

## HIGHLIGHTS IN THIS ISSUE

BY SAM FIORANI

Supply chain issues continue to hit the headlines – whether it’s a lack of semiconductors or problems making batteries or disruptions in the importation other parts. Just-in-time issues have resulted in out-of-stock problems, slowing output, increasing prices and upsetting customers. A happy medium between no inventory and excess inventory is needed but a solution is not waiting in the wings. This will be weighing on the industry for years to come unless a modern W Edwards Deming re-revolutionizes the assembly process. If he or she is around, they need to make themselves known, and soon.



**Analysis of the high-stakes EV startups and how to sift the winners from the losers, p14**

## NEWS



BY SAM FIORANI

### Ford F-150 Lightning production halted

The industry’s growing pains in the transition to fully electric vehicles continue and another automaker has seen the need to halt production. Output of Ford’s key F-150 Lightning was stopped on February 14, as have shipments of already produced models. The electric full-sized pickup has been rolling off of the assembly line in Detroit since early 2022 and a third shift was added to increase output.

An issue was discovered in the production of the batteries, but no details were announced. None of the affected batteries were delivered to customers. There’s no official word on exactly how long the hold on production and shipments will continue but a quick turnaround is expected.

### Nissan ups ante in Europe

Renault and Nissan have been working on their partnership for months, with the two automakers revising their cross-ownership agreements, among other changes. The latest change involves Nissan raising its focus on Europe. When the company introduced its “Nissan Next” drive in May 2020, the plan was to increase profitability and introduce a range of updated models, but Europe was not key to this move.

That has now changed and Europe is growing in importance for the automaker’s next chapter. Closing the Barcelona plant in Spain in 2021 raised the fear that Nissan’s large Sunderland plant in the UK could be next. Recent requests by Nissan for the UK government to provide assistance to ensure the continued operation of





Its UK plant is still key for Nissan

Sunderland could be part of the automaker's change of heart for the European operations.

## Global assembly plant shake-up

As vehicle manufacturers around the world look to right-size their production footprint, a growing number of assembly plants are being eyed by other automakers. Toyota's plant in St Petersburg, closed following Russia's invasion of Ukraine, is in the crosshairs of an Iranian automaker for future expansion. Ford's Saarlouis plant in Germany is scheduled for closure but a number of companies are looking into acquiring the 400,000-unit facility, including Magna, NEDCAR and BYD, the last of which is currently looking for expansion into Europe.

## BYD extends its reach in Europe

Global expansion of BYD has been previously covered in these pages (November 2022) and more details are emerging. Shortly after Ford announced its plans to close its Saarlouis plant in 2025, BYD emerged as a potential acquirer

BYD may build its own plant in Europe for EVs such as Seal



of the factory. Now, BYD is looking into building its own plant in Europe. The concept is being floated and has not been locked in, but the efficiencies of a dedicated electric vehicle factory weigh in favor of BYD's own plant rather than converting an existing ICE-based plant. The likelihood of BYD taking over Ford's German factory has quickly slipped and a greenfield plant has emerged as a better bet.

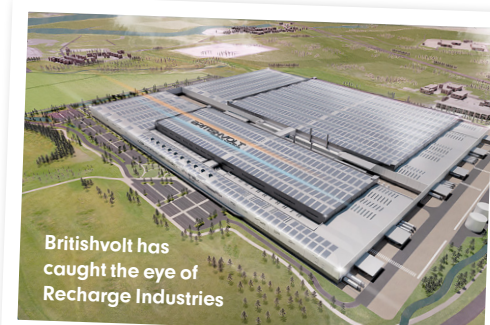
## Tesla expands Nevada plant

With an additional investment of US\$3.6 billion, Tesla is increasing capacity at its Gigafactory 1. Located in Sparks, just outside of Reno, Nevada, the plant will now have more space for production of the 4680 battery cells and volume output of its Class 8 Semi. The extra battery cell capacity will be necessary to produce the battery-intensive Semi. With an intention to dramatically expand production of the Semi, the

additional assembly space will be needed as output is ramped up over the next two years.

## Britishvolt may not be dead

Northumberland-based Britishvolt went into administration in January with the expectation that the three-year-old startup would close. UK government funding for the battery maker was denied in late 2022, putting the plans for its



Britishvolt has caught the eye of Recharge Industries

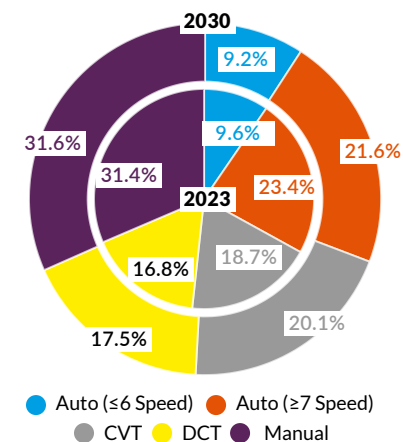
## 'THE LIKELIHOOD OF BYD TAKING OVER FORD'S GERMAN PLANT HAS SLIPPED'

north-east England plant, where construction was halted in August, on hold.

Early reports of outside investors taking over the company in January disappeared. Recharge Industries, based in Australia, emerged late as the preferred bidder for the assets of Britishvolt, but a resurrection of the company has not yet been outlined.

## TRANSMISSION CONSUMPTION BY TYPE

Excludes BEVs



Source: AutoForecast Solutions

**GLOBAL ELECTRIC VEHICLE INITIATIVES**



BY CONRAD LAYSON

**General Motors owns its own lithium supply**

General Motors received a mostly favorable decision from Chief Judge Miranda Du of the US District Court for the District of Nevada, in Reno, in the matter against mining company Lithium Americas. The Bureau of Land Management was held responsible for not fully clearing the land use rights that Lithium Americas intends to use to dump mining waste from its proposed Thacker Pass lithium mine in Humboldt County, Nevada.

On January 31, GM invested US\$650 million in Lithium Americas Corp to develop and begin operations at the Thacker Pass open pit mine. GM's investment makes it the largest Lithium Americas shareholder, replacing China's Gangfeng Lithium in the process. For the investment, GM expects to receive all of the Thacker Pass mine output of 40,000 tons of lithium carbide annually, beginning in 2026. When that has been refined, GM and joint venture Ultium Cells would be able to build enough battery cells to power 400,000 battery-electric vehicles (BEV) per year.

The Thacker Pass mine will yield lithium-laden clay instead of spodumene rock ore. Unlike the evaporative brine pool method of producing lithium carbonate, Hazen Research of Golden, Colorado, has developed a way of extracting lithium carbonate after first baking the lithium-rich pellets and then leeching the compound using either water or sulfuric acid. The process yields ores of 82% purity, with further



refinement yielding upwards of 92% purity.

In 2021, GM committed to 20,000 tons per year of lithium hydroxide offtake agreement with Controlled Thermal Resources (CTR) via its brine pool evaporation facility in Hell's Kitchen, on the Salton Sea in southern California. Once it is operational in 2024, GM and Ultium Cells would be able to build and equip up to 200,000 BEVs per year. By themselves, the two offtake agreements with CTR and Lithium Americas would enable GM to build up to 600,000 BEVs per year, beginning in 2025, as lithium supplies stabilize.

These two lithium producers extract the mineral inside the US, making their products eligible for GM customers to receive the US\$3,750 Clean Battery tax credit as called for in the Inflation Reduction Act (IRA) passed in August 2022. But GM's foray into lithium mining

**'THE TWO OFFTAKE DEALS ENABLE GM TO BUILD 600,000 BEVS PER YEAR'**

and direct offtake agreements are not the only battery mineral supplies upon which they will rely to boost EV production.

LG Energy Solution (LGES), GM's joint-venture partner in Ultium Cells LLC, has separate deals with US-based lithium suppliers, in large part for the purpose of maintaining Ultium Cells LLC's compliance with the IRA. LGES's first

North American offtake agreement occurred in October 2021 with Australian firm Liontown Resources Limited. LGES will receive 100,000 tons of spodumene from Liontown's Kathleen Valley Lithium Project in Washington state, beginning in 2024.

Over the next four years, the amount could be increased to 150,000 tons of spodumene. While not all of the offtake is dedicated to US consumption, the first year's supply refined to battery-grade lithium in 2024 could allow for 1,000,000 BEVs to be produced in that year. Up to 1,500,000 BEVs could be made each succeeding year. In November 2022, LGES concluded an offtake deal with Compass Minerals for 4,400 tons of lithium carbonate per year, beginning in 2025. The source will be Compass's evaporative brine pool facility in the Great Salt Lake in Utah. Once refined, that amount of lithium could be used to produce up to 88,000 BEVs per year.

Not all of LGES's lithium offtake from the US mines and brine pools was originally intended to supply either Ultium Cells or the North American market. However, the Inflation Reduction Act changed the mineral requirements for North American EVs to qualify for Clean Battery and Clean Mineral tax credits. LGES finds itself with enough North American lithium supply for the next five years to be able to reallocate these resources and make cells that comply with the IRA.

**St Catharines, Ontario will be GM's second Ultium electric drive plant**

General Motors gave its St Catharines, Ontario propulsion plant a new lease of life. The



# TOYOTA PLANS TO PRODUCE 200,000 BEVS ANNUALLY AT GEORGETOWN'

legacy OEM will transition the plant away from producing V6 and V8 internal combustion engines and transmissions, and towards a future of producing electric motors under the Ultium brand. After a period spent retooling, the plant will continue for a time to produce the new electric motors alongside traditional V8 engines.

The new Ultium electric motors will initially be supplied to the reconfigured Ingersoll, Ontario plant, where they will be installed into the BrightDrop all-electric delivery van.

Ultium electric drive units from St Catharines will also be allocated to Factory Zero in Hamtramck, Michigan for use in Chevrolet Silverado EV and GMC Sierra EV pickup trucks. GM indicated that it expects to produce approximately 400,000 electric vehicle drive units per year for use in Ultium EVs.

The timing for the transition at the St Catharines plant is still being discussed with the government of Ontario, as well as with UNIFOR leaders. The eventual total sum of GM's investment is similarly unknown, also due to discussions with the Canadian government and union leaders.

The development follows a similar course for GM-Toledo Propulsion Systems, announced in September 2022. The US\$760 million investment will convert the traditional ICE

manufacturing plant into an Ultium electric drive plant in stages. Ultium electric drive units from Toledo will be installed in GM EVs, beginning in 2024.

