Seraph.

Q2 2023 INDUSTRY REPORT NORTH AMERICA & EUROPE

EV, NOT SO FAST.
CHALLENGES ON THE ROAD AHEAD:
MACCE (MANPOWER, AGILITY, CHINA, COSTS, EV)

The industry must address manpower challenges, weak EV infrastructure, and growing Chinese influence while managing cost

Human Capital

- In September, North American OEMs will face a significant challenge from the UAW due to a big gap between expectations; the public battle is heating up – **short-term workforce, financing, and inventory plans are required.**
- Skilled labor is in short supply for tooling and equipment implementations to support new launches – **Prepare your company for "hurry up and wait" from OEMs and the slower ramp-up of suppliers (due to low production efficiency).**
- "Local for local" regionalization and EV expansions are pushing wage increases in the EU as well in NA, where unemployment is at historic lows in Mexico – **with a projected 20% wage increase in Mexico, we anticipate price increases and additional automation (which will put increased pressure on the development of more maintenance personnel which is already in short supply).**

EV NA / EU & China Growth

- Momentum toward EVs is still strong, but OEM production line issues and supply chain challenges delay many launches. This creates CAPEX challenges, uncertain sales projections related to infrastructure readiness, raw material availability (de-coupling w/ China) and reduces OPEX efficiency– **develop a stepped approach to launch/volume scenarios with your customers linked to the deployment of capital, line balance (efficiency), and operator training.**
- China's EV strength is displacing foreign competition for non-luxury in China domestically; China is exporting more autos and importing less, which hurts EU & US brands - **OEMs and suppliers are adjusting their global investments, bullish on NA. The US automotive market is already saturated, leading to a vehicle price war.**

Inflation & Cost Structure

- OEMs and suppliers share cost and material concerns. Many purchasing teams do not have a playbook for an inflation-driven world, and the old tactics are resulting in more supply chain disruptions – **evaluate "local for local," calculate total project cost (incl. risk, automation, people development)**
- Lower efficiency creates drag and, therefore, ample opportunities for cost reduction – **suppliers need to return to the fundamentals of manufacturing, discipline, KPI, and problem-solving.**
- Rising interest rates to combat inflation are increasing the cost of financing – **causing a reduction in expansion and M&A.**
- Costs decreased for shipping critical EV commodities and components from Q3 2021 peak – **which provides some relief. Still, there is potential bottleneck on the horizon for EV manufacturing and commodities to meet stated goals.**

From Industry Leaders …

Due to nearshoring, new plants, and competition, the **Mexico labor and wage** situation is putting a strain on Suppliers and OEMs.
"We are calling it the Tesla effect."

- OEM Executive

"Traditional OEMs are playing catch up with Tesla's architecture. Their first EVs were just slammed together with traditional components, but they have realized that they need to do a **greenfield and build it from scratch**. This takes time and the right resources, which they are short of."

- Tier 1 Engineering Director

"We had a **brain drain** in 2008/09 and during COVID and now we need that know how to **support with nearshoring and Mexico labor** constraint/wage increase."

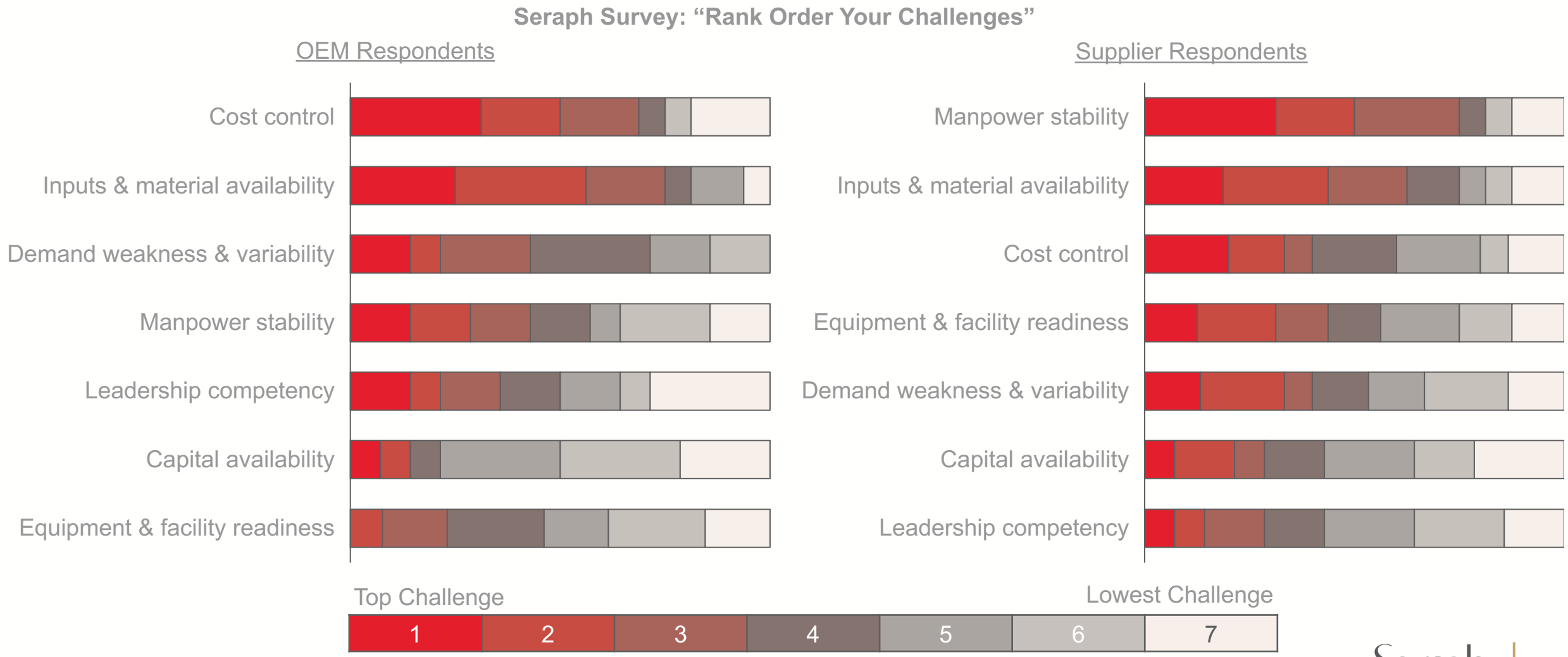
- Founder Engineering Consulting

"I get this software-defined vehicle stuff, **but at some point, the rubber hits the road, and you better make sure the damn thing runs** and there is some profit."

- OEM Engineering Executive

Electric and software architecture is moving back into the OEMs, and Suppliers who have heavily invested in these areas need to remain vigilant as control shifts.

OEMs and suppliers share cost and material concerns, but suppliers face a more acute manpower challenge



Source: Seraph Q2 2023 Automotive Leader Survey, including respondents from North America and Europe working in the 10 largest auto manufacturing firms

Human Capital

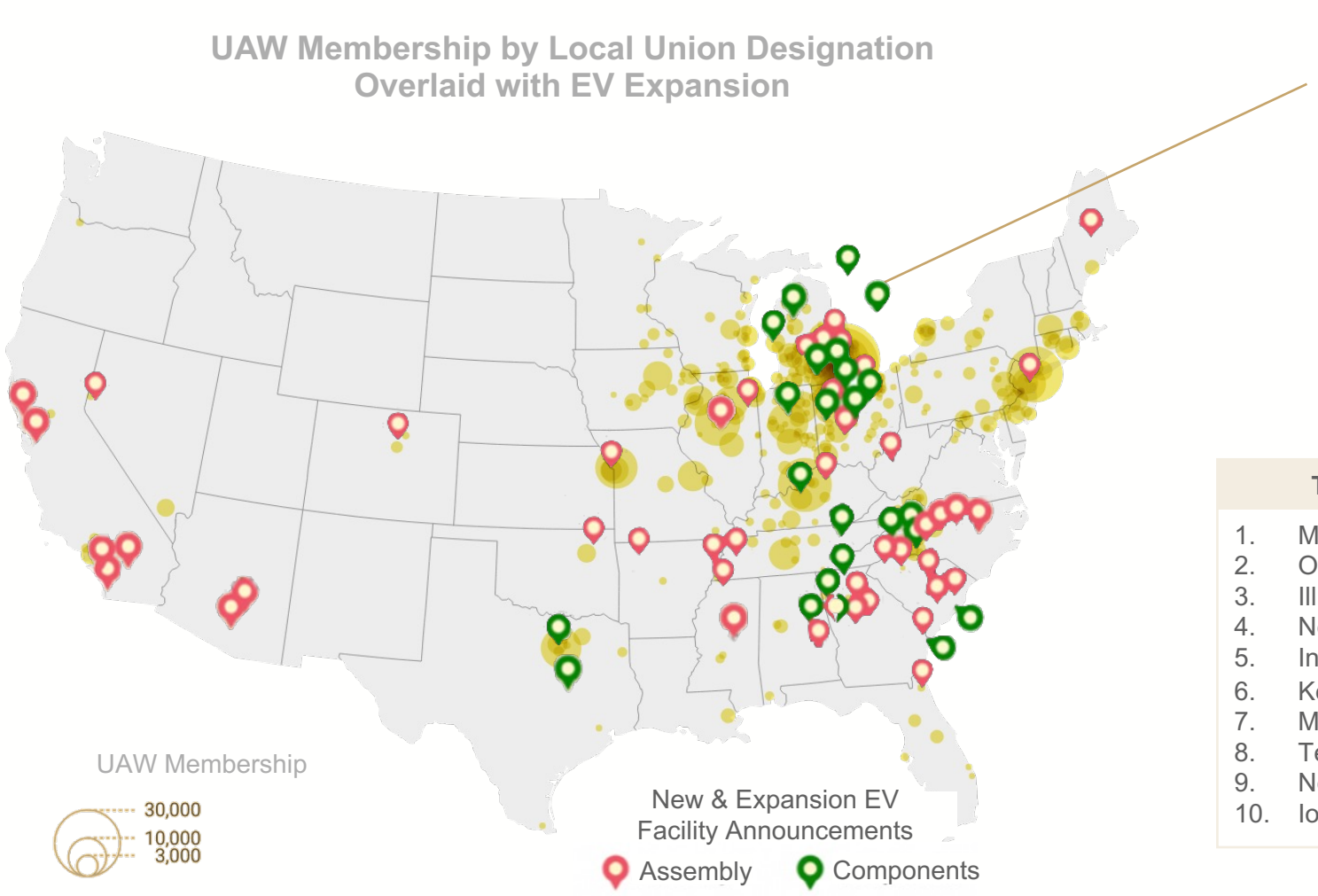
- UAW communication has ramped up over the past decade thanks to social media platforms and site visits.
- Labor shortages, nearshoring, and individuals' strong finances have put unions in a strong position for action in 2023.
- UAW Leadership does not want EV joint ventures to compromise the UAW's strength in the Midwest.
- The UAW's strike fund remains healthy and can fund a lengthy strike.
- Labor challenges remain an issue in the US as unemployment stabilizes.
- NA and EU still have a skilled labor shortage, particularly in maintenance and controls engineering.

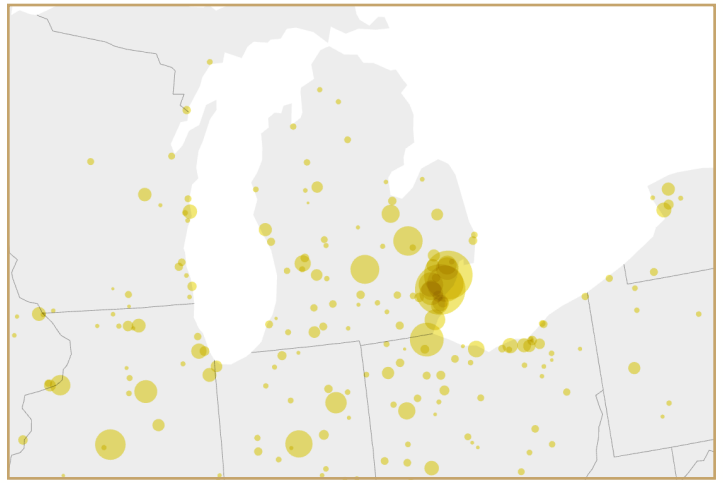
A prolonged strike grows more likely, with the UAW taking a firm public stance and the “Big 3” showing no hint of concessions

The Pre-conditions for a Strike Appear to Be Satisfied

- ✓ **The UAW’s Will to Strike**
  - ✓ **UAW's Engaged Membership**: UAW leadership actively communicates with members through increased social media engagement and live updates. The 4X increase in "Likes" per video since May 31 shows heightened interest among members.
  - ✓ **Ample Strike Fund:** At nearly $1B, the UAW could simultaneously sustain a 99-day strike at all three OEMs.
- ✓ **High Demands by the Union**: UAW has set forth substantial demands, including a 20% immediate pay increase with 5% yearly increases for the next four years (net 46% increase), reinstatement of COLA, the end of the tiered wage system, EV battery plants with full-paid UAW workers, and a 32-hour work week paid like 40 hours.
- ✓ **OEMs Not Ready to Give In**: GM, Ford, and Stellantis have a different view than the UAW. In an op-ed, GM didn’t address the core demands, Ford's Farley has argued that their current contract and wage increases are already adequate, and Stellantis’ first negotiating plan was “trashed” by UAW president Shawn Fain.

The growth of EV joint ventures in non-union strongholds is undermining the UAW's strength



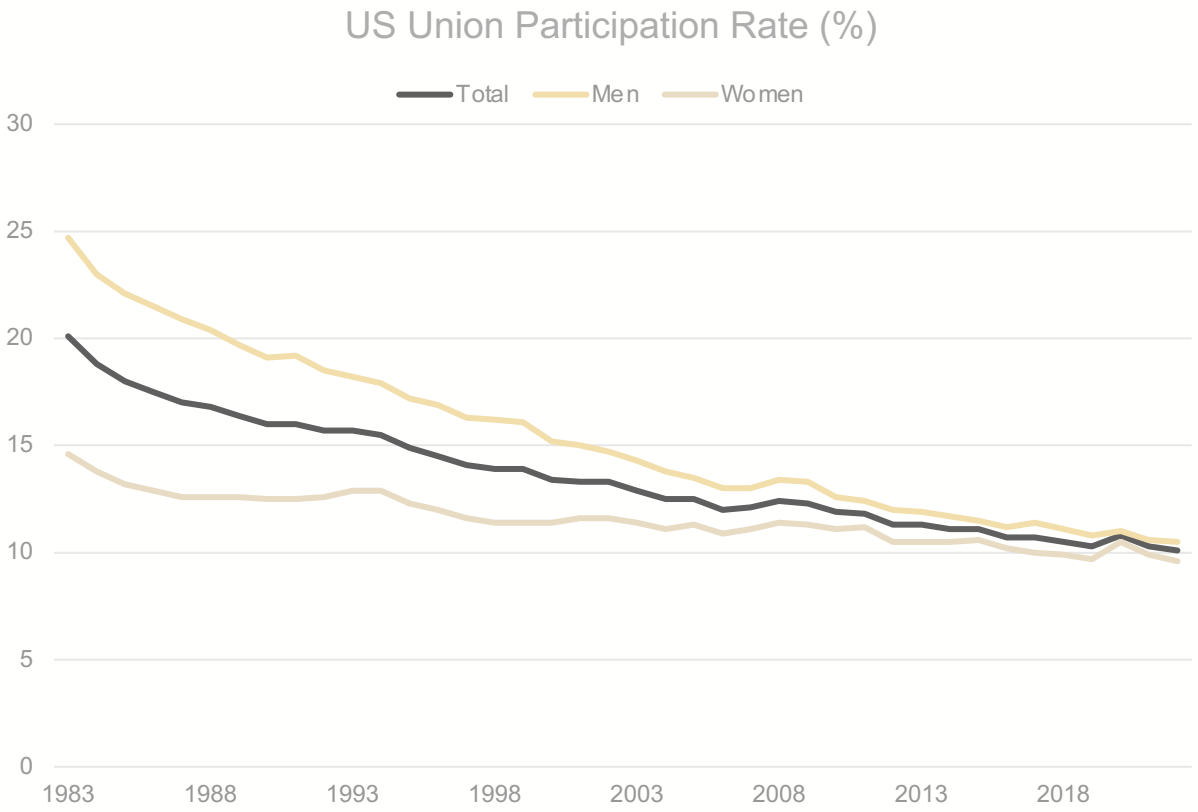


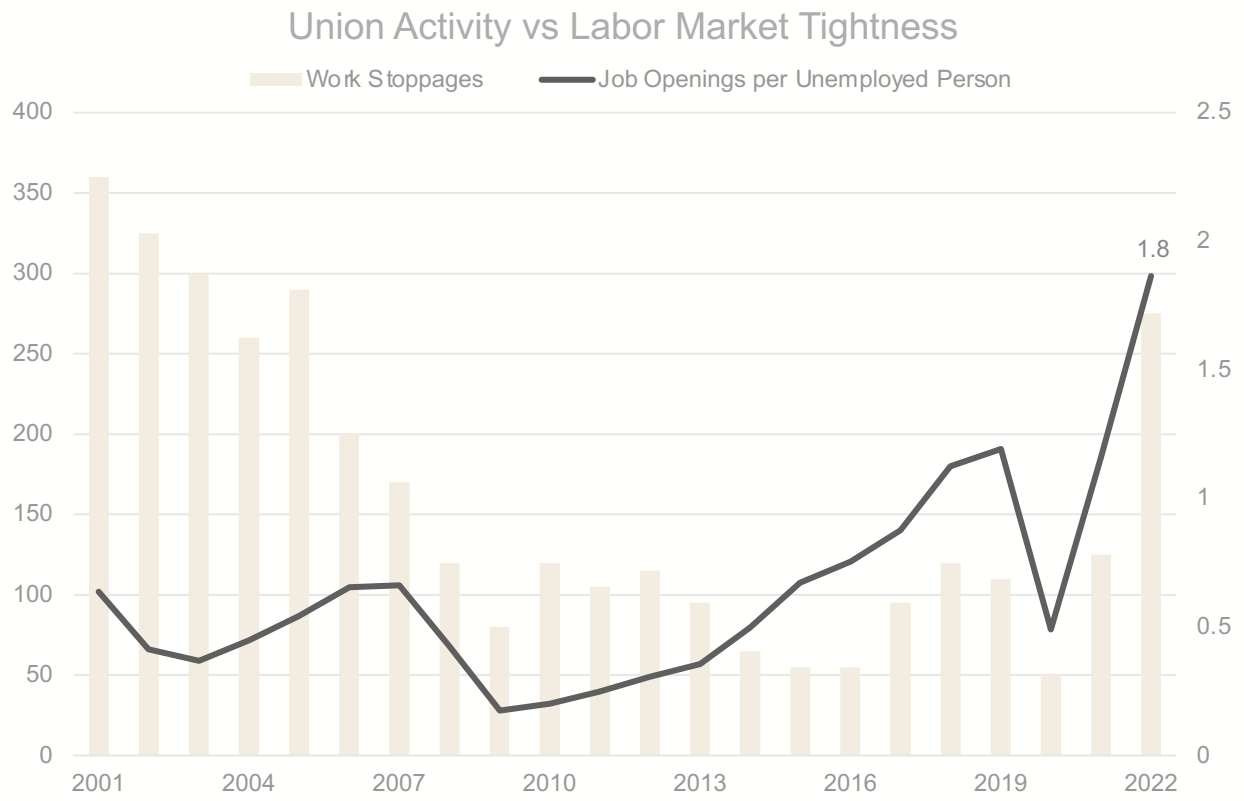
Top 10 UAW States		
1.	Michigan	138,593
2.	Ohio	37,187
3.	Illinois	29,355
4.	New York	23,778
5.	Indiana	20,083
6.	Kentucky	18,641
7.	Missouri	16,129
8.	Texas	10,617
9.	New Jersey	10,410
10.	Iowa	9,789

