ZETA | ZERO EMISSION TRANSPORTATION ASSOCIATION

September 16, 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-2023-0589
California State Motor Vehicle Pollution Control Standards; Advanced Clean Fleets Regulation; Request for Waiver of Preemption and Authorization; Opportunity for Public Hearing and Public Comment
Submitted via Rulemaking Portal: https://www.regulations.gov.

The Zero Emission Transportation Association (ZETA) is an industry-backed coalition of over 50 member companies advocating for 100% electric vehicle (EV) sales. ZETA is committed to enacting 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 comment on its consideration of California's request for a waiver of federal preemption to implement the Advanced Clean Fleets (ACF) program. We urge EPA to grant California's request without delay. The state of California has regulated mobile source 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 shall grant a waiver of preemption if certain statutory conditions are met.

In the context of the ACF program, California has met those conditions and EPA therefore has no basis to deny the state's request for a waiver. California's analysis accompanying its request indicates as much:

- The ACF program, in the aggregate, is at least as protective of public health and the environment as the applicable federal standards.
- ACF regulations are necessary to meet California's compelling and extraordinary air quality conditions.

- The ACF standards and enforcement procedures are consistent with Clean Air Act Section 202(a).

The intent of these standards is to reduce tailpipe emissions and protect public health. California's analysis projects the ACF program will reduce emissions in California by nearly 147,000 tons of NO_x, 7,000 tons of fine particulate matter, and 327 million tons of greenhouse gases between now and 2050.

The automotive industry, and many others that supply it, is aligning behind electrification as the most commercially viable pathway to achieving the emissions reductions necessary to protect public health, the climate, and the environment. Failure to grant California's request would introduce significant uncertainty for industry and could risk stranding both public and private sector investments in domestic manufacturing.

Transportation electrification not only reduces emissions but it 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.

EPA's approval of California's request will ensure the supply chain has the regulatory certainty needed to protect today's investments and align with the sector's path to a zero-emission future. We again urge EPA to approve California's request without delay and appreciate the opportunity to expand upon these and many more points in our written comments below.

If you have any questions or concerns, please contact me at al@zeta.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 ACF 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 ACF 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 market for medium- and heavy-duty EVs is primed for continued rapid growth in the coming years.[3] As discussed further in these comments, thousands of electric medium- and heavy-duty vehicles (MHDVs) have already been put on our roadways and the diversity of available vehicle models is growing rapidly. Significant investments are being made throughout the supply chain to support a smooth transition to mass adoption of EVs. Programs such as ACF 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.

As discussed in the next section of these comments, we believe EPA has no basis to deny California's request. These comments will also discuss the public health, environmental, economic, and financial benefits of MHD 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

The Clean Air Act (CAA) authorizes EPA 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 emissions standards that are at least as protective of public health, in the aggregate, as the

[1] *See* 89 FR 57151 (July 12, 2024)
[2] "The U.S. National Blueprint for Transportation Decarbonization," Departments of Energy, Transportation, and Housing and Urban Development, and Environmental Protection Agency, 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 that produce zero tailpipe emissions.

federal standards.[4] The waiver provision was added to the Federal Air Quality Act of 1967 (a predecessor 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.[5] Since this authority was granted to EPA, California has requested and received waivers of federal preemption to regulate mobile source emissions more than 50 times.[6]

Per the CAA, EPA shall grant a waiver of federal preemption unless the record supports one of three limited findings for denial.[7] 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 the Advanced Clean Fleets Program, 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.

Congress recently reaffirmed EPA's authority to grant California a waiver of federal preemption when it passed the Inflation Reduction Act (IRA) of 2022.[8] 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.[9] 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)."[10] 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 ACF.[11]

3. The ACF Program is Necessary to Protect Public Health and the Environment

MHDV tailpipe emissions include harmful air pollutants that have a wide range of negative impacts on human health and the environment. Despite representing only about 1.8 million

[4] "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
[5] *Ibid.*
[6] 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 August 20, 2024
[7] 42 U.S.C. § 7543(e)(2)
[8] IRA, Pub. L. No. 117-169, §60105(g), 136 Stat. 1818 (2022).
[9] *Ibid.*
[10] *Ibid.*
[11] "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

trucks among the 30 million registered vehicles in California, MHD vehicles, engines, and the fossil fuels that power them account for 41 percent of the state's total transportation GHG emissions and are a major contributor to nitrogen oxides (NOx) and particulate matter (PM) emissions.[12] These pollutants do not affect all communities equally and collectively increase premature mortalities, cause cardiovascular and respiratory diseases, increase the risk of cancer, and threaten the stability of the climate.[13]

With an average lifespan of 33 years, most MHDVs spend more time and miles on the road before retirement than light-duty vehicles.[14] As a result, the MHDV segment represents a prime and outsized opportunity to improve public health, minimize emissions, and reduce fossil fuel reliance and net energy consumption, as ZETA noted in its white paper, "Medium- and Heavy-Duty Electrification: Weighing the Opportunities and Barriers to Zero-Emission Fleets."[15]

A large portion of Californians remain vulnerable to the dangers of vehicle pollution including over 15 million people who live within 1,750 feet of a traffic corridor.[16] 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),[17] 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 the nearest state, making it the most pollution-impacted state in the nation by far. Transportation electrification in California would prevent 1,924 premature deaths, 26,292 asthma attacks, and 122,047 days of lost work in 2050.[18]

As evident in Figure 1 below, California's particular struggle with air quality is underscored by the number of National Ambient Air Quality Standards nonattainment areas in the state. Rapid electric MHDV deployment in California will make it easier for these areas to come into attainment.

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[12] "Staff Report: Initial Statement of Reasons," CARB, August 30, 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/acf22/isor2.pdf

[13] "Health Impact of Air Pollution," American Lung Association, https://www.lung.org/research/sota/health-risks. Accessed August 28, 2024.

[14] "Colorado Medium- and Heavy-Duty Vehicle Study," Colorado Energy Office, October 12, 2021. https://energyoffice.colorado.gov/press-releases/polis-administration-releases-new-colorado-medium-and-heavy-duty-vehicle-study

[15] "Medium- and Heavy-Duty Electrification: Weighing the Opportunities and Barriers to Zero-Emission Fleets ," ZETA, January 2022. https://fs.hubspotusercontent00.net/hubfs/8829857/ZETA-WP-MHDV-Electrification_Opportunities-and-Barriers_Final3.pdf

[16] "A census of the US near-roadway population: Public health and environmental justice considerations," Rowangould, Transportation Research Part D: Transport and Environment,Volume 25, 2013, Pages 59-67. https://doi.org/10.1016/j.trd.2013.08.003.