## Toyota to start EV production at Georgetown, Kentucky plant in 2025

Incoming Toyota Motor President Koji Sato indicated that he will move the OEM quickly to producing all-electric vehicles. That begins with a new goal of producing 200,000 BEVs annually beginning in 2026 at the Georgetown assembly plant in Kentucky. EV production will be phased in while vehicles with internal combustion engines continue to be produced at the plant. Toyota's plan calls for a run rate of 10,000 sport-utility-bodied BEVs to be produced monthly by the end of 2025.

The Georgetown plant plan coincides with



**Toyota President Sato is accelerating the shift to EVs**

the start of battery cell production at the Toyota Battery Manufacturing North Carolina (TBMNC) facility in Greensboro, North Carolina. Originally funded at US\$1.3 billion, the plant received additional funding of US\$2.5 billion during construction. The US\$3.8 billion total outlay was used to expand the plant and produce battery cells for battery-electric vehicles as well as cells and completed battery packs for hybrids. The capacity of the TBMNC plant hasn't been announced, but AFS estimates a capacity of 25GWh annual output isn't out of the question, considering that the North Carolina battery plant will support both BEV and hybrid production. Expansion to increase the capacity at a later date is also a possibility.

Toyota's two electric vehicle factories will produce EVs that are compliant with the battery sourcing and vehicle assembly requirements

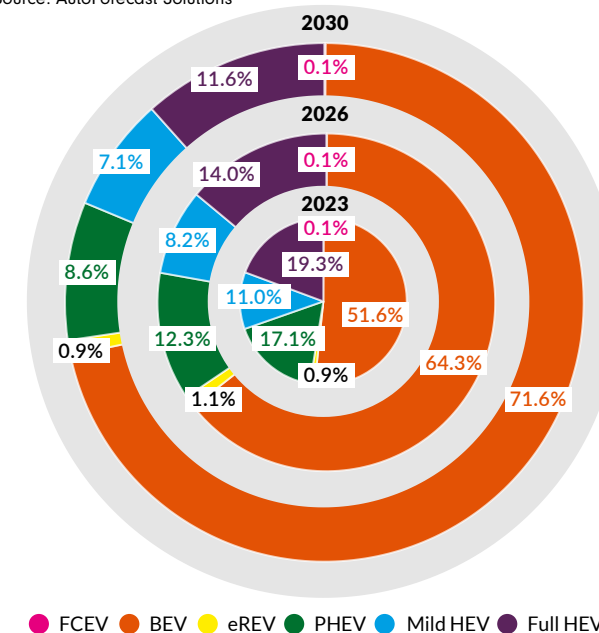
set out in the Inflation Reduction Act. Toyota customers should therefore be able to receive up to US\$7,500 in federal income tax credits, which can be applied to the vehicle cost at the point of sale.

Toyota recognizes that these incentives will help it to attain its North American product distribution goal of building 200,000 electric vehicles in the US annually, beginning in 2026. Toyota's global electric vehicle production target of one million units in 2026 would be attained with electric vehicles being produced in Japan, China and India, along with the US. Toyota plans to achieve 3.5 million electric vehicle sales globally by 2030.

### GLOBAL LIGHT VEHICLE ELECTRIFICATION

Percentages based on electrified vehicle market only

Source: AutoForecast Solutions





# GLOBAL LIGHT VEHICLE PRODUCTION OUTLOOK



BY SAM FIORANI

PRODUCTION AROUND THE world will grow slightly in most regions this year, despite a slow start. Continued fears of a coming recession are slowing demand and preventing manufacturers from ramping up output.

As long as their fears do not spread into a deep downturn, more cars and trucks will roll out of factories across almost all regions, leading to 5.3% greater production this year as compared with 2022.

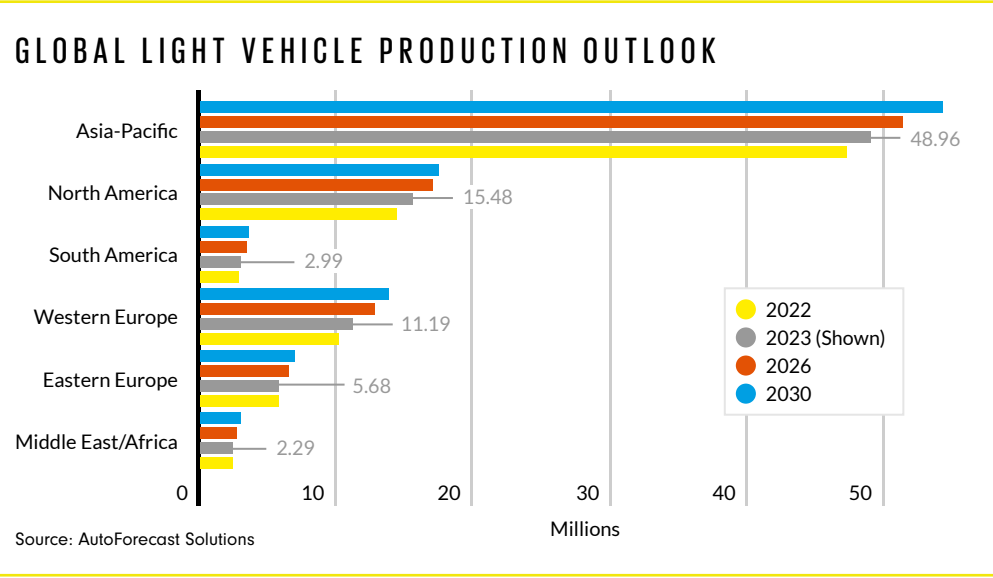
Leading the way will be Western Europe. After coming off three straight years of sub-10-million-unit production, output will top 11 million units for the first time since 2019. Economic recoveries in Germany, France, Spain and Italy will drive this increase, but the attitudes of consumers in these countries could turn, upsetting the momentum.

As always, China will fuel the growth in the Asia-Pacific region and the world's largest market is expected to improve in 2023.

Expansion in the country will help the region produce 3.9% more light vehicles this year. Increases in exports are helping to boost production even with slow growth in sales.

Eastern Europe and Middle East/Africa will not see the boost other regions will experience this year. The continued war between Russia and Ukraine is stifling the whole region and will keep growth below 0.5% in 2023.

Dealing with global sanctions in Iran, the Middle East/Africa region will slow further this year, with the market contracting 2.5%. Solutions to the local problems will be necessary to power economic growth, keeping both regions soft in the meantime.

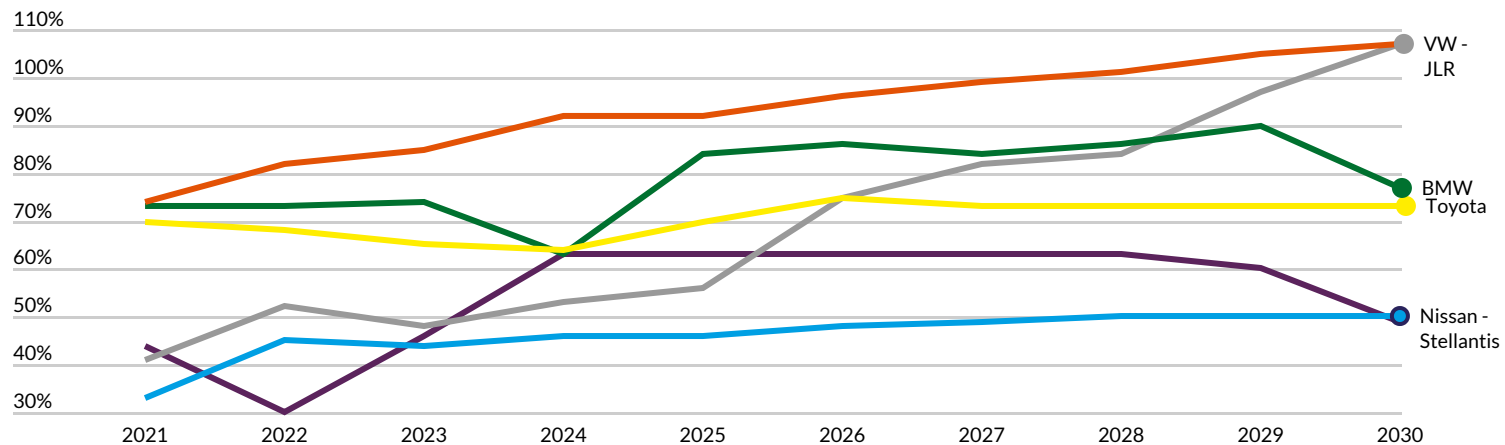
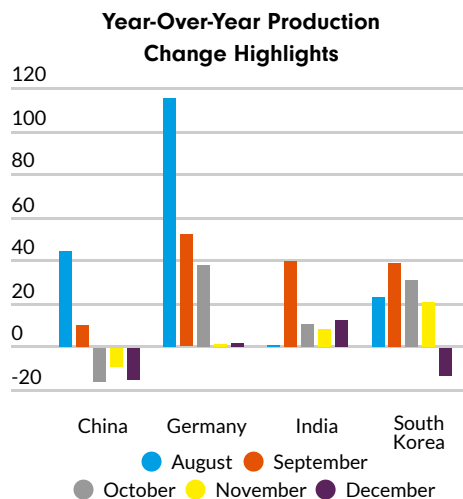