Top 10 UAW Cities		
1.	Dearborn, MI	27,604
2.	Warren, MI	25,489
3.	New York, NY	14,714
4.	Detroit, MI	13,718
5.	Louisville, KY	13,533
6.	Toledo, OH	11,737
7.	East Peoria, IL	9,433
8.	Flint, MI	8,707
9.	Lansing, MI	8,365
10.	Pleasant Valley, MO	7,988

Note: EV expansion map shown does not include battery supply chain announcements, but they will also play a key role
Source: US Department of Labor, Office of Labor-Management Standards, Department of Energy

Despite a continued decline in union membership, several factors have aligned to put unions in a strong position for action in 2023

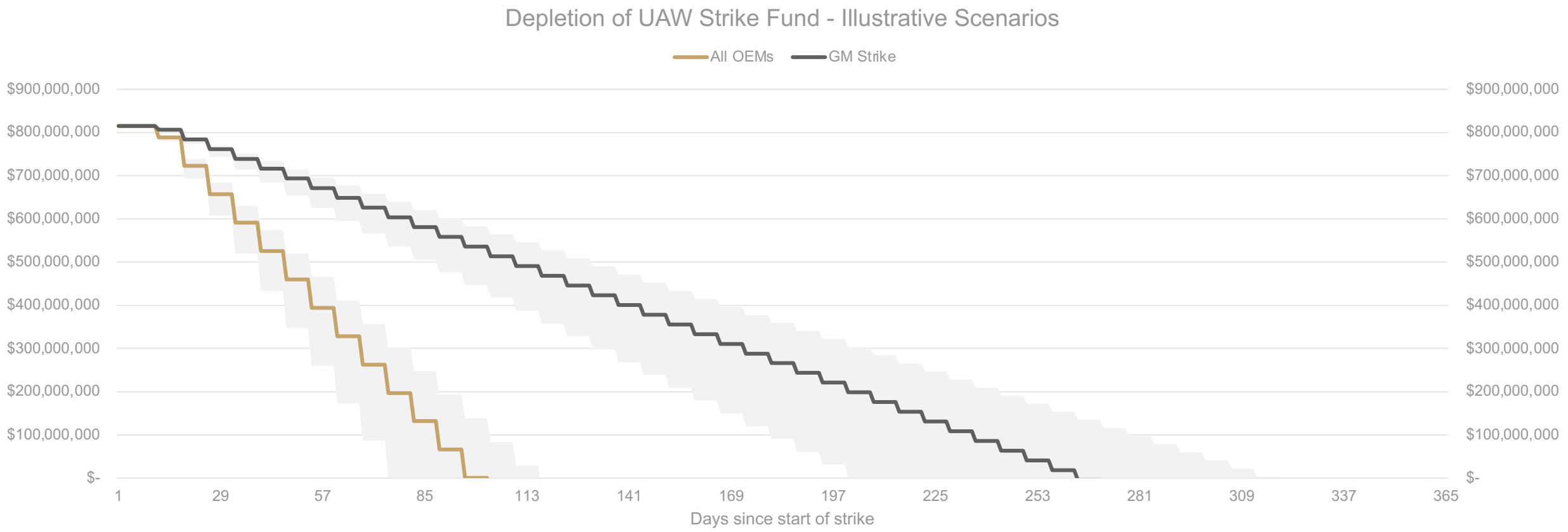




Labor shortages, nearshoring, US EV market share competition, and strong individual finances due to pandemic-era fiscal stimulus have given organized labor more bargaining power.

Source: BLS, Bloomberg Law labor data

The UAW strike fund is healthy and can sustain benefits for a lengthy strike, but $500 weekly pay is still less than 40% of typical earnings

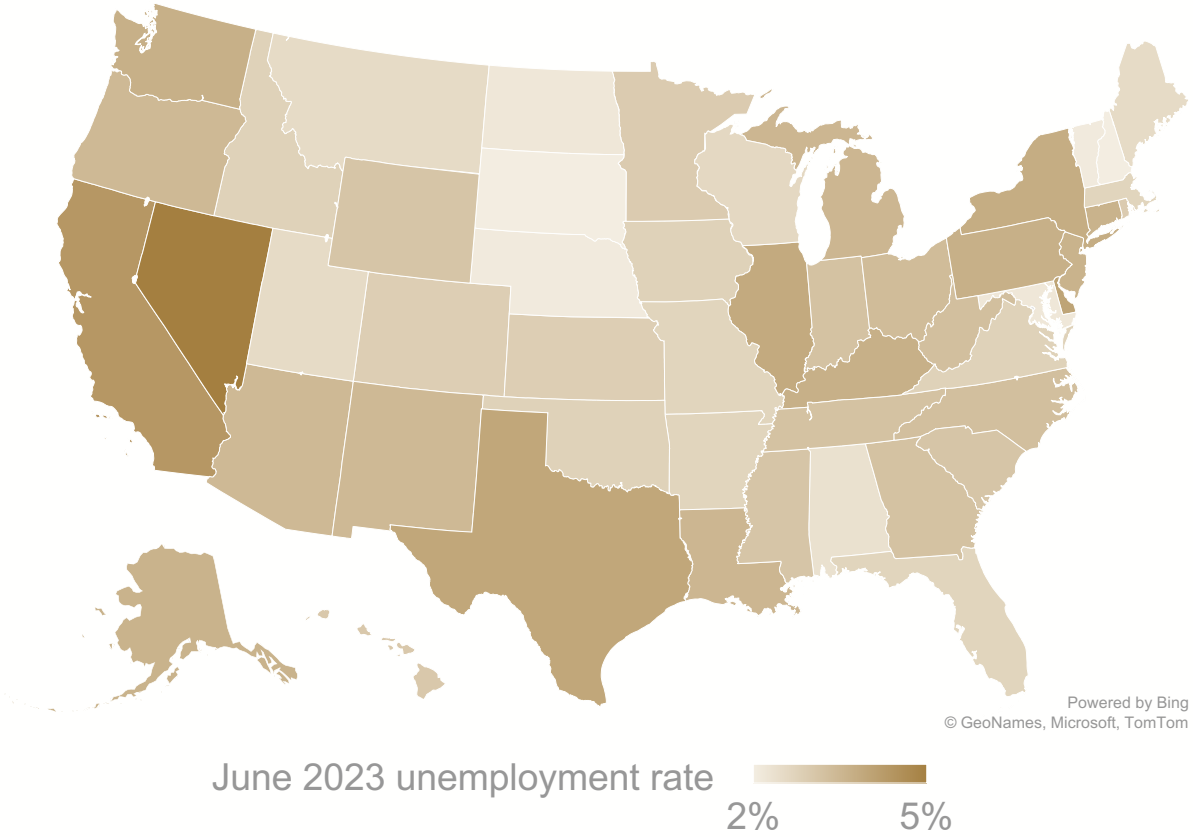


Striking workers are not eligible for unemployment, so UAW pays members $500/week out of the strike fund. If UAW achieves wage increase demands, workers will be net positive for lost strike wages within a year, even with an 85 working day strike, shorter strikes will have a faster payback.

Note: Grey zones indicate low-high range of strike fund depletion rates
Source: UAW, US Department of Labor

Unemployment in the US has dropped beneath pre–pandemic levels, but some have not returned to the workforce

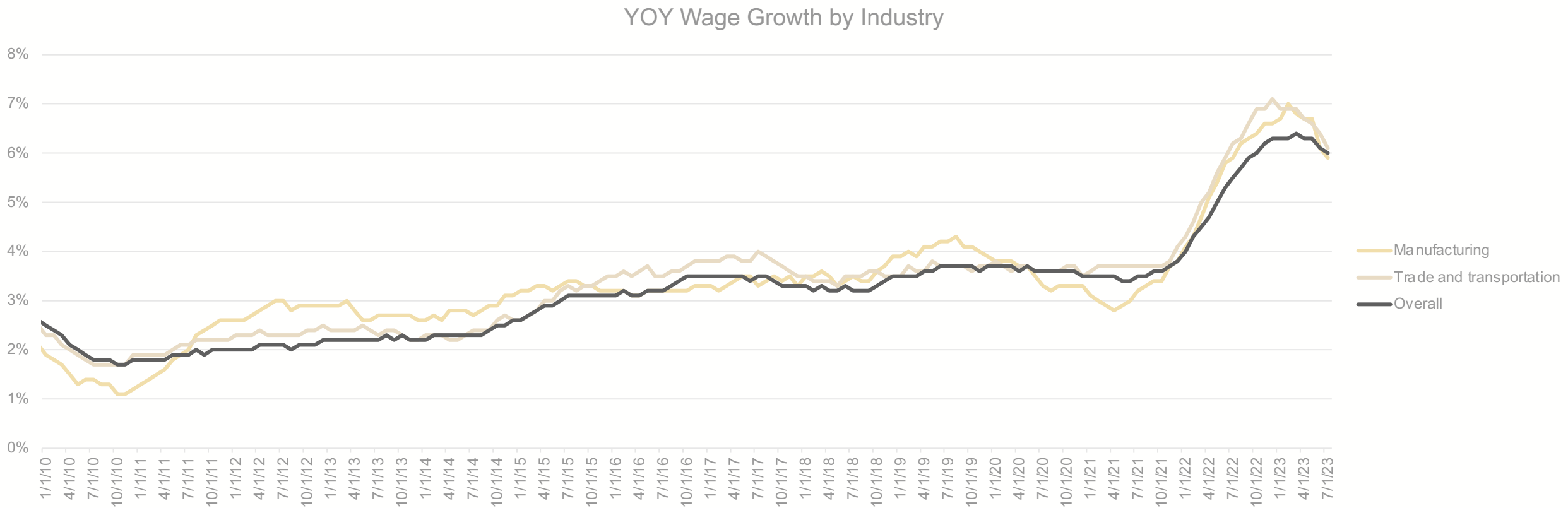
June 2023 Unemployment



US Unemployment vs. Labor Force Participation Rate

Source: US BLS

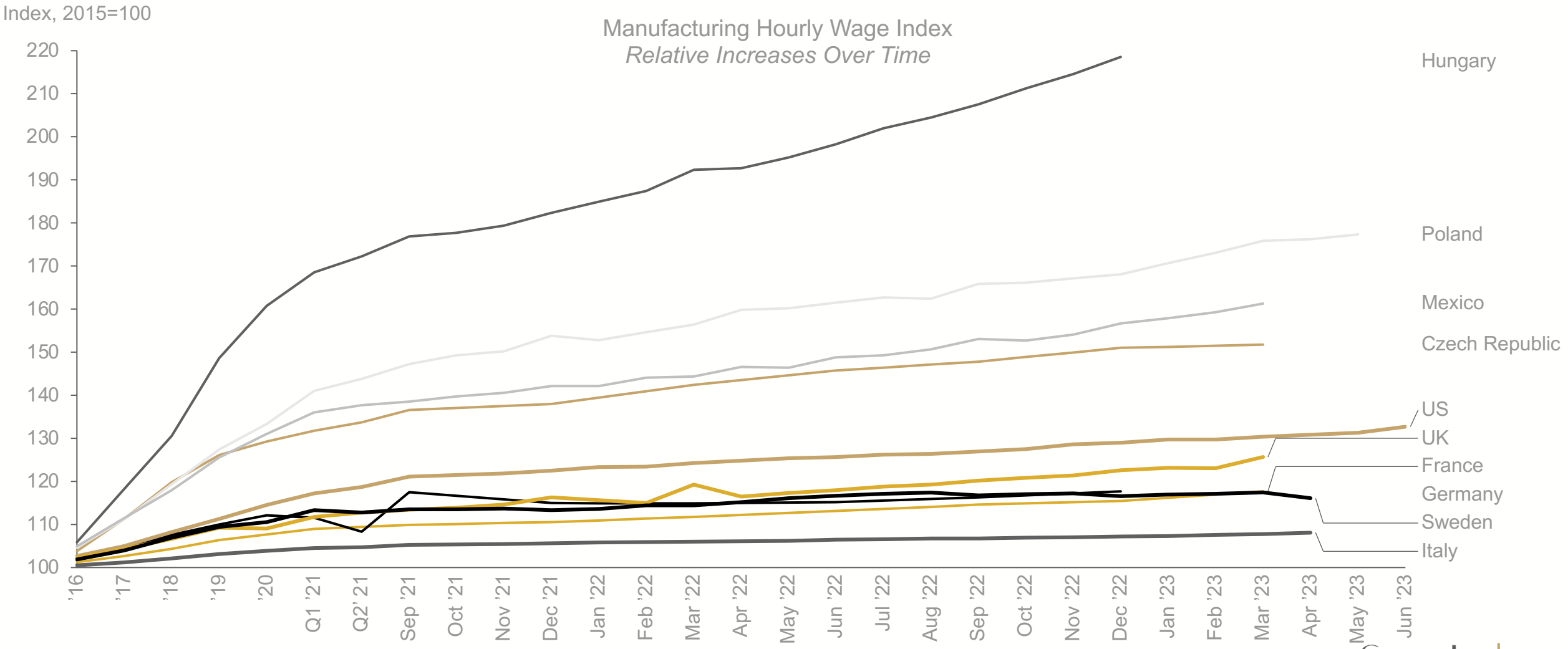
US Wage growth cooled slightly in Q2, but remains significantly elevated relative to pre-pandemic norms



Wage growth is slowing, but the new baseline is significantly higher than when programs started.
Suppliers have not adequately recovered from these increases.

