

THE US AND THE BUMPY TRANSITION TO ELECTRIC VEHICLES

GOVERNING ENERGY TRANSITIONS

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Introduction

This essay argues that while the United States has historically demonstrated lacklustre governance in addressing climate change, the Biden administration marks a significant shift, particularly in its push towards electric vehicles (EVs). President Biden has implemented a clear climate goal and an ambitious decarbonization agenda using a "carrot and stick" strategy through legislative and regulatory means, a first for any US administration.

The effectiveness of this strategy is bolstered by a broad coalition of stakeholders, including states, businesses, automakers, union workers, and new vested interests such as Republican-led states benefiting from climate legislation investments. The administration has prioritized coordinating billions of dollars to support these initiatives, along with a growing green lobby within Congress. These efforts, combined with legal protections for investments and the reframing of climate action as a driver of economic growth and job creation, strengthen Biden's approach.

However, the pathway is fraught with challenges. Biden, as a polarizing figure, exacerbates the political divide over EVs, with some Republicans, influenced by fossil fuel interests, resisting the shift. Furthermore, under Biden's watch, oil and gas production has reached record levels, and while many Americans support climate action, they are less informed about the benefits of EVs and concerned about costs and infrastructure. Additionally, China poses a significant threat to the traditional auto industry.

The essay is structured into four sections: 1) the current outlook and challenges of cleaner transportation; 2) the historical context of cleaner transport regulation; 3) an evaluation of Biden's governance over the EV transition; and 4) concluding remarks on the future of U.S. transportation governance. This analysis highlights how the Biden administration's approach, though facing obstacles, has significantly redirected the country from past dynamics and set a strategic long-term direction with clear targets.

Current outlook

The transition to EVs is a crucial component of the current administration, under Democrat Joe Biden. In 2020, Biden ran under a platform that prioritised climate change, committing to slash the nation's emissions in half, and to achieve **50% of annual sales of new vehicles to be electric, by 2030** (White House, 2023). This is an ambitious goal, given that the country's EV sales reached about 10% in 2023, well below Europe and China (IEA, 2024).

Market share of EV sales

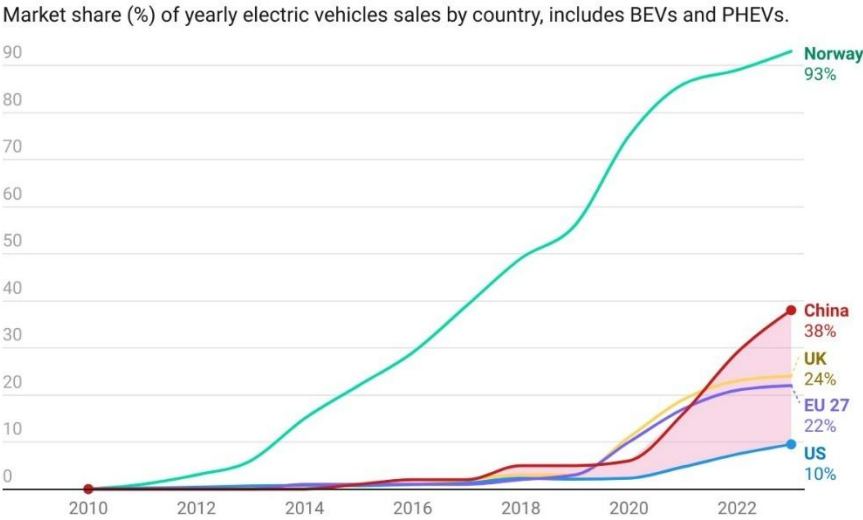
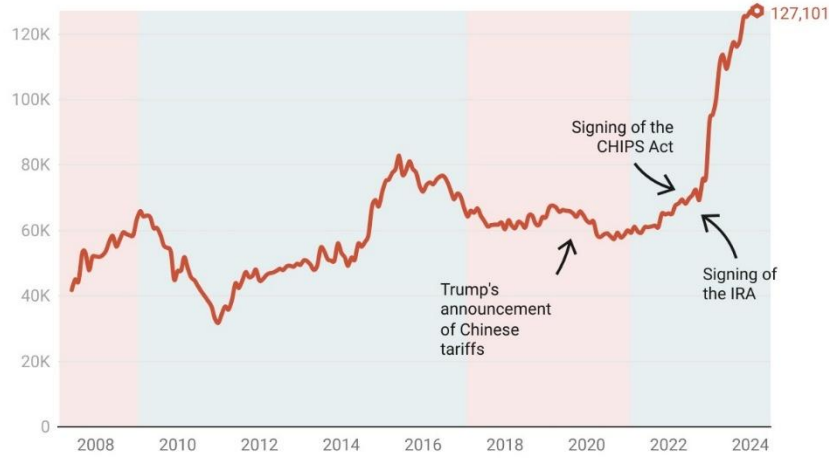


Chart: Own making. • Source: IEA • Created with Datawrapper

The Biden administration has aggressively pursued the EV transition using a "carrot and stick" approach. By enacting the Bipartisan Infrastructure Law (BIL) and the **Inflation Reduction Act (IRA)**, it has directed substantial incentives into the EV supply chain, including for charging stations and battery production, and offered incentives for EV purchases (White House, 2022). Additionally, through the **Environmental Protection Agency (EPA)**, the administration restored Obama-era emissions rules in 2021, rolled back by the Trump administration, and set the most ambitious emissions standards to date in 2024 (EPA, 2024). This combination of legislative incentives and regulatory standards has effectively spurred a boom in manufacturing investment, demonstrating the success of this comprehensive strategy in advancing the EV market (FRED, 2024).