More light vehicles will be made this year than in 2022

Source: AutoForecast Solutions

**UNITED KINGDOM CAPACITY UTILIZATION BY VEHICLE MANUFACTURER**

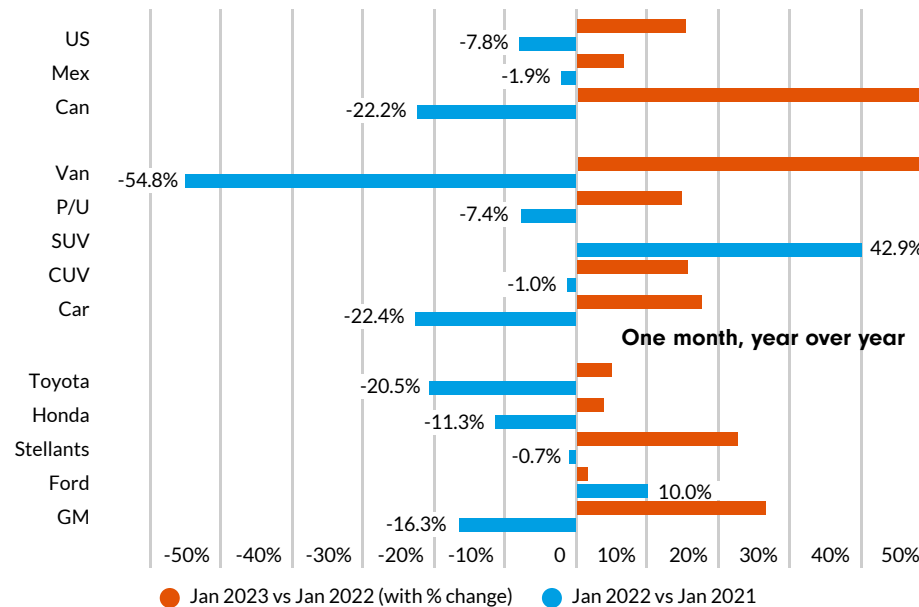
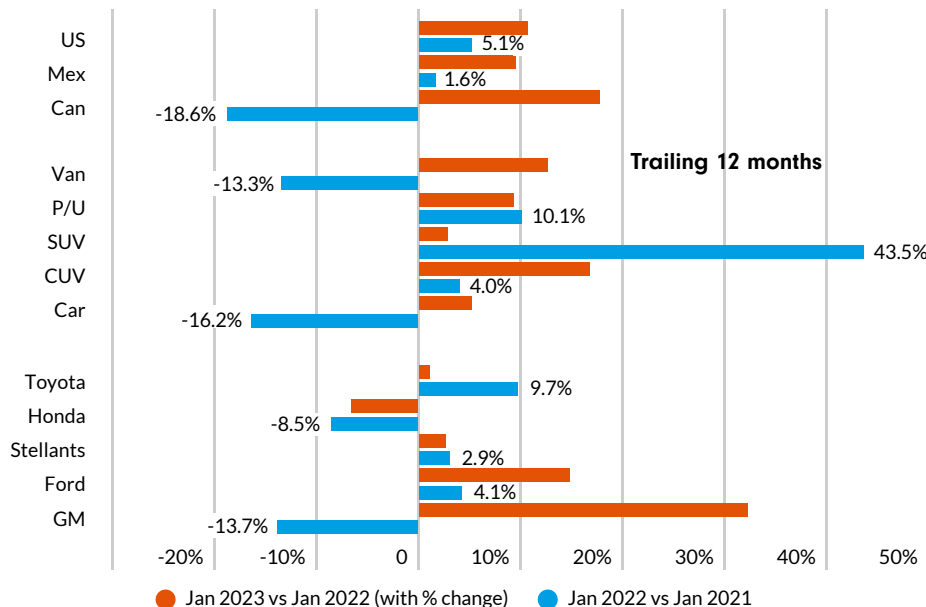
**Selected Manufacturers**



The AFS Forecast covers 60 countries. Chart shows changes 2022 over 2021.

**NORTH AMERICAN PRODUCTION CHANGES**

Source: AutoForecast Solutions



Trailing 12 months represents 12-month period vs the year-prior period

One month represents single month over prior single-month change



## GLOBAL LIGHT VEHICLE SALES OUTLOOK



BY SAM FIORANI

THE NEW YEAR has opened quietly. After two years of slow sales globally, this year is expected to begin the long recovery to full production and “normal” sales levels. Unfortunately, 2023 has come in like the allegorical lamb when a lion was preferred. While numbers are largely positive, there’s no wave of consumers flooding into the new vehicle market.

Economic threats are part of the rationale for this slow recovery. Consumers are worried about the rumors of recessions in a number of developed countries. Although some positive signs continue to float about, consumers who believe that the worst will happen can cause a negative outcome based on their preparation

for it. But that is just part of the current situation.

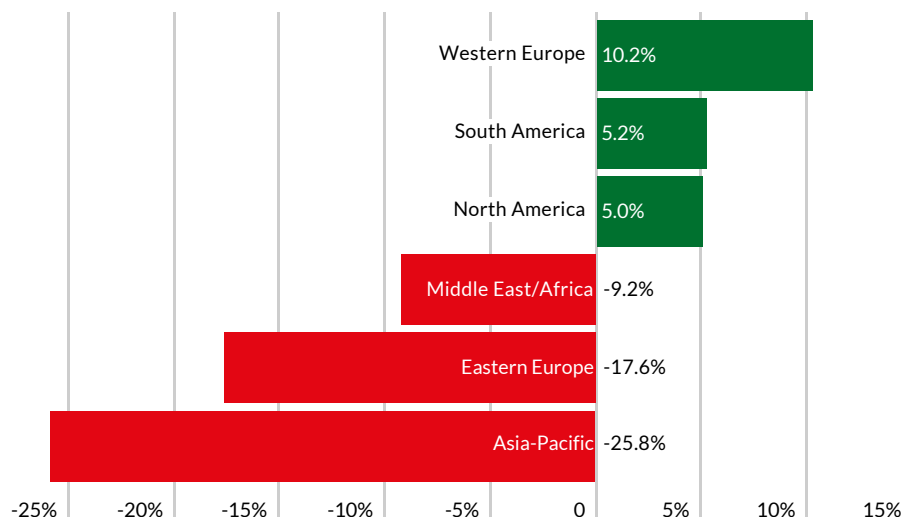
Continued problems in the supply chain have slowed production and focused the remaining production into more expensive and more profitable vehicles. Higher-priced vehicles push more cost-conscious buyers into the used market or to maintain their current cars and trucks. Removing these buyers from the new car market slows the industry recovery and that is not expected to change in the near term.

This is especially obvious in North America. The slow recovery of the Mexican market continues although sales in January were slightly softer than expected. Last January, the market hit a trough, with fewer than 80,000 units



Sales of new cars in China fell markedly in January but it was mostly due to the timing of the Lunar New Year

### JANUARY 2023 YOY LIGHT VEHICLE SALES CHANGE



Source: AutoForecast Solutions

sold in the month. Almost 4% ahead of the same period in 2022, January 2023 didn’t even rise to the level of the already low total two years ago. The poor report in January forced a downward revision on the forecast for 2023, now targeting 1.1 million units, a 4.9% improvement over 2022.

Unlike Mexico, Canada was almost exactly as anticipated. With sales just over 98,000 units, the trend is on target to hit 1.64 million units in 2023. This will reflect a 4.2% improvement over

the poor showing in 2022. While looking up, this still places Canada well behind where the market has been in recent years.

Sales in the US were also surprisingly close to expectations. Just over one million units were sold in the month and the country is on track for a 5.2% improvement over last year’s terrible outcome. With continued increases in production and dealer inventories, the market will end 2023 at just over 15.1 million units. Not a great year, in terms of the recent past, but an improvement.

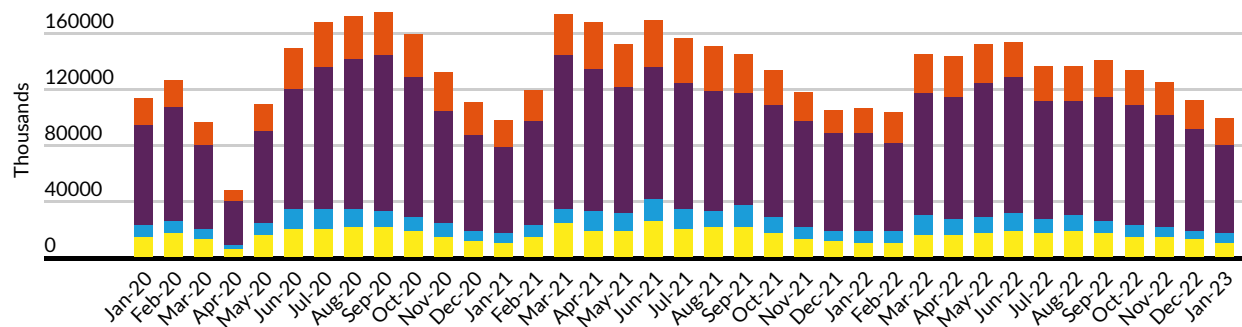
Almost entirely because of the timing of the Lunar New Year, light vehicle sales in China were down about 35%. Reports of sales in January do not directly reflect any trend for 2023. As the holiday moves between January and February, one week each year reflects the downtime, with a decrease in retail sales as citizens typically travel home. The celebration this year ran between January 22 and January 29, fitting the entire holiday in January.