[17] "Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles," American Lung Association, 2020. https://www.lung.org/getmedia/99cc945c-47f2-4ba9-ba59-14c311ca332a/electric-vehicle-report.pdf

[18] *Ibid.*

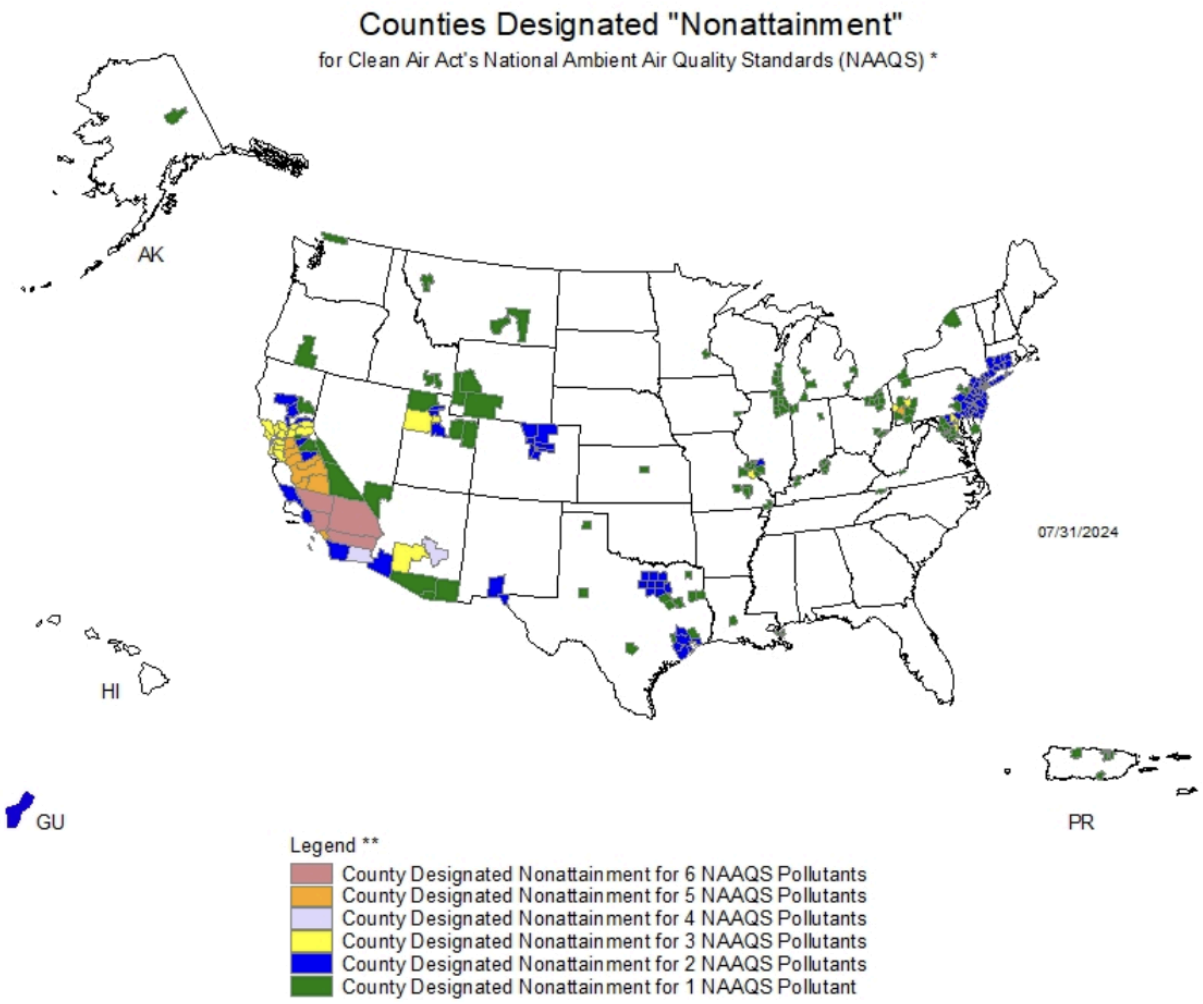

Figure 1. U.S. Counties Designated Nonattainment[19]

Tailpipe emissions from combustion-powered MHDV fleets do not affect all communities equally.[20] In California, transportation emissions have a disproportionate impact on both

[19] "Counties designated Nonattainment." Environmental Protection Agency. Accessed August 28, 2024. https://www3.epa.gov/airquality/greenbook/mapnpoll.html

[20] "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

lower-income communities and communities of color. A 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 Angeles County are exposed to 60 percent more vehicle pollution than the state average and 250 percent more than the San Francisco Bay Area."[21]

Beyond negative health effects on humans, transportation-based pollution damages the environment in a myriad of ways. Volatile organic compounds (VOCs) and NO_x emitted by diesel-fueled vehicles react to form ground-level ozone, which leaves agricultural crops and forests particularly susceptible to stunted growth and a decreased ability to sequester CO_2.[22]

Perhaps the most consequential environmental impact of diesel combustion is its emission of global warming-causing GHGs. As the nature of anthropogenic climate change is becoming increasingly evident, the urgency needed in addressing its causes is becoming greater.[23] Unmitigated GHG emissions are resulting in more extreme weather patterns, reductions in air quality, a rise in sea levels and acidification of the oceans, more frequent and devastating wildfires, longer periods of drought in some regions, and changes to the frequency and intensity of tropical cyclones, among a wide range of other life-threatening impacts.[24,25] These effects will be particularly severe in California, which is already susceptible to the effects of sea level rise, droughts, extreme heat, and wildfires.[26]

EVs 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.[27] Even when accounting for manufacturing emissions under a full lifecycle analysis, EVs are significantly less GHG-intensive over their useful life relative to combustion vehicles.[28]

