

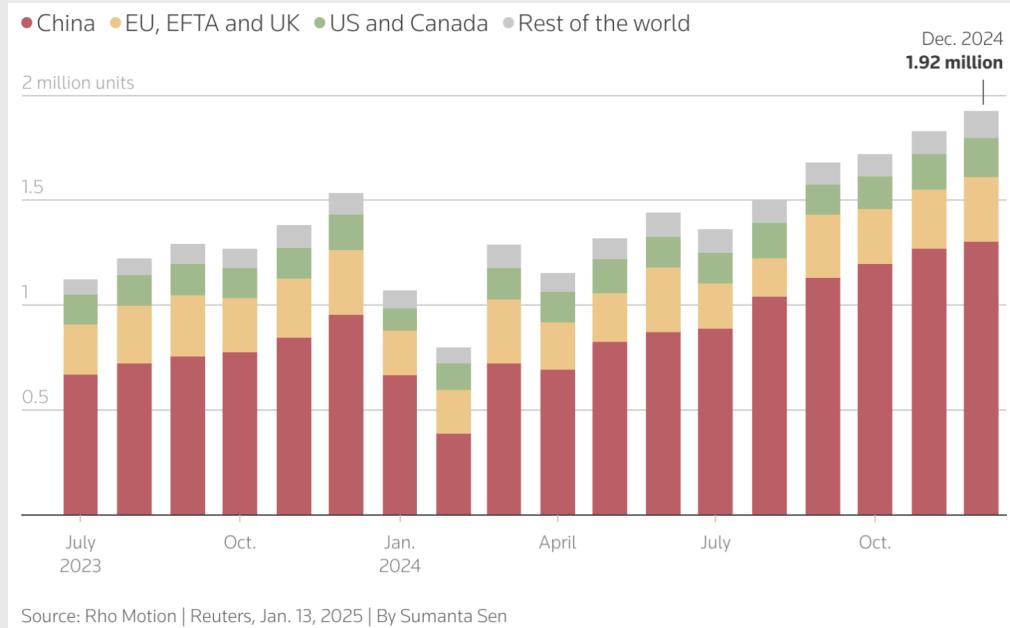
U.S.-China Clean Energy Relationship: Reflections on the Inflation Reduction Act and Future Direction

John Paul Helveston, George Washington University

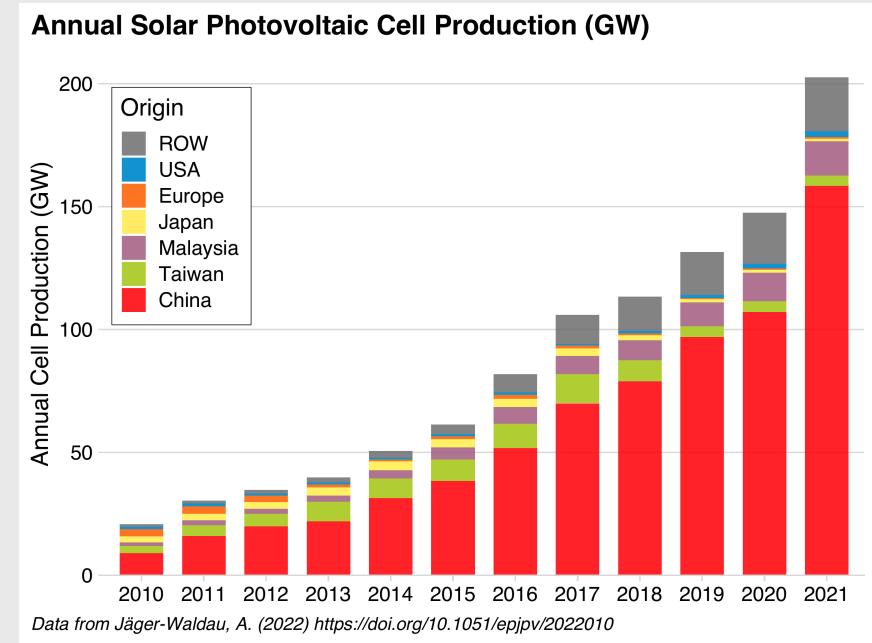
February 21, 2025

Chinese firms dominate EV and solar industries

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



Solar module production ('10 - '21)

