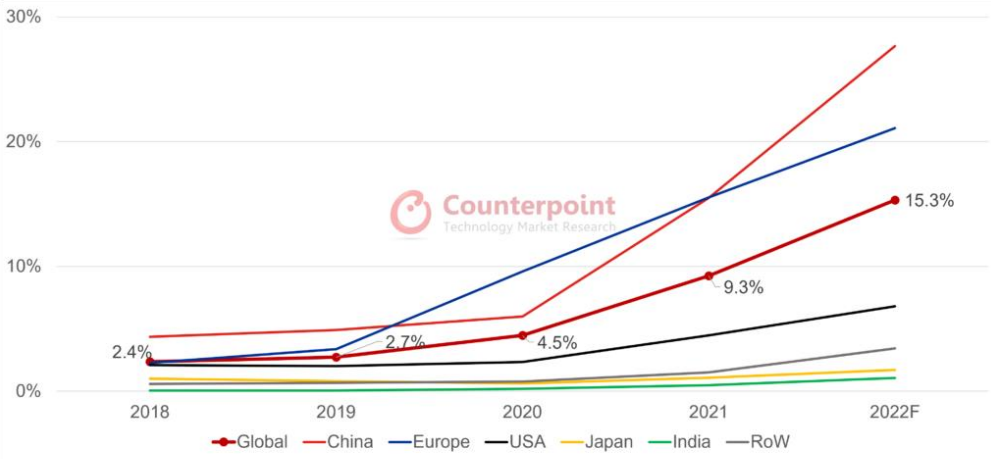
Read this insight on our website: https://www.counterpointresearch.com/promising-yet-challenging-market-self-driving-socs/

Can Chinese EV Makers Make it Big in Japan?

August 1.

For an automotive market like Japan, which is the base of global giants like Toyota, Honda, Nissan and Mazda, and saw early entry of hydrogen-fuel vehicles, it is easy to assume that the country would be a big market for new energy vehicle (NEV) makers. But the numbers tell a different story. According to the latest Counterpoint Research Global Passenger Vehicle Trackers, the NEV penetration in Japan is around 1% compared to around 15% in China.

Global NEV Penetration, 2018-2022F



Source: Counterpoint Research's Global Passenger Car Forecast, 2018-2030F

The total NEV sales in Japan from 2018 to 2021 were just 4% of the total sales in China in 2021. It is easy to conclude that Japan is not an attractive market for EV makers. But opportunities can be found when taking an in-depth look into the market. In fact, the Japanese government is now actively pushing EVs by providing subsidies to set up EV charging stations.

FCEV vs BEV: What will be the future trend?

The debate on fuel cell electric vehicles (FCEVs) and battery electric vehicles (BEVs) has been going on for years now. Many in countries like Japan and South Korea still believe that hydrogen fuel will be the future, while China has been pushing BEVs. Leading NEV maker Tesla has also bet on BEVs and made it to the top of the China NEV market by achieving almost 50% share in H1 2022.

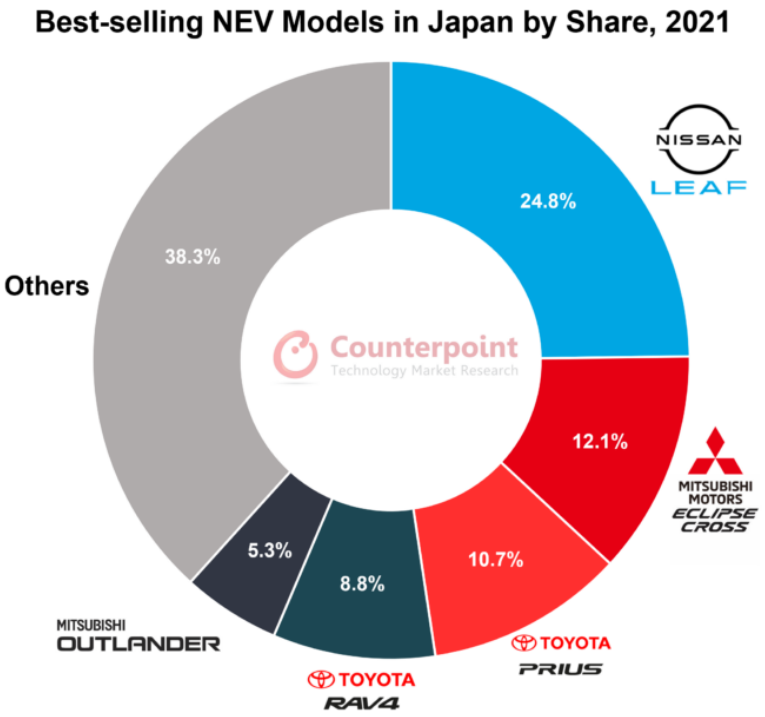
BEV and FCEV Comparison

Vehicle	BEV	FCEV
Mileage		✌
Recharge Time		✌
Low-temperature Performance		✌
Cost of Use	✌	
Weight of Vehicle		✌
Power Performance	✌	
Convenience of Refuelling	✌	
Cost/Price of Vehicle	✌	
Refuel Station Construction Cost	✌	✌ *

Source: Counterpoint Analysis
Note: *If converting an existing gas station into a hydrogen refuelling station, the cost will be relatively lower.

