

# North Americas Sales and Production Outlook

Prepared for:  
Automotive Logistics and Supply Chain  
Mexico Conference

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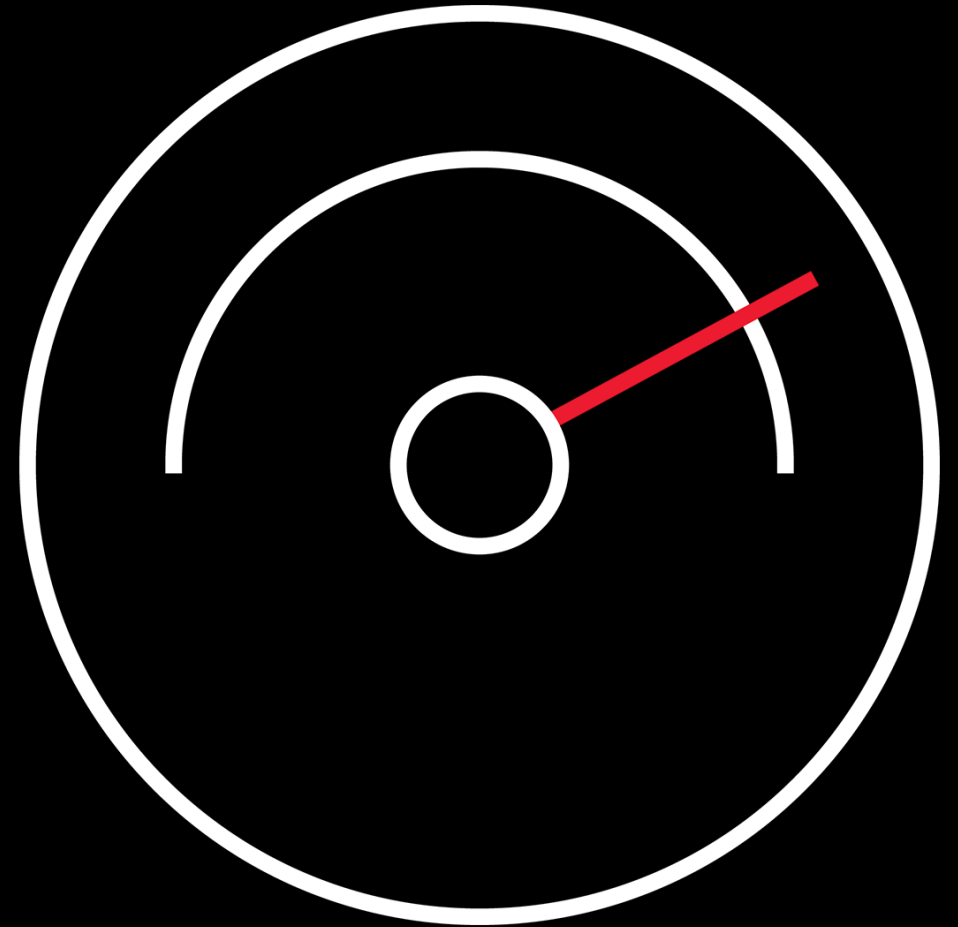
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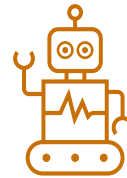
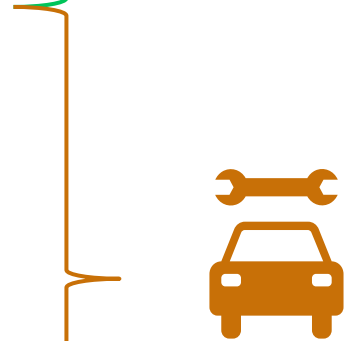
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# S&P Global

# The war in Ukraine creates new challenges for supply chains

Russia and Ukraine are among the world's top suppliers of key commodities

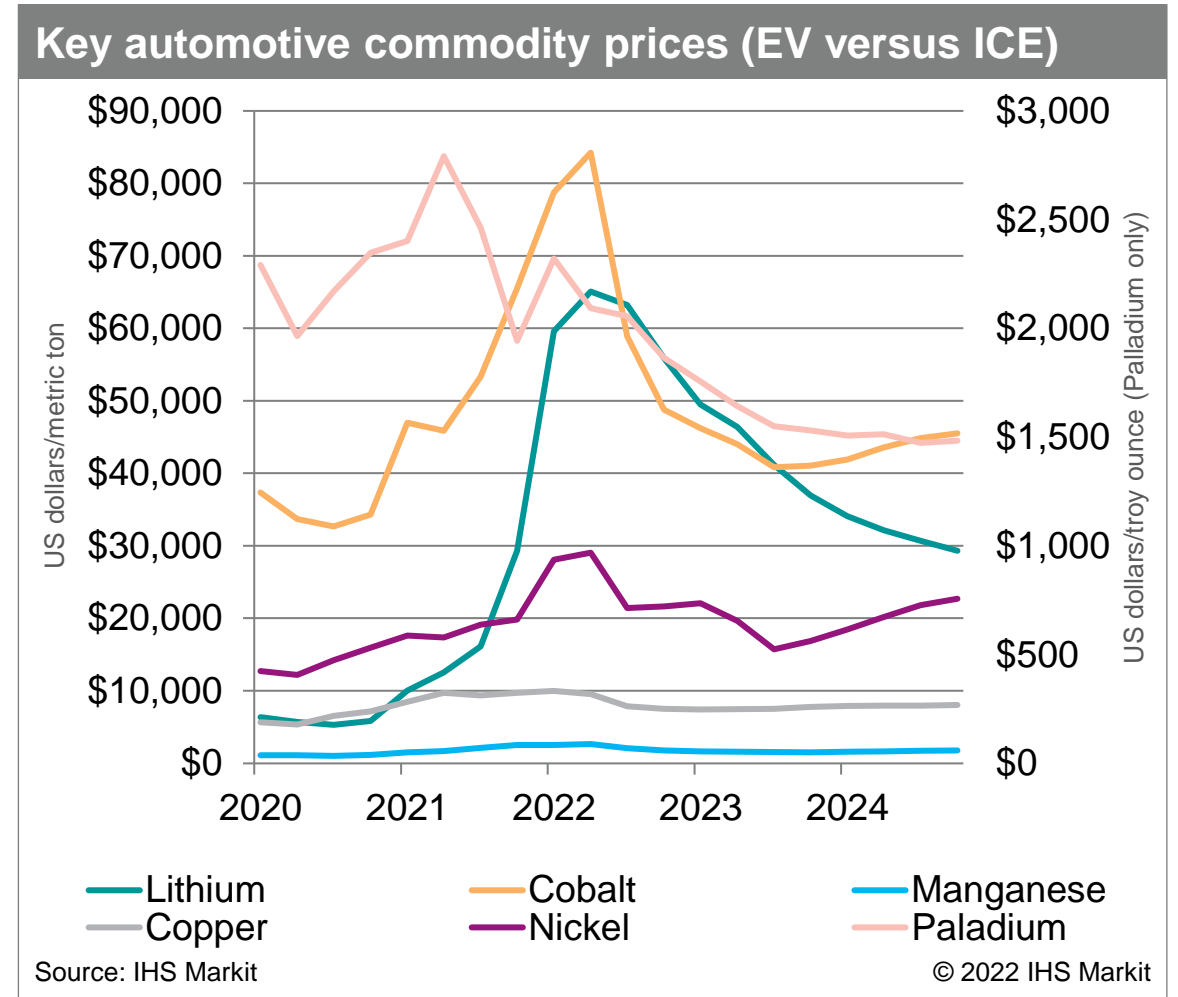
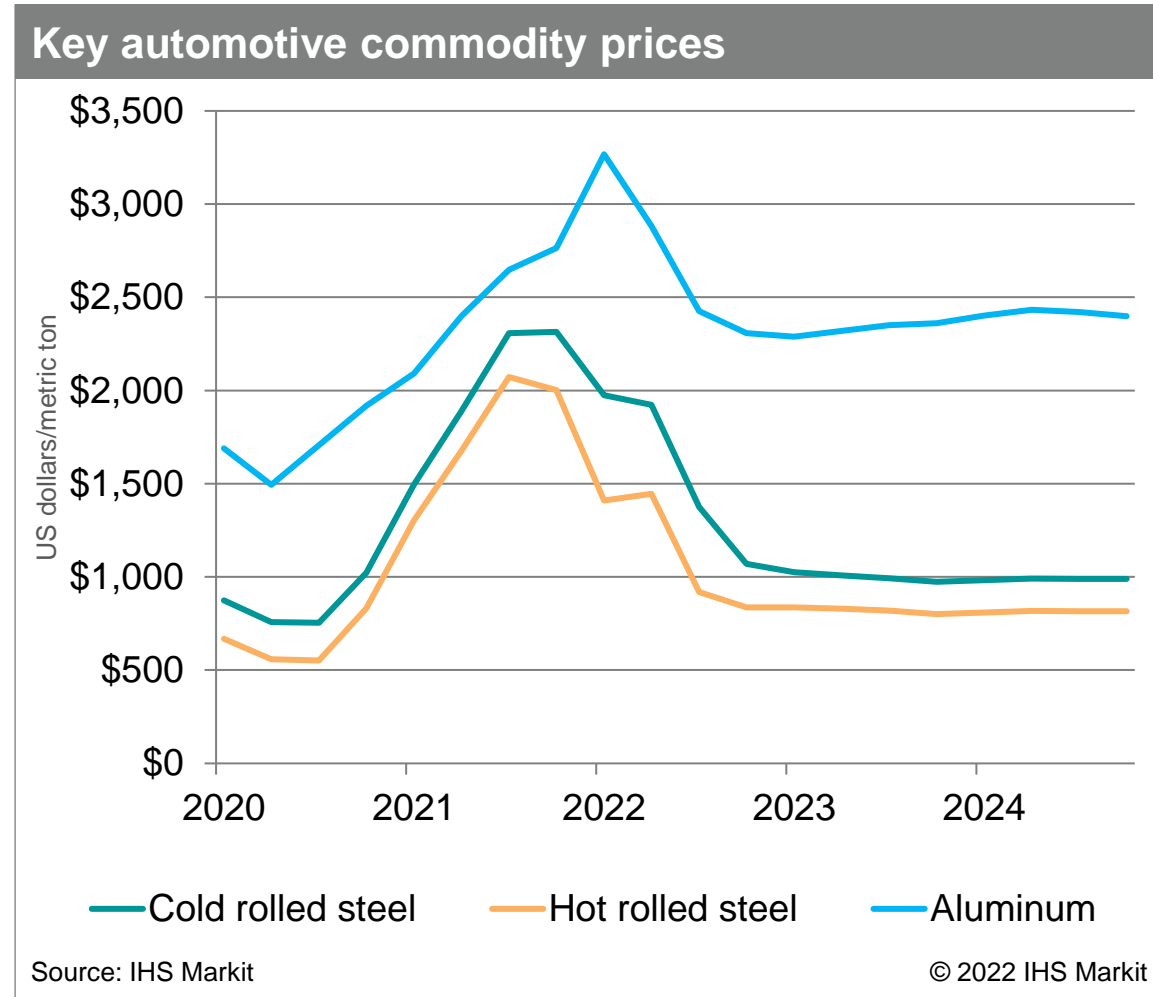
- Wheat
- Corn
- Vegetable oils
- Fertilizers
- Iron & steel
- Aluminum
- Palladium
- Nickel
- Carbon black
- Neon gas
- Oil
- Gas