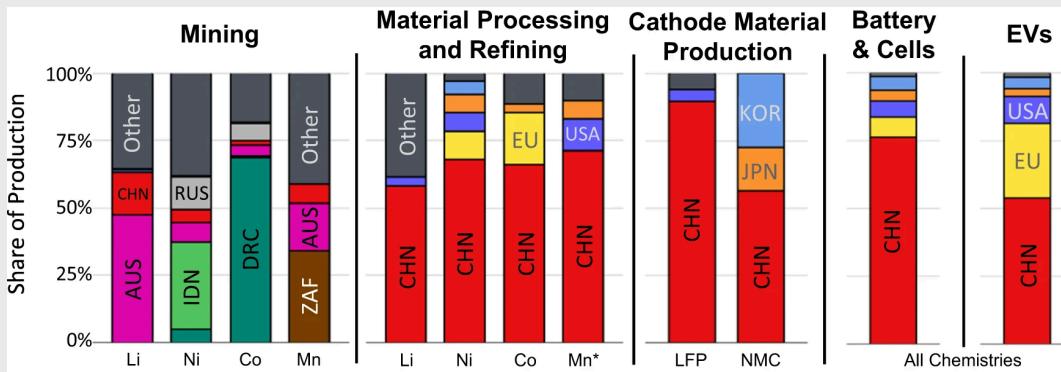


<https://www.reuters.com/business/autos-transportation/global-electric-vehicle-sales-up-25-record-2024-2025-01-14/>

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

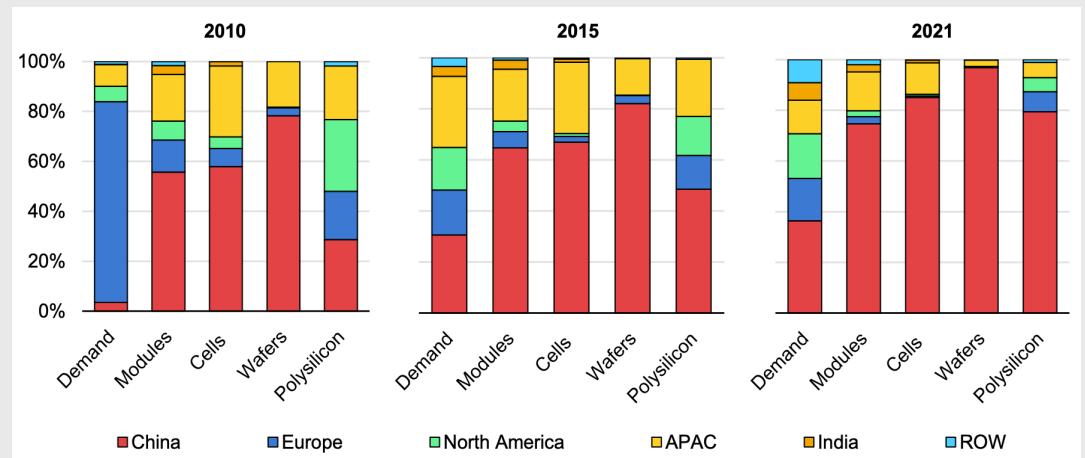
Chinese firms dominate EV and solar supply chains

