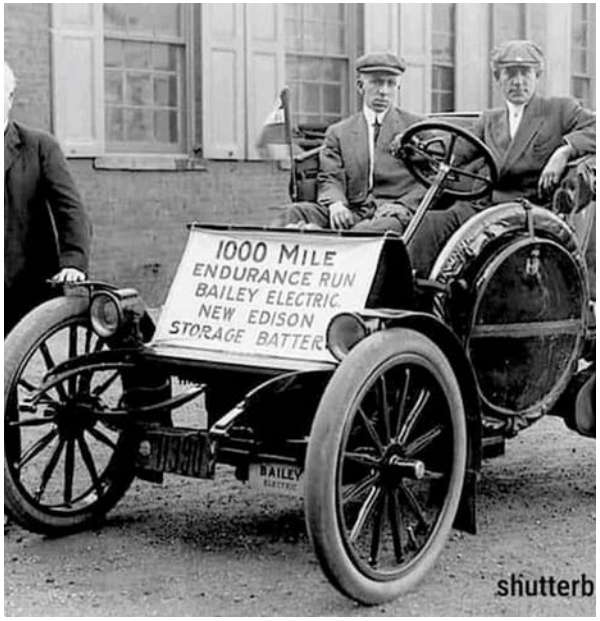


Automotive Update:
Electric Vehicles Transforming the Industry

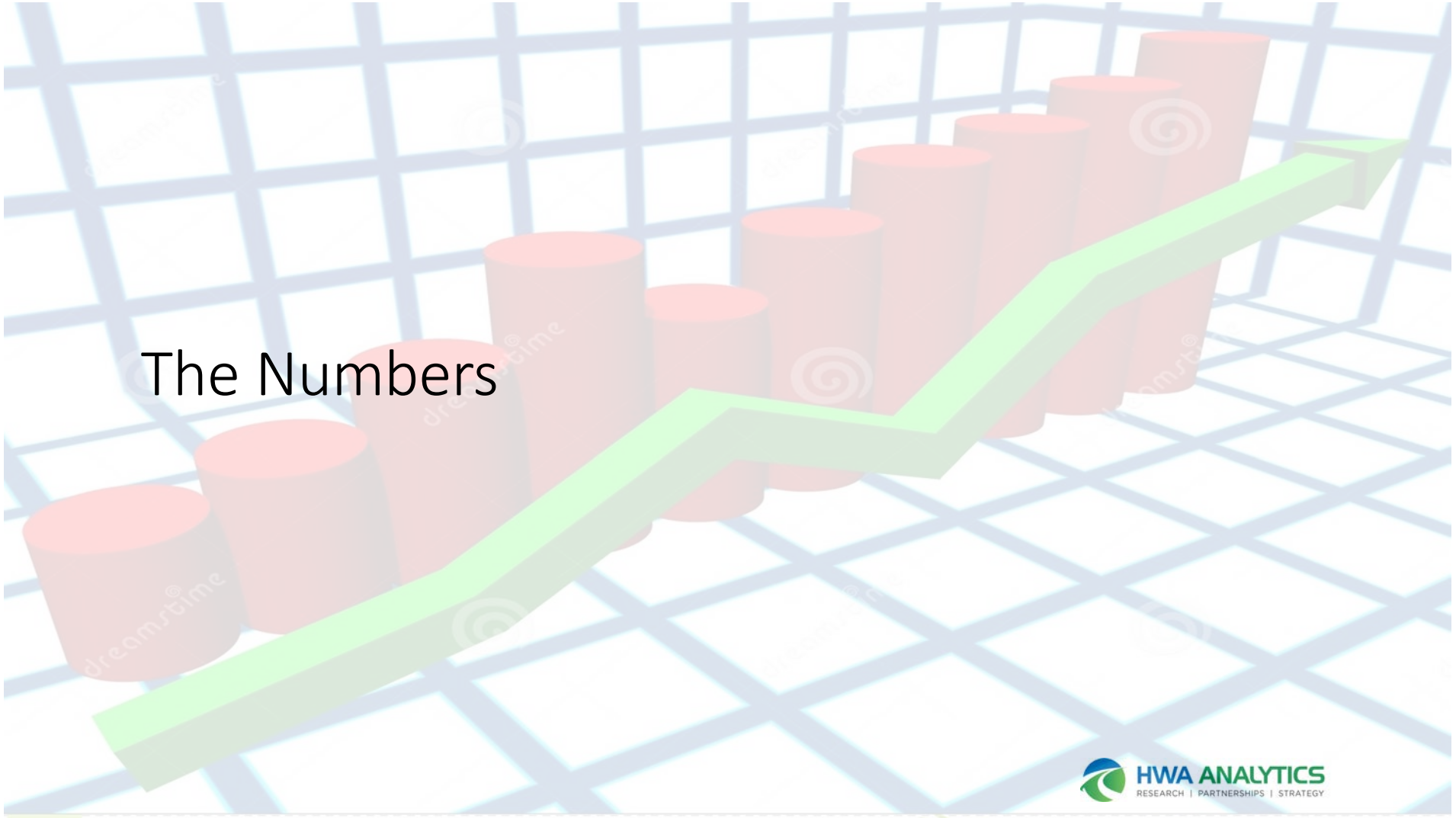
FTA Pittsburgh
October 24, 2022

Kim Hill, President
HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

Today’s Agenda

- The numbers
- Technology changes
- Supply chain
- Major investments
- Opportunities and risks
- Question marks