**Price increases**  
**Supply shortages**  
**Food protest risks**

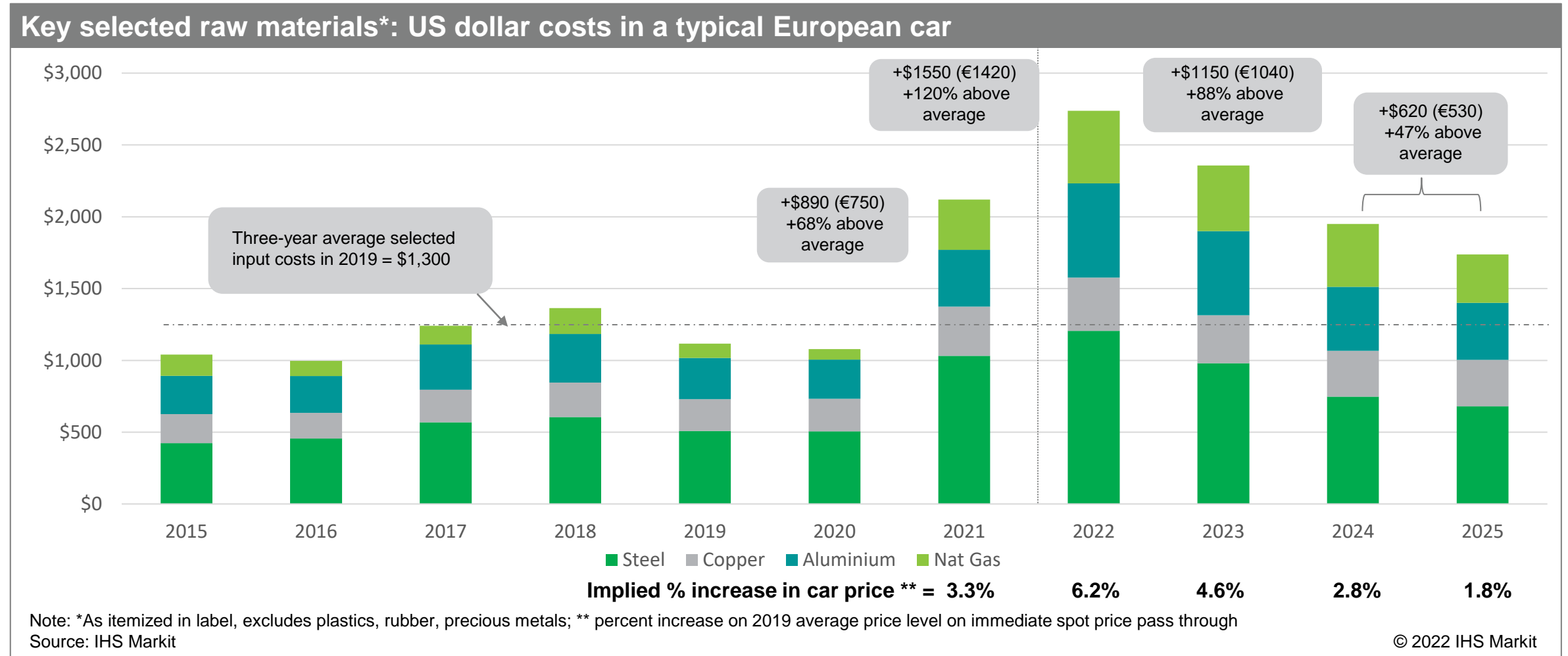
# Automotive commodities unlikely to return to pre-COVID prices

Key risks remain for essential inputs to both electric vehicle (EV) and internal combustion engine (ICE) manufacturing

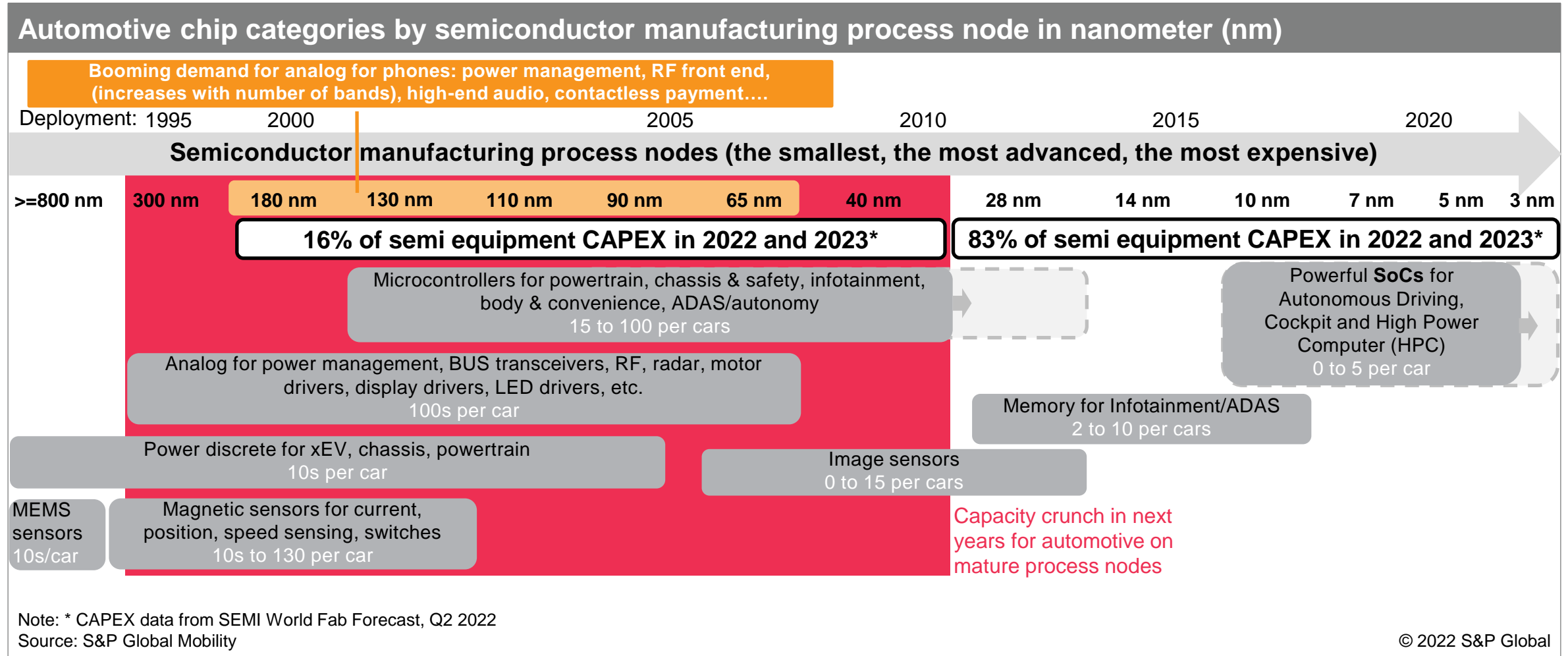


# Calculated input costs for selected raw materials

Forecast prices are based on direct and immediate pass through of spot market prices—but clear risks for post-recovery trend demand



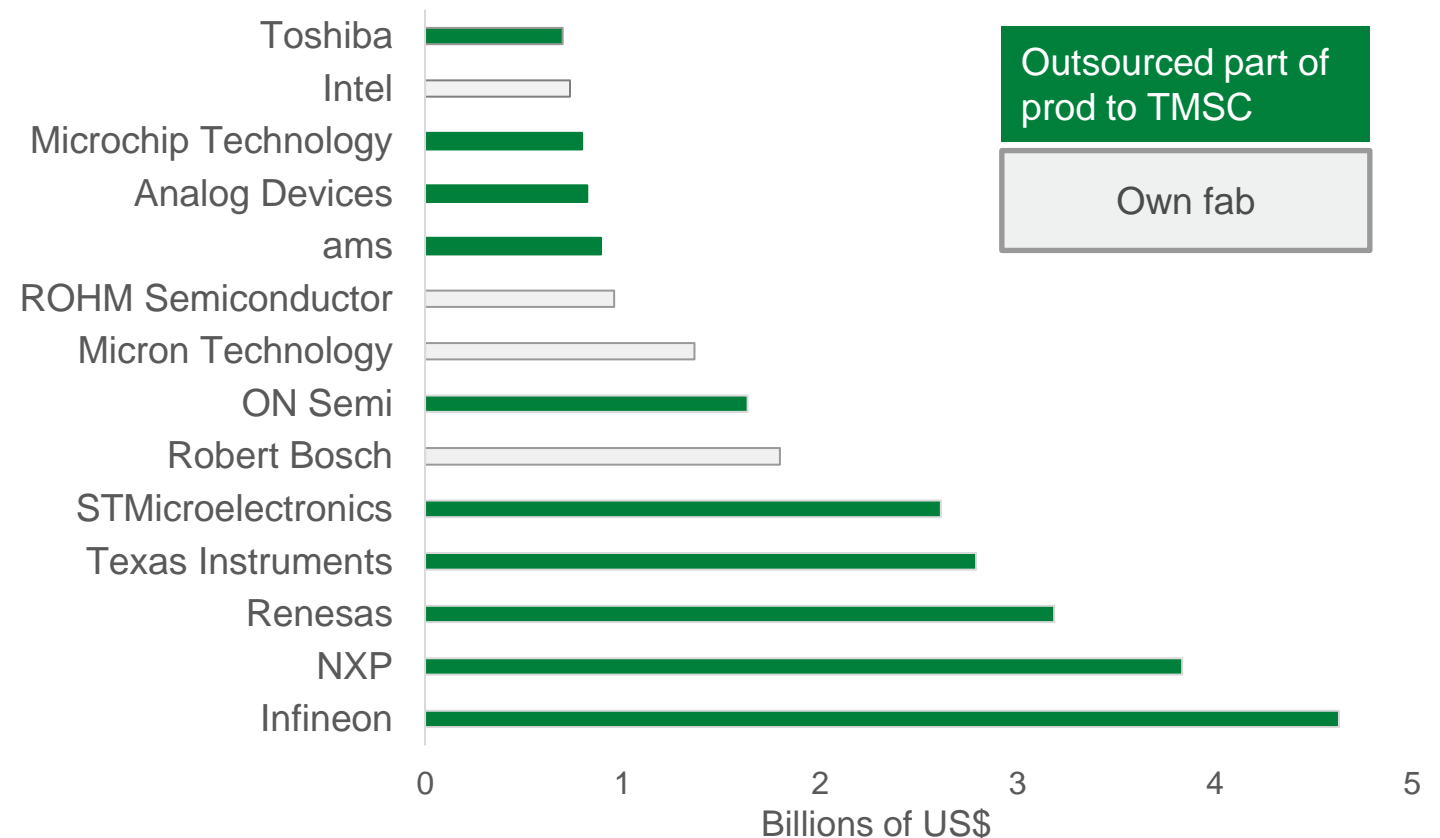
# Automotive chip capacity crunch on mature semiconductor manufacturing process nodes beyond 2022 – especially for analog chips