The FCEV has many advantages but the BEV can be scaled up in a shorter time due to a more favorable infrastructure construction cost for the government and enterprises. Moreover, the BEV beats the FCEV both in terms of unit price and cost of use. Given the current macroeconomic headwinds, any plan to set up FCEV infrastructure will find few takers in the government or industry in the near future.

The Nissan Leaf BEV was the best-selling NEV model in Japan in 2021, with more than twice the sales as the second-placed Mitsubishi Eclipse Cross, a plug-in hybrid electric vehicle (PHEV).



Source: Counterpoint Passenger EV Shipment Tracker

Why BYD decided to enter Japan electric car market?

China's BYD recently launched three electric car models in Japan – Seal, Atto 3 and Dolphin. As discussed above, Japan's NEV market is comparatively small. So, what are the factors driving BYD's Japan electric car market entry? We discuss them below:

Not a newbie in Japan's vehicle market: BYD is already selling its electric buses in Japan. Furthermore, through tie-ups with Japanese companies including Toyota, Kansai Electric Power Company and Keihan Bus Company, BYD has a better understanding of the country's consumption patterns.

Cost competitiveness: Within the same price segment, BYD can offer better vehicles in terms of mileage and other performance parameters.

Investment in charging infrastructure: Either by itself or together with the government, BYD has to increase the number of charging stations and charging points. The difference between China and Japan here is that there is a higher proportion of private charging points in China. But in Japan, more public charging points are needed due to the higher cost of land and parking slots. That is why the Japanese government is providing subsidies to set up EV charging stations.

Localization: The Japanese market has a unique taste in consumer electronics, such as the consumers here prefer to buy the iPhone SE while their counterparts elsewhere are likely to favor bigger-screen smartphones. The same is true for vehicles. The Kei car category, created by the Japanese government for the smallest permissible cars, is popular among local car users. Of the three models launched by

BYD, the Dolphin is very similar to a Kei car. The key reasons why Kei cars are welcome in Japan include:

- Streets are narrow in Japan, especially in major cities.
- There are many mountain roads in Japan.
- Parking space is scarce.

China EV makers going overseas: Challenges and opportunities

Unlike the traditional internal combustion engine (ICE) vehicle era, China's vehicle makers are big players in the NEV arena. Core NEV technologies like battery, motor and electronic control systems are all now being developed in China also. It is undeniable that China's NEVs now dominate the market volumes globally. China's NEV companies and even traditional car companies consider it strategically important to enter overseas markets.

Besides China, Europe and US are the other major markets with good EV penetration and growth. The rest of the markets are still in an educational phase. Therefore, some caution is needed for the NEV makers planning to enter markets like Japan.

The acceptance of the NEV: Although the safety levels of BEVs, PHEVs and FCEVs have improved and reached that of ICEVs, it still needs time for a large number of consumers to trust NEVs, especially in the markets dominated by ICEV manufacturers. But the situation is gradually improving with more and more friends, relatives or other known people using NEVs.

Cost: Many times it is the cost that triggers a purchase or replacement decision. For Chinese NEV makers, cost control is important as still many key parts are made only by a few players.

Better products: Besides the core technologies for the car's hardware, new applications such as smart cockpit, driving assistant and driverless option are being introduced on the software side to improve the car user experience. Vehicle makers must continue to focus on removing key pain points of target consumers.

Brand power and market competitiveness: Car consumers are more willing to pay a premium for a known brand name. At the same time, many are looking for more bang for their buck. Therefore, it is important for car makers to study consumer behavior and composition of the market they are planning to enter.

Investment and policies: The NEV ecosystem in many markets is still not mature. Huge investments are required to develop this ecosystem, whether it is manufacturing units, service centers, points of sales or charging stations. With the goal of "zero carbon" in mind, many countries provide incentives to NEV makers and consumers, though the risk of policy change always remains.

Read the insight on our website here: https://www.counterpointresearch.com/can-chinese-ev-makers-make-it-big-in-japan/

China Cloud on Tesla's Q2 2022 Numbers; Fundamentals Remain Strong

July 25.

- Tesla sold more than 254,000 vehicles in Q2 2022, an increase of 27% YoY, which was below general expectations.
- This was the first time since the COVID-19-hit 2020 that the automaker experienced a sequential decline in sales.

After achieving phenomenal growth in Q1 2022, Tesla's global sales during Q2 2022 grew by just 27% YoY to over 254,000 units, falling short of expectations. In QoQ terms, the sales fell 18%. Business during Q2 2022 was affected by COIVD-19-related shutdowns in China. Production units in and around Shanghai were closed temporarily due to strict lockdown measures. As a result, Tesla sold just 89,000 cars across China during Q2 2022. Cumulative sales in China during April and May fell by more than 66% YoY. The situation improved only after the production returned to full capacity in June.

It was expected that the Berlin Gigafactory would boost Tesla's sales in Europe after becoming operational in March 2022. But the production was lower than expected. A few rumored reasons for the low production are litigation with the German government and a shortage of human resources. The Berlin factory is currently focusing on the production and deliveries of the Model Y across Europe.

