The Electric Vehicle Transition

An Economic View

29TH ANNUAL AUTOMOTIVE INSIGHTS SYMPOSIUM
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KRISTIN DZICZEK
POLICY ADVISOR
FEDERAL RESERVE BANK OF CHICAGO

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TRENDS
Everything is Changing…
TRENDS

2021: The “Hockey Stick Moment” for Electric Vehicles

Battery Electric, Plug-in Hybrid, & Fuel Cell, Share of U.S. Sales

Source: Wards Informa
Plug-in Vehicle Volumes by Company

Source: Wards Informa; image: Tesla.com
Forecast Increase in Number of EV/PHEV/FCEV Models Produced in North America

Source: Federal Reserve Bank of Chicago analysis of S&P Global Mobility global light vehicle production forecast, December 2022
2022: Announced U.S. EV & Battery Investment tops $73.6 Billion

Source: Atlas Public Policy via npr.org
KPMG’s 2022 survey: North American auto executives project 35% EV market share by 2030 vs. 52% share in the same survey in 2021
New purchase, lease, & manufacturing incentives in the Inflation Reduction Act
Despite lower production, the industry has been very profitable.
There are many hurdles ahead
Prices are rising; & EV prices are 35% higher
CRITICAL ISSUES

Jobs & job quality are changing
Economic Factors

*Sales, production, inventory, supply chains, & capacity*
**ECONOMIC FACTORS**

Safe, reliable, & affordable transportation matters

- 68% of adults commute to work alone in a car
- Transit & bus passenger miles have not recovered to pre-pandemic levels
- Some employers have started providing transportation to work
- Commute miles are 35% of personal travel
- Improved transportation options could impact labor force participation

Source: U.S. Department of Transportation; [Bureau of Transportation Statistics](https://www.bts.gov/).
Light vehicle prices plateauing while inventory begins to tick upward

Sources: Kelley Blue Book (ATPs) & Ward’s Informa (Inventory)
ECONOMIC FACTORS

Raw material prices remain elevated

- Highly volatile raw materials prices impacted by a wide variety of factors
- Even with prices coming down in recent months, the overall bill of materials remains higher than 2012-2020 period

Source: Bank of America Global Research Estimates
ECONOMIC FACTORS

Luxury share remains elevated

- Luxury share has inched up—averaging 17% in 2022
- Consequences for future used vehicles?
  - Rich mix
  - Very little leasing
  - Underproduction in 2008-2009 & 2021-2022

Source: Cox Automotive
ECONOMIC FACTORS

New light vehicle finance rates & sales trends

- Sales were higher (14.2M SAAR) in Q4 than Q1 (14M SAAR) even with +107 bps increase in 72-month finance rates
- Due to the extended period of supply-constrained conditions, it may be difficult to determine the full impact of higher rates on new light vehicle sales

Source: Federal Reserve Statistical Release (Q4 number is November 2022), Ward’s Intelligence, November 2022
ECONOMIC FACTORS

Summary of Economic Projections

“We think we’ll have to maintain a restrictive stance for some time.”
“There are no rate cuts in 2023 in the SEP.”
– Fed Chair Jay Powell

Source: Federal Reserve Board of Governors
Change since September 2022 SEP: Higher  Same  =
ECONOMIC FACTORS

EV & electrified vehicles are gaining U.S. market share

- Several models are only available as BEV or HEV now—such as the Toyota Sienna minivan or the GMC Hummer
- Total electrified share has more than doubled in pandemic from 5.2% in 2020 to 12.3% in 2022

**ECONOMIC FACTORS**

**BEV prices are influenced by model availability & mix**

- Factors that mitigate higher BEV prices:
  - Production/supply chain recovery
  - Moderating raw materials prices
  - Cooler demand/normalized mix
  - New model introductions & greater availability of moderately-priced EVs
  - Production efficiencies
  - Technology improvements
  - IRA MSRP caps

![Battery Electric Vehicle Price Premium](chart)

Source: Kelley Blue Book Monthly Average Transaction Price Reports
EV ownership is concentrated on the coasts & mountain states—and among high income households

Sources: Alliance for Automotive Innovation Annual Report
**ECONOMIC FACTORS**

**Undercapacity Reasons**

- Relative to manufacturing, the transportation equipment sector has seen:
  - Increased underutilization due to insufficient materials & labor constraints, but...
  - Orders & other factors are less of a concern in transportation equipment

Source: U.S. Census, Quarterly Survey of Plant Capacity Utilization
ECONOMIC FACTORS

Supply chain pressure may be releasing

- The net change in supply chain flows has been positive
- Still not back to normal (0)
- There is always a potential for more bottlenecks to surface

Source: Federal Reserve Bank of New York
Shipping & logistics remain challenged

- Recent rail car loadings are trending slightly upward (rail strike averted, but labor relations are strained)
- Port labor talks are stalled (expected to go into 2023)
- Shipping container costs are down, but still above pre-pandemic levels
- Truck driver shortage remains

