ZETA | ZERO EMISSION TRANSPORTATION ASSOCIATION

February 27, 2024

U.S. Environmental Protection Agency
EPA Docket Center
Office of Air Docket
Mail Code 28221T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

RE: Docket No. EPA–HQ–OAR–2023–0292
California State Motor Vehicle Pollution Control Standards; Advanced Clean Cars II Regulations; Request for Waiver of Preemption
Submitted via Rulemaking Portal: http://www.regulations.gov.

The Zero Emission Transportation Association (ZETA) is an industry-backed coalition of over 60 member companies advocating for 100% electric vehicle (EV) sales. ZETA is committed to supporting policies that drive EV adoption, create hundreds of thousands of jobs, dramatically improve public health, and significantly reduce emissions. Our coalition spans the entire EV supply chain including vehicle manufacturers, charging infrastructure manufacturers and network operators, battery manufacturers and recyclers, electricity providers, and critical minerals producers, among others.

ZETA thanks the U.S. Environmental Protection Agency (EPA) for the opportunity to provide comment on its consideration of California's request for a waiver of federal preemption to implement the Advanced Clean Cars II (ACC II) program. We urge EPA to grant California's request without delay.

The state of California has regulated motor vehicle air pollutant emissions for well over 50 years in accordance with the federal Clean Air Act. In recognition of California's longstanding history of cutting-edge emissions regulations and the need for such regulations in the state, Congress provided in Section 209(b) of the Clean Air Act that EPA must grant a waiver of preemption to California to allow the state to issue its own vehicle emissions regulations if certain statutory conditions are met. In the context of the ACC II program, California has met those conditions and therefore EPA has no basis to deny the state's request.

California's analysis accompanying its request indicates as much:

- The ACC II program, in the aggregate, is at least as protective of public health and the environment as the applicable federal standards.

- California needs the ACC II regulations to meet compelling and extraordinary conditions.
- California's standards are consistent with Clean Air Act Section 202(a).

The ACC II program is the result of a robust public engagement process and is designed to reduce vehicle tailpipe emissions and protect public health. California's own analysis projects the ACC II program will reduce emissions in the state by 30.4 tons per day of NOx, 2.0 tons per day of PM2.5, and 58.4 million metric tons per year of greenhouse gases by 2040.

Transportation electrification not only reduces emissions but it also promotes American economic competitiveness, creates good-paying jobs, and improves local health outcomes. Private sector investments in the domestic EV supply chain total billions of dollars and support hundreds of thousands of American jobs, many of which are located in California. Moreover, research has consistently indicated that without adequate regulation of vehicle emissions, communities in California and across the U.S. would experience avoidable increases in mortality.

American consumer demand for EVs remains strong and is driven by factors that include cost-savings, environmental protection, increasing model availability, and the ability of an EV to meet a driver's day-to-day needs. The ACC II program will incentivize the production of more EVs to meet growing consumer demand while also spurring innovation to meet the needs of an increasingly wider range of consumers.

ZETA believes the goals of the ACC II program are achievable and EPA's granting of California's request will ensure the supply chain has the regulatory certainty needed to protect today's investments and put the sector on a path to a zero-emission future. We again urge EPA to approve California's request without delay and look forward to expanding upon these and many more points in our written comments below.

ZETA and our member companies appreciate the opportunity to submit comments on this request. If you have any questions or concerns, please contact me at al@zeta2030.org.

Sincerely,

Albert Gore
Executive Director
Zero Emission Transportation Association

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1. Introduction

ZETA appreciates the opportunity to provide comment on EPA's consideration[1] of California's request for a waiver of federal preemption to implement the ACC II program. This request offers EPA an opportunity to assist California in locking in significant emissions reductions, protecting public health and the environment, and backstopping the industry's investments in electrification technologies. The ACC II program will also play a key role in helping achieve the Biden-Harris Administration's blueprint for decarbonizing the transportation sector while adhering to U.S. commitments under the Paris Climate Agreement.[2] The blueprint calls for continuously strengthened vehicle emissions standards through the next two decades as a central pillar of the U.S. greenhouse gas (GHG) reduction strategy.

The EV market is primed for continued rapid growth in the coming years.[3] As discussed further in these comments, hundreds of thousands of vehicles have already been put on our roadways, the diversity of available EV models is growing exponentially, and battery prices are falling rapidly. Significant investments are being made throughout the supply chain to support a smooth transition to mass consumer adoption of EVs. Programs such as ACC II provide the regulatory certainty needed to not only ensure manufacturers continue to invest in EV technologies but that the entire supply chain supporting the transition to electrification will have a clearer picture of how to plan capital expenditures today to meet the increased demand for its products over the coming years.

ZETA believes the goals of the ACC II program are achievable and EPA's granting of California's request will ensure the supply chain has the regulatory certainty needed to protect today's investments and put the sector on a path to a zero-emission future. As discussed in the next section of these comments, we urge EPA to grant California's request without delay. These comments will discuss the public health, environmental, economic, and consumer benefits of electric vehicles while also demonstrating the EV supply chain's preparations for an electrified and decarbonized future.

2. EPA Should Grant California's Request Without Delay

Tailpipe emissions from cars and trucks release harmful air pollutants that have various negative impacts on human health and the environment.[4] Cars and trucks and the fossil fuels that power them are the largest contributors in California to GHG emissions, particulate matter (PM)

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[1] *See* 88 FR 88908 (December 26, 2023)
[2] The U.S. National Blueprint for Transportation Decarbonization (January 2023) https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf
[3] Unless otherwise noted, ZETA refers to "EVs" in these comments to mean battery-electric vehicles.
[4] "Health Impact of Air Pollution," American Lung Association https://www.lung.org/research/sota/health-risks; accessed February 26, 2024

pollution, and ozone forming air pollutants.[5] These pollutants collectively increase premature mortalities, cause cardiovascular and respiratory diseases, increase the risk of cancer, and threaten the stability of the climate.

Accordingly, the EPA regulates these harmful emissions under the Clean Air Act (CAA), which authorizes the agency to set federal standards to control emissions from mobile sources. Importantly, however, the CAA also gives authority to the EPA Administrator to waive preemption of the federal standards and allow California to enact and enforce mobile source emission standards that are at least as protective of public health, in the aggregate, as the federal standards.[6] The waiver provision was added to the Federal Air Quality Act of 1967 (a precursor to the current Clean Air Act and indeed, the creation of EPA itself) in recognition of California's severe air quality challenges and because the state had already established its own emission standards for mobile sources.[7] Since this authority was granted to EPA, California has requested and received waivers of federal preemption more than 50 times.[8]

Under the CAA, EPA must grant a waiver of federal preemption unless the record supports one of three limited findings for denial.[9] Specifically, per Section 209(b) of the CAA, EPA shall grant a waiver unless the Administrator finds that: 1) California's determination that its motor vehicle emission standards are, in the aggregate, at least as protective of public health and welfare as applicable Federal standards is arbitrary and capricious, 2) the state does not need such standards to meet compelling and extraordinary conditions, or 3) such developed state standards are not consistent with Section 202(a) of the CAA. In the case of ACC II, we believe California has unequivocally met the requirements of CAA Section 209(b) and EPA therefore has no basis to deny the state's request.

The intent of the ACC II program is to reduce mobile source emissions, which account for roughly 41 percent of total GHG emissions in California and are also a major contributor of airborne oxides of nitrogen (NOx) and PM.[10] The ACC II program is the result of a robust public engagement process and is designed to reduce vehicle tailpipe emissions and protect public

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[5] "Clean Air Act Waiver and Authorization Request Support Document," California Air Resources Board, (November 15, 2023) https://www.epa.gov/system/files/documents/2023-12/ca-waiver-carb-req-acf-2023-11-15.pdf
[6] "Clean Air Act: Historical Information on EPA's Process for Reviewing California Waiver Requests and Making Waiver Determinations," Government Accountability Office, (January 16, 2009) https://www.gao.gov/assets/gao-09-249r.pdf
[7] *Ibid.*
[8] See U.S. EPA, Vehicle Emissions California Waivers and Authorizations, https://www.epa.gov/state-and-local-transportation/vehicle-emissions-california-waivers-and-authorizations ; accessed February 14, 2024
[9] "Governor Newsom, Attorney General Bonta, and CARB Lead Coalition in Defense of California's Truck Emissions Regulations," Office of Governor Gavin Newsom, (June 28, 2023) https://www.gov.ca.gov/2023/06/28/governor-newsom-attorney-general-bonta-and-carb-lead-coalition-in-defense-of-californias-truck-emissions-regulations/
[10] *Ibid.*

health. California's own analysis[11] estimates that the ACC II program will reduce emissions in the state by 30.4 tons per day of NOx, 2.0 tons per day of PM2.5, and 58.4 million metric tons per year of GHGs by 2040.

Congress recently reaffirmed EPA's authority to grant California a waiver of federal preemption when it passed the Inflation Reduction Act (IRA) of 2022.[12] The IRA includes a provision to encourage states to adopt and enforce GHG and zero emission standards for mobile sources pursuant to existing authority under the CAA.[13] This provision appropriated $5 million to provide grants to states "to adopt and implement greenhouse gas and zero emission standards for mobile sources pursuant to §177 of the Clean Air Act (42 U.S.C. 7507)."[14] A waiver of federal preemption from EPA is a necessary precondition for states to adopt standards pursuant to CAA §177. In addition to the $5 million in funding, Congress relies upon and endorses EPA's longstanding authority under Section 209(b) of the CAA to waive preemption of state GHG and zero emission standards, such as ACC II.[15]

3. Consumer Demand for EVs Remains Strong

American consumers are quickly becoming accustomed to EVs and demand is rising rapidly as they become more ubiquitous. Recent media reports that EV demand is plateauing are overblown.[16] A January 2024 study from GBK Collective indicated that there is a new wave of EV shoppers hitting the market with half of Americans interested in an EV or Hybrid for their next vehicle purchase, far outweighing the current ownership trends mentioned in the study.[17] This new demand is powered by more mainstream, cost conscious, and pragmatic consumers rather than early adopters. The stagnant EV market depicted towards the end of Q3 in 2023 and thereafter is therefore not static, but signifies a shift in the type of consumer showing interest in purchasing an EV and realigning demand. McKinsey & Co. even projects that worldwide demand for EVs will grow sixfold from 2021 through 2030, increasing 6.5 million annual unit sales to roughly 40 million over that nine-year period.[18]

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[11] *Ibid.* at footnote 5.
[12] IRA, Pub. L. No. 117-169, §60105(g), 136 Stat. 1818 (2022).
[13] *Ibid.*
[14] *Ibid.*
[15] "The Clean Air Act Amendments of 2022: Clean Air, Climate Change, and the Inflation Reduction Act," Dotson and Maghamfar, (January 2023) https://www.eli.org/sites/default/files/files-pdf/53.10017.pdf
[16] "How Electric Vehicles Are Losing Momentum with U.S. Buyers, in Charts," The Wall Street Journal, (December 27, 2023) https://www.wsj.com/business/autos/electric-vehicle-demand-charts-7d3089c7
[17] "Charging Ahead: Putting U.S. Demand for Electric and Hybrid Vehicles in Context," GBK Collective, (January 2024) https://www.gbkcollective.com/thoughtleadership/auto-study
[18] "Electric Vehicles - what's ahead," McKinsey & Company, (Accessed February 14, 2024) https://www.mckinsey.com/features/mckinsey-center-for-future-mobility/our-insights/electric-vehicles-whats-ahead

Of America's top selling vehicles in 2023, the Tesla Model Y came in at number five, with unit sales up 56.5% from last year - its top competitors being mostly pickup trucks.[19] Of the top ten selling vehicles for 2023, the Tesla Model Y's 56.5% increase in sales was the largest increase in unit sales across all ten vehicles. Further, in 2023, Tesla's Model 3 was the third best-selling sedan in the U.S. overall behind the Toyota Camry and the Toyota Corolla.[20]

This strong interest in EVs is expected to continue to grow throughout 2024, with reporting indicating that global passenger EV sales (battery electric and plug-in-hybrid) is anticipated to increase 21% in 2024, with 70% of that increase coming from strictly battery electric vehicles.[21] Bloomberg goes on to note that EV sales in the U.S. should be just under 1.9 million units, which accounts for 13% of new car purchases.[22]

BloombergNEF expects a 20% jump in EV adoption from pre-IRA estimates based on a prediction that there will be 3.2 million EVs on American roads by 2028.[23] In fact, demand for EVs is expected to exceed supply at the current trajectory. Consumer Reports found there are 45 buyers for every EV produced.[24] Today, EV demand is driven by factors that include cost-savings, environmental protection, increasing model availability, and the ability of an EV to meet a driver's day-to-day needs. A study by AAA found that once drivers own an EV, their previously held concerns (e.g., range anxiety, cost, lack of charging) largely disappear. For example, 77% said they had little to no range anxiety after owning an EV.[25] This underscores that many of the commonly-cited barriers to EV adoption can be addressed through experience and education.

A primary reason the EV market is growing is simply because consumers prefer the new features and technology in EVs. An article published in June 2023 from Inside Climate News indicated that while some people buy an EV on principle, the rapid rise in sales is poised to continue because consumers like the features that EVs offer.[26] This includes features such as longer

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[19] "A compact crossover is coming for America's pickup trucks. Here are the top selling cars of 2023," CNBC, (January 6, 2024) https://www.cnbc.com/2024/01/06/top-10-best-selling-cars-in-the-us-in-2023.html
[20] "Surprised? Here's 2023's Best-Selling New Cars, Trucks, and SUVs in America," MotorTrend, (January 11, 2024) https://www.motortrend.com/news/best-selling-cars-trucks-suvs-in-america-2023/
[21] "Electric Vehicle Marker Looks Headed for 22% Growth This Year," Bloomberg, (January 9, 2024) https://www.bloomberg.com/news/newsletters/2024-01-09/electric-vehicle-market-looks-headed-for-22-growth-this-year
[22] *Ibid.*
[23] "Zero-Emission Vehicles Factbook," BloombergNEF, (November 2022), https://assets.bbhub.io/professional/sites/24/2022-COP27-ZEV-Transition_Factbook.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top
[24] "Excess Demand: The Looming EV Shortage," Consumer Reports, (March 2023), https://advocacy.consumerreports.org/wp-content/uploads/2023/03/Excess-Demand-The-Looming-EV-Shortage.pdf
[25] "Owning an Electric Vehicle is the Cure for Most Consumer Concerns," AAA Newsroom, (January 22, 2020) https://newsroom.aaa.com/2020/01/aaa-owning-an-electric-vehicle-is-the-cure-for-most-consumer-concerns/
[26] "It's the Features, Stupid: EV Market Share Is Growing Because the Vehicles Keep Getting Better," InsideClimate News, (June 8, 2023) https://insideclimatenews.org/news/08062023/inside-clean-energy-electric-vehicle-market-features/

battery ranges, faster acceleration, lower total cost of ownership, and a higher ride quality than comparable ICEVs. As more features are added and technology of EVs improves, more consumers are likely to switch just based on those facts, independent of the environmental or climate change incentive to do so. This indicates that the EV market is broadening to a wider consumer base, which further amplifies the trend of greater adoption among consumers that the market is currently experiencing.