**‘UNFORTUNATELY, 2023 HAS COME IN LIKE A LAMB WHEN A LION WAS PREFERRED’**

Source: AutoForecast Solutions

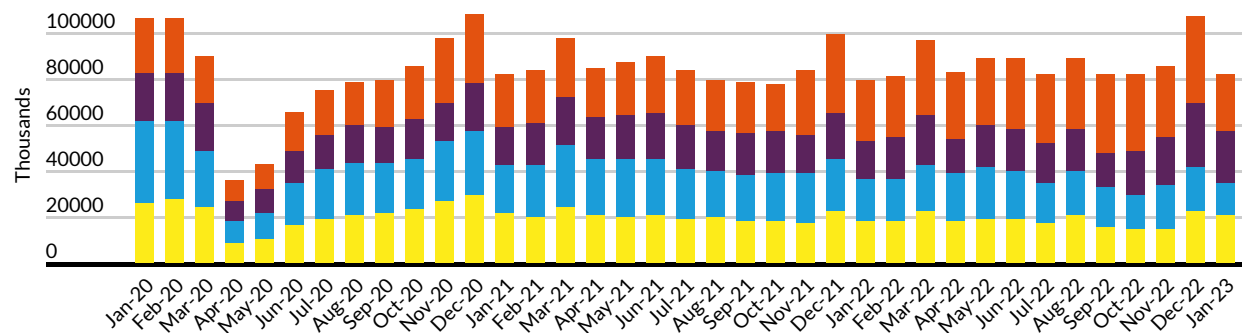
Trailing 36 months

**CANADA LIGHT VEHICLE SALES**



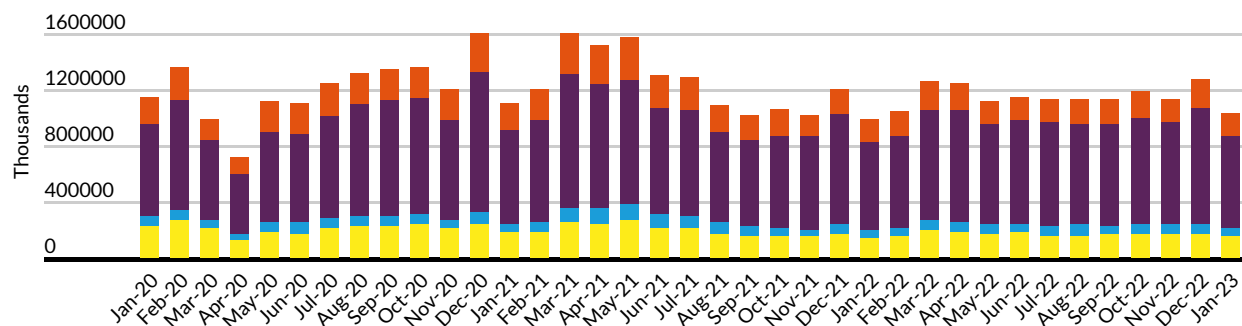
Trailing 36 months

**MEXICO LIGHT VEHICLE SALES**



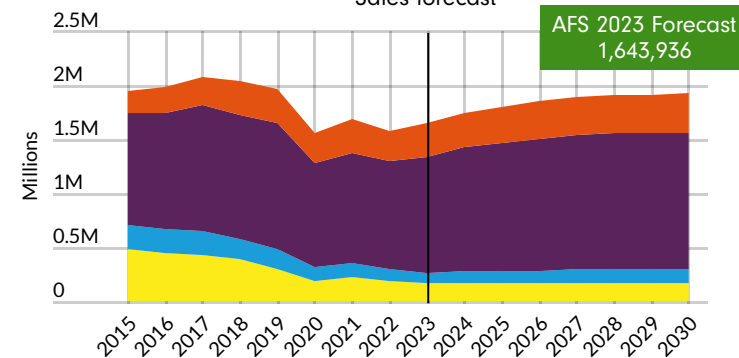
Trailing 36 months

**UNITED STATES LIGHT VEHICLE SALES**

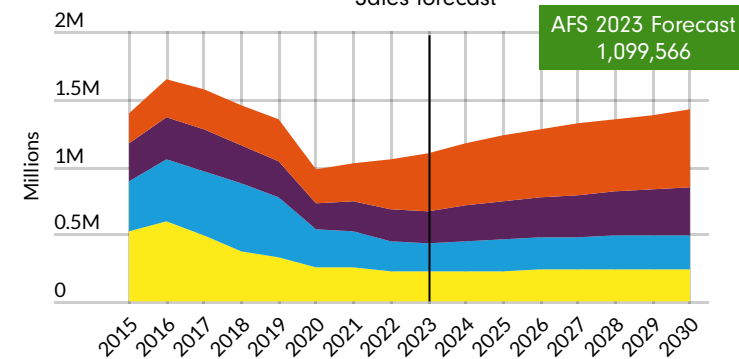


● NA-Car ● Imp - Car ● NA-LT ● Imp-LT

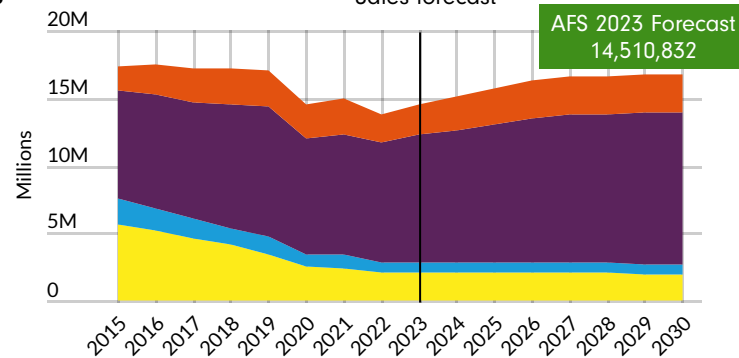
Sales forecast



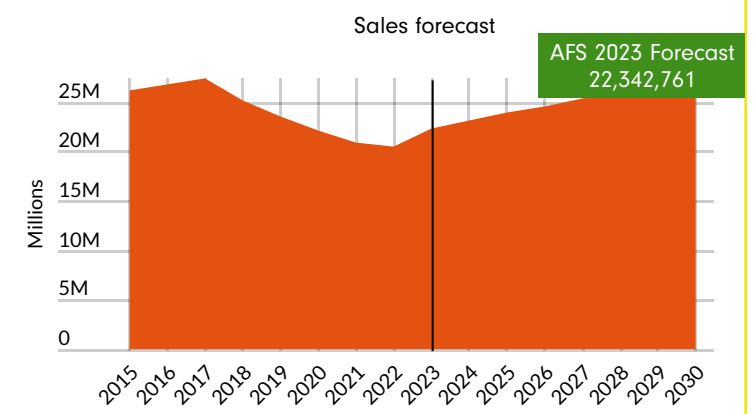
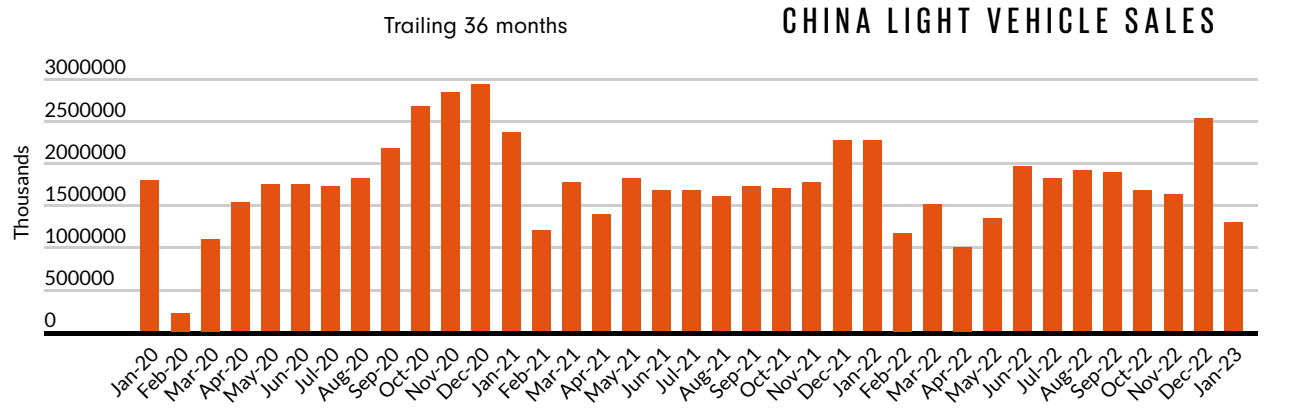
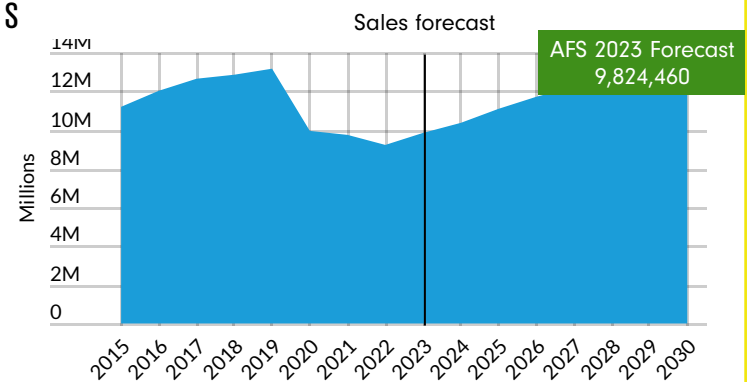
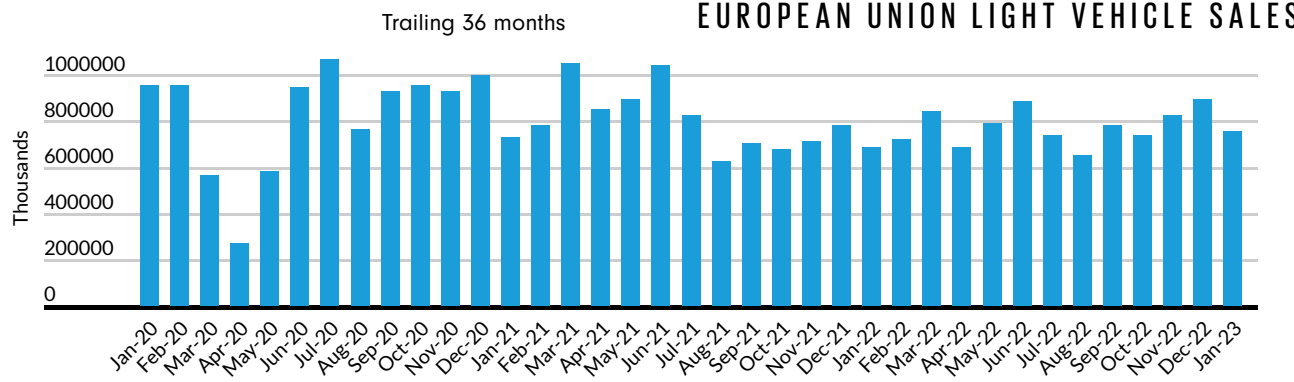
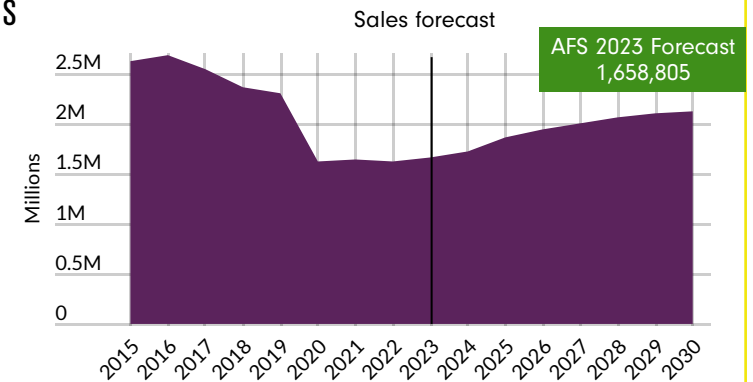
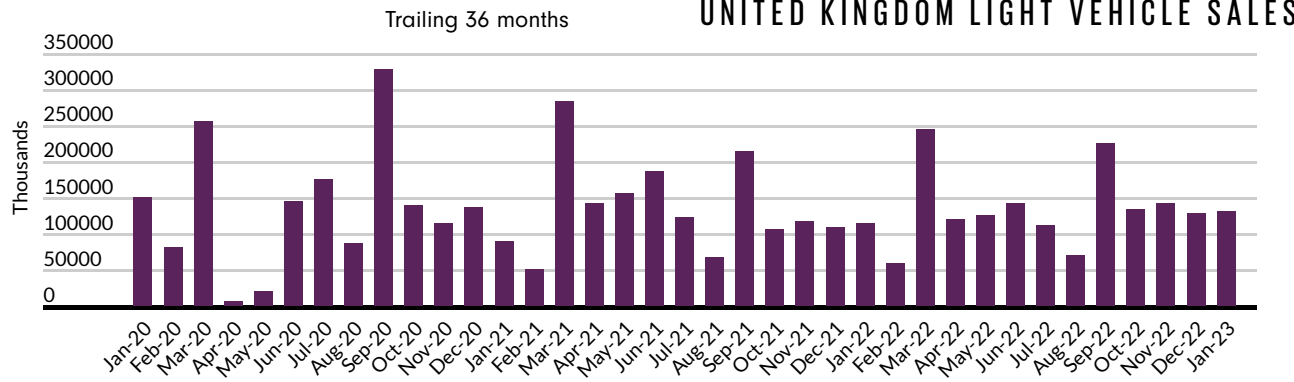
Sales forecast