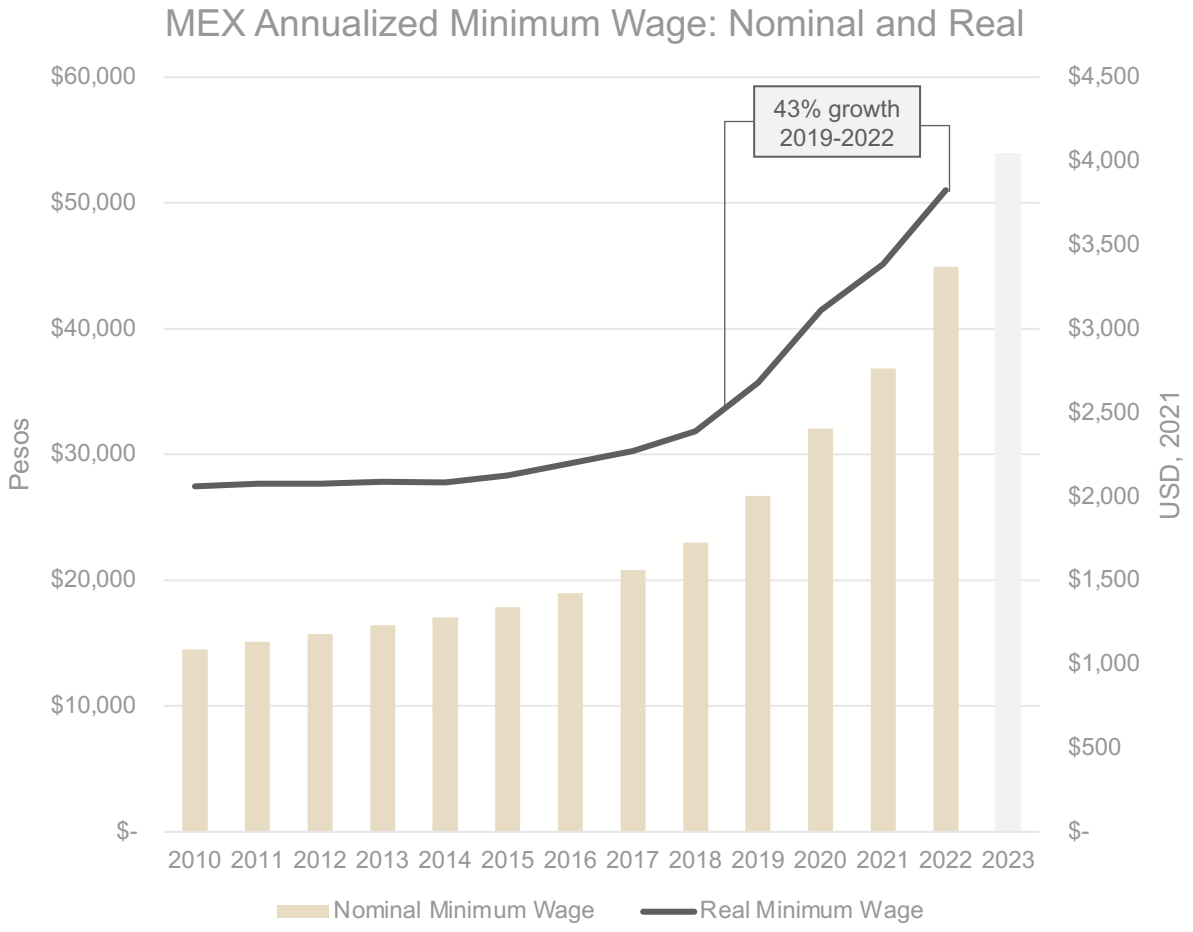
Source: Bureau of Labor Statistics

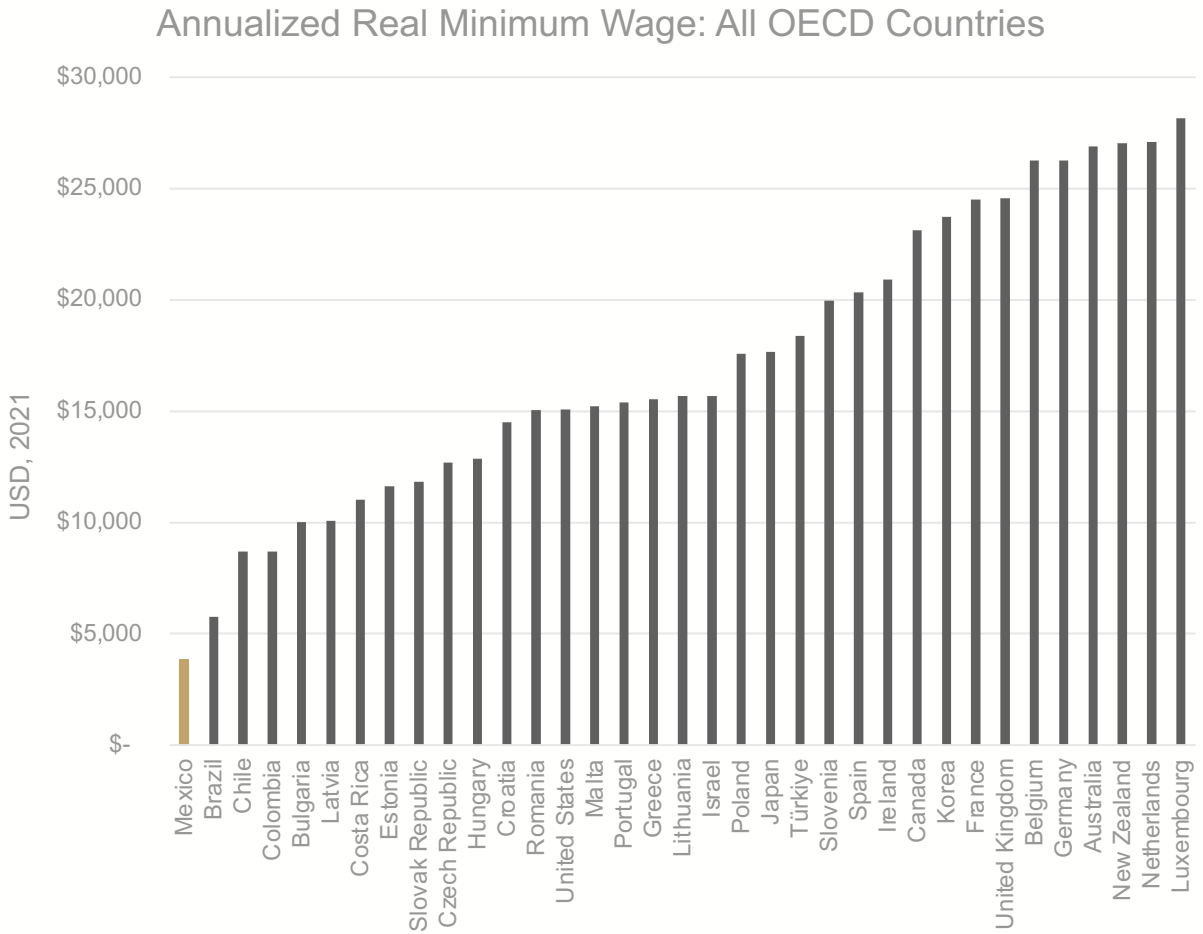
Low-cost manufacturing countries' wages have grown faster than developed economies, partially eroding cost competitiveness



Source: OECD
Note: Monthly data for Czech Republic, France, Germany, OECD Europe, so quarterly data was prorated. Germany and Hungary have not reported data for 2023, and the others' final month is staggered; only the US is reporting June data as of August 13, 2023.

Despite consistent minimum wage hikes, Mexico remains attractive for manufacturing investment due to low labor costs

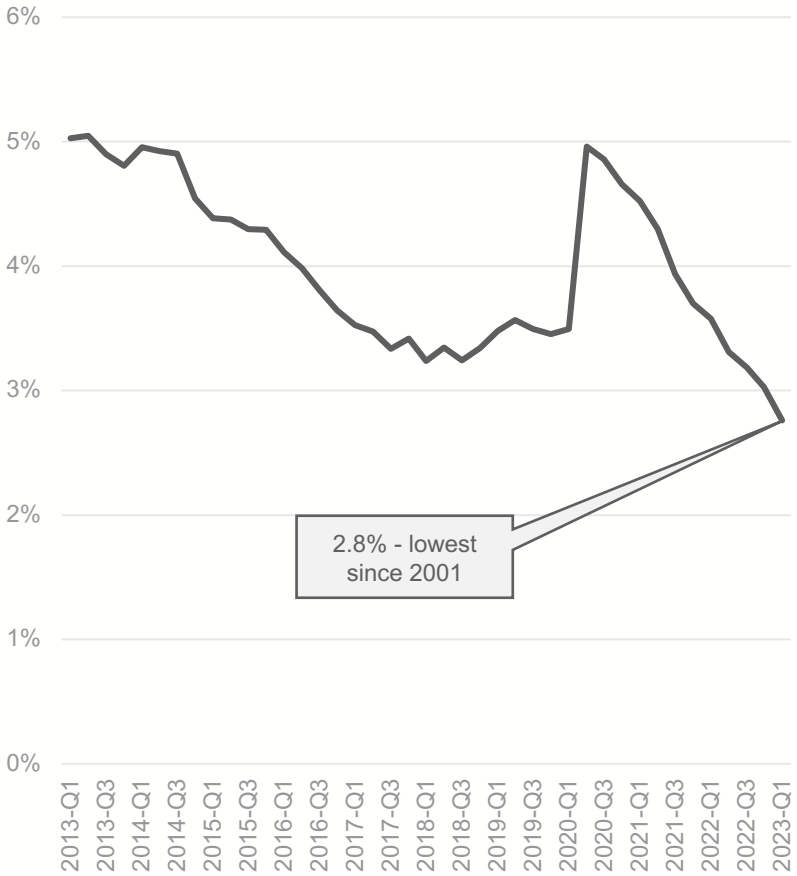




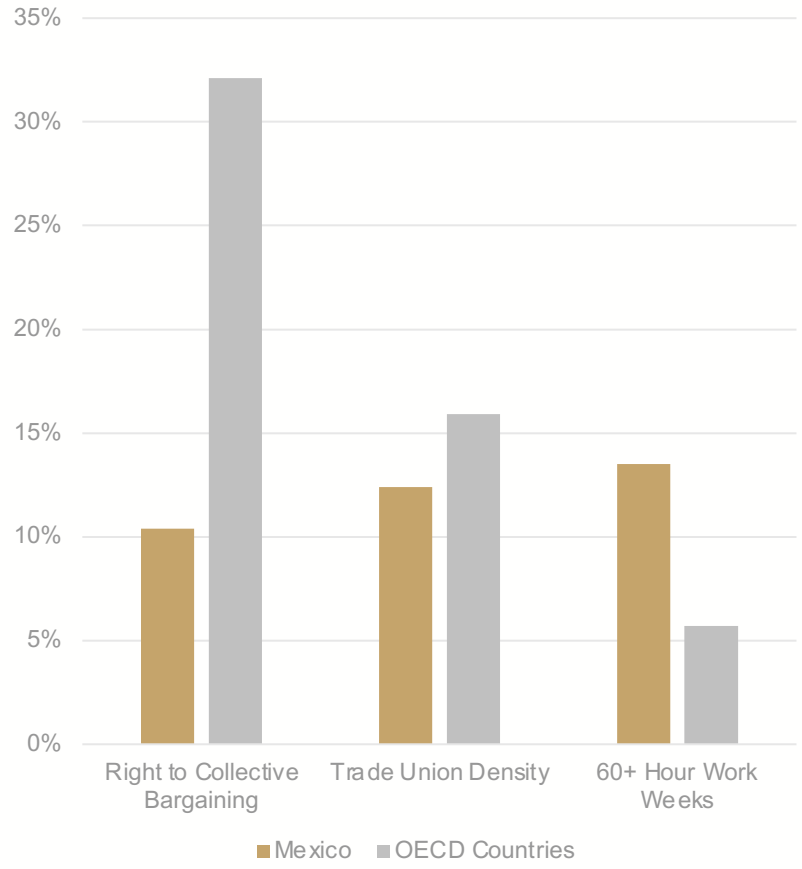
Source: Organization for Economic Co-operation and Development (OECD)

Persistent labor shortages and policies designed to improve working conditions will continue to drive up Mexican labor costs

Mexico Unemployment Rate, Quarterly



2020 Working Condition Indicators



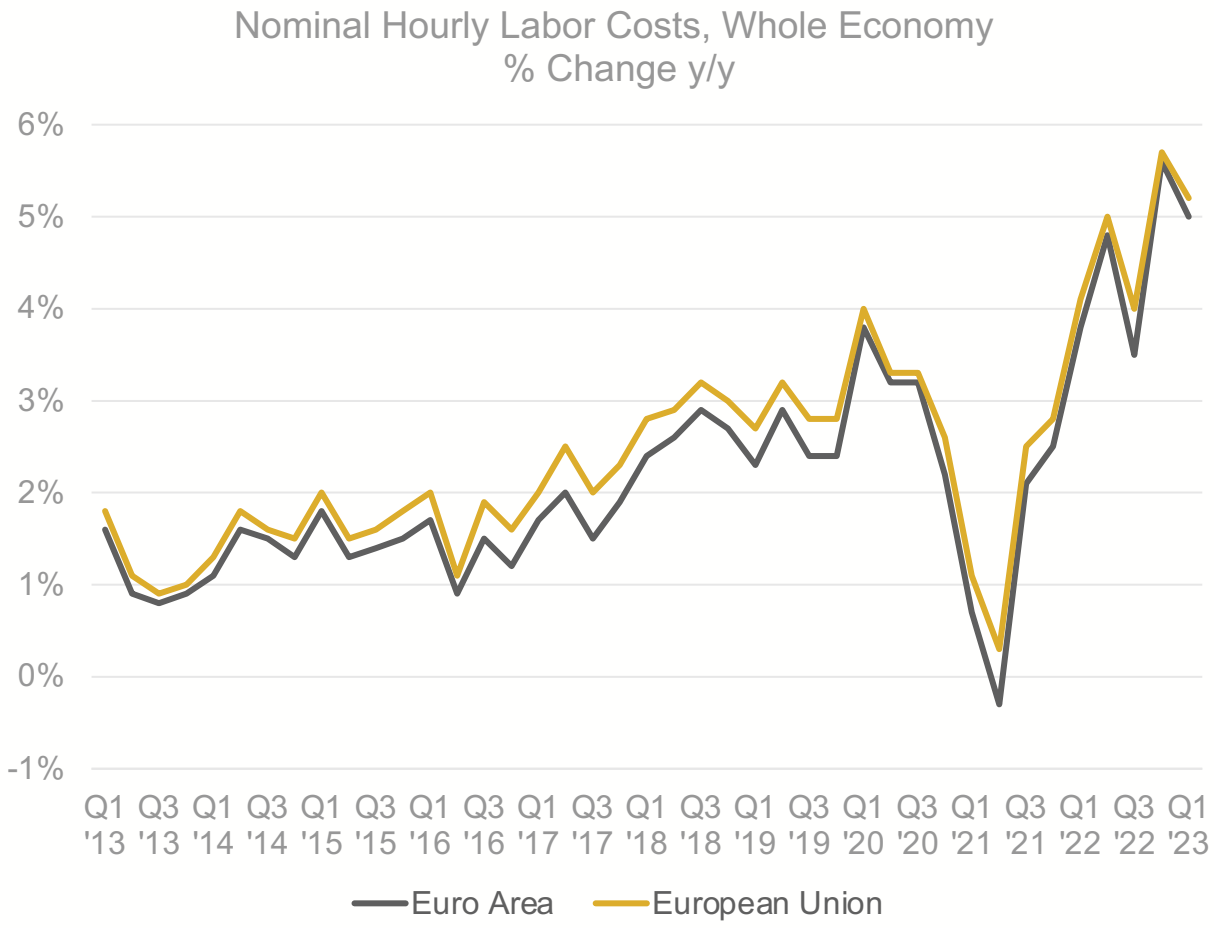
New Labor Model Implementation Schedule

- Domestic Reform
  - Certification system for unions
  - Independent courts and agencies for labor disputes
  - Employer prohibitions to protect union interests
  - Union regulations to protect member interests
  - Working hours reduction (48 hrs/wk to 40 hrs/wk)
  - Prohibition of labor subcontracting
- International Reform
  - USMCA Facility-Specific Rapid Response Labor Mechanism to investigate international labor rights disputes

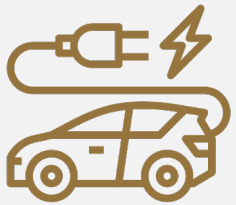
Source: OECD, Main Economic Indicators; OnLabor, Mexico News Daily

Labor availability remains a significant concern in the EU; most significantly, skilled labor driving labor costs higher

- In Q1 2023, hourly labor costs rose compared with the same quarter of the previous year by:
  - 5.0% in the Euro Area
  - 5.3 % in the EU,
- The **job vacancy rate is currently at a record high** in Europe, and more than a quarter of EU businesses reported production problems due to labor shortages last year.
- EU leaders and business representatives have **blamed the shortage solely on a skills gap** among European workers.
- Labor shortages exist in various sectors and occupations across all skill levels and are **set to increase**. They are expected to persist in both high skills and low skills occupations, **driven by the creation of new jobs and the need to replace workers who retire**.



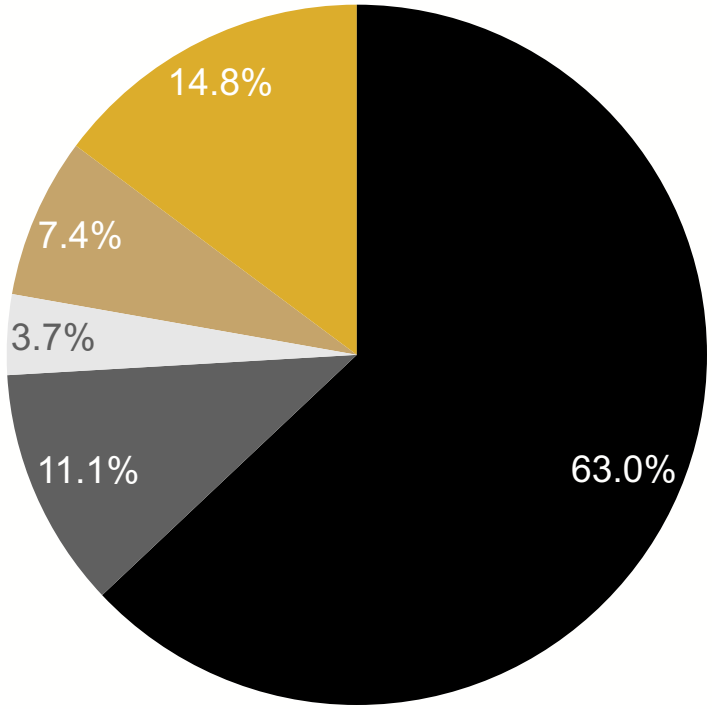
EV NA / EU & China Growth



- China’s NEV-friendly policies are helping to solidify China as a global leader in the EV market.
- Fueled by EU strength, Chinese exports are rising, with dependences on imports decreasing.
- Companies intentionally focus on the EV business (vs. ICE) while consciously reducing dependency on and exposure to China.
- While the EU has become more reliant on Chinese manufacturing, the US is reducing its dependency on China in favor of other Asian countries and Mexico.
- However, the industry is experiencing several launch delays in 2023.
- Decades of dependency on China have driven emphasis on nations to build de-coupling strategies.

