

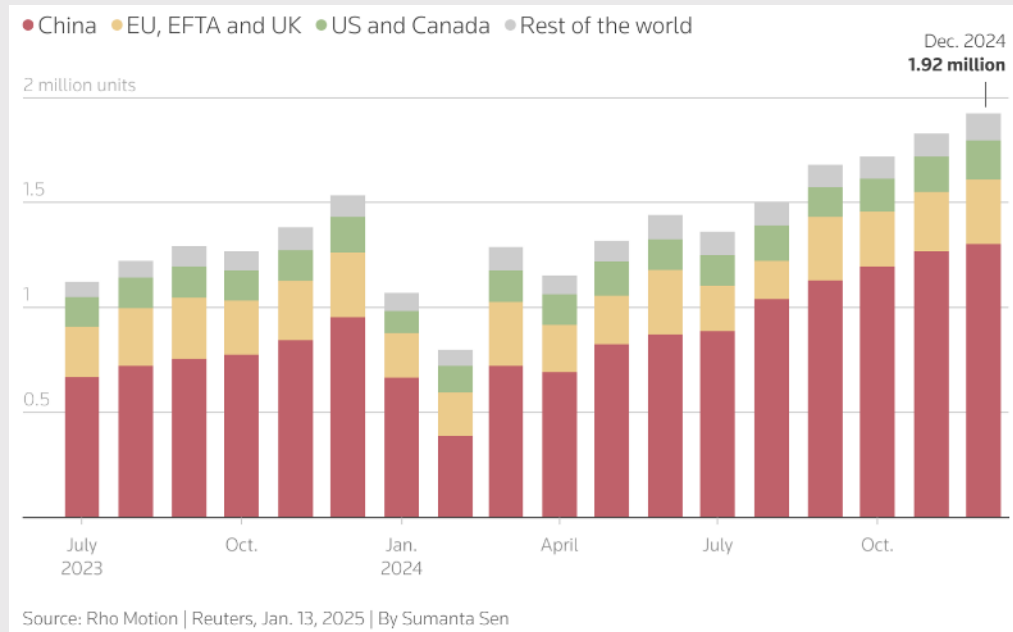
# Competition vs Collaboration Across Clean Tech: Is Reshoring Possible?

**John Paul Helveston**, George Washington University

April 30, 2025

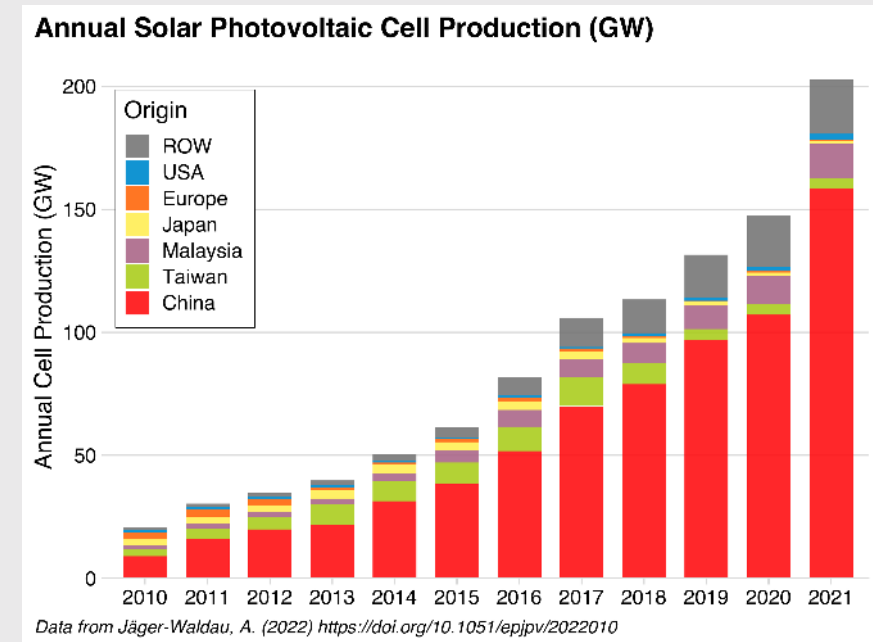
# Chinese firms dominate EV and solar industries

## EV sales (Jul. '23 - Dec. '24)



<https://www.reuters.com/business/autos-transportation/global-electric-vehicle-sales-up-25-record-2024-2025-01-14/>

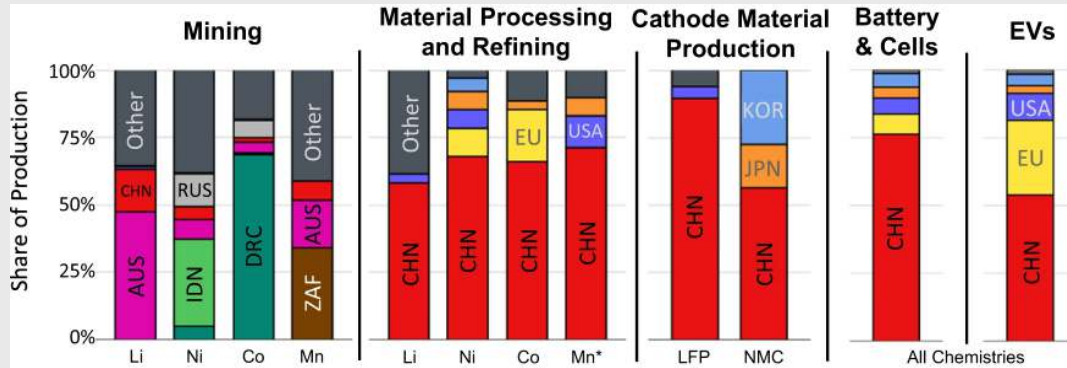
## Solar module production ('10 - '21)



Helveston, J.P., He, G., & Davidson, M.R. (2022) "Quantifying the cost savings of global solar photovoltaic supply chains" *Nature*.

