The Energy Council
2025 Federal Energy and Environmental Matters Conference

IER INSTITUTE FOR ENERGY RESEARCH

Electric Vehicles: Past, Present, and Future

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Edison & Ford: Early EV Lessons

"Electric cars must keep near to power stations. The storage battery is too heavy…Your car is self-contained–carries its own power plant–no fire, no boiler, no smoke and no steam. You have the thing. Keep at it."

Ford's Path

Ford was developing the first vehicles pursuing both EVs and gas-powered options

Edison's Battery Push

Developed nickel-iron batteries for EVs but struggled with cost and weight

1896 Meeting

Edison advised Ford to pursue gas cars, citing EV limitations—heavy batteries and short range

Key Lesson

Gas cars won early due to better infrastructure and performance—technology must match consumer needs and economic reality

The peak of EV market share in America occurred between 1900 and 1910 at 33 percent

Original Justification for CAFE Standards (1975)

Response to the 1973 Oil Crisis

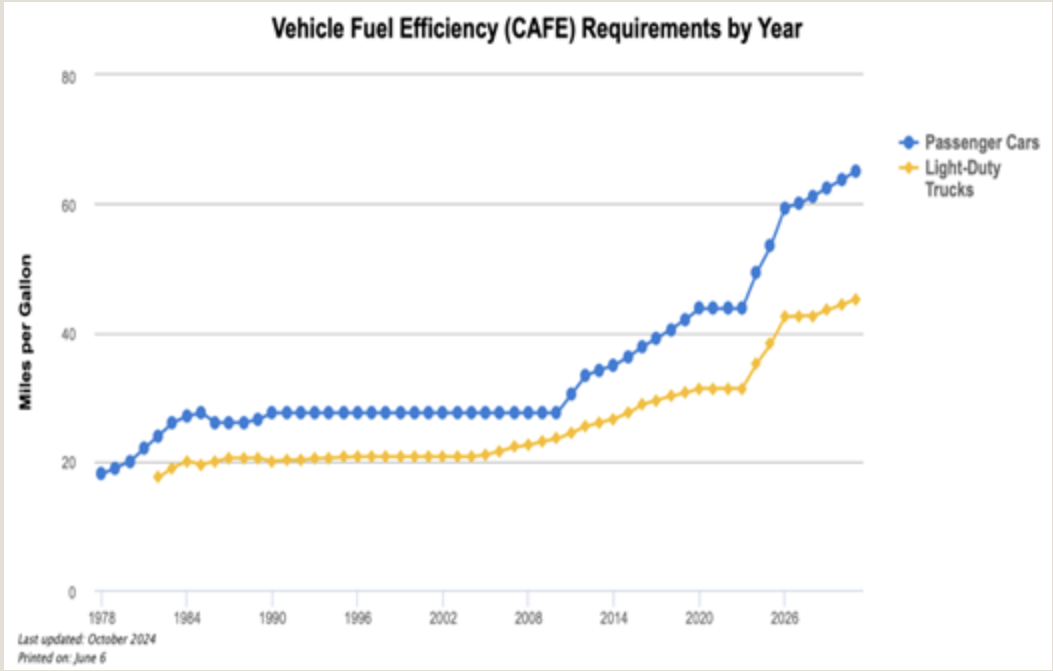
- CAFE was enacted to reduce U.S. dependence on foreign oil after the Arab oil embargo caused severe fuel shortages and price spikes

Energy Security Goal

- Aimed to improve national energy security by mandating increased fuel efficiency in passenger vehicles to reduce dependence on foreign oil

Shifting justification

- Once foreign oil wasn't a concern, it became wrapped up in the climate change agenda



Major Obama-Era EV Actions

- 2009 - $7,500 EV Tax Credit: Promoted existing credit to boost consumer adoption.
- American Recovery and Reinvestment Act (2009):
  - **Bailouts gave the federal government leverage over auto companies to set an aggressive regulatory agenda**
  - **The justification was also to get off foreign oil**
  - $2.4B for EV batteries, components, and R&D
  - Funded charging stations and EV workforce training
  - Bailouts enabled a push for stricter auto regulations
- EV Everywhere Challenge (2012): DOE effort to make EVs competitive with gas cars by 2022
- Fuel Economy & GHG Standards (2012):
  - Target: 54.5 mpg by 2025
  - GHG credits incentivize EV production
- Federal Fleet: Expanded hybrid and EV purchases for government use
- Tesla Loan: $465M DOE loan helped scale Model S
- Public & Industry Engagement: Promoted EVs via White House initiatives and industry collaboration