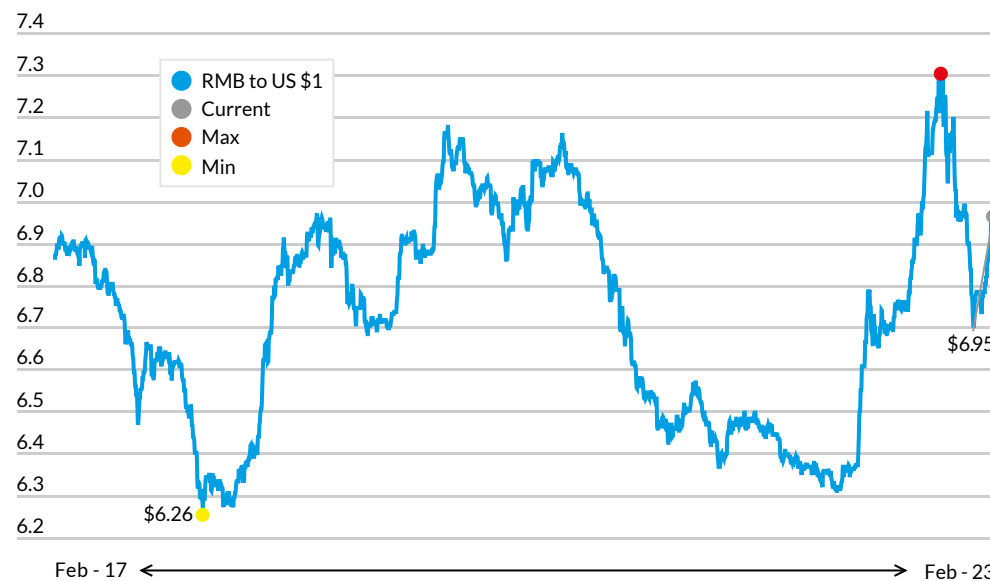
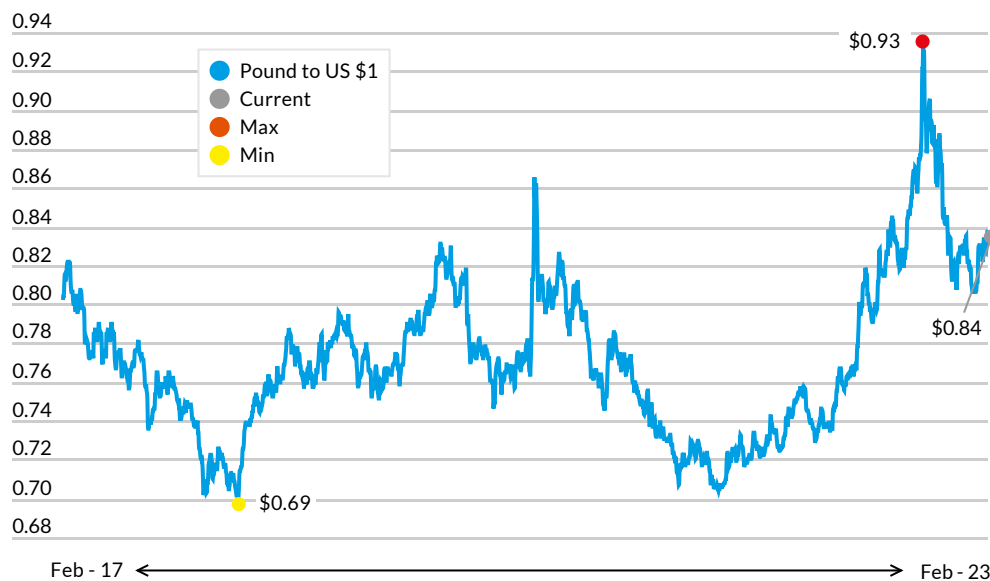
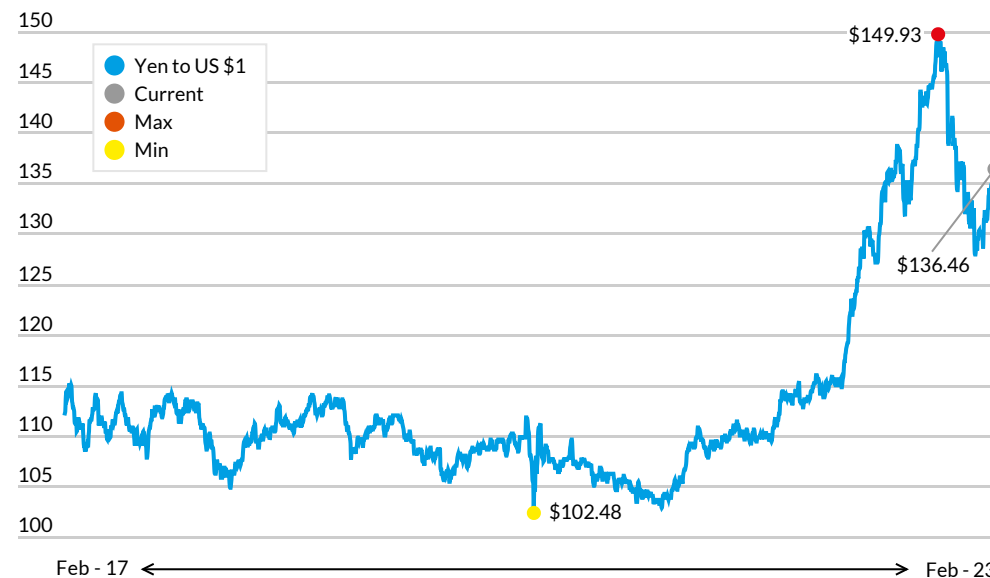
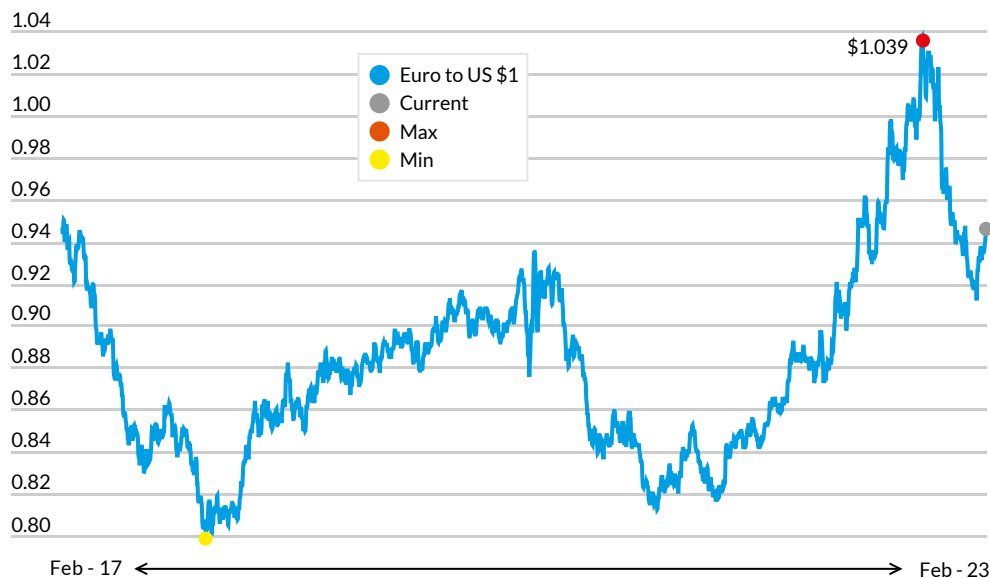
Sales forecast







**EXCHANGE RATES VS US DOLLAR**





**Europe Brent Crude**

**OIL PRICES**

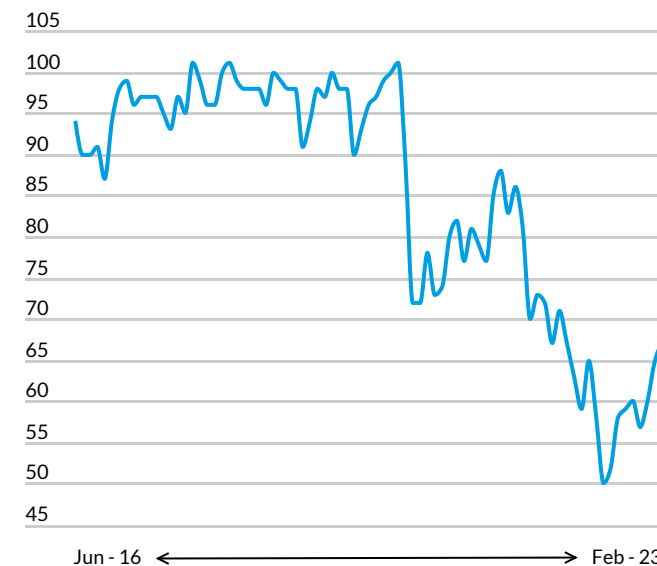
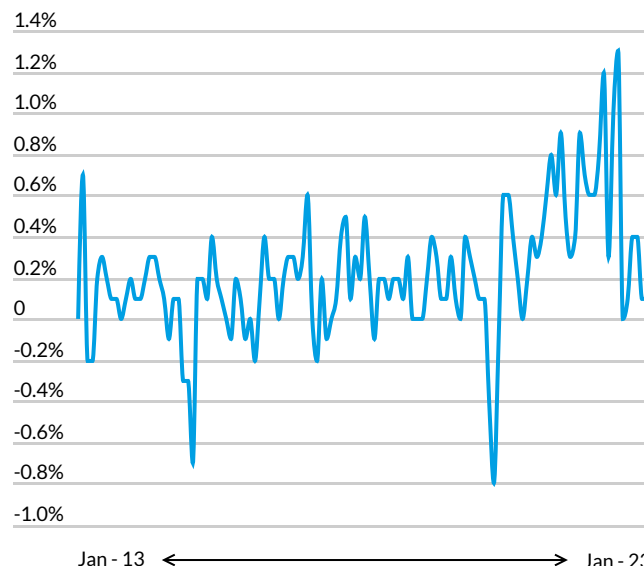
**West Texas Intermediate**