A common misconception is that range anxiety continues to pose a significant barrier to adoption across all vehicle classes. The average U.S. household travels 37 miles per day.[27] The average range on an electric vehicle in the U.S. is 291 miles, which is above all other major car markets and a third higher than the global average.[28] The EV models currently available can meet the needs of most American households.[29] Vehicles capable of traveling distances up to 520 miles, such as the Lucid Air Dream Edition R,[30] are being produced today and those with ranges greater than 600 miles are expected in the coming years.[31] In the light-duty vehicle segment, a recent study found that the majority of EVs that have been driven more than 100,000 miles still have at least 90 percent of their original range left.[32] Average range climbed to 291 miles for U.S. EVs in 2022 which addresses another key consumer-focused barrier as EV adoption becomes more widespread.[33]

In addition to vehicle owners who purchase an EV for personal use, there are a growing number of rideshare operators purchasing or renting EVs. These drivers travel significantly more miles than a typical American, who on average drives 40 miles a day[34] and they have expressed satisfaction with the EV driving experience. Because of the greater distance traveled, rideshare drivers also stand to see the greatest fuel and maintenance cost savings. In fact, cost savings were the number one reason ride-share drivers adopted an EV. Not only have EV drivers seen higher

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[27] "Average Miles Driven Per Year: Why It Is Important," Kelley Blue Book, (May 15, 2023) https://www.kbb.com/car-advice/average-miles-driven-per-year/

[28] "US Electric Cars Set Record With Almost 300-Mile Average Range," (March 9, 2023) https://www.bloomberg.com/news/articles/2023-03-09/average-range-for-us-electric-cars-reached-a-record-291-miles

[29] "Longest Range Electric Cars for 2023, Ranked," Car and Driver, (March 23, 2023) https://www.caranddriver.com/features/g32634624/ev-longest-driving-range/

[30] "An absolute triumph of efficiency, Lucid Air achieves 520 miles of range," Lucid Newsroom, (September 16, 2021) https://www.lucidmotors.com/stories/lucid-air-achieves-520-miles-of-range

[31] "Volvo targets 621-mile EV range by 2030 as part of tech focus," Autocar, (June 30, 2021) https://www.autocar.co.uk/car-news/electric-cars/volvo-targets-621-mile-ev-range-2030-part-tech-focus

[32] "New Study: How Long Do Electric Car Batteries Last?" Recurrent Auto, (March 27, 2023) https://www.recurrentauto.com/research/how-long-do-ev-batteries-last

[33] "US Electric Cars Set Record With Almost 300-Mile Average Range," (March 9, 2023) https://www.bloomberg.com/news/articles/2023-03-09/average-range-for-us-electric-cars-reached-a-record-291-miles

[34] "Average Miles Driven Per Year: Why It Is Important," Kelley Blue Book, (May 15, 2023) https://www.kbb.com/car-advice/average-miles-driven-per-year

earnings, but 94% of drivers have reported a positive experience with their EV,[35] and up to 93% of them would choose an EV as their next vehicle according to a survey of Uber drivers.[36] Among drivers who do not currently use an EV, more than 60% would switch to an EV.[37]

a. EV Sales are Increasing

Global annual EV sales climbed to over 13.6 million units in 2023, which accounted for 16% of total car purchases.[38] This increase represents a roughly 30% increase from the previous year's total of 10.5 million vehicles.[39] Overall, 2024 automotive forecasts from AutoPacific, Cox Automotive, and S&P Global Mobility show increases in EV sales ranging from 20%-30% for the year.[40]

One in every four light duty vehicles sold in California during 2023 was an EV.[41] According to the California Energy Commission, BEVs accounted for nearly 380,000 of vehicle sales in 2023 or nearly 22% of total light duty vehicle sales in the state.[42] Of the nearly 380,000 BEVs sold in California in 2023, more than half came from Tesla, mostly from the Model Y, 3, X, and S.[43]

b. California Consumer Incentive Programs are Well-Utilized

California implemented an early incentive network for EVs as well as a variety of supporting laws and regulations. Accordingly, California leads the nation in EV program development. The Department of Energy's Alternative Fuels Data Center notes 39 separate state incentives related

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[35] "Equitable Electrification: Early Findings from the Uber-Hertz Partnership," Uber Under the Hood, (September 15, 2022) https://medium.com/uber-under-the-hood/equitable-electrification-early-findings-from-the-uber-hertz-partnership-2774b6f39d9b

[36] "How Uber helps drivers go electric," Uber Under the Hood, (August 29, 2022) https://medium.com/uber-under-the-hood/how-uber-helps-drivers-go-electric-9e637b69f4de

[37] *Ibid.*

[38] "Electric vehicle sales set new record in December, hybrid demand accelerates," CBT News, (February 9, 2024) https://www.cbtnews.com/electric-vehicle-sales-set-new-record-in-december-hybrid-demand-accelerates/

[39] *Ibid.*

[40] "U.S. Electric Vehicle Sales Are Poised to Rise a Lot in 2024, Despite What You May Have Heard," Inside Climate News (February 8, 2024) https://insideclimatenews.org/news/08022024/inside-clean-energy-us-electric-vehicles-sales-are-poised-to-rise-in-2024/

[41] "California electric car sales boomed in 2023," The Sacramento Bee, (February 6, 2024) https://www.sacbee.com/news/business/article285045582.html

[42] "New ZEV Sales in California," California Energy Commission, (Accessed February 14, 2024) https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/new-zev-sales

[43] *Ibid.*

to alternative fuels and technology, 52 private and utility incentives, and 79 laws and regulations in the state.[44]

One particularly noteworthy incentive is the Clean Vehicle Rebate Project (CVRP) created for consumer EV adoption. California leads the U.S. in EV sales with over 1 million full BEV registrations in 2023– making up 40% of the total US EV fleet. For 2023, BEVs comprised roughly 22% of all vehicle sales in the state.[45] California's success in EV market share is partially due to their CVRP, the first state incentive for EV purchasers. Since 2010, the program has provided more than 582,000 rebates.[46] Every year, CVRP's funding runs out due to high demand, with a lengthy waitlist for when more funding becomes available.[47] As of November 2023, the CVRP rebate program has been closed to new applicants. Currently, of the over 582,000 rebates granted, nearly 72% of them have been for BEVs, with a total of over $1.1 million granted to ensure more BEVs are on the road in California.[48] Another successful EV incentive program in California is Clean Cars 4 All, which provides incentives to help lower-income consumers replace their older higher polluting vehicles with newer, more cleaner options.[49] If participants in the program purchase an EV, they are also eligible for home charger incentives or prepaid charge cards. Overall, the Clean Cars 4 All program has allocated $436 million and helped upgrade 13,000 Californian's vehicles to more cleaner options.[50]

c. EV Prices are Decreasing

One reason for the explosive growth in EV demand is the increasing cost competitiveness of EV models. In fact, ICCT reported that EVs could achieve cost parity this year for certain mass market models and are already at parity for a few luxury models due to the purchase and production incentives in the Inflation Reduction Act.[51] Additionally, as the price of lithium-ion battery cells has declined by more than 80% since March 2022, EVs are on track to reach cost

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[44] "California Laws and Incentives," U.S. DOE Alternative Fuels Data Center, (Accessed February 14, 2024) https://afdc.energy.gov/laws/all?state=CA
[45] "New ZEV Sales in California," California Energy Commission, (accessed February 14, 2024) https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/new-zev-sales
[46] "Rebate Map," California Clean Vehicle Rebate Project, (Accessed February 14, 2024), https://cleanvehiclerebate.org/en/rebate-map
[47] "California Electric Car Rebate: Everything You Need to Know," Car and Driver, (Accessed February 14, 2023 https://www.caranddriver.com/research/a31267652/california-ev-tax-credit/
[48] Ibid., footnote 46.
[49] "Clean Cars 4 All," California Air Resources Board, (Accessed February 25, 2024) https://ww2.arb.ca.gov/our-work/programs/clean-cars-4-all
[50] *Ibid.*
[51] "Electric Vehicles Could Match Gasoline Cars on Price This Year," The New York Times, (February 14, 2023) https://www.nytimes.com/2023/02/10/business/electric-vehicles-price-cost.html

parity with ICE vehicles.[52] Many outlets have posited that EVs will reach cost parity with ICE vehicles in 2030, but there are also differing analyses.[53,54] According to a 2024 study from the Responsible Battery Coalition, small EVs are cost-competitive with ICE vehicles regarding TCO, with largest EVs being slightly still more expensive than their ICE counterparts.[55] However, the study indicated that real savings are best determined on a case-by-case basis. Parity with ICE vehicles is significantly driven by the cost of the vehicles' lithium-ion battery. Other factors such as tax incentives, increased competition, and improvements in material processing have driven down the costs of battery manufacturing and thus the prices of EVs.

Cost is the number one cited barrier related to purchasing an EV. Approximately 60% of Americans would purchase an EV if it were the same price as an ICEV.[56] The price differential between EVs and ICEVs is rapidly shrinking. In 2020, an EV cost about 42% more than an ICEV.[57] Today, an EV costs about 20% more than a similar ICEV, with the average EV selling at around $50,798, compared to $48,800 for new cars of any kind.[58] This average selling price is inflated by the popularity of luxury EVs on the market; out of the top ten best-selling EVs in the U.S., the average starting price is $53,509.[59]

Upfront cost parity might be achieved even sooner than anticipated. Tax incentives in the IRA bring down the cost premium even further, with up to $7,500 available from the federal government through Section 30D in addition to state and local incentives. After accounting just for federal tax incentives, the average starting price drops to below $50,000 for the top-10 best-selling EVs, similar to the price of the average ICEV.

Today, while most EVs are still more expensive than a comparable ICE vehicle, the EV market spans a variety of price points. Some of the most affordable EVs start at around $27,495, before

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[52] "EVs Set to Match Gas Guzzlers in Price as Battery Prices Plummet," CNET, (September 24, 2023) https://www.cnet.com/roadshow/news/evs-set-to-match-gas-guzzlers-in-price-as-battery-costs-plummet/#ftag=CAD590a51e

[53] "RMI predicts price parity for EVs globally by 2030," EV inFocus, (September 20, 2023) https://www.evinfocus.com/rmi-predicts-price-parity-for-evs-globally-by-2030/

[54] "Electric vehicles to reach price parity with ICE vehicles in 2027, says Gartner," Neowin, (September 8, 2023) https://www.neowin.net/news/electric-vehicles-to-reach-price-parity-with-ice-vehicles-in-2027-says-gartner/

[55] "New research finds small EVs cost-competitive with ICE vehicles, real savings best determined case-by-case," Repairer Driven News, (January 3, 2024) https://www.repairerdrivennews.com/2024/01/03/new-research-finds-small-evs-cost-competitive-with-ice-vehicles-real-savings-best-determined-case-by-case/

[56] "International Electric-Vehicle Consumer Survey 2019," AlixPartners, accessed June 21, 2023 https://www.alixpartners.com/insights-impact/insights/international-electric-vehicle-consumer-survey/

[57] "The Average Price of an Electric Car," CarEdge, (September 22, 2022) https://caredge.com/guides/average-price-of-an-electric-car

[58] "EV prices nipping at gas-powered vehicle heels with discounts and cheaper options," Electrek, (January 9, 2024) https://electrek.co/2024/01/09/ev-prices-gas-powered-vehicle-discounts/

[59] "Electric Car Prices: Average Electric Car Cost in 2024," Find My Electric, (January 25, 2024) https://www.findmyelectric.com/blog/electric-car-prices/

factoring in the federal Section 30D tax credit.[60] The Tesla Model 3–one of the most popular models in the world–recently reduced its starting price to $38,990 before any incentives.[61] In a similar move, Ford cut the price of its Mustang Mach-E, the third-best selling EV in 2022.[62] After two price cuts in 2023, the starting price of the Mach-E premium is $46,995.[63] Each year there is a growing number of EV models available under $50,000.

Economies of scale and decreases in the cost of components are driving down the price of new models. Production tax credits from the IRA are expected to cut production costs for batteries and EVs, unlocking savings that can be passed on to customers. The EV battery is one of the most significant factors in the cost of an EV, comprising 20-50% of the total vehicle cost, though this percentage has decreased significantly over time. This decrease is driven by lithium prices, which have significantly dropped over the last year and a half, from $85,000 to $13,500 per tonne from November 2022 to February 2024.[64] This trend is driven by a boom in lithium supply from China, Australia, and Chile. Overall, the cost of lithium-ion batteries declined substantially between 2008 and 2022, down to $153 per kWh, as shown in Figure 1.[65]

[60] "Here Are the 11 Cheapest Electric Vehicles You Can Buy," Cars.com, (June 28, 2023) https://www.cars.com/articles/here-are-the-11-cheapest-electric-vehicles-you-can-buy-439849/
[61] "Tesla Model 3 and Model Y Prices Continue to Fluctuate," Car and Driver, (May 3, 2023) https://www.caranddriver.com/news/a43539838/tesla-model-3-price-reduced-again/
[62] "2022's top 10 best-selling electric vehicles in the US: Find out why they made the cut," Electrek, (January 9, 2023) https://electrek.co/2023/01/09/the-top-10-best-selling-electric-vehicles-in-the-us-of-2022/
[63] "Ford cuts prices of Mustang Mach-E after Tesla moves," Reuters, (May 3, 2023) https://www.reuters.com/business/autos-transportation/ford-cuts-prices-mustang-mach-e-2023-05-02/
[64] "Lithium price data," Trading Economics (February 26, 2024), https://tradingeconomics.com/commodity/lithium
[65] "FOTW #1272, January 9, 2023: Electric Vehicle Battery Pack Costs in 2022 Are Nearly 90% Lower than in 2008, according to DOE Estimates," U.S. Department of Energy, (January 9, 2023) https://www.energy.gov/eere/vehicles/articles/fotw-1272-january-9-2023-electric-vehicle-battery-pack-costs-2022-are-nearly

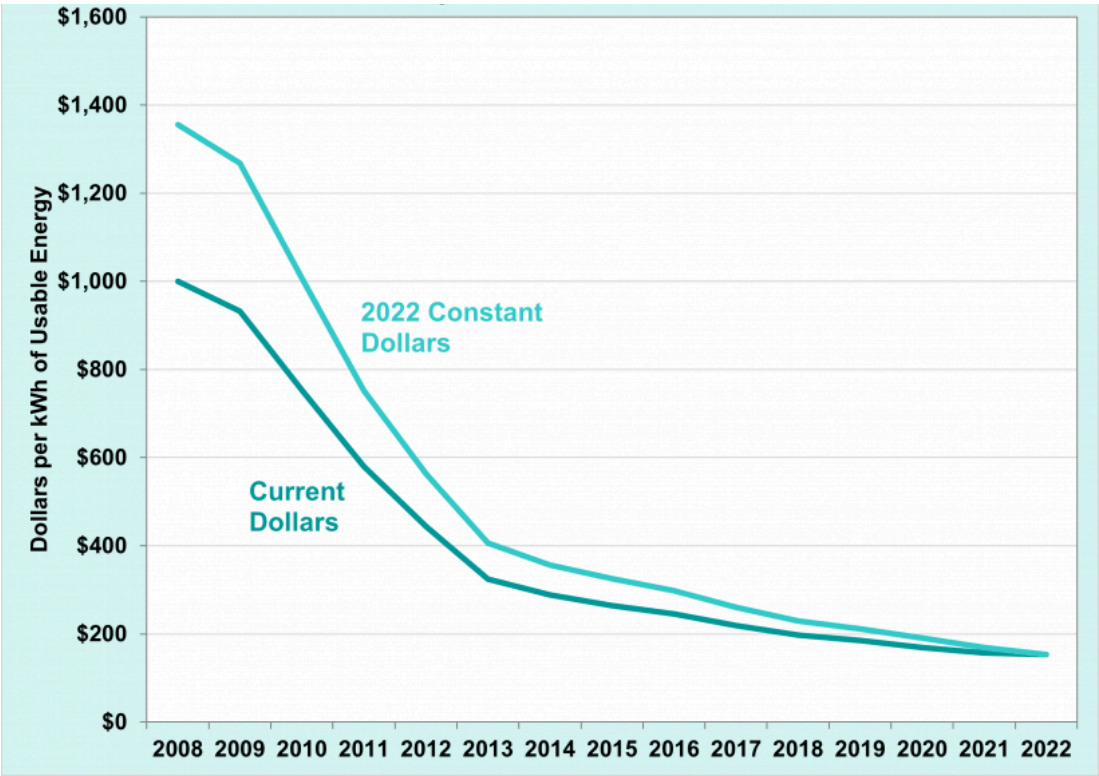

Figure 1: Estimated historical lithium-ion battery pack costs from 2008-2022[66]

In September 2023, Benchmark Minerals Intelligence Battery Price Assessments reported that for the first time in two years, battery cell price has dropped below $100/kWh. A 33% drop from March 2022 estimates, Benchmark reports that battery cells cost an average of $98.2/kWh.[67]

4. **The Advanced Clean Cars II Program is Necessary to Protect Public Health and the Environment**

ICEVs are a constant and ongoing hazard to public health and the environment. They are also major contributors to anthropogenic climate change. The Advanced Clean Cars II program presents a viable pathway to reducing pollution from the transportation sector and unlocking tangible environmental and public health benefits. As such, ZETA urges EPA to grant California's request without delay.