Trump 45

Regulatory Reform: Trump 45

- Replaced Obama-era fuel economy rule (54.5 mpg by 2025) with SAFE Rule (40.4 mpg by 2026)
- Weakened GHG emissions standards—less pressure on automakers to build EVs
- Revoked California's Clean Air Act waiver, challenging state-level EV mandates

Opposition to EV Subsidies

- Proposed eliminating the $7,500 federal EV tax credit in multiple budgets
- No legislative repeal, but sent a clear message against federal EV incentives

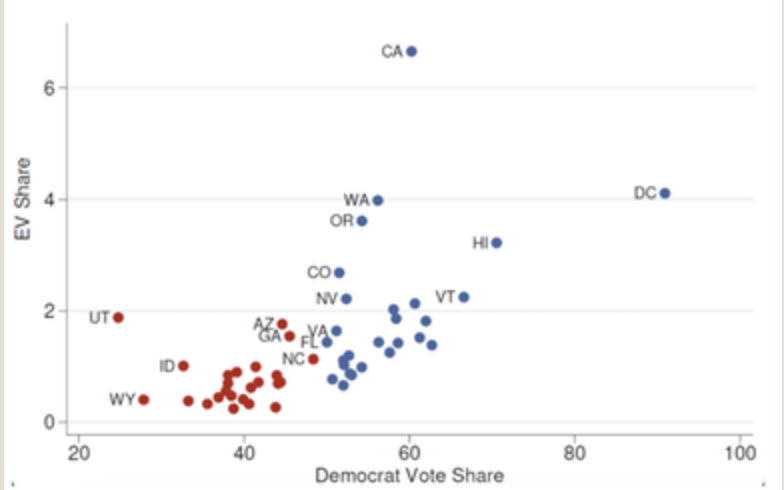
Key Biden-Era EV Actions

- **EO 14037 (Aug 2021):** Set goal for 50% of new cars to be zero-emission by 2030; directed EPA & NHTSA to draft supporting standards
- **EO 14057 (Dec 2021):** Required 100% zero-emission light-duty federal fleet by 2027; all vehicles by 2035; mandated federal charging infrastructure
- **EPA GHG Standards (Dec 2021):** Toughest-ever emissions rules for 2023–2026 models (5-10 % by 2026 and 50 - 52 % by 2030), pushing near-term EV adoption
- **Infrastructure Law (Nov 2021):** Created NEVI program—$7.5B to build a 500,000-charger national network
- **Inflation Reduction Act (Aug 2022):**
  - Overhauled EV tax credit ($7,500 with sourcing rules)
  - Added $40K commercial EV credit
- **Defense Production Act (2022–24):** Invoked to boost domestic mining and processing of battery minerals; launched battery-supply initiatives
- **DOE Loans:** $9.63B to Ford's BlueOval SK (2023), among other loans to expand U.S. EV and battery production
- **USPS Fleet Electrification (Dec 2022):** Committed to 66,000 electric delivery vehicles and 14,000 chargers
- **EPA Multi-Pollutant Rule (Mar 2024):** Targets 56–60% EV sales by 2032 for new light- and medium-duty vehicles
- **EPA Heavy-Duty Truck Rule (Apr 2024):** First federal mandate for zero-emission freight trucks and buses by 2032
- **California Waivers (Dec 2024):** Granted waivers allowing CA and aligned states to mandate EVs under the Clean Air Act