Tesla bets on in-house battery cell manufacturing

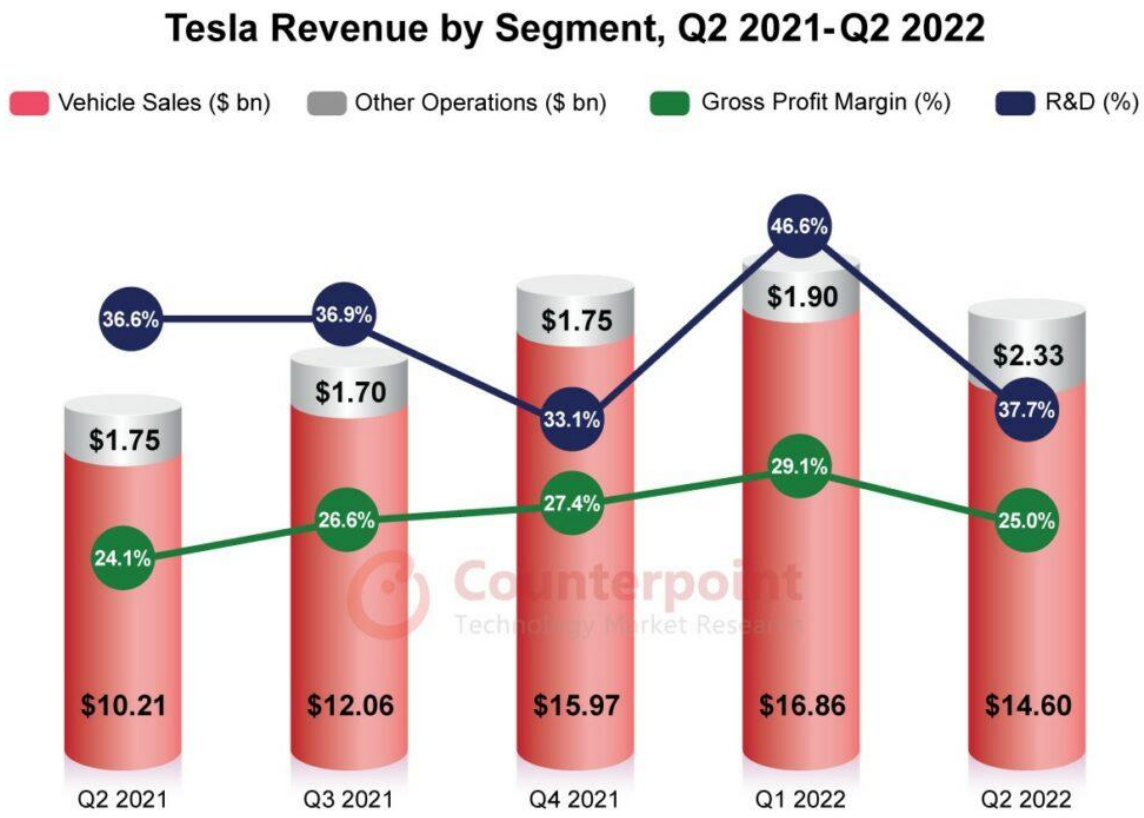
Tesla delivered its first batch of cars equipped with the in-house 4680 battery cells and structural battery packs during this quarter. These cells use a little amount of lithium. With lithium prices soaring worldwide, 4680 cells will help lower the vehicle manufacturing cost. The cells will power the Model Ys coming out of the Berlin Gigafactory. However, Tesla will shut the Berlin Gigafactory for a couple of weeks during autumn to upgrade the production system of 4680 cells.

Other businesses see 33% YoY growth

Although Tesla's vehicle sales in Q2 2022 failed to meet expectations, its other businesses like energy deployment and storage, charging and other services grew more than its vehicle segment. Energy deployment, energy storage, charging and other services grew by 33% YoY. Tesla deployed 106 MW of solar panels and 1.13 GWh of energy storage during Q2 2022. It installed 247 new superchargers worldwide, bringing its global supercharger number to 3,971 units with more than 36,000 connectors.

Tesla converts 75% of its Bitcoins to fiat currency

During Q2 2022, Tesla also converted 75% of its Bitcoins to fiat currency. This was done to have a better cash position against the backdrop of COIVD-19-related uncertainties. This conversion reduced Tesla's digital assets to $218 million and added $936 million in cash to Tesla's balance sheet.



Source: Tesla Q2 2022 Financials and Counterpoint Analysis

Q2 2022 Financial Results

During Q2 2022, Tesla sold more than 254,000 vehicles at 27% YoY growth. The Model 3 and Model Y comprised more than 93% of these sales.

Revenue from vehicle sales stood at $14.6 billion. Total revenue grew by almost 42% YoY, with the COVID-19 impact on China reducing the QoQ number by about 10%. Revenue generated from automotive credit also declined slightly compared to Q2 2021.

The company's other services, like energy storage, charging and insurance, contributed to 14% of its total revenue. Revenue from insurance and vehicle services saw a 54.2% YoY growth, while the energy storage and charging segment grew by just 8% YoY. The energy storage business was expected to perform better but was restricted due to semiconductor-related supply issues.

Tesla's gross profit during Q2 2022 reached $4.2 billion and stood at 25%. Though the shutdown in China adversely affected the business, increase in US deliveries along with the higher average vehicle price helped Tesla earn 47% more profit YoY.

R&D costs grew 16% YoY during Q2 2022. Tesla is trying to achieve complete autonomy by 2024 by perfecting Full-Self Driving (FSD) software. But the resignation of Andrej Karpathy, the director of artificial intelligence and autopilot system at Tesla, in mid-July is likely to stall the progress of this project, which is expected to get delayed by a year.