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[21] "Inequitable Exposure to Air Pollution from Vehicles in California." Union of Concerned Scientists. Accessed August 28, 2024. https://www.ucsusa.org/sites/default/files/attach/2019/02/cv-air-pollution-CA-web.pdf
[22] "Learn about Impacts of Diesel Exhaust and the Diesel Emissions Reduction Act," Environmental Protection Agency, June 16, 2021, https://www.epa.gov/dera/learn-about-impacts-diesel-exhaust-and-diesel-emissions-reduction-act-dera
[23] "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/
[24] "The Effects of Climate Change," NOAA, accessed August 28, 2024. https://climate.nasa.gov/effects/
[25] "AR6 Synthesis Report - Climate Change 2023" IPCC, March 2023. https://www.ipcc.ch/report/ar6/syr/
[26] "Climate Change Impacts in California," State of California Department of Justice, accessed August 29, 2024. https://oag.ca.gov/environment/impact
[27] "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
[28] "CO2 emissions from gas cars outweigh electric, even with battery manufacturing | Fact check" USA Today, January 23, 2024. https://www.usatoday.com/story/news/factcheck/2024/01/23/electric-car-battery-gas-engine-co2-fact-check/72158513007/

4. MHDV Electrification Benefits Fleet Operators and the U.S. Economy

The benefits of medium- and heavy-duty fleet electrification go beyond public health and environmental considerations. Electric MHDVs save fleet operators money on fuel and maintenance while their manufacture is creating domestic jobs and in turn promoting American economic competitiveness. In recognition of these benefits, California has provided financial incentives and technical assistance to fleet operators to help them electrify quickly and lower upfront costs. This combination of economic benefits and forward-thinking government policies will enable fleet operators to meet the requirements of California's ACF program.

Electric MHDVs have much lower fuel and maintenance costs than petroleum-powered alternatives, resulting in significant lifetime total cost of ownership (TCO) savings for fleet operators that are expected to increase with time. The highest impact vehicles currently, both in terms of local health impact and TCO savings, are those used predominantly in urban areas.[29] Many Class 2b and 3 pickup trucks and vans achieved TCO parity with diesel and gas alternatives as early as 2020.[30] By 2027, EDF projects that TCO per mile will be lower for EVs compared to diesel vehicles in almost all vehicle classes used in urban areas.[31] Many segments, including school buses and delivery trucks, will achieve immediate TCO parity, with other segments achieving parity after 3 years or less of operation.[32] These savings mean that fleet operators could save up to $1 per mile driven, allowing them to reinvest savings, grow their businesses, and create jobs.[33]

TCO savings are expected to expand to vehicles in higher classes over the coming years. By 2030, a fully-electric Class 5 van will have a 22% lower TCO than a diesel equivalent, creating savings of $47,000 per vehicle.[34] Likewise, by the next decade, an electric day cab is expected to achieve a 31% TCO improvement on diesel vehicles, resulting in savings of $239,000.[35] Even the largest vehicles see TCO parity in the near future: the International Council on Clean Transportation projects that electric long-haul trucks will achieve TCO parity or lower compared to their diesel counterparts in all states across the country, including California, by 2030.[36]

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[29] "Key Findings from Roush Industries: Medium- and Heavy-Duty ZEV Cost Evaluation," EDF, 2022. https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/2022/02/FINAL-Roush-Fact-Sheet-2.10.22.pdf

[30] "Cost of electric commercial vans and pickup trucks in the United States through 2040," ICCT, January 11, 2022. https://theicct.org/wp-content/uploads/2022/01/cost-ev-vans-pickups-us-2040-jan22.pdf

[31] "Key Findings from Roush Industries: Medium- and Heavy-Duty ZEV Cost Evaluation," EDF, 2022. https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/2022/02/FINAL-Roush-Fact-Sheet-2.10.22.pdf

[32] *Ibid.*

[33] *Ibid.*

[34] "Advanced Clean Fleets Total Cost of Ownership Discussion Document," California Air Resources Board, September 9, 2021, https://ww2.arb.ca.gov/sites/default/files/2021-08/210909costdoc_ADA.pdf

[35] *Ibid.*

[36] "Total Cost of Ownership of Alternative Powertrain Technologies for Class 8 Long-Haul Trucks in the United States," ICCT, April 2023. https://theicct.org/wp-content/uploads/2023/04/tco-alt-powertrain-long-haul-trucks-us-apr23.pdf

Besides being a prudent financial decision for fleet operators, demand for electric MHDVs will lead to domestic job growth throughout the supply chain. MHDV electrification will require building out a domestic manufacturing supply chain and charging network, both of which hold considerable economic potential. A UCLA study found that in California, a transition to fully electric transportation in California would create 6.6 million job years of employment between 2020 and 2045 on net.[37] Electrification of MHDVs alone could increase California's state gross domestic product by up to $190 billion by 2050.[38]

Many countries have made commitments to accelerate zero emission MHDV deployment within their borders. Ensuring U.S. regulations, including subnational regulations such as California's ACF program, match or exceed these ambitions is vital to creating certainty and encouraging domestic investment in the industry. Below is a list of regional and national targets that further underscore the need for California, and the United States as a whole, to maintain pace with the rest of the world:

- Austria, Canada, Chile, Denmark, Finland, Luxembourg, Netherlands, New Zealand, Norway, Scotland, Switzerland, Turkey, United Kingdom, Uruguay, and Wales signed a Memorandum of Understanding (MOU) in 2021.[39] The MOU sets a target for ZEVs to account for 30% of new truck and bus sales by 2030, and 100% by 2040. Since 2021, a further 22 nations have signed the MOU, bringing the total number of signatories to 37.[40]
- In 2024, the European Union (EU) adopted stringent standards for MHDVs to reduce emissions by 45% by 2030, 65% by 2035 and 90% by 2040 from 2019 levels. The EU also required all new city buses to be zero-emission by 2030.[41]
- The EU's Clean Vehicles Directive sets national targets for ZEV public procurement by national governments, ranging from 15-65% depending on the vehicle segment.[42]
- Chile set a target for 100% of new public transportation to be ZEVs by 2035, and 100% by 2045 for freight transport and buses.[43]

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[37] "Workforce Impacts of Achieving Carbon-Neutral Transportation in California,"UCLA Luskin Center, September 2022. https://innovation.luskin.ucla.edu/wp-content/uploads/2022/09/Workforce-Impacts-of-Achieving-Carbon-Neutral-Transportation-in-California.pdf

[38]"Comparison of Medium- and Heavy-Duty Technologies in California", ICF, December 2019. https://caletc.com/wp-content/uploads/2024/04/ICF-Truck-Report_Final_December-2019.pdf

[39] "Memorandum of Understanding on Zero-Emission Medium- and Heavy-Duty Vehicles," Global Commercial Vehicle Drive to Zero, accessed August 28 2024. https://globaldrivetozero.org/mou-nations/