[66] *Ibid.*, at footnote 53
[67] "Global cell prices fall below $100/kWh for the first time in two years." (September 6, 2023). Benchmark Source, https://source.benchmarkminerals.com/article/global-cell-prices-fall-below-100-kwh-for-first-time-in-two-years

a. Reducing Transportation Emissions Protects Public Health

The transition to transportation electrification will save lives, as human interaction with on-road emissions has proven to yield detrimental health outcomes. When inhaled into the lungs, criteria pollutant emissions cause inflammation, chest tightness, shortness of breath, and increased risk of permanent health issues such as asthma.[68] Beyond respiratory health, new research also demonstrates that ground level ozone, exacerbated by passenger car and light truck tailpipe emissions, leads to worsening coronary disease. A 2023 study shows that "exceeding the World Health Organization ozone limit is associated with substantial increases in hospital admissions for heart attack, heart failure and stroke."[69] The study looked at coronary disease over three years and found that increased concentrations of ground-level ozone led to 109,400 of 3,194,577 documented hospital admissions.[70]

Passenger cars and light trucks are major contributors to California emissions of $PM_{2.5}$, NOx, VOCs, and CO_2.[71] Such pollutants are directly linked to long-term respiratory, cognitive, and autoimmune impairment. As evident in Figure 2, California's particular struggle with air quality is underscored by the number of National Ambient Air Quality Standards Nonattainment Areas in the state. The rate of EV deployment in the state is expected to have a direct relationship with improved health outcomes, particularly for millions of individuals living near high traffic areas.[72]

[68] "State of the Air Report 2023," American Lung Association, (April 2023) https://www.lung.org/research/sota
[69] "Ozone pollution and hospital admissions for cardiovascular events," European Heart Journal, (2023) https://academic.oup.com/eurheartj/article/44/18/1622/7070974
[70] Ibid.
[71] "Federal Vehicle Standards," C2ES, accessed May 18, 2023 https://www.c2es.org/content/regulating-transportation-sector-carbon-emissions/
[72] "PM2.5 polluters disproportionately and systemically affect people of color in the United States," Science Advances (April 28, 2021) https://advances.sciencemag.org/content/7/18/eabf4491

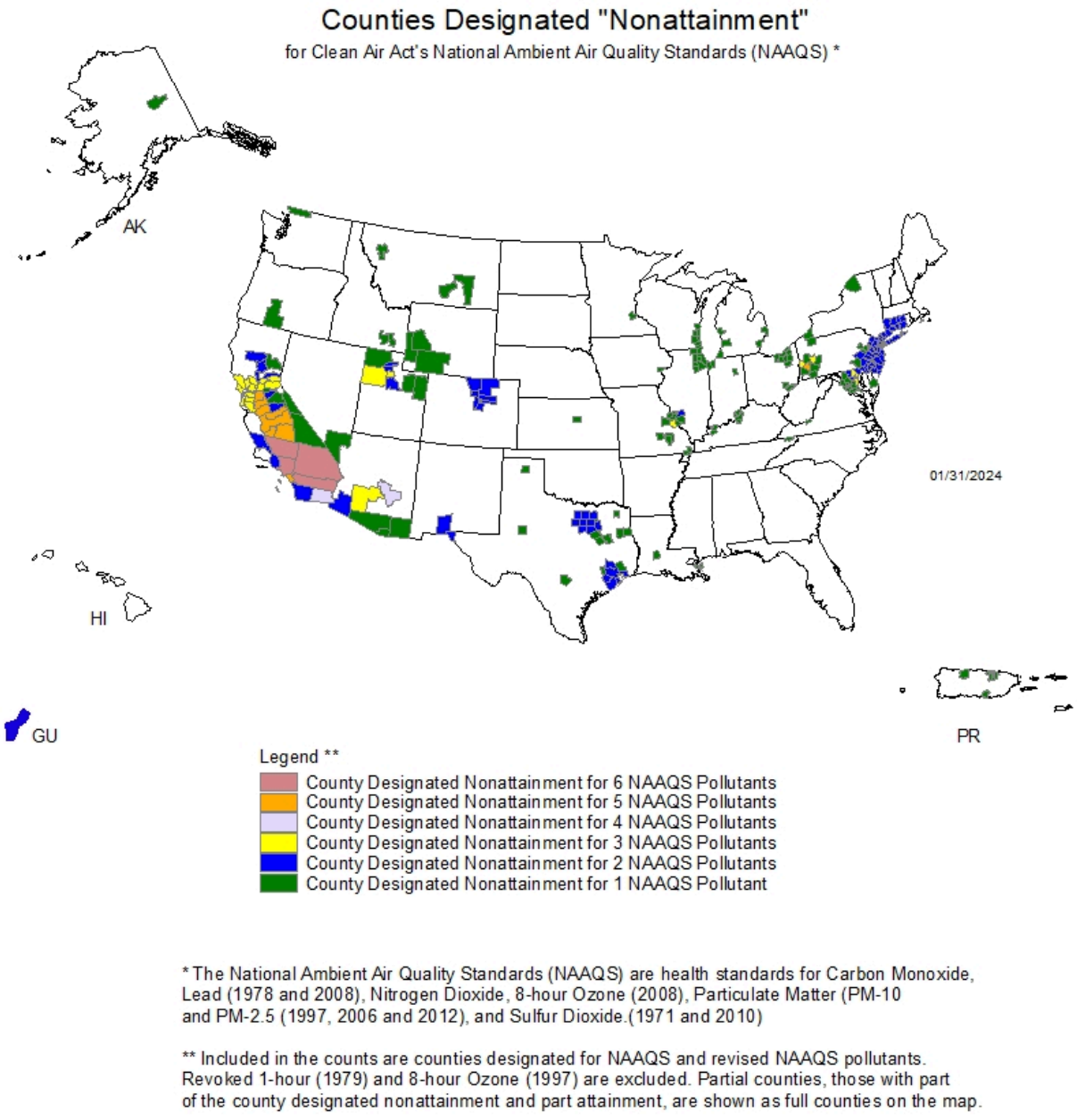

Figure 2. Counties Designated Nonattainment[73]

A large portion of the U.S. population remains vulnerable to the dangers of vehicle pollution. In the United States, 45 million people live within 300 feet of a major traffic facility or corridor.[74] In

[73] "Counties designated Nonattainment." Environmental Protection Agency. Accessed February 14, 2024. https://www3.epa.gov/airquality/greenbook/mapnpoll.html

[74] "Research on Near Roadway and Other Near Source Air Pollution," Overviews and Factsheets, Environmental Protection Agency (December 15, 2022) https://www.epa.gov/air-research/research-near-roadway-and-other-near-source-air-pollution.

California, 40% of the population lives a third of a mile from a traffic corridor. Proximity to these roadways exposes residents to needless health risks, and replacing internal combustion engine vehicles with electric alternatives will yield significant public health benefits. According to the American Lung Association (ALA),[75] a widespread transition to zero-emission transportation over the next 30 years would yield $22 billion in avoided health costs in California—$15.3 billion more than in Texas, which has the next highest savings opportunity. Transportation electrification in California would prevent 1,924 premature deaths, 26,292 asthma attacks, and 122,047 days of lost work in 2050.[76] By contrast, a recent study concludes that oil and gas consumption leads to negative health impacts totaling $77 billion annually in the U.S.[77]

It's also critical to highlight that tailpipe emissions from internal combustion powered passenger cars and light trucks do not affect all communities equally. The intersection of race, transportation-related air pollution, and the resulting negative health outcomes are well documented. In 2017, a national study found that in 2010, people of color experienced 37% more NO_X exposure than white populations and had 2.5 times higher concentrations of NO_X within their communities.[78] Had these communities of color been exposed to the same level of NO_X as white populations, 5,000 deaths from heart disease could have been prevented that year. The American Lung Association estimates that people of color are 3.2 times more likely to live in a county with at least one pollution-related "failing grade."[79]

One California study found that road emissions have a disproportionate impact on both lower-income communities and communities of color.[80] The study by Union of Concerned Scientists found that:

> "On average, African American, Latino, and Asian Californians are exposed to more PM2.5 pollution from cars, trucks, and buses than white Californians. These groups are exposed to PM2.5 pollution 43, 39, and 21 percent higher, respectively, than white Californians…Exposure to PM2.5 from cars, trucks, and buses is not equally distributed across the state. People living in Los

[75] "Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles," American Lung Association, accessed May 5, 2023 https://www.lung.org/getmedia/99cc945c-47f2-4ba9-ba59-14c311ca332a/electric-vehicle-report.pdf
[76] "Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles," American Lung Association, (September 10, 2020), https://www.lung.org/getmedia/99cc945c-47f2-4ba9-ba59-14c311ca332a/electric-vehicle-report.pdf
[77] Jonathan J Buonocore, et. al. (2023) *Environ. Res.: Health* https://iopscience.iop.org/article/10.1088/2752-5309/acc886
[78] "Changes in Transportation Related Air Pollution Exposures by Race, Ethnicity, and Socioeconomic Status: Outdoor Nitrous Oxide in the US in 2000 and 2010", Lara P. Clark, et. al., (September 14, 2017) https://ehp.niehs.nih.gov/doi/10.1289/EHP959
[79] Ibid., at footnote 76.
[80] "Inequitable Exposure to Air Pollution from Vehicles in California." Union of Concerned Scientists. accessed February 14, 2024. https://www.ucsusa.org/sites/default/files/attach/2019/02/cv-air-pollution-CA-web.pdf

> Angeles County are exposed to 60 percent more vehicle pollution than the state average and 250 percent more than the San Francisco Bay Area."[81]

A 2021 study by the Environmental Defense Fund and the George Washington University drew even more drastic conclusions about traffic's impact on health outcomes:

> "The analysis estimated that exposure to particulate pollution (soot) resulted in more than 3,000 deaths and 5,500 new childhood asthma cases every year in the Bay Area. Exposure to the traffic-related pollutant nitrogen dioxide also had alarming health impacts - resulting in more than 2,500 deaths and 5,200 new childhood asthma cases every year.found that air pollution in the Bay Area cases over 3,000 deaths and 5,000 new asthma cases annually."[82]

b. Reducing Transportation Emissions Protects the Environment and the Climate

Never has the evidence been more clear that climate change is anthropogenic, and recent atmospheric research provides new indications of human-caused climate change associated with increases in CO_2 emissions. Differences between tropospheric and lower stratospheric temperature trends have long been recognized as a fingerprint of human effects on the climate.[83] A new study published in the *Proceedings of the National Academy of Sciences* has factored in temperature from the mid to upper stratosphere–25 to 50 kilometers above the Earth's surface–into these comparisons.[84] The results further underscore the impact humans are having on our atmosphere and the potentially catastrophic effects that are increasingly likely to result such as more frequent wildfires, longer periods of drought in some regions, and an increase in the wind intensity and rainfall from tropical cyclones.[85,86]

As the nature of anthropogenic climate change is becoming increasingly evident, the urgency needed in addressing its causes is becoming greater.[87] Between 1971 and 2020, around 380,000,000,000,000,000,000,000 joules of energy—equivalent to 25 atomic bombs—have been trapped in the atmosphere as a result of warming, according to a 2023 study published in *Earth*

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[81] *Ibid.*
[82] "New study reveals large and unequal health burden from air pollution in California's Bay Area." Environmental Defense Fund. (March 31, 2021).
[83] B. Santer, et.al. "Exceptional stratospheric contribution to human fingerprints on atmospheric temperature," PNAS, (May 8, 2023) accessed May 15, 2023 https://www.pnas.org/doi/10.1073/pnas.2300758120
[84] *Ibid.*
[85] "The Effects of Climate Change," NOAA, accessed June 23, 2023 https://climate.nasa.gov/effects/
[86] "AR6 Synthesis Report - Climate Change 2023" IPCC (March 2023) https://www.ipcc.ch/report/ar6/syr/
[87] "Carbon dioxide levels in atmosphere mark a near-record surge," Washington Post, (June 5, 2023) https://www.washingtonpost.com/climate-environment/2023/06/05/carbon-dioxide-growing-climate-change/

System Science Data.[88] In 2021, California alone emitted 381.3 million metric tons of CO_2—of which, transportation was responsible for nearly 39%.[89]

EVs are clearly the cleaner alternative to internal combustion engines; they produce zero tailpipe emissions and studies have shown that in every state in the U.S.—even states with fossil fuel intensive electricity grids—driving an electric vehicle leads to significantly fewer GHG emissions.[90] In Kentucky, for example, where the electricity mix is 71.8% coal and 20.6% natural gas, driving an EV results in 6,903 fewer pounds of CO_2 annually than driving an ICEV.[91] In California, which has an electricity grid of 40% natural gas and nearly 60% no-to-low-emission sources, EV drivers emit 11,209 fewer pounds of CO_2 than an ICEV driver.

5. Transportation Electrification Benefits the Consumers and the Economy

Beyond health and environmental improvements, transportation electrification will benefit the country's economic development and Americans' pocketbooks. The transition to EVs is already leading to new manufacturing jobs, improved property values, and new investments in communities.[92,93,94]

This trend should be expected to continue and accelerate in the coming years. The burgeoning EV industry will create new jobs for the manufacturing of components such as batteries, electric motors, and power electronics, as well as charging infrastructure. In addition, the manufacture of conventional vehicle component parts like brakes and windshields will continue to be a source of employment in the automotive industry.

Electrification will also help ensure the United States maintains its economic competitiveness with the rest of the world. As discussed further below, governments around the world are establishing more ambitious electrification goals to align with recent announcements from global manufacturers. Ensuring U.S. regulations match or exceed these ambitions is vital to encouraging domestic investments and accelerated job creation in the industry.

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[88] von Schuckmann, K., et. al. "Heat stored in the Earth system 1960–2020: where does the energy go?," Earth Syst. Sci. Data, (April 17, 2023) https://doi.org/10.5194/essd-15-1675-2023
[89] "Current California GHG Emission Inventory Data" California Air Resources Board. (2023). https://ww2.arb.ca.gov/ghg-inventory-data
[90] "Driving an EV Is Getting Greener, Especially in the U.S.," The Wall Street Journal (May 10, 2023) https://www.wsj.com/articles/how-clean-are-electric-cars-it-depends-4d1086d6?mod=hp_lista_pos2
[91] "Emissions from Electric Vehicles," Department of Energy's Alternative Fuels Data Center, accessed June 26, 2023 https://afdc.energy.gov/vehicles/electric_emissions.html
[92] Sklarz and Miller, "The Impact of Noise on Residential Property Value," (September 20, 2018) https://www.collateralanalytics.com/wp-content/uploads/2018/10/CA-RESEARCH-The-Impact-of-Noise-on-Residential-Property-Values.pdf
[93] "Electric Vehicle Investments Provide Benefits Across the U.S.," ZETA, accessed June 27, 2023 https://www.zeta2030.org/education-fund/investments
[94] "U.S. Energy & Employment Jobs Report," U.S. Department of Energy, (June 2023) https://www.energy.gov/policy/us-energy-employment-jobs-report-useer

a. Electrification Will Continue to Create Good-Paying American Jobs

EVs are the key to simultaneously tackling the climate crisis and restoring the United States as a global leader in automotive manufacturing. As of March 2023, more than 143,000 jobs in the EV industry had been created since the passage of the Bipartisan Infrastructure Law (BIL) in November 2021.[95] Combined with the Inflation Reduction Act (IRA) of 2022 and stringent vehicle emissions standards from EPA, manufacturing investments and job creation will continue to grow. The IRA alone is projected to create around 9 million new clean energy jobs over the next decade.[96]

As a result of the EV industry's growth, every state can be an "auto state," home to suppliers and manufacturers who produce parts for all vehicle power trains. Over the next five years, the Environmental Defense Fund predicts that 26 states will house new factories or production lines to manufacture EVs, batteries, components, and chargers.[97] Some states' EV economies are growing faster than others: as of November 2023, one-third of the private investment that occurred as a result of the IRA—$48 billion—benefited communities in Georgia, Arizona, Nevada, and Michigan. Those four states, along with Wisconsin, Pennsylvania, and North Carolina, are some of the most competitive in the country.[98]

Researchers at the Goldman School of Public Policy found that a scenario with 100% electric light-duty vehicle sales by 2030 and 100% medium- and heavy-duty by 2035 would result in 2 million *more* jobs than the current trajectory.[99] This is a result of the new jobs in the charging infrastructure, electricity, and maintenance sectors. The manufacturing and installation of charging infrastructure alone is projected to create more than 29,000 jobs.[100] In general, jobs in the EV industry are high-quality and high-paying and are attracting a new generation of workers who are eager to work in the sustainable transportation industry.