Total Construction Spending: Manufacturing in the US

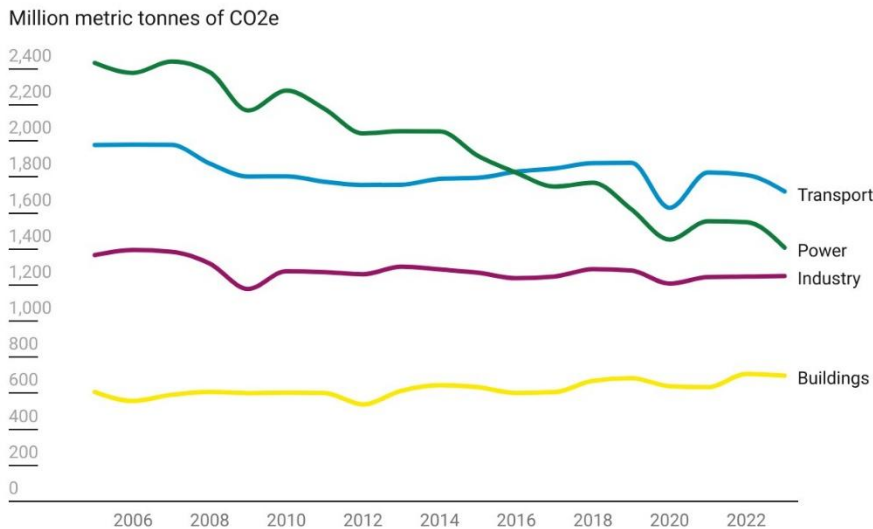
Producer Price Index by Industry: New Industrial Building Construction. Values are indexed and normalized to a common base (June 2012 = 100). Millions of USD.



Range highlighted in blue references Democratic presidencies of Barack Obama and Joe Biden, while the red range highlights Republican presidencies of G.W. Bush and Donald Trump, respectively.
 Chart: Own making. • Source: Federal Reserve Economic Data (FRED) • Created with Datawrapper

In the United States, the transportation sector is the largest source of carbon emissions, with oil driving most of this impact -contributing to the environmental degradation- (Rhodium Group, 2024). Furthermore, after the shale oil revolution, the US became the world’s largest producer of oil and has beaten record levels of production under Biden (EIA, 2024). Thus, the transition to electric vehicles requires enormous changes in manufacturing, infrastructure, technology, labour, global trade, and consumer habits.

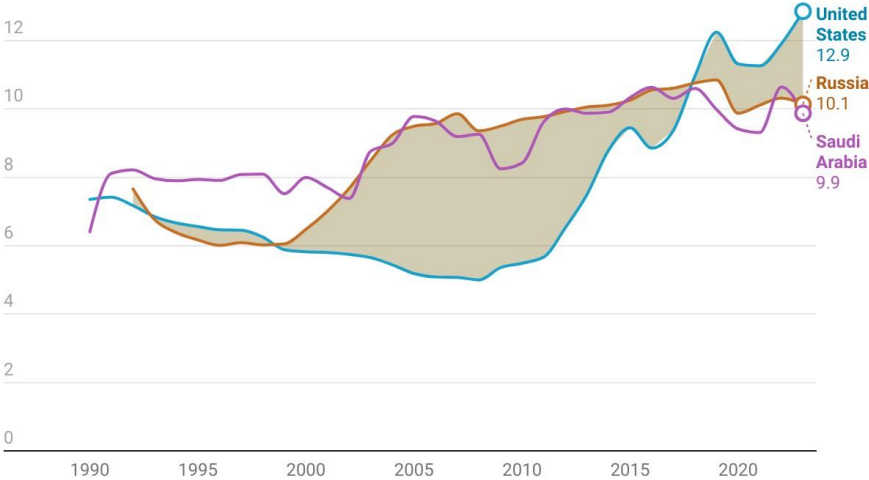
US Emissions by sector



The power sector has seen a long-term decline in emissions driven by a continued phasing-out of coal. Meanwhile, transport emissions remain steady due to aviation emissions and gasoline consumption.
 Chart: Own making. • Source: Rhodium Group • Created with Datawrapper

US is the world's largest oil producer

Top three global oil producers. Average annual production (mbpd).