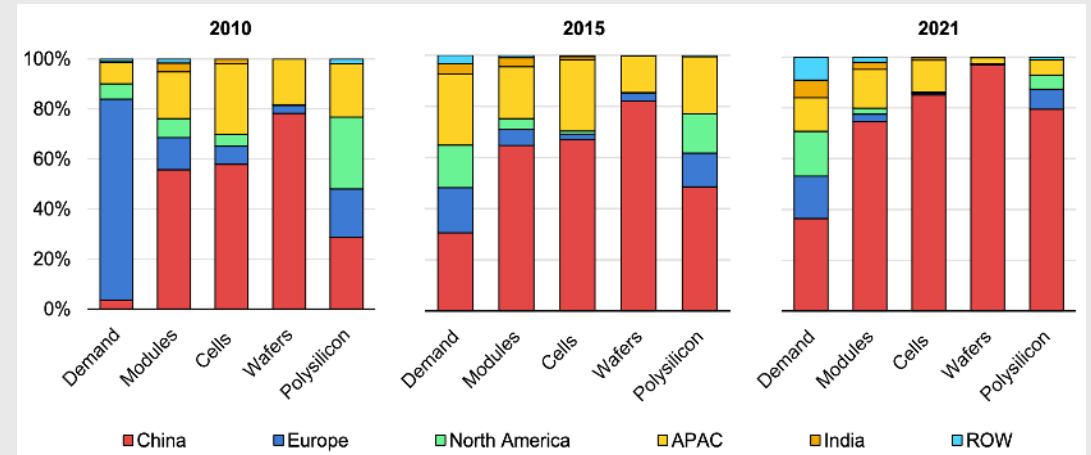
# Chinese firms dominate EV and solar *supply chains*

## EV battery supply chain



Cheng, Anthony L., et al. "Electric vehicle battery chemistry affects supply chain disruption vulnerabilities." *Nature Communications* 15.1 (2024): 2143.

## Solar module supply chain



IEA Special report 2022: Solar PV Global Supply Chains,  
<https://www.iea.org/reports/solar-pv-global-supply-chains>

**Bipartisan goal:** The US needs to counter China's lead in clean energy tech

**Keep Chinese clean tech out of US market:** Steep tariffs on imported Chinese EVs, batteries, PV modules

**Keep Chinese firms out of US clean tech supply chains:** IRA restrictions on EV subsidy eligibility, unclear guidance on Foreign Entities of Concern (FEOC) rules

# Countering China by Investing in Manufacturing

**IRA Strategy:** Investing in *manufacturing* will lead to enduring support for clean tech through local jobs & economic benefits

**To what extent are counter-China policies helping or harming the clean tech manufacturing goal?**

# Solar PV

# Solar PV

Total available U.S. federal subsidies: \$0.16 / W

Average U.S. module price (Q1 2024): \$0.33 / W

## Sources:

- <https://www.nrel.gov/docs/fy24osti/91209.pdf>
- Michael Davidson, "U.S.-China Clean Energy Race: Accelerating Innovation, Manufacturing and Adoption", <https://web.sas.upenn.edu/future-of-us-china-relations/climate-and-environment/>