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

Counteracting China & 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/>

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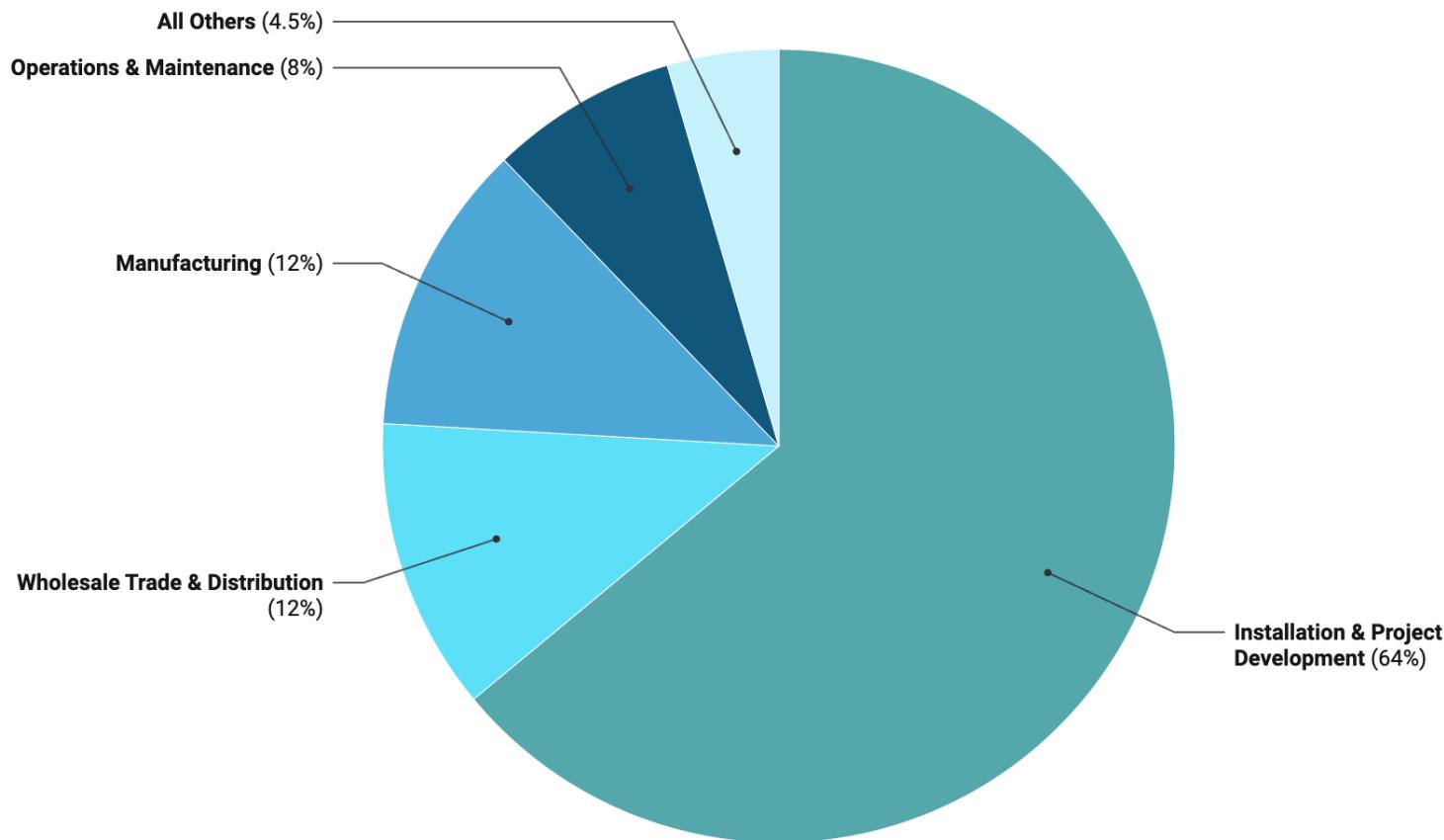
Risk: U.S. producers may not be globally competitive

Sources:

- <https://www.nrel.gov/docs/fy24osti/91209.pdf>
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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%