## But industry missed 2) Increased dependence on TSMC

- Building and maintaining semiconductor fabs is expensive
- Trend to fab-light i.e. more outsourcing to “foundries” for contract manufacturing of wafers
- TSMC is #1 semiconductor foundry with ~56% share
- TSMC fabricates vast majority of processors and modems for mobile phones, processors for gaming, even now Intel’s processors

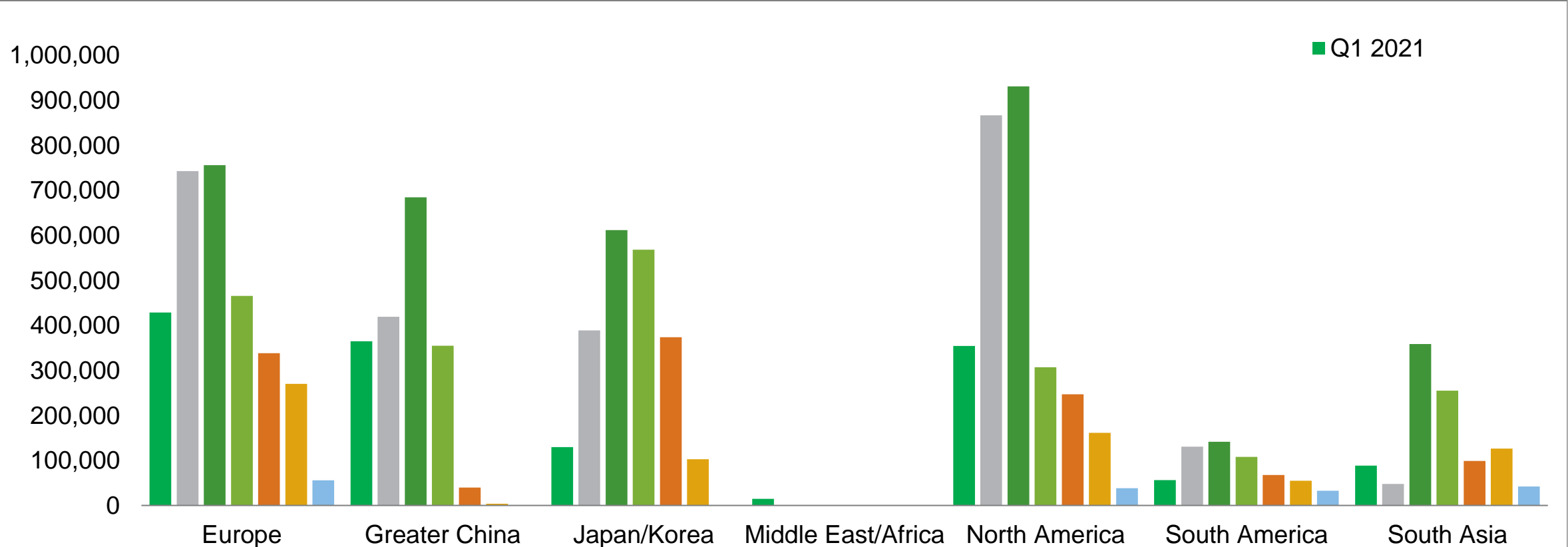
Top 15 car chip vendors in 2020 (70% of market)



Source: IHS Markit – E/E & Semiconductor service

# 11.6 million cars not produced because of chip shortage, and growing...

**Light Vehicle production volume loss to-date due to chip shortage**



Note: This is not forecast, the figures represent the scale of disruption identified as of July 29<sup>th</sup> 2022

Source: S&P Global Mobility – Light Vehicle Production: Update assessment of semiconductor supply issues – July 2022

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# Three forecasts to get one sales forecast

**The current supply chain–constrained sales forecast methodology requires three stages to complete the final forecast.**

1. Semiconductor Supply Assessment to drive Vehicle Production Outlook
2. Theoretical or Notional “Demand Forecast”
3. Distributed Realization of Notional Demand over time to get effective demand and final sales

**Each stage has its own set of assumptions.**

# Affordability crunch impacts—household mobility pressures

A mixed picture of new car price pressures, household budget concerns, and policy tightening is bearing down on affordability

## Forecast adjustment—evolution through 2022

Forecast Adjustments	Oil Prices	Car Prices	Interest Rates	Energy Price Crisis	Gas Supply Squeeze
March	Yes	Yes	Yes		
April		Yes		Yes	
May					
June					
July	Yes		Yes		
Aug				Yes	
Sept					Yes (EU)

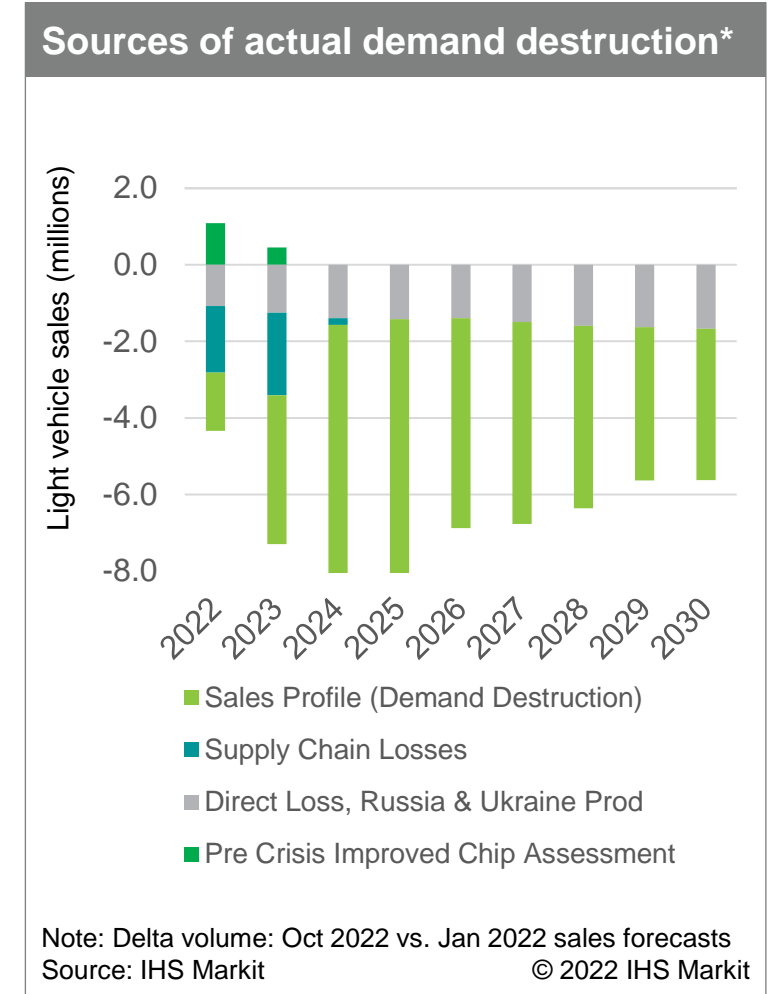
Source: IHS Markit

EU Gas flow & rationing TBC

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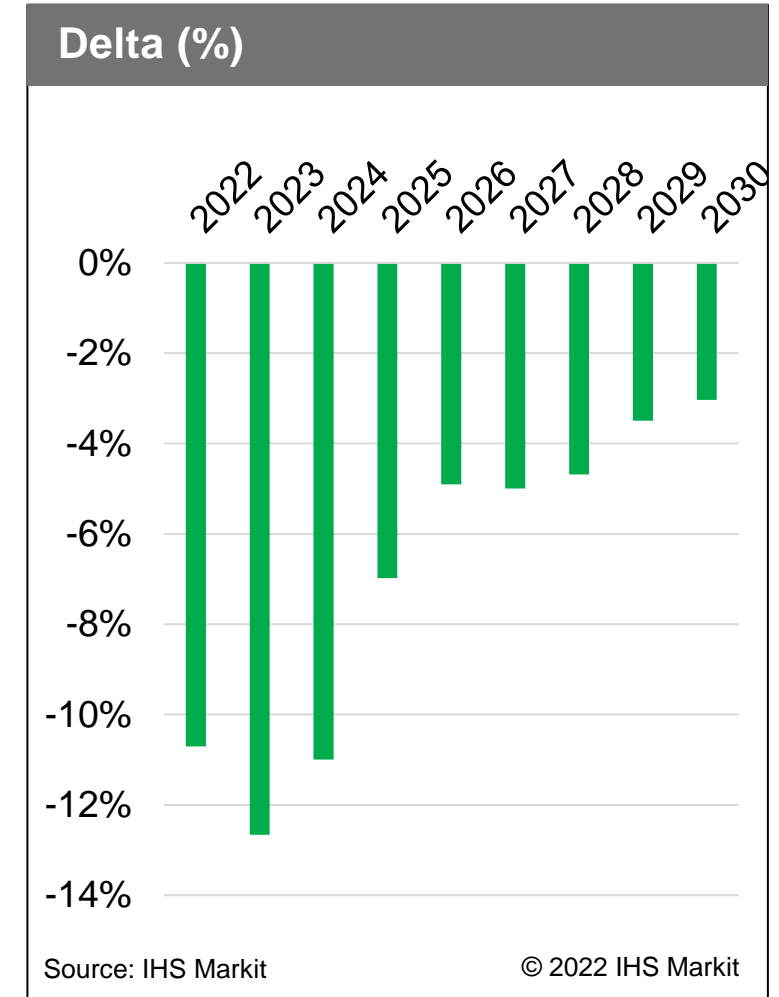
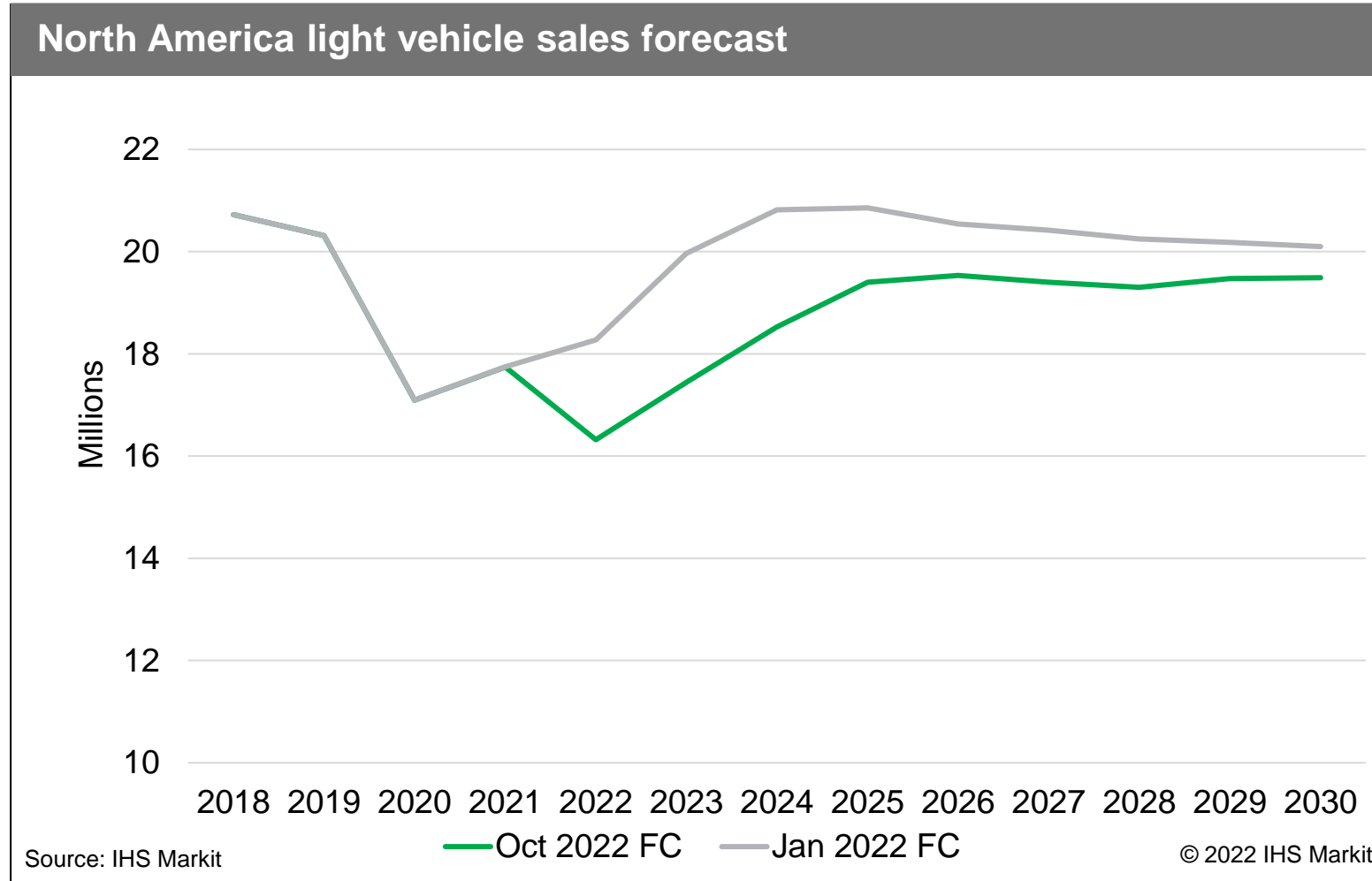
# Conflict impact on supply chains to weigh on global auto recovery