# Solar PV

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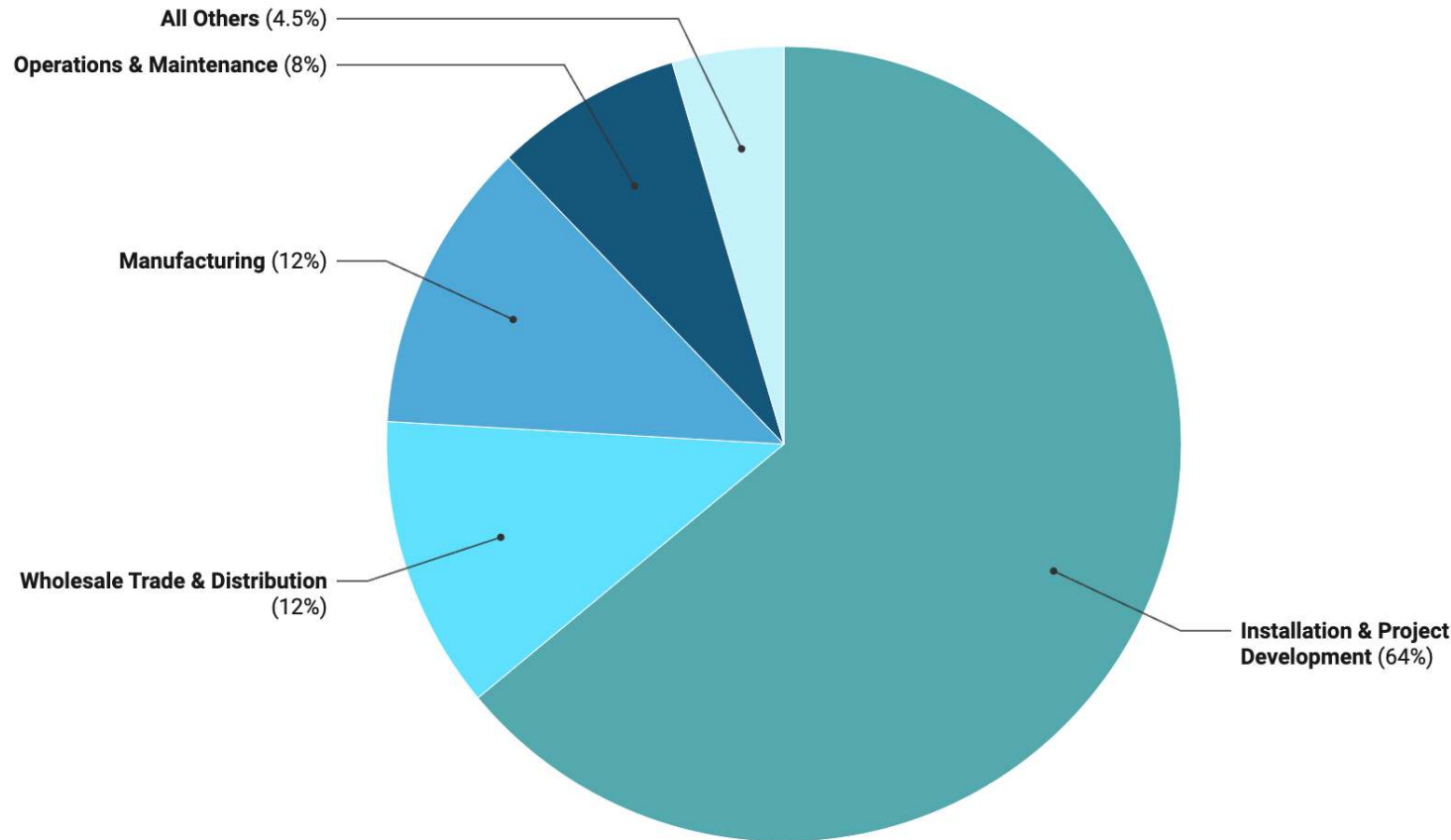
**Risk: U.S. producers unlikely to be globally competitive**

Sources:

- <https://www.nrel.gov/docs/fy24osti/91209.pdf>
- Michael Davidson, "U.S.-China Clean Energy Race: Accelerating Innovation, Manufacturing and Adoption", <https://web.sas.upenn.edu/future-of-us-china-relations/climate-and-environment/>

# Solar unlikely to produce desired # of manufacturing jobs

U.S. Solar Jobs by Sector, 2023



Installation and project development accounts for 2/3 of solar jobs.

**Manufacturing is 12% of solar jobs**

<https://irecusa.org/census-solar-job-trends/>

# We need diversification

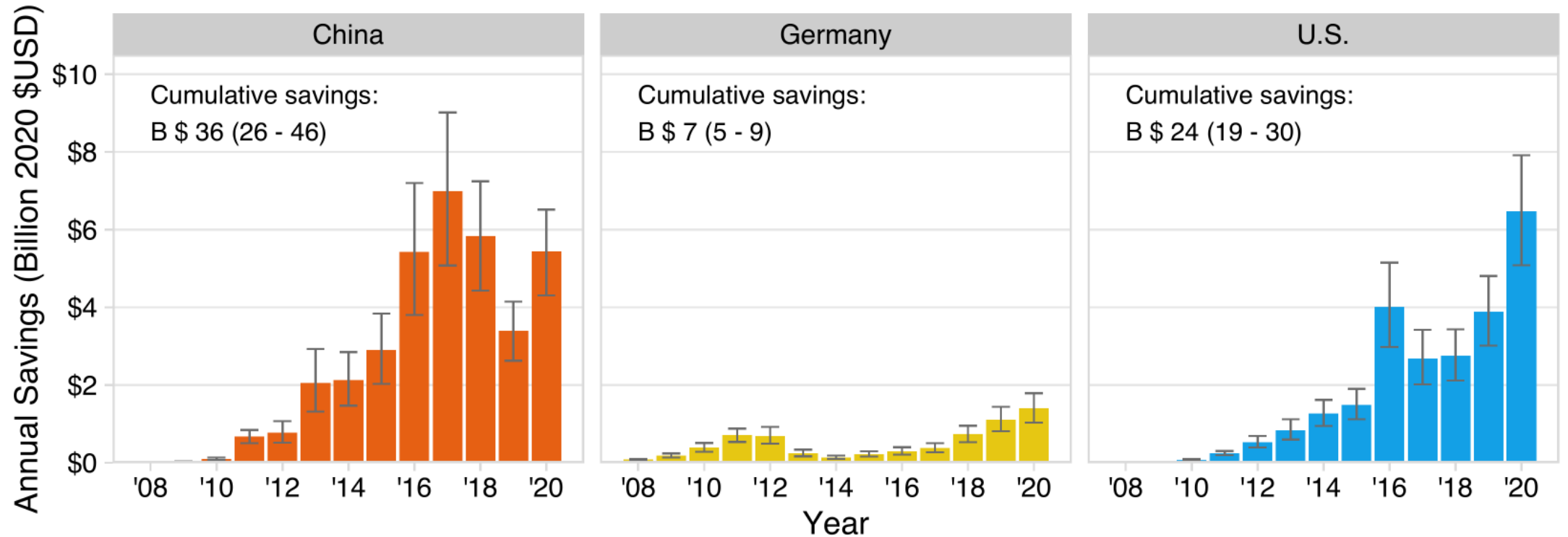
China has enough solar PV capacity to meet annual global demand through 2032.