[40] *Ibid.*

[41] "Heavy-duty vehicles: Council signs off on stricter CO2 emission standards," European Council, May 13, 2024. https://www.consilium.europa.eu/en/press/press-releases/2024/05/13/heavy-duty-vehicles-council-signs-off-on-stricter-co2-emission-standards

[42] "Clean Vehicles Directive," European Commission, accessed August 28, 2024 https://transport.ec.europa.eu/transport-themes/clean-transport-urban-transport/clean-and-energy-efficient-vehicles/clean-vehicles-directive_en

[43] "Global EV Outlook 2022 - Securing supplies for an electric future," IEA, (2022) https://iea.blob.core.windows.net/assets/e0d2081d-487d-4818-8c59-69b638969f9e/GlobalElectricVehicleOutlook2022.pdf

- In July 2023, China began implementing more stringent emissions standards for heavy-duty vehicles.[44]
- In March 2022, Canada set zero emissions targets for ZEV models to account for 35% of MHDVs by 2030 and 100% by 2040.[45]
- New Zealand will require public fleets to only buy zero emission buses starting in 2025, with a goal to fully decarbonize its public bus fleet by 2035.[46]
- Pakistan aims for 90% of new heavy-duty truck sales to be electric by 2040.[47]
- Austria also has a goal for 100% of smaller MHDVs (<18 tonnes) to be ZEVs in 2030 and larger MHDVs in 2035.[48]
- France plans to ban the sale of new MHDVs that use fossil-fuels by 2040.[49]
- Norway is targeting 100% of new MHDVs and 75% of buses to be ZEVs by 2030.[50] The country also recently increased its ambitions for trucks, requiring all new trucks sold to be electric or run on biogas by 2030.[51]

5. The EV Supply Chain is Preparing to Support Increased MHDV 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 ACF program provide regulatory certainty for the entire supply chain supporting the transition to electrification, allowing businesses to continue making investment decisions that will maximize this once-in-a-generation opportunity. As discussed further in this section, the EV supply chain is composed of discrete, yet interconnected segments that are continuing to scale up in capacity and investments being made throughout the EV supply chain are key to positioning California and the United States as global leaders in clean transportation.[52,53,54]

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[44] "China Auto Industry National VI B Emission Standard," International Trade Administration, July 30, 2023. https://www.trade.gov/market-intelligence/china-auto-industry-national-vi-b-emission-standard
[45] *Ibid*.
[46] "Decarbonisation of bus fleets for a healthier Aotearoa." New Zealand Government, April 28, 2023. https://www.nzta.govt.nz/media-releases/decarbonisation-of-bus-fleets-for-a-healthier-aotearoa/
[47]"Global Overview of Government Targets for Phasing Out Internal Combustion Engine Medium and Heavy Trucks," ICCT, August 26, 2021. https://theicct.org/global-overview-of-government-targets-for-phasing-out-internal-combustion-engine-medium-and-heavy-trucks
[48] *Ibid*.
[49] *Ibid*.
[50] *Ibid.*
[51] "Norway sets ambitious zero-emissions goals for trucks by 2030," Mobility Portal Europe, December 5, 2023, https://cleantechnica.com/2024/03/27/norway-is-taking-the-lead-in-electric-trucks/
[52] "US and Canada Electric Vehicle Supply Chain Map," Charged by the Book. Accessed August 27, 2024. https://www.charged-the-book.com/na-ev-supply-chain-map
[53] "FACT SHEET: Biden-Harris Administration Announces New Private and Public Sector Investments for Affordable Electric Vehicles," White House, 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/
[54] "Clean Investment Monitor," Rhodium Group, MIT CEEPR, Accessed August 27, 2024. https://www.cleaninvestmentmonitor.org/database-access

a. Critical Minerals

As projected demand for critical minerals and materials (lithium, nickel, cobalt, manganese, copper, graphite, and rare earth elements) for use in EV batteries continues to grow—due in part to policies such as California's ACF program—the supply chain is preparing to meet that demand both through new extraction and processing and with additional support from recycling. Demand for critical minerals is expected to grow substantially in the coming years.[55] Figure 2 shows the International Energy Agency's projected demand scenarios by 2040 relative to a 2023 baseline.

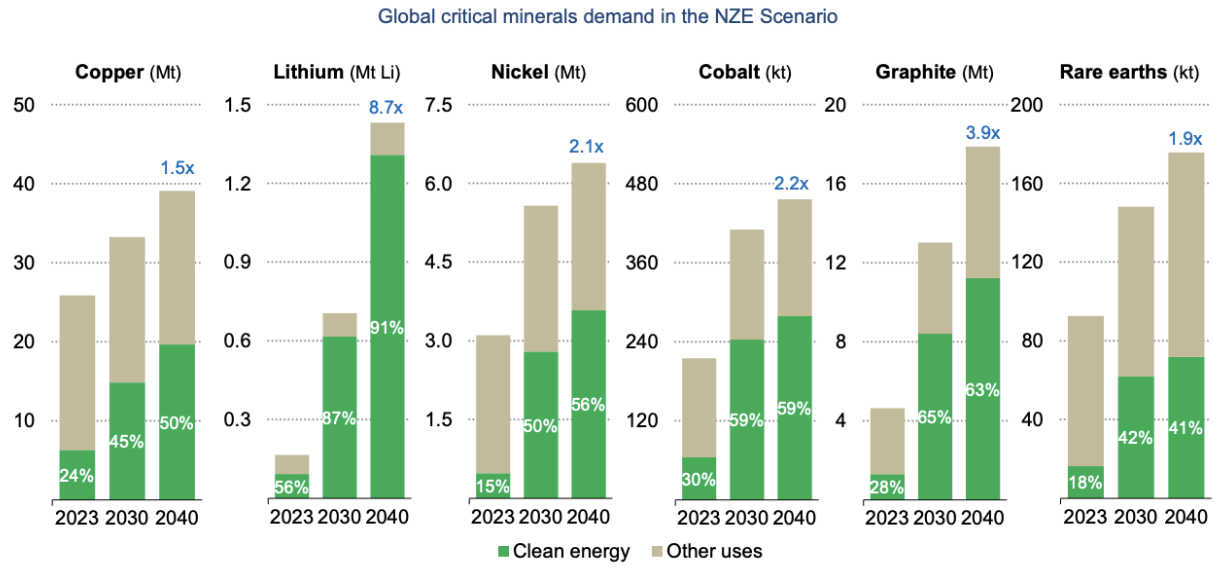

Figure 2. Mineral demand growth from new EV sales by scenario, 2040 relative to 2023.[56]

In a scenario that meets the goals of the Paris Climate Agreement, total demand for critical minerals rises significantly over the next two decades to over 1.5 times 2023 demand for copper and rare earth elements, over two times for nickel and cobalt, and almost 9 times for lithium.[57] 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.