Estimated impacts of conflict assumed to be higher in outbound years as production recovers

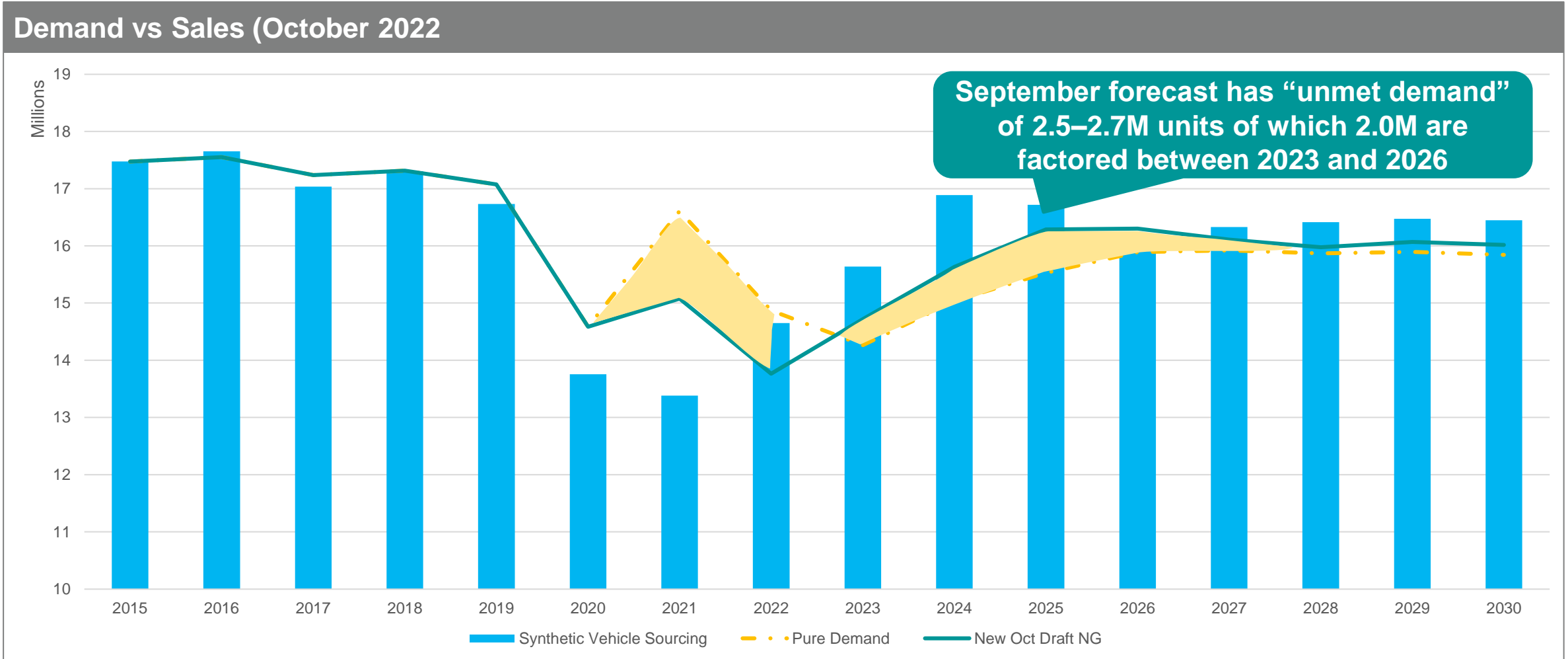


# Inflation and semiconductor supply remain limits on North American demand

Further declines in 2022 and a recovery toward pre-pandemic not part of the base case forecast anymore



# US light vehicle sales

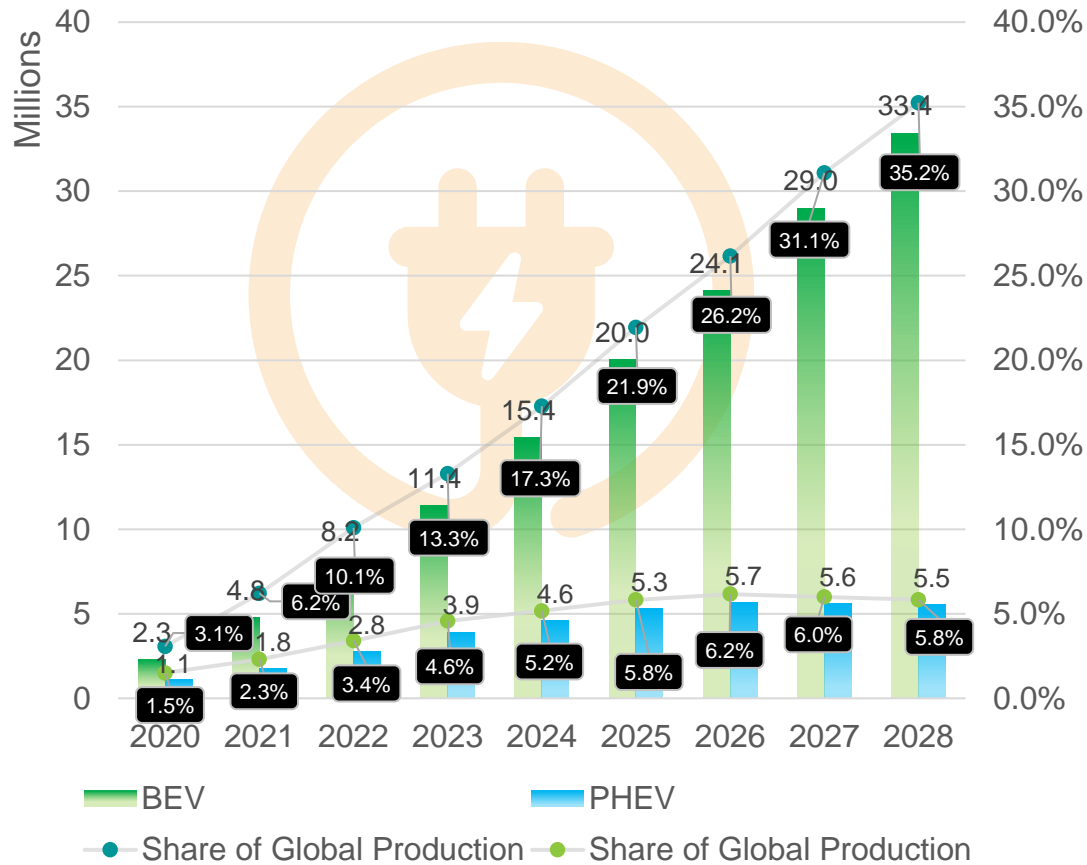


# Global Production Overview – BEV and PHEV

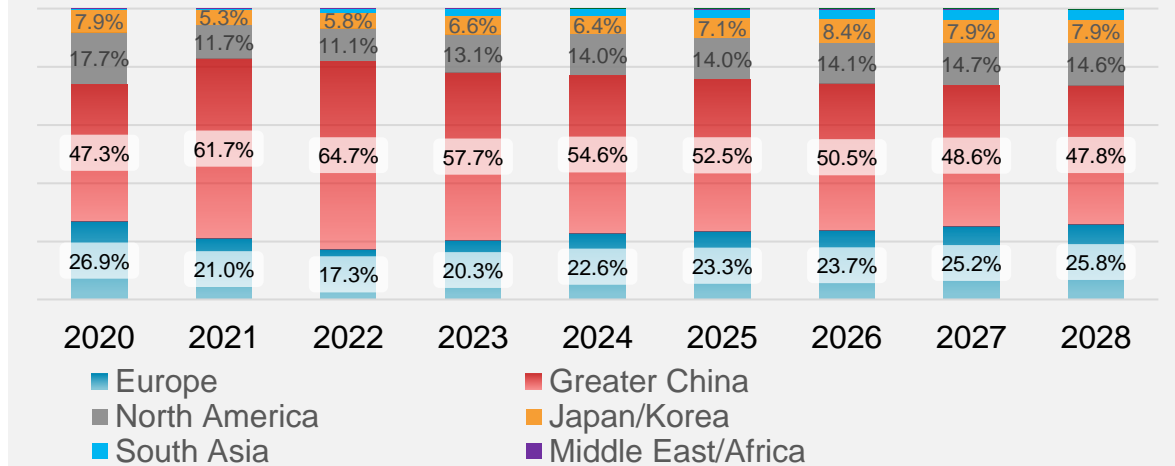
China and Europe lead in BEV and PHEV production; BEV share increased on stimulus effects, product availability and preference – volume and share up in tight market, risks easy to identify but no fundamental change forecast in base case