Source: Wood Mackenzie, <https://www.reuters.com/world/china/china-will-dominate-solar-supply-chain-years-wood-mackenzie-2023-11-07/>

But do we need *onshoring*?

# Estimated \$67 B in savings from global supply chains

## Annual Module Savings Under Global vs. National Market Scenarios (2008 - 2020)



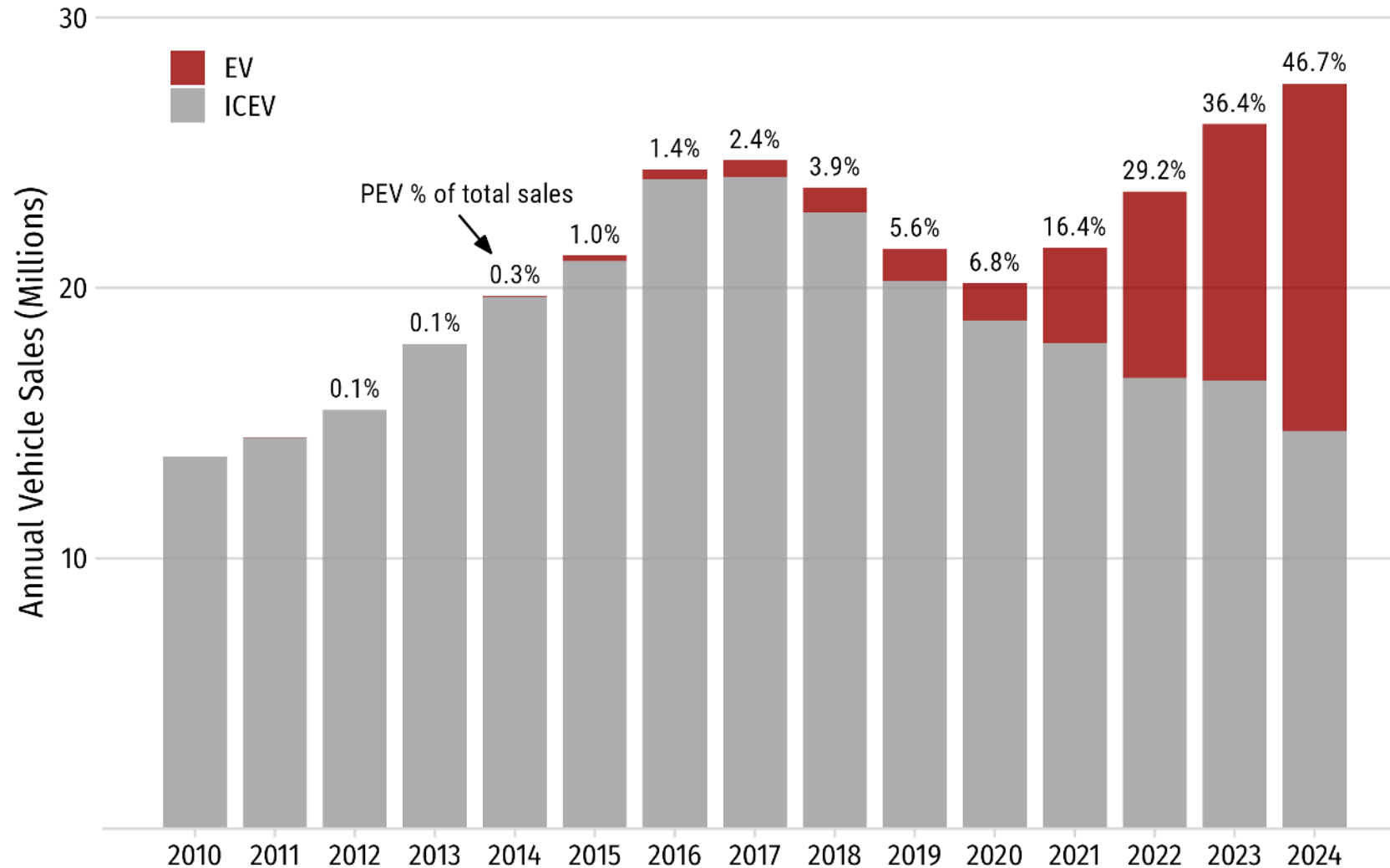
Source: Helveston, J.P., He, G., & Davidson, M.R. (2022) "Quantifying the cost savings of global solar photovoltaic supply chains" *Nature*. 612 (7938), pg. 83-87. DOI:

[10.1038/s41586-022-05316-6](https://doi.org/10.1038/s41586-022-05316-6)

# Electric Vehicles

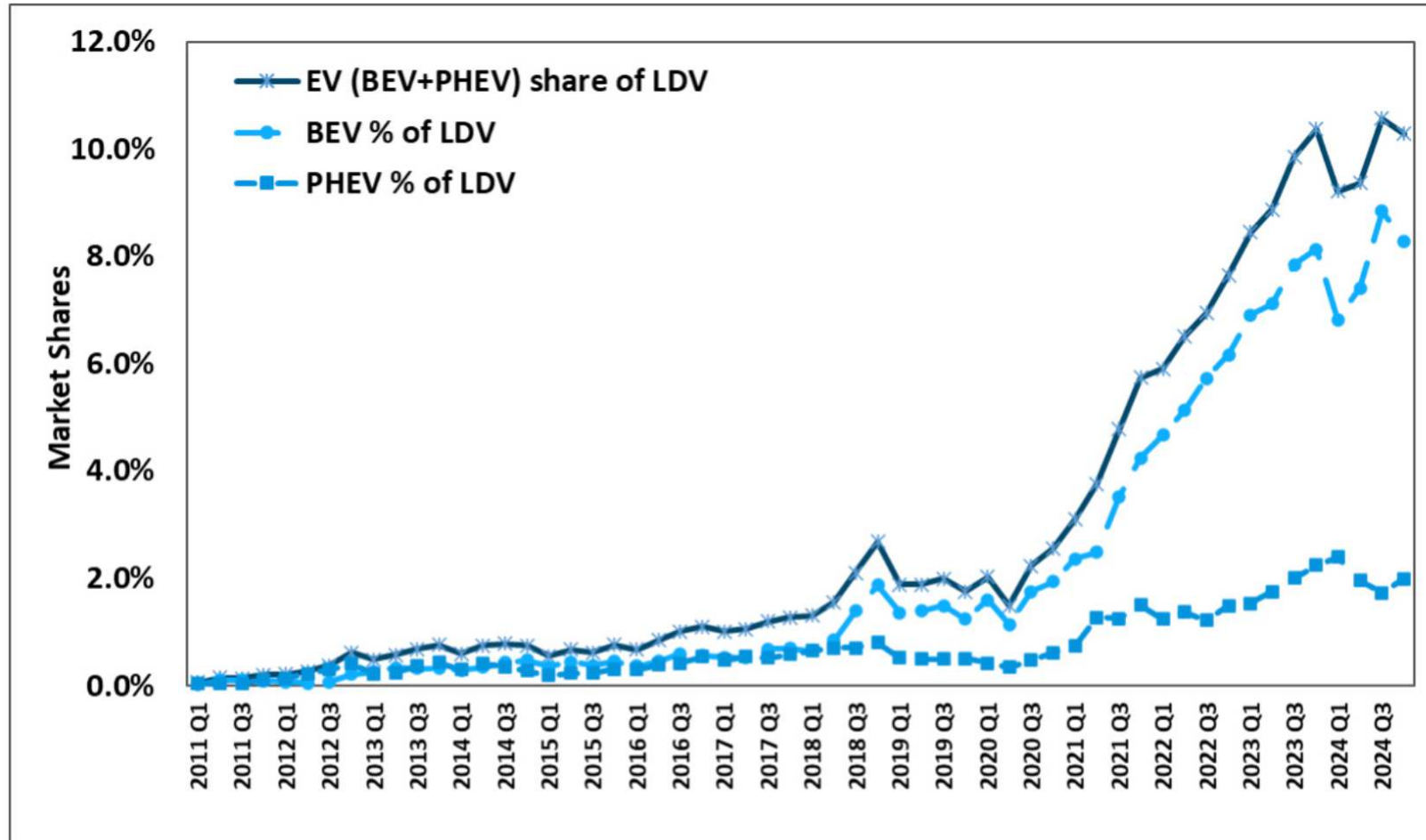
## In China, PEV sales grow while ICEV sales slow

After peaking in 2017, internal combustion engine vehicle (ICEV) sales have declined for 7 straight years