The Numbers



HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

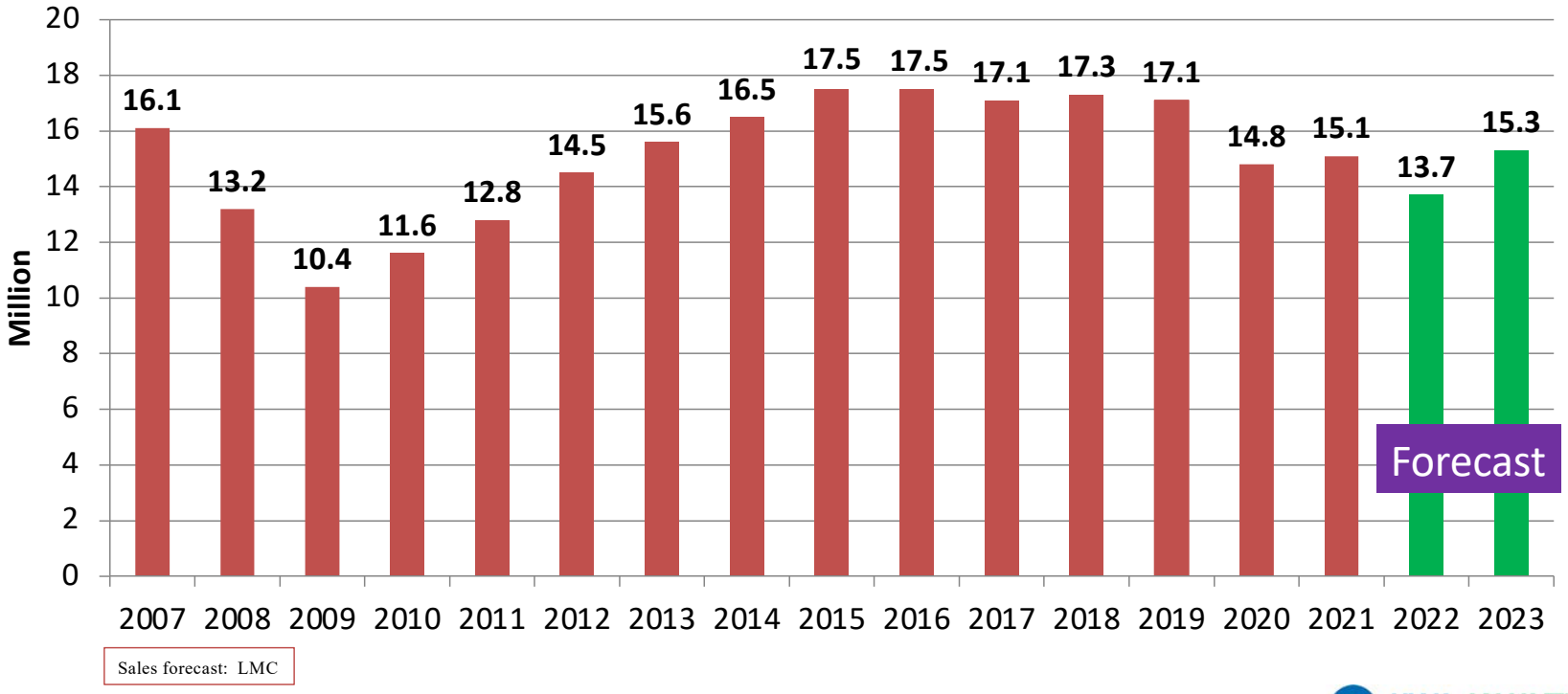
Sales update

- Sales were up for the month of September compared to September 2021
- However, the annual sales market remains down 13 percent so far this year.

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

U.S. Sales: They are dismal…

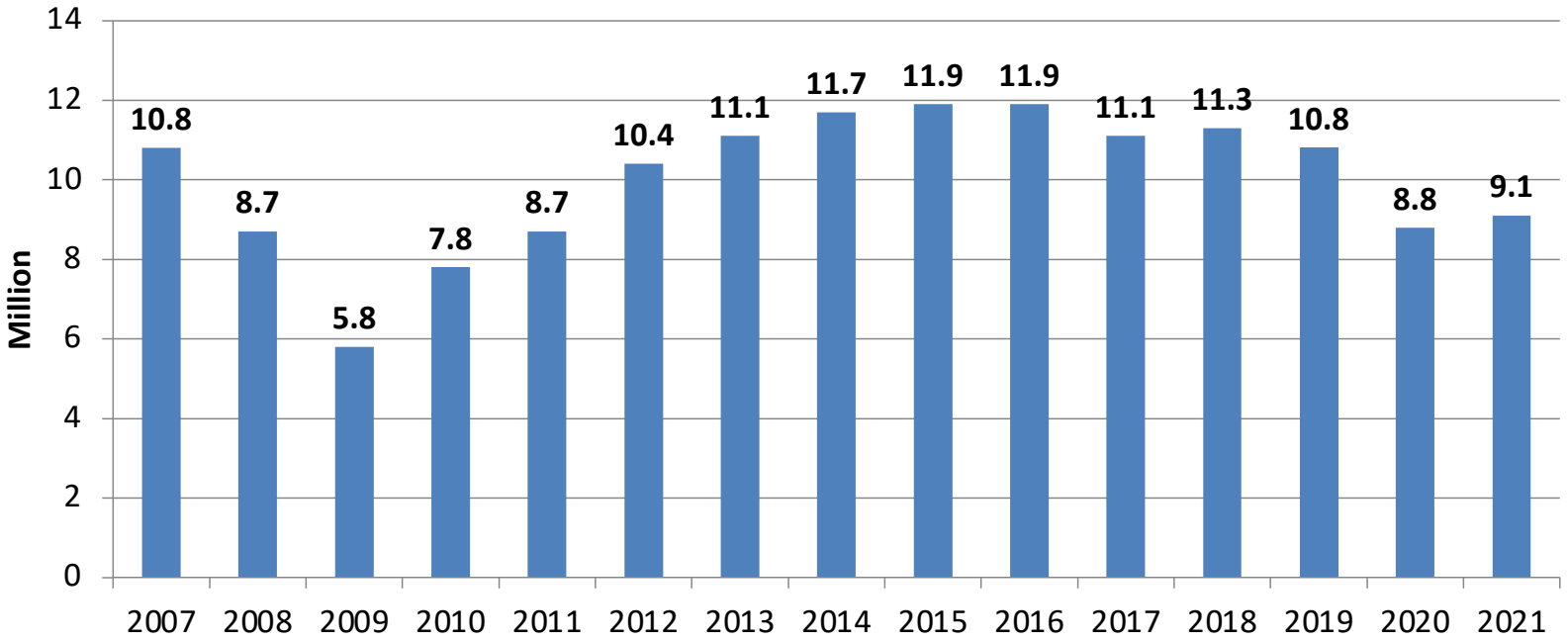
Projected to drop 9% to 13% in 2022, rebound(??) in 2023