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

We need diversification

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

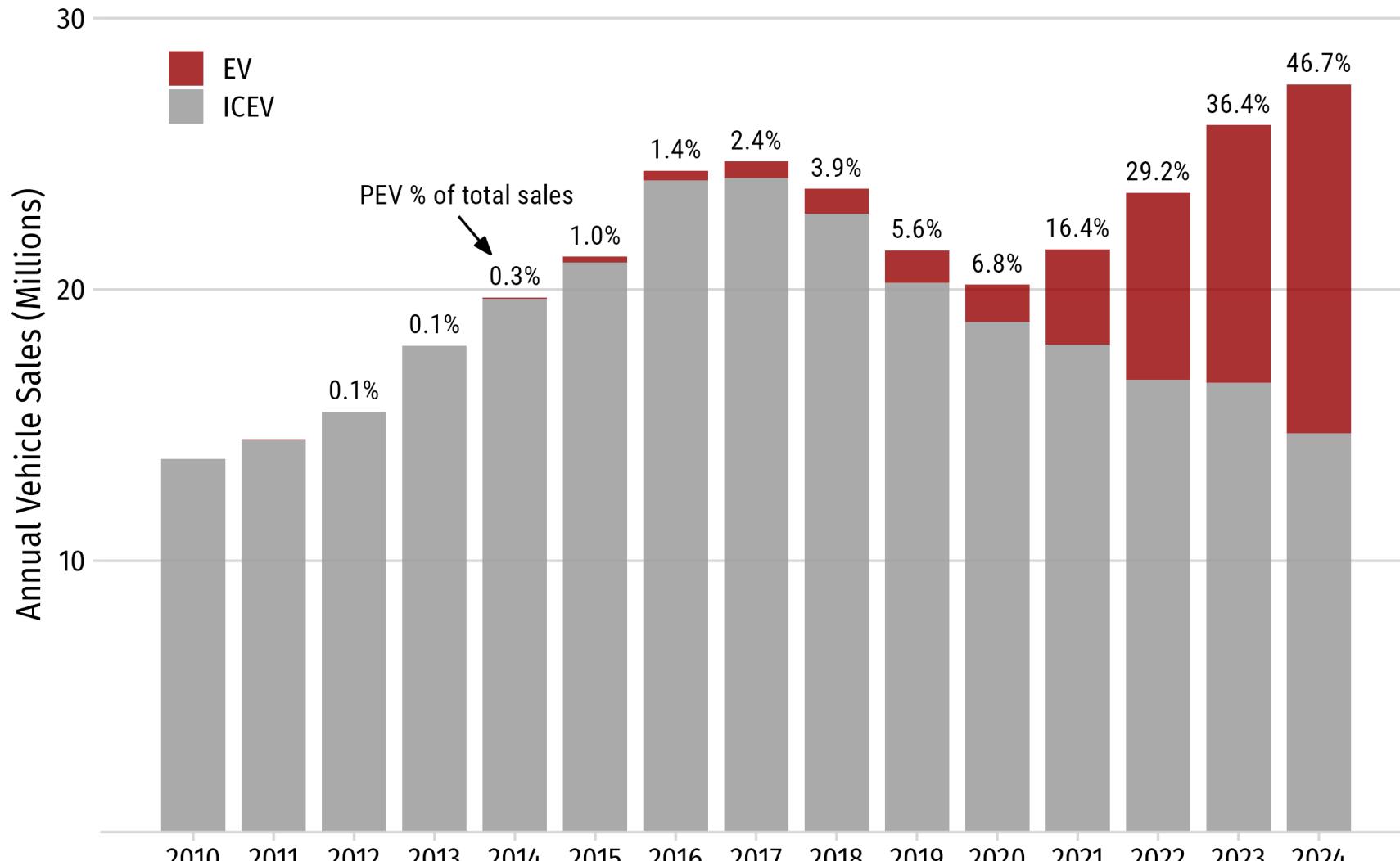
Source: Wood Mackenzie, <https://www.reuters.com/world/china/china-will-dominate-solar-supply-chain-years-wood-mackenzie-2023-11-07/>

But do we need *onshoring*?