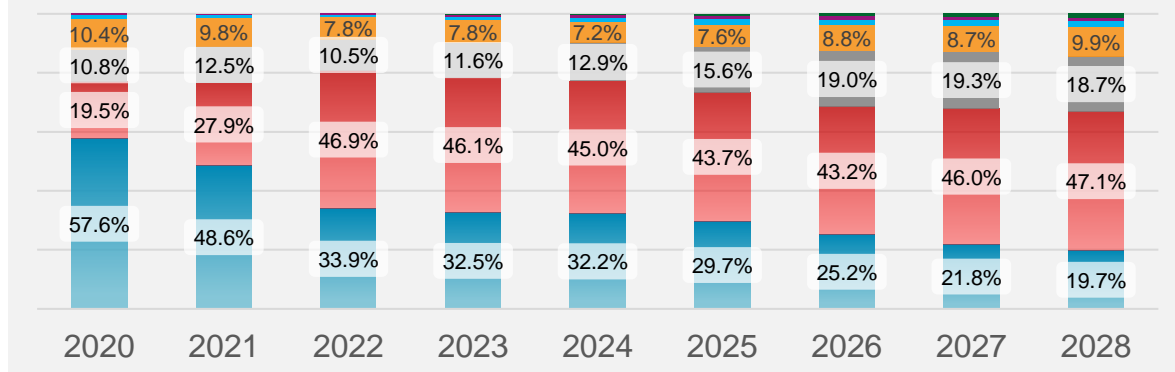
Global BEV and PHEV Production



BEV Production by Region



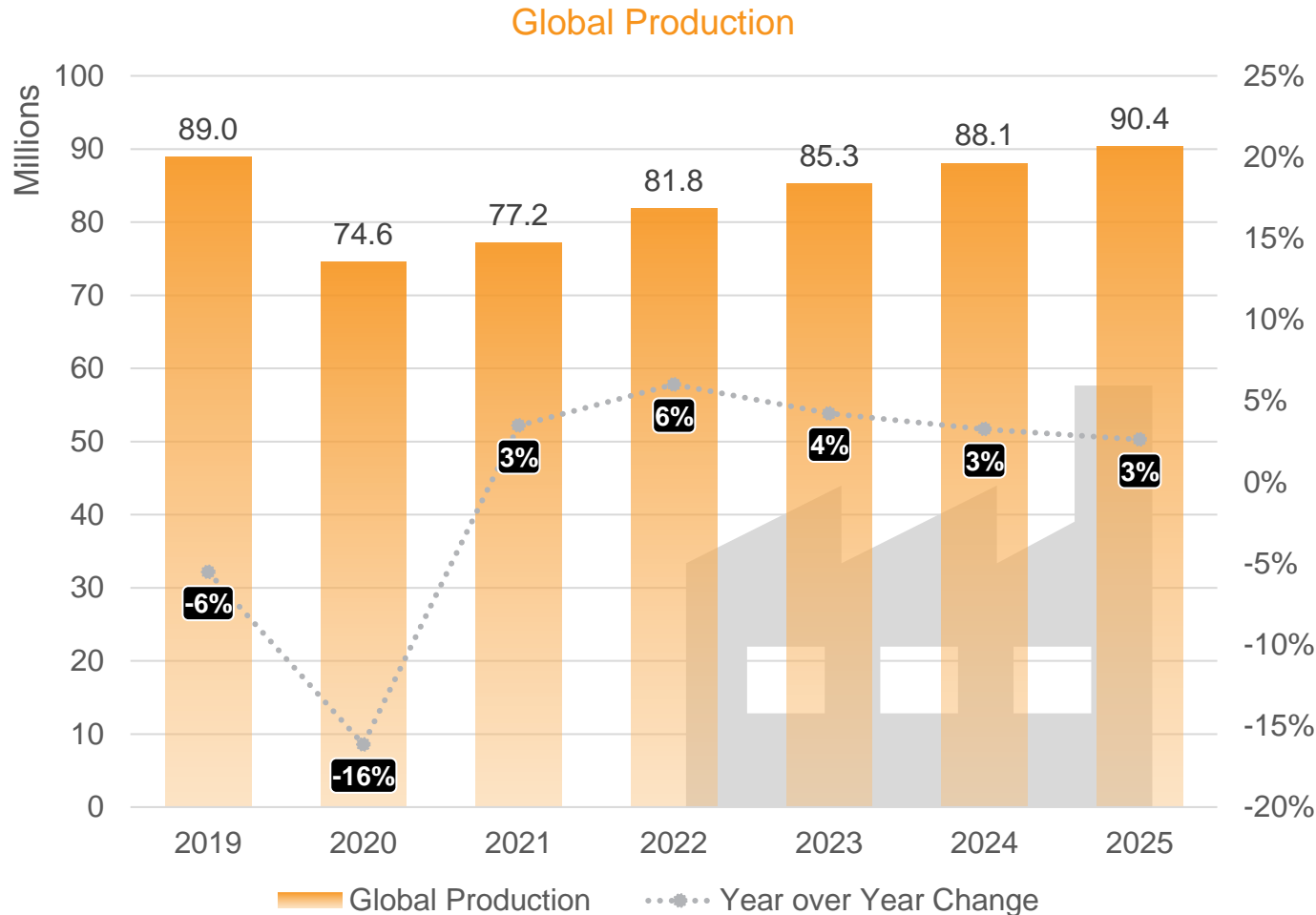
PHEV Production by Region





# Global Production Overview

2022 raised again but mixed effects continue, mainland China shows very strong result in August +34% y/y, India too, +25%, North and South America, South Korea effectively flat in '22, Japan cut and Europe comes under threat from risk to natural gas supplies



## Comments

- ▲ Mainland China continues recovery on easing of lockdown and stimulus, +34% (y/y) increase in August LV production
- ▲ India demonstrates robust activity expected to underpin balance of this year and next
- ▲ Iran drives sharp increase in Middle East/Africa
- ▲ Non-automotive chip demand easing but displacement effects limited
- ▲ More evidence of OEMs proactively de-contenting to keep lines moving, recently mainland China
- ▼ Europe faces risk from permanently reduced supplies of natural gas from Russia; downside expected to be felt in 2022 and 2023
- ▼ Other raw materials could be weaponized
- ▼ Zero-COVID policy in mainland China in face of fast-moving Omicron variant is a major challenge that could quickly see lockdowns adopted: recently Chengdu, Chongqing
- ▼ Investment in analogue chips limited and lead times are yet to fall; MCU supply and lead times healthier
- ▼ General economic squeeze becoming more influential and earlier in the cycle

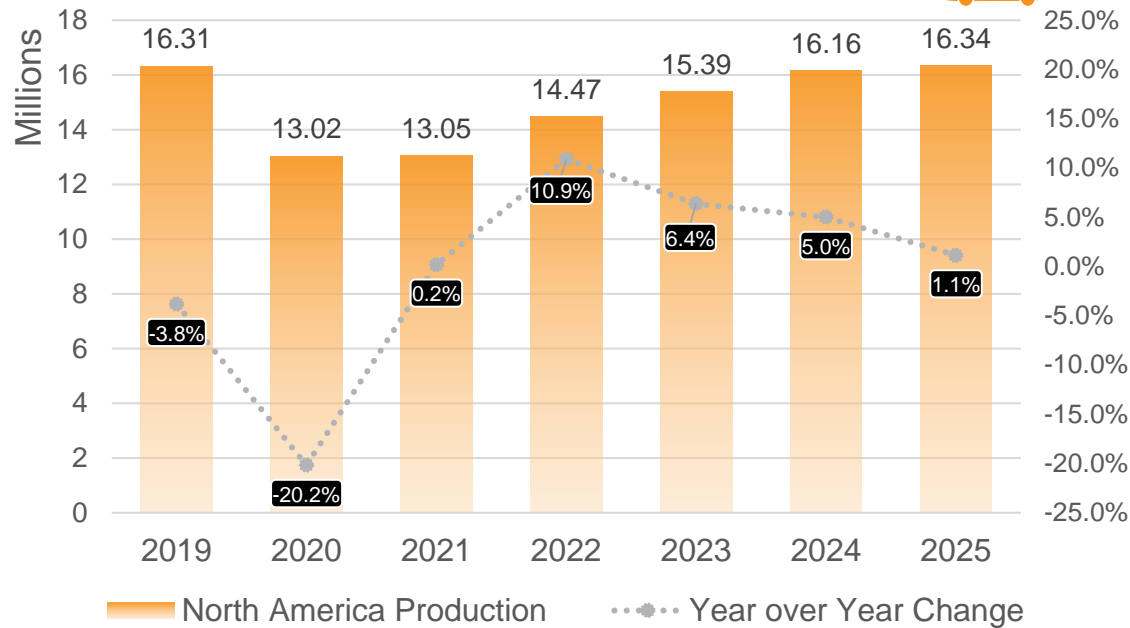
# North America Production Overview



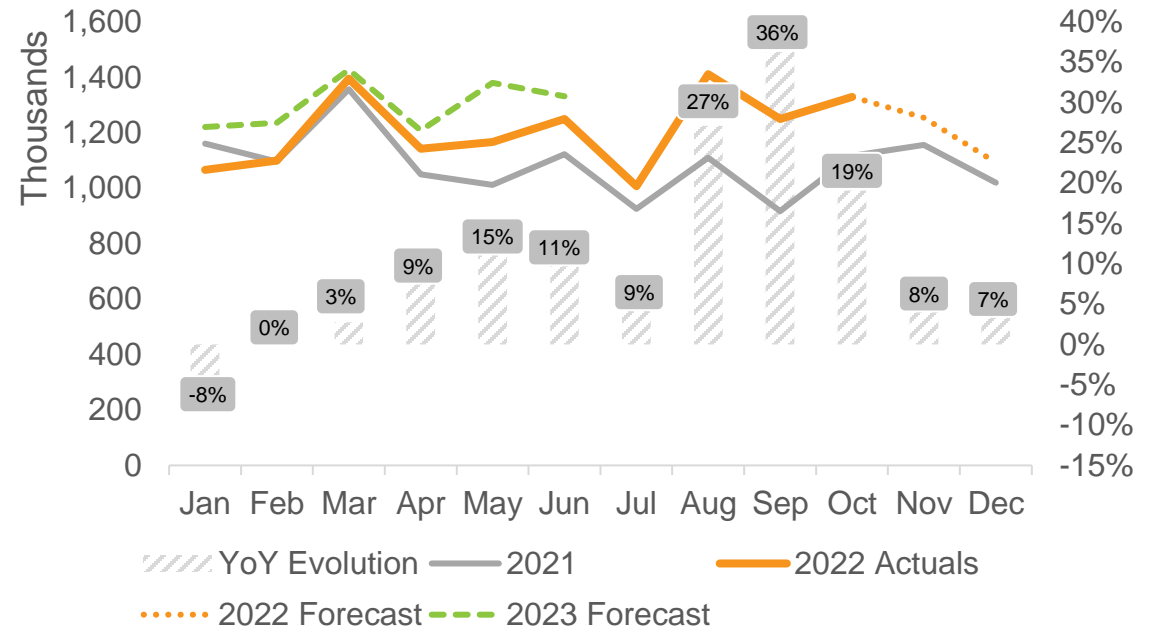
Semiconductor shortage undermines short-term outlook