The US oil production hits record levels of production under the Biden administration.
Chart: Own making. • Source: EIA • Created with Datawrapper

The federal political system and the inherent division between Democrats and Republicans leads to a gridlock that affects both the executive branch and Congress, persisting to the present day (Selin, 2011, p.10). The direction of climate legislation, including the shift towards cleaner cars, dramatically shifts with the change of the White House occupant. Democrats are generally supportive of the climate transition, while most Republicans remain climate change sceptics, ignoring scientific consensus. This partisan divide is starkly evident in Congress.

EVs have especially drawn Republican scrutiny and have become a focal point in the broader cultural wars, reflecting how deeply these issues are embedded in public opinion and partisan politics (Dunlap et al, 2016). Additionally, former President Donald Trump has weighted in using harsh rhetoric about electric vehicles' impact on the American economy.



The Republican rhetoric seems to be working, a Gallup poll found that 69% of Republicans would not buy an EV, compared with 27% of Democrats (Gallup, 2024).

Americans' EV Ownership and Potential Ownership, by Political Party

Thinking now about electric vehicles, which of the following applies to you – you currently own an electric vehicle, you are seriously considering buying an electric vehicle, you might consider buying an electric vehicle in the future, or you would not buy an electric vehicle?

Party identification	Currently own	Seriously considering buying	Might consider in future	Would not buy
Democrat	9%	15%	46%	27%
Independent	6%	9%	36%	47%
Republican	6%	2%	22%	69%

Strong divide among different parties.

Table: Own making. • Source: Gallup US • Created with Datawrapper

This situation is further complicated by powerful high-carbon coalition groups that support the fossil fuel industry's *status quo*, reinforcing the resistance to clean transportation initiatives. Since 1990, more than 80% of oil & gas contributions have gone to Republicans (OpenSecrets, 2024a). During the 2023-24 election cycle, Trump has received over 4 million dollars from the Oil & Gas industry, and the Koch Industries -private oil company- has given to conservative groups in contributions more than 28 million USD (OpenSecrets, 2024b).¹

Which industry supports which political party?

Average (%) of USD received per industry in electoral cycles from 1990 to 2024.

Industry	Republicans	Democrats
Auto manufacture	52%	48%
Coal mining	87%	13%
Electric Utilities	59%	41%
Oil and gas	82%	18%
Renewable Energy	30%	70%

Coal, oil and gas have a complete Republican party inclination, while Renewable Energy companies support Democrats.

Table: Own making. • Source: OpenSecrets • Created with Datawrapper

This complex web of partisanship and vested interests continues to shape the US approach to climate and EV policies, highlighting significant challenges in moving towards a sustainable future. However, China's dominance in the global EV market presents a bipartisan concern,

¹ Contributions can be given directly to individuals, PACs, or to outside groups like think tanks, consultancies, etc.

and a critical juncture for Biden. As the leading manufacturer, exporter, and seller of EVs, with around 8 million vehicles sold in 2023, China's aggressive policies have set new market standards and driven down production costs (IEA, 2024). This challenges American industry leadership and threatens the U.S. with its overcapacity and cheap state backed EVs (Bloomberg, 2024).

In response to China's growing influence and control over essential battery materials like lithium and cobalt, Biden is trying to frame the support to EV transition as a support to traditional automakers. These efforts aim to counter China's impact, ensuring the US remains competitive in the global shift towards clean vehicles and unifying lawmakers in a rare consensus amidst broader political divisions over climate policy.

Historical development

The governance of climate legislation in the US, especially regarding clean transportation, has been marked by significant variability due to changing political landscapes and the evolving understanding of environmental impacts associated with the transportation sector (Mildenberger, 2021). This journey has seen periods of proactive regulation interspersed with times of regression and inaction, influenced by shifts in presidential administrations and their respective approaches to environmental policy.

What are/were the US presidents' opinions on the energy transition?

G.W. Bush	B. Obama	D. Trump	J. Biden
"I will not accept a plan that will harm our economy and hurt American workers. Because first things first are the people who live in America. That's my priority."	"The science is beyond dispute and the facts are clear. ... My presidency will mark a new chapter in America's leadership on climate change."	"You're going to lose your beautiful way of life [...] For auto workers, Biden's forced transition is a transition to hell."	"When I think of climate change, I think about jobs. Good-paying, union jobs that put Americans to work, make our air cleaner, and rebuild America's crumbling infrastructure."

GW Bush remarks were given in the context of the rejection of the Kyoto Protocol. He also dismissed the plan because the science behind climate change was "incomplete". Trump gave those remarks in the context of Biden's push for more stringent emissions standards published by the EPA.

Table: Own making. • Source: Mildenberger (2021), Harrison (2010), White House (2023). • Created with Datawrapper

The Corporate Average Fuel Economy (CAFE) standards were introduced in the 1970s

following the oil crisis to reduce U.S. dependence on foreign oil, primarily for national security reasons (Sen et al., 2017). Administered by the Department of Transportation, these standards focused on improving fuel efficiency and lowering gasoline use, with emissions reduction being a secondary goal.