Politicizing EVs was a Mistake

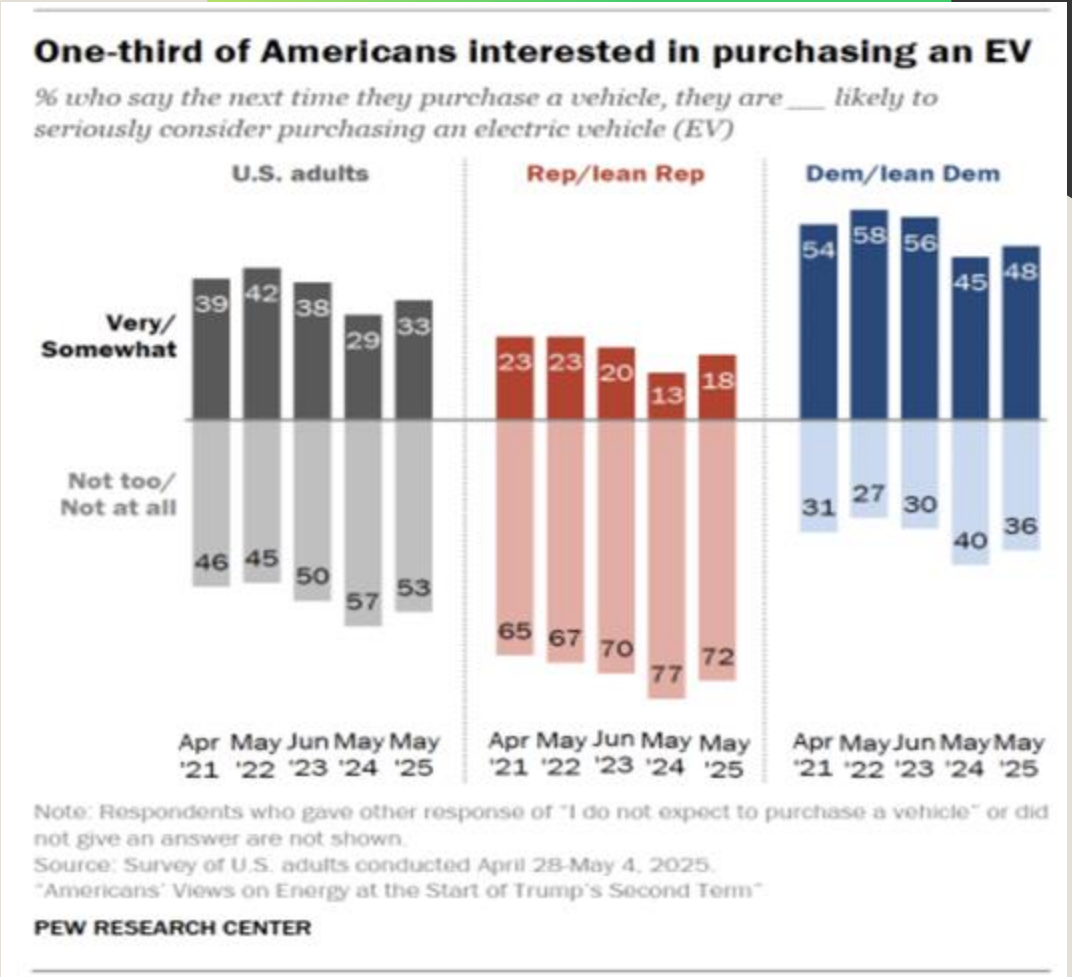
Electric cars as a political symbol are not good for adoption:

- There is a strong correlation between the democratic vote share and the EV share of sales
- Subsidies benefit the rich, which played into politics
  - Nationally, 14% of households earning over $100,000 own an electric vehicle, compared to 5% of middle-income households and 2% of those earning $40,000 or less, according to a recent Gallup poll
  - In California, the state leading in electric vehicles, the Top 20 ZIP codes with the highest percentage of EVs have median household incomes above $100,000, while the lowest-income areas have almost no EV ownership



