

# Smoky Mountains Mobility Conference

Carla Bailo - ECOS Consulting President & CEO

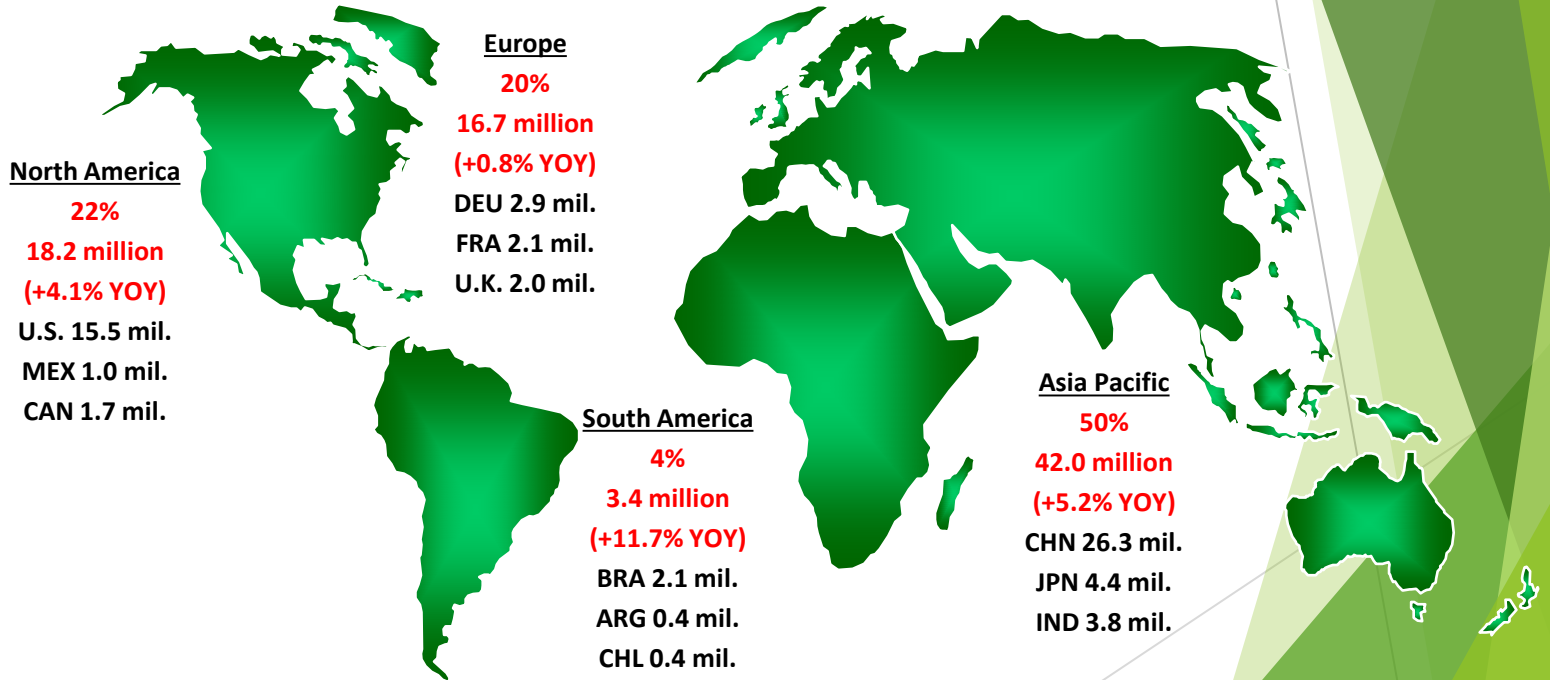
Past President and CEO - Center for Automotive Research

# Automotive Industry State in 2022

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the right side of the frame, creating a modern, dynamic feel. The text is centered on the left side of the image.