Electric Vehicles

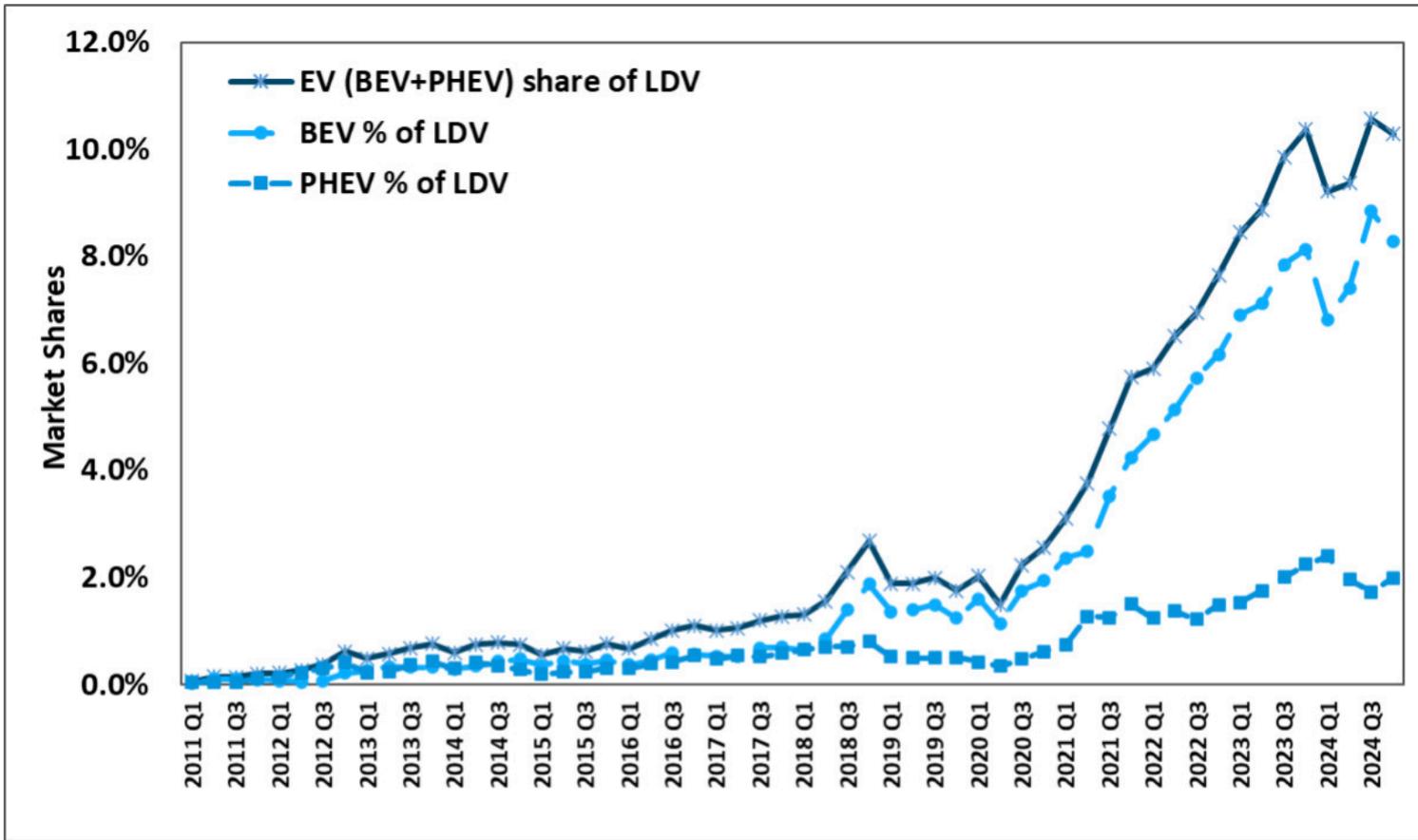
In China, PEV sales grow while ICEV sales slow