[55] "Global Critical Minerals Outlook 2024," IEA, May 2024. https://iea.blob.core.windows.net/assets/ee01701d-1d5c-4ba8-9df6-abeeac9de99a/GlobalCriticalMineralsOutlook2024.pdf
[56] *Ibid.*
[57] *Ibid.*

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.[58] However, while much of the production for certain minerals is concentrated in a handful of countries, the Carnegie Endowment for International Peace and Figure 3 below demonstrate that the demand for most virgin critical minerals can be met through extraction in democratic countries.[59]

Critical Mineral	**2030 Global Demand 1.5ºC Scenario (kt)**	**Democratic Countries' Reserves (kt)**	**Surplus or Deficit (kt)**
Boron	5	79,000	78,995
Chromium	1,312	213,620	212,308
Cobalt	1,246	2,302	1,056
Copper	23,568	1,235,800	1,212,232
Graphite	30,181	75,200	45,019
Lithium	2,884	17,255	14,371
Manganese	3,205	1,338,000	1,334,795
Molybdenum	296	6,876	6,580
Nickel	10,914	60,000	49,086
Selenium	2	32	30
Silver	327	388	61
Tellurium	35	11	-24
Tin	2,210	2,330	120
Zinc	14,273	129,900	115,628

Figure 3. Critical Minerals Potential in All Democratic Countries[60]

[58] "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

[59] 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.

[60] "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

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.[61] However, while producing enough metals to meet these targets would require extraordinary technological and financial cooperation, substantial economic development opportunities create a strong incentive to do so.

b. Batteries

The U.S. battery manufacturing industry is quickly scaling to meet demand driven by transportation electrification and programs such as ACF. Since January 2021, the U.S. private sector has announced nearly $140 billion in direct investments in battery manufacturing on top of the $71 billion that had already been invested since 2018.[62] According to Argonne National Laboratory, by 2030, U.S. battery capacity will be near 9,000 GWh per year.[63] This expansion in production capacity will also lead to significant innovation and cost savings. Argonne National Lab anticipates battery pack prices will fall to between $56 and $86 per kWh in 2035.[64]

In 2022, the Inflation Reduction Act created the Section 45X Advanced Manufacturing Production Tax Credit and the Section 48C Advanced Energy Project Tax Credit, both of which will continue incentivizing the buildout of battery manufacturing and recycling capacity. The Section 45X credit provides $35 per kWh for each battery cell, $10 per kWh for each battery module, and 10% of the costs of production of the applicable critical materials. The Section 48C credit also appropriated $10 billion to fund clean technology manufacturing facilities, including those that process, refine, and recycle critical minerals.[65] In March 2024, the IRS allocated approximately $4 billion of Section 48C credits for over 100 projects across 35 states, with approximately $1.5 billion allocated to projects in designated energy communities.[66] As of August 2024, the remaining $6 billion is in the process of being allocated.[67] Through these

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[61] *Ibid*.
[62] *Id.* at footnote 54.
[63] "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
[64] "Cost Analysis and Projections for U.S.-Manufactured Automotive Lithium-ion Batteries," Argonne National Laboratory, January 2024. https://publications.anl.gov/anlpubs/2024/01/187177.pdf
[65] "Inflation Reduction Act: What it Is and What it Means for EV Adoption." Zero Emission Transportation Association, 2022. https://www.zeta2030.org/insights/the-inflation-reduction-act-what-it-is-and-what-it-means-for-ev-adoption
[66] "Biden-Harris Administration Announces $4 Billion in Tax Credits to Build Clean Energy Supply Chain, Drive Investments, and Lower Costs in Energy Communities," U.S. Department of Energy, March 29, 2024. https://www.energy.gov/articles/biden-harris-administration-announces-4-billion-tax-credits-build-clean-energy-supply
[67] "Qualifying Advanced Energy Project Credit (48C) Program," U.S. Department of Energy, accessed August 29, 2024. https://www.energy.gov/infrastructure/qualifying-advanced-energy-project-credit-48c-program

credits, the IRA cuts nearly one third of the cost of producing EV batteries in the United States.[68]

Key to meeting the forthcoming demand for EV batteries and critical minerals will be recycling existing batteries at their end-of-life (EOL). The global market for lithium-ion battery recycling is estimated to exceed $17 billion by 2030 which will be largely driven by the growing number of EVs approaching end of life (EOL).[69,70] The volume of EOL batteries from EVs and large storage applications is less than 500,000 tons today, but is expected to reach almost 20 million tons by 2040.[71] In addition to increasing supply of critical minerals, IEA predicts that recycling and other reduced material intensity will lower lifetime emissions of battery packs by more than 30 percent by 2035.[72] There is also a substantial effort to construct new copper recycling facilities, which often require different sources of feedstocks beyond EOL batteries, as demand for copper is expected to increase with increased deployment of EVs.

As the battery industry matures, electric MHDV batteries will become increasingly durable. In the LDV segment, a recent study found that a majority of EVs retain at least 90 percent of their original range capacity left even after driving more than 100,000 miles—a testament to battery durability.[73] While MHDVs operate under different duty cycles and applications, there is good reason to believe advances in LDV battery technologies and durability will extend into other vehicle classes. These technological advances are also supported by federal regulations. EPA's final rule setting federal GHG emissions standards for heavy-duty vehicles set battery durability and warranty requirements which will help bolster fleet operator confidence in the reliability of electric MHDV batteries.[74]

c. Electricity Generation and Grid Readiness

California's transition to zero-emission transportation offers a unique challenge to the energy companies that will need to ensure they have ample electricity supply and delivery system capacity 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.