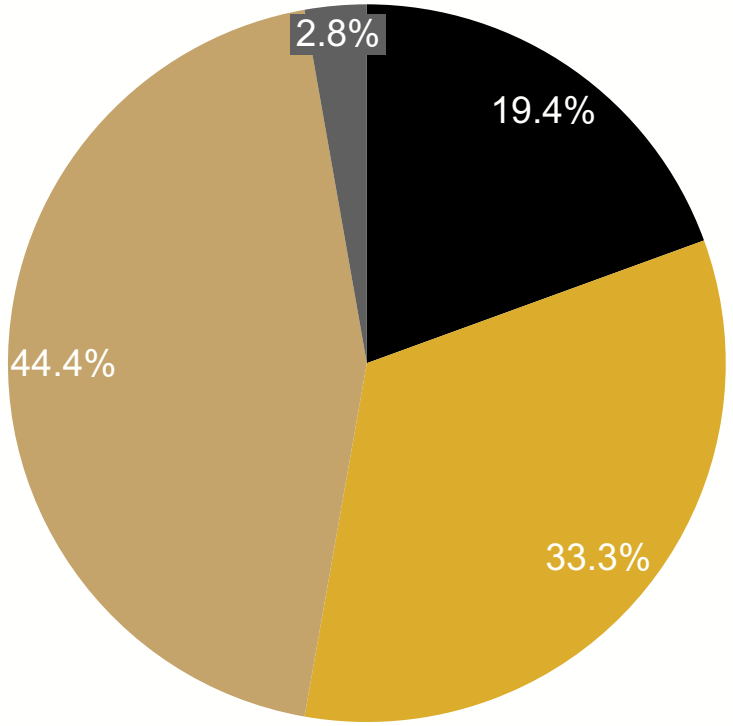
Although investing in EV and non-China supply chains is priority, most are taking a balanced approach

Seraph Survey: "Have you changed your view of sourcing parts from China for western markets from pre-COVID?"



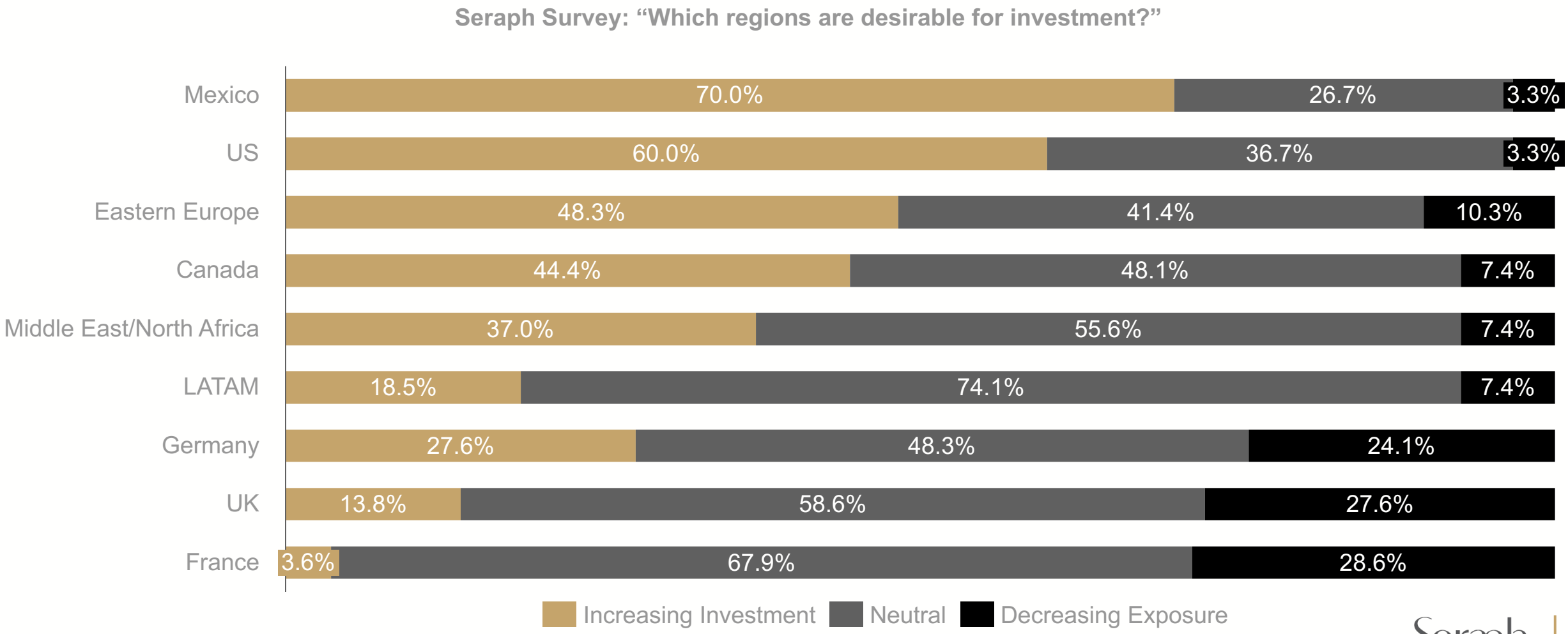
- Sourcing more from China
- No change in sourcing strategy
- Diversifying away from China suppliers, but expect exposure to remain
- Actively decreasing dependency on China suppliers, goal is zero exposure
- Did not have China exposure before COVID

Seraph Survey: "How do you view ICE vs. EV new business?"



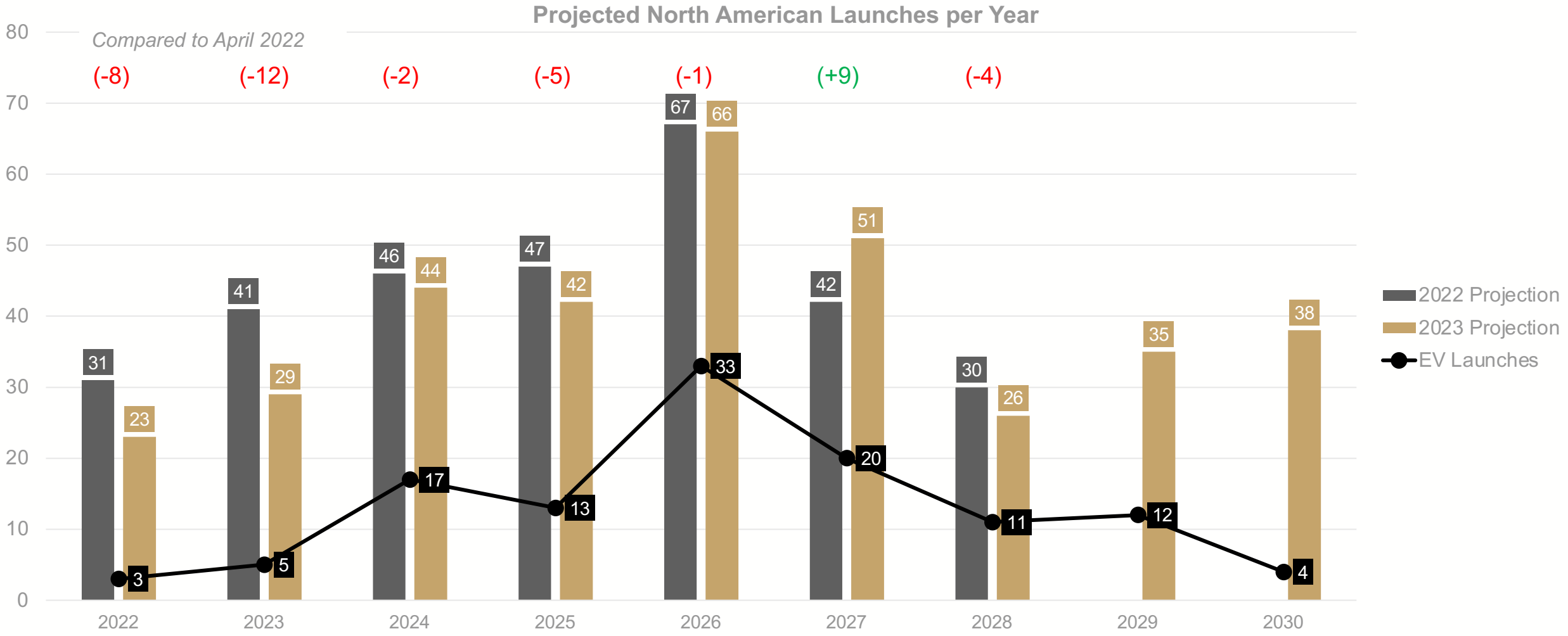
- ICE business is still strategic, continued investment
- EV business is the future, diverting resources
- Balanced approach, investing in both ICE and EV
- Evaluating trends, no clear direction yet

Western automakers, except for Tesla, are curtailing their China investments and refocusing on other regions



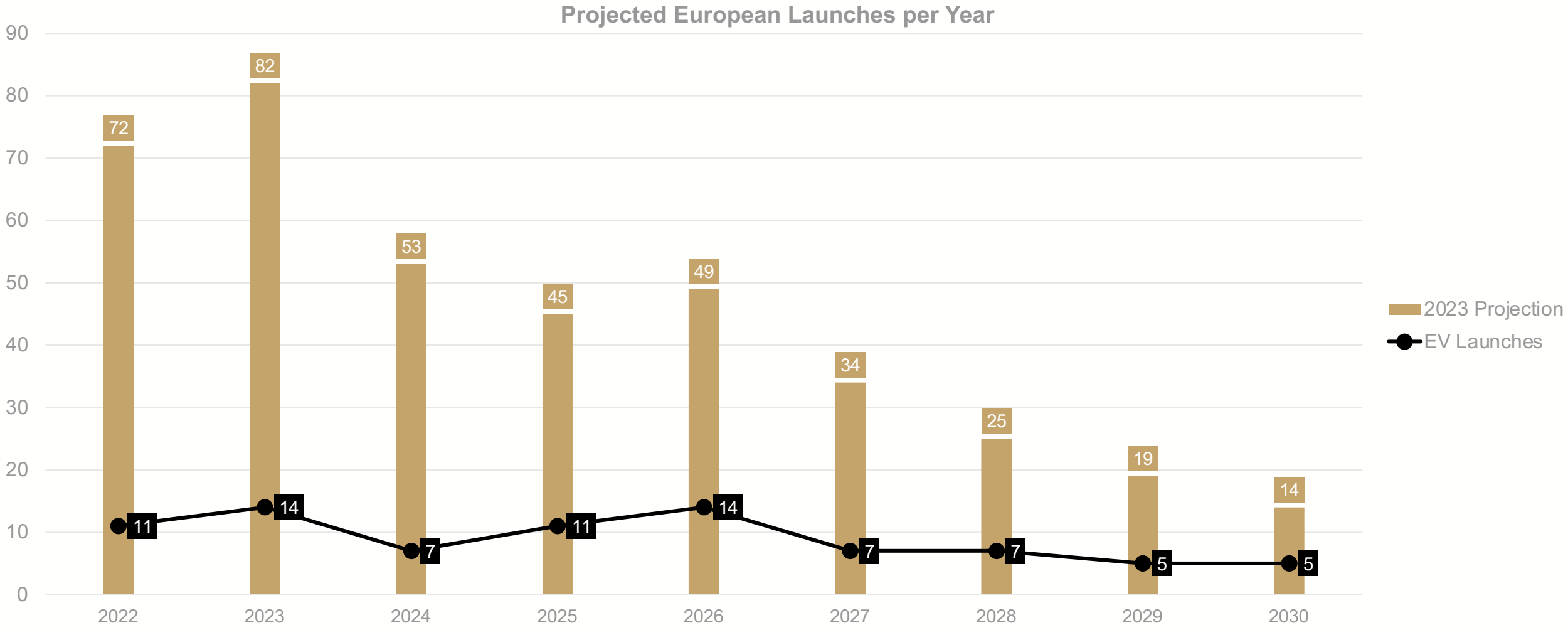
Source: Seraph Q2 2023 Automotive Leader Survey, including respondents from North America and Europe working in the 10 largest auto manufacturing firms

Ambitious launch dates for North American vehicles have been pushed back, making it challenging to plan capacity investments



Source: S&P IHS, Automotive News, Company Announcements, Seraph Analysis

Percentage of European EV launches to total launches increases over time; this percentage will likely decrease as launches are pushed back



Source: S&P IHS, Automotive News, Company Announcements, Seraph Analysis

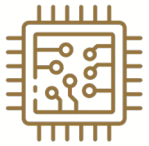
With significant CAPEX required to support EV launches, suppliers should do additional diligence on the prospects for volumes and potential ROI

As OEMs seek to increase their EV portfolio, there are likely more launches than the market will accept. Volumes being below forecast will deplete supplier cash. It is important that suppliers evaluate OEM program volume projections using the criteria:

The right charging connectors

Models relevant to consumers at resilient price points

Secured access to critical minerals



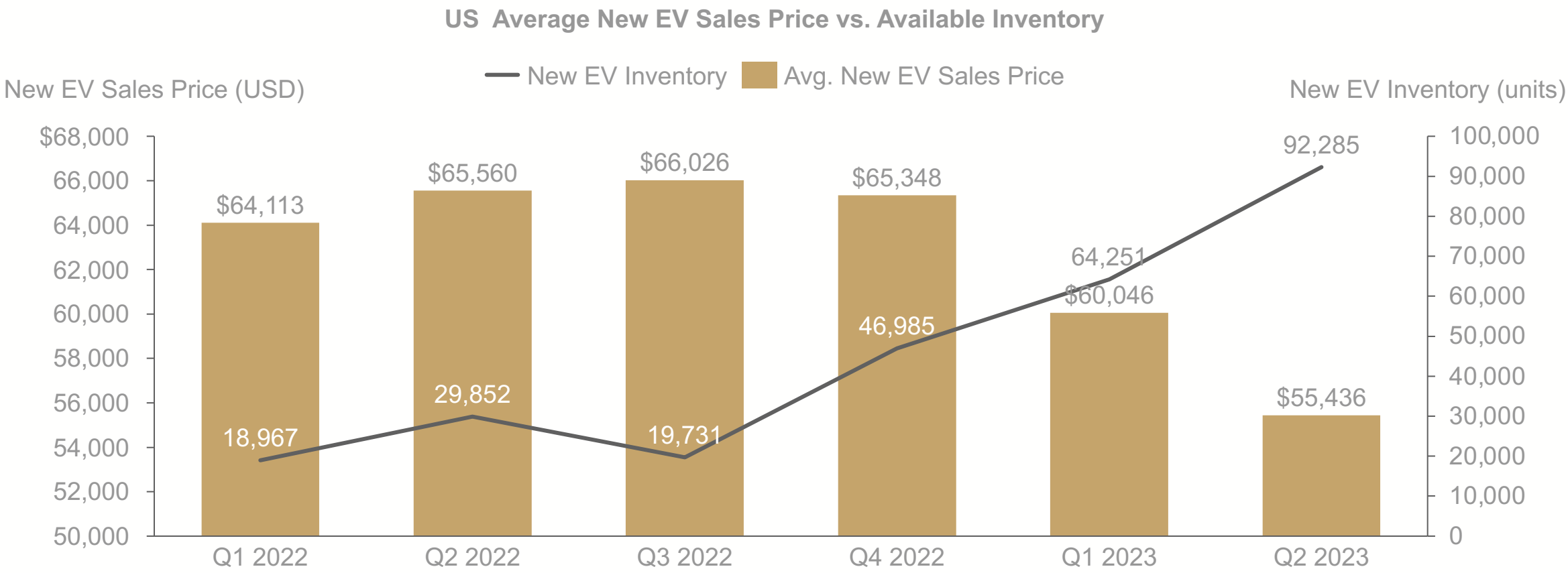
Secured access to semiconductors

Capable supply chain managers (demonstrated competency in managing Tier N risks)

Distribution channels to areas with appropriate charging and infrastructure development

Suppliers are increasingly looking for financial support from OEMs to support major new technology investments.