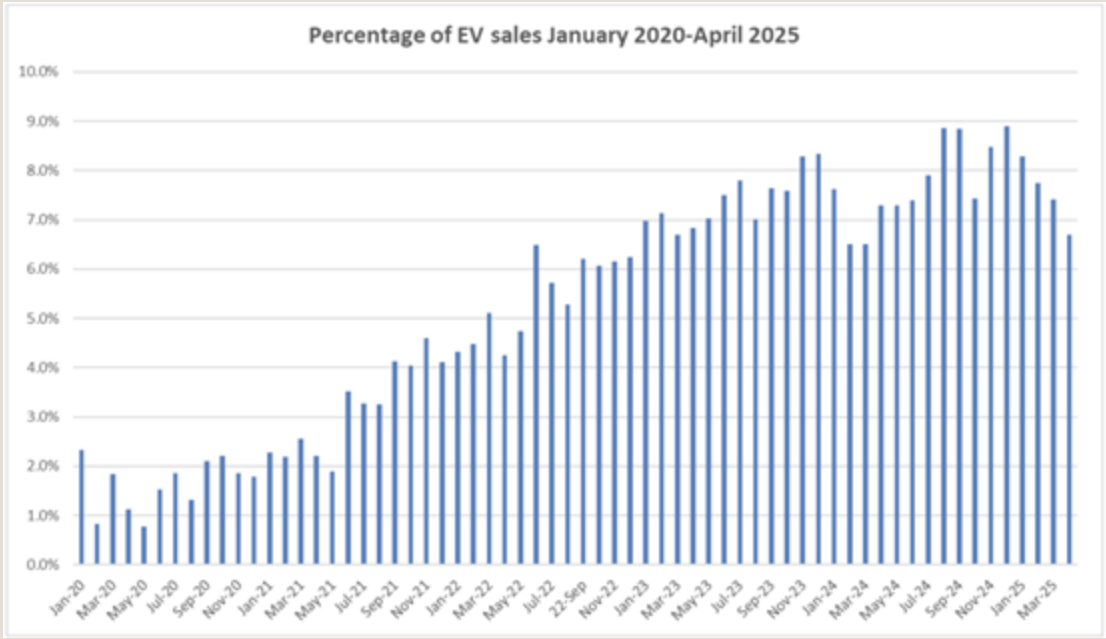
“But the results thus far point to a strong and enduring correlation between political ideology and U.S. EV adoption. The EV market has grown in scale dramatically over this time period, yet we find that, at least through 2022, new registrations continue to be overwhelmingly concentrated in the most Democratic counties.”

Where Things Stand Today: Polling, EVs, and the Marketplace



What is the market saying?

- EV sales have leveled off–EVs as a percentage of total car sales are essentially the same in 2025 (7.5% of sales) as in 2023 (7.4% of sales)
- Early adopters and wealthy consumers who are purchasing a third or fourth car have largely been captured in the sales numbers
- Affordable options are largely unavailable to consumers



Battery Limitations

Range:

- Average EV range in 2024 is **~291** miles per charge.
- Cold weather can **reduce range by up to 40%** (AAA study).
- Gasoline cars often have **400–500 miles** of range and refuel in minutes

Battery Costs:

- Average cost: **~$139 per kWh** in 2023 (down from $1,200+ in 2010)
- A typical EV battery (~70 kWh) still costs nearly **$10,000 to produce**

Weight:

- EVs are typically **20–30% heavier** than comparable gas vehicles. Example:
- Ford F-150 Lightning: **6,015–7,000 lbs**
- Gas F-150: **4,021–5,014 lbs**
- Heavier vehicles cause more road wear and reduce efficiency

⚡ Charging Infrastructure

Public Charging Gaps:

- **~168,000 public chargers** in the U.S. (2024), but only **~33,000 fast chargers**
- For 2030 EV goals, estimates suggest the U.S. needs over **1.2 million public chargers**

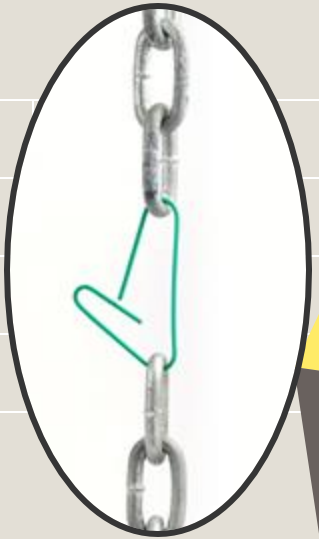
Grid Impact:

- A single DC fast charger can require **as much power as 50 homes**
- Widespread EV charging will require major upgrades to local distribution grids