Source: Tesla Q2 2022 Financials and Counterpoint Analysis

Market Outlook

Despite experiencing a dip during the second quarter of 2022, Tesla's future outlook seems strong and promising with strong fundamentals. Tesla has secured the supply of LFP batteries for its Shanghai Gigafactory by signing a deal with BYD. Transitioning to LFP batteries and 4680 battery cells will help Tesla reduce vehicle manufacturing costs. Moreover, Tesla expects the Berlin Gigafactory production capacity to cross 100,000 units by the end of 2022. With all these developments, Tesla is expected to cross more than 1.2 million units of vehicle deliveries by the end of 2022.

Read this insight on our website here: https://www.counterpointresearch.com/china-cloud-on-teslas-q2-2022-numbersfundamentals-remain-strong/

Local Lead: After Uber, Grab Aims to Overtake Google Maps, HERE in Southeast Asia

July 14.

In 2018, when Uber was dominating the ride-hailing market across the globe, it sold its Southeast Asian business to Grab, recognizing its weak credentials in offering localized services. Fast forward to June 2022, when Grab announced that it would be competing with Google and HERE by launching a map service called GrabMaps. Currently, the GrabMaps service is powering Grab in seven out of the eight countries where it operates. Grab aims to become entirely dependent on GrabMaps by Q3 2022.

Grab initially used mapping solutions from OpenStreetMap (OSM) and HERE to power its location-based services. In 2017, the company started to build GrabMaps for its internal usage as it wanted to serve its customers with more accurate arrival times by providing pinpoint pick-up and drop-off locations to its driver-partners. In this blog, we will try to understand in detail why Grab decided to launch its own map service, its outlook and implications for other map providers such as Google and HERE

Why Grab decided to launch its own map service?

Hyper-localization needs: Grab executives have been quite vocal about the maps from Google and HERE being more “car-centric” and less localized with points of interest (POIs), accuracy and updates, especially in the SEA markets where Grab operates. Though OSM is even less accurate, Grab is using it as a base and boasts millions of edits to it to improve the maps for SEA countries.

Accuracy: Grab has been struggling since 2016 to provide accurate maps. It tried to depend on and integrate multiple third-party sources from OSM, Google Maps and HERE, but keeping the maps up to date remained a challenge. The edits to POIs and local routes, which had been mostly outsourced before (like to GlobalLogic), had quality issues, which Grab aims to fix with a bigger in-house team.

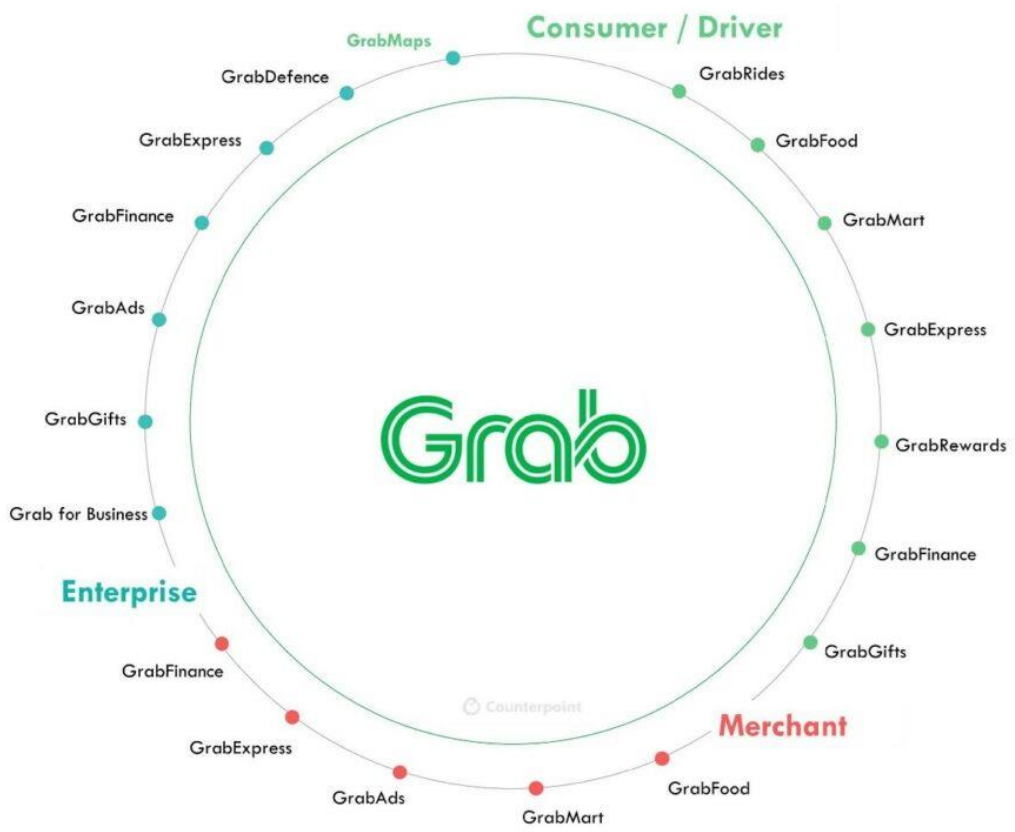
Scale: With all the hyperlocal intelligence, maps data and location-based services, Grab has built a significant scale to serve its core SEA markets better than third-party providers. It is estimated that GrabMaps will reach a billion API calls per month later this year. GrabMaps is also on a mission to increase its POIs to close to 40 million by the end of 2022.