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[95] "Report Finds Investments in U.S. Electric Vehicle Manufacturing Reach $120 Billion, Create 143,000 New Jobs," Environmental Defense Fund, (March 14, 2023) https://www.edf.org/media/report-finds-investments-us-electric-vehicle-manufacturing-reach-120-billion-create-143000

[96] "Job Creation Estimates Through Proposed Inflation Reduction Act," University of Massachusetts, (August 4, 2022) https://peri.umass.edu/publication/item/1633-job-creation-estimates-through-proposed-inflation-reduction-act

[97] 'New climate laws drive boom in electric vehicle jobs.' Environmental Defense Fund, (August 17, 2023) https://vitalsigns.edf.org/story/new-climate-laws-drive-boom-electric-vehicle-jobs

[98] 'In 2024, Republican EV Attacks May Fall Short as Swing States Reap Investment.' U.S. News, (November 27, 2023) https://www.usnews.com/news/top-news/articles/2023-11-27/in-2024-republican-ev-attacks-may-fall-short-as-swing-states-reap-investment

[99] "Switching to Electric Cars and Trucks Would Support 2 Million Green Jobs in 2035," UC Berkeley School of Public Policy, accessed May 15, 2023, https://www.2035report.com/transportation/green-jobs

[100] "The Commanding Heights of Global Transportation: Quantifying the Employment Effects," SAFE, (March 9, 2021) https://secureenergy.org/the-commanding-heights-of-global-transportation-quantifying-the-employment-effects/

EV charging infrastructure buildout similarly promises to generate substantial job creation throughout the country. The International Energy Agency (IEA) estimates that 12 new jobs are created for every $1 million invested in charging infrastructure.[101] By comparison, ICE vehicle manufacturing creates an average of 7.2 jobs per million dollars invested. At this rate, the BIL's $5 billion allocations through the National Electric Vehicle Infrastructure (NEVI) formula program to build out a national EV charging network could create at least 60,000 direct jobs.

Beyond installation, ongoing electric vehicle supply equipment (EVSE) operations and maintenance will create thousands more jobs. This creates an entirely new occupation, that of an EVSE technician, that goes beyond the role of a traditional electrician. EVSE technicians are responsible for the ongoing maintenance and operations of chargers and are specially trained to handle electrical and parts malfunctions, software upgrades, cell signal issues, damages, and more.[102,103]

As discussed further in section 6(b) of these comments, the U.S. battery manufacturing industry is quickly scaling to meet demand driven by transportation electrification. Since January 2021, the U.S. private sector has announced nearly $82 billion in domestic battery manufacturing investments, translating to 96 new or expanded processing and manufacturing plants creating thousands of new jobs in the process.[104]

b. EVs Have Lower Total Cost of Ownership than Comparable ICE Vehicles

Though a vehicle's total cost of ownership (TCO) depends on several factors, such as the region, driving characteristics, and fuel prices, EVs are consistently cheaper to own than gas-powered cars. A typical driver can expect to save between $6,000 and $12,000 over a vehicle's lifetime by switching to an EV.[105] These savings are magnified in rural areas where drivers travel an average of 38% more miles than urban drivers.[106]

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[101] "Sustainable Recovery - Transport," IEA, accessed June 23, 2023 https://www.iea.org/reports/sustainable-recovery/transport

[102] ChargerHelp Guiding Standards 2022, accessed June 23, 2023 https://www.chargerhelp.com/_files/ugd/30e128_0032898550534e609ce4188fa91bc926.pdf

[103] "FACT SHEET: Biden-Harris Administration Announces New Standards and Major Progress for a Made-in-America National Network of Electric Vehicle Chargers," The White House, accessed June 6, 2023 https://www.whitehouse.gov/briefing-room/statements-releases/2023/02/15/fact-sheet-biden-harris-administration-announces-new-standards-and-major-progress-for-a-made-in-america-national-network-of-electric-vehicle-chargers/

[104] New US Battery Manufacturing and Supply Chain Investments Announced Under President Biden, US Department of Energy, (February 13, 2023) https://www.energy.gov/sites/default/files/2023-02/Battery%20Supply%20Chains%20Investments%20Map.pdf

[105] "Electric Vehicles Save Consumers Money," Consumer Reports, (June 2023) https://advocacy.consumerreports.org/wp-content/uploads/2023/06/CR_EVSavings_FACTSHEET_6.2023.pdf

[106] "Clean Transportation Strategies for Rural Communities in the Northeast and MidAtlantic States," Union of Concerned Scientists, (November 2020) https://www.ucsusa.org/sites/default/files/2020-11/rural-transportation-opportunities.pdf

EVs have fewer internal moving parts than their ICE counterparts, which makes them simpler to maintain and reduces the likelihood of a major malfunction.[107] The average maintenance costs for an EV are 50% lower than those for a comparable ICEV, saving customers time and money.[108] EVs have significantly fewer components that require regular maintenance like engine oil, transmission fluid, and air filters. According to Argonne National Laboratory, the maintenance costs for an EV averages 6.1 cents per mile, compared to 10.1 cents per mile for a similar ICEV.[109] That means for vehicles driven 10,000 miles per year can save $400 per year, totalling $2,000 over five years. Over a vehicle's lifetime, an EV owner can save an average of $4,600 on maintenance costs alone by transitioning away from driving a gas vehicle.[110]

The average cost of electricity in the U.S. is 16.19 cents per kWh as of November 2023.[111] Given this average price, charging an EV with a fully-depleted 100 kWh battery will cost $16.19 to reach a full charge on average. While the range of a 100 kWh battery varies depending on a vehicle's efficiency, a typical Tesla Model S can go up to 400 miles on a single charge.[112] Comparatively, the average national gasoline price for regular grade was $3.47 in November 2023.[113] Filling up a 12-gallon passenger vehicle with a 30 mpg fuel economy would cost $41.64 to move the vehicle 360 miles. At $16.19 for a full charge, fueling an EV cuts fuel prices by 61.2%. According to AAA, over the course of a year the cost of refueling an EV costs around $546, compared to $1,255 per year when fueling a gasoline car.[114] Further, EVs will become even more accessible to American families as the used-car market grows. More than 70% of car sales in the U.S. are pre-owned vehicles,[115] and the emergence of a used EV market will benefit a broad range of customers by offering them a lower total cost of transportation.

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[107] "Maintenance and Safety of Electric Vehicles" U.S. Department of Energy, accessed June 18, 2023 https://afdc.energy.gov/vehicles/electric_maintenance.html

[108] "Consumer Reports Study Finds Electric Vehicle Maintenance Costs Are 50% Less Than Gas-Powered Cars," Great Plains Institite, (November 16, 2020) https://betterenergy.org/blog/consumer-reports-study-finds-electric-vehicle-maintenance-costs-are-50-less-than-gas-powered-cars/

[109] "Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains." (April 2021) https://doi.org/10.2172/1780970

[110] "EVs Offer Big Savings Over Traditional Gas-Powered Cars," Consumer Reports, (October 8, 2020) https://www.consumerreports.org/hybrids-evs/evs-offer-big-savings-over-traditional-gas-powered-cars/

[111] "Electric Power Monthly," Energy Information Association, accessed February 14, 2024 https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a

[112] "Fuel Economy of the 2021 Tesla Model S Long Range," U.S. Department of Energy, accessed July 3, 2023 https://www.fueleconomy.gov/feg/noframes/44051.shtml

[113] "Weekly U.S. Regular All Formation Retail Gasoline Prices." Energy Information Association. Accessed February 14, 2024. https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMM_EPMR_PTE_NUS_DPG&f=W

[114] "True Cost of Electric Vehicles," AAA Automotive, accessed July 3, 2023, https://www.aaa.com/autorepair/articles/true-cost-of-ev

[115] 'New and used light vehicle sales in the United States from 2010 to 2022,' Statista, (2022) https://www.statista.com/statistics/183713/value-of-us-passenger-cas-sales-and-leases-since-1990/

EVs are not just cheaper to operate, but more predictable as well. Since the price of oil is sensitive to a wide range of economic, geopolitical, and operational factors, EVs help protect consumers from rapid fuel price spikes. As shown in Figure 3 below, EVs are not only cheaper to drive per mile but their fuel costs are more consistent and predictable compared to similar ICEVs. Electricity prices, on the other hand, are subject to regional market forces rather than global ones and tend to be less volatile and subject to fewer supply shocks than oil prices.[116]

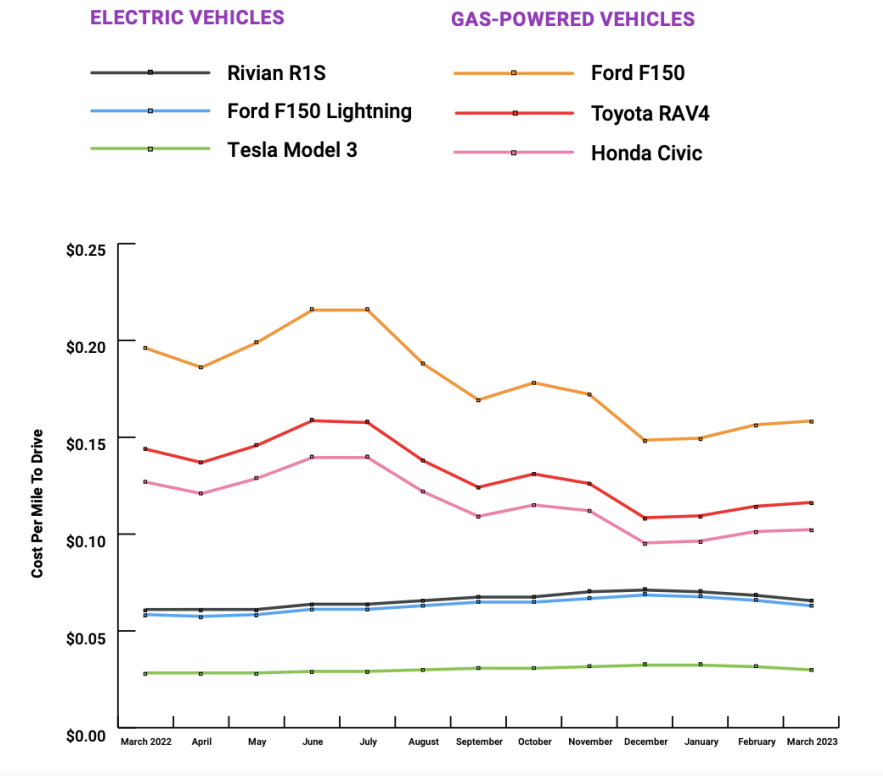

Figure 3: A comparison of operating costs for electric and gas-powered vehicles from March 2022 to March 2023.[117]

c. Electrification Promotes American Economic Competitiveness

Governments around the world are setting more stringent emissions standards to align with recent announcements from global manufacturers. Ensuring U.S. regulations match or exceed these ambitions is vital in allowing certainty and encouraging investment in the industry domestically. If the U.S. does not move more aggressively on EV deployment, it risks ceding

[116] "Energy Price Stability: The Peril of Fossil Fuels and the Promise of Renewables," Roosevelt Institute, (May 2022), https://rooseveltinstitute.org/wp-content/uploads/2022/05/RI_EnergyPriceStability_IssueBrief_202205.pdf
[117] "Electric vehicles are far cheaper to drive than gas-powered cars," ZETA, (March 2023) https://8829857.fs1.hubspotusercontent-na1.net/hubfs/8829857/ZETA-EV%20vs.%20Gas%20Report_V4.pdf

market share to other countries and regions who are moving faster, such as China, the European Union, and others.

Many countries have made commitments to accelerate EV development and deployment in their borders. An increase in EV sales is taking place across the world, but has been dominated by the Chinese market, which accounts for the majority of all new EV registrations. As of Fall 2023, China had 14 million BEVs on the road while the U.S. had nearly 2.5 million.[118,119] Part of this disparity is due to China's purchase incentives, high registration fees for ICEVs, robust charging network, and national "new energy vehicle" targets.[120]

With its own emissions targets, countries in Europe are sending strong signals about the continent's future electric fleet. Europe is the second-largest market for EVs in the world, with 30% of the global share.[121] A faster transition to EVs would ensure the U.S. remains at the forefront of this global transition. Below is a list of regional and national goals for light- and medium-duty zero-emission vehicle deployment that further underscores the need for the U.S. to maintain pace with the rest of the world:

- European Union: Target to reduce CO2 emissions from new cars and vans by 55% in 2030 and 100% in 2035 compared to 2021 emissions.[122]
- Norway: 100% of LDV sales to be zero-emission by 2025.[123]
- Switzerland: ZEV sales of 28% in 2025, 60% in 2030, and 100% from 2040.[124]
- Denmark: End the sale of new petrol and diesel cars from 2030, and PHEVs from 2035.[125]
- Netherlands: 100% ZEV sales by 2030.[126]

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[118] "China has 18.21M registered new energy vehicles," The State Council Information Office, The People's Republic of China, (October 11, 2023) http://english.scio.gov.cn/pressroom/2023-10/11/content_116737022.htm
[119] "How Many Electric Vehicles are there in the United States?" Exploding Topics, (November 23, 2023) https://explodingtopics.com/blog/electric-vehicles-stats#ev-us-numbers
[120] "An evaluation of government incentives for new energy vehicles in China focusing on vehicle purchasing restrictions," *Energy Policy,* (October 2017) https://doi.org/10.1016/j.enpol.2017.07.057
[121] "Trends in electric light-duty vehicles," IEA, (April 2023), https://www.iea.org/reports/global-ev-outlook-2023/trends-in-electric-light-duty-vehicles
[122] "Fit for 55: zero CO2 emissions for new cars and vans in 2035," European Parliament, accessed June 18, 2023) https://www.europarl.europa.eu/news/en/press-room/20230210IPR74715/fit-for-55-zero-co2-emissions-for-new-cars-and-vans-in-2035
[123] "Annual update on the global transition to electric vehicles: 2022," International Council on Clean Transportation, (June 2023) https://theicct.org/wp-content/uploads/2023/06/Global-EV-sales-2022_FINAL.pdf
[124] "Switzerland - EV Adoption by Year," HEV-TCP, accessed June 18, 2023 https://ieahev.org/countries/switzerland/
[125] "Denmark embraces electric car revolution with petrol and diesel ban plan," Reuters, (October 2, 2018) https://www.reuters.com/article/us-denmark-autos/denmark-embraces-electric-car-revolution-with-petrol-and-diesel-ban-plan-idUSKCN1MC121
[126] "Supporting Governments With 100% ZEV Targets," ZEV Alliance and ICCT, (November 2021) https://zevalliance.org/wp-content/uploads/2021/11/support-governments-zev-targets-nov21.pdf

- United Kingdom: Phase out new petrol and diesel cars and vans by 2030. All new cars to be fully zero emission after 2035.[127]
- Canada: ZEV targets for light-duty sales of 20% by 2026, 60% by 2030 and 100% by 2035.[128]
- Chile: 100% of LDV sales will be zero-emissions by 2035, with an accompanying ban on ICE sales.[129]
- Korea: 50% of new sales to be ZEVs by 2025, and 80% by 2030.[130]
- China: "New energy vehicle" sales in key air pollution control regions to account for about 50% of new vehicle sales by 2030.[131]
- Japan: 100% of car sales to be electrified by 2035.[132]

Despite China's relative competitive advantage in critical mineral and clean energy supply chains, the U.S. has made significant progress in reshoring and friend-shoring these critical value chains that will make wide-scale transportation electrification a reality. Further, federal policies such as the IRA and recent regulatory actions will ensure the feasibility of California's ACC II program.

Specifically, the clean vehicle incentives in the IRA have two key policy objectives: increase EV deployment and counter foreign influence by building domestic clean energy supply chains. Designed to complement each other, the Section 30D New Clean Vehicle Tax Credit and the Section 45X Advanced Manufacturing Production Tax Credit will be the main drivers of these policy outcomes.

Through the proposed Foreign Entities of Concern (FEOC) guidance, the U.S. Departments of Energy (DOE) and Treasury (Treasury) set a strong standard that will fortify our supply chains and ensure the U.S. owns and leads the transition to clean transportation. These standards aim to balance the goal of onshoring mid- and upstream production with bolstering the rapid growth of domestic battery and vehicle manufacturing sectors. By combining Section 30D with the Section 45X manufacturing tax credit, the U.S. has jump-started a North American manufacturing boom that will supplement ongoing efforts to restructure international supply chains and place the U.S.

[127] "Transitioning to zero emission cars and vans: 2035 delivery plan," HM Government, accessed June 30, 2023 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005301/transitioning-to-zero-emission-cars-vans-2035-delivery-plan.pdf
[128] "Proposed regulated sales targets for zero-emission vehicles," Government of Canada, (January 9, 2023) https://www.canada.ca/en/environment-climate-change/news/2022/12/proposed-regulated-sales-targets-for-zero-emission-vehicles.html
[129] "Chile to ban sale of light and medium internal combustion engines in 2035," Electrive, (October 18, 2021) https://www.electrive.com/2021/10/18/chila-to-ban-sale-of-internal-combustion-engines-in-2035/
[130] "Zero-Emission Vehicles Factbook," BloombergNEF, (November 2022) https://assets.bbhub.io/professional/sites/24/2022-COP27-ZEV-Transition_Factbook.pdf
[131] "Global EV Outlook 2023 - Policy developments," IEA, accessed June 20, 2023 https://www.iea.org/reports/global-ev-outlook-2023/policy-developments
[132] "Japan Transition to Electric Vehicles, U.S. International Trade Administration, (July 7, 2021) https://www.trade.gov/market-intelligence/japan-transition-electric-vehicles

in a leadership position. California's ACC II program's feasibility is amplified because of these federal policies.