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[68] "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/

[69] "Lithium-ion Battery Recycling Market," Markets and Markets, August 2024. https://www.marketsandmarkets.com/Market-Reports/lithium-ion-battery-recycling-market-153488928.html "Battery Recycling Market Size, Share & Trends Analysis Report By Chemistry" Grand View Research, April 2023. https://www.grandviewresearch.com/industry-analysis/battery-recycling-market

[70] "Looming EV raw materials supply crunch has OEMs eyeing battery recycling and production scrap," S&P Global, January 4, 2024. https://www.spglobal.com/mobility/en/research-analysis/ev-raw-materials-supply-crunch-battery-recycling.html

[71] "Battery recycling takes the driver's seat," McKinsey and Company, March 13, 2023. https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/battery-recycling-takes-the-drivers-seat#/

[72] "Batteries and Secure Energy Transitions," IEA, April 2024, https://www.iea.org/reports/batteries-and-secure-energy-transitions

[73] "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

[74] *See* 89 Fed. Reg. 29440 (April 22, 2024)

In some instances, this may also require investing in new energy generation sources and associated transmission and distribution system infrastructure to accommodate major electric MHDV charging centers like vehicle depots or co-locate other necessary amenities.

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.

This section will discuss the growing energy demands of electric MHDV adoption and new potential hotspots for energy demand. It will also use case studies to highlight how California 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 California grid's ability to handle the load growth from electric MHDVs 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. 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. California's ACF program will provide the regulatory certainty needed to not only ensure vehicle manufacturers continue to invest in electric MHDV 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.

In 2021, the U.S. fleet of electric vehicles used 6.1 terawatt hours (TWhs) of electricity to travel 19.1 billion miles.[75] That accounted for just 0.15% of the total national energy generation that year.[76] In 2022, the United States produced 4,243 TWhs of electricity.[77] 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

[75] "Assessment of Light-Duty Plug-in Electric Vehicles in the United States, 2010–2021," Argonne National Lab, November 2022 https://publications.anl.gov/anlpubs/2022/11/178584.pdf
[76] "Monthly Energy Review May 2023," EIA, https://www.eia.gov/totalenergy/data/monthly/pdf/sec7_3.pdf
[77] *Ibid.*

electricity to power all vehicles if they were electric.[78] 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 strategy and 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, carbon capture, long-duration energy storage, and green hydrogen. In 2022, electricity generated from renewable sources surpassed coal for the first time in U.S. history.[79] At the same time, electricity providers are looking at ways to add 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.[80,81] Already, available renewable energy resources in the U.S. are estimated to amount to more than 100 times the nation's current electricity needs.[82]

Power generation is only one of the considerations when preparing for 100% transportation electrification. In particular, the industry needs to develop its ability to precisely manage demand in real time, including by accurately predicting when and where increases in demand will occur. It is important to note that energy demand is not constant. Instead, it consists of relatively predictable peaks and troughs throughout the day. High demand consistently 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.[83] 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.

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

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[78] "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/
[79] "U.S. renewable electricity surpassed coal in 2022," Associated Press, March 28, 2023 .https://apnews.com/article/renewable-energy-coal-nuclear-climate-change-dd4a0b168fe057f430e37398615155a0
[80] "Renewable Energy," Department of Energy, accessed August 28, 2024. https://www.energy.gov/eere/renewable-energy
[81] "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
[82] "Renewable Energy Resource Assessment Information for the United States," Department of Energy, accessed August 28, 2024. https://www.energy.gov/eere/analysis/renewable-energy-resource-assessment-information-united-states
[83] "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/

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 have similar case studies pertaining to their service territories detailed in ZETA's July 2023 policy brief entitled 'Powering the EV Market: How Electricity Providers are Planning for the Future.'[84]

1. Pacific Gas & Electric

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 over 610,000 EVs in operation in its service area—one in every eight of all EVs on the road throughout the nation—expansion of PG&E's programs to support EV charging across Northern and Central California, including its EV Charge Network (EVCN), EV Fleet, EV Fast Charge, and EV Schools and Parks programs have been critical to support the State's transition to a clean transportation future. Over the last half-decade, PG&E has supported the deployment of more than 7,000 EV charging ports across its service area through these programs. Additionally, it offers a variety of other infrastructure programs, rates, incentives and resources to help accelerate EV adoption among customers, and PG&E is working collaboratively across the EV charging ecosystem to accelerate and implement 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 and 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.

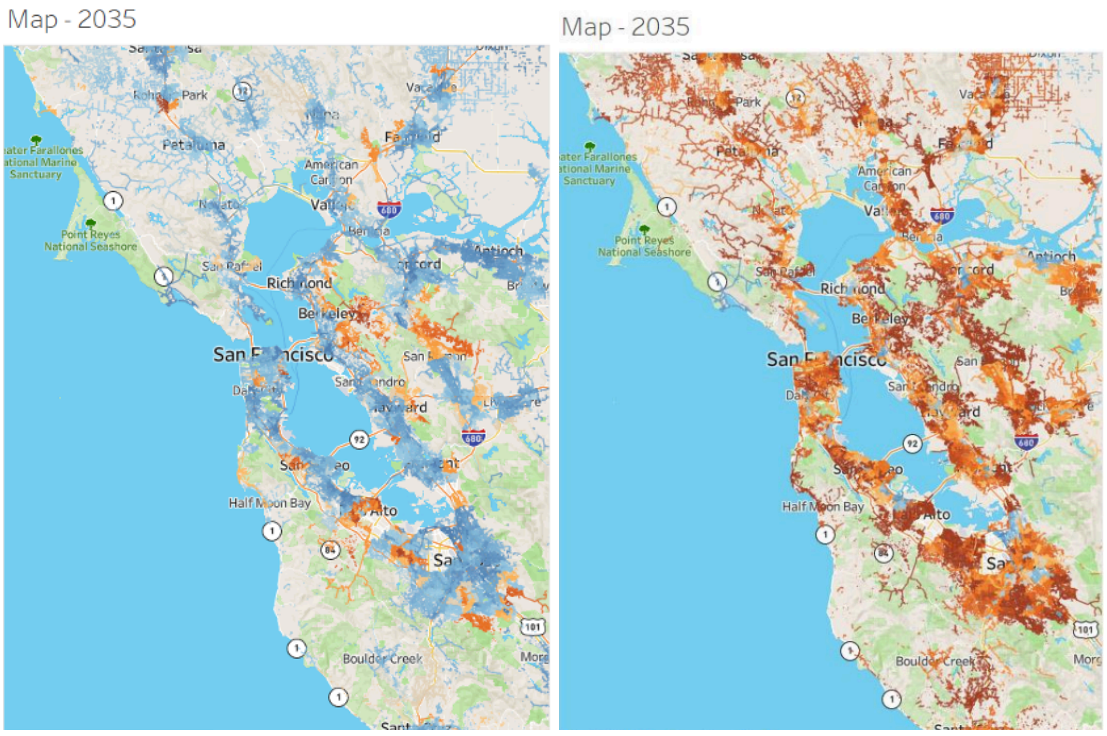
[84] "Powering the EV Market: How Electricity Providers are Planning for the Future." Zero Emission Transportation Association, July 2023. https://www.zeta2030.org/policy-brief-powering-the-ev-market-how-electricity-providers-are-planning-for-the-future

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.