**Change in Personal Consumption Expenditures**

**United States Consumer Price Index**

**Consumer Confidence**



Federal Reserve Bank of St. Louis

US Bureau of Labor Statistics

University of Michigan

**SPECIAL REPORT**



CONRAD LAYSON

# Ford versus the Inflation Reduction Act

On February 13, Ford Motor Company announced the formation of BlueOval Battery Park Michigan, a wholly owned subsidiary that will use licensed technology from Chinese EV battery maker Contemporary Amprex Technology Limited (CATL) to make low-cost lithium-iron-phosphate (LFP) battery cells. The US\$3.5 billion factory will employ between 2,100 and 2,500 people in Marshall, Michigan, once it's operational in 2025. With current nickel-manganese-cobalt (NMC) batteries costing US\$120/kWh, the cost savings of the US\$90 to US\$100/kWh LFP battery cell offsets the trade-off of the LFP's less energy-dense characteristic. The logic is that a resulting shorter-range EV could be made to a lower price point and appeal to a budget-conscious customer. The LFP cells that Ford will produce in the new factory will be used in budget-trimmed versions of the F-150 Lightning and Mustang Mach-E.

Ford's final decision was taken against a backdrop of controversy. Virginia Governor Glenn Youngkin ended Virginia's participation in the battery factory's site selection with remarks that were more political in nature than business oriented. Senator Mark Rubio has called for a closer review of the licensing agreement between Ford and CATL by the Committee on Foreign Investment in the United States (CFIUS).



Ford's F-150 Lightning will be offered at a lower entry price with the cheaper CATL-supplied LFP battery cells

All of which occurred in the wake of an alleged Chinese intelligence-gathering balloon shot down nine days before.

The most significant result from creating the BlueOval Battery Park Michigan facility is that Ford will surrender key consumer benefits from the Inflation Reduction Act (IRA) in the short term. For new EV purchases, Ford customers will not receive the US\$3,750 Clean Battery portion of the consumer tax credit for vehicles

**'FORD INTENDS TO REALIZE OTHER SAVINGS GAINED FROM EMPLOYING LFP BATTERIES'**

that use the new LFP battery cells. At issue is the unspoken acknowledgement that CATL's LFP cells will be produced using battery minerals and components of Chinese origin, which are strictly prohibited for vehicles purchased by private parties under the IRA.

Ford intends to realize other savings gained from employing LFP batteries, even against the headwinds generated by partnering with a Chinese battery cell provider. Section 45W of the Code allows a commercial entity purchasing a vehicle with non-IRA-compliant battery components to receive the full US\$7,500 in EV credits provided that vehicle is in turn leased to another party. Recent comments by Treasury indicate those customers include private citizens. The US\$7,500 credit itself applies to vehicles up to 14,000lb of gross vehicle weight, which defines weight classes 1 through 4. It has been thought that leasing customers would still receive the benefit of the US\$7,500 IRA tax

credits as the leasing companies would apply the credits against the capitalized cost of the leased vehicle, thereby reducing the monthly payment. That theory has yet to be tested with real-world experience.

A further indication of Ford's disregard for the IRA can be found in its planned use of imported CATL LFP cells in the Mustang Mach-E as early as this year and in the F-150 Lightning in 2024. This means that at the port of entry, Ford will pay a 3.5% import tariff plus a 25% tariff on EV battery cells that are on 2019's Section 301 list of Chinese-made goods. The BlueOval Battery Park Michigan facility is due to come online by 2025. Ford would have to price the lower range and performance of EVs equipped with LFP cells below EVs that use the higher-performing NMC formula, even if the cost of the cells is nearly at parity after tariffs. Which means that Ford is willing to lose money on vehicles employing LFP cells in the short term. Assuming those cells cost US\$90/kWh, then after tariffs those same cells will cost approximately US\$116/kWh, just US\$4/kWh below the estimated cost of the NMC cathode formula currently supplied to Ford by SK On. Ford will realize cell and pack cost savings using LFP cells produced in Marshall, Michigan, but only after 2025.

Complicating matters is the dissatisfaction of Senator Joe Manchin with the Department of the Treasury's way of handling the IRA's implementation. The senator lambasted Treasury over Secretary Janet Yellin's insistence that the department would not do congress's job for them by closing the 45W loophole with the issuance of its final rules. Senator Manchin's disenchantment deepened when the department missed the mandated December 31, 2022 issuance of the final rules of implementation for the IRA. The industry anticipates Treasury's rules to be issued in



March, likely towards the end of the month if past practice is any indicator.

In late January, Senator Manchin introduced S63, the American Vehicle Security Act of 2023, in an effort to delay the disbursement of tax credits under the original act's provisions under Section 30D until Treasury has issued its final rules, close the Section 45W loophole and prevent any vehicle with Chinese-sourced minerals or battery components from receiving any tax credits as stated in 30D, whether that vehicle is leased or sold. The bill currently sits in the Committee on Finance. There is no further activity scheduled on the senate side. There is also no commensurate bill in the House of Representatives. AFS believes there is no political will to revisit the IRA, or amend its shortcomings through the legislative process.

In a late bid to stymie the Ford-CATL intellectual property licensing agreement, Senator Rubio called on the CFIUS to review the licensing agreement with the utmost scrutiny. However, with no foreign ownership of the factory, the equipment used to make the cells being owned by Ford and the factory being located in the US, AFS believes the agreement will stand up to enhanced CFIUS review. If the agreement passes CFIUS's scrutiny, the BlueOval Battery Park Michigan facility's construction costs will qualify for federal subsidies available through the IRA's US\$10 billion in additional funding of the Qualifying Advanced Energy Project Credit, a tax credit created under the American Recovery and Reinvestment Act of 2009. Under Section 48C of the Code, up to 30% of a qualifying facility's construction or upgrading costs can be covered with a tax credit after the company's application is approved.

Ford is the first OEM to break so visibly with the restrictions on mineral and component sourcing imposed by the IRA. Will the bulk

## 'RECYCLING WILL GIVE FORD A STOCKPILE OF IRA-COMPLIANT BATTERY MINERALS'

of Ford's future EV customers be leasing customers? AFS believes this will be the case. If Treasury's final rules on implementing the IRA do nothing more than cement our understanding of the law as it stands now, then Ford could control its fate by exclusively leasing its LFP battery-powered vehicles to consumers through a Ford consumer leasing subsidiary. It would be in Ford's best interest to pass along the US\$7,500 tax credit issued to the Ford leasing company as savings to consumers by reducing the capitalized cost of the leased vehicles by that amount. Combined with the savings provided by LFP battery packs, it could be possible to increase Ford's EV production and sales volumes with value-priced vehicles that are profitable - at least for the duration of the IRA, which sunsets after December 31, 2032.



Ford Mustang Mach-E is in line for the new LFP cells

Leading up to that point, AFS believes other OEMs will deploy battery packs composed of LFP cells, thus reducing the differences in cost between rival EVs in the same segment.

As leased vehicles leave Ford in control of the battery pack, the opportunity to recycle those vehicles' packs increases a potential benefit to the company. The IRA considers the minerals recovered from battery packs recycled in the US to be of US origin and compliant with IRA consumer purchase tax credit requirements. The recycled minerals will give Ford a stockpile of IRA-compliant battery minerals. Ford will enjoy a greater opportunity to create IRA battery packs that would qualify for the consumer tax credits on EVs built for sale, not just leasing.

With ICE vehicle transaction prices reaching US\$45,000 and EV transaction prices exceeding US\$61,000 at the dealership, Ford's opportunity to secure a strong position in the value end of the EV market is made possible by the use of LFP cells. With products in budget through near-luxury segments of the EV market, Ford assures itself better financial health for the future.

AFS forecasts other OEMs to follow Ford's example. However, they will do so after Treasury issues the IRA's final rules in March. Ford's announcement of the BlueOval Battery Park Michigan facility prior to Treasury's release of the final rules is an enormous gamble. The decision relies on several factors not in Ford's control to remain stable, including that there is no political will to revisit the IRA and close the 45W leasing loophole; and that Ford's IP sharing agreement with CATL will withstand CFIUS review and allow the factory to be built.

AFS's view is that Ford got it right on all counts. Treasury's announcement in March will confirm or deny this forecast, but AFS believes Ford will have stolen a march on legacy rivals that'll be hard to overcome out to the mid-term.

## SPECIAL REPORT



BY SAM FIORANI

# Canadian International Auto Show

The industry's evolution toward electrification is proudly on display at car shows around the world. At this year's Canadian International Auto Show (CIAS), electric vehicles were everywhere. For the first time in three years, the floors of the Metro Toronto Convention Center were dedicated to the latest cars and trucks on sale in Canada, and 300,000 people were waiting for those doors to open.

Slightly smaller than in the past, the CIAS still packs more bang for the buck than just about any other car show. Dedicated halls display automotive-related toys, custom vehicles and one of Canada's best classic car shows, the Cobble Beach Concours d'Elegance.

And that's in addition to all of the square meters presenting vehicles on sale today and ones that will be offered in the near future.

Chevrolet showed off five electric models, including the Silverado EV, while sibling brand GMC proudly displayed the Hummer pickup and SUV as well as the Sierra EV.

But Buick, which has already announced that it will become a fully electric brand, introduced its facelifted and still gas-powered Encore GX with its new family face and first North America appearance of the updated logo.

Toyota took the chance to showcase so many new vehicles that its stand looked radically



Hyundai's sleek new Ioniq 6 sedan was a show star

different than it did at the last CIAS. Front and center, the brand introduced Canadians to the Grand Highlander large crossover, which had made its global debut just a few weeks prior at the Chicago Auto Show.