Yearly Production



Monthly Production Evolution



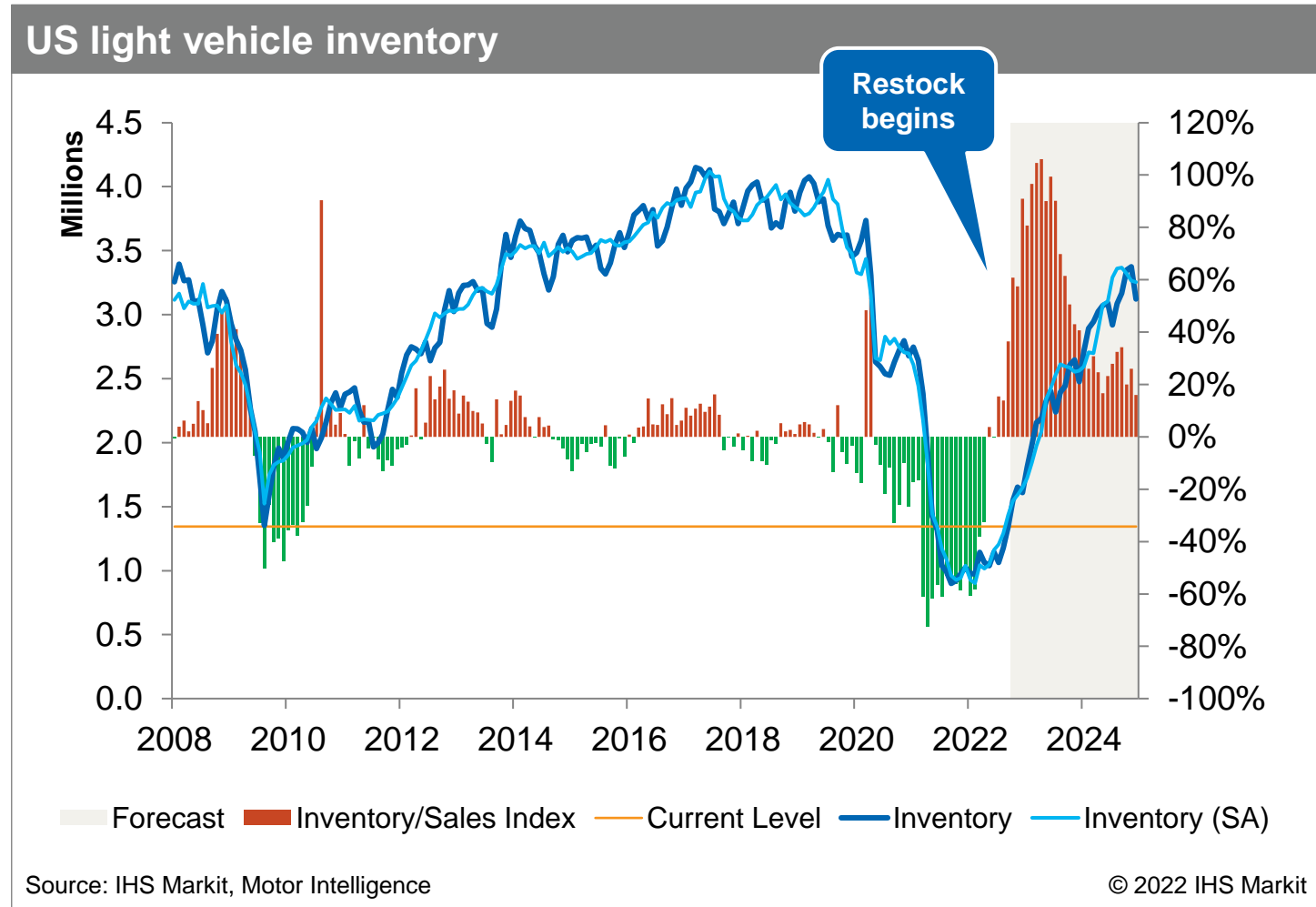
- ▲ US inventory remains at historic lows at 30 days' supply or 1.35M units
- ▲ Breaking a 35-month streak of year-over-year declines, US inventory increased for the third straight month by 445K units or 49.5%
- ▲ 1.5-million-unit inventory shortage remains amid ongoing supply chain, labor and logistics related issues
- ▲ Improving production and inventory restocking from 2023 onwards expected to alleviate pricing pressures in autos

- ▼ Economic slowdown and recession fears increasing
- ▼ Potential for demand destruction amid economic pressures
  - ▼ 2022 was reduced 0.7% or 109K units to 14.47M units
  - ▼ 2023 was reduced 1.5% or 234K units to 15.39M units
- ▼ Production results remain volatile and far from normal operating patterns
  - ▼ Ongoing short-lead downtime
  - ▼ Status of unfinished vehicles



# US inventory

Supply chain and logistics issues continues to hinder and skew market



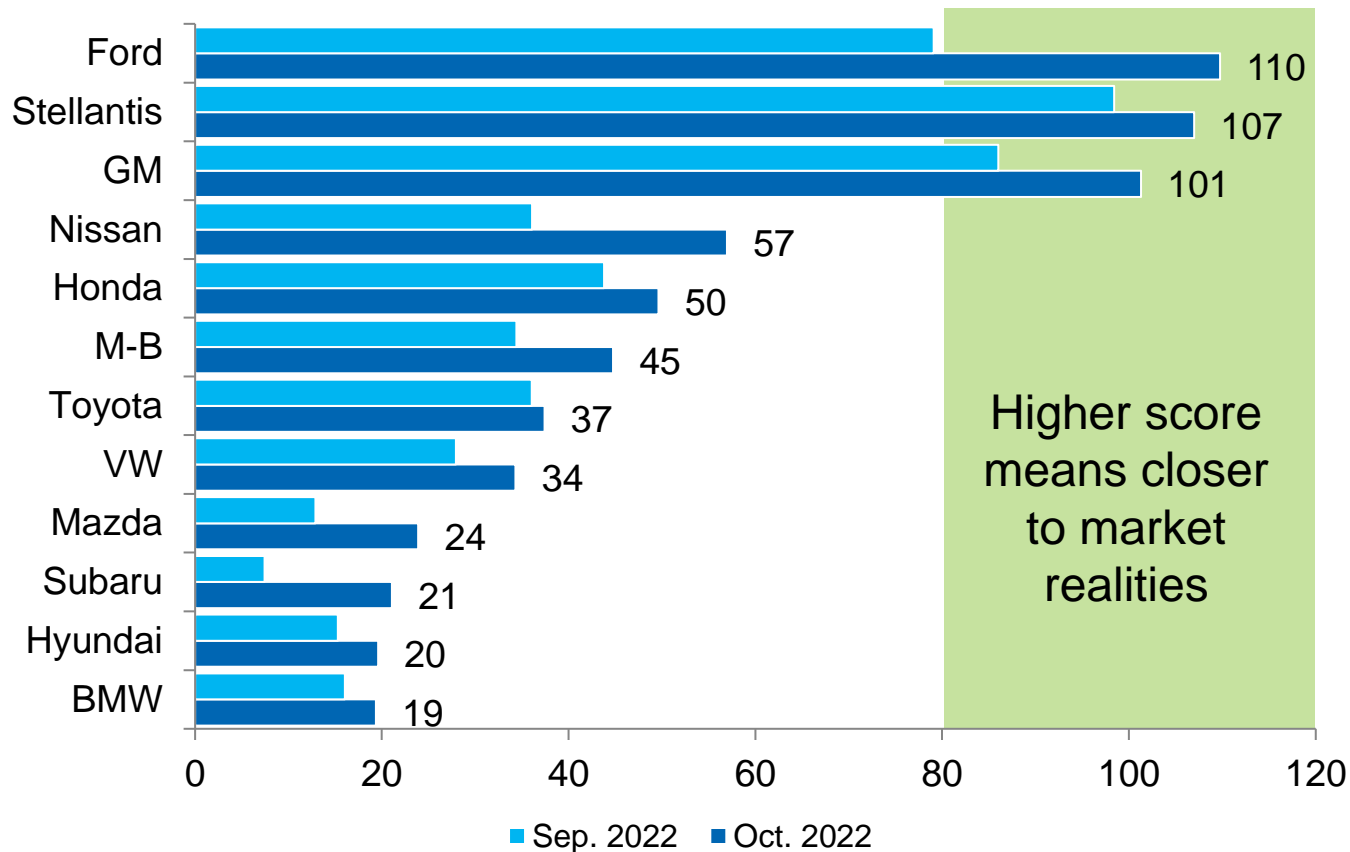
## Inventory update

- Inventory: September 2022
  - Stock: 1.35M units or 30 days' supply
  - Y/Y: +445K units or +49.5%
  - Inventory to Sales Index: +36.5%
- Entering formative stages of restocking
  - Third month of y/y increase after 35 months of declining inventory
  - 1.5M unit inventory shortage
- Ongoing shortages, labor and logistics issues extending constraints into 2023
- Risk of pent-up demand destruction risk
  - Strong pricing power for OEMs, dealers
  - Buying conditions at record lows
- Rapidly improving inventory outlook
  - Expect sharp increases in 2023
  - Pricing power risk amid increasing availability
  - Supply chain related constraint to continue