6. The EV Supply Chain is Preparing to Support Increased Electrification

The widespread transition to electrified transportation involves industries and companies that have not historically had a major role in supplying products to the transportation sector. Policies like California's ACC II program provide regulatory certainty for the entire supply chain supporting the transition to electrification.

As discussed further in this section, the supply chain is composed of discrete, yet interconnected segments that are continuing to scale up in capacity. Complementary policies in various stages of implementation today will lead to an even more robust and resilient supply chain. A transition to a decarbonized transportation sector is not only necessary for public health, climate, and economic security but is feasible for industry to implement and align with the planned and existing investments being made throughout the EV supply chain.[133,134] Through ZETA, the full scope of the U.S. EV supply chain is coalesced behind the goal of 100% EV sales.

a. Critical Minerals Development

As projected demand for critical minerals (lithium, nickel, cobalt, manganese, copper, graphite, and rare earth elements) for use in EV batteries continues to grow, the supply chain is preparing to meet that demand both through new extraction and processing and with additional support from recycling.

The Section 30D New Clean Vehicle Tax Credit in the Inflation Reduction Act ensures that these critical minerals are sourced either in the United States or from free trade agreement countries. The credit is composed of two halves: qualifying vehicles will receive $3,750 for meeting each of the critical mineral and battery component sourcing requirements totaling up to $7,500.[135] The stringent ramp-up of the domestic sourcing requirements in the IRA over the coming years will lead to a robust supply chain capable of delivering domestically-sourced raw and refined materials.

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[133] "US and Canada Electric Vehicle Supply Chain Map," Charged by the Book, accessed June 30, 2023 https://www.charged-the-book.com/na-ev-supply-chain-map

[134] FACT SHEET: Biden-Harris Administration Announces New Private and Public Sector Investments for Affordable Electric Vehicles (April 17, 2023) https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/17/fact-sheet-biden-harris-administration-announces-new-private-and-public-sector-investments-for-affordable-electric-vehicles/

[135] "Overview and Analysis: March Treasury Guidance for Clean Car Tax Credit (30D)," ZETA, (April 2023) https://www.zeta2030.org/insights/overview-and-analysis-march-treasury-guidance-for-clean-car-tax-credit-30d

A key element to the success of the supply chain's ability to deliver the critical minerals necessary to support the transition to electrified transportation will be reforming the permitting processes for new extraction and processing operations. The Biden-Harris Administration has placed a much-needed focus on this area,[136] and ZETA has consistently supported reforms that ensure development projects are constructed quickly while meeting the strongest environmental standards.[137]

In June 2021, the Administration released "Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth," a report which found that U.S. minerals supply chains are "at serious risk of disruption.'[138] In addition to assessing the state of critical material value chains, the report outlined recommendations for supply chain transparency, domestic production, Defense Production Act (DPA) activation, industry collaboration, and workforce development, among others.

In March 2022, President Biden invoked the Defense Production Act (DPA). The DPA allows the Department of Defense (DOD) to fund feasibility and modernization projects for mining and processing facilities.[139] With funding from the DPA, DOD invested $120 million in a rare earths separation plant in Texas with Lynas Rare Earths.[140] In October 2022, the White House announced the American Battery Material Initiative to leverage Federal investments and activities to build both a domestic and international critical minerals supply chain in coordination with our allies.[141] In February 2023, President Biden further expanded this authority to allow for large, longer-term investments in critical mineral projects. This announcement paralleled the rollout of the $2.8 billion from DOE to U.S. critical minerals development.

In August 2023, DOE's Advanced Materials and Manufacturing Technologies Office reactivated funding for the Critical Minerals Institute (CMI). The CMI, made up of three other DOE national laboratories, 15 universities, and 36 industry members, conducts research to "diversify supply,

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[136] "FACT SHEET: Biden-Harris Administration Outlines Priorities for Building America's Energy Infrastructure Faster, Safer, and Cleaner," (May 2023) https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/10/fact-sheet-biden-harris-administration-outlines-priorities-for-building-americas-energy-infrastructure-faster-safer-and-cleaner/

[137] "Critical Mineral Permitting Reform Framework," ZETA, (May 2023) https://www.zeta2030.org/insights/critical-mineral-permitting-reform-framework

[138] https://www.whitehouse.gov/wp-content/uploads/2021/06/100-day-supply-chain-review-report.pdf

[139] "Defense Production Act Title III Presidential Determination for Critical Materials in Large-Capacity Batteries," U.S. Department of Defense, (April 5, 2022) https://www.defense.gov/News/Releases/Release/Article/2989973/defense-production-act-title-iii-presidential-determination-for-critical-materi

[140] "Australia's Lynas gets $120 mln Pentagon contract for U.S. rare earths project," Reuters, (June 14, 2022) https://www.reuters.com/markets/us/australias-lynas-secures-120-mln-pentagon-contract-us-rare-earths-facility-2022-06-14/

[141] "Biden-Harris Administration Awards $2.8 Billion to Supercharge U.S. Manufacturing of Batteries for Electric Vehicles and Electric Grid," U.S. Department of Energy, (October 19, 2022) https://www.energy.gov/articles/biden-harris-administration-awards-28-billion-supercharge-us-manufacturing-batteries

develop substitutes, and drive recycling and reuse of critical materials."[142] In the next five years, the DOE will allocate as much as $31 million to CMI. Through the DOE, another $150 million for the advancement of cost-effective and environmentally responsible critical minerals processing and refinement.

To ensure there is a trained workforce for the critical mineral industry, the DOE and Department of Labor created a workforce development strategy, funded by the BIL.[143] These efforts will include retraining in fossil-fuel and automotive communities and enhancing additional training programs across the country. All together, these actions incentivize manufacturers and developers to create an American supply of critical minerals. Since their announcement, investments in the critical mineral supply chain have dramatically expanded in the country.

Domestic programs complement the establishment of the Minerals Security Partnership (MSP)—a multilateral initiative between Australia, Canada, Finland, France, Germany, India, Italy, Japan, Norway, the Republic of Korea, Sweden, the United Kingdom, the United States, and the European Union.[144] This agreement outlines the ethics, environmental, and safety standards expected of critical mineral mining and processing and ensures stronger trade connections between nations. The MSP also encourages investments between governments for certain projects. This partnership may use loans from the Export-Import Bank of the United States to explore on-shoring and friend-shoring the supply chain. In October 2023, the MSP issued a joint statement announcing support for critical minerals mining, processing and recycling projects around the world.[145]

There is an important distinction between energy security and mineral security. Utilization of critical minerals is inherently different from the utilization of petroleum, in that petroleum is consumed as a fuel while minerals become a component of manufactured vehicles. Supply disruptions and fluctuating prices for critical minerals are felt differently and by different parties as opposed to petroleum; while petroleum price shocks have an immediate impact on consumers through higher fuel prices, critical minerals supply chain shocks affect only the production and price of new vehicles.

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[142] DOE. 21 August 2023. "U.S. Department of Energy Renews Critical Materials Institute to Secure America's Clean Energy Technology Supply Chains." DOE. https://www.energy.gov/eere/ammto/articles/us-department-energy-renews-critical-materials-institute-secure-americas-clean

[143] "DOE Announces $5 Million to Launch Lithium-Battery Workforce Initiative," U.S. Department of Energy, (March 18, 2022) https://www.energy.gov/articles/doe-announces-5-million-launch-lithium-battery-workforce-initiative

[144] "Minerals Security Partnership," U.S. Department of State, (June 14, 2022) https://www.state.gov/minerals-security-partnership/

[145] "Joint Statement on the Minerals Security Partnership Announce Support for Mining, Processing, and Recycling Projects," U.S. Department of State (October 10, 2023) https://www.state.gov/joint-statement-on-the-minerals-security-partnership-announce-support-for-mining-processing-and-recycling-projects/

Moreover, critical minerals are not a single good but a number of distinct commodities, each with their own supply and demand dynamics, with some capable of substituting each other. Further, while petroleum is consumed as a fuel and thus requires continuous supply, minerals become part of the vehicle and have the potential to be recovered and recycled.

i. Projected Demand for Critical Minerals

Demand for critical minerals is expected to grow substantially in the coming years. Figure 4 IEA's projected demand scenarios by 2040 relative to a 2020 baseline.

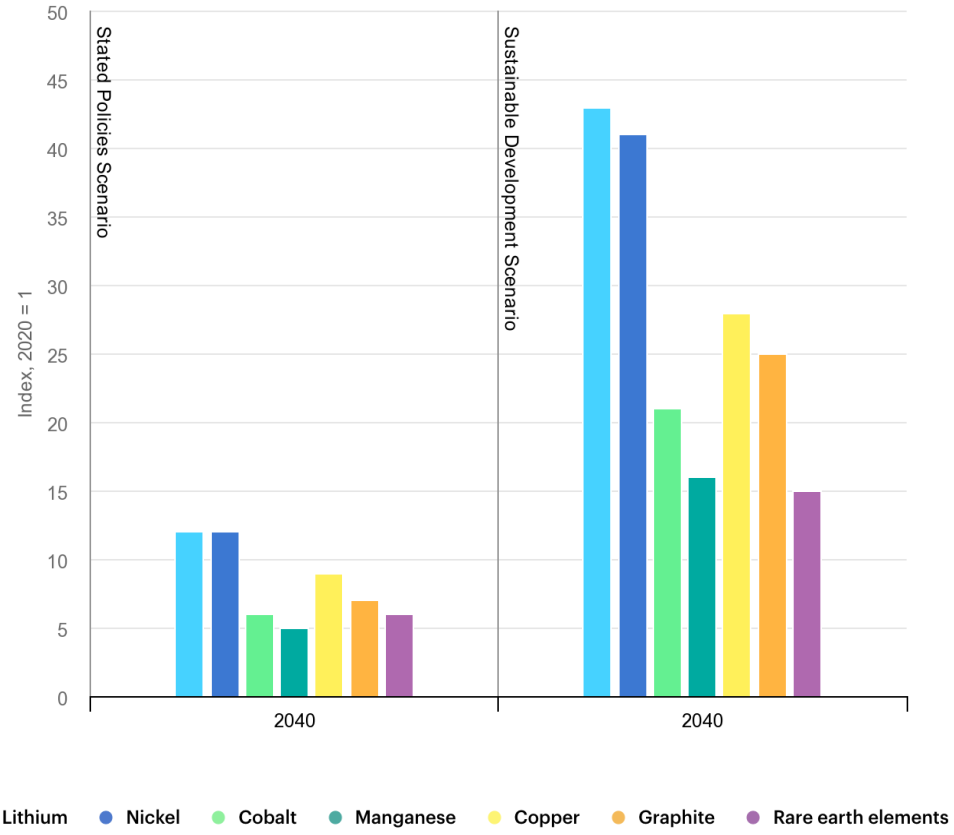

Figure 4. Mineral demand growth from new EV sales by scenario, 2040 relative to 2020[146]SCE

[146] "Mineral demand growth from new EV sales by scenario, 2040 compared to 2020," IEA, (October 26, 2022) https://www.iea.org/data-and-statistics/charts/mineral-demand-growth-from-new-ev-sales-by-scenario-2040-compared-to-2020

In a scenario that meets the goals of the Paris Climate Agreement, the share of total EV-driven demand for critical minerals rises significantly over the next two decades to over 40% for copper and rare earth elements, 60-70% for nickel and cobalt, and almost 90% for lithium.[147] EVs and battery storage have already displaced consumer electronics to become the largest consumer of lithium and are set to displace the stainless steel industry as the largest end user of nickel by 2040.

ii. Meeting the Forthcoming Demand for Critical Minerals

As demand for critical minerals is expected to grow rapidly, it is first necessary to evaluate the current state of global production. For most minerals, production has grown in the past decade.[148] However, while much of the production for certain minerals is concentrated in a handful of countries, there is reason to believe that most critical minerals demand can be met through extraction in democratic countries. According to the Carnegie Endowment for International Peace and as shown in Figure 5 below, nearly all critical mineral demand could be met through reserves in democratic countries.[149]

Critical Mineral	**2030 Global Demand 1.5ºC Scenario (kt)**	**Democratic Countries' Reserves (kt)**	**Surplus or Deficit (kt)**	**2030 Democratic Demand as a % of Production Democratic Capacity**
Boron	5	79,000	78,995	2%
Chromium	1,312	213,620	212,308	2%
Cobalt	1,246	2,302	1,056	3040%
Copper	23,568	1,235,800	1,212,232	130%
Graphite	30,181	75,200	45,019	8185%

[147] "The Role of Critical Minerals in Clean Energy Transitions," IEA, (May 2021) https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions
[148] "bp Statistical Review of World Energy," British Petroleum, (2022) https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2022-full-report.pdf
[149] Democratic countries include: Argentina, Armenia, Australia, Austria, Belgium, Bhutan, Bolivia, Brazil, Bulgaria, Canada, Chile, Finland, France, Georgia, Germany, Ghana, Iceland, Indonesia, Japan, Mexico, Mongolia, Nigeria, Norway, Peru, Poland, Portugal, Senegal, Sierra Leone, South Africa, South Korea, Spain, Sri Lanka, Sweden, Ukraine, and the United States.

Lithium	2,884	17,255	14,371	1006%
Manganese	3,205	1,338,000	1,334,795	8%
Molybdenum	296	6,876	6,580	59%
Nickel	10,914	60,000	49,086	239%
Selenium	2	32	30	557%
Silver	327	388	61	557%
Tellurium	35	11	-24	7816%
Tin	2,210	2,330	120	547%

Figure 5. Critical Minerals Potential in All Democratic Countries[150,151]

The Net Zero Industrial Policy Lab at Johns Hopkins University finds that partnerships among democratic countries would be able to produce enough minerals to enable the world to limit warming to 1.5 degrees Celsius, the more ambitious target in the Paris Climate Agreement.[152] The study also addresses production capacity—a facet of the supply chain where U.S. allies and democratic nations around the world have an opportunity to make significant headway in order to address climate and security goals. The study concludes that ramping up production to scale "would require an extremely focused and targeted approach—nothing less than a highly coordinated joint industrial strategy."[153] The study concludes that the U.S. and its partners must "significantly friendshore production" at unprecedented speed and scale in order to achieve 2030 targets.[154]

Other studies have reached similar conclusions. A 2022 study by the RAND Corporation, which addresses critical minerals through the lens of national security,[155] argued that, considering the

[150] "Friendshoring Critical Minerals: What Could the U.S. and Its Partners Produce?," Carnegie Endowment for International Peace (May 3, 2023) https://carnegieendowment.org/2023/05/03/friendshoring-critical-minerals-what-could-u.s.-and-its-partners-produce-pub-89659

[151] The chart demonstrates current reserves for critical minerals that exist within democratic countries and the surplus or deficit relative to global electric vehicle demand. The chart also includes projected demand in 2030 by democratic countries as a percentage of 2023 production capacity in those countries. The data reveals an urgent need to scale mining production. Notes: Lithium expressed in Li.

[152] *Ibid.,* at footnote 150

[153] *Ibid.,* at footnote 150

[154] *Ibid.,* at footnote 150

[155] Villalobos, Fabian, Jonathan L. Brosmer, Richard Silberglitt, Justin M. Lee, and Aimee E. Curtright, Time for Resilient Critical Material Supply Chain Policies. Santa Monica, CA: RAND Corporation, 2022. https://www.rand.org/pubs/research_reports/RRA2102-1.html.

time it takes to enact policy, industrial scale, and recover minerals, the United States needs to act immediately to diminish China's outsized share over the lithium-ion battery supply chain.[156] The study implores the United States to utilize the Department of Defense and Defense Industrial Base capabilities to swiftly address domestic and allied critical mineral supply chains.[157]

iii. Critical Mineral Production

As the public and private sectors have recognized the growing need for lithium, domestic exploration for the mineral has expanded, with ZETA members leading the charge in scaling up capacity to meet projected demand in the coming years. The most recent USGS Mineral Commodity Summaries demonstrate that domestic lithium reserves increased ~3,000%—from 35,000 metric tons (MT) of lithium in 2019 to 1,100,000 MT in 2022.[158,159] Since then, Ioneer's Rhyolite Ridge project–located in Esmeralda County, NV–holds the largest known lithium and boron deposit in North America.[160] Ioneer, a ZETA member, announced a mineral resource update in April 2023 that found a 168% increase in estimated lithium at Rhyolite Ridge.[161] Ioneer now estimates that their lithium resource is 3.4 million tonnes of lithium carbonate equivalent and 14.1 million tonnes of boric acid equivalent.