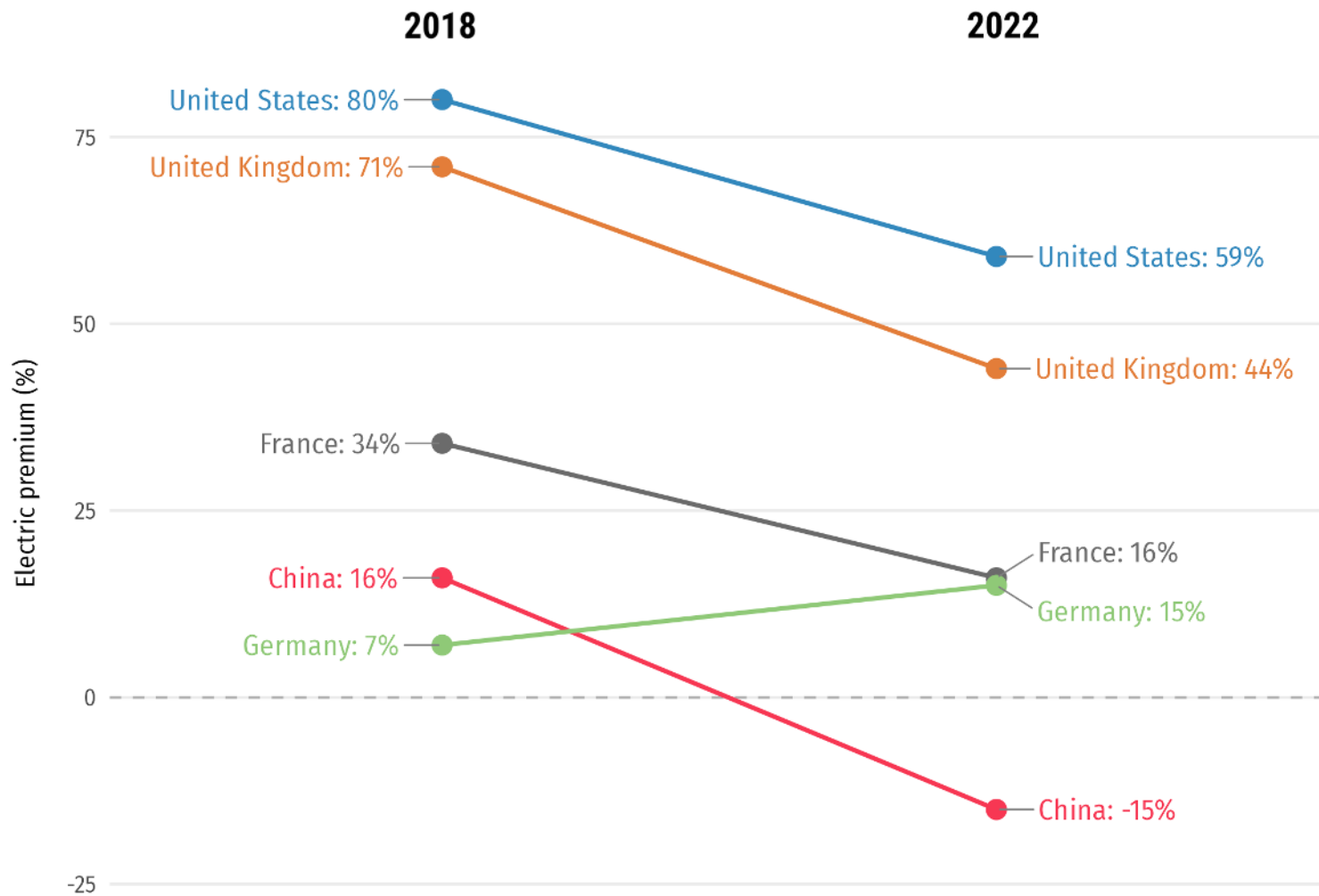
Data sources: OICA, marklines.com

# EV sales in US reaching ~10% of sales



Source: Argonne National Lab, <https://www.anl.gov/ev-facts/model-sales>



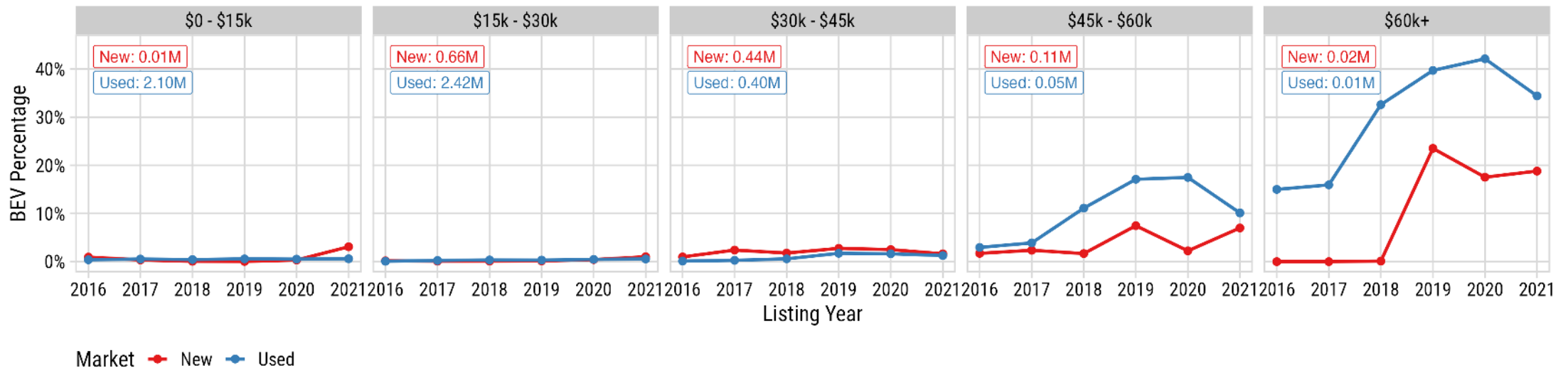


The EV sector has an affordability problem (except in China)