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 are being 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. Involving 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.



2020 CEC IEPR Mid (2035) CARB MSS (2035)

Figure 4. 2035 Load scenarios in the San Francisco Bay Area based on different EV adoption forecasts.

In Figure 4 above, the difference in magnitude of localized EV load in the year 2035 can be seen in a relatively low EV adoption scenario (2020 California Energy Commission (CEC) Integrated Energy Policy Report (IEPR Mid)) and a higher policy-based scenario based on the California Air Resources Board (CARB) Multiple Source Strategy (MSS) forecast. Grid planners can use this tool to investigate and solve for circuit level impacts of EV load growth.

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 are 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.

2. Southern California Edison: Preparing the Grid for EV Adoption

About 40% of the nation's electric vehicles, more than 1.3 million, have been sold in the state of California. More than 430,000 of those 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.

Solving near-term challenges

One way SCE is addressing the near-term issues is its Power Service Availability (PSA) initiative for Transportation Electric 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. For those ready to invest in EV charging for medium- and heavy-duty vehicles, SCE's Charge Ready Transport program similarly offers low- to no-cost site upgrades to support the installation. The program provides funding to help electrify semi-trucks,

buses, and delivery vehicles, among others. Through its Charge Ready programs, SCE has installed more than 3,000 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 a new forecasting approach for Medium-Duty / Heavy Duty (MDHD) vehicles 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 new forecasting methodology leverages MDHD fleet industry data to more accurately predict MDHD electrification adoption and corresponding grid needs
    - 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 new or expanded 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)

d. MHDV Charging Infrastructure

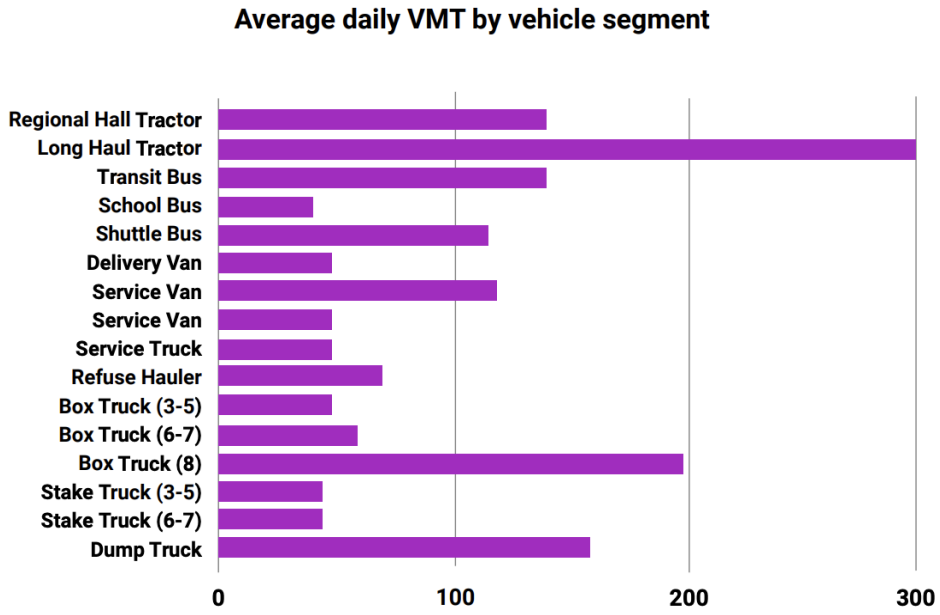
A commonly cited barrier to electric MHDV adoption is the lack of affordable charging infrastructure.[85] It is first important to note that charging needs for fleet-owned MHDVs can be much different than consumer-owned light-duty EVs. Electric MHDVs tend to have higher capacity batteries requiring faster charging rates or longer charge times, or a combination of both. While most electric MHDV fleet vehicles have shorter, scheduled routes and can rely primarily on depot charging overnight, some fleets may require on-route charging to supplement longer trips. To ensure upfront capital is spent on the appropriate electric vehicle supply equipment (EVSE), charging installation projects can benefit from a customized analysis of a fleet's needs based on fleet size and type, average VMT, duty cycles, and projected time of charging.

As studied by the International Council on Clean Transportation, the majority of class 4-8 electric MHDV charging will occur at depots, with the exception of single unit long-haul trucks.[86] Depot charging is ideal for minimizing cost and maximizing battery health, whereas on-route charging prioritizes convenience. Often located at warehouses, logistic hubs, or public

[85] *Id.* at footnote 15.
[86] Near-Term Infrastructure Deployment to Support Zero-Emission Medium- and Heavy-Duty Vehicles in the United States, International Council on Clean Transportation, May 2023. https://theicct.org/wp-content/uploads/2023/05/infrastructure-deployment-mhdv-may23.pdf

stations in industrial areas, fleet owners and operators can use these chargers for overnight charging of vehicles.[87] Depot charging can save fleet operators money: chargers are installed at a pre-existing facility, charge during scheduled downtime (which means they do not have to stop during typical hours spent on the road), and can pay less for the electricity that they use (per-mile public charging rates are often higher).[88] Given its centralized nature, depot charging is also well-suited for electricity load management. Depots can allow for easier coordination with grid operators to distribute charging activity to off-peak load times and facilitate tracking up-time fleet charging metrics. In analysis conducted by Atlas Public Policy, more than 98% of cost-competitive scenarios for electric MHDV fleets included depot charging.[89]

The average MHDV travels less than 100 miles per day.[90] Likewise, trucks with the longest routes drive a maximum of 600 miles but average less than 300 miles per day.[91] Figure 5 below provides the average range of various vehicle classes; as many EV models have a similar range, the electric MHDV models currently available can meet up to 60% of operational needs,[92] with trucks being produced today capable of traveling longer distances (330 miles).[93]