Flanking the eight-passenger wagon was Toyota's all-electric bZ4X crossover and hybrid Crown combining the styling of a crossover and a sedan with the blended gas-electric drivetrain that has been a hallmark of the Toyota brand for nearly a quarter century.

Toyota's luxurious corporate cousin, Lexus, showed off its first dedicated fully electric model, the RZ crossover.

On the main floor, a few brands placed their latest EVs next to the electric models they've been selling for years. Hyundai and Kia took up a large area displaying their whole lineup, with Kia's EV6 and Niro EV and the Hyundai Ioniq 5 joined by Hyundai's sleek Ioniq 6 sedan, which goes on sale shortly. Nissan wants everyone to know it has a new electric model in the Ariya and shone the spotlight on the Surf wagon concept version of it, with its simulated wood exterior and dog dish hubcaps.

While the Stellantis stand featured something from Alfa Romeo, Chrysler, Dodge, Jeep and Ram (and Wagoneer, treated as a distinct brand), it was what wasn't on the stand that

was most noteworthy. Jeep showed off its plug-in hybrid 4xe models on the indoor "off-road" course while the new Dodge Hornet kept its distance from the closely related Alfa Romeo Tonale. Ram's big news has been the coming electrification of its full-sized pickup. After showing the concept Revolution at CES followed by the Ram 1500 Rev at Chicago, only the standard models were shown in Toronto.

Just a month after its debut, the APMA showed off its Project Arrow prototype, highlighting the capabilities of its membership of Canadian suppliers, which provided virtually every part on this electric vehicle, with only the touchscreen being sourced from outside of the country.

The CDN\$20 million program put together a real vehicle using parts provided by 58 Canadian suppliers to let vehicle manufacturers around the world know that Canada has the parts necessary to support any vehicle production, local or abroad.

Despite recent issues with the project, Vinfast had a prominent display featuring its upcoming range of electric crossovers. The sub-compact VF6 and compact VF7 sat alongside the pre-production versions of the mid-sized VF8 and three-row VF9 models. Plans continue to move forward toward North American production of Vinfast EVs.

**'FLANKING THE TOYOTA GRAND HIGHLANDER WAS THE BZ4X AND HYBRID CROWN'**

**SPECIAL REPORT**



BY SAM FIORANI

# Picking winners and losers among EV startups

Since the emergence of Tesla, the electric vehicle market has blossomed. Entrepreneurs around the world have examined the Tesla example and decided to create their own new electric vehicle. The idea was simple enough: throw some batteries below the seats, put in a powerful motor or four, design a rakish exterior and elegant interior, and people will flock to your product with wads of cash in their hands. Upon closer examination, it took Tesla more than a decade to turn an annual profit after spending billions of dollars to get there and having throngs of buyers willing to pay upwards of US\$100,000 per vehicle.

Just like in the "wild west" days of the automotive industry a century prior, many will enter and few will succeed. Tesla is currently on a path to succeed, but most of the other startups will not. Many of the hundreds of EV startup companies around the world are barely worth noting, but there are a few that have garnered the attention of investors, suppliers and potential buyers.

Tesla hit the market at just the right time. By the time the Model S was introduced, the global economy was in its long, slow and steady rise from the "Great Recession". Investment money was virtually free as interest rates around the world were at or near all-time lows. Buyers were

looking at Tesla as the latest way to display their personal success and/or their stand on breaking from the petroleum industry. Investors saw Tesla as the newest tech company and, later, the IBM/Microsoft/Apple wave that they missed decades ago. This supported Tesla's growth through the tough times and prepared it for a position among the world's automakers. But those days have come to an end and few companies will follow in its tire tracks.

Interest rates have risen and investment money is no longer cheap. Promised "eventual" profits aren't good enough to find financiers for a risky entry into the automotive industry. And the new players do not seem to have engendered the "cult of personality" that helped prop up Elon Musk and Tesla this past decade. It's a different world with different circumstances, leading to even fewer startups being successful in the long term.

AFS is tracking hundreds of EV startups. While most of them do not have the inertia to qualify for coverage in the AFS forecast, here are a few of the most significant startups and where they currently stand in the marketplace.

● **RIVIAN**

Twenty-six-year-old RJ Scaringe launched his EV startup in 2009 after earning his PhD in mechanical engineering from MIT. Originally named Mainstream Motors, the company evolved into Avera Automotive and then Rivian in 2011. The initial planned vehicle was a sports car, but the company pivoted quickly to focus on autonomous ride-sharing vehicles. By 2016, Rivian settled on a pickup and a sport-utility as the company's first products.

Scaringe raised millions of dollars and acquired the former Mitsubishi factory in Normal, Illinois. With significant investment, substantial products and a manufacturing space





Delayed rollout of the R1T added to Rivian's difficulties

## 'RIVIAN'S ONCE-STELLAR IMAGE HAS BEEN TARNISHED OVER THE PAST YEAR'

in place, Rivian had the basics to launch an electric vehicle company. Unlike many of the startups of the time, Rivian's initial production targets were relatively modest, adding to the company's chances of survival. This package lured General Motors, Ford and Amazon as potential investors. In 2019, Amazon agreed to purchase 100,000 electric vans, a previously unannounced product, and acquire a sizeable stake in the company. General Motors backed away from a tie-up with Rivian, but Ford saw the startup as a good partner to develop large EVs for its brands and also purchased a stake to ensure the development of the new vehicle. By early 2021, Rivian had raised US\$2.6 billion and an IPO later that year raised an additional US\$13.5 billion. Amazon held about 20% of the company while Ford's stake was more than 11%.

Following the IPO, Ford decided to end the project with Rivian but held a stake in the company valued as high as US\$100 billion. Ford started slowly backing away from its investment, selling shares and taking financial hits along the way. In its financial report for the 2022 fiscal year, Ford wrote off US\$7.4 billion of its Rivian investment as part of the US\$2.2 billion loss for the year. Ford now holds just over 1% of the startup.

Rivian has been slow in launching its products. The rollout of the R1T pickup was

delayed and a fraction of its planned 2022 output was actually built. Delaying the R1S sport-utility has also hurt the company's image to investors. All of this led to a US\$5.0 billion loss in the first three quarters of 2022, more than doubling the loss from the prior year. Year-end production volumes narrowly missed even the most recently revised targets. Stock prices have fallen by 85% from their peak. Increased competition isn't making things easier for the startup. Beating Tesla to the electric pickup market, Rivian found itself in competition with former partner Ford, which introduced an electric version of the most popular vehicle in the US. Although it has yet to sell its promised Cybertruck pickup, Tesla has cut the prices of its existing vehicles, putting pressure on Rivian's US\$75,000 pickup and US\$92,000 SUV.

To save money, Rivian has been cutting jobs. A previously planned second plant in Atlanta, reportedly expected to cost US\$5 billion, has been delayed while the company gets its first plant operating closer to full capacity. Rivian's once-stellar image has been tarnished over the past year and more work is needed to get the company back on track.

### ● ARRIVAL

Smaller EV startups tend to believe that focusing on commercial applications is the key to

success. Delivery vans with shorter routes make sense for electric vehicle adoption because highway speeds are rarely encountered and overnight charging can be done at the warehouse. Additional incentives in the US from the Inflation Reduction Act have increased the demand for electric commercial vehicles. However, this market is getting crowded with legacy players (Ford, Mercedes-Benz and GM's BrightDrop) as well as startups, like Rivian, backed by large delivery companies.

Arrival was one of the first companies to announce its entry into this market and quickly dropped plans for other vehicles to focus on the delivery van. Smaller factories planned in the US and the UK were part of the novel approach that the company was taking in order to launch its vans with as little investment as possible. But more investment is always needed for an automotive startup and that is pinching Arrival.

Plans are still on the books for the factory in South Carolina to begin production in 2024, but more funding will be needed to get there. Already traded on the NASDAQ under the symbol ARVL, the EV maker has seen its stock price tumble from almost US\$23 per share two years ago to around 35 cents a share currently. Recent bumps in the stock price have been attributed to short sellers entering the market. As a penny stock, finding new real investors is extremely tough.

Operating costs at Arrival are draining about US\$30 million quarterly, which, by comparison, looks good. Without dramatic cost-cutting and an infusion of cash, Arrival can only maintain this rate for a very short time before draining its coffers. The company is estimated to not have enough financing to get through 2023.

Last year, Arrival was forced to let go of almost all employees in the UK. Executives have



Arrival has focused on its delivery van, seeking as little investment as possible, but its reserves are now low

been shuffled and in February new CEO Igor Torgov was announced for the company. Torgov has no automotive experience and it is doubtful that he can quickly turn around the struggling startup. Reports have the company reducing staffing by half to save more money and to keep the company afloat until production is ready to begin.

● **FARADAY FUTURE**

Seemingly the grandfather of EV startups, Faraday Future was founded in 2014. Early on, the company was viewed as a primary competitor for Tesla, even luring legacy automakers including Fiat Chrysler and Geely as potential partners. Over the years, Faraday Future has demonstrated a number of running prototypes, such as the low-slung 2016 FFZero1 coupe and the FF91 crossover, the latter of which has been the production intent demonstrator. In the first year, the company claimed as many as 1,000 employees. A number of investors have been linked to the company, including Evergrande Health (later to launch its own EV brand), The9 (a Chinese video game company) and a range of venture capital groups.

Despite all of the money funneled into the company, Faraday Future's payroll was draining its coffers and the money was running out by 2018. Initial plans included building a greenfield plant in North Las Vegas, Nevada. By 2018, the plans for the new US\$1 billion plant had been abandoned and the property was sold at a substantial loss. An additional plant in China was planned and quietly disappeared. To stem the bleeding further, the startup sold its Los Angeles headquarters and moved to a former Pirelli tire factory in Hanford, California. Layoffs continued. During these years of turmoil, a significant number of executives left the



startup. Founder Nick Sampson resigned in 2018 followed by Senior Vice President Peter Savagian. CEO Jia Yueting stepped down in 2019 and was replaced by former BMW/Byton executive Carsten Breitfeld, who resigned in 2022. Two board members were pushed out in late 2022, accused of attempting to drag the company into bankruptcy.