EV sales prices are coming down, but still 15% higher than the average new vehicle, and inventory is increasing



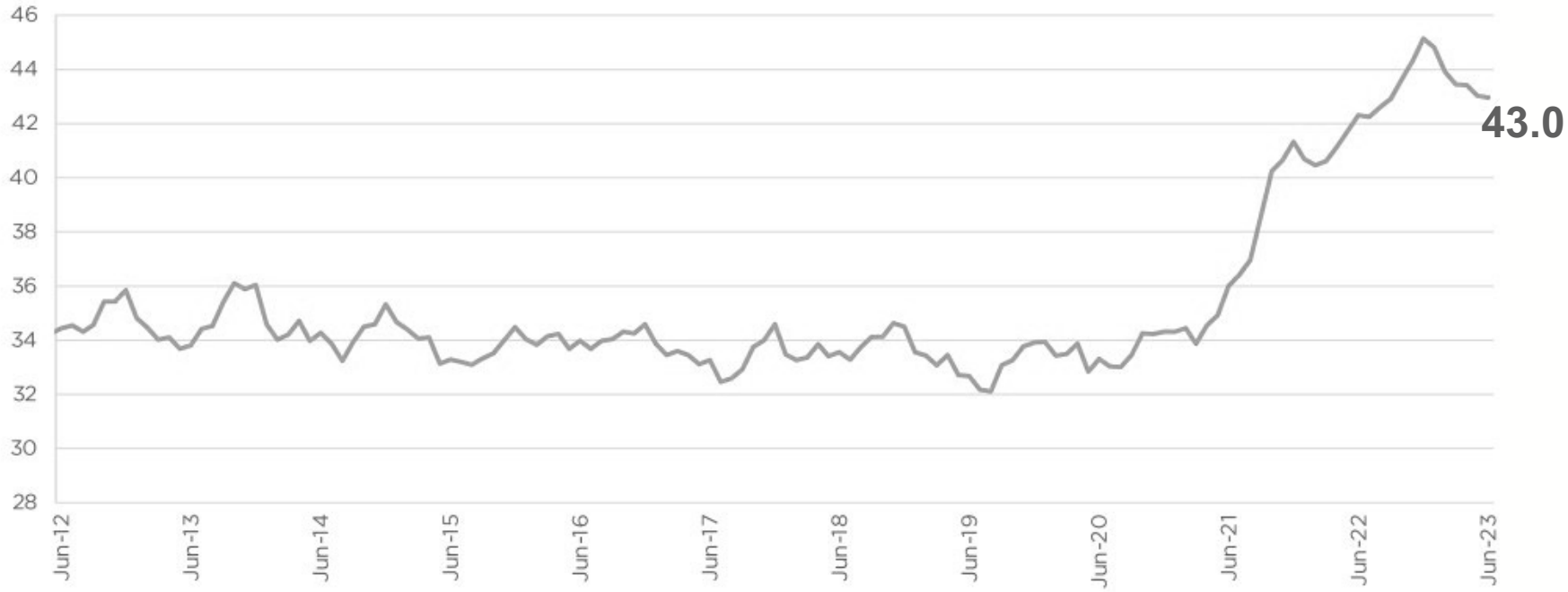
"As a data point, we had a 32-day supply of new vehicles, including 26 days in the U.S. and 36 days in the U.K. As a data point, our current supply of new battery electric vehicles is 54 days in the U.S. and 52 days in the U.K."

- Michelle Hulgrave, EVP & Chief Financial Officer, Penske Automotive Group Q2 2023 Earnings Call

Source: Cox Automotive Sales Data, Company Q2 2023 Earnings Calls

The slight trend of vehicle affordability improved by 2 weeks during 2023, but remains 26% less affordable than two years ago

Median Weeks of Income Needed to Purchase a New U.S. Vehicle



Factors impacting recent affordability improvement:

- Slightly increasing new-vehicle prices, +1% y/y
- Increasing incentives, now 4.4% of avg. transaction price, from 2.4% last July
- Growing incomes offsetting rising prices
- Slight increase in interest rates, avg. new car rates now 9.63%

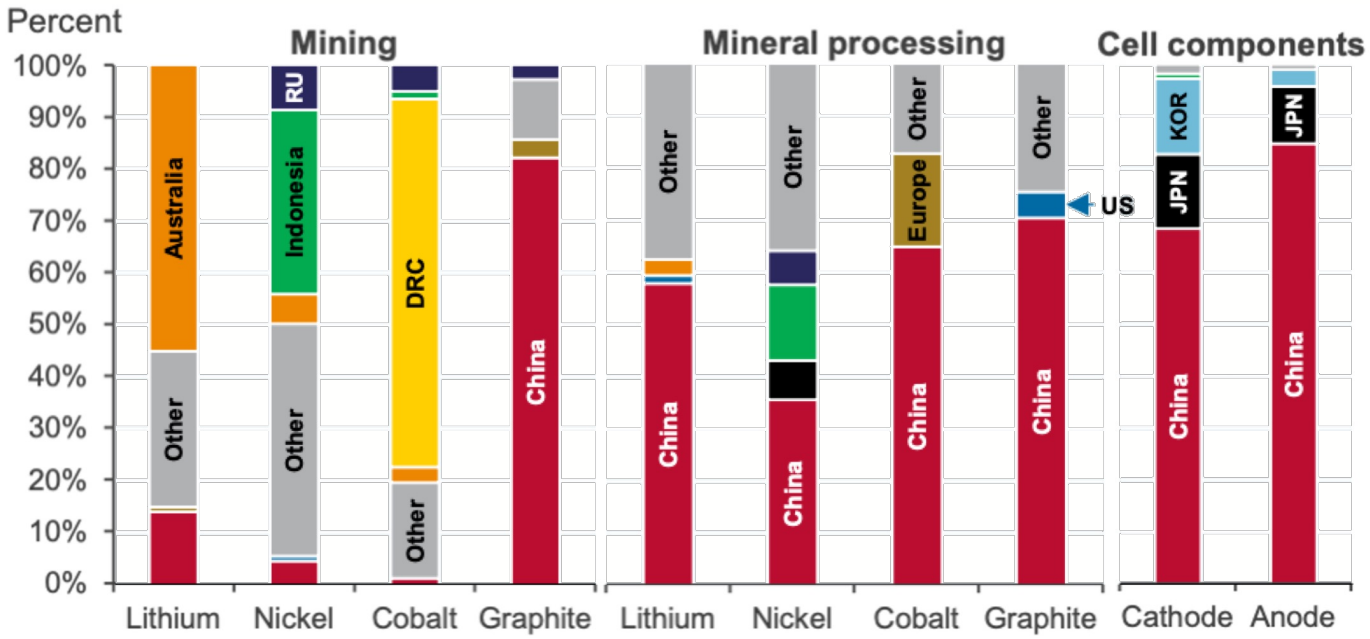
"I expect margins will continue to moderate partly to maintain current demand in this higher monthly payment environment and partly as inventory levels continue to increase and fewer vehicles are being sold at MSRP. However, I do not expect margins to return to pre-pandemic levels for the foreseeable future, based on higher average selling prices of vehicles and continued lower industry inventory levels."

- Michael Manley, CEO AutoNation Q2 2023 Earnings Call

Source: COX Automotive/Moody's Analytics Vehicle Affordability Index

Battery supply chains remain long and China-controlled; US and EU need to make strategic investments in mineral processing

Battery Supply Chain Sources



Global Average Lead Times
Mineral Discovery to Production, 2010-2019

Years	Phase
12.5 yrs	Discovery, exploration to feasibility study
1.8 yrs	Construction planning
2.6 yrs	Construction to production

Recent Critical Mineral Developments

Mineral Prices: Most critical mineral prices began to moderate in the latter half of 2022 and into 2023 but remain well above historical averages. Jan 2021-May 2022: lithium (7x), cobalt (2x), nickel (almost 2x).

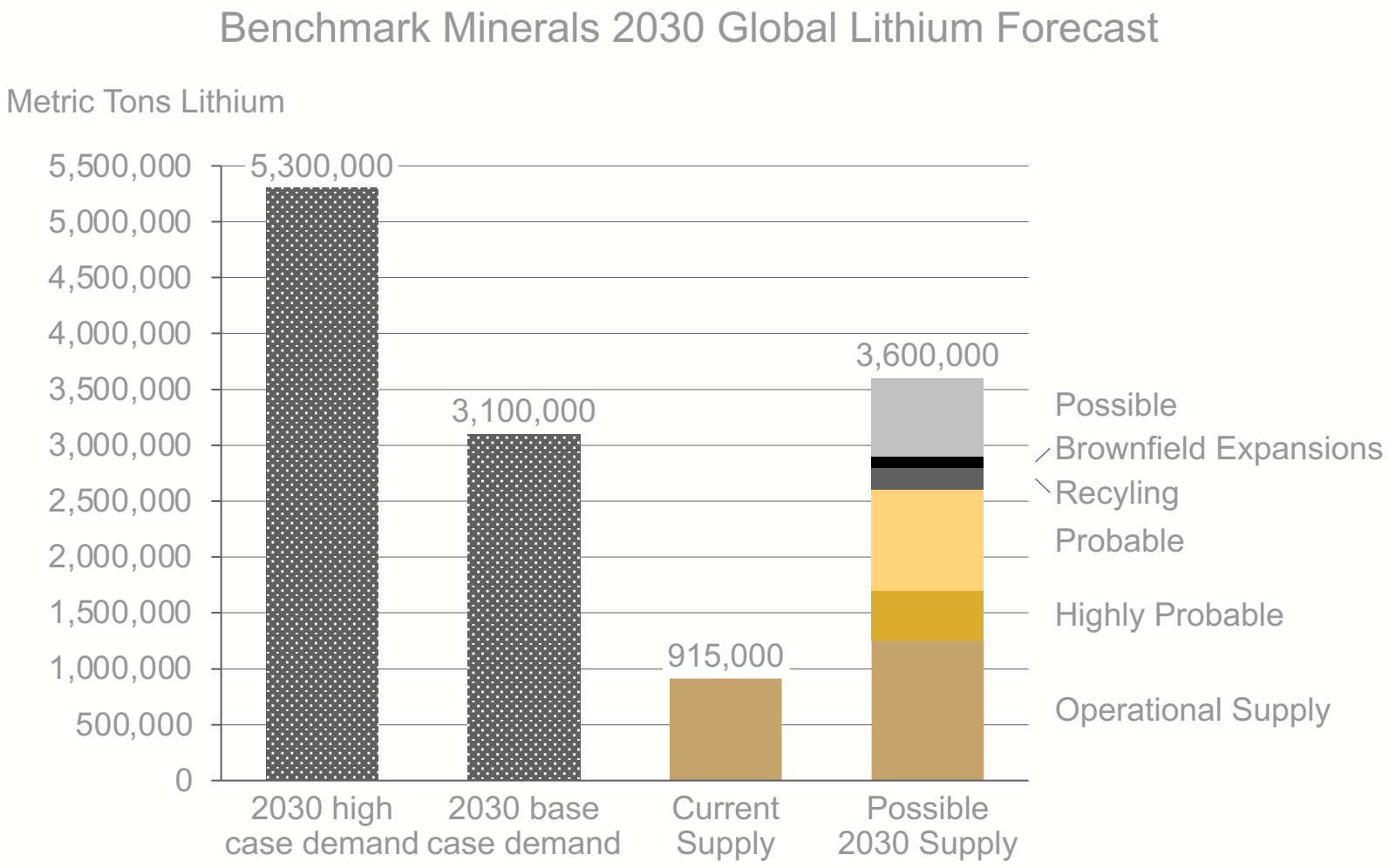
Exploration Spending: 20% increase in 2022; lithium spending increased by 90%, uranium 60%, nickel 45%.

Recycling Capacity: The vast majority is in China, but new facilities are being developed in Europe and the United States. The shift from recycling scrap from manufacturing to used EV batteries is expected around 2030.

Venture Capital Funding: The first quarter of 2023 was strong for critical minerals despite a downturn in other VC segments.

Source: IEA

The projected deficit of EV minerals will bottleneck some OEMs from meeting their goals, impacting unsuspecting suppliers



OEMs have been proactively making deals for the near term-production:

"GM now has binding agreements securing all battery raw materials supporting our goal of 1 million units in annual capacity in North America in 2025. This includes lithium, nickel, cobalt, and the full CAM supply."
- Mary Barra, Q2 2022 Earnings Call

ACG's acquisition of two mining operations in Brazil is backed by various global investors and commitments, including a $100M investment from Stellantis and a $100M commitment from VW's PowerCo. These funds will support the production of nickel sulfide and copper concentrates, to be processed in North America and Europe for electric vehicles.
- ACG *June 2023*

Non-exhaustive examples, there are many more like this

Source: Benchmark Lithium Forecast 2023, GM Earnings Call, Company Announcements

OEMs in North America are converging around Tesla's NACS connector; consumers are likely to delay purchases until it is implemented

CCS

CCS1

CCS2

NACS

	CCS	NACS
Design	Separate pins for delivering AC and DC charging	Shares the same pins for both AC and DC charging
Global Availability	North America (low reliability) & Europe (higher reliability)	North America only (Tesla Supercharger Network)
US Network Size*	13,883 ports across 7,000 stations	30,468 ports across 6,070 stations

November 2022

Tesla open-sources its proprietary charging connector and brands it NACS

June 2023

Ford partners with Tesla, allowing Ford customers to access Supercharger Network

Electrify America Charging Network will Support NACS

GM announces a similar agreement to Ford

The SAE announced it will standardize the NACS connector

Volvo & Rivian follow suit

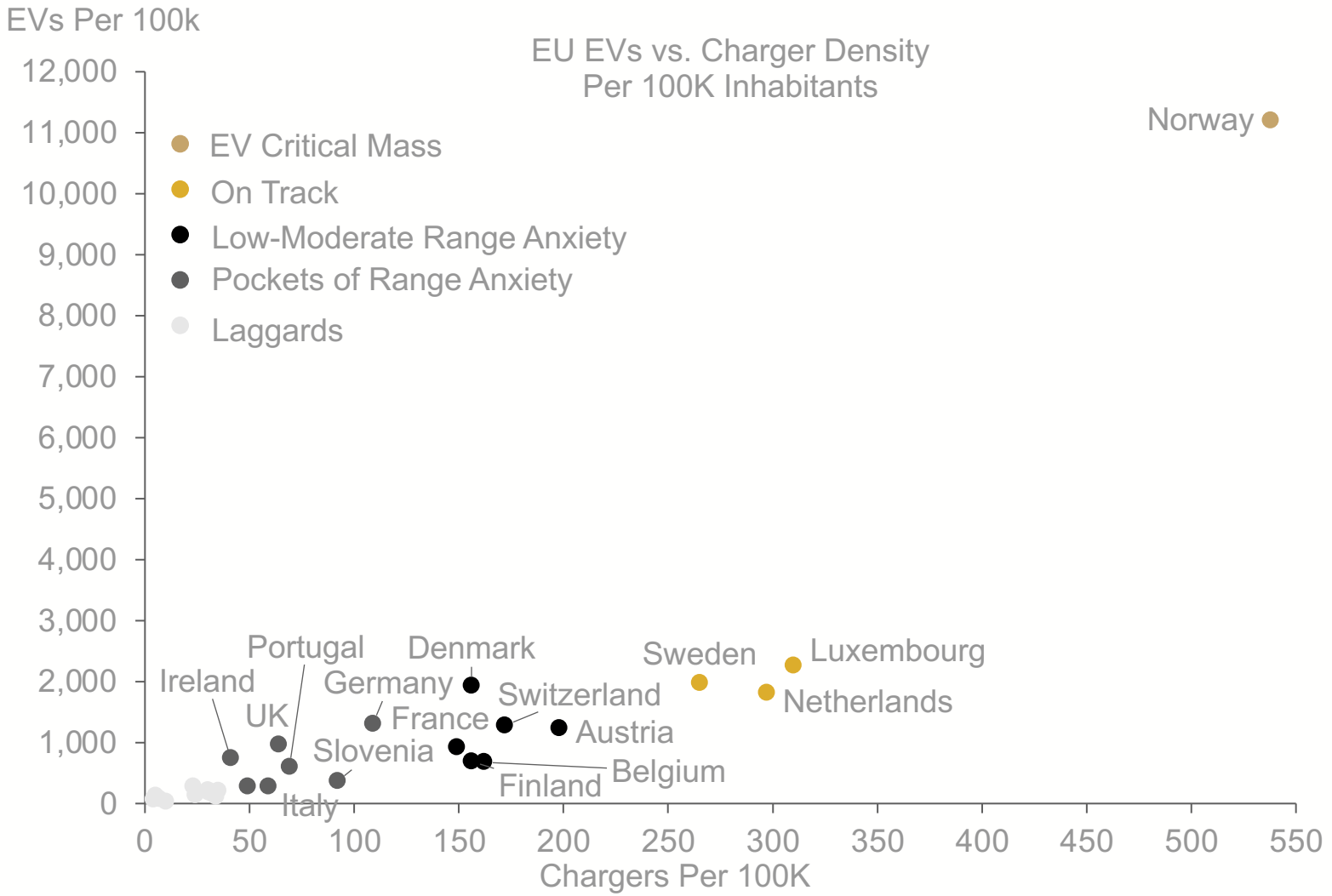
July 2023

GM, Stellantis, Hyundai, Kia, Honda, BMW & Mercedes-Benz announce $1B charging network JV

The JV will aim to use 80% US federal funding to roll out 30,000 DC fast chargers, starting 2024 supporting both NACS & CCS connectors

Source: WSJ, Company Announcements, SAE, US Department of Energy Alternative Fuels Data Center*

Norway charging capability is superior to the rest of Europe; rollout must accelerate to support strong EV demand



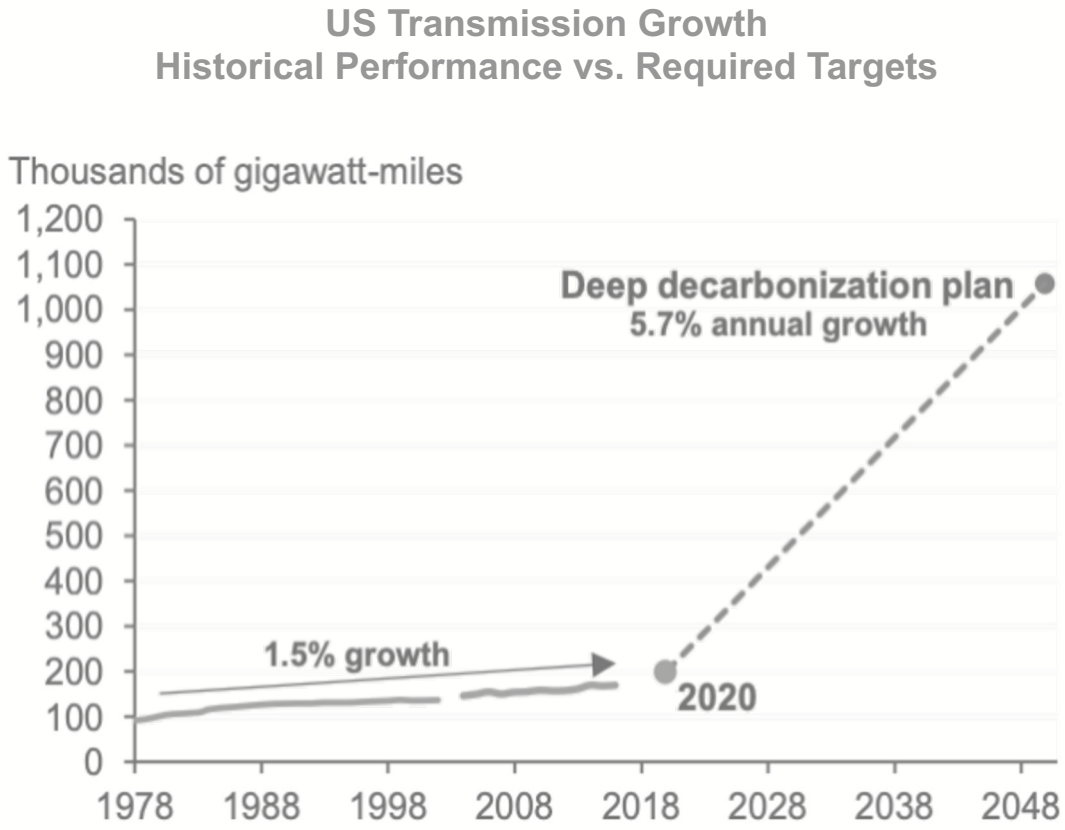
Norway, the leader in EV market share, is a case study for overcoming charging concerns:

- EVs are now ~20% of all passenger vehicles in the country.
- In Q1 2023, almost 84% of new cars sold are EVs, up from 64.5% in 2021.