During the 1990s, the Clinton administration was hampered by a bipartisan divide and weak party discipline, leading to a stagnation in federal climate legislation. In the 2000s, the situation didn't improve under the Bush administration, which showed a marked scepticism towards climate science, influenced by strong fossil fuel lobbying (Selin, 2011). President Bush and Vice President Cheney's connections to the oil industry—Bush's family history and Cheney's role as CEO of Halliburton—further fuelled resistance to environmental efforts, resulting in a lack of meaningful federal climate policy during this period (Bloomberg, 2004).

The federal government's hesitant approach to climate change spurred states, particularly California, to take their own action. In 2004, California challenged the Bush administration's less assertive policy, and sought an EPA waiver under the Clean Air Act to enforce stricter standards, but the Bush administration delayed and eventually denied the request, sparking a major legal conflict.

This dispute led to the landmark Supreme Court case *Massachusetts v. EPA* in 2007, which confirmed the EPA's authority to regulate greenhouse gases (Mildenberger, 2021). This decision was a turning point in US environmental policy, emphasizing the executive branch's influence in steering the automotive industry toward sustainability, but also in combating climate change in a broader sense. Following the ruling, the EPA set stringent greenhouse gas emission limits, measured in grams of CO₂ per mile, and tightened standards for other pollutants like particulate matter and nitrogen oxides.

Since 2010, the Obama administration pushed EPA to implement increasingly strict regulations on climate-warming emissions from cars and light-duty trucks. In the same year, the Department of Energy through its industrial policy, granted Tesla Motors a \$465 million loan, crucial for developing the all-electric Model S and establishing manufacturing facilities in California. By 2023, Tesla dominated the U.S. EV market, accounting for around 55% of all EV sales (Cox Automotive, 2024).

Additionally, the Obama administration introduced incentives to encourage automakers to produce electric vehicles, offering up to \$7,500 off the first 200,000 EVs sold by each manufacturer. This policy aimed to boost domestic EV production and lessen the

environmental impact of the transportation sector, but the cap of units sold presented some hurdles for the domestic industry that required adjustments (Golub, 2022).

The Trump administration significantly undermined the transition to sustainable transportation by rolling back many Obama-era environmental standards, causing regulatory instability and slowing progress towards cleaner, more efficient vehicles. “We saved our oil companies”, declared Trump in his last State of the Union (WH, 2020). The Trump-led EPA minimized the urgency of climate change, reducing efforts to promote sustainable transportation.

In stark contrast, Democrat Joe Biden, who campaigned heavily on climate change, aims for 50% of new vehicle sales to be electric by 2030 (WH, 2023a). Upon taking office, Biden implemented the most substantial climate policies of any US president, setting clear goals to guide significant policy decisions (CAP, 2024).

Under Biden, key legislative achievements like the Bipartisan Infrastructure Law and the Inflation Reduction Act have been instrumental in advancing the energy transition, directing significant funds towards clean energy technologies for both manufacturers and consumers, effectively exploding investment in retail and manufacturing of clean energy, reaching 240 billion of private investment in 2023 alone (CIM, 2024).

Clean Energy Technology Investment

Billions of USD in clean investment by quarter (2018-2023).

Q1 Q2 Q3 Q4

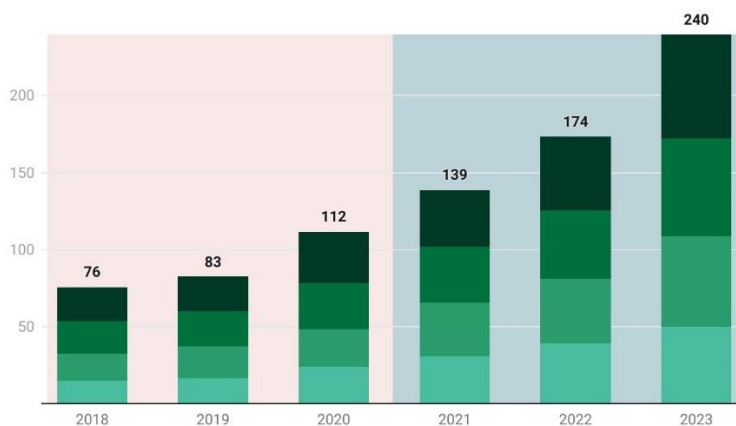
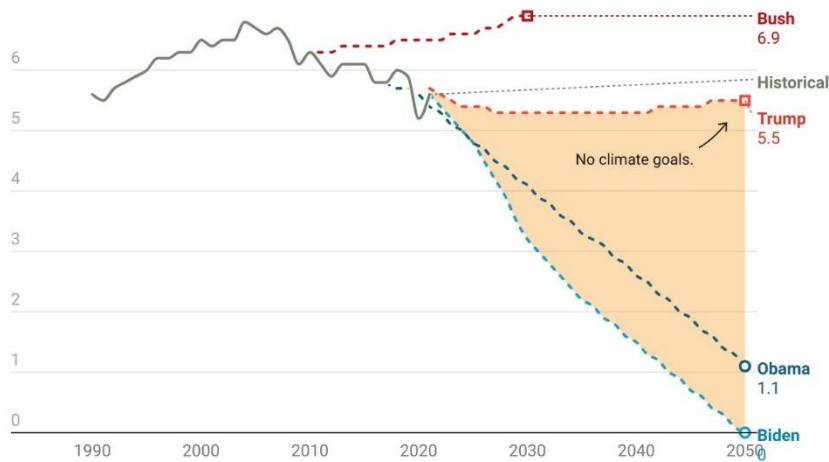