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



Data sources: OICA, marklines.com

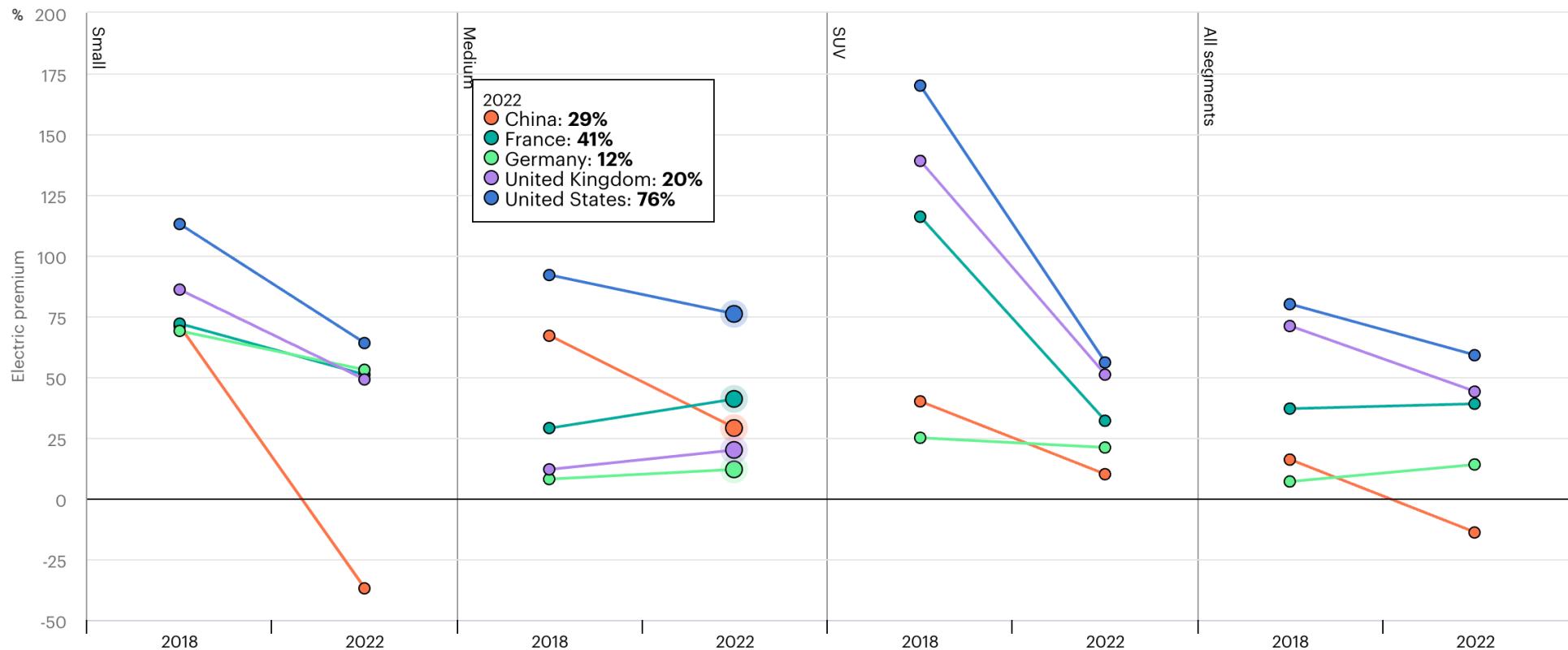
EV sales in US reaching ~10% of sales



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