# US inventory analysis

Market connection defines reality

## US inventory alignment by manufacturer



Source: IHS Markit

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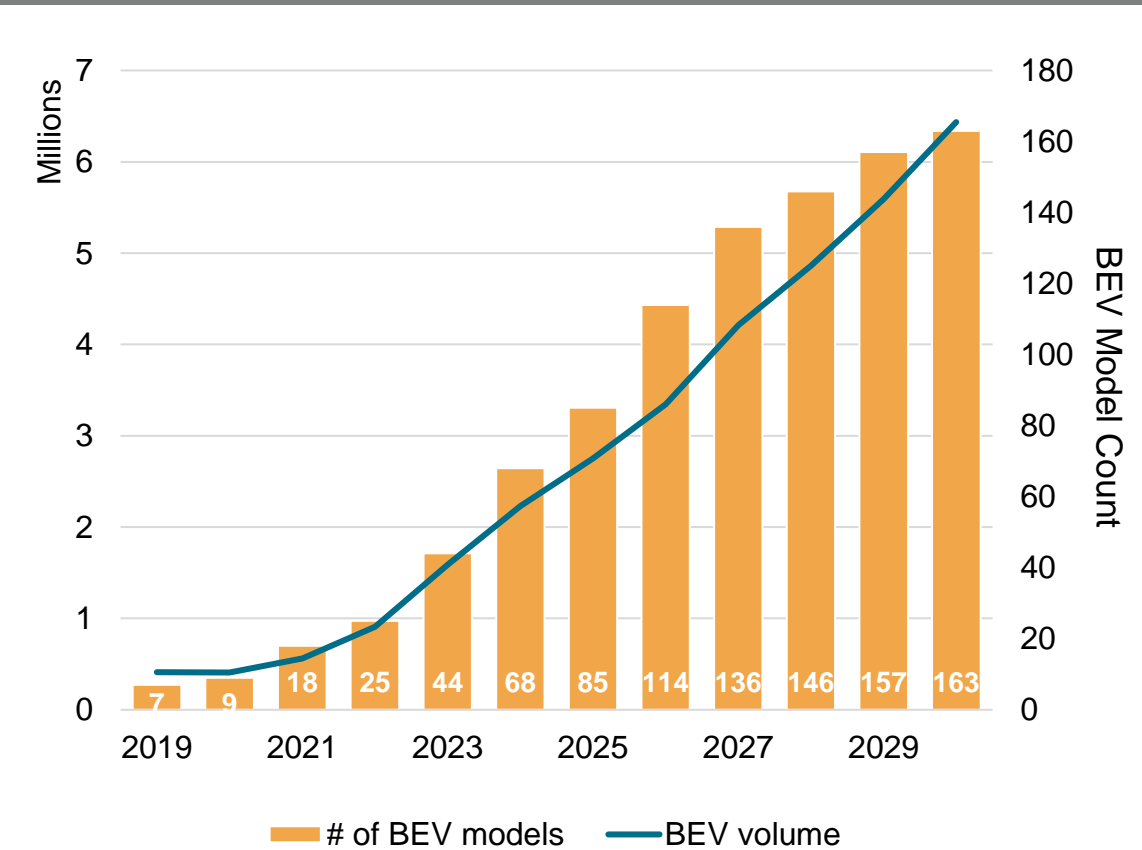
## Inventory Alignment Score (IAS)

- Indicates how close inventory is to benchmark
  - New benchmark: 2.19 times US sales
  - Historic benchmark: 2.45 times US sales
  - Measure of connection to market realities
- Domestics closer to new normal
  - Protecting high volume, high margin vehicles
  - Closer to facing market adjustments
  - Pricing power to come under pressure
  - Expect changes to mix and incentives
- Transplants remain more disconnected
  - Scores more indicative of supply chain issues
  - Limited inventory hampering sales
  - More protracted pricing power
  - More protracted overbuild period

# North American Production

Tail Wagging the Dog, More BEVs than Consumers to Start; Are We Redefining “High Volume” Manufacturing?

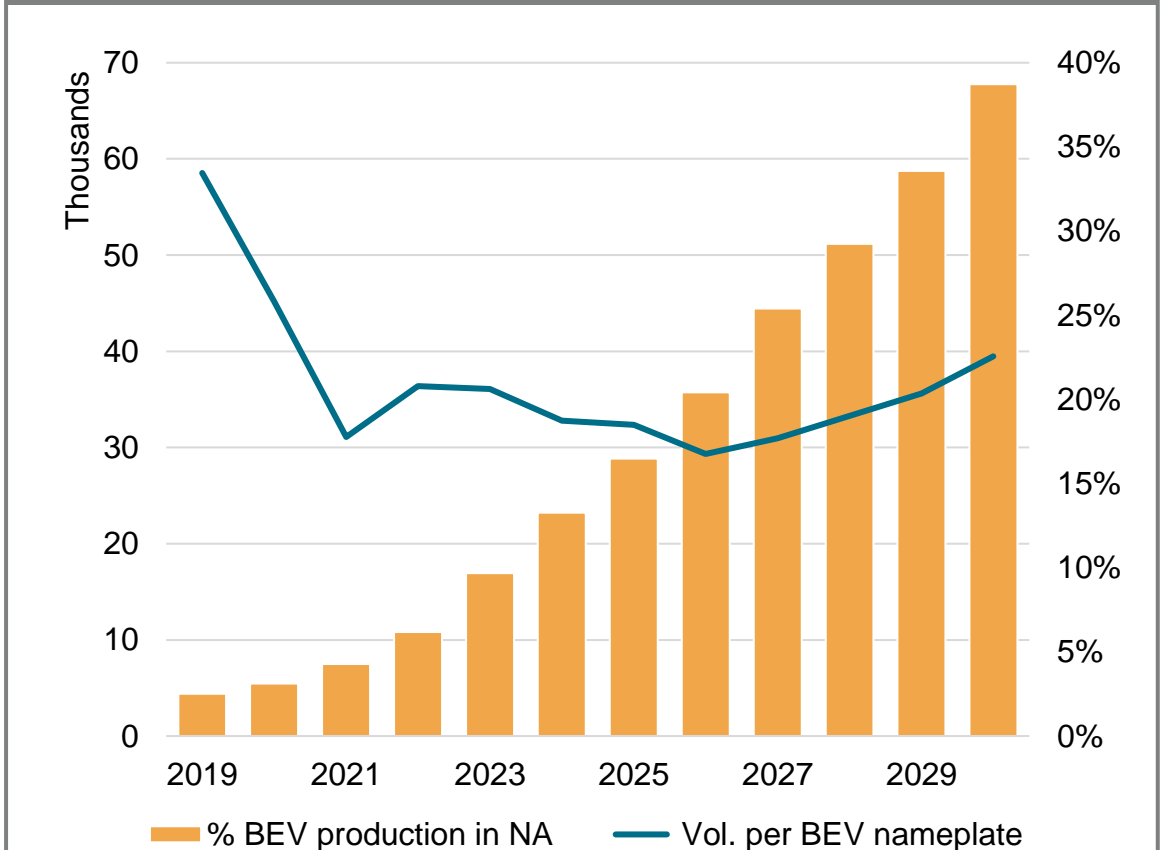
### Battery Electric Vehicle Production and Model Count



Source: S&P Global Mobility

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### BEV Share of Production and Volume per Nameplate

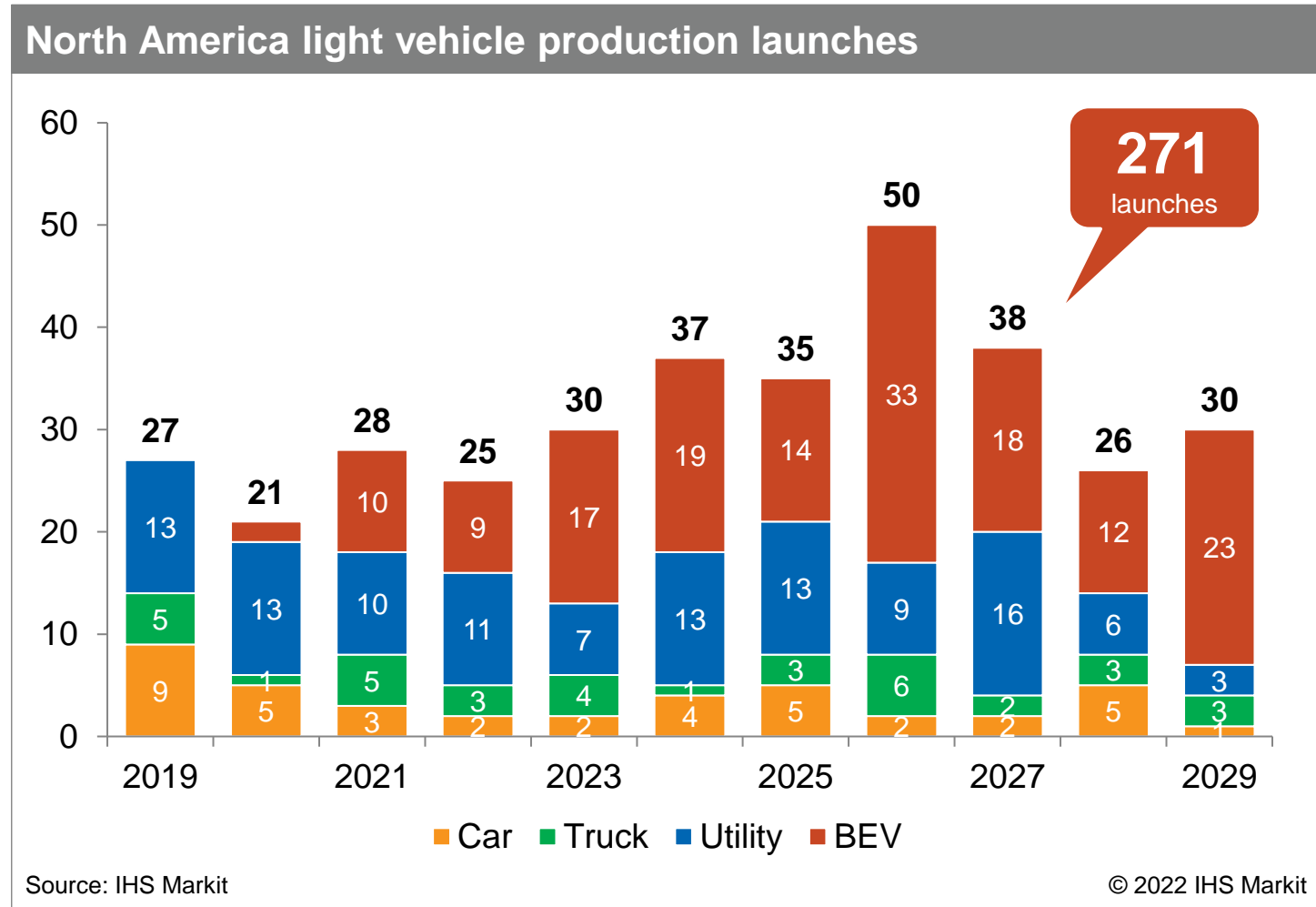


Source: S&P Global Mobility

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# Robust product activity continues

Longer and shorter life cycles on the horizon



## Delayed launches and extensions

- Launches amid industry issues
  - Increasing price scalability
  - Execution and pricing risks
- Utility vehicle expansion continues
  - Competition weighs on leaders
  - Splintering segmentation
  - Pricing and margin pressure
- BEV activity: 2022 to 2029
  - 119 all-new BEVs, 26 redesigns
  - 30% share or 5.0M units in 2029
  - Product redundancy: ICE to BEV
  - Another 100 plus BEVs as import or part of multi-energy nameplates
- Legacy ICE programs as a hedge
  - Extensions amid future costs`

# Updated EV tax credits under IRA 2022

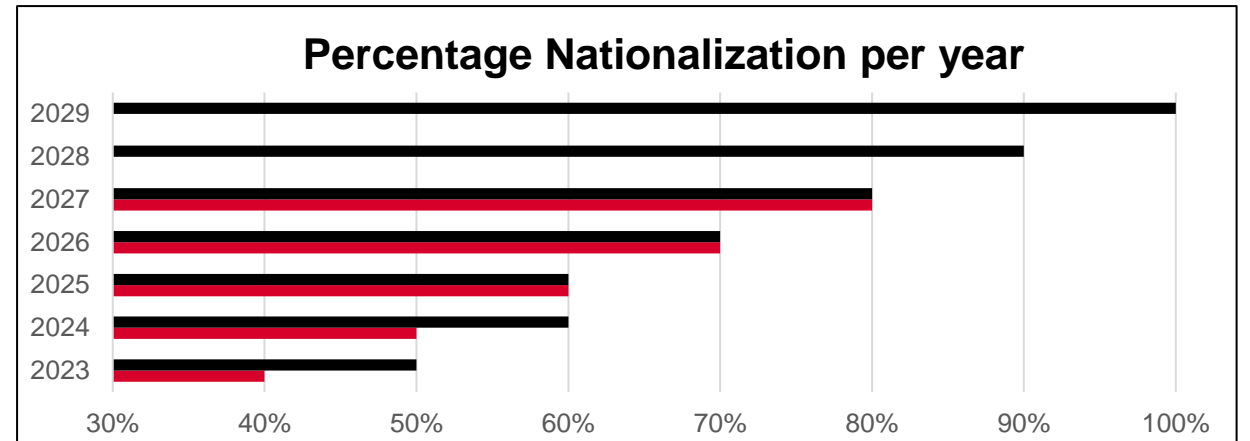
200,000 units cap has been revoked but there are additional restrictions on battery material sourcing

Incentives were introduced in 2011 for EVs in the form of tax credits, up to \$7,500 was offered to OEMs to promote clean energy vehicles, for vehicles with more than 4 kWh battery capacity and 200,000 units sales cap for OEMs this is continued with the new condition of final assembly plant based out of USA till end of 2022.