# Global Vehicle Sales (In Millions) 2021 and 2022

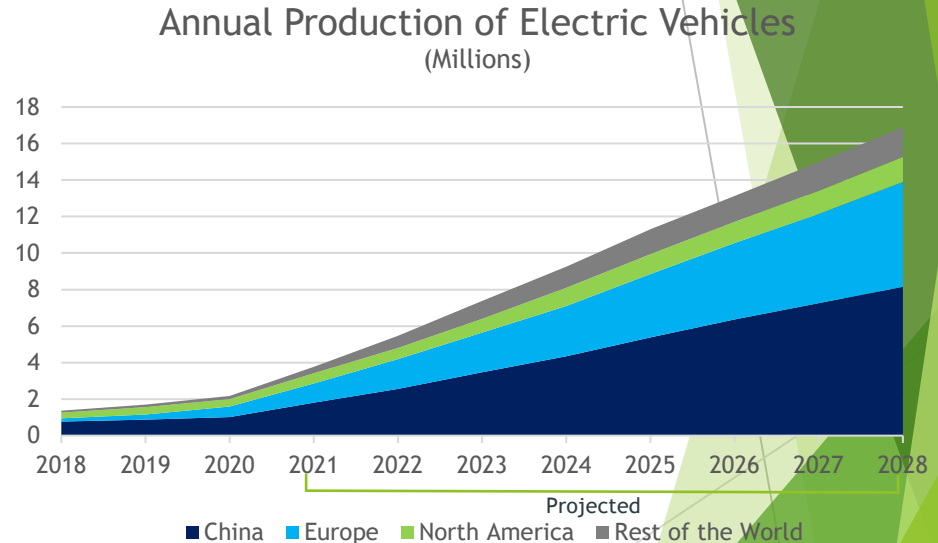
Total Sales = **84.4 Million (+5.2%)** - 2022 on track for **67.6 (76) Million**



# Countries to Rapidly Expand Annual EV Production

## Global EV Production to Reach 17 Million Vehicles by 2028

- China is expanding its annual production of EVs, and is on a pace to make more than 8 million vehicles by 2028.
- Europe will be second to China in EV production and is expected to produce almost 6 million EVs by 2028.
- North American automakers are on track to build only 1.4 million electric cars a year by 2028, compared with 410,000 last year.

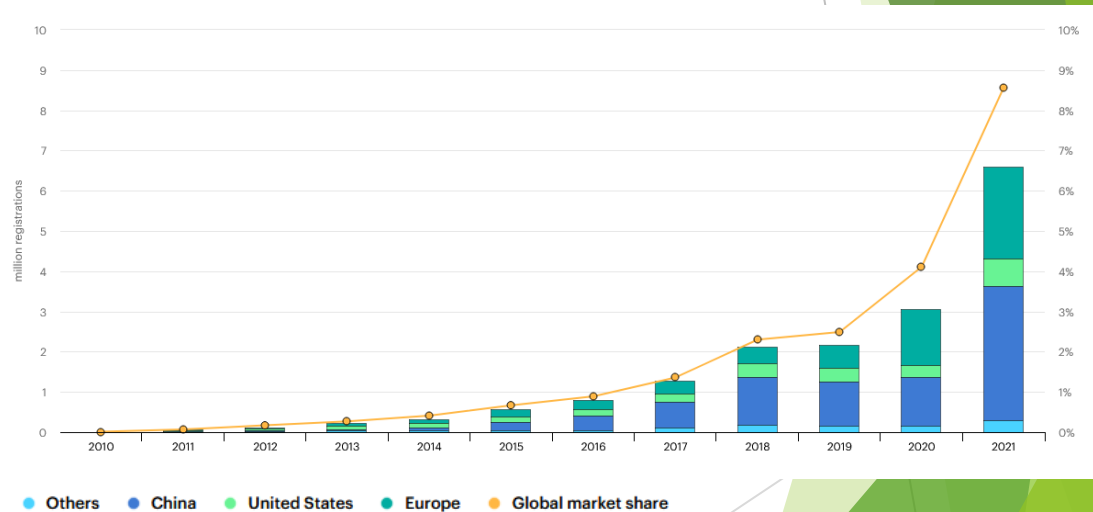


Data through April 22, 2021. Figures for 2021 and later are forecasts. Does not include plug-in gasoline-electric hybrids

# Global EV Sales Tripled Their Market Share From 2019

- In 2021, EV sales more than doubled to 6.6 million, representing close to 9% of the global light vehicle market and more than tripling their market share from two years earlier.
- All the net growth in global car sales in 2021 came from electric cars.
- 2022 update: Global sales are 2 million in Q1 - 75% increase from 2021 Q1