Charging Time:

- Level 1 (standard outlet): **2–5 miles of range per hour**
- Level 2 (240V): **~25 miles per hour**
- DC Fast Charging: 10–80% charge in **20–45 minutes** — still longer than a gas fill-up (3–5 min)

Supply Chain & Manufacturing Constraints



Mineral Demand:

- One EV battery requires:
- **8 kg lithium, 35 kg nickel, 20 kg manganese, 14 kg cobalt**
- Global lithium demand could increase **40x by 2040** (IEA)

Manufacturing Bottlenecks

- Building a new battery plant takes **3–5 years**
- Global EV battery capacity is expected to **triple by 2030**, but demand could outpace supply

Geopolitical Risk:

- **~70% of cobalt** and **~60% of lithium** refining occurs in **China**
- Congo supplies over **70% of global cobalt** — raising labor and ethical concerns

Price

Cost & Consumer Economics

Purchase Price:

- Average new EV price (2023): **$53,469**
- Average new gas car: **$48,000**

Used Market:

- **Used EVs depreciate faster** (esp. with outdated tech/battery concerns)
- Limited inventory — **EVs are <2% of used vehicle sales**

Technology

- Adoption of new technology generally occurs when a technology makes something better, cheaper, or safer
- No one had to mandate the iPhone
- EVs are simply a transfer of technology from a complex engine and a simple fuel delivery system (the gas tank) to a complex fuel delivery system (battery) to a simple engine
- Where’s the benefit to the consumer?

Environment

Life-Cycle Emissions

EVs produce zero tailpipe emissions but have high emissions from battery production and electricity generation

Total emissions often exceed those of gas cars until many miles are driven

Tire Particulate Pollution

EVs are heavier and accelerate faster, increasing tire wear

Life cycle tire emissions can exceed tailpipe emissions, undermining environmental gains