Sales forecast: LMC

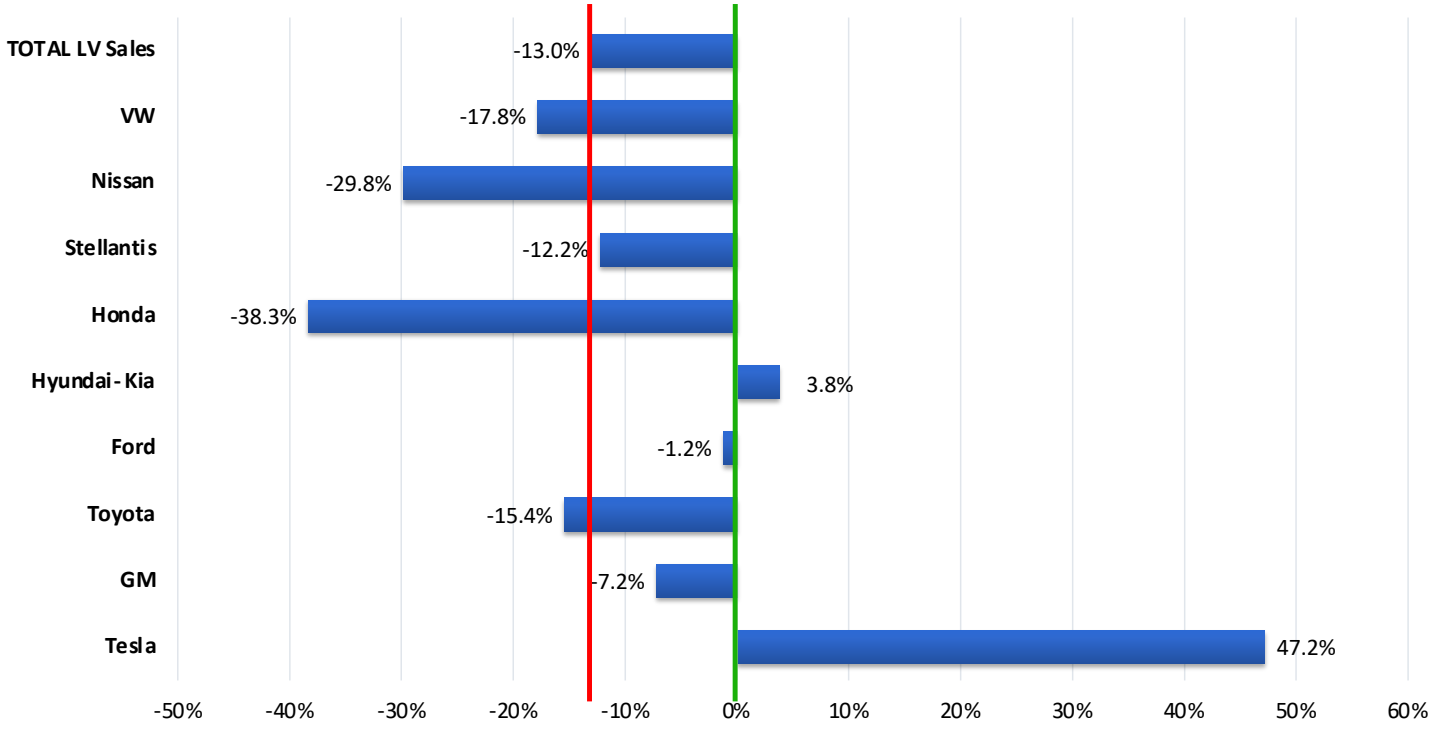
HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

U.S. Vehicle Production slipping—supply chain woes…



HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

Percent Change in Sales of Light Vehicles Per OEM: Through September: 2022 vs. 2021



Source: Automotive News

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

EVs: Automakers have a lot to do to catch up to Tesla.

- Tesla—65 percent of new EV registrations through August, down only slightly from its 66.2 percent share a year earlier
- 4 of the top 5 EVs sold through August were Teslas
- Overall EV registrations climbed 56 percent year over year
- Through August, EVs accounted for a record 5 percent share of U.S. light-vehicle total registrations. Aiming for 50 percent by 2030…
- Non-Tesla startups posted 61 percent EV growth through August 2022, with 160,403 registrations among 22 brands
- 15 new EV models released since the beginning of 2021
- Autonomy projects Tesla's market share of EV sales below 40 percent by the end 2023

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

EV sales

- Through August, Ford reported 33,354 sales,
  - Up 111 percent, for 7.3 percent of the EV market
  - Mach-E crossover reported 25,596 sales — making it the third best-selling EV in the U.S.
- The South Korean brands, with ambitions to bring four new EVs to the U.S. by the end of next year, represent a formidable competitor.
- Korean advantage (for now): 43,072 new EV sales, 9.4 percent segment share
- Korean brands' EVs, (which are all imported), stopped qualifying for $7,500 tax credits with introduction of the Inflation Reduction Act
- Ford's North America-built Mustang Mach-E crossover, F-150 Lightning pickup and E-Transit 350 van all qualify for the tax credits for the remainder of 2022.
- Federal mandate (target)—50% EV sales by 2030, CA—all EV by 2035

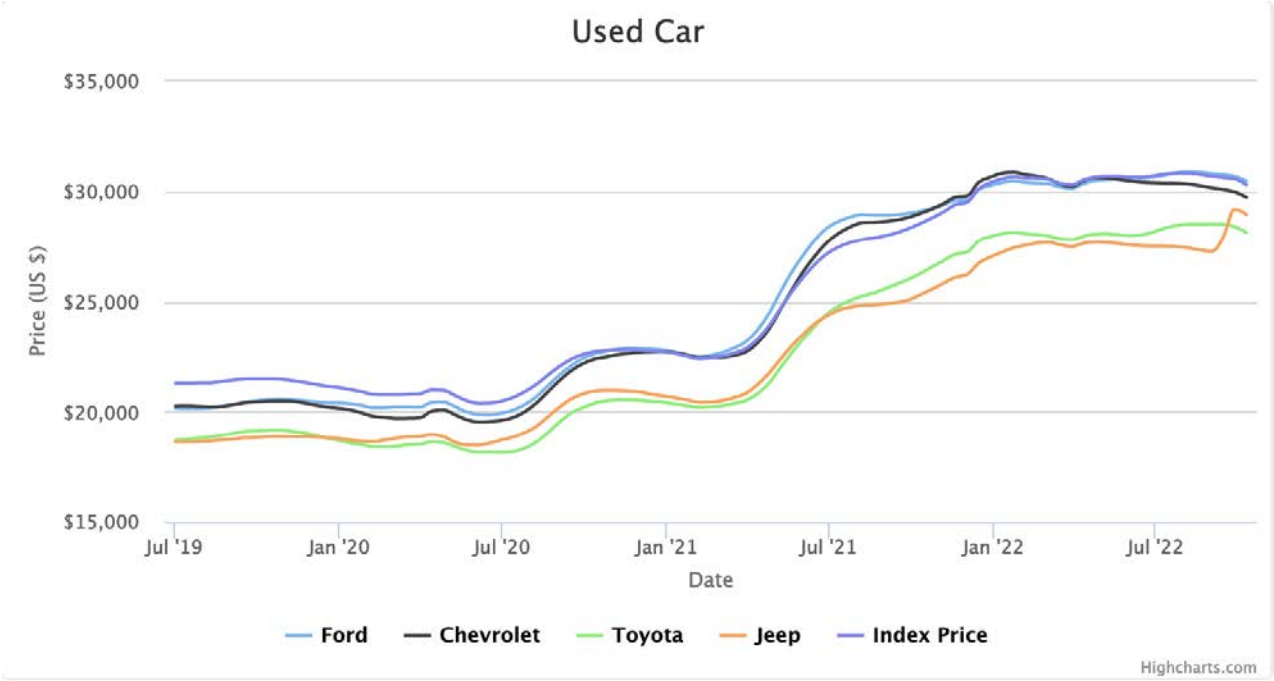
HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