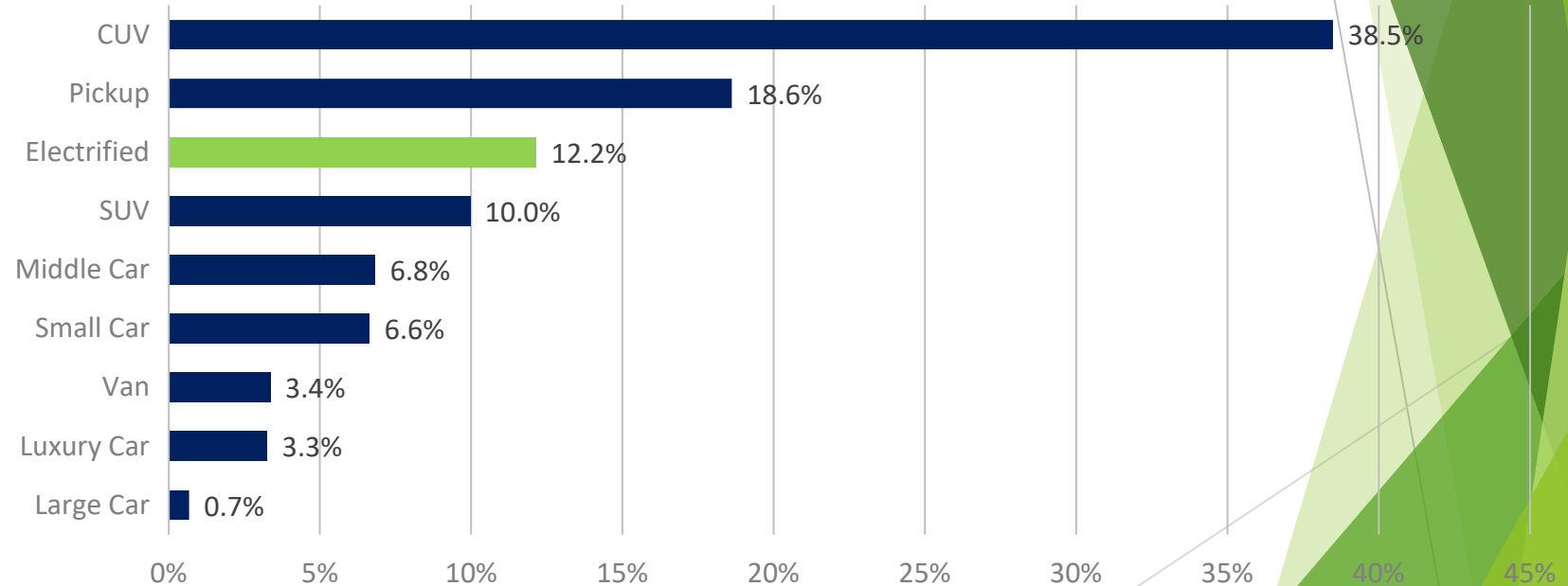
Global sales and sales market share of electric cars, 2010-2021