Chart: Own making. • Source: Clean Investment Monitor • Created with Datawrapper

The EPA, under Biden, has mandated that by 2032, most new passenger cars and light-duty trucks sold in the U.S. must be electric or hybrid. This rule, developed over nearly three years, marks a major shift in the American automotive market and underscores Biden’s commitment to a cleaner transportation future.

Presidents' climate ambitions

Historical US annual GHG emissions and projections under different presidents in gigatonnes of CO₂e (GtCO₂e) from 1990 to 2050



Trump administration had no pollution reduction goals. Conversely, Biden's goals require a 6% annual reduction of pollution from 2021 to 2030.

Chart: Own making. • Source: Center for American Progress. • Created with Datawrapper

Biden changed the “rules of the game”

North (1991) defines institutions as “humanly devised constraints that structure political, economic, and social interaction,” known as the “rules of the game.” In the US, these rules have contributed to relatively weak climate policies due to the political system's complexities. The separation of powers means that U.S. climate legislation needs approval from the House, the Senate, and the President (Selin, 2011). Filibuster rules and the threat of a presidential veto often require supermajorities in Congress, forcing policy change advocates to build broader coalitions than those seeking to block change. Historically, this has challenged Democrats, as Republicans, backed by high-carbon coalitions, have resisted changes to the fossil fuel regime, leading to federal inaction and policy variability.

However, the stability of Biden’s achievements, especially the IRA, suggests they won’t be easily undone by a future Republican administration. Once the IRA was enacted, the executive branch cannot roll it back unilaterally, and a full repeal in Congress would need a Republican supermajority and unanimous support—unlikely given the significant benefits the IRA has brought to Republican states. This bipartisan advantage might mitigate the impact of potential reversals. Moreover, investments in long-term projects mean that repealing or undermining the IRA could create significant legal and economic turmoil, deterring any administration from such actions.

Moreover, the US legislative process is profoundly impacted by fixed elections, creating a dynamic known as “**weak party discipline**,” where senators and representatives often

prioritize local economic interests over party alignment. This has historically challenged Democrats, particularly evident when resistance within their ranks derailed Clinton's BTU tax proposal in the 1990s.

During the IRA negotiations, this dynamic was again crucial. With Congress evenly split, the Democrats needed every vote. Senators from both parties often represent **strong local interests**: Republicans from Texas and Alaska back the oil industry, those from Wyoming and Democrats from West Virginia support coal, and Michigan Democrats defend the auto industry.

The reconciliation process used to pass the IRA required only a simple majority, circumventing the filibuster's 60-vote threshold. This made Senator Joe Manchin of West Virginia a pivotal figure due to his ties to both his party and fossil fuel interests. After extensive negotiations, and despite his initial resistance, the Biden administration made strategic concessions to the fossil fuel sector, securing Manchin's support, and enabling the IRA's passage despite uniform Republican opposition.

Where does loyalty lie?

Recipients of Oil & Gas USD during the 2022 Senate election cycle.

Recipient	Total
Manchin Joe (D-WV)	818,609
Lankford James (R-OK)	447,721
Murkowski Lisa (R-AK)	436,963
Kennedy John (R-LA)	356,146
Johnson Ron (R-WI)	340,706
Scott Tim (R-SC)	321,012
Rubio Marco (R-FL)	297,626
Hoeven John (R-ND)	292,096
Lee Mike (R-UT)	287,592
Sinema Kyrsten (D-AZ)	244,835

Joe Manchin, Democrat from West Virginia has a long-standing relationship with the coal industry in his state and fossil fuel industry at a national level.

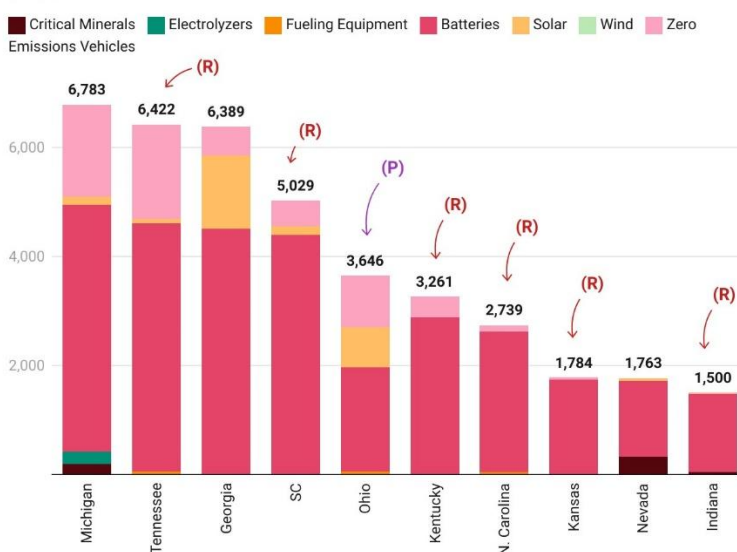
Table: Own making. • Source: OpenSecrets • Created with Datawrapper