Top 10 EV models by new registrations: January-August 2022

1.	Tesla Model Y	134,978
2.	Tesla Model 3	123,634
3.	Ford Mustang Mach-E	25,596
4.	Tesla Model S	20,032
5.	Tesla Model X	19,739
6.	Hyundai Ioniq 5	16,929
7.	Kia EV6	15,612
8.	Chevrolet Bolt EUV	11,788
9.	Volkswagen ID.4	9,127
10.	Nissan Leaf	8,740

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

New vehicle price: $48,000, New EV: $67,000
At least used vehicle prices starting to moderate…



HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

MirrorLink

TOYOTA

UBER

Apple CarPlay

Ford

TESLA

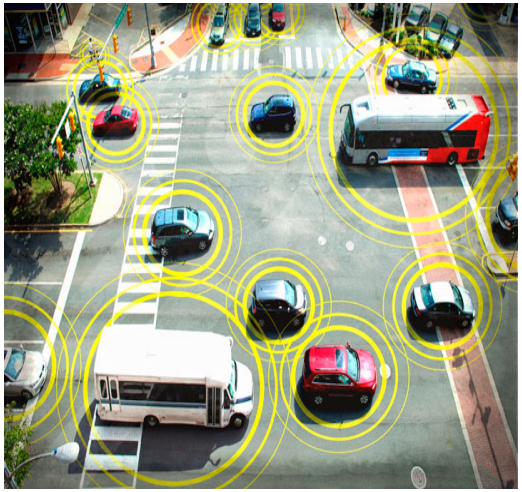
Google

intel

"Revolutionizing transportation for our customers while improving safety on roads is the goal of our autonomous vehicle technology"

- Mary Barra, CEO, GM

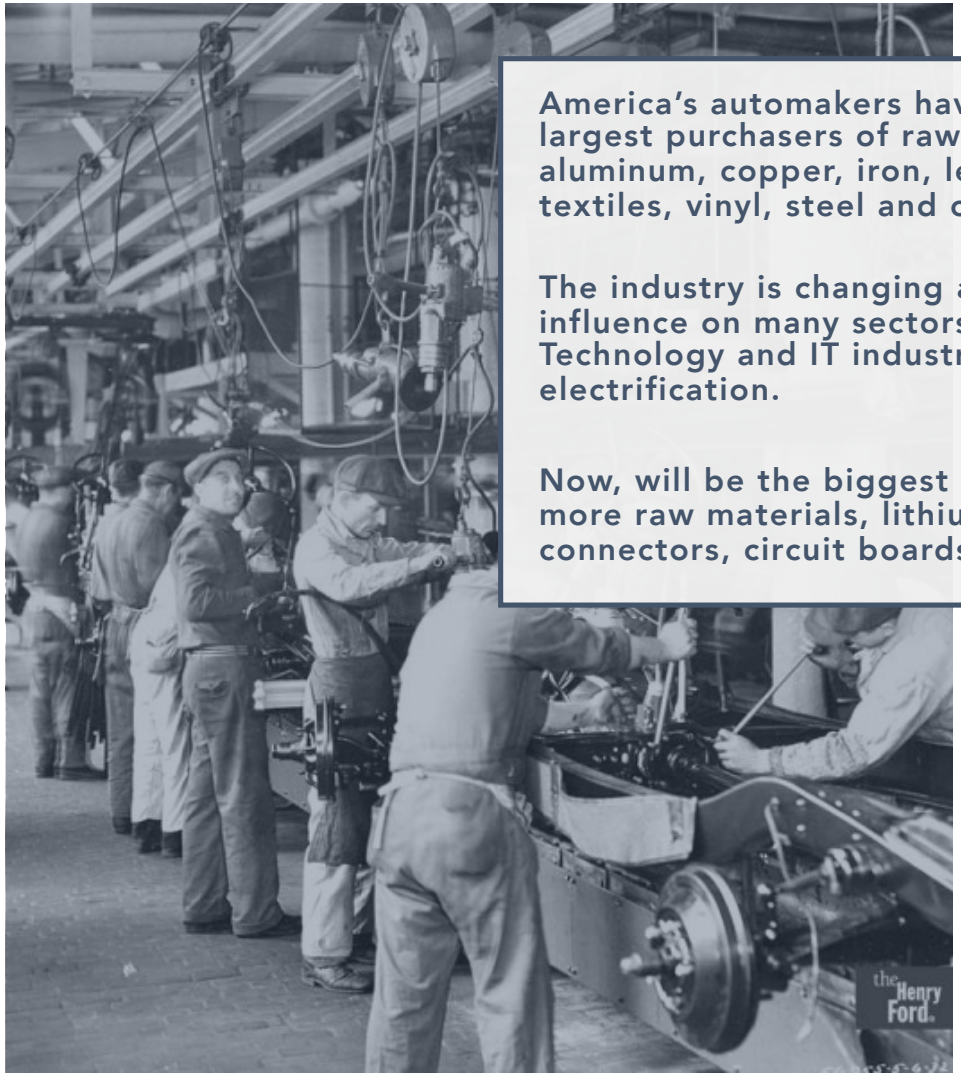
GM



Disruptive changes in Auto

- Electrification
- Technological changes and tech expertise
- Big data
- Autonomous vehicles/technology
- Navigation
- Artificial Intelligence
- OEM/Tech partnerships