# Electrified vehicles take up 12.2% of the LV market

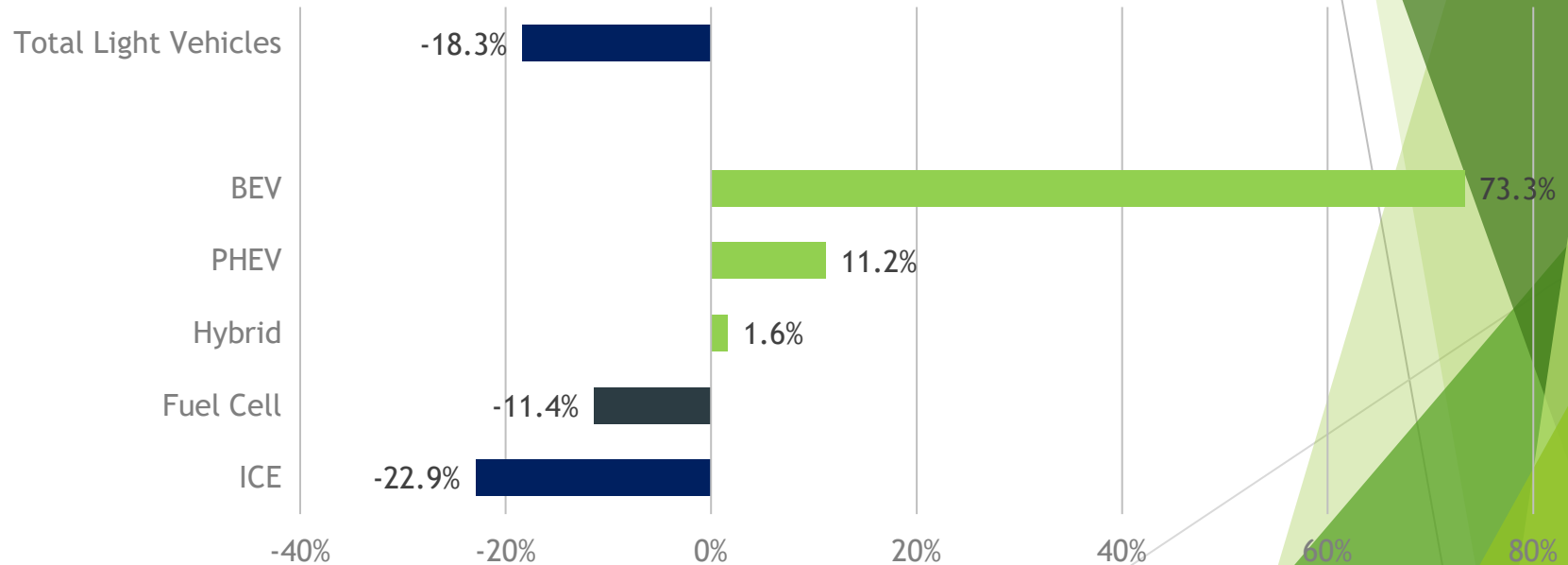
## Market Share: Segment Breakdown

U.S. Light Vehicle Sales 2022 YTD Through June



# Electrified vehicles see a massive increase in year-to-date sales since last year

## Segment Breakdown: U.S. Light Vehicles Sales Percent Change 2022 YTD vs. 2021 YTD Through June



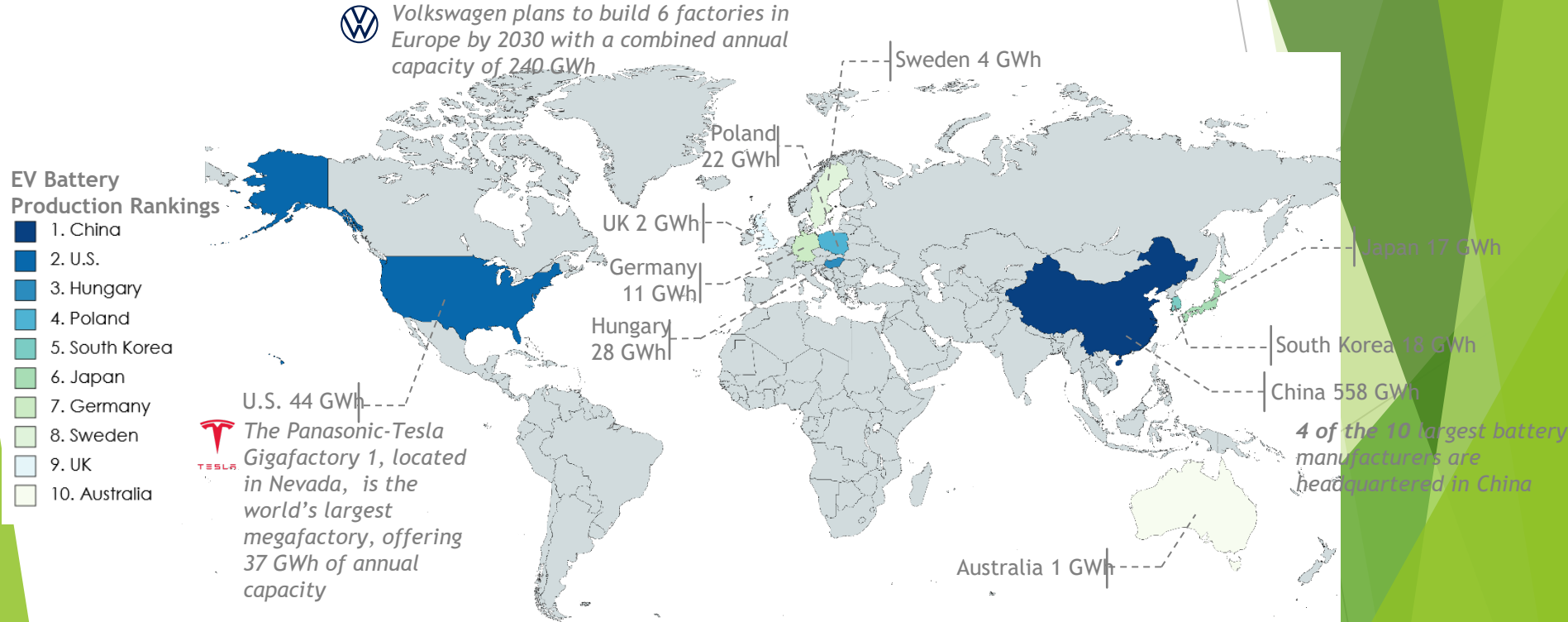