Source: <https://www.iea.org/reports/global-ev-outlook-2024/executive-summary>

# BEVs Concentrated in High-Price Segments in US

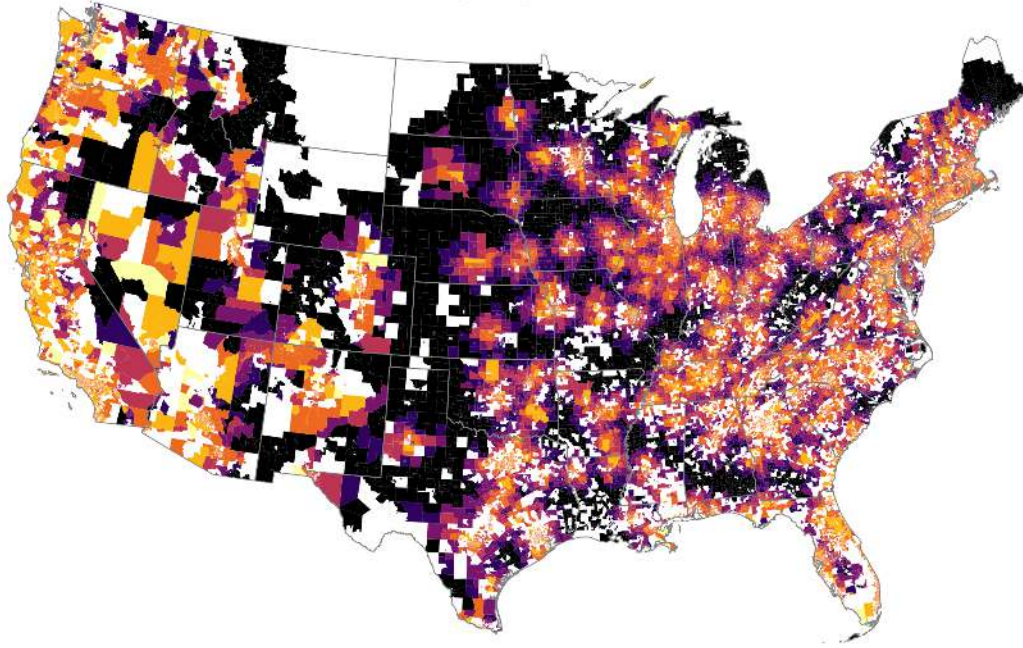
In 2021, BEVs just 1.1% of new and 0.6% of used listings under \$45,000



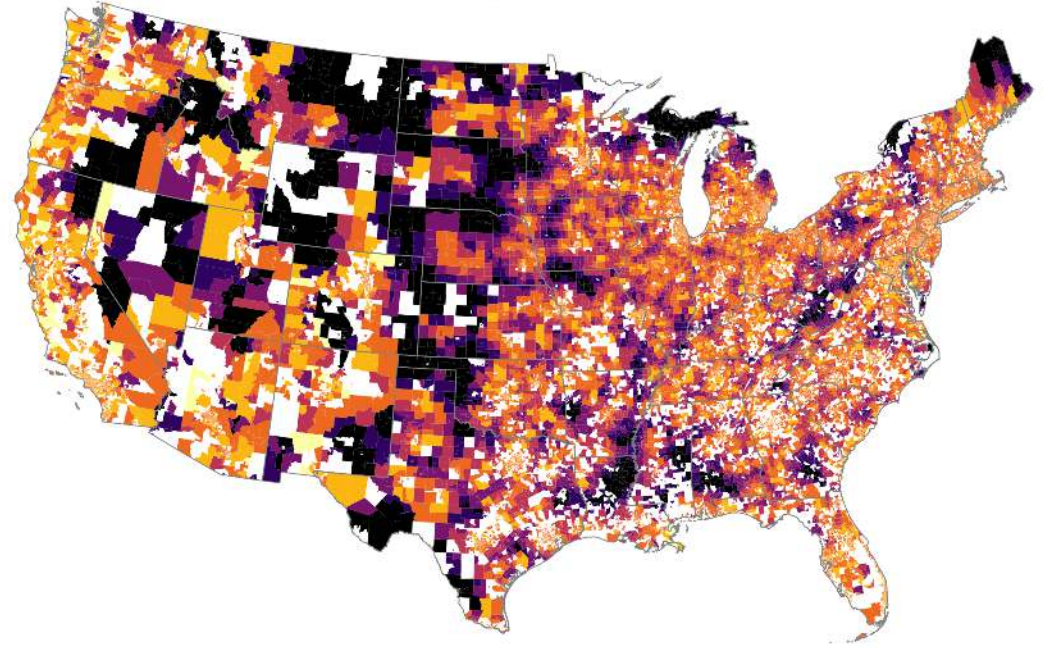
Data pulled from >60k dealerships, 2016 to 2021. Source: marketcheck.com

# The BEV Deserts of America

2016



2021



Additional travel time to nearest <\$25,000 BEV (Minutes)



# Things that don't help affordability:

Tariffs (100% tariff on imported Chinese EVs since 05/2024)

Effectively banning the use of Chinese suppliers

Inflation (see tariffs)

# Opportunities

Chinese FDI into U.S.

**Gotion batteries:** Multi-billion dollar investments in Illinois and Michigan

**Challenge:** Uncertainty around Foreign Entities of Concern (FEOC) status

Technology Licensing Agreements

**Ford-CATL:** Licensing battery technology in a Michigan plant

**Challenge:** CATL was recently added to DOD's list of “Chinese military companies”

The biggest competitor  
to an American EV  
is not a Chinese EV...