New tax credits-The price is still capped at \$7,500. The new EV tax credit system has updated the eligibility criteria to promote nationalization of EV manufacturing.

## Eligibility Criteria and Conditions

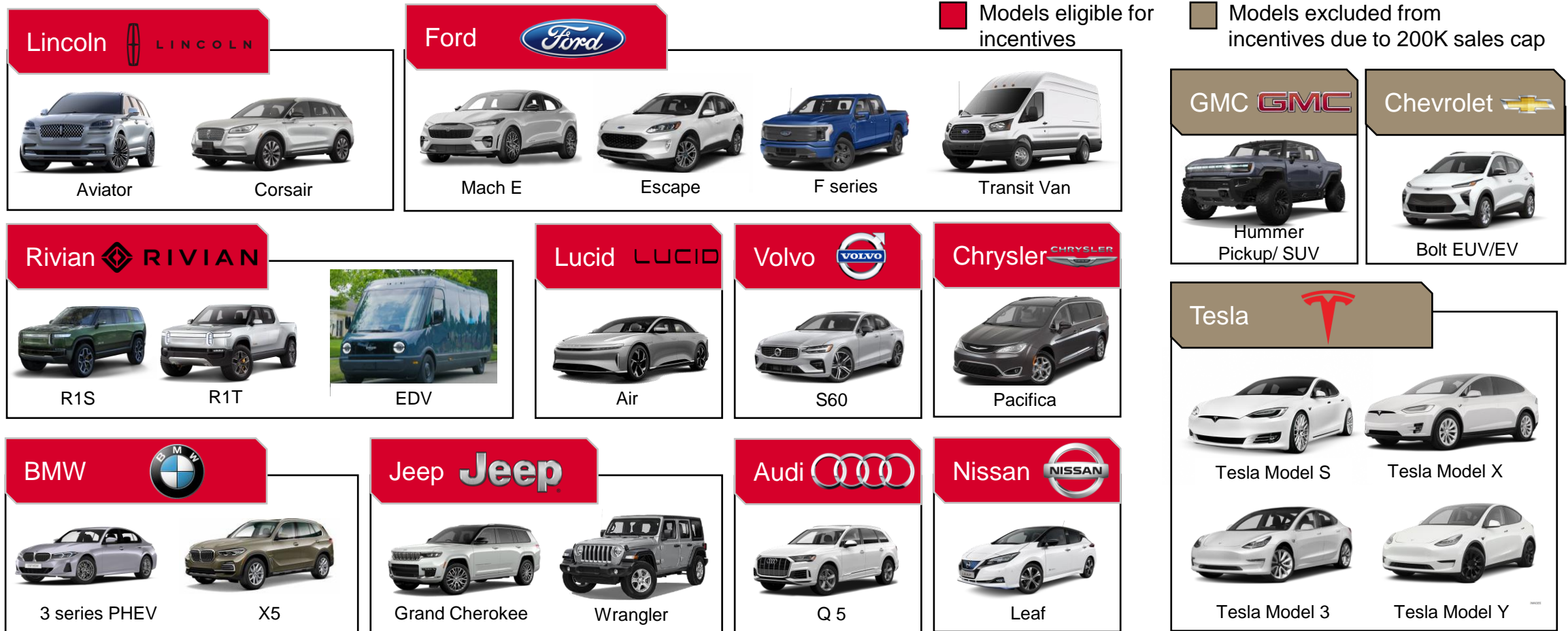
- The **MSRP** for vehicles is set at \$80,000 for SUVs, Vans and pickup trucks and \$55,000 for other vehicles.
- The final **income cap** is \$150,000 for single, \$225,000 for head of household, and \$300,000 for taxpayers with a joint return.
- The EV **final assembly** plant should be based out of the USA.
- The **sourcing** of Material Criteria to get a \$7,500 tax credit is categorized into two equal categories: Critical Minerals for \$3,750 and Battery Components for \$3,750.
- The vehicles should be no more than 14,000 pounds, should be propelled by **electric power** and should have a battery capacity not less than 10 kWh.



- ❑ **Critical Minerals:** % of minerals extracted or processed in the US or imported from a country which has FTA with the US or from materials recycled in the US.
- ❑ **Battery Components:** % of value made or assembled in the US.

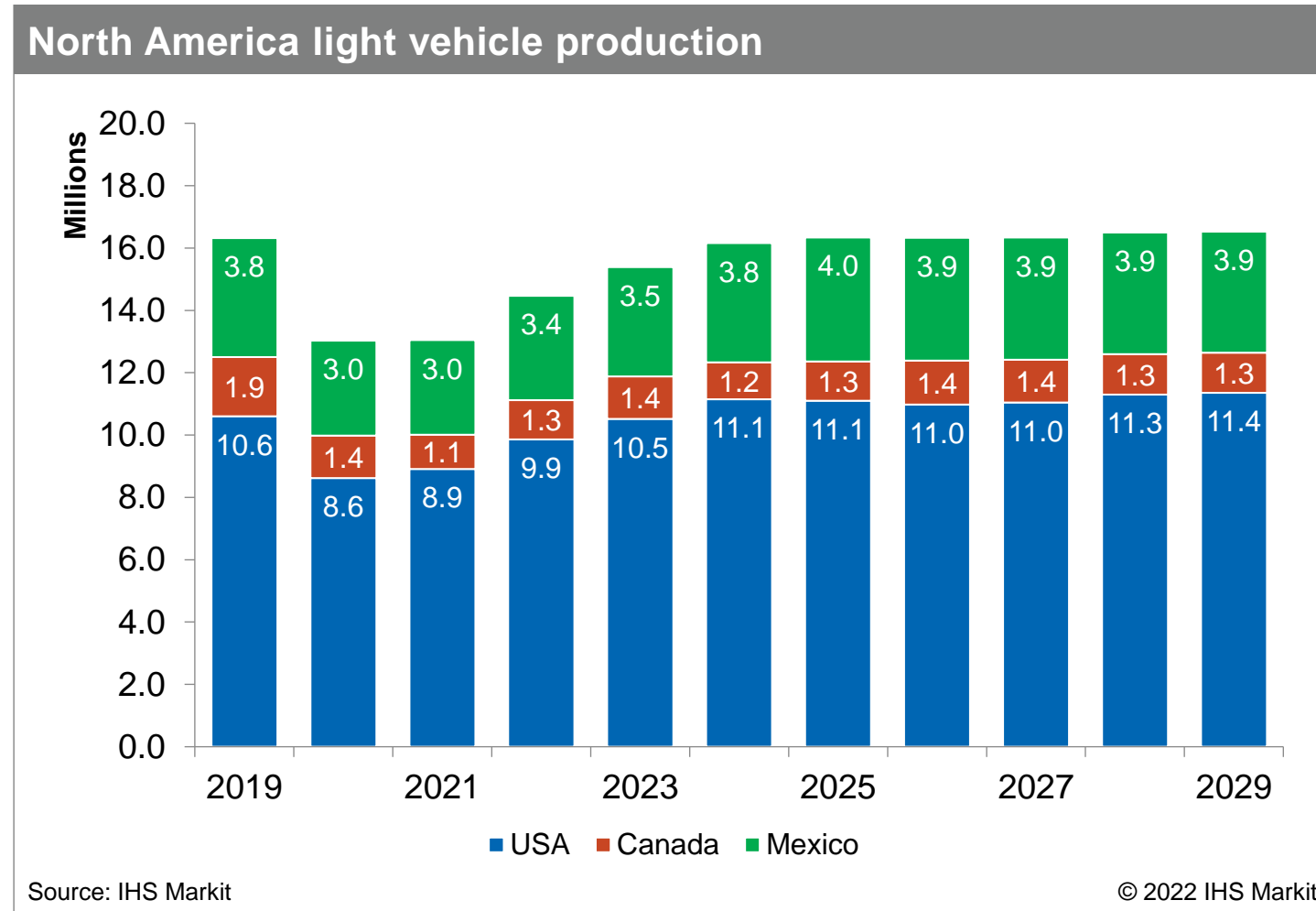
# Eligible Vehicles

The new law may disqualify the eligibility of about 70% of the battery-electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs) and fuel cell electric vehicles (FCEVs) on sale in the US market for tax credits



# North America production outlook

## Intra-regional production shifts



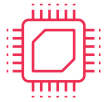
## Reshuffling the deck

- Broad IRA and USMCA implications
- US as safe sourcing hedge amid policy actions and discussions
  - Favored for BEV investment from battery cell to vehicle assembly
- Reprieve for Canada
  - BEVs as a lifeline for renewal
  - Follow the incentives:
    - Ford and Stellantis
    - Tesla potential
  - Fate of GM in Oshawa
  - Toyota and Honda status quo
- Mexico under pressure
  - Increasing China imports
  - Underutilized capacity amid BEV shift
  - BEV sourcing implications

# Global sales overview summary



**COVID-19 recovery cycle**—a challenging set of evolving drivers is risking “destroyed demand”



**Supply chain hangover**—the longer the supply squeeze lasts, the more potential there is for “lost”/destroyed demand (especially chips)



**Affordability**—elevated raw material prices are hurting prices—new car prices might not fall back as the market mix normalizes with the easing of the chip crisis (electrification “on top” factor for some regions especially Europe)



**Decent pent-up demand**—but the industry is “running out of runway” for 2022, and the outlook for 2023 is deteriorating



**Regions vary**—Mainland China stimulus helps short-term “pull forward” while US and European demand follows supply



**Key risks loom large**—big questions on big issues especially energy security, geopolitics, climate policy, and auto regulations



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