RUNNING ON EMPTY: A ROADMAP TO THE ELECTRIC VEHICLE CHARGING TRANSITION

ABSTRACT

The transportation sector accounts for a large portion of the United States' greenhouse gas emissions. By transitioning a gas-reliant light duty vehicle fleet to one entirely powered by electricity, carbon emissions exponentially can be curbed. This article will discuss the opportunities for and existing regulatory drivers behind such an infrastructure overhaul. It will analyze challenges inhibiting a comprehensive deployment of electric vehicles and charging infrastructure, including the continued dependency on petroleum equipment and service stations. Finally, it will advocate for a three-pronged approach that addresses transition barriers and encourages the complete metamorphosis of the United States' transportation fueling infrastructure.

I. INTRODUCTION

No doubt