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[156] *Ibid.*
[157] Villalobos, Fabian, Jonathan L. Brosmer, Richard Silberglitt, Justin M. Lee, and Aimee E. Curtright. 2022.Time for Resilient Critical Material Supply Chain Policies. Santa Monica, CA: RAND Corporation, https://www.rand.org/pubs/research_reports/RRA2102-1.html.
[158] USGS. 2019. "Lithium." Mineral Commodity Summaries 2019. U.S. Department of Interior. Accessed June 30, 2023. https://d9-wret.s3.us-west-2.amazonaws.com/assets/palladium/production/atoms/files/mcs2019_all.pdf
[159] USGS. 2023. "Lithium." Mineral Commodity Summaries 2023. U.S. Department of Interior. Accessed June 30, 2023. https://doi.org/10.3133/mcs2023
[160] Ioneer - Rhyolite Ridge, accessed May 16, 2023 https://rhyolite-ridge.ioneer.com/
[161] "New Ioneer Mineral Resource update finds 168% increase in estimated lithium at Rhyolite Ridge," BusinessWire, (April 26, 2023) https://www.businesswire.com/news/home/20230426005886/en/New-Ioneer-Mineral-Resource-update-finds-168-increase-in-estimated-lithium-at-Rhyolite-Ridge

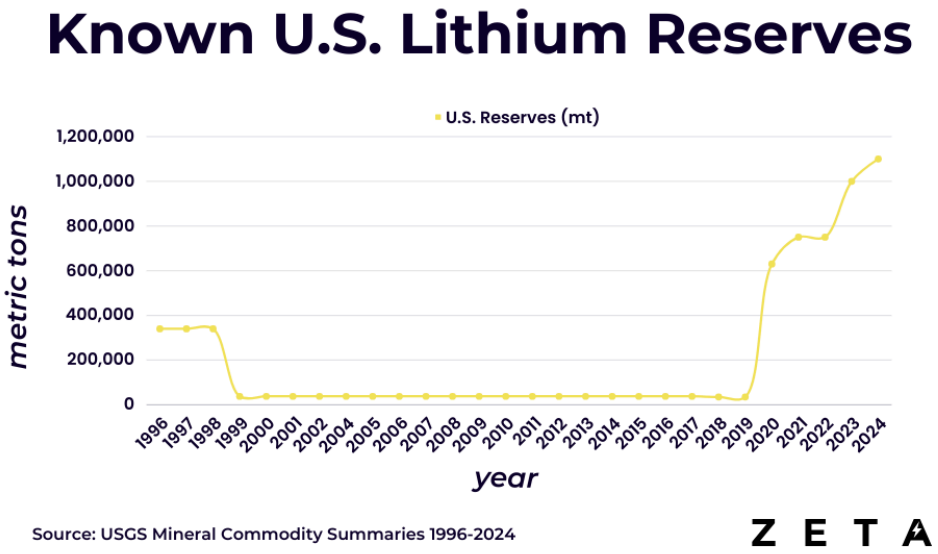

Figure 6. U.S. Lithium Reserves as reported in the USGS Mineral Commodity Summaries from 1996-2024

Additionally, in September 2023, Lithium Americas discovered an estimated 20-40 million metric tons of lithium resource in the McDermitt Caldera in Northern Nevada.[162] Lithium Americas also began construction activities at Thacker Pass in Nevada following receipt of notice to proceed from the Bureau of Land Management.

In May 2023, ZETA member Albemarle announced it is aiming to spend between $1.25 billion and $1.5 billion to double its lithium hydroxide output in Australia to a volume that it estimates could power more than 2 million electric cars each year.[163] Albemarle plans to build two additional processing trains at its Kemerton plant south of Perth in Western Australia, which could boost its lithium hydroxide production by 50,000 tons annually. The company recently announced that it achieved an IRMA 50 level of performance in an independent third-party assessment of its lithium brine extraction and concentration site in the Salar de Atacama, using the Initiative for Responsible Mining Assurance (IRMA) comprehensive mining standard.[164]

[162] "Hydrothermal enrichment of lithium in intracaldera illite-bearing claystones," Science Advances, (August 30, 2023) https://www.science.org/doi/10.1126/sciadv.adh8183
[163] "Lithium giant Albemarle eyes $1.5B Australian expansion," E&E News, (May 4, 2023) https://subscriber.politicopro.com/article/eenews/2023/05/04/lithium-giant-albemarle-eyes-1-5b-australian-expansion-00095141
[164] "Albemarle Becomes First Lithium Producer to Complete Independent Audit and Publich IRMA Report," Albemarle Newsroom, (June 20, 2023) https://www.albemarle.com/news/albemarle-becomes-first-lithium-producer-to-complete-independent-audit-and-publish-irma-report

ZETA MemberLithium Production Projects		
Company	**Project/Location**	**Production Estimate**
Ioneer *offtake agreement with Ford*	Rhyolite Ridge, Nevada	24,000 metric tons lithium carbonate /year
Lithium Americas *offtake with GM*	Thacker Pass, Nevada	80,000 metric tons lithium carbonate/year
Albemarle	North Carolina	100,000 tons lithium hydroxide /year (processing)
Livent *offtake with GM*	North Carolina	15,000 metric tons lithium hydroxide/year
Piedmont Lithium *offtake agreements with Tesla and LG*	Tennessee and North Carolina	60,000 metric tons lithium hydroxide / year

Figure 7. ZETA members key domestic lithium production projects.

With a variety of applications beyond EVs, ensuring a domestically sourced supply of copper will be critical to ensuring a rapid transition to electrified transportation. In May 2023, the Department of Energy (DOE) proposed to characterize copper as critical through its inclusion on the official DOE Critical Materials List.[165] In particular, DOE is recommending a designation for copper of "near-critical" in the medium term (2025-2035). To meet the forthcoming increases in demand for copper, a pair of domestic projects are currently in various stages of development: One major project that would help the U.S. with its growing demand for copper, molybdenum, silver and critical minerals is Resolution Copper in Arizona. This project has the potential to supply up to 25% of the nation's copper demand to power America's clean energy transition with $1 billion annually into Arizona's economy. The project employs 300 people, 80% of whom live locally in rural communities within 40 miles of the project. When the mine is fully operational, Resolution Copper expects to directly employ about 1,500 workers, paying around $134 million per year in total compensation. In total, the project is expected to support 3,700 direct and indirect jobs, many of them local building trades and U.S. Steel Workers union jobs.[166]

ZETA Member NewRange Copper Nickel is a 50:50 joint venture of Teck Resources Limited and PolyMet Mining Corp., holding the NorthMet and Mesaba deposits – two large, well defined resources in the established Iron Range mining region of Minnesota. The stand- alone company

[165] "Critical Materials Assessment," U.S. Department of Energy, (May 2023) https://www.energy.gov/sites/default/files/2023-05/2023-critical-materials-assessment.pdf
[166] *See:* https://resolutioncopper.com/

is creating a path to develop one of the world's largest and lowest-cost copper-nickel-PGM producing districts, unlocking a new domestic supply of critical minerals for the low-carbon transition through responsible mining, and delivering significant, multi-generational economic and other benefits to the region and beyond.[167]

b. Batteries

The U.S. battery manufacturing industry is quickly scaling to meet demand driven by transportation electrification. According to Argonne National Lab, between 2010 and 2021, $95 billion was invested in the U.S. battery manufacturing industry.[168] This number represents 160 new or expanded critical materials processing and manufacturing facilities, with enough capacity to provide batteries for 10 million EVs each year and create 70,000 new jobs. Data from the Blue Green Alliance reports that $177 billion has been invested in 415 facilities representing 217,000 jobs since 2010—the vast majority of which has been invested since the passage of the Inflation Reduction Act.[169]

The Bipartisan Infrastructure Law allocated $1.6 billion to the Department of Energy for the funding of "new commercial-scale domestic facilities to extract and process lithium, manufacture battery components, recycle batteries, and develop new technologies to increase U.S. lithium reserves."[170] In 2022, the Inflation Reduction Act Section 45X Advanced Manufacturing Production Tax Credit provided $35 per kWh in each battery cell, $10 per kWh in each battery module, 10% of the costs of production of the applicable critical materials incurred by the taxpayer. The Section 48C Advanced Energy Project Tax Credit also appropriated a $10,000,000 fund for tax credits to build clean technology manufacturing facilities, including those that process, refine, and recycle critical minerals.[171] Through the Section 45X credit, the IRA cuts the cost of producing batteries in the United States by nearly one third.[172] Together, these historic provisions will drive American battery innovation, ensuring that the sector is equipped to electrify all vehicle classes as EV deployments accelerate over the coming years.

There is historic momentum around battery manufacturing as it ramps up to support

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[167] *See:* https://newrangecoppernickel.com/
[168] "A new look at the electric vehicle supply chain as battery-powered cars hit the roads en masse," Argonne National Laboratory, (May 4, 2023) https://www.anl.gov/article/a-new-look-at-the-electric-vehicle-supply-chain-as-batterypowered-cars-hit-the-roads-en-masse
[169] "EV Jobs Hub." Blue Green Alliance. accessed January 31, 2024. https://evjobs.bgafoundation.org/
[170] *See* Public Law 117-58
[171] "Inflation Reduction Act: What it Is and What it Means for EV Adoption," ZETA, (2022) https://www.zeta2030.org/insights/the-inflation-reduction-act-what-it-is-and-what-it-means-for-ev-adoption
[172] "U.S.-Made EVs Could Get Massively Cheaper, Thanks to Battery Provisions in New Law," Car and Driver, (February 3, 2023) https://www.caranddriver.com/news/a42749754/us-electric-cars-could-get-cheaper-inflation-reduction-act-section-45x/

transportation electrification. Over the past year, battery producers have rapidly invested in new battery capacity in anticipation of strong electric vehicle sales growth. A total of 1.4 terawatt hours (TWhs) of new battery capacity was announced in just the last six months, according to Benchmark's Gigafactory Assessment.[173] The number of plants being tracked more than doubled to 379 in April from 174 plants in November 2020, according to Benchmark. Since January 2021, the U.S. private sector has announced nearly $82 billion in battery manufacturing investments, translating to 96 new or expanded processing and manufacturing plants.[174]

A key component for meeting the coming demand for EV batteries and critical minerals will be recycling existing batteries at their end-of-life (EOL). As shown in Figure 8, North American battery recycling capacity is growing rapidly and as it increases in the coming years, so too will available EOL battery feedstocks as EVs on the road today will approach the end of their useful life.

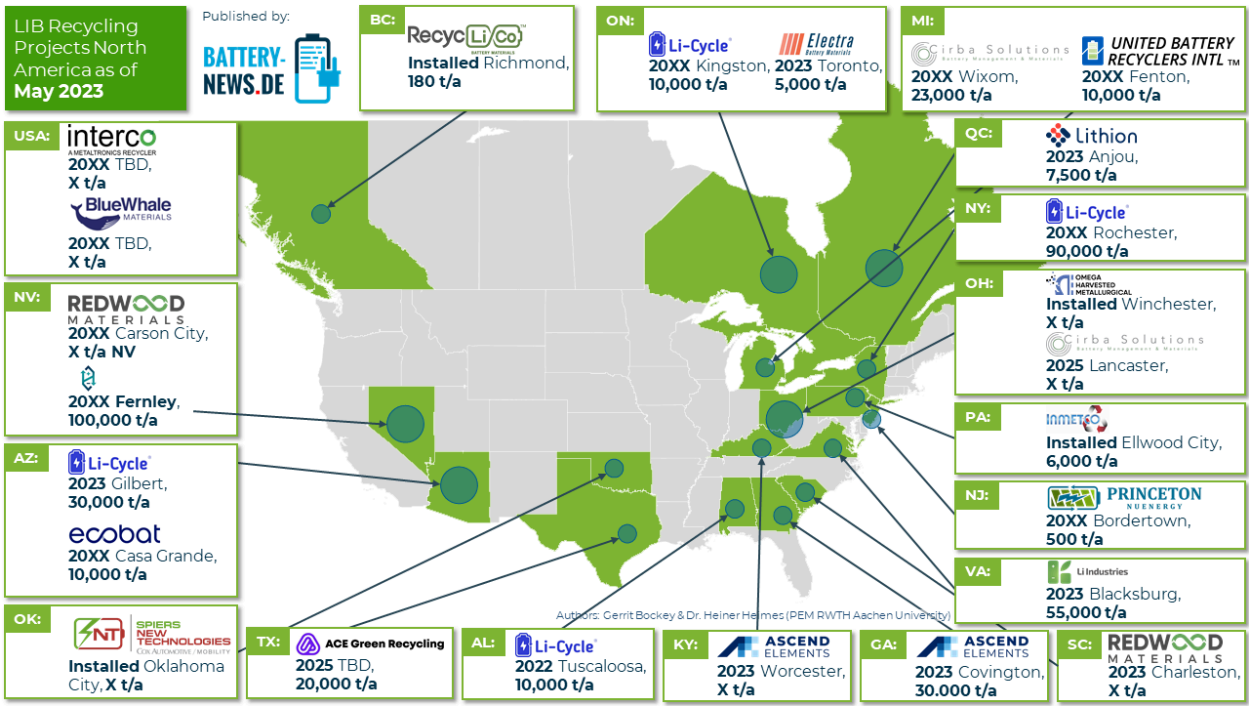

Figure 8. Battery recycling projects in North America (as of May 2023)[175]

[173] "Battery gigafactory plans slow down in April after record 2022," Benchmark Minerals Intelligence, (April 26, 2023) https://source.benchmarkminerals.com/article/battery-gigafactory-plans-slow-down-in-april-after-record-2022?mc_cid=f82a9ac7a8&mc_eid=be723945d8

[174] New US Battery Manufacturing and Supply Chain Investments Announced Under President Biden, US Department of Energy, (February 13, 2023) https://www.energy.gov/sites/default/files/2023-02/Battery%20Supply%20Chains%20Investments%20Map.pdf

[175] "Battery Recycling in North America as of May 2023," Battery-News.de, (May 5, 2023) https://battery-news.de/index.php/2023/05/05/batterie-recycling-in-nordamerika/

In recognition of the potential solutions that battery recycling can provide, Congress required EPA under the Bipartisan Infrastructure Law to develop battery recycling best practices and battery labeling guidelines. Congress allocated $10 million and $15 million respectively to the agency to complete these tasks by September 30, 2026.[176] While there will likely be more work needed, potentially through voluntary consensus standards bodies, a framework is beginning to take shape to ensure increased recycling capacity is built out in the coming years.

The global market for EV battery recycling alone is estimated to reach $17.1 billion by 2030.[177] By 2025, Benchmark Minerals Intelligence forecasts that scrap will account for 78% of the pool of recyclable materials.[178] This growth is largely driven by the growing number of EVs approaching EOL. The volume of EOL batteries from EVs and large storage applications is less than 2 GWh today but could reach 100 GWh by 2030 and 1.3 TWh by 2040.[179]

c. Electricity Generation and Grid Readiness

Transitioning to zero-emission transportation offers a unique challenge to the energy companies that will need to ensure they have ample electricity supply to match EV-driven demand. At minimum, this will require investments in the electricity distribution system to enable the deployment of electric vehicle charging equipment. In some instances, this may also require investing in new energy generation sources and associated distribution system infrastructure to accommodate high-use EV charging centers.

However, this is not the first time electricity providers have navigated increases in electricity demand brought on by new technologies: similar spikes accompanied the mass adoption of now-standard appliances like refrigerators and in-home air conditioners. Still, it will be important to ensure that providers and government agencies can work within their regulatory frameworks to test solutions and upgrade the grid to prepare for future demand increases accompanying greater EV adoption.

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[176] *See* Public Law 117-58

[177] "Battery Recycling Market Size, Share & Trends Analysis Report By Chemistry (Lithium-ion, Lead Acid, Nickel), By Application (Transportation, Industrial), By Region (Europe, Asia Pacific, North America), And Segment Forecasts, 2023 - 2030," Grand View Research, (April 2023) https://www.grandviewresearch.com/industry-analysis/battery-recycling-market

[178] "Benchmark Minerals: Battery production scrap will be the main source of recyclable material this decade," (September 16, 2022) https://chargedevs.com/newswire/benchmark-minerals-battery-production-scrap-will-be-the-main-source-of-recyclable-material-this-decade/

[179] "The Role of Critical Minerals in Clean Energy Transitions - Reliable supply of minerals," IEA, (2021) https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/reliable-supply-of-minerals

This section will discuss the growing energy demands of widespread EV adoption and new potential hotspots for energy demand. It will also use case studies to highlight how electricity providers are preparing for this transition. These case studies showcase solutions that have the potential to revolutionize energy consumption and highlight how electricity providers support customer EV adoption through incentive programs, building infrastructure, and other initiatives.