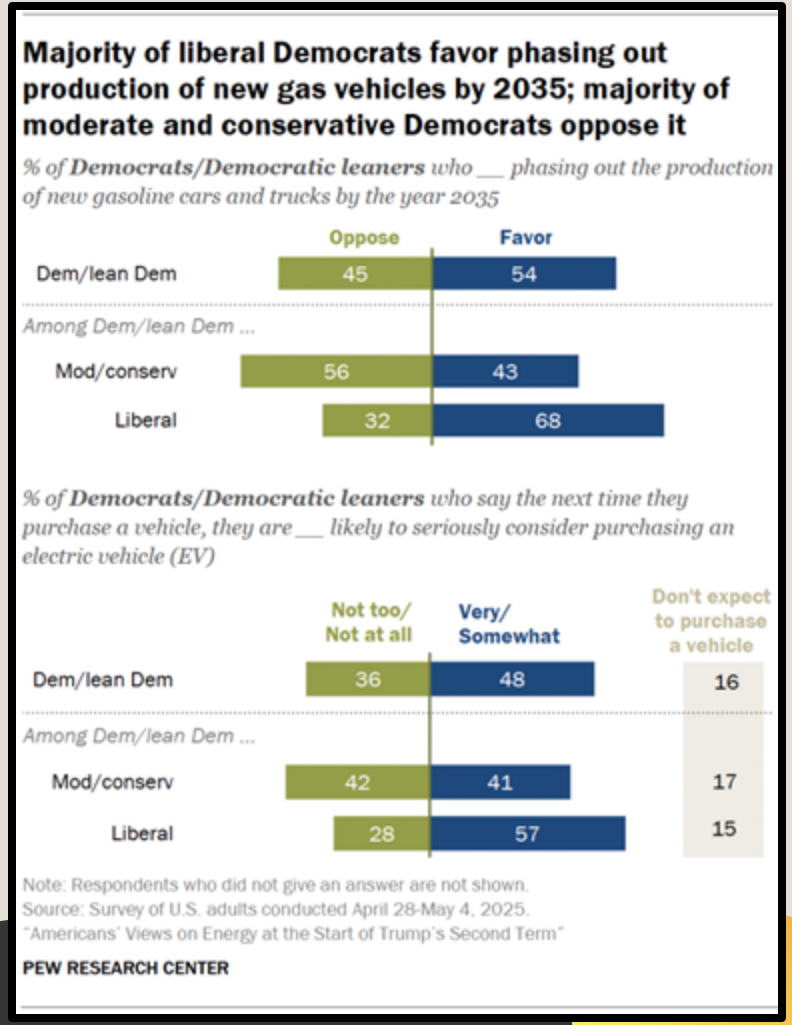
Net Impact Is Overstated

Environmental benefits of EVs are conditional and often exaggerated

EVs often have a higher production-related carbon footprint than conventional vehicles. The breakeven point in emissions varies based on driving distance and energy sources used for electricity

Trump 47

- Trump and consumers acknowledge EV realities
- The public voted with their pocketbooks and at the at the ballot box



Trump 47 Actions

Summary Table: Key Trump Anti-EV Actions (Post-Jan 20, 2025)

Action Area	Description
Repealed EV Sales Targets	Revoked 50% EV sales goal for 2030
Paused Charging Infrastructure	Halted federal funding for EV charging stations
Eliminating EV Tax Credits	Pushed to end $7,500 new EV, $4,000 used EV, and home charger credits after 2025
Rolling Back Emissions Standards	Directed agencies to weaken vehicle emissions and fuel economy rules
Targeted State Emissions Waivers	Ordered end to California and other state waivers for stricter emissions/zero-emission mandates
Stopped EV Manufacturing Grants	Instructed agencies to halt funds for EV and battery manufacturing
Promoted Fossil Fuels/Choice	Framed EV incentives as mandates, emphasized consumer choice and fossil fuel development
Reviewed Trade Policy	Ordered review of tariffs on imported vehicles and parts, affecting EV supply chains

Zeldin EPA

Reconsideration of light-duty, medium-duty, and heavy-duty vehicle regulations that provided the foundation for the Biden-Harris electric vehicle mandate (Car GHG Rules).

Congress

Congressional Review Act: California EV mandates (H.J. Res. 87, 88, 89)

Reconciliation Bill Provisions

Summary Table: Key EV-Related Provisions

Provision	Current Law (2024)	Proposed Change in Bill	Effective Date
New EV Tax Credit (up to $7,500)	Available for qualifying vehicles	Phased out after 2026, but most end 2025	Dec 31, 2025 (most automakers)
Used EV Tax Credit (up to $4,000)	Available for qualifying used EVs	Eliminated	Dec 31, 2025
Commercial EV/Charging Credits	Available under IRA	Eliminated	Dec 31, 2025
Annual Federal EV Fee	No federal fee	$250/year for EVs, $100/year for hybrids	Upon bill enactment
Battery Manufacturing Credits	Available with domestic content rules	Stricter rules on Chinese components	Not specified
FTC CARS Rule Enforcement	In effect	Temporarily suspended	Until Sept 30 (proposed)

But...


POLITICO
Musk, Tesla blast GOP plans to end clean energy tax credits in megabill
TESLA

but...


BOUGHT IT BEFORE
ELON WENT CRAZY

What Should Happen

- Return CAFE mandate to an economically and technologically feasible test.
- Get the government out of the deployment of EV tech. Even Elon thinks so.

"Do we need support for gas stations? We don't. There's no need for support for a charging network. I would delete it. Delete."

What’s next?

Transportation bill
EV fees - how do they pay?

To account for weight and the avoidance of the gas tax: the transportation bill will focus on accounting for EV usage

The Reconciliation bill imposes new annual registration fees: $250 for electric vehicles and $100 for hybrids, indexed to inflation. Revenue goes to the Highway Trust Fund. The fees expire October 1, 2035

One proposal: vehicle miles traveled (VMT) tax instead in lieu of the highway trust fund

Final Thoughts

- This was never about EVs, it was about getting people out of their cars
- Even with the Federal and California push, consumers simply didn’t respond in the marketplace and Democrats paid the price at the voting booth
- Auto companies have an opportunity to reorient their investments towards consumer preference (ICE, Hybrids, & EVs)
- Policies that run counter to that should be eliminated, and the government should have a lighter touch on the auto industry.

Questions?

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