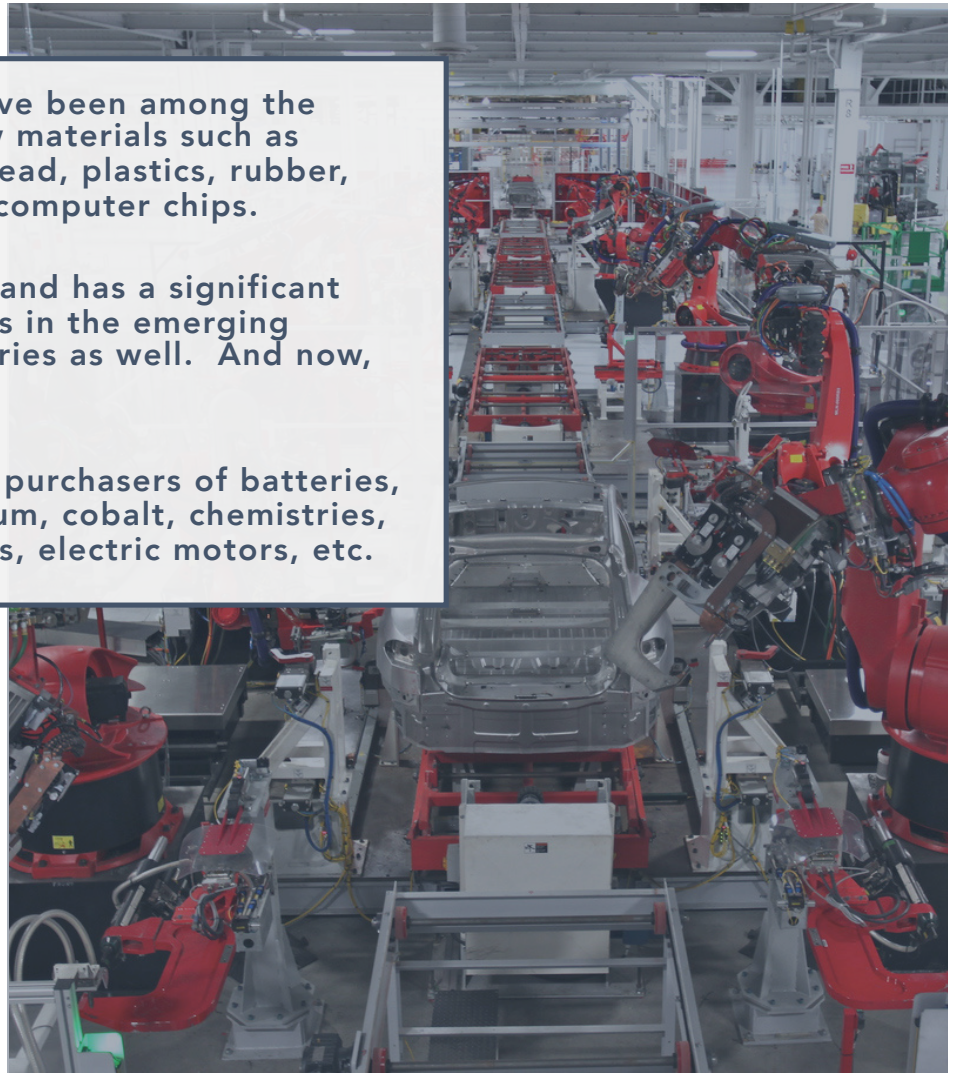
HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY



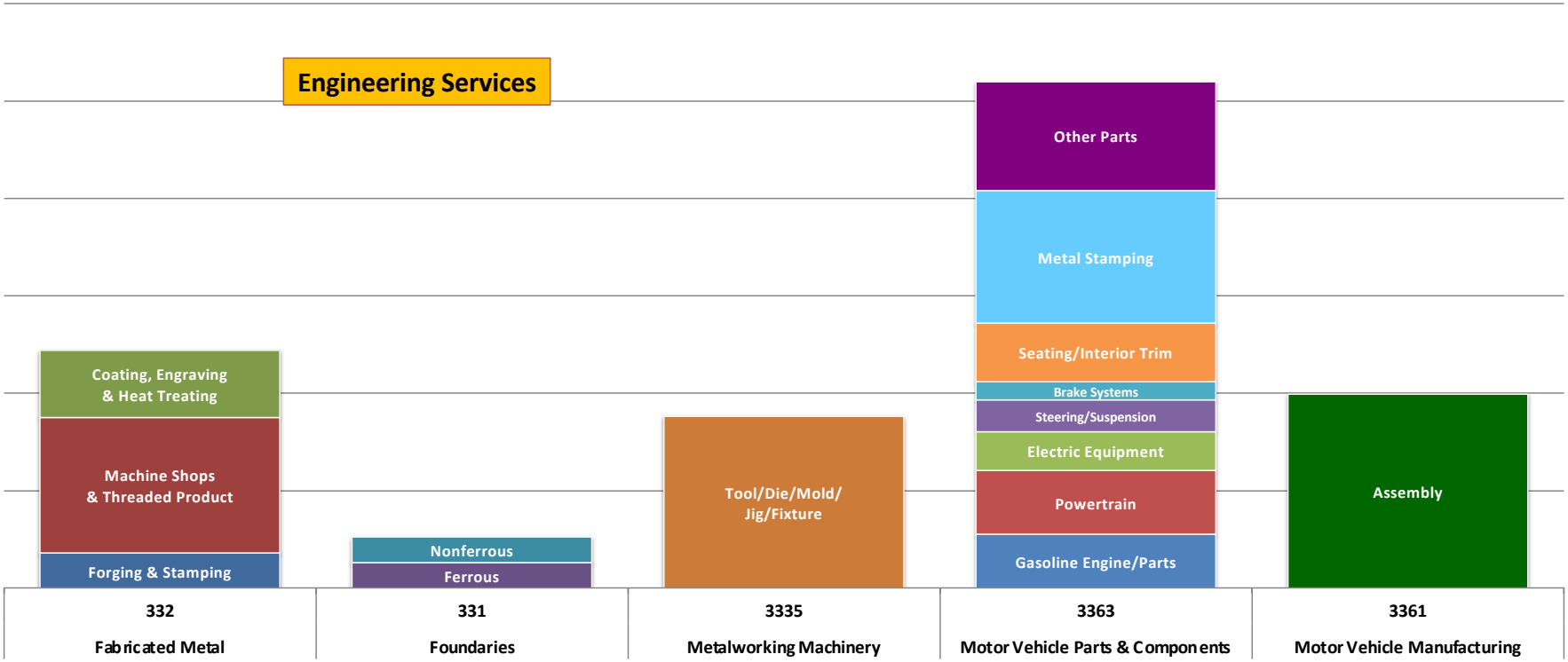
America's automakers have been among the largest purchasers of raw materials such as aluminum, copper, iron, lead, plastics, rubber, textiles, vinyl, steel and computer chips.

The industry is changing and has a significant influence on many sectors in the emerging Technology and IT industries as well. And now, electrification.

Now, will be the biggest purchasers of batteries, more raw materials, lithium, cobalt, chemistries, connectors, circuit boards, electric motors, etc.



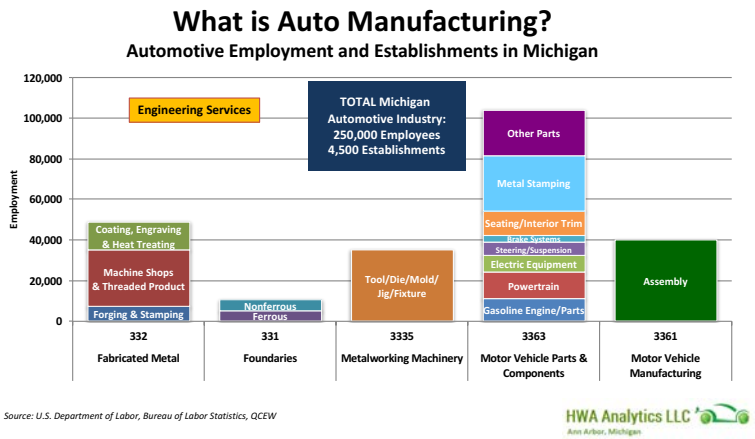
Auto Manufacturing—That was then….