Gamification and incentivization: Grab is looking to incentivize the community members. They can earn additional income from their contributions and edits. For example, Grab drivers are estimated to contribute on an average half a million inputs per quarter for map edits, whereas the users contribute to edits running into thousands per quarter. Crowdsourced street-level imagery using KartaCam is another good example of how Grab is trying to build its own maps with a richer set of imagery.

Super-app to super-platform: As Grab has become bigger in the last few years with hardly any competition, the near-monopoly status has driven its ambition to scale in multiple ways leveraging its rich location-based data and intelligence. Since it is community-based, the real-time location updates and edits from driver-partners and consumers can help it become more accurate and hyper-localized such as Naver in South Korea or Google in the US or HERE in Europe. It aims to become both a B2C and a B2B platform by building, controlling and managing its own location stack of maps, data and intelligence, and licensing the data to other businesses for different solutions in the region.

What are Grab map service outlook and implications?

The decision to launch GrabMaps as a mapping solution in Southeast Asian countries would directly put Grab in competition with established and legacy mapping solution providers like Google, HERE and TomTom



Business: GrabMaps will directly compete with HERE and Google in the eight SEA markets which are home to more than half a billion population and millions of POIs. In the consumer space, this is a direct blow to Google as advertisers will flock to Grab, which will look to position itself as a provider of more localized and accurate map data. In the enterprise space, automotive solutions, particularly embedded navigation, is one area where GrabMaps can challenge the dominance of HERE. The rise in electric vehicle (EV) sales and ADAS in Southeast Asia is a great opportunity for GrabMaps to present hyper-local solutions for EVs, like EV routing and charging point network and availability. In transport and logistics (T&L), enterprises and the public sector, it will directly compete with HERE and attract entities to adopt its highly localized maps that are kept fresh by Grab's thousands of drivers and users.

Scale: It will be important to see with whom Grab partners within the ecosystem. It certainly won't be Google due to conflicting business models. Grab will be sitting on tons of location intelligence data and still will need to improve its maps in core markets or other markets it decides to enter

Costs and pricing: Building and maintaining maps is not easy and is Capex and Opex intensive. But since Grab already has millions of users, businesses and drivers on its platform, whom it can flexibly incentivize and track to improve its maps, its cost concerns should be much less. This should, in turn, allow Grab to initially offer (say for the first two years) very attractive API pricing compared to HERE or Google to win customers for its B2B platform. This will also trigger a price war.

Readiness and platform capabilities: While Grab has been successful as an O2O platform and spread out with multiple services to scale the platform opportunities, it is going to be a task to match the capabilities and service-level agreements (SLAs) which HERE currently offers and promises. This would be one of the key differentiators for HERE in terms of its enterprise-grade platform and GrabMaps will take at least two to three years to catch up. This gives a window of opportunity for HERE to improve its hyper-local capabilities in SEA markets and catch up with GrabMaps on mapping intelligence. Partnerships for building map intelligence will be the key for HERE in this region.

Key conclusions

Grab recognizes that global players often don't provide localized solutions, which results in dissatisfaction among the region's consumers. Therefore, Grab looks to bridge this gap through hyper-local solutions by leveraging its strong presence in the region and understanding the dynamics of the local markets better than global players.

By benefitting from its community network and local knowledge of the drivers, Grab offers more accuracy, freshness and coverage than its competitors like Google and HERE.

Grab's goal is to become a double-sided platform while creating, controlling and managing its location data, maps and intelligence and licensing the data for different solutions in the region. For instance, by leveraging its fleet of vehicles, Grab can offer solutions like real-time traffic data to others and can evolve as a connected vehicle data platform like HERE and Wejo.

The key challenge Grab will encounter is to attain the same capabilities and SLAs which HERE offers. This would put Grab behind HERE for enterprise-grade solutions. The coming next two to three years will decide who gets to lead the SEA region's mapping industry.

Read this insight on our website here: https://www.counterpointresearch.com/grab-aims-overtake-google-maps-southeast-asia/

Global EV Shipments Up 79% YoY in Q1 2022; Tesla Remains Leader

July 8.

- In Q1 2022, global electric passenger vehicle (EV) shipments exceeded 1.95 million units.
- Passenger battery electric vehicle (BEV) shipments grew 90% YoY during the quarter.
- EV shipments are expected to cross 10 million units by the end of 2022 and 58 million units by 2030.

New Delhi, London, San Diego, Buenos Aires, Hong Kong, Beijing, Seoul – July 8, 2022

After surviving the COVID-19 pandemic and semiconductor shortages, the global automotive sector continued to recover in early 2022. Passenger vehicle shipments, especially electric passenger vehicle* (EV) shipments, grew during the first quarter. According to the latest research from Counterpoint's Global Electric Passenger Vehicle Model Shipments Tracker, EV shipments grew 79% YoY in Q1 2022 to reach 1.95 million units. Of these, battery electric vehicles (BEVs) accounted for 73% and plug-in hybrid electric vehicles (PHEVs) for the rest. China remained the market leader in EV shipments, followed by Europe and the US. China's EV shipments increased 126% YoY in Q1 2022 to reach more than 1.14 million units from just 0.5 million units in Q1 2021.