# Global Battery Status

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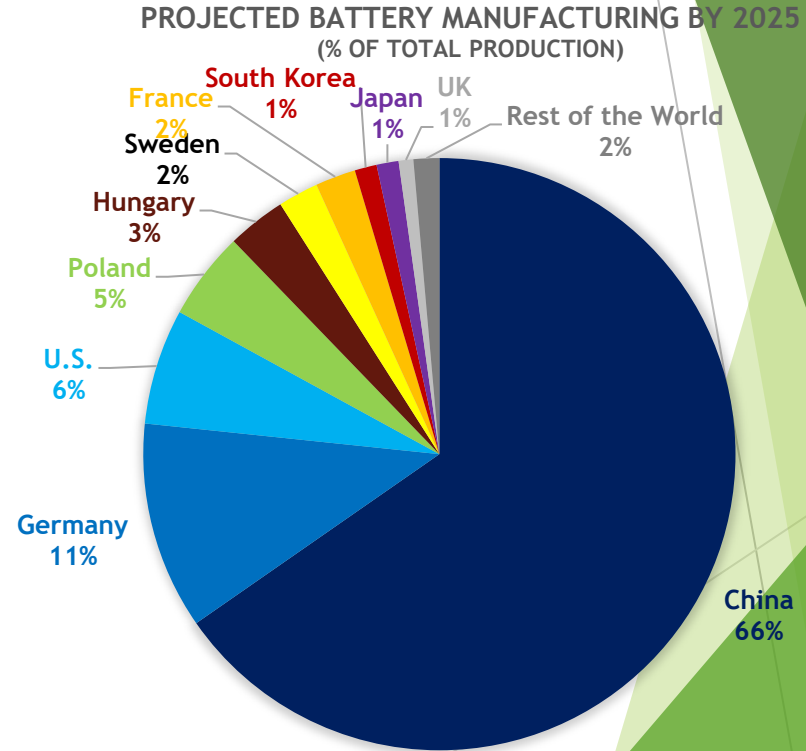
# The Top Ten Countries for EV Battery Production

## EV Battery Manufacturing Capacity, by Region



# The Future of EV Battery Manufacturing

- The largest battery manufacturers are currently located in regions that have high demand for EVs and more access to raw materials.
- Global lithium-ion manufacturing capacity is expected to **more than double** by 2025.