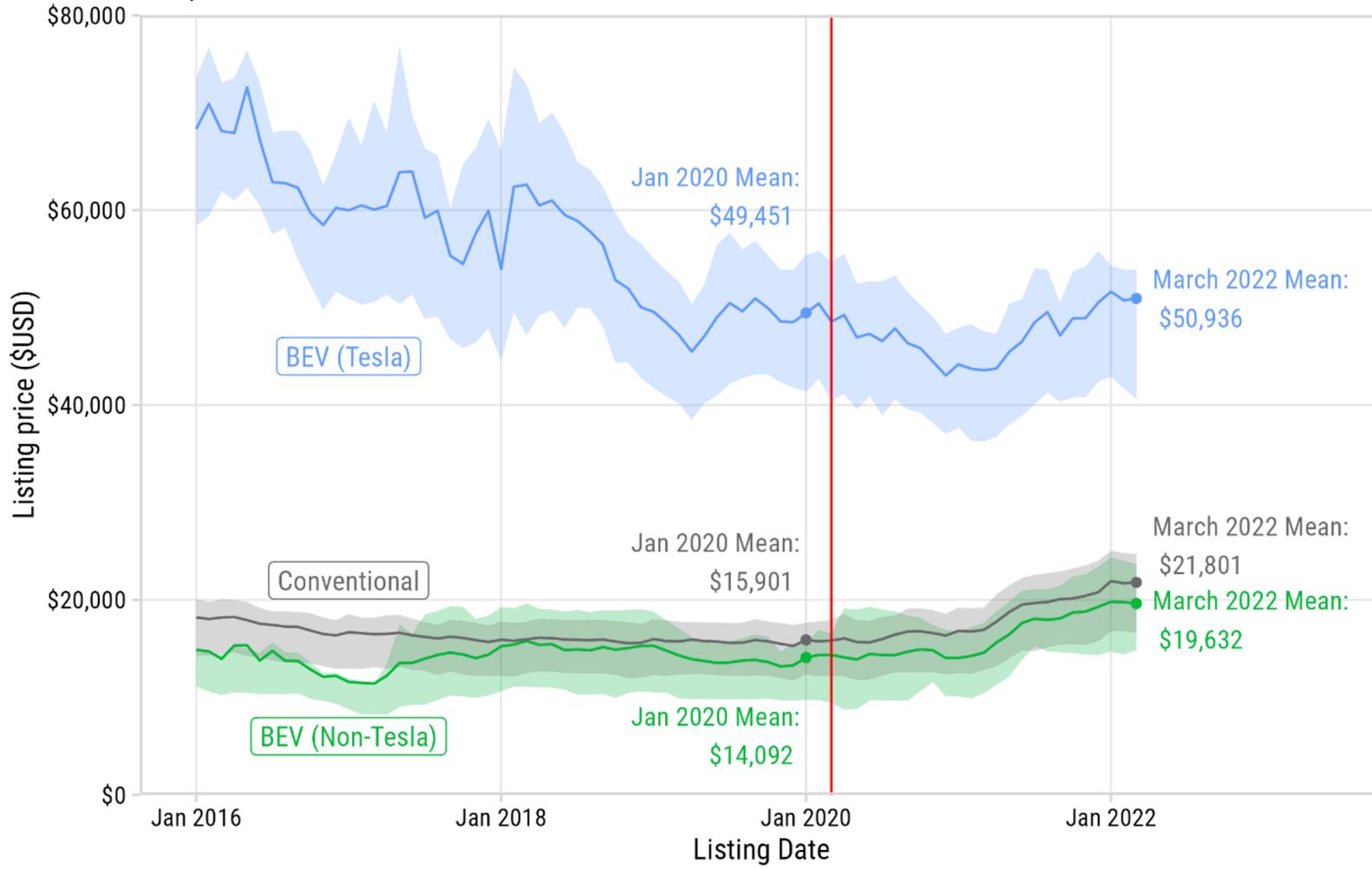
EV sector has an affordability problem (except in China)

Price gap between the sales-weighted average price of BEV and ICEV, before subsidy, by size, in 2018 and 2022