[87] Alana Aamodt, Karlynn Cory, & Kamyria Coney, "Electrifying Transit: A Guidebook for Implementing Battery Electric Buses," National Renewable Energy Laboratory, April 2021. https://www.nrel.gov/docs/fy21osti/76932.pdf
[88] Charles Satterfield and Nick Nigro, "Assessing Financial Barriers to Adoption of Electric Trucks," Atlas Public Policy, February 2020.
http://atlaspolicy.com/wp-content/uploads/2020/02/Assessing-Financial-Barriers-to-Adoption-of-Electric-Trucks.pdf
[89] *Ibid.*
[90] "Staff Report, Initial Statement of Reasons," CARB, Public Hearing to Consider the Proposed Advanced Clean Fleets Regulation, p. 42. August 30, 2022. https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/acf22/isor2.pdf
[91] "Average Annual Vehicle Miles Traveled by Major Vehicle Category," DOE Alternative Fuels Data Center, Accessed August 28, 2024. https://afdc.energy.gov/data/10309
[92] *Id.* at footnote 15.
[93] "Fact Sheet | The Future of the Trucking Industry: Electric Semi-Trucks," EESI, May 11, 2023.
https://www.eesi.org/papers/view/fact-sheet-the-future-of-the-trucking-industry-electric-semi-trucks-2023

Figure 5. Average VMT by MHDV Segment[94]

Just as electric MHDV deployment will not occur all at once, neither will MHD EVSE deployment. Initial strategic buildout of depot-based charging in high-priority areas will help ensure EVSE manufacturing capacity can scale while continuing to support a more rapid electric MHDV transition. This is already under way at certain locations[95,96] and HD EVSE product offerings are increasing rapidly.[97,98,99] Publicly accessible truck charging stations have been announced in California in collaboration with the California Energy Commission, many in prime locations that will drive early adoption of electric long-haul trucking.[100] Policies such as California's ACF program provide the regulatory certainty needed to support those investments by creating more clarity on expected MHD EVSE demand and EPA should grant California's waiver request without delay.

e. Electric MHDV Model Availability

Among the MHDV segment, shorter-haul vehicles are currently more cost-competitive to electrify than long-haul trucking—although technological improvements are accelerating the timeline for the latter. At present, transit buses, delivery vans, and school buses are well suited to electrification: they travel shorter distances, regular routes, and benefit from return-to-base operations ideal for depot charging. Increasing the proportion of EVs in this vehicle segment will demonstrate the viability of this technology, increasing consumer confidence and paving the road for larger scale electrification.

MHDV manufacturers have begun ramping up their electric model production as a growing number of fleet operators intend to decarbonize their fleets, due in part to policies such as ACF, translating to rising MHDV sales in Europe and the United States in recent years.[101] In North America, there are 275 electric medium- and heavy-duty vehicle models available today, up from 171 in 2021. This includes 112 medium-duty vehicles, 20 school buses, and 37 transit buses.[102]

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[94] *Id.* at footnote 15.
[95] "Electric Island: First US Charging Station for Electric Semis is Ready for Megawatt Fast-Charging," Green Car Reports, April 22, 2021. https://www.greencarreports.com/news/1132019_first-charging-station-electric-semis-megawatt-fast-charging
[96] "WattEV breaks ground on nation's first electric truck stop charging station in Bakersfield," KGET.com, December 17, 2023 .https://www.kget.com/news/business/wattev-breaks-ground-on-nations-first-electric-truck-stop-charging-station-in-bakersfield/
[97] "Siemens Unveils Fast and Flexible Charging Solution for Electric Buses, Trucks, and Heavy-Duty Vehicles at ACT Expo," Siemens e-Mobility, August 31, 2021. https://www.siemens.com/us/en/company/press/press-releases/smart-infrastructure/siemens-launches-sicharge-uc-in-the-united-states.html
[98] "ChargePoint Express Plus," Chargepoint, accessed August 28, 2024. https://www.chargepoint.com/fleet/stations/express-plus
[99] "EVgo Fleet Charging Solutions," EVgo, accessed August 28, 2024. https://www.evgo.com/charging-solutions/evgo-fleet-solutions/
[100] "TravelCenters of America to Build One of Nation's First Publicly Accessible Truck Charging Stations," BP Pulse, July 24, 2024, https://bppulsefleet.com/press/travelcenters-of-america-to-build-publicly-accessible-truck-charging-station/
[101] "Global EV Outlook 2024," IEA, April 2024. https://iea.blob.core.windows.net/assets/a9e3544b-0b12-4e15-b407-65f5c8ce1b5f/GlobalEVOutlook2024.pdf
[102] "Zero-Emission Technology Inventory (ZETI) Data Explorer," Global Commercial Drive to Zero, accessed August 28, 2024 https://globaldrivetozero.org/tools/zeti-data-explorer/

HD trucks alone have nearly doubled in model availability since 2021, making them one of the fastest growing segments, as shown in Figure 6.[103]

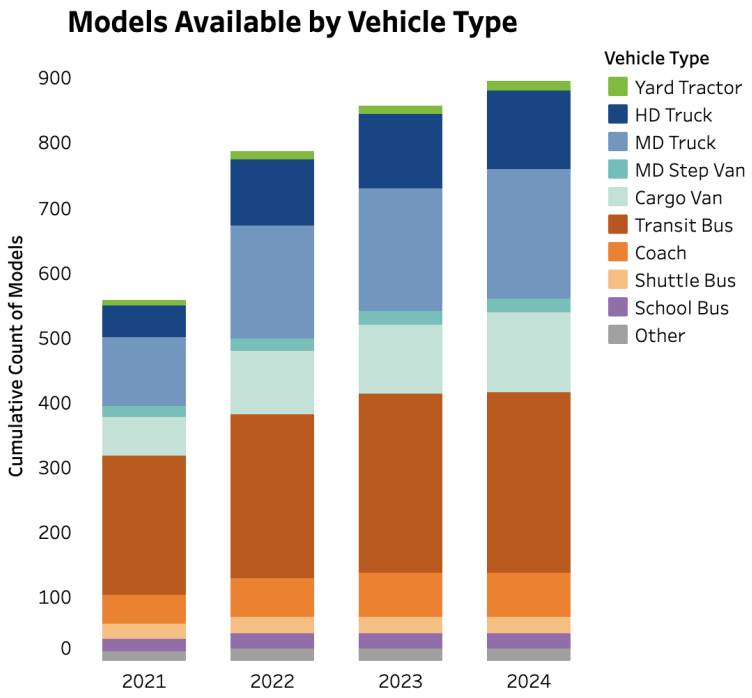

Figure 6. Global model availability growth from 2021-2023.[104]

6. 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 ACF 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 MHDV electrification technologies. ZETA believes 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.

[103] *Ibid.*
[104] *Ibid.*