In the first six months since the Inflation Reduction Act (IRA) became law, it has had considerable success, creating over 100,000 jobs and stimulating economic activity across various sectors, as noted by the WEF (2023). This success is further amplified by robust stakeholder engagement with states and local governments, highlighting the legislation's widespread impact. These stakeholders have increasingly relied on the IRA's funding and policies, alongside significant private investments, with over \$40 billion directed to the EV supply chain in 2023 alone (CIM, 2024).

Notably, six of the top ten states that received the most funding in 2023 were Republican led. This distribution of benefits has created new vested interests in emerging industries and has started to challenge the "weak party discipline" concept among Republicans. This suggests a shift in political dynamics driven by the economic and industrial developments under the IRA. Consequently, while Republicans may feel compelled to publicly criticize the IRA, they privately recognize the benefits of the jobs and investment it brings.

Actual manufacturing investment in clean energy technologies in 2023

Top ten state recipients of private investment in clean energy technologies in 2023 in millions of dollars.



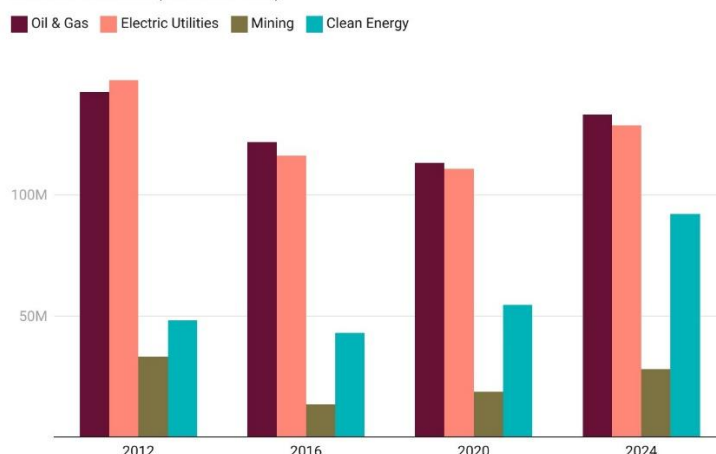
(R) means Republican-led state, (P) means state with mix of Republican and Democratic senators. Six states out of the top ten who have received the most private investment are Republican states, while one is mixed between both (Ohio), and three are Democrat.

Chart: Own making. • Source: Clean Investment Monitor • Created with Datawrapper

The fact that legislation like the IRA, with its \$369 billion rollout in green industrial policies, passed through Congress, changes the previous landscape. These policies provide concentrated benefits to well-organized groups, such as clean energy firms, leading to a surge in "green lobbying" within the halls of Congress (Meckling et al., 2015). Under Biden, spending by clean energy lobbying groups has nearly doubled, effectively building robust support for carbon regulation, and reinforcing the momentum towards a greener economy (OpenSecrets, 2024a).

Annual Lobbying Spending by Industry

Selected industries (millions of USD).



Clean energy lobbying spending has been steadily increasing, almost doubling under Biden.

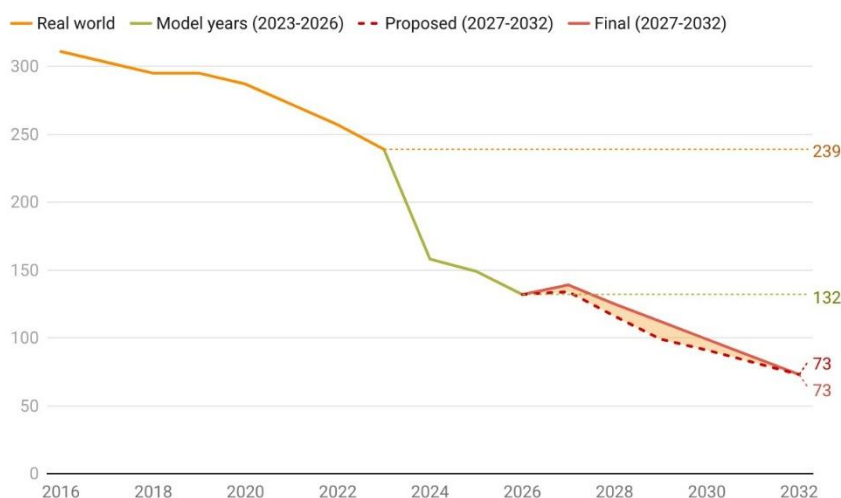
Chart: Own making. • Source: OpenSecrets • Created with Datawrapper

Unlike Trump, who rolled back vehicle regulations without consulting the auto industry—leading to criticism for ignoring ongoing operational adjustments—Biden has taken a more collaborative approach. His administration has won broad support from automakers for the EV transition. In March 2024, John Bozella, president of the Alliance for Automotive Innovation, representing most US automakers, praised the Biden administration's EPA rules for considering industry feedback and adjusting the emissions reduction timeline. "The future is electric," Bozella noted, emphasizing the inevitable transition for the industry and consumers (AFAI, 2024).