Source: U.S. Department of Labor, Bureau of Labor Statistics, QCEW

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

This is now…



Source: U.S. Department of Labor, Bureau of Labor Statistics, QCEW

HWA Analytics LLC
Ann Arbor, Michigan

- Computers and semi-conductors
- Professional and Technical Services
- Vehicle IT Platforms
- Advanced driver assistance systems
- Dedicated short range communications
- Autonomous vehicle operating systems
- Collision avoidance
- Connected vehicle services
- Connected vehicle ecosystem
- Navigation
- Systems integration
- Information technologies
- Passive safety
- Sensors
- Proximity sensors
- Microprocessors
- Embedded processors
- Testing services
- Software systems

- Artificial intelligence
- Deep learning
- Autonomous cars
- Haptic touch control
- Haptic feedback technology
- Gesture and motion detection systems
- Human-machine interface—HMI
- Speech recognition technology—
- Machine learning
- After-market autopilot systems
- Radar
- Lidar—light-based radar
- GPS
- EV charging systems
- Antenna systems
- Onboard communications
- Computer vision systems
- Vehicle cameras
- Simulation systems

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

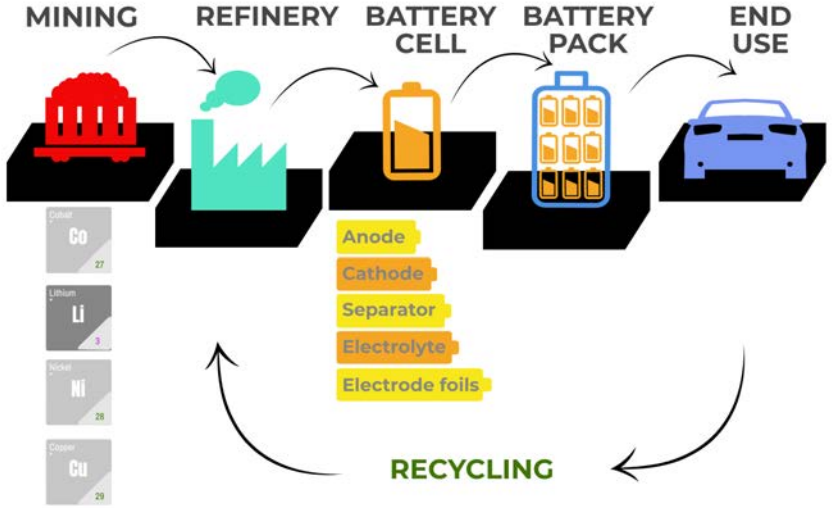
The road to level 5 autonomy and full battery electric

Substantial change/new components

- Thermal controls
- Electrical/power supply
- Steering
- Braking
- Aerodynamics/NVH
- Driveline
- Electronics
- Battery
- Vision/lighting
- ADAS/Active safety
- Wheels/tires
- Fuel
- Propulsion
- Exhaust
- Suspension
- Interior
- Seating
- Exterior
- Passive safety

Battery supply chain—a glimpse

A recent Battery Show in Michigan featured companies offering technologies and products in these broad categories:



- Thermal management
- Connectors
- Wire harnesses
- Materials
- Chemistries
- Testing
- Electronic and electrical parts
- Circuit boards

- Automation
- Clean rooms
- Battery management
- Electric motors
- Drive systems
- Sensors
- Cooling systems
- Others

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

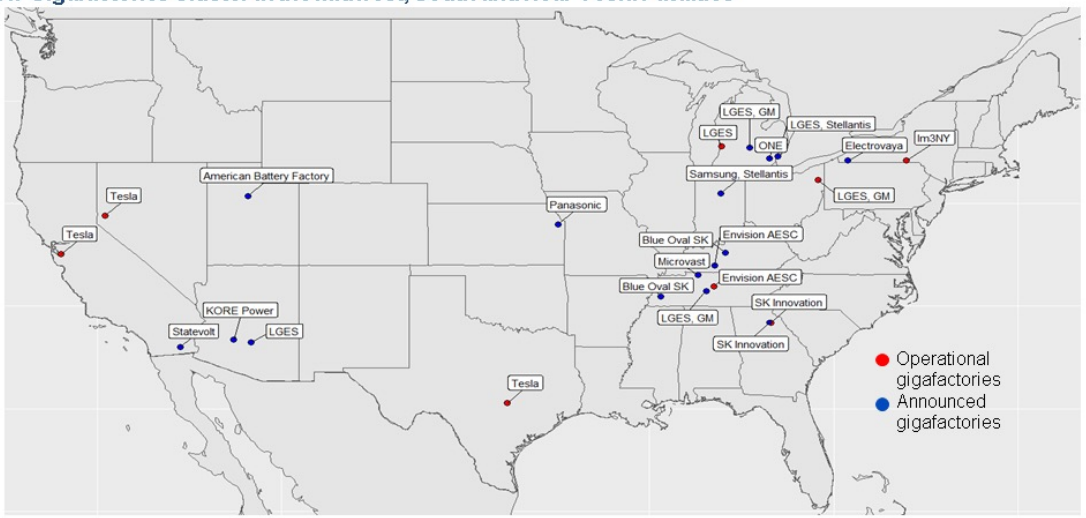
EV and Mobility Ecosystem: 15 Nodes

- **Vehicle assembly**
- **Sales – new, used**
- **Original supplier vehicle parts**
- **Parts-making tools and production equipment for assembly**
- **EV Battery pack production and battery cell production**
- **Microchip production, chip manufacturing, and materials**
- **Power Industry infrastructure**
- **Battery recycling and materials reclamation**
- **Research and development**
- **EV Charging infrastructure**
- **EV-Mobility businesses post-production – drivers towards electrification**
- **Agencies, policy-influencers, education, all other non-industrial**
- **EV-Mobility businesses post-production – consumer-oriented businesses**
- **Automotive industry post-production at-risk businesses**
- **Broader EV-Mobility businesses**

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

Competing for major EV investments

Chart 3
New Gigafactories Cluster in the Midwest, South and Near Tesla Facilities