# Global Battery Raw Material and Supply Chains

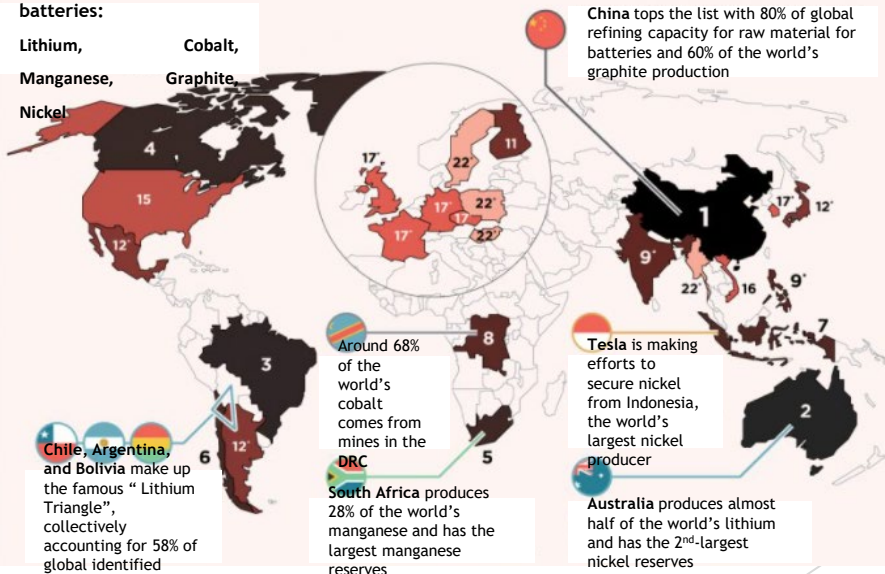
# TOP 25 NATIONS FOR MINING IN THE EV BATTERY SUPPLY CHAIN

## LI-ION BATTERY RAW MATERIAL SUPPLY RANKING

Five critical minerals required for lithium-ion batteries:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Lithium	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Cobalt	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Manganese	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nickel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Graphite	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

batteries:

Lithium, Manganese, Nickel, Cobalt, Graphite



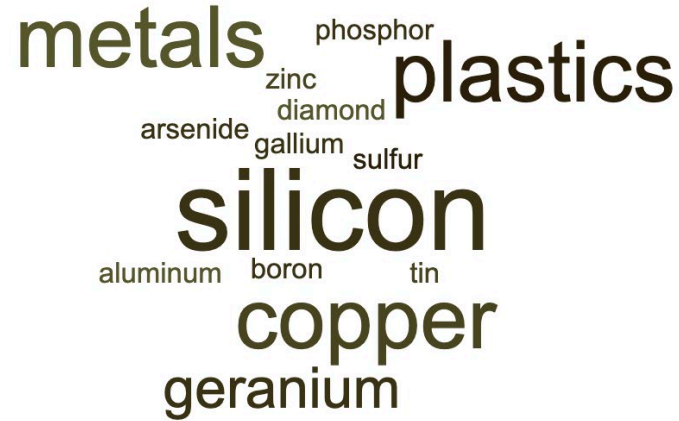
# Supply Chain Challenges

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# Semiconductor and MORE Shortage

- Major impact
  - ▶ Latest analysis from AutoForecast Solutions (June 2022)
    - ▶ Global losses of over 3 million units of vehicle production in 2022
    - ▶ North American losses of over 1 million units of vehicle production in 2022
    - ▶ Likely to continue to 2023 - expected to lose 1.3 million units
  - ▶ Exacerbating industry inventory problems
    - ▶ Russia and Ukraine conflict - raw material shortages, harnesses
    - ▶ Battery raw materials material shortages
    - ▶ “There is something new everyday”

What's next?



A word cloud featuring various materials and elements. The words are arranged in a roughly circular shape, with 'metals' and 'plastics' being the largest. Other prominent words include 'silicon', 'copper', and 'geranium'. Smaller words include 'phosphor', 'zinc', 'diamond', 'arsenide', 'gallium', 'sulfur', 'aluminum', 'boron', and 'tin'.

metals phosphor  
zinc plastics  
diamond  
arsenide gallium sulfur  
silicon  
aluminum boron tin  
copper  
geranium

HAVE TALENT DOING CONSTANT RISK ANALYSIS

# Opportunities

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# IIJA, CHIPS and IRA

- \$5.7B (about 600K) for EV charging stations (1.03 million are needed to reach 50% by 2030)
- Semiconductor processor manufacturers \$52.7 billion over five years (total needed may be closer to \$420B to reclaim leadership)
- \$7.5K incentive per EV purchase with domestic content, household income, and vehicle MSRP restrictions
- \$369B in climate and energy spending (research - primarily applied)

Thank You

The background features a white space with abstract, overlapping green geometric shapes on the right side. These shapes include various shades of green, from light to dark, forming a dynamic, layered composition. The shapes are primarily triangles and polygons that create a sense of depth and movement.