Other countries will need to reach comparable levels of charging density to support relative EV sales volumes.

Sources: GridX EV Charging Report, Norwegian Road Federation.
Note: Unlabeled Low EV & Charger Density Countries: Estonia , Latvia , Croatia , Slovakia , Spain , Hungary , Czechia , Lithuania , Greece , Poland , Romania, Bulgaria

Increasing EV charging volume will require significant grid investments, and governments will support CAPEX, but it will take work



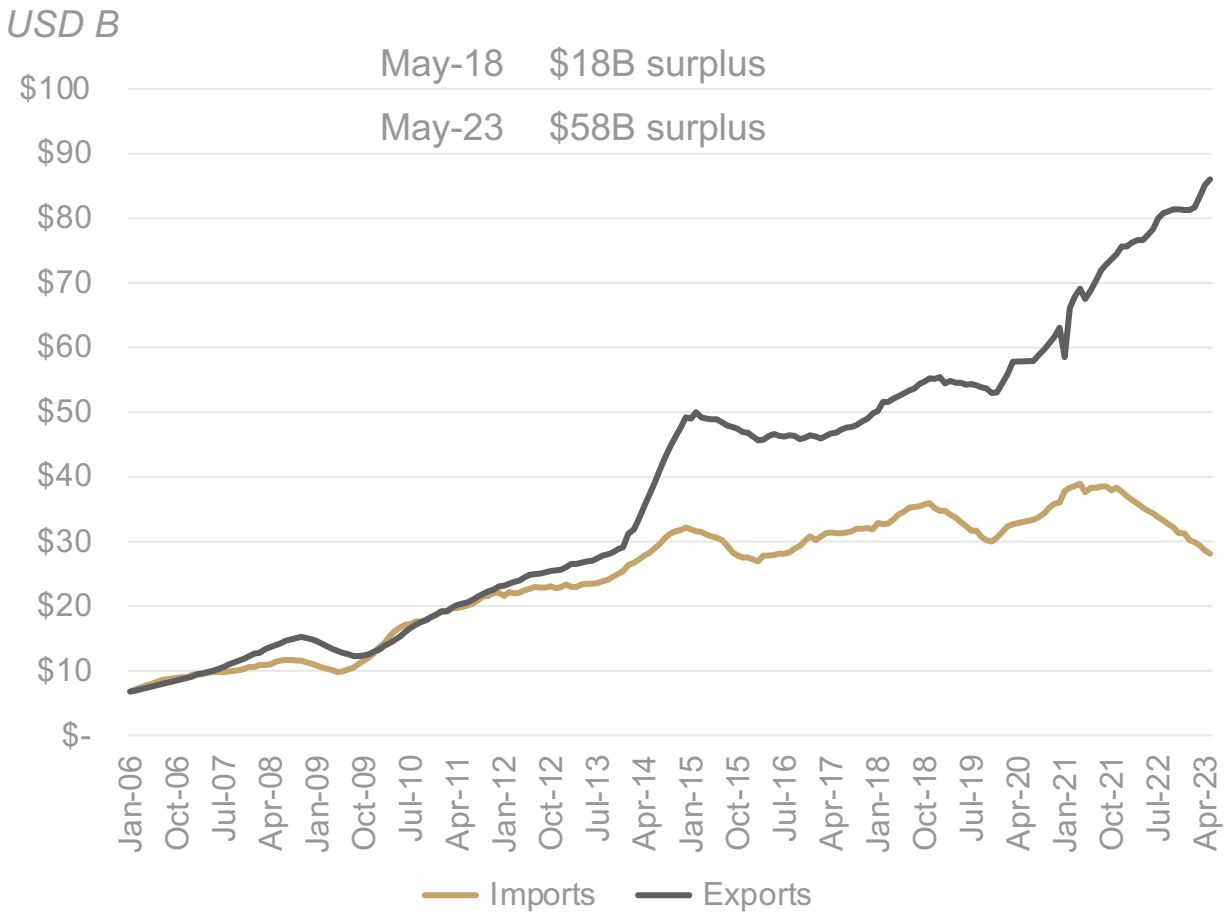
The grid will need to be upgraded, and North America and Europe do not have a great track-record

- A Palo Alto study discovered that exceeding 2030 electrification goals for EVs and household devices would **overload over 95% of residential transformers**.
- These transformers are meant to cool during low-usage times of electricity overnight, but a nearby cluster of Level 2 EV chargers reduces their cooling opportunity.
- Upgrading transformers for higher demand is costly, with estimates reaching up to **$1,000 per household**.
- Between 2020 and 2022, lead times for distribution transformers across all electric industry segments and voltage classes rose by **443%**, with previous two to four months' orders now averaging over **a year**.

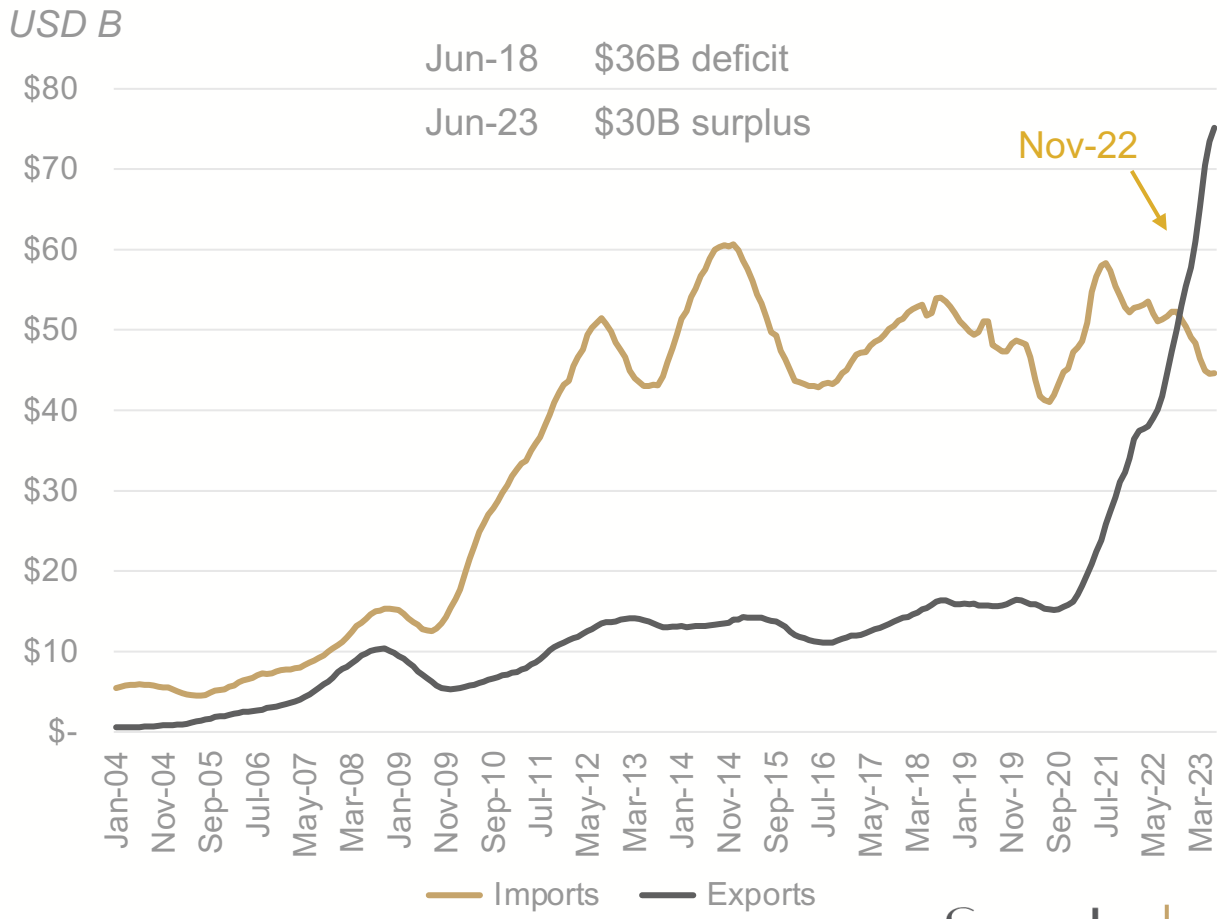
Sources: IEA, JP Morgan Asset Management, US Department of Energy, Princeton University “Net Zero America”, City of Palo Alto Utilities Advisory Commission Staff Report, Center for Distributed Energy at Georgia Tech, Electricity Subsector Coordinating Council (ESCC)

China's global auto imports are declining while exports rapidly increase, fueled by EV strength

China Auto Parts Trade
Trailing 12 Month USD Billions

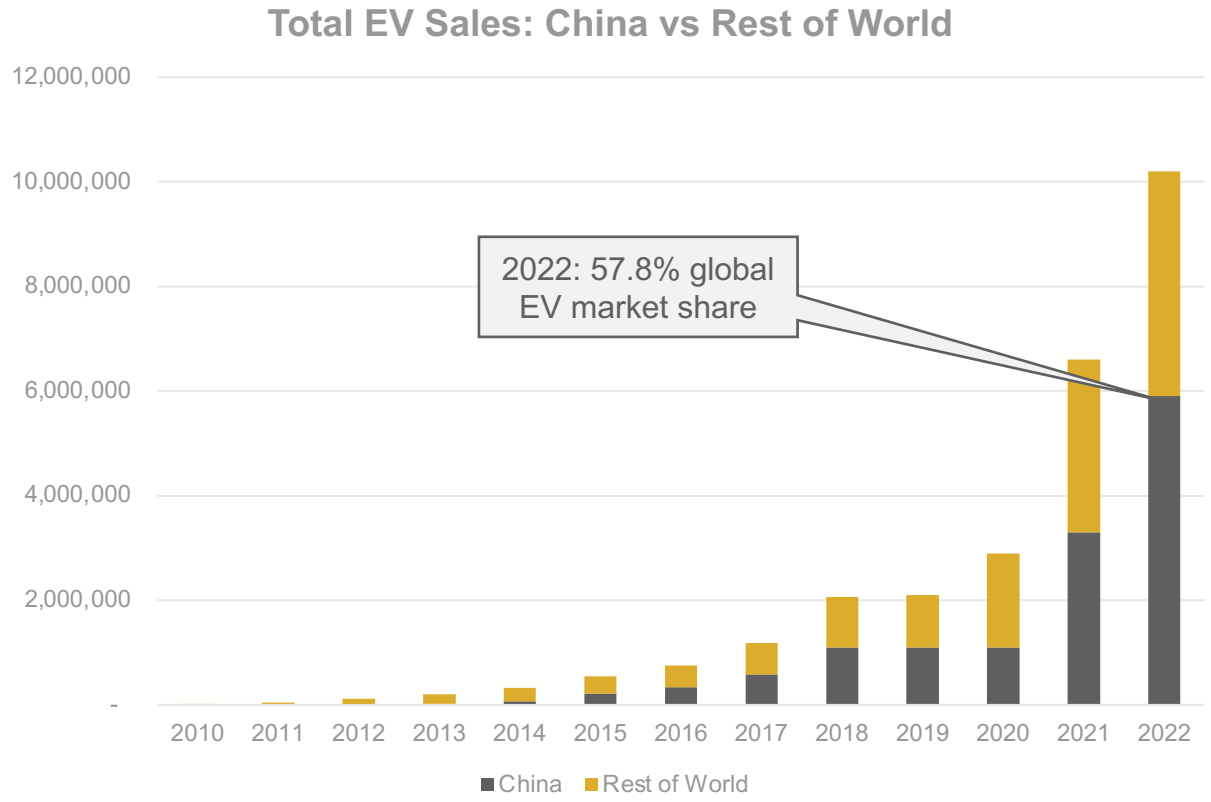


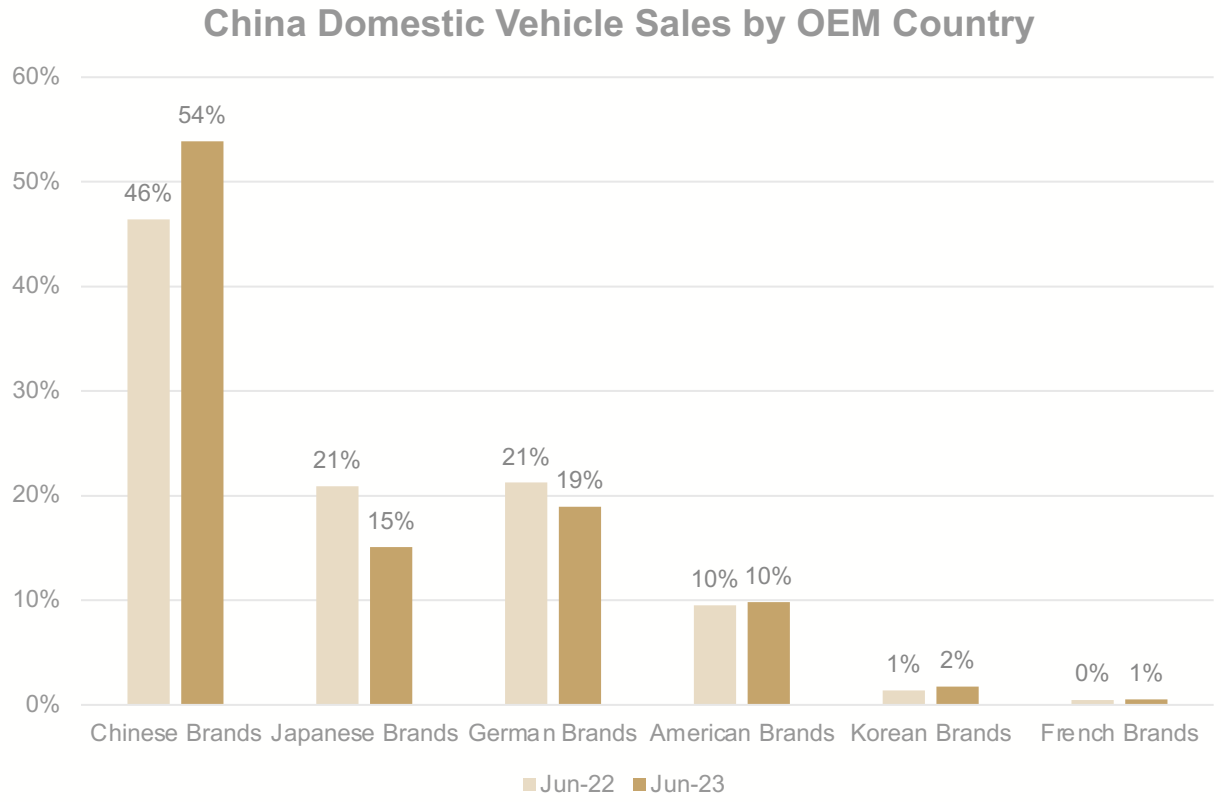
China Finished Vehicles Trade (Motor Vehicle & Chassis)
Trailing 12 Month USD Billions