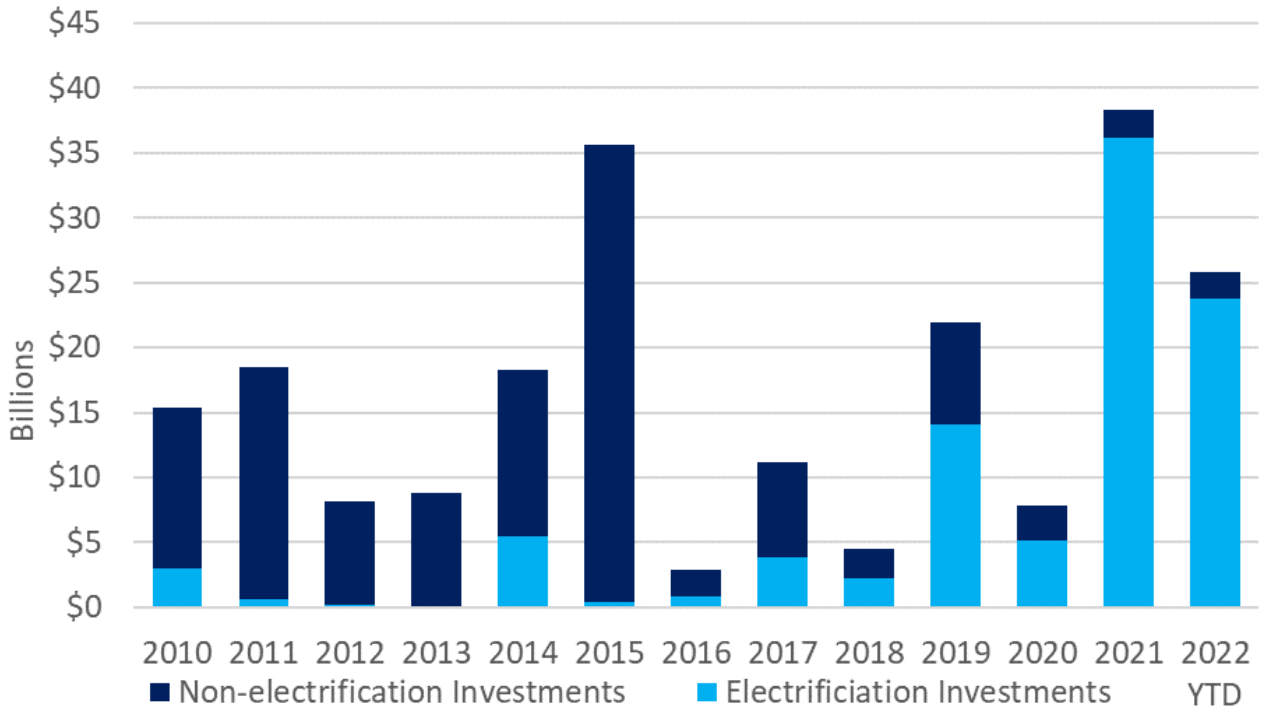


NOTES: We define a gigafactory as having capacity of 1 gigawatt hour or greater. Map does not include announcements that fail to specify a city or capacity estimate.
SOURCE: Company announcements, media reports, NAATBatt North American Lithium-Ion Battery Supply Chain Database.

Federal Reserve Bank of Dallas

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

U.S. EV investment growing rapidly: $60 billion since 2021

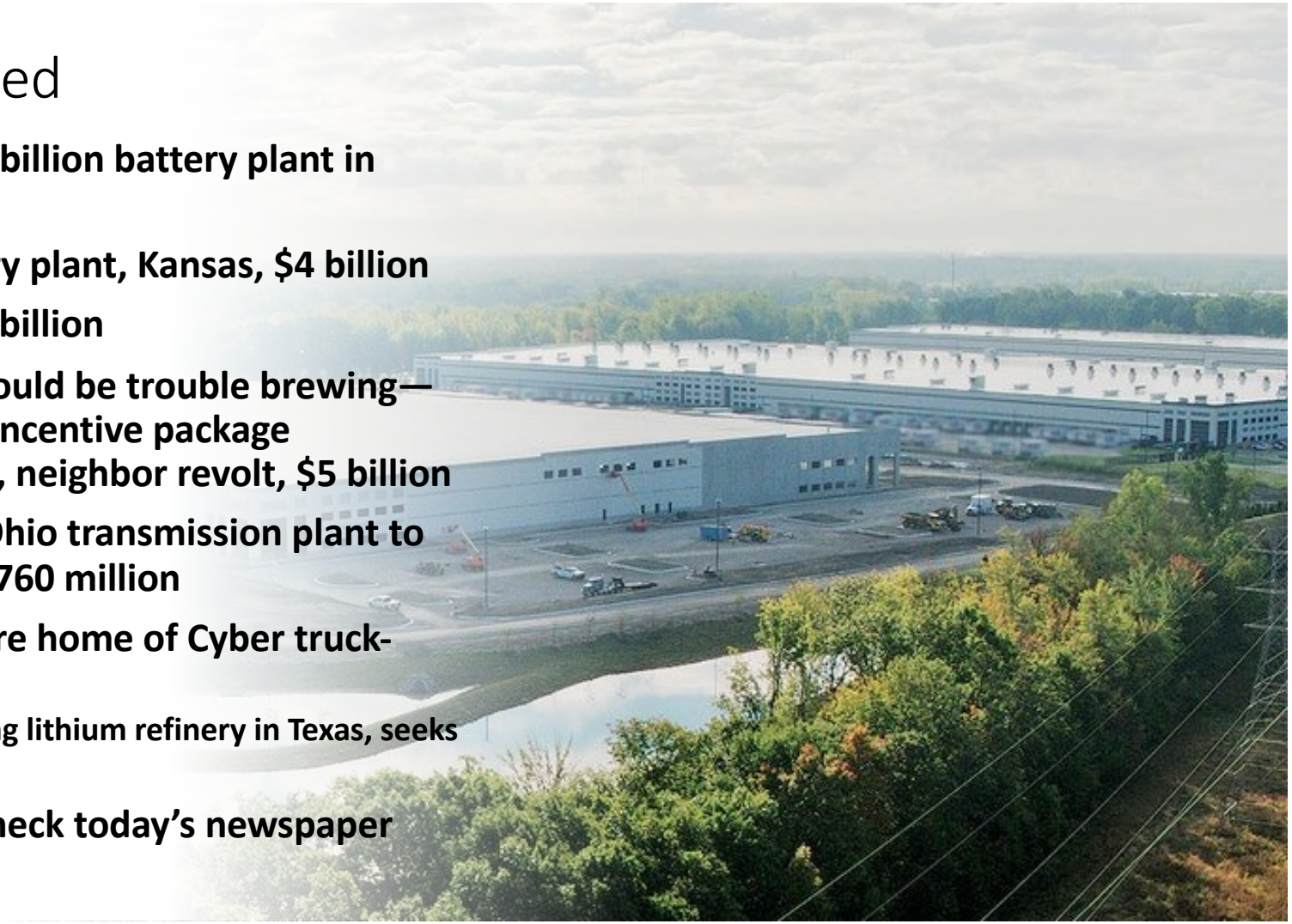


Source: Center for Automotive Research

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

Announced

- **Honda-LG's $3.5 billion battery plant in Ohio**
- **Panasonic battery plant, Kansas, $4 billion**
- **Hyundai, GA, $5 billion**
- **Rivian GA (?)… could be trouble brewing—state court says incentive package unconstitutional, neighbor revolt, $5 billion**
- **GM converting Ohio transmission plant to EV drivetrains: $760 million**
- **Texas Tesla: future home of Cyber truck- $1B / $60M**
  - **Tesla considering lithium refinery in Texas, seeks tax relief**
- **Many others—check today's newspaper**