**ECONOMIC FACTORS**

**Source:** Association of American Railroads, Haver Analytics
ECONOMIC FACTORS

Production capacity utilization is very low

- U.S. 2-shift/straight-time net capacity of 500K units since 2008
  - Closed plants = 3 million units of capacity
  - New plants = 1.8 million units of capacity
- Concern re: fate of potential underutilized assembly, powertrain, & component plants
- Productivity will suffer as internal combustion engine (ICE) vehicle & component production ramps down & electric vehicle (EV) & component production ramps up

Source: Author's calculations based on Ward's data through Q3 2022
U.S. Industrial Policy

Potentially game-changing incentives for EVs
The Inflation Reduction Act is aimed at improving EV affordability: New incentives for new & used vehicles

**2022**
- $7,500 if...
  - North American assembled
  - Not GM or Tesla
  - Adds FCEV to the program

**Starting 1 January 2023**
- $3,750/$3,750 if...
  - Battery components & critical minerals content requirements met
  - MSRP < $55K cars/ $80K trucks/vans/SUVs
  - AGI cap $300K/225K/150K
  - 7 kWh minimum
  - $4,000 or 30% of sales price for used EVs <$25K & 2+ years old with AGI $150K/112.5K/75K

**Starting 1 January 2024**
- No “entity of concern” battery components (China, Russia, Iran, North Korea)

**Starting 1 January 2025**
- No “entity of concern” battery components or critical minerals

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**New Commercial Clean Vehicle Tax Credits**
- Up to $7,500 for GVW <14K pounds and $40K for GVW >14K pounds
- It appears there are no North American assembly, critical minerals or battery component content requirements
- Leases qualify
The Inflation Reduction Act aims to lower producer costs, too

**INDUSTRIAL POLICY**

**Manufacturing Tax Credits**
- $35/kWh for battery cells produced
- $10/kWh for battery modules
- 10% of cost incurred for critical minerals

**Domestic Manufacturing Conversion Grants**
- Grants for re-equipping, expanding, or establishing a U.S. manufacturing facility to produce BEV, PHEV, PEV, or FCEVs

**Advanced Energy Project Credit**
- For establishing, expanding, or re-equipping facilities for producing a wide array of clean energy products including advanced light-, medium-, & heavy-duty vehicles, energy storage (batteries), & fuel cell equipment

**Advanced Technology Vehicle Manufacturing**
- Adds funding to program to make direct loans for the cost of establishing or expanding U.S. manufacturing facilities that produce low or zero GHG vehicles or components

**Infrastructure Investment & Jobs Act**
- $7.5B in formula & competitive grants to incentivize EV charging build-out
- Funding for grid upgrades & resilience
- $9.5B in clean hydrogen manufacturing programs

INDUSTRIAL POLICY

China is a major player in battery, components & minerals production

- China produces 80% of global battery cells & has invested in critical minerals mining, refining, & processing across the globe
  - Dominant investor in domestic & foreign Cobalt extraction & processing
  - Controls 61% of global lithium refining
  - Controls 100% of natural graphite processing (battery anodes)

- Global lack of sufficient mining, processing, & refining capacity for critical minerals
- Mining permits take years to approve
- Even when a mine is operating, it could take 2-3 years to produce “battery grade” materials
- Recycling will be key, but it is not sufficient in early years when few vehicle batteries are available to recycle & reclaim minerals (or be put to second use)
- Inflation Reduction Act’s regulatory phase will determine how the “foreign entities of concern” language will be operationalized

Source: U.S. Department of Energy, America’s Strategy to Secure the Supply Chain for a Robust Clean Energy Transition
UAW & Unifor Talks

Major Issues & Considerations
UNION NEGOTIATIONS

Many challenges ahead in addition to the EV transition

ISSUES
- EVs—jobs, job quality, organizing new plants
- Job security
- Wages
- COLA
- Health care
- Temporary-to-Permanent Conversions
- Overtime pay
- Vacation & holidays
- Profit sharing
- Outsourcing/insourcing

CONSIDERATIONS
- New leadership at UAW, Unifor, & automakers
- UAW President, VP, & remaining regional director run-offs not decided until March 2023
- Profitable operations for more than a decade
- High inflation environment
- Economic uncertainty

UAW contracts expire: 14 September 2023
Unifor contracts expire: 18 September 2023
Outlook

Overview of outside forecasts
2023 U.S. sales forecasts trend upward

- 2019: 17.1 million
- 2020: 14.6 million
- 2021: 15.1 million
- 2022: 13.7-13.9 million
- The 2023 consensus is just above 2020 sales level, but still way short of 2019 U.S. sales
- Top 10 Average forecasts are more bullish—with 2023 back to 16-million-units

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Source: Wolters Kluwer/Haver Analytics; UM RSQE