Sources: National Bureau of Statistics of China, China Customs, CIEC

China has invested heavily in domestic EV production; the results are evident

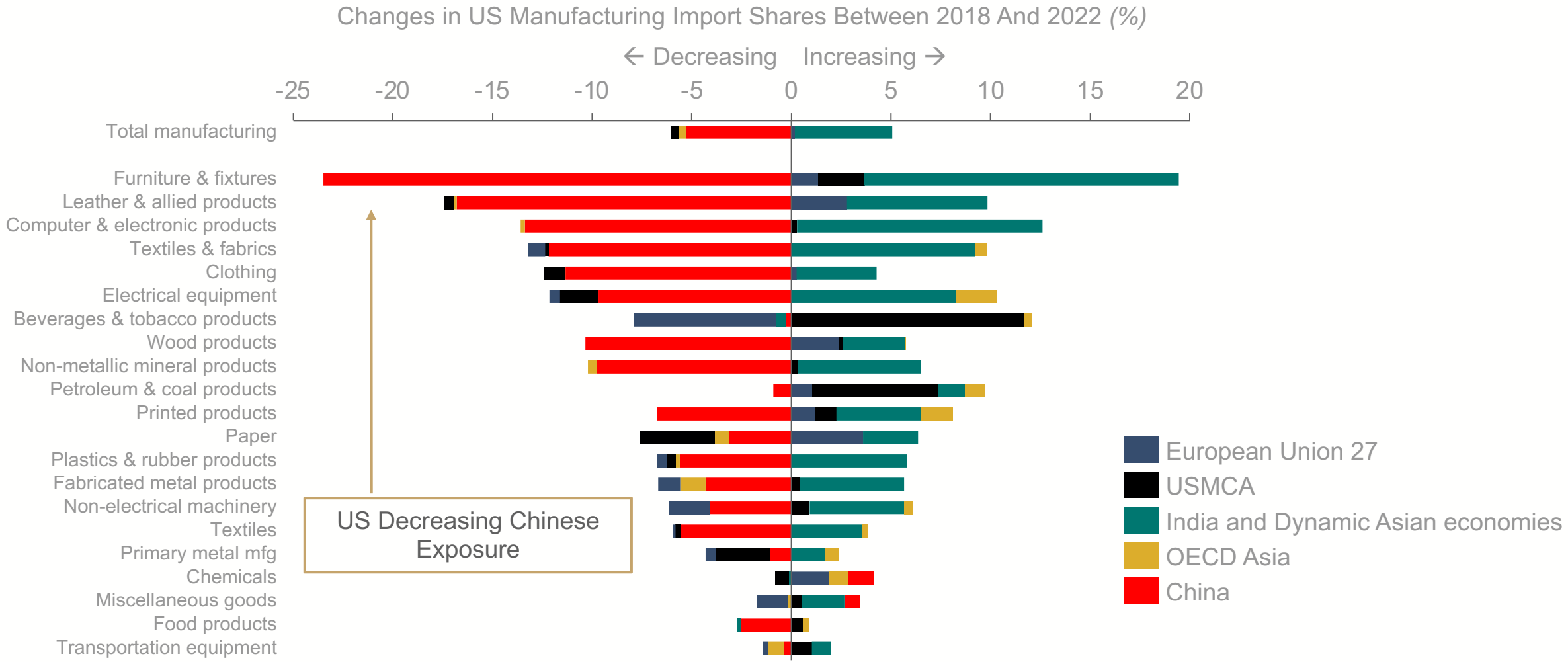




Led by BYD, Chinese factories produce the majority of EVs globally.
Chinese brands now sell the majority of cars in China, up nearly 20% from a decade ago, and have substantial & growing global exports.

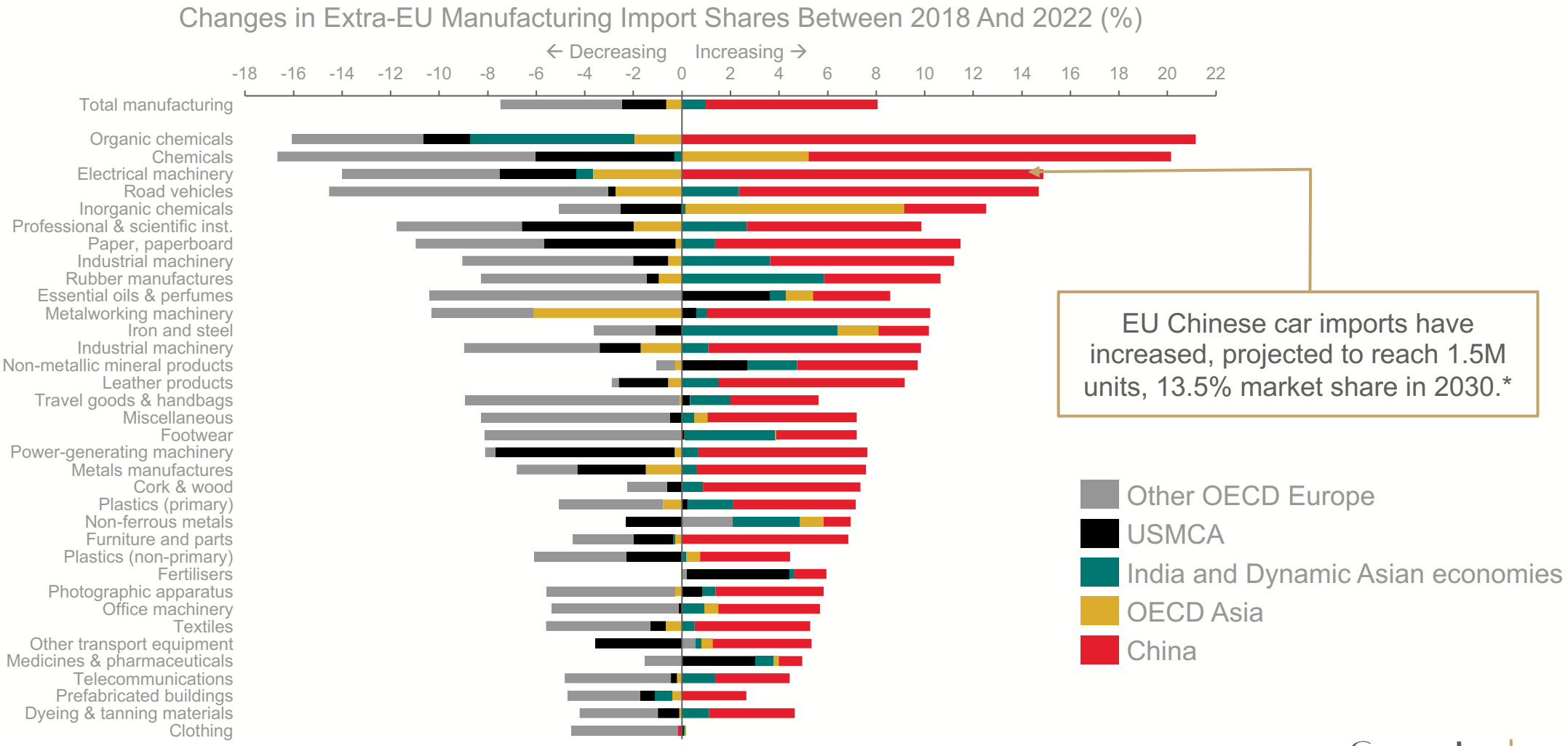
Source: International Energy Agency (IEA), MarkLines

The US is reducing overall dependency on China manufacturing in favor of other low-cost countries in Asia and Mexico



Source: OECD
Note: Note: Import stats based on NAICS. OECD Asia = Japan, Korea; Dynamic Asian economies = Chinese Taipei, Hong Kong (China), Malaysia, Philippines, Singapore, Thailand, Viet Nam; USMCA = United States, Mexico, Canada; Rest of the world = all other countries not mentioned in the chart. US manufacturing includes food, beverages, fuels.

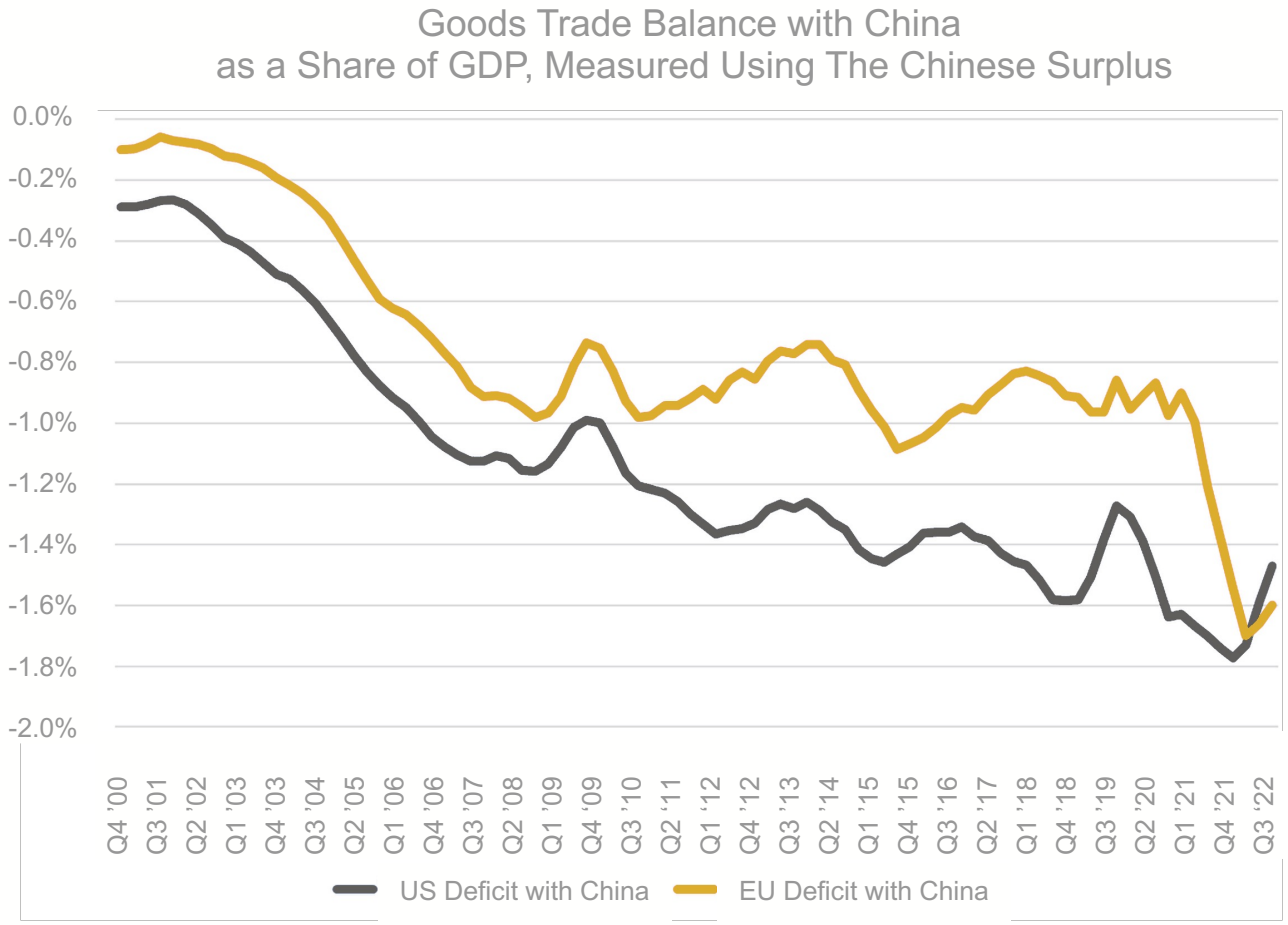
The EU has become more reliant on Chinese manufacturing while trading less with non-EU member countries, notably the UK



Sources: OECD, Allianz*

Note: Import stats based on Eurostat SITC. OECD Asia = Japan, Korea; Dynamic Asian economies = Chinese Taipei, Hong Kong (China), Malaysia, Philippines, Singapore, Thailand, Viet Nam; USMCA = United States, Mexico, Canada; Other OECD Europe = Iceland, Norway, Switzerland, Turkey, UK; Rest of the world = all other countries not mentioned in the chart.

Multi-decade dependencies vastly outweigh and limit the magnitude of recent moves to decouple from China



*"China is Germany's largest single trading partner, but whereas **China's dependencies on Europe are constantly declining**, Germany's dependencies on China have taken on greater significance in recent years…*

…de-risking is urgently needed. However, we are not pursuing a decoupling of our economies."

- German Federal Government

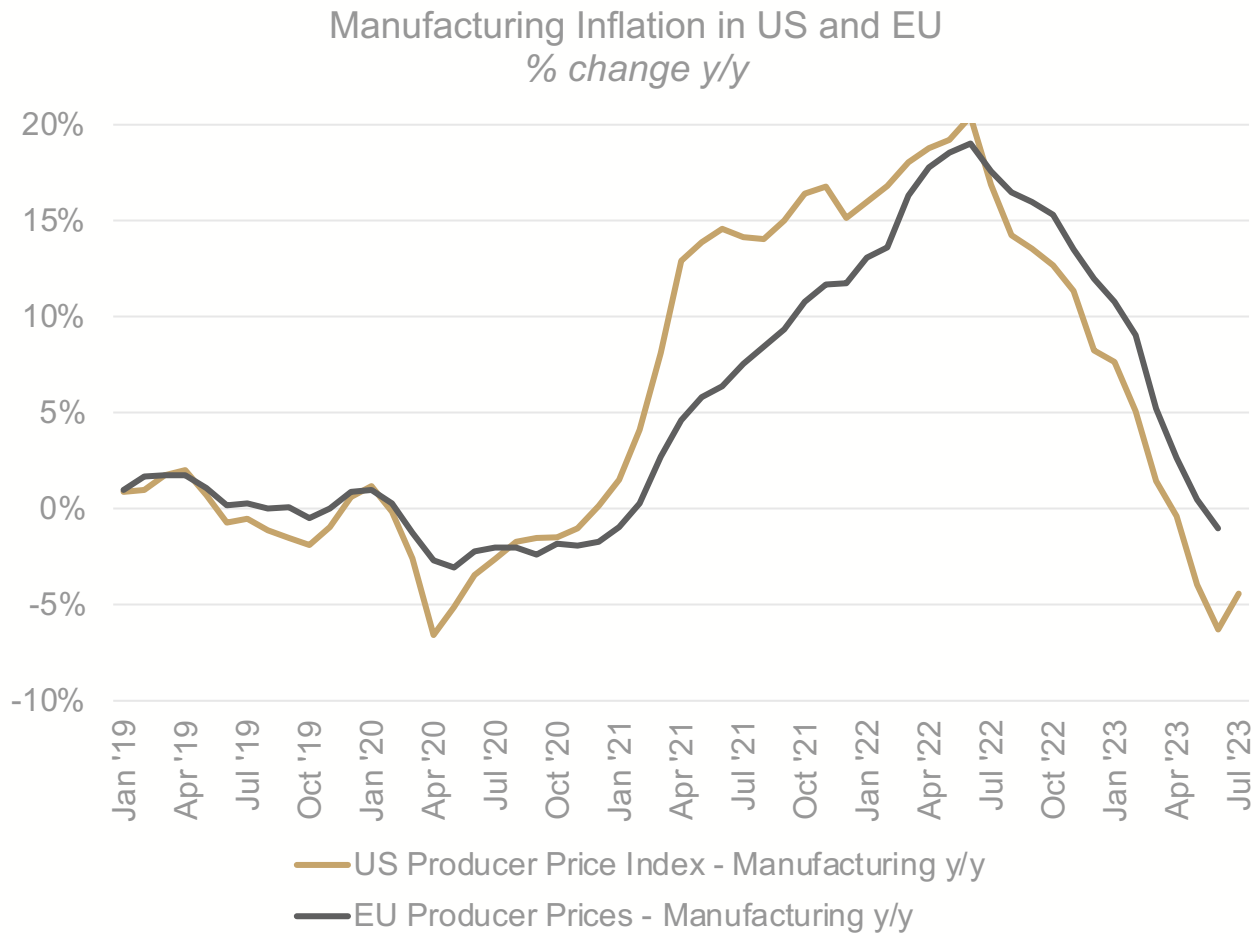
Sources: Strategy on China of the Government of the Federal Republic of Germany, Brad Setzler CFR

Inflation and Costs

- Both OEMs and suppliers share concerns over cost and materials.
- Shipping costs have dramatically decreased over the past year, as has shipping availability.
- Automotive leaders have been able to improve initiatives to increase profits continuously; existing bad contracts and talent shortages are lasting challenges when looking to reduce costs.
- Inflation in Europe eclipses inflation in the US due to energy and commodity price shocks.
- Commodity prices remain high compared to pre-pandemic prices for Europe and the US.