Commenting on the market dynamics, **Senior Research Analyst Soumen Mandal** said, "The EV market is witnessing a boom. However, shipments would have been higher if the automotive supply chain was not affected by the Ukraine crisis and fresh COVID-19 waves in China in March 2022. With EVs comprising just 12% of the total passenger vehicle shipments during the first quarter of 2022, there is a lot of scope for expansion. Fresh players are entering the market to benefit from the opportunity. To counter new entrants, existing players are using leading-edge technologies to have improved battery, superior IVI system and higher levels of ADAS in their EV models as major selling points."

Tesla: Tesla has registered phenomenal growth over the course of a year. The company's shipments grew 68% YoY in Q1 2022 and are expected to cross 1.3 million units by the end of 2022. After operations started at the Shanghai Gigafactory in 2019, Tesla's China shipments skyrocketed. With the Berlin Gigafactory becoming operational in March, Europe sales are likely to increase in Q2 2022. Tesla is currently the global EV market leader. In Q1 2022, it sold more vehicles than the next three OEMs combined in the BEV segment. Tesla will face competition from BYD, NIO and XPeng in China while Volkswagen is gearing up to compete on the global front. Despite this competition, Tesla is likely to remain the market leader in the BEV segment for the next few years.

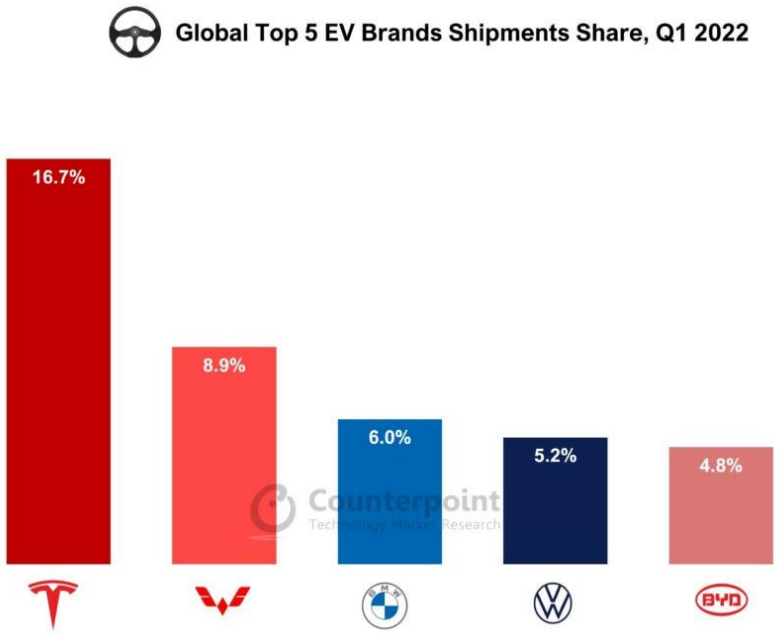
BYD Auto: BYD emerged as China's top EV seller during Q1 2022. Its EV shipments increased by a whopping 433% YoY to reach more than 0.28 million units. This was due to BYD increasing its production of BEVs and PHEVs while completely halting its internal combustion engine business. In Q1 2022, BYD's BEV and PHEV shipments grew 271% YoY and 857% YoY, respectively.

Wuling: The joint venture between SAIC, GM and Wuling has proved a success as the Wuling Hongguang Mini EV is the most sold EV model in China. Compared to Q1 2021, Wuling grew by just 14% and currently holds the third rank in the global EV market. Wuling achieved high EV shipments by just operating across China and Indonesia. Expanding across the SEA countries will help its business to grow as competition in the region is not that high. An early entry will help Wuling to secure a significant market share.

BMW: Over the years, BMW has developed its business more in the PHEV segment than in BEV. BMW's 16% YoY growth is mostly due to its offering of several new and improved PHEV models. BMW's

BEV shipments are predominantly driven by the company's i-series models, while BMW Series 3 and Series 5 models are driving its PHEV shipments.

Volkswagen: Volkswagen is working hard to compete with Tesla in Europe, but its efforts have been disrupted by the supply crisis caused by Russia's invasion of Ukraine. With its ID models, Volkswagen wants to capture a significant share of the EV segment. During Q1, Volkswagen's EV shipments increased by 25% YoY. China remains Volkswagen's top EV market, followed by Europe and North America. Across all major regions, the company's all-electric ID.4 model registered most shipments.