Originally planned to launch an initial public offering (IPO), the company decided to join the stock market through a reverse merger with a special-purpose acquisition company (SPAC) known as Property Solutions Acquisition Corporation. The launch of the public listing on NASDAQ under the symbol FFIE valued the company at US\$3.4 billion and raised about US\$1 billion. Troubles followed the new public venture as the US Securities and Exchange Commission launched multiple investigations

**'CONTINUED FINANCIAL ISSUES PUT CANOO AT RISK IN THE SHORT TERM'**

into the finances of Faraday Future in early 2022. Peaking at a stock price of US\$16.54, FFIE fell below US\$1 in September 2022 where it has remained, hitting as low as US\$0.30 per share. With billions of dollars invested, market capitalization of the company remains below US\$400 million.

Production of the FF91 was originally planned for 2018. Cost-cutting delayed the introduction of the final production version many times, which, in turn, pushed back the job one date by years. After years of promises, the production version of the FF91 was demonstrated in early 2022. With a production capacity of 10,000 units per year, output was announced to start before the end of March 2023 with first deliveries in April.

● **CANOO**

Following Canoo over the past two years could be described as a roller coaster ride, but it's

more like a sled ride with only modest upticks along the way as its stock price careened from US\$17 in early 2021 to about US\$1 in February 2023. Today, the company's market cap is under US\$400 million. Originally founded as Evelocity in 2017, the company changed its name to Canoo in 2019 and merged with an SPAC in late 2020. Trading on the NASDAQ under the symbol GOEV, Canoo was valued at US\$2.4 billion.

With its uniquely styled products, Canoo targeted commercial and ride-sharing applications. Its van, eventually named the Lifestyle Vehicle, is 4.4 meters long with a windshield stretching almost to the leading edge of the vehicle to maximize interior space. An entry-level two-seat cargo version (Lifestyle Delivery Vehicle, or LDV) is offered for about US\$35,000 while versions with more seats push the price to US\$50,000.

Based on a very flexible design, a pickup





version has also been shown as a later addition to the lineup. A number of personnel changes, failed partnerships and questions about financing have plagued the company from the beginning.

Former Opel executive Karl-Thomas Neumann, hired to help lead the company, exited Canoo in 2019 and co-founder Stefan Krause left in 2020. Hyundai announced in 2020 that it would work with Canoo as part of its electrification plan but this cooperative effort was abandoned in early 2021. Also in 2021, the US Securities and Exchange Commission started an investigation into the SPAC merger and questions from investors about sudden changes in the company's direction.

New leadership moved the company to Arkansas and promised a new production facility in the region. Facilities in Bentonville, Arkansas; Pryor, Oklahoma; and Oklahoma City, Oklahoma have been announced, as late as November 2022, with production planned to begin in 2023. To spur faith in the startup, Canoo signed agreements with fleet leasing companies promising orders for thousands of LDVs.

Continued financial issues put the company at risk in the short term. To raise additional funding in February 2022, Canoo offered 50,000,000 shares at a discounted rate, leading to a further decline in the value of the stock. The company reported losses of more than US\$400 million in the first three quarters of 2022, including nearly US\$118 million in the third quarter alone. The same quarterly report showed cash at the end of September 2022 limited to just US\$6.8 million.

● **VINFAST**

Entrepreneur Pham Nhat Vuong started building his fortune when he founded Vingroup in 1993. A quarter century after branching the

conglomerate into food, entertainment and healthcare markets in Ukraine and Vietnam, Vuong decided to enter the automotive industry through the Vinfast subsidiary. The new venture purchased an old General Motors plant and worked with BMW to introduce its first, ICE vehicles. Vinfast's GM-based Fadil sub-compact quickly topped the Vietnamese sales charts in 2021, but the company shifted its focus to electric vehicles.

While the ICE-powered models were competitive in Vietnam, exporting them posed a problem largely because of their connections to GM and BMW. Developing electric vehicles from the ground up would allow Vinfast to export products and target big markets like Europe and the US. A full range of electric models was announced in 2019 and exports were scheduled to begin in late 2021. Although the timeline shifted, vehicles went on sale in the

**'THE SPEED AT WHICH VINFAST WAS MOVING WAS TRULY IMPRESSIVE'**

home market and were introduced to export markets in 2022. At the end of 2022, the first batch of nearly 1,000 Vinfast SUVs arrived at the port in California.

The speed at which Vinfast was moving was truly impressive. The multi-billion-dollar Vingroup financed the early stages and public offerings in Singapore added to the bank account. To reduce shipping costs and

make the vehicles more appealing, a US\$2 billion greenfield plant in North Carolina was announced with production capacity of 150,000 vehicles annually. With stores opening in California, Vinfast began laying the groundwork for US sales in early 2023. However, the VF8 and VF9 EVs were not ready for customer delivery.

Early word on the stateside vehicles puts doubt on their competitiveness. The US\$50,000 Vinfast VF8 mid-sized crossover was promised to feature a range of 250 to 290 miles, depending on the battery pack, but the first batch of vehicles were said to have 30% less range. Blaming outsourced software, Vinfast was working on an update before the vehicles arrived at the port.

Other components posed safety or reliability issues and needed to be redesigned or replaced. On top of everything else, the competitive nature of the electric vehicle market caused the prices of various models already on sale to fall by thousands of dollars before the VF8s and VF9s could be unloaded.

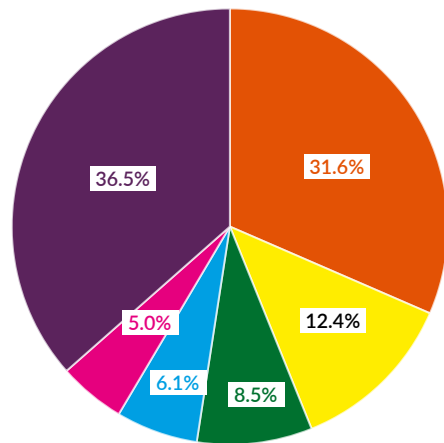
Through February, the North American operations have been consolidated. Originally separate, the Canadian and US sales groups were combined into one group and redundant positions eliminated. Additional jobs have been cut as the group continues to reduce costs in North America and around the world.

The larger Vingroup is navigating financial problems. Vingroup ended 2022 with a 19% drop in revenues, but showed a modest profit of US\$84 million, up from the previous year's loss of US\$320 million. Getting Vinfast up and running and successful is necessary to return the investment from Vingroup and stabilize the conglomerate. Some 7,500 potential workers in North Carolina are also counting on Vinfast to be successful.



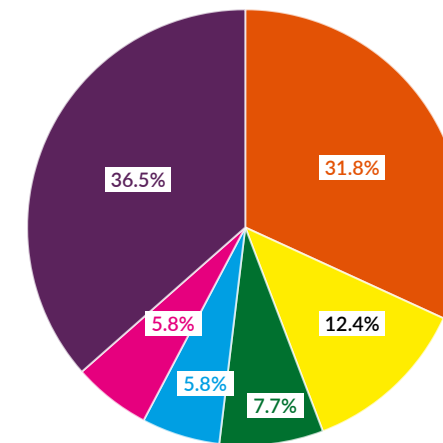
Vinfast is expanding from its operations in Vietnam (pictured) and is building a US\$2 billion plant in the US

**2023 TOP 5 GLOBAL COUNTRIES**



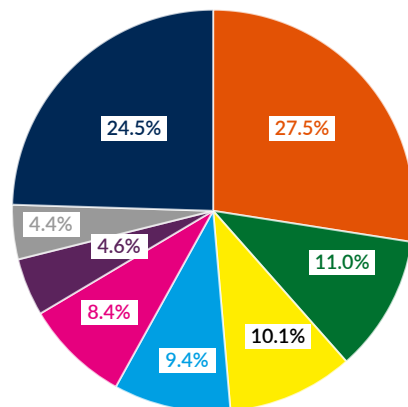
China United States Japan  
India Germany ROW

**2023 TOP 5 GLOBAL COUNTRIES**



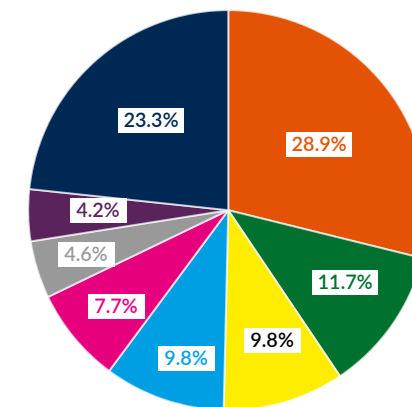
China United States Japan  
India Germany ROW

**2023 TOP GLOBAL SEGMENTS**



Small CUV Mid-Sized CUV Mid-Sized Pickup  
B D C Minivan Others

**2023 TOP GLOBAL SEGMENTS**



Small CUV Mid-Sized CUV Mid-Sized Pickup  
B D C Minivan Others

**TOP 5 BRAND OWNERS**

Brand Owner	2022 Production	Brand Owner	2029 Production
Toyota Motor	10,664,331	Toyota Motor	11,022,414
Volkswagen	8,080,690	Volkswagen	9,319,372
Stellantis	7,171,516	Stellantis	8,313,059
Hyundai Motor	7,079,298	Hyundai Motor	7,957,789
Renault-Nissan-Mitsubishi	6,741,289	Renault-Nissan-Mitsubishi	7,550,494

**TOP 5 GLOBAL PLATFORMS**

CMF-B HS	2,783,592	CMF-B HS	2,879,682
NGA-C	2,249,343	KP2	2,209,795
MQB A1	2,098,808	NGA-C	2,188,958
NGA-K-SUV	2,055,428	NGA-K-SUV	2,129,471
N	1,886,250	Gen III	1,946,191

Renault-Nissan-Mitsubishi (CMF-B HS), Toyota Motor (NGA-C, NGA-K-SUV, NGA-C), Tesla (Gen III), Volkswagen (MQB A1), Hyundai Motor (KP2, N)

**TOP 5 GLOBAL ASSEMBLY PLANTS**

Chongqing Engine 1	1,089,108	Manesar 1	1,136,913
Manesar 1	1,067,306	Chongqing Engine 1	1,071,463
Liuzhou 2	811,004	Liuzhou 2	740,228
Gigafactory 3	726,669	Gigafactory 3	679,303
Xi'an 2	658,608	Beijing 1	665,444

Maruti Suzuki (Manesar 1) Changan Auto (Chongqing Engine 1) SAIC-GM-Wuling (Liuzhou 2) BYD (Xi'an 2) Beijing Benz (Beijing 1) Tesla (Gigafactory 3)



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