...it's a gas car

## Top 4 Selling Vehicles in **China**

### **Xiaomi SU7**

\$30,171 - \$41,909



### **BYD Song**

\$24,721 - \$38,555



### **Geely Xingyuan**

\$ 9,615 - \$13,667



### **Tesla Model Y**

\$36,822 - \$43,809





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## Top 4 Selling Vehicles in **USA**

### **Toyota RAV4**

\$29,250 - \$38,955



### **Honda CRV**

\$30,100 - \$41,100



### **Ford F-150**

\$44,095 - \$79,005







### **Chevrolet Silverado**

\$42,700 - \$70,000



# Thanks!

<https://jhelvy.github.io/2025-jeffries-us-china-summit>

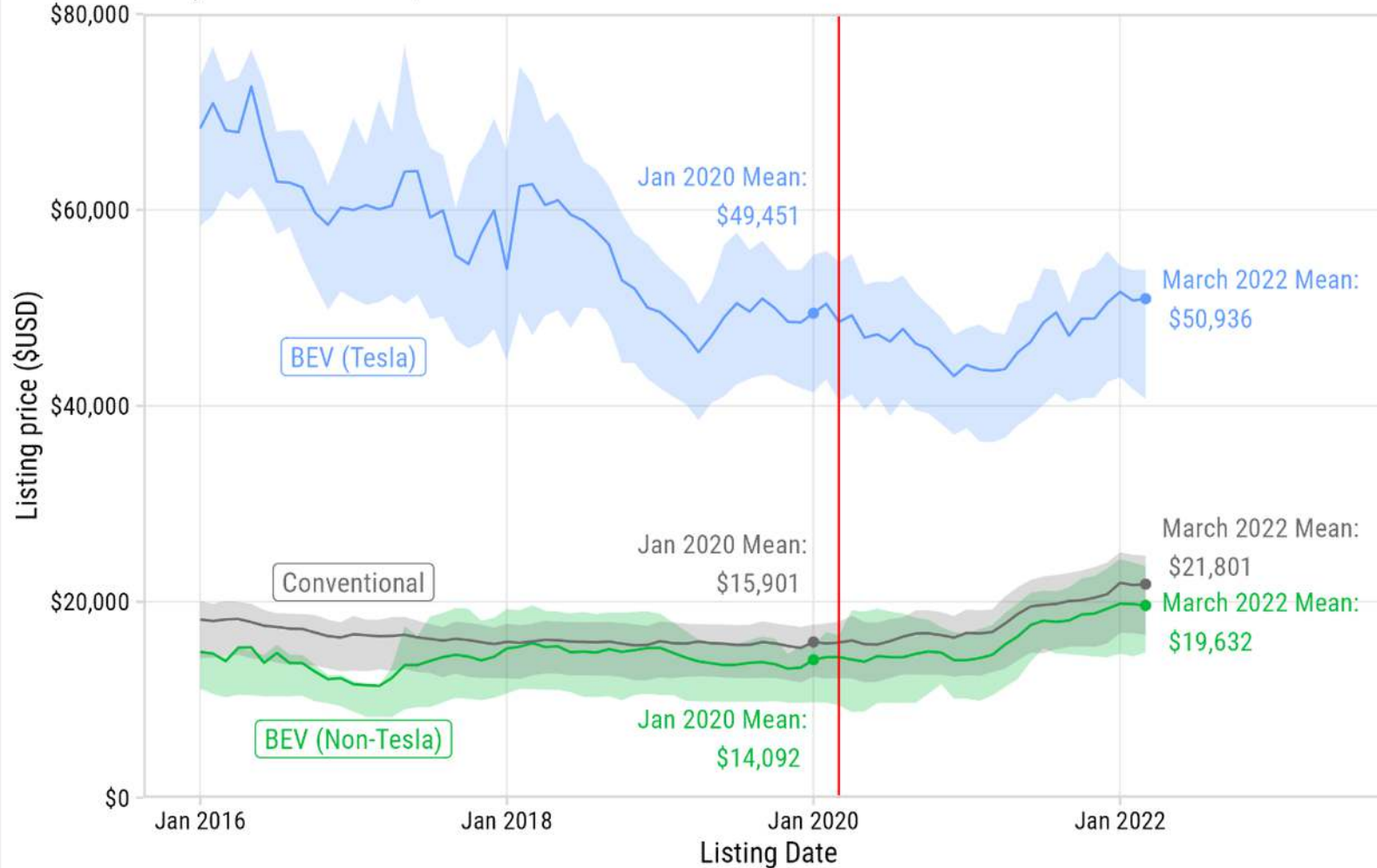
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# Extra Slides



## Used market listing prices are substantially higher post-COVID19

Prices inflation-adjust to constant 2019 \$USD



Used market is more affordable, but post-COVID prices are up in all markets, not just EVs

Source: Roberson, Laura A., \*Pantha, S., & Helveston, J.P. (2024) "Battery-Powered Bargains? Assessing Electric Vehicle Resale Value in the United States" Environmental Research Letters.

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