The EPA's revised rules, a key part of Biden's climate strategy, reflect this cooperative approach. While extending the timeline for emissions reductions, they preserve the goal of halving carbon pollution from the car and truck fleet by 2032. The EPA now estimates that EVs will make up 30% to 56% of new light-duty vehicle sales by 2030 to 2032, marking a significant move towards cleaner transportation. This strategy demonstrates a balance between ambitious climate goals and the practicalities of an industry in transition (EPA, 2024b).

Auto Emissions Targets

Historical and projected targets for light-duty cars (grams of CO₂ emitted per mile driven)



After negotiations with the auto industry, the Biden administration reached consensus and agreement.

Chart: Own making. • Source: EPA • Created with Datawrapper

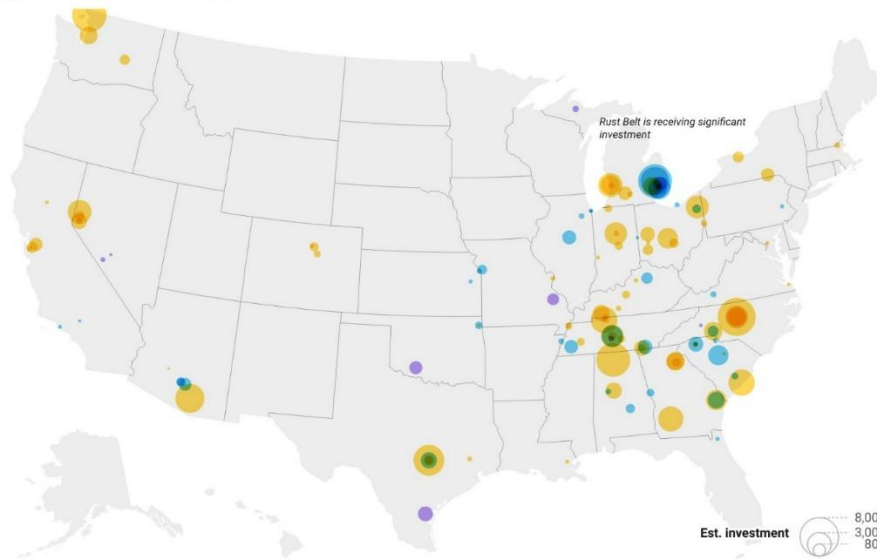
In late 2023, the United Auto Workers (UAW) went on strike due to concerns about the transition to EVs and its effects on unionized labour, especially as Biden's subsidies were enhancing local EV and battery manufacturing in largely non-unionized plants. Misconceptions about the EV industry requiring fewer and differently skilled workers raised fears of layoffs or the need for retraining (Cotterman, 2024). However, the Democratic administration successfully mediated negotiations with the Big Three—GM, Ford, and Stellantis—achieving a deal that secured significant worker benefits and broadened the coalition backing the industry's transition (Bloomberg, 2023).

Additionally, the Rust Belt, America's historic manufacturing heartland, is benefiting from Biden's strategy, with substantial investments rolling out in the region. These further addresses labour concerns and strengthens the sustainable transition to cleaner transport. “When I think about climate change, I think jobs”, has repeatedly stated Joe Biden, pushing for manufacturing and training programmes (WH, 2023b).

Investment in manufacturing of EV supply chain

US private investment in clean energy technologies for transportation (millions of USD)

Batteries Critical Minerals Zero Emission Vehicles



Private projects focused on the electric vehicle supply chain either under construction or already operating. The investment announcements for these projects span from 2018 to 2023.

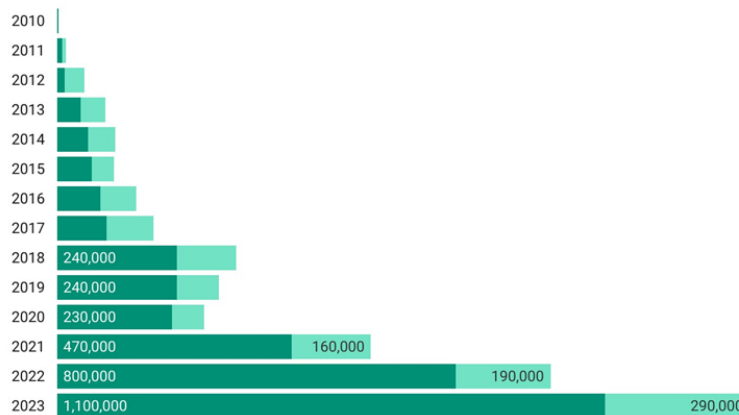
Map: Own making. • Source: Clean Investment Monitor • Created with Datawrapper

Although the Biden administration's push for EVs has significantly shifted US market dynamics, with 1.4 million EVs sold in 2023—a stark contrast to the market during the Trump era—the evolving landscape of vested interests and political polarization has placed EVs at the centre of political debates (IEA, 2024; EVPP, 2024). These discussions are intertwined with issues such as technological transitions, the future of the oil industry, competition from China, and public opinion towards EVs.