The grid's ability to handle millions of additional EVs hinges on utilities' proactive planning capacity. Granting utilities the flexibility to make proactive upgrades to the electrical grid and facilitate transportation electrification will require careful planning and coordination between regulators and stakeholders. Regulatory certainty will allow utilities to make the investments necessary to facilitate a smooth EV transition. In order to invest proactively, rather than in response to firm load, energy providers will need clear insight into multi-year schedules for customer electrification, approval from regulators to recover costs, and/or flexibility to serve loads with non-wire alternatives.

Stable policies will provide the regulatory certainty needed to not only ensure vehicle manufacturers continue to invest in EV technologies, but that the entire supply chain supporting the transition to electrification will have a clearer picture of how to plan capital expenditures today to meet the increased demand over the coming years.

i. Anticipated Impacts to the Electrical Grid from Increased EV Deployment

In 2021, the U.S. fleet of electric vehicles used 6.1 TWhs of electricity to travel 19.1 billion miles.[180] That accounted for just 0.15% of the 4,243 TWhs of total national electricity generation for that year.[181] To meet the demand of transportation electrification, more generation will be needed to service EVs and electrified vehicle technologies. One estimate suggests it would take roughly 800 to 1,900 TWh of electricity to power all vehicles if they were electric.[182] It is important to remember, however, that this new demand will not occur all at once but rather more gradually as EVs continue to displace ICEVs. While achievable, meeting this increase in electricity demand will require significant strategic planning as electric providers transition to renewable, carbon free resources.

The key to meeting these energy requirements will be the expansion of renewable energy resources but also the addition of new, zero-emission and low-emission load-following resources like advanced nuclear, natural gas with carbon capture, long-term energy storage, and green

[180] "Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010–2021," Argonne National Laboratory, (November 2022) https://publications.anl.gov/anlpubs/2022/11/178584.pdf
[181]"Monthly Energy Review May 2023," EIA, https://www.eia.gov/totalenergy/data/monthly/pdf/sec7_3.pdf
[182] "How much electricity would it take to power all cars if they were electric?," USAFacts, (May 15, 2023) https://usafacts.org/articles/how-much-electricity-would-it-take-to-power-all-cars-if-they-were-electric/

hydrogen. In 2022, electricity generated from renewable sources surpassed coal for the first time in U.S. history.[183] At the same time, electricity providers are adding low-cost energy storage to increase the availability of non-dispatchable renewable generation such as solar and wind. Currently, renewable energy generates about 20% of all electricity production in the U.S, and renewable sources like solar and wind are expected to account for the majority of new utility-scale electricity generation going forward.[184,185] Already, available renewable energy resources in the U.S. are estimated to amount to more than 100 times the nation's current electricity needs.[186]

Power generation is only one of the considerations when preparing for 100% transportation electrification. In particular, the industry needs to improve its ability to manage demand in real time, including by accurately predicting when and where increases in demand will occur.

Energy demand is not constant, but consists of relatively predictable peaks and troughs throughout the day. High demand occurs between 5:00 PM and 8:00 PM each day, as customers return home, turn up their climate control systems, begin cooking dinner, and turn on other devices.[187] System demand peak is typically between 5:00-6:00 PM during the summer, and 7:00-8:00 AM in the winter. As such, EV charging poses minimal impacts to the winter peak hours but could increase summer peaks without managed charging. As discussed further below, electricity providers are looking at ways to reduce the impact of EV charging on these spikes in energy demand by studying the energy needs of their customers.

ii. Utility-Specific Planning Underway

The electricity providers in ZETA's membership are actively preparing for the EV transition. The case studies below highlight the groundbreaking initiatives underway by California utilities Pacific Gas and Electric (PG&E) and Southern California Edison (SCE). Collectively, PG&E and SCE service 31 million Californians and over a million EVs.

PG&E and SCE are not unique in their innovative preparedness. Electricity providers across the country are making proactive changes in advance of increased transportation electrification. ZETA members Duke, Con Edison, Salt River Project, Vistra Corp., and Xcel Energy have

[183] "U.S. renewable electricity surpassed coal in 2022," Associated Press, (March 28, 2023) https://apnews.com/article/renewable-energy-coal-nuclear-climate-change-dd4a0b168fe057f430e37398615155a0
[184] "Renewable Energy," U.S. Department of Energy, accessed June 4, 2023 https://www.energy.gov/eere/renewable-energy
[185] "Solar power will account for nearly half of new U.S. electric generating capacity in 2022," EIA, (January 10, 2022) https://www.eia.gov/todayinenergy/detail.php?id=50818
[186] "Renewable Energy Resource Assessment Information for the United States," U.S. Department of Energy, accessed June 4, 2023 https://www.energy.gov/eere/analysis/renewable-energy-resource-assessment-information-united-states
[187] "Yes, the grid can handle EV charging, even when demand spikes," Yale Climate Connections, (March 23, 2023) https://yaleclimateconnections.org/2023/03/yes-the-grid-can-handle-ev-charging-even-when-demand-spikes/

similar case studies, which can be found in ZETA's July 2023 policy brief, 'Powering the EV Market: How Electricity Providers are Planning for the Future.'[188]

1. Pacific Gas & Electric (PG&E)

As California's largest electric provider, PG&E continues to play an important role in advancing electric vehicle adoption in support of the state's broad climate goals. PG&E works in collaboration with the California Energy Commission and California Public Utilities Commission to plan and approve grid infrastructure upgrades to support this shift to zero-emission transportation.

With nearly 660,000 EVs sold in its service area—one in every seven of all EVs on the road throughout the nation—expansion of PG&E's EV charging network in Northern and Central California is critical to support the State's transition to a clean transportation future. Over the last half-decade, the provider has deployed more than 5,000 EV charging ports across its service area. Additionally, it offers a variety of resources to help accelerate EV adoption among customers, and PG&E is working collaboratively with vehicle manufacturers to develop vehicle grid-integration technologies.

Grid planning requires precise forecasts to ensure electric infrastructure is available to support future demand. Pre-existing electricity demand (load) forecasts did not provide the geographical granularity needed to best plan for grid investments. PG&E could allocate the load to residential charging locations; however, larger charging loads that are often not associated with existing service points—such as public charging systems—lacked a methodology to be accounted for in long-term forecasting efforts. Without the ability to identify future EV demand with geographic and temporal accuracy, PG&E was limited in its ability to plan future grid capacity.

Lacking a long-term geospatial forecasting methodology, PG&E was primarily dependent on customer requests for service to inform where EV load would materialize. This reliance on customer requests led PG&E to reactively develop capacity solutions to serve load requests. Given the long lead times often associated with capacity projects and the relatively fast pace at which customers wish to build EV charging infrastructure, there would be instances where energization timelines exceeded the requested energization date from customers. This can occur with large load applications associated with public DCFC charging stations or large fleets, which have the potential to exceed the maximum capacity of existing electrical infrastructure in those areas.

[188] "Powering the EV Market: How Electricity Providers are Planning for the Future." Zero Emission Transportation Association. (July 2023) https://www.zeta2030.org/policy-brief-powering-the-ev-market-how-electricity-providers-are-planning-for-the-future

Identifying a need for a more proactive approach, PG&E set out to improve its forecasting abilities to increase the clarity of where and when EV loading is most likely to materialize. This enables PG&E to build capacity in advance of service applications being received. Although research indicates that customer preference for EVs is increasing, and there are many regulations and incentives which further support the transition to EVs, there are still uncertainties around the pace of adoption. This impacts how the EV load will manifest on the electric grid. For this reason, a solution capable of supporting a variety of forecast scenarios was necessary for success. PG&E commissioned a multi-faceted project focused on three common categories of EV charging load: 1) public DCFC & Level 2 charging stations, 2) residential EV charging, and 3) fleet charging.

Detailed analysis and machine learning modeling and testing were applied to each of these focus areas to predict where EV charging is most likely to occur. These analyses were performed at the premise level and resulted in over 5 million potential growth points across PG&E's service territory that were integrated into existing distribution planning software. This created a dynamic tool that can adapt to a variety of forecast inputs, such as system-level adoption forecasts, EV charging behaviors, and charging infrastructure assumptions. These scenarios can be integrated into PG&E's distribution planning processes.

Developing a solution that was easily integrated into existing distribution planning processes and software was critical for successful implementation. This involved PG&E forecasting and asset planning teams in the development of the EV forecasting tool, as well as reviewing and approval of the major inputs and assumptions used to develop forecast scenarios, ensured alignment in the scenarios generated.

Using varying EV forecast scenarios, PG&E was able to assess the localized grid impacts from high EV adoption scenarios that are better aligned with state transportation electrification goals and policies. PG&E assessed how various levels of EV adoption, as well as the impacts that changing charging behaviors (such as on vs. off-peak charging), can have on grid needs. Early analysis has indicated that off-peak charging can reduce near-term grid constraints. In the future, this may lead to new circuit peaks and capacity constraints that must be addressed.

Results from these analyses were helpful in advocating for approval of higher transportation electrification forecasts with regulators and the state energy commission, which are ultimately used for electric grid planning. PG&E has also used these forecasts to produce directional assessments of the resources needed to support capacity investments included in their long-term capital planning. PG&E continues to work to improve its forecasting and planning capabilities. Still, the solutions implemented to date have enabled a more robust approach that will allow PG&E to continue to support its customers' electrification transition.

PG&E's plan for a high electrification future also includes the following measures:[189]

- Working diligently to plan and develop capacity infrastructure to ensure electricity is available where peak demand is expected to increase as zero-emission vehicle adoption continues to grow. Efforts include close collaboration with state agencies, technology partnerships, EV charging developers, vehicle original equipment manufacturers, and adopters of zero-emission vehicles to proactively prepare electric capacity in high demand areas in ways that consider economic development and customer electricity rates.
- Proactive discussions with customers and municipalities to understand their individual plans for electrification load growth to better include them in PG&E forecasting and planning.
- In addition to using customer TE plans to inform longer-term load forecasts and planning, PG&E is also using these customer plans to inform our near-term priority proactive upgrades.
- Working with state agencies and regulators to increase the load forecasts that are used for utility planning, enabling a faster build out of additional capacity infrastructure (as described earlier).

2. Southern California Edison (SCE)

About 40% of the nation's electric vehicles, more than 1.8 million, have been sold in the state of California.[190] A significant number of these are in SCE's service area alone. Many have expressed doubts that the grid is ready for the energy demand created by the need to charge so many EVs, but electric power companies, including SCE, are keeping up with increasing levels of adoption.

In anticipation of growing EV demand in Southern California, SCE is continuously taking the steps to upgrade the grid and promote customers' transition to electric transportation and proactively solve near-term issues, while also undertaking long-term investments to ensure the grid is ready for all levels of anticipated electrification adoption.

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[189] "Answers to Administrative Law Judge's Ruling Seeking Additional Information on the Distribution Planning Process by Pacific Gas and Electric Company," PG&E, (April 10, 2023) https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M505/K839/505839889.PDF

[190] CEC, New ZEV Sales in California for 2023, available at https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/new-zev-sales

Solving near-term challenges

One way SCE is addressing the near-term issues is its Power Service Availability (PSA) initiative for Transportation Electrification service.

- SCE is focusing on (1) improving its internal processes to streamline interconnection, (2) engaging fleet operators to better understand their plans for electrification, (3) improving its ability to forecast and assess the impacts of transportation electrification (TE) growth, and (4) leveraging new technologies as grid infrastructure solutions
- Because some projects require more time than others to build, SCE is encouraging fleet owners to engage with the utility early in the process so that SCE can better understand and plan for the fleets' needs.

SCE is also improving how we partner with customers to meet their needs.

- This includes streamlining buildout, developing deeper customer engagements that include rate planning and load management education, and right-sizing grid solutions to meet the expected charging demand growth in both the near and long term. These efforts will provide more innovative and customer-focused solutions.

In addition to customer project deployment, SCE has also pushed to accelerate EV adoption through customer-side infrastructure programs such as Charge Ready for light-duty vehicles.

- Through its Charge Ready program, SCE installs, maintains, and covers installation costs for charging infrastructure while participants own, operate, and maintain the charging stations. Through its Charge Ready programs, SCE has installed more than 4,400 charging ports throughout its service area and is targeting 30,000 charging ports by 2026.

SCE's Transportation Electrification Advisory Services program is also available for commercial customers considering electric transportation options.

- On top of offering educational webinars and workshops, the program also offers to develop site-specific EV-readiness studies to help determine the feasibility of proposed projects and grant writing assistance to help customers secure zero-emission vehicle grants.

Long-term Planning and investing in the grid for TE

SCE is improving the value of EV adoption forecasts used for grid planning by assessing where, when, and how much EVs are likely to charge.

- SCE led the West Coast Clean Transit Corridor Initiative, composed of nine other electric utilities and two agencies representing more than two dozen municipal utilities, to conduct a multi-phase and multi-year research study to forecast EV truck populations and

determine the proper number and size of highway charging sites. Subsequent phases of this initiative are supporting internal planning operations across the participating utilities.

- SCE developed an augmented forecasting approach to capture accelerated load growth due to Medium-Duty / Heavy Duty (MDHD) vehicles as well as the direct current fast charging (DCFC) for Light-Duty vehicles and port electrification for the recent General Rate Case (GRC) Application.
    - Because MDHD electrification is still nascent, current forecasting methodologies that are based (in part) on historical adoption are insufficient
    - For the GRC, SCE's augmented forecasting methodology leverages MDHD fleet industry data to more accurately predict MDHD electrification adoption and corresponding grid needs
    - The augmented forecasting approach also included added load from DCFC charging plazas for Light-Duty vehicles.
    - SCE (and the IOUs) are collaborating with CPUC on a new "Freight Infrastructure Planning" (FIP) Framework to further address planning for MDHD
- SCE is working to expand the current distribution planning forecast window from 10 years to 20 years. Developing and implementing an interagency-sponsored forecast that spans 20 years for distribution will bring benefits, such as:
    - Identifying long lead time projects that are needed beyond the 10-year horizon
    - Identifying important land acquisition needs
    - Informing how the development of infrastructure may need to be levelized to practically achieve the scale of development required by achieving state ZEV policies and GHG targets.
- SCE has proposed robust investments in its GRC application to support TE adoption and load growth.
    - The investments proposed are designed to ensure long-lead infrastructure projects (such as substation expansion or new substations) will be completed when load growth arrives. The plan especially focuses on high TE locations: freight corridors, fleet hubs, Port of Long Beach, etc.
    - Specific TE-focused projects include:

Project Type	Count	Cost ($M)*
New A Substations	4	535
A-Bank Upgrades	4	116
New B Substations	5	122
B-Bank Upgrades	6	9

New Distribution Circuits	33	183

*Cost reflects spend in GRC window (2023-2028)

iii. Transmission

A critical part of ensuring a smooth transition to an electrified transportation sector will be a robust build out of high-voltage transmission lines. Doing so will also enable increased penetration of renewables into the grid mix, helping to further improve the environmental benefits of electric vehicles. While progress in this space has historically been slow and bogged down by procedural delays, there are some signs of progress. In April 2023, the U.S. Bureau of Land Management approved a 732-mile transmission line, which will carry wind energy from Wyoming through to Nevada.[191] Also in April 2023, a Maine court granted approval to restart work on the 145-mile New England Clean Energy Connect project, which will carry hydropower from Canada to New England.[192] The line is expected to carry up to 1,200 megawatts of power.

Electricity transmission is also a key focus of the Biden-Harris Administration. In May 2023, the administration published its plan to decrease permitting timelines for new transmission projects, among other key items.[193] Also in May 2023, the U.S. Department of Energy proposed a rule on designating National Interest Electric Transmission Corridors.[194] There will also be a role for Congress to play in improving transmission permitting times and this is a policy area where some bipartisan support exists.