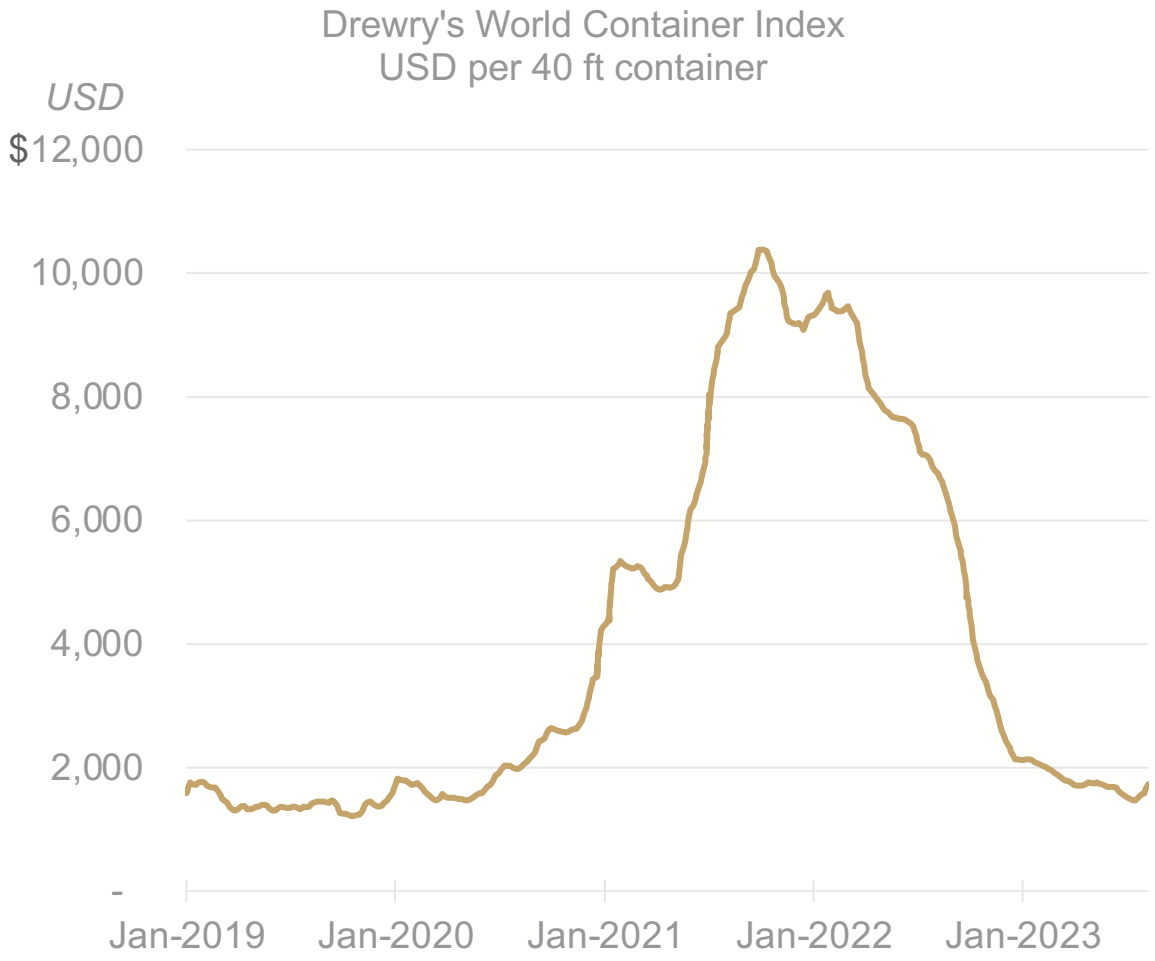
Manufacturing-related industrial prices are stabilizing but remain substantially elevated from pre-Covid levels

- After two years of rapid price increases in manufacturing, industrial prices have begun to decrease in 2023
- Recent price declines are nowhere near great enough to cancel out COVID inflation
- For the 4-year period from June 2019 to June 2023, the producer price index increased:
  - US: +24.9%
  - EU: +22.6%
- Producer prices have outpaced consumer price increases. For the 4-year period from June 2019 to June 2023, the consumer price increased:
  - US CPI: 19.1%
  - EU HICP: +20.0%



Source: US BLS via FRED, Eurostat
Note: EU = basket of 27 countries in EU

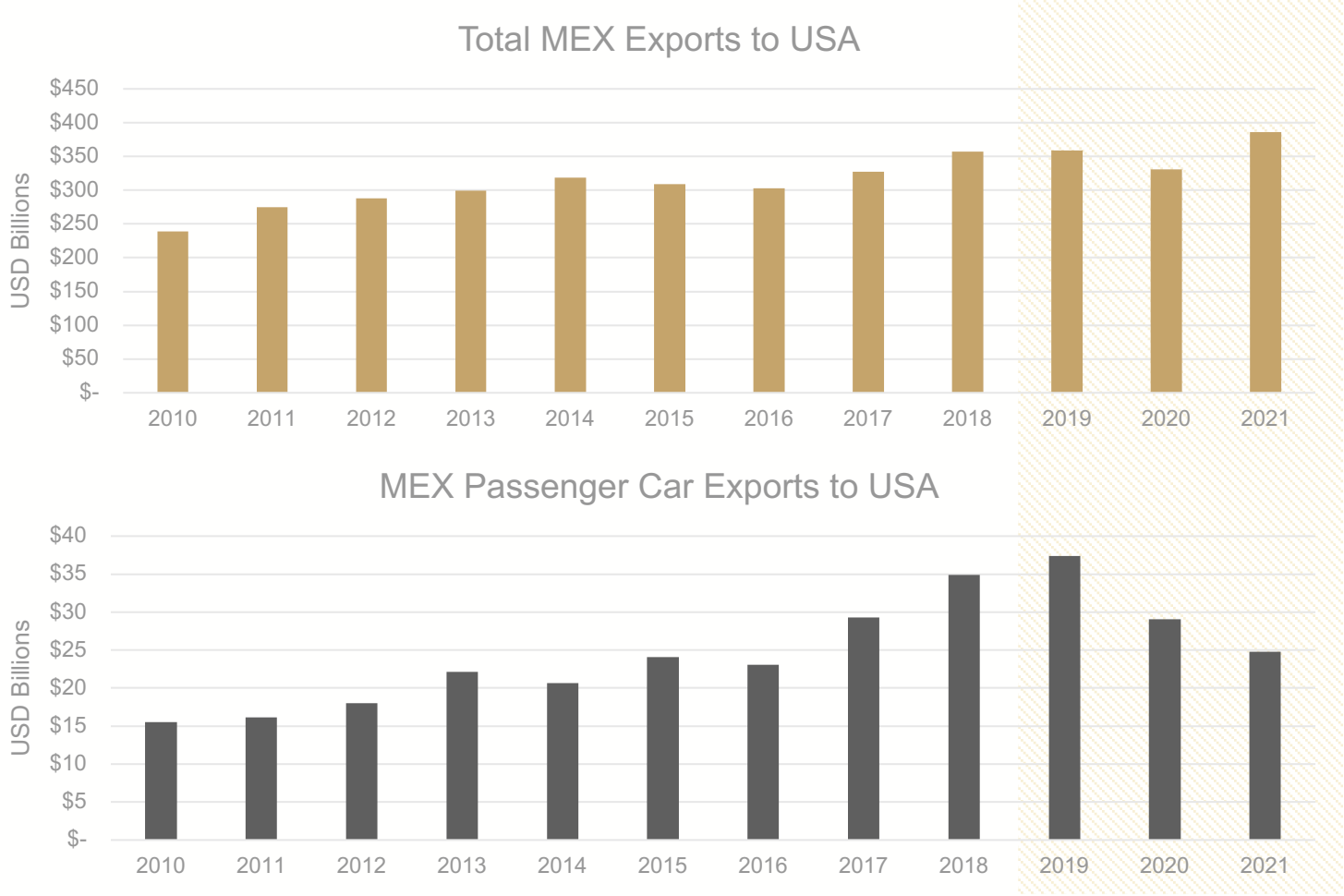
Global container shipping costs have fallen from pandemic peaks



Route	Route code	27-Jul-23	3-Aug-23	10-Aug-23	Weekly change (%)	Annual change (%)
Composite Index	WCI-COMPOSITE	$1,576	$1,761	$1,791	2% ▲	-72% ▼
Shanghai - Rotterdam	WCI-SHA-RTM	$1,292	$1,620	$1,673	3% ▲	-81% ▼
Rotterdam - Shanghai	WCI-RTM-SHA	$527	$520	$526	1% ▲	-56% ▼
Shanghai - Genoa	WCI-SHA-GOA	$1,893	$2,070	$2,072	0%	-76% ▼
Shanghai - Los Angeles	WCI-SHA-LAX	$2,087	$2,322	$2,362	2% ▲	-65% ▼
Los Angeles - Shanghai	WCI-LAX-SHA	$839	$838	$846	1% ▲	-33% ▼
Shanghai - New York	WCI-SHA-NYC	$3,049	$3,330	$3,363	1% ▲	-66% ▼
New York - Rotterdam	WCI-NYC-RTM	$735	$737	$798	8% ▲	-38% ▼
Rotterdam - New York	WCI-RTM-NYC	$1,590	$1,587	$1,593	0%	-77% ▼

Source: Drewry

While total exports from MEX to the US rebounded post-pandemic, supply chain struggles have hampered the movement of passenger vehicles



*"**Our issue is really on finished vehicles**…And if you were to ask my CEO, it's one of her top five issues to be able to move the vehicles that we build."*

-Global Purchasing Chief, GM

*"There is a **capacity imbalance** due to the bulk of goods that move northward, especially considering that other companies are following the same…strategy"*

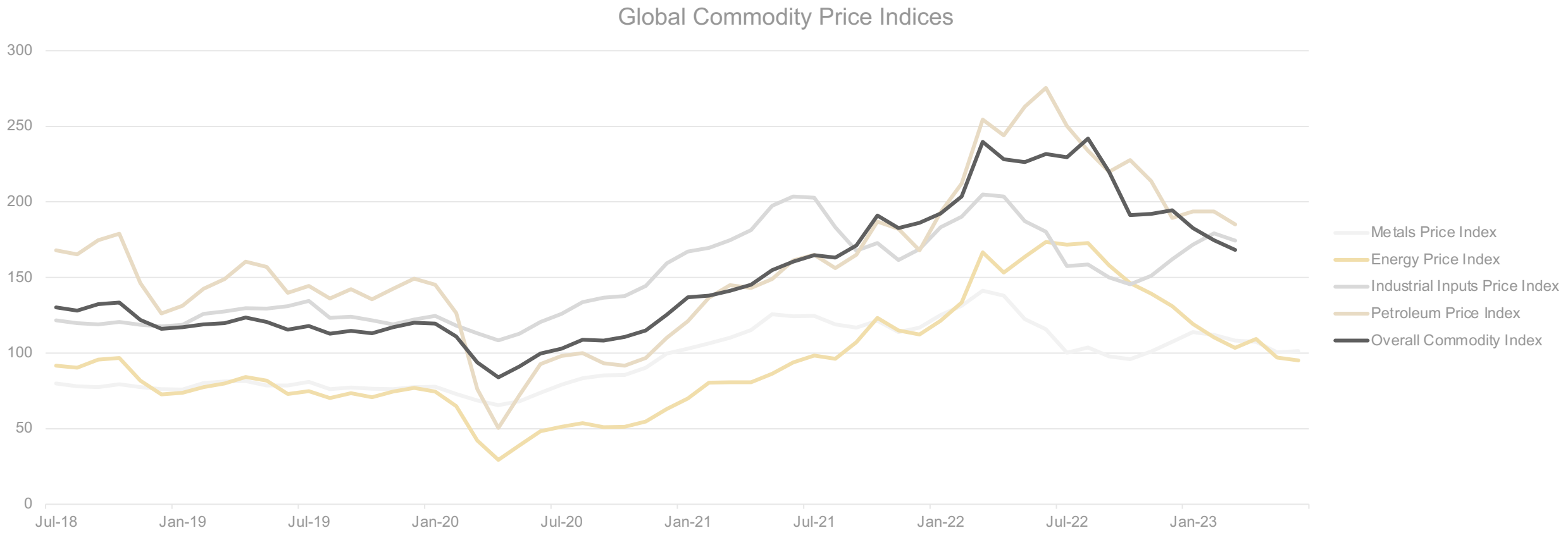
-Director of Customer Logistics, Ryder System

"***The nation's ports are saturated**, especially the Pacific gateways…AMDA has signaled that the **problems cannot be resolved immediately**"*

-Mexico Business News

Source: OECD, Main Economic Indicators; Automotive Logistics; Inbound Logistics

While commodity prices have declined steadily since the late 2022 peaks, they remain elevated relative to pre-pandemic norms

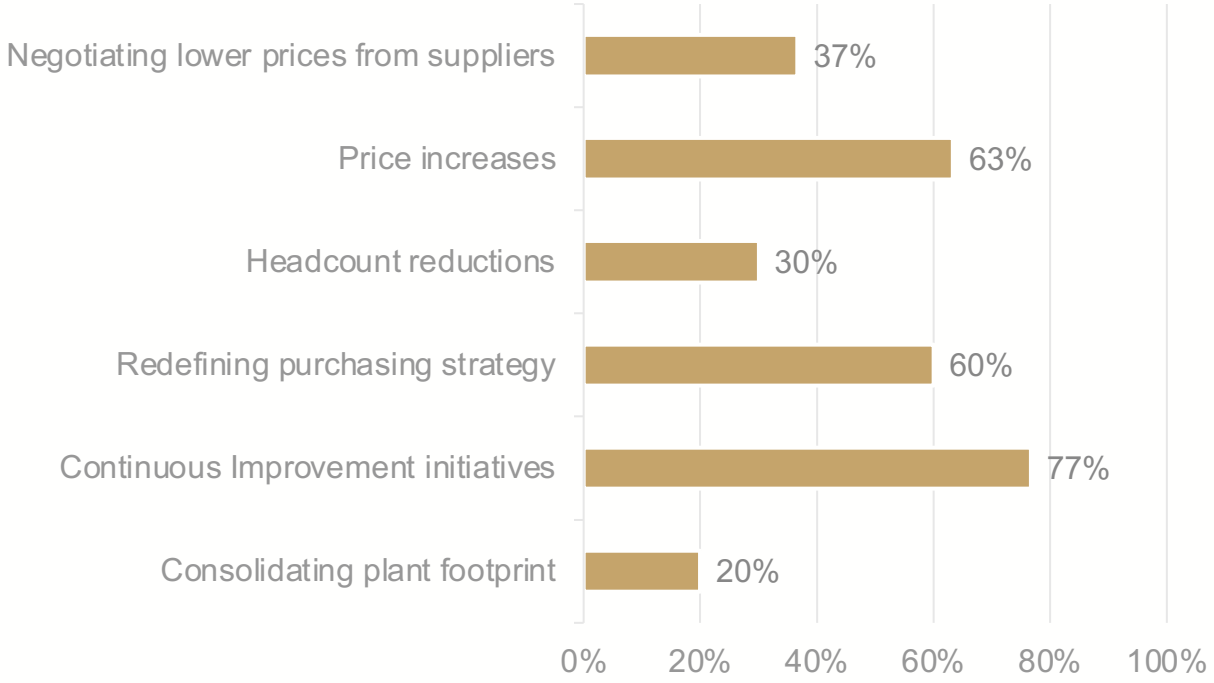


An expected rise in copper, cobalt, and lithium prices will be key drivers of EV price levels

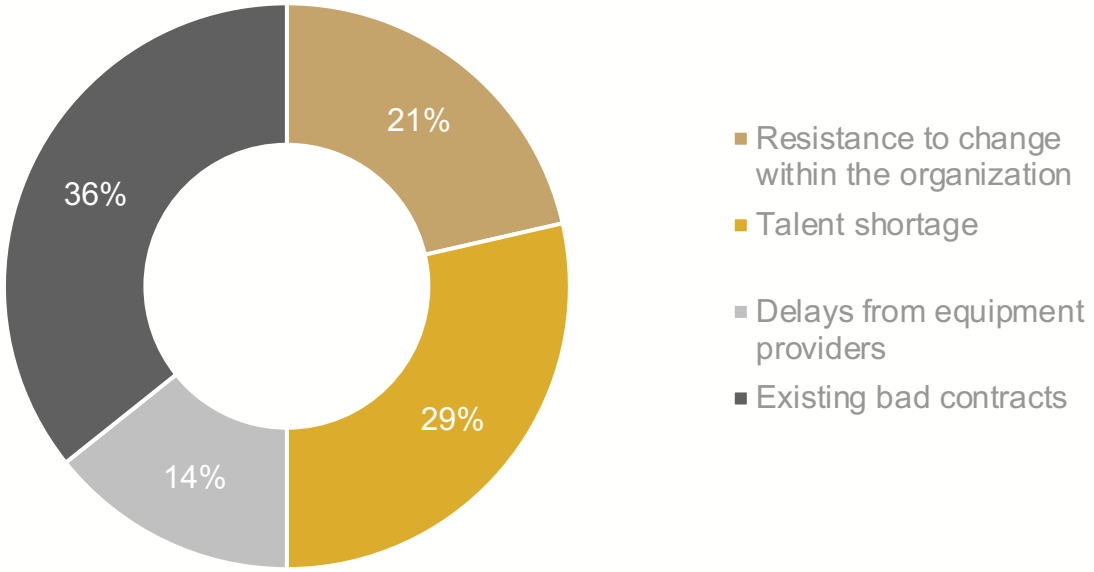
Source: International Monetary Fund (IMF)

How automotive leaders are tackling rising costs

What actions have you taken to increase profitability?



What are the main challenges you are facing in reducing costs?



Survey data and Seraph team's fieldwork reveal manufacturers grappling with price and cost issues. However, organizational resistance to change and talent shortages cause 50% of the struggles with cost reduction, indicating a lack in efficiency and operational cost management. During many assessments and projects Seraph encounters manufacturers struggling with inefficiency, underutilized capacity, and inadequate problem-solving.

WANT A DEEPER LOOK?

We are happy to meet with you and your team,
take you through the report and
discuss the impacts for your business.

WADE PHILLIPS

President, Europe
wphillips@seraph.com

THOMAS KOWAL

President, North America
tkowal@seraph.com


Seraph.
Thank you
seraph.com