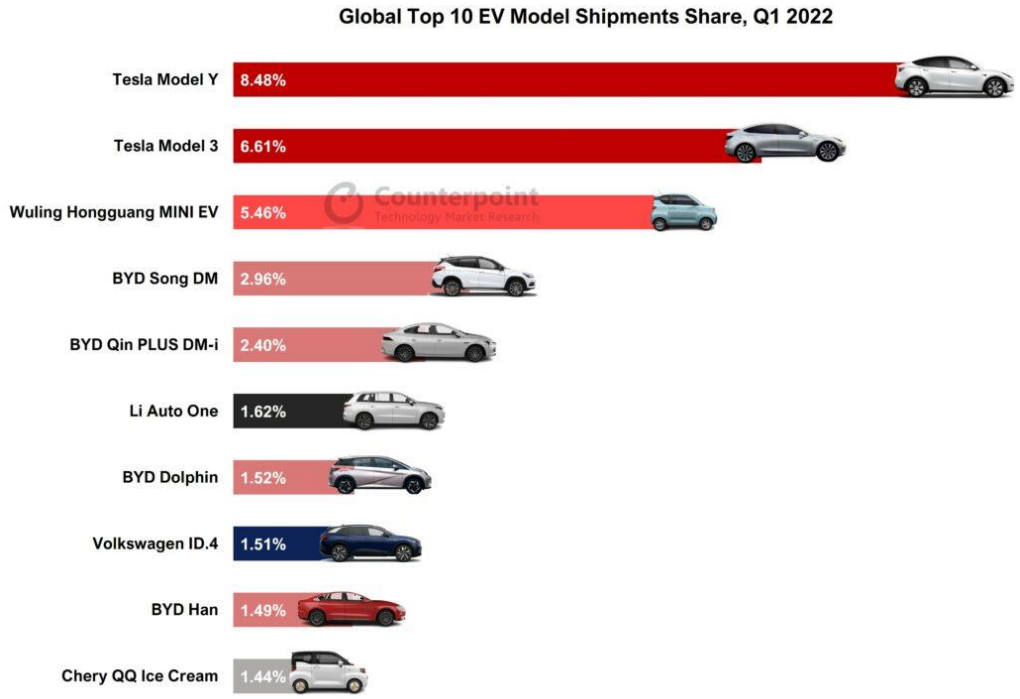
Source: Counterpoint Research Global Electric Passenger Vehicle Model Shipments Tracker, Q1 2022

Discussing the reasons for the rise in EV shipments, **Mandal** further added, "Technological development is the key reason behind the increase in EV shipments. Battery technology has undergone recent breakthroughs. These developments have made batteries capable of longer ranges and longer overall lives. Range anxiety, one of the barriers to EV adoption, has reduced. The development of composite charging network infrastructure, subsidies from governments on EV purchases and increasing fuel prices combined with increasing environmental awareness are other reasons."

On battery technology, **Research Vice President Neil Shah** said, "Different compositions of lithium-ion batteries and the development of LFP batteries have been a game changer in this field. Battery chemistries like NMC, NCA and LFP are used widely for their high energy density and safety. After an increase in the price of lithium due to the Ukraine crisis, OEMs are transitioning to LFP batteries which use very little lithium and are safer than NMC and NCA composition batteries. Alongside LFP, manufacturers are also working on revolutionary solid-state battery technology. Besides being safer, solid-state batteries have higher energy density and will be able to outperform other battery chemistries. In 2021, NIO showcased its new ET7 with a solid-state battery of 150kWh. But this was later replaced by a semi-solid-state battery for the vehicle's launch in March 2022. Despite several clear advantages, the high cost of solid-state batteries will limit their potential for mass adoption in the near term."

The top 10 EV models accounted for a third of global EV sales in Q1 2022. With Tesla's new gigafactories coming up across the world, its Model Y and Model 3 currently hold the first two positions. Wuling's budget model, the Hongguang MINI EV, has been the best-selling model in China for more than 15 months. Seven out of the top ten EV models are from Chinese OEMs. This shows the

development of Chinese EV market over the past few years.



Source: Counterpoint Research Global Electric Passenger Vehicle Model Shipments Tracker, Q1 2022

Commenting on the market outlook, **Research Vice President Peter Richardson** said, "With many countries aiming to phase out gasoline-powered vehicles by 2040, car makers are facing a seismic change. Not only are they having to move to electric drivetrains, but cars are becoming smart, connected and increasingly able to drive themselves. This is the most tumultuous period since the auto industry was established more than a century ago. According to Counterpoint's Global Passenger Car Forecast, EV shipments are expected to exceed 10 million units in 2022 and reach around 58 million units in 2030. There will be a fight for existence as incumbent auto manufacturers use their scale and manufacturing expertise to fend off new entrants that have no legacy business to protect. The current economic headwinds are likely to favor deep-pocketed incumbents, but some new entrants will either survive on their own or be acquired by established players."

*Under electric vehicles (EVs), we are considering only battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). Hybrid electric vehicles and fuel cell vehicles (FCVs) are not included in this study.

The comprehensive and in-depth 'Global Electric Passenger Vehicle Model Shipments Tracker, Q1 2018-Q1 2022' is now available for purchase at report.counterpointresearch.com.

Feel free to reach us at press@counterpointresearch.com for questions regarding our latest research and insights.

Background

Counterpoint Technology Market Research is a global research firm specializing in products in the TMT (technology, media, and telecom) industry. It services major technology and financial firms with a mix of monthly reports, customized projects and detailed analyses of the mobile and technology markets. Its key analysts are seasoned experts in the high-tech industry.

Read this insight on our website here: https://www.counterpointresearch.com/ev-shipments-grew-79-yoy-in-q1-2022/

Europe Connected Car Market Drives Forward Despite Bumps

June 15.

- 4G car market share will hit the high of 91% in 2022 before declining.
- 3G car market share will be in a continuous decline after 2021.