The table stakes are HIGH

- Georgia, which has emerged as a winner in the current investment surge, landed two $5 billion EV deals from Rivian and Hyundai that promise to create more than 15,000 jobs.
- Offered incentives worth $3.3 billion to win the projects.
- 33 percent of proposed capital investment
- Rivian: $288 million—site preparation and job training programs
- Rivian: 7,500 jobs, $5 billion investment—both, or just jobs??

Ford—Tennessee

- $5.6 billion investment—Vehicle and battery plants
- Bloomberg says the incentive package is at least $2.4 billion, which includes tax breaks, donated land, infrastructure improvements and short-term wage subsidies from federal government. (43 percent!!!)
- Even that figure is an undercount. It excludes an electricity subsidy provided by the Tennessee Valley Authority, the largest federal utility. (Yikes!)

Coming

Honda, Sony team up, with NA plant expected 2026

Sony jumping ahead of Apple, Google in producing car

Panasonic needs battery capacity

So do most automakers—GM, Ford, Toyota (?), Stellantis, Subaru (probable Toyota team-up),

Most current assembly plants will get a battery twin in the vicinity

CATL—$5 billion battery plant

$1.2 Trillion – 2030 !!

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

So, what about Chips?

- Smart chips—this is what the microchip industry wants to sell
- Smart chips—NASA can fly to an asteroid and hit it head-on (on purpose)

- Not-so-smart (“Dumb”) chips—this is what auto needs
- Not-so-smart chips: intermittent windshield wipers, dim headlights, regulate seat warmth, etc.
- CHIPS Act provides desperately needed money
  - Looks like industrial policy, in the best way

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

The transition to EVs will be messy

- Will be big and splashy, with $5 billion investments being thrown about
- Transition current facilities to EV facilities (the workers hope) — for instance:
  - Ford Van Dyke transmission-95% converted to EV powertrain, sister Livonia facility-5% converted to EV powertrain
  - GM transmission to build EV propulsion for Hummer, Silverado, Sierra in Ohio
- Many suppliers will fold, merge, be bought out, or acquire other companies.
- Many workers and companies will miss out…

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY

Opportunities and at-risk businesses

Anything ICE-related is at-risk

Manufacturers of:

Transmissions

Gas engines

Exhaust systems

Fuel delivery

Related parts suppliers

Auto repairs shops—independents

Opportunities in electrification

Battery, battery cell, and battery pack production

Microchips

Battery recycling and reclamation

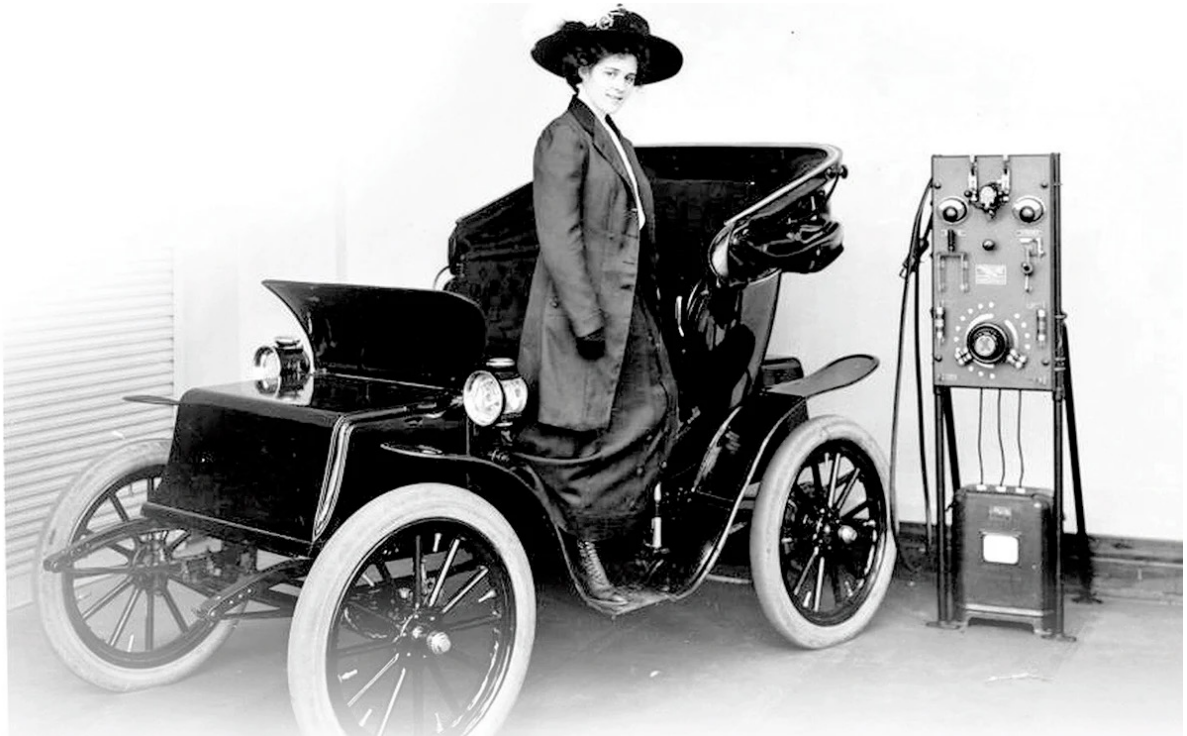
Battery R&D

Electrical contractors, computer storage, terminals, peripherals,

Question marks

- Chip supply
- Battery materials—where do they come from
- Supply chain in general—it's a mess
- Interest rates
- Inflation
- Affordability? EVs priced as luxury—those people can afford them
- Charging infrastructure
- Consumer demand—is it as robust as is thought?
  - What if everyone who wants an EV buys one and it's not 100 percent of all buyers?
- No matter what, it is imperative to help companies and workers prepare for the transition…

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY



Thank you!

kimhill@hwa-analytics.com

734.355.1740

HWA ANALYTICS
RESEARCH | PARTNERSHIPS | STRATEGY