Used market listing prices are substantially higher post-COVID19

Prices inflation-adjust to constant 2019 \$USD

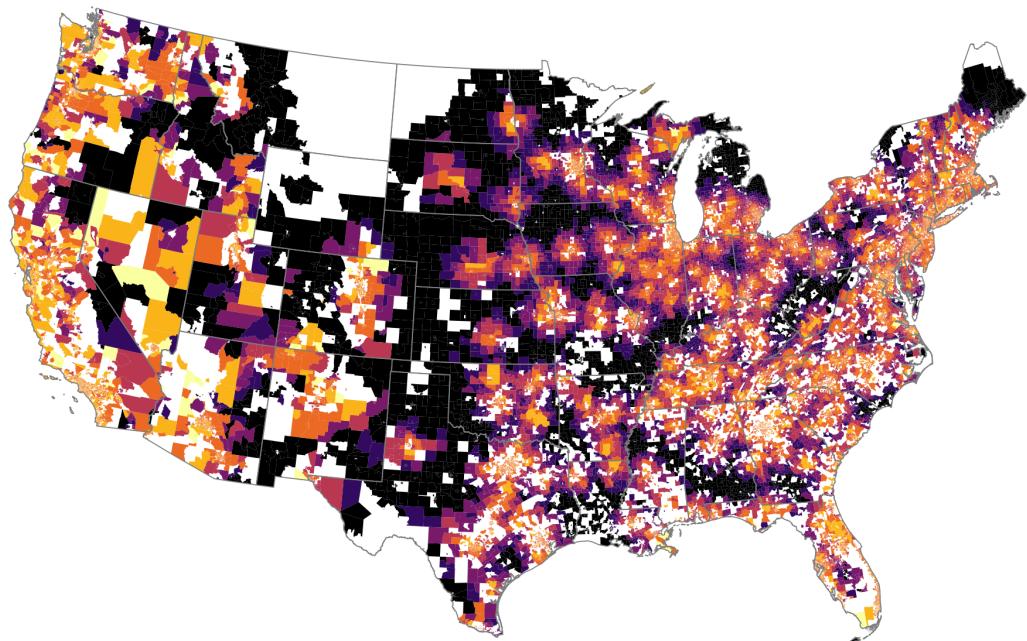


Used market is more affordable, but post-COVID prices are up in all markets, not just EVs

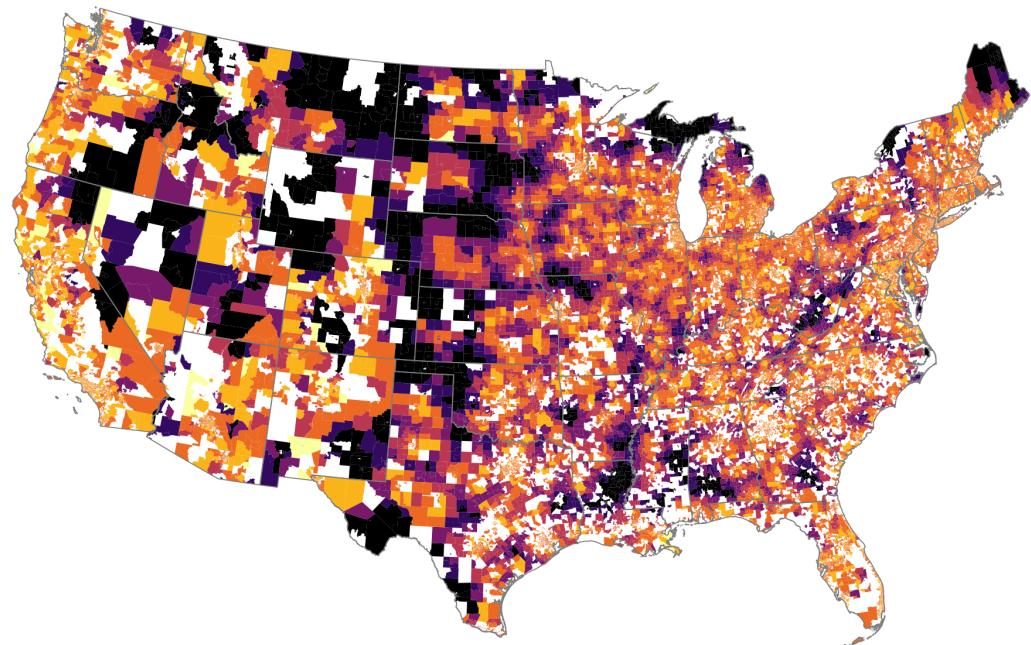
Source: Roberson, Laura A., *Pantha, S., & Helveston, J.P. (2024) "Battery-Powered Bargains? Assessing Electric Vehicle Resale Value in the United States" Environmental Research Letters.

There are still affordable EV deserts

2016



2021



Additional travel time to nearest BEV (Minutes)



Things that don't help affordability:

100% tariff on imported Chinese EVs

Effectively banning the use of Chinese suppliers (inc. raw materials) in US EVs

Inflation

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 EV
is not a Chinese EV,
it's gas cars

Thanks!

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