London, San Diego, Buenos Aires, New Delhi, Hong Kong, Beijing, Seoul – June 15, 2022

Europe's connected car* market bounced back in 2021 after the pandemic-induced downturns. However, the ongoing semiconductor shortage led to production losses which prevented the continent's overall automotive market from returning to pre-pandemic normalcy. According to the latest research from Counterpoint's **Smart Automotive Service,** Europe's connected car market grew 16% YoY in 2021 to cross 8.6 million units, with Germany leading the charge followed by France. In terms of most 4G cars shipped, Germany was at the forefront followed by France and UK. 5G cars are expected to take center stage going forward.

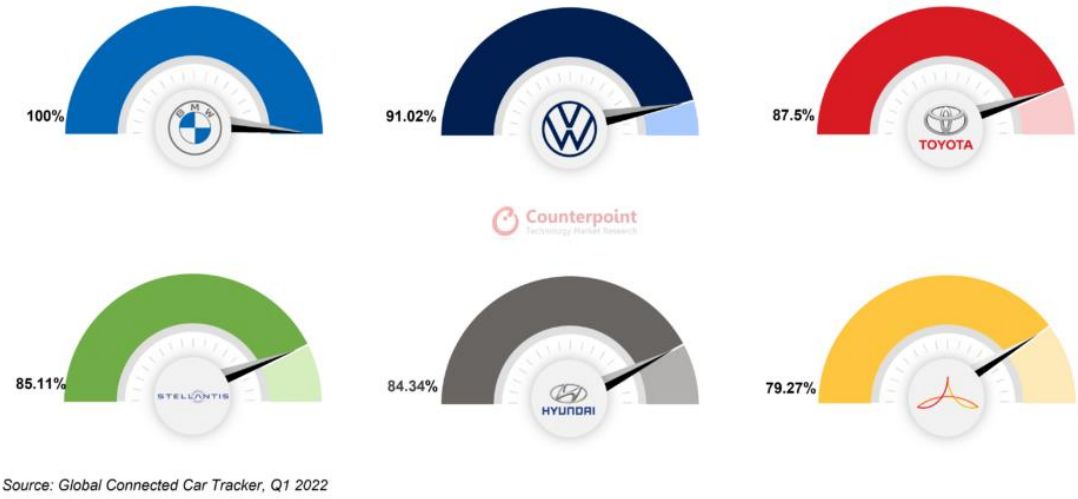
Commenting on the European automotive market's performance, **Research Analyst Fahad Siddiqui** said, "The rapid electric vehicle (EV) uptake in Europe is not only aiding automakers in meeting the CO_2 emission targets and providing attractive deals to customers through government subsidies but also helping increase the connected car penetration. The market share of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) with respect to EV sales stood at 38% and 29% respectively in 2021, with the leader in the BEV market being Tesla followed by Volkswagen and then Renault. OEMs are introducing more EV models to remain future proof. In addition, having a mix of ICE (internal combustion engine) vehicles and EVs in their portfolios means they can continuously upgrade their expertise in the electrification domain and potentially gain market share."

After witnessing a decline in 2020, Europe's connected car market performed well last year registering a yearly growth of 16%. The top three automotive groups in 2021 were Volkswagen, Stellantis, and BMW. Volkswagen was heavily affected by the chip shortages, which restricted sales and resulted in low inventories with dealerships. Within Volkswagen Group, connectivity penetration for Audi and Volkswagen brands stood at 90% and 52% respectively with the latter shipping a higher number of connected cars. Being a luxury automaker, Audi enjoys a higher connected car penetration rate with more connected cars in its fleet. The countries where these brands performed best were Germany followed by the UK.

Senior Analyst Soumen Mandal said, "In 2021, China led the EV market, followed by Europe. By 2026, Volkswagen Group is likely to be dominant, followed by Stellantis and the Renault-Nissan-Mitsubishi alliance. In terms of market share, Volkswagen will account for almost 20% of the total market. All other automotive groups are likely to account for less than 15% share."

Mandal added, "Next generation connected cars were already visible last year, with the first global 5G car hitting the roads in November. The automobile industry is pivoting towards new vehicle architectures and software will play a key role in this. Software-defined vehicles will employ emerging architectures in the form of zonal distribution of ECUs (electronic control units) with cross-domain functionality, less wiring, and high-performance computers. Furthermore, in the next few years, upgraded network infrastructure will help cars to communicate with networks and with each other to complement the increased autonomous driving efforts. This may help to counteract growing congestion and will be an important part of smart city developments."

Europe Connected Car Penetration Forecast by Automotive Groups, 2026F



Source: Global Connected Car Tracker, Q1 2022

Keeping the technology evolution in mind, **Research Vice-President Neil Shah** said, "Currently, 4G technology can support good data throughput and specialized connectivity for applications related to telematics, predictive analytics, and infotainment in a connected car. However, as electronics in cars are advancing rapidly to cater to higher speed and more data-intensive applications, 5G will play a crucial role in enabling next-level connected mobility. Around a third of cars sold in Europe in 2026 will have 5G connectivity. The leading 5G car brands will be BMW, Stellantis, Volkswagen, and Ford. Ford will introduce 5G connectivity in the US in 2022 followed by other markets later in the year. Volkswagen is expected to introduce a 5G car by the end of 2023, while Stellantis will do so by the end of this year."

*The connected car data here refers to only passenger cars with embedded connectivity.

The comprehensive and in-depth 'Global Connected Car Tracker, Q1 2019-2026F' is now available for purchase at http://report.counterpointresearch.com/. Feel free to reach out to us at press@counterpointresearch.com for questions regarding our latest research and insights.

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