In May 2023, the Biden-Harris Administration approved the SunZia Transmission Project and celebrated the groundbreaking in September 2023. When completed, the project will provide 4,500 MW of primarily renewable energy from New Mexico to Arizona and California.[195]

In October 2023, the Biden-Harris Administration announced $1.3 billion for the addition of 3.3 GW of power across three cross state transmission lines: the Cross-Tie 5000kV Transmission

[191] "US approves $3bn Wyoming-Nevada power line," Power Technology, (April 12, 2023) https://www.power-technology.com/news/us-approves-3bn-wyoming-nevada-power-line

[192] "Maine court greenlights embattled $1B transmission line," E&E News, (April 17, 2023) https://subscriber.politicopro.com/article/eenews/2023/04/21/maine-court-greenlights-embattled-1b-transmission-line-00093087

[193] "FACT SHEET: Biden-Harris Administration Outlines Priorities for Building America's Energy Infrastructure Faster, Safer, and Cleaner," (May 2023) https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/10/fact-sheet-biden-harris-administration-outlines-priorities-for-building-americas-energy-infrastructure-faster-safer-and-cleaner/

[194] *See* 88 FR 30956 (May 15, 2023)

[195] "Biden-Harris Administration Celebrates Groundbreaking of New SunZia Transmission Line That Will Deliver Clean, Reliable, Affordable Energy to Millions of Americans," U.S. Department of the Interior, (September 1, 2023) https://www.doi.gov/pressreleases/biden-harris-administration-celebrates-groundbreaking-new-sunzia-transmission-line

Line through Nevada and Utah, the Southline Transmission Project through Arizona and New Mexico, and the Twin States Clean Energy Link through New Hampshire and Vermont.[196] Together these projects will provide power to 3 million homes and create over 13,000 direct and indirect jobs.

d. Charging Infrastructure

Although the majority of charging needs will be ultimately met through at-home or near-home charging, a fully electrified transportation system will also require a robust public charging network—one which the sector is already deploying. California is home to nearly 16,000 public DC Fast and Level 2 charging stations with over 43,000 individual ports.[197] As of January 2024, the White House reports that the number of public charging stations has increased to 170,000.[198] The Biden-Harris Administration has stated that they are on track to deploy 500,000 public chargers by 2026—four years earlier than the initial target.[199] A 2022 study by McKinsey & Company projected that the U.S. will need 1.2 million public EV charging stations to accommodate forecasted EV deployments by 2030.[200] A June 2023 NREL study[201] analyzed U.S. progress towards building out an accessible network of public EV chargers and found that:

- The United States is on track to install a network of 1.2 million public chargers by 2030, keeping up with rapidly growing demand for EVs.
- Of the 1.2 million charging ports, about 1 million are expected to be Level 2 charging, providing convenient, low-cost charging to meet a variety of daily needs, with the remaining charging ports being DC fast chargers that are critical to driver confidence and longer distance travel.

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[196] "Biden-Harris Administration Announces $1.3 Billion to Build Out Nation's Electric Transmission and Releases New Study Identifying Critical Grid Needs." Department of Energy. (October 30, 2023). https://www.energy.gov/articles/biden-harris-administration-announces-13-billion-build-out-nations-electric-transmission

[197] "Electric Vehicle Charging Station Locations," U.S. Department of Energy, Alternative Fuels Data Center, (Accessed February 8, 2024) https://afdc.energy.gov/fuels/electricity_locations.html#/analyze?fuel=ELEC&country=US&region=US-CA

[198] "FACT SHEET: Biden-Harris Administration Announces New Actions to Cut Electric Vehicle Costs for Americans and Continue Building Out a Convenient, Reliable, Made-in-America EV Charging Network," The White House (February 14, 2024) https://www.whitehouse.gov/briefing-room/statements-releases/2024/01/19/fact-sheet-biden-harris-administration-announces-new-actions-to-cut-electric-vehicle-costs-for-americans-and-continue-building-out-a-convenient-reliable-made-in-america-ev-charging-network/

[199] *Ibid.*

[200] "Building the electric-vehicle charging infrastructure America needs," McKinsey & Company, (April 18, 2022) https://www.mckinsey.com/industries/public-and-social-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs

[201] "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure," National Renewable Energy Laboratory, (June 2023) https://driveelectric.gov/files/2030-charging-network.pdf

- Building out a public charging network will require between $31 and $55 billion of cumulative public and private capital investment and will help unlock hundreds of billions of dollars of consumer savings from reduced fuel and maintenance costs.

As discussed further below, industry is continuing to rapidly build out EV charging capacity both as a result of private investment and with support from billions of dollars in federal funding. Complementary policies that encourage vehicle manufacturers to transition to EVs sends market signals to the charging industry that provide the certainty needed to make proactive infrastructure and manufacturing investments.

i. Impacts to EVSE Deployment from BIL and IRA Programs

With over $7.5 billion available across multiple programs, the Bipartisan Infrastructure Law represents the nation's largest ever investment in increasing Americans' access to EV chargers. Through the BIL's $5 billion National Electric Vehicle Infrastructure (NEVI) Formula Program, the federal government is partnering with private industry to build out a national charging network along key highway corridors. In September 2022, the Federal Highway Administration approved formal plans submitted by all 50 States, the District of Columbia, and Puerto Rico. The design of these state application processes through the NEVI Formula Program will help drive EVSE standardization, which will in turn improve reliability and consistency in the consumer-facing charging experience.

As of December 2023, implementation of the NEVI program is well under way—26 states have issued proposals or awarded contracts for installing NEVI-funded chargers. NEVI-funded chargers are online and serving customers in Ohio and New York. As evident in Figure 9, Vermont, and Pennsylvania have begun construction of new NEVI stations and rollout is expected to increase pace this year as the program progresses. Not shown in the figure below, is Tennessee's January 2024 issuance of awards.

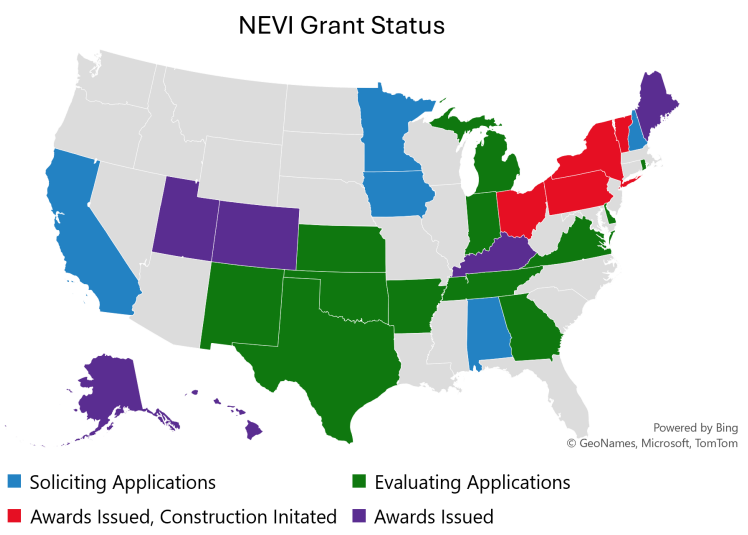

Figure 9. NEVI Funding Status as of December 2023[202]

Separately, the BIL's Charging and Fueling Infrastructure (CFI) Discretionary Grant Program allocates another $2.5 billion towards installing EV chargers in communities where people live and work.

As charging deployment continues to increase, the distribution of this network, not just its size, risks limiting electrification—especially in rural areas. In response, the Biden-Harris Administration has taken a comprehensive approach to EVSE build-out, recognizing the diverse demographics, landscapes, and types of communities throughout the United States. Ubiquity and visibility are important components of a national EVSE network deployment. The Department of Transportation has put together separate toolkits to guide EVSE deployment in both urban[203] and rural[204] areas. Both toolkits go through an explanation of electric mobility basics, as well as the benefits and challenges that are specific to individuals, communities, and transit operators in their respective region types. Both expand on public-private partnership opportunities, as well as best practices for early planning and financing. With respect to EVSE, DOT has identified three levels of EVSE planning: community, corridor, and site. These toolkits are intended to guide private, state, and local entities as they implement federal funding and engage in other equitable, thorough EVSE deployment strategies.

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[202] "States award $130 million to build hundreds of EV charging stations along U.S. highway corridors." Atlas EV Hub. (December 18, 2023). Accessed February 14, 2024. https://www.atlasevhub.com/weekly-digest/states-award-130-million-to-build-hundreds-of-ev-charging-stations-along-u-s-highway-corridors/

[203] "Charging Forward: A Toolkit for Planning and Funding Urban Electric Mobility Infrastructure," U.S. Department of Transportation, (June 2023) https://www.transportation.gov/urban-e-mobility-toolkit

[204] *Ibid.*

The tax credits provided in the Inflation Reduction Act, specifically the Section 30C Alternative Fuel Vehicle Refueling Property Tax Credit[205] are critical to helping ensure the continued availability of products necessary for a fully-electrified transportation sector. By targeting investments toward non-urban and lower-income residents, the credit incentivizes individuals and commercial operators to install charging stations at their homes and in publicly-accessible locations. Retailers, local businesses, and commercial fleet operators can utilize the credit to offset the costs of installing charging infrastructure on their property, enabling them to attract and retain customers. In guidance issued January 2024, the U.S. Department of the Treasury detailed an inclusive approach to defining 30C eligibility. According to analysis done by NRDC, the January 2024 guidance will prevent a total of 32 million people from being unduly denied access to the 30C credit.[206]

Taken together, the funding in the NEVI and CFI programs under the BIL and the 30C Alternative Fuel Vehicle Refueling Property Tax Credit in the IRA will lead to significant buildout of EV charging in communities, at homes and businesses, and along high-traffic highway corridors.

As a national public charging network continues to take shape, there are multiple efforts underway to help EV drivers locate and access charging infrastructure. As mentioned previously, the AFDC maintains a database of public charging stations with route-planning functionality embedded in the tool.[207] NREL recently announced the launch of an interactive map showing EV charging locations near national parks.[208] ZETA member Rivian is incorporating EV charging locations into their vehicles' onboard display.[209] Google Maps will now suggest charging stops on shorter trips, include a 'very fast' filter for charging station searches, and will show users in search results when a location has a charging station on-site.[210]

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[205] *See* 26 U.S.C. § 30C
[206] "New Policy Boosts Access to EV Charging," National Resources Defense Council, January 22, 2024, https://www.nrdc.org/bio/max-baumhefner/new-policy-boosts-access-ev-charging
[207] U.S. Department of Energy Alternative Fuels Data Center, accessed May 2, 2023 https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC
[208] "New Interactive Map Shows EV Charging Stations Near National Parks," National Renewable Energy Laboratory, (April 2023) https://www.nrel.gov/news/program/2023/new-interactive-map-shows-ev-charging-stations-near-national-parks.html
[209] Rivian on LinkedIn, accessed June 26, 2023 https://www.linkedin.com/posts/rivian_rivian-adventurousforever-careersintech-activity-7077710678597238784-YifP
[210] Google is adding some new features for EVs with built-in Google Maps," The Verge, (February 8, 2023) https://www.theverge.com/2023/2/8/23589724/google-maps-ev-charging-built-in-features

e. EV Production and New Model Availability

EVs are now available in all light- and medium-duty classes, with many presenting owners with a favorable total cost of ownership today. Continued innovation by industry will only increase product offerings and vehicle capabilities in the coming years.

While EV manufacturing investments in the U.S. have been ramping up over the past decade, the passage of the BIL and IRA have supercharged investment. Before the passage of these bills, several automakers had already committed to electrify large portions or all of their vehicle offerings. These targets were in recognition of the need to meet environmental goals and a result of the market's movement towards EVs. Several major automakers set ambitious goals for a 100% electrified fleet. To meet these targets, they have significantly expanded their EV model offerings alongside manufacturing capability.

i. Impacts to EV Production from BIL and IRA Programs

Policies in the BIL and IRA are driving demand for EVs both for personal and commercial use. As discussed previously in these comments, customers are increasingly choosing to electrify and OEMs are better incentivized to meet this demand through the build out of additional domestic manufacturing capacity. As a result, EV production and model availability is rapidly expanding.

Analysis by the Environmental Defense Fund found that announced EV manufacturing investments from 2015 to 2023 total $31.4 billion and would lead to at least 55,800 new jobs and result in automakers being capable of producing more than 4.3 million EVs per year in 2026.[211] Figure 10 below illustrates the ramp up in EV manufacturing capacity through 2026, with major manufacturing capacity additions following BIL and IRA passage. As additional announcements are made, domestic EV manufacturing capacity will continue to grow, leading to a secure domestic supply chain and thousands of new jobs.

[211] "U.S. Electric Vehicle Manufacturing Investments and Jobs Characterizing the Impacts of the Inflation Reduction Act After 6 Months," Environmental Defense Fund, (June 2023) https://blogs.edf.org/climate411/files/2023/03/State-Electric-Vehicle-Policy-Landscape.pdf

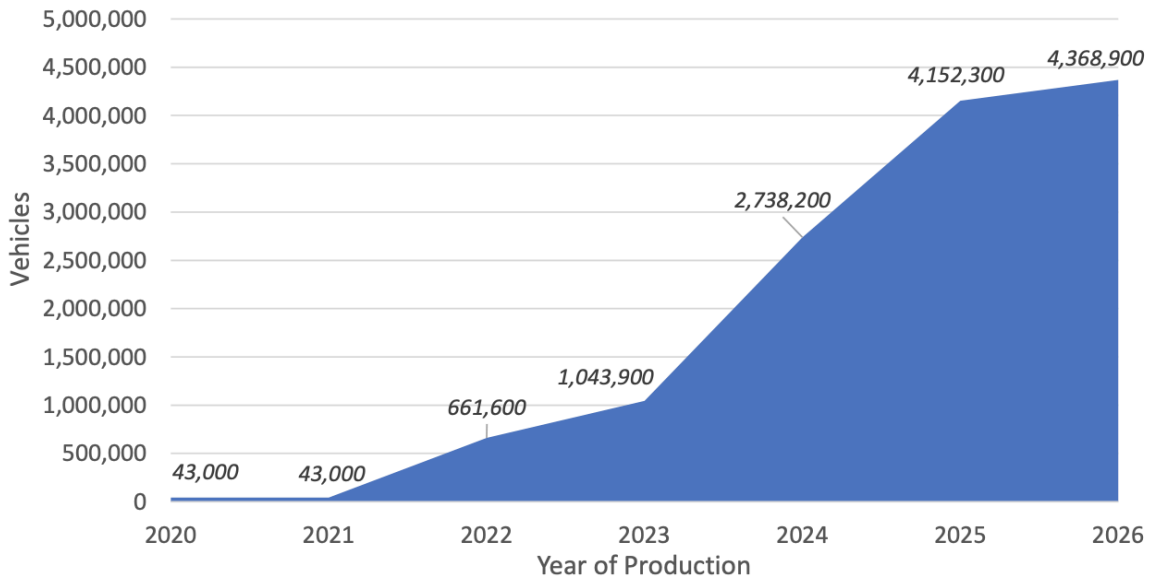

Figure 10. Estimated EV manufacturing capacity following passage of the IRA and BIL, 2020-2026.[212]

ii. Recent New EV Model Announcements

Consumer Reports has compiled a noncomprehensive list of more than 20 new EVs in a variety of makes and models that are expected in the U.S. by the end of 2024.[213] In addition to new models from legacy automakers, there are a number of new entrants expected in 2024 including Fisker, Polestar, and VinFast. The list lengthens to more than 35 for models expected in the next few years, including from startups such as Rivian, Lucid, and Canoo.[214]

EV model availability has been growing quickly, at a compound annual growth rate of 30% over the 2016-2022 period. Such growth is to be expected in a nascent market with a large number of new entrants bringing innovative products to the market, and as incumbents diversify their portfolios. Even companies that had previously urged caution on EV commitments are shifting towards greater electrification. Toyota plans to release at least 10 EV models by 2026, and is also restructuring to create a unit solely dedicated to electric vehicles.[215]

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[212] *Ibid.*
[213] "Hot, New Electric Cars That Are Coming Soon," Consumer Reports, (February 22, 2024) https://www.consumerreports.org/cars/hybrids-evs/hot-new-electric-cars-are-coming-soon-a1000197429/
[214] "Future Electric Vehicles: The EVs You'll Soon Be Able to Buy", Car and Driver, (February 13 2024) https://www.caranddriver.com/news/g29994375/future-electric-cars-trucks/
[215] "Toyota's New EV Plan is a Big Reality Check," Bloomberg, (February 14, 2023), https://www.bloomberg.com/opinion/articles/2023-02-14/toyota-s-new-ev-plan-is-a-big-reality-check

In the future, the number of models can be expected to continue to increase quickly, as major carmakers expand their EV portfolios and new entrants strengthen their positions, particularly in emerging markets and developing economies.[216]

7. Conclusion

ZETA appreciates the opportunity to provide comments on EPA's consideration of California's request for a waiver of federal preemption to implement the ACC II program. This request offers EPA an opportunity to assist California in locking in significant emissions reductions, protecting public health and the environment, and backstopping the EV industry's investment in electrification technologies. ZETA believes the goals of the ACC II program are achievable and EPA's granting of California's request will ensure the supply chain has the regulatory certainty needed to not only ensure manufacturers continue to invest in EV technologies but that the entire supply chain supporting the transition to electrification will have a clearer picture of how to plan capital expenditures today to meet the increased demand for its products over the coming years. We urge EPA to grant California's request without delay.

Thank you for your consideration.

[216] *Ibid.,* at footnote 27