US sales of Electric Vehicles

Electric vehicles include BEV and PHEV.

BEV PHEV



Data depicted is in units of vehicles.

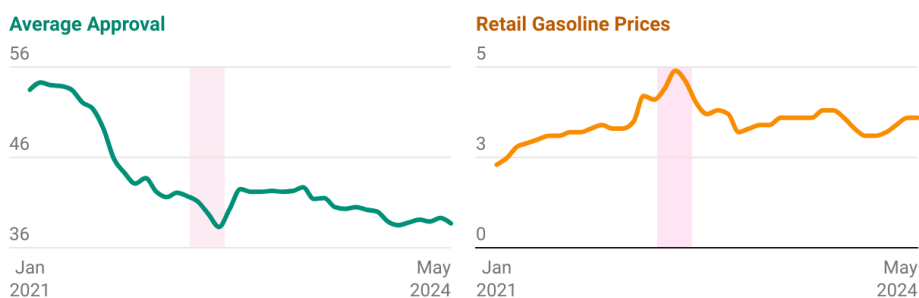
Chart: Own making. • Source: IEA • Created with Datawrapper

Climate change remains a "back-of-the-mind" issue for many Americans (Giddens, 2009). A 2024 Gallup poll revealed that only 37% of Americans worry "a great deal" about climate change, ranking it 12th out of 14 national priorities (Gallup, 2024b). More immediate issues like inflation and crime dominate public concern, with gasoline prices particularly influential due to their direct impact on inflation (Kenny, 2022).

The US has some of the lowest gasoline taxes among OECD countries, according to the DOE (DOE, 2019). Americans, accustomed to cheap gasoline, are sensitive to its price fluctuations, which are highly politicised. Since Biden took office, his popularity has taken a consistent hit, especially when gasoline prices spiked in 2022, challenging his legitimacy, and highlighting the political challenges he faces in balancing economic concerns with EV transition (EIA, 2024b; FiveThirtyEight, 2024).

Gasoline Prices have a direct impact on the President's approval

Approval in % and gasoline prices in USD per gallon.



Biden's approval plummeted when gasoline prices spiked.

Chart: Own making. • Source: FiveThirtyEight, EIA • Created with Datawrapper

The fossil fuel industry is also resisting the new EPA regulation. The American Fuel & Petrochemical Manufacturers, a lobbying group, have launched a substantial ad campaign in swing states to politicise what it inaccurately labels "Biden's EPA car ban". Additionally, a coalition of fossil fuel companies and Republican attorneys is expected to sue to block the rule.

Finally, the Republican Party argues that promoting EVs will primarily benefit China, increasing US dependence on Chinese supply chains—given China's significant control over critical minerals—and that the transition will result in manufacturing job losses to China, thereby increasing China's geopolitical leverage over the US.

This is a major misconception that the Biden administration has actively worked to counter. The global transition to EVs is inevitable, and if the US does not fully embrace this shift by

boosting its domestic industry, implementing industrial policies to support manufacturing and innovation, enhancing consumption through incentives, it risks falling behind.

Without proactive measures and the management of trade alliances with strategic partners like Latin America and East Asian countries, the US could lose out to a dominant China, whose overcapacity allows it to export low-cost EVs globally. Without state support for innovation and competition, traditional automakers might find themselves unable to compete.

Conclusion

Biden has tried to shift the climate change narrative from solely focusing on mitigation to highlighting economic and labour benefits, but he faces significant challenges. The high-carbon coalition—comprising fossil fuel companies, lobbying groups, and Republicans—along with partisan polarization and voter concerns about EVs' high upfront costs and inadequate infrastructure, continue to impede progress. Additionally, China's dominance in manufacturing, innovation, and the supply chain, along with its uncompetitive pricing, poses a major threat to traditional automakers, necessitating swift action. Yet, China remains a bipartisan concern, suggesting potential for cooperation across party lines.

Despite these challenges, Biden's administration has achieved unprecedented success in changing the dynamics of US climate and transportation policy, dynamics that are not easy to roll back, like previous administrations did. Under his leadership, the US has experienced a significant boom in manufacturing, job creation, and EV adoption. While Republicans have generally been unwilling to negotiate, especially in recent years, Biden has demonstrated an ability to build consensus with those open to discussion. He has aligned interests among Democrats linked to fossil fuel sectors, automakers, labour unions, and has engaged Republican states by offering local economic incentives. This approach has shifted the narrative of "weak party discipline" towards Republicans and fostered a low-carbon coalition. Biden's strategic leadership has directed the nation towards achieving substantial goals, even when hopes for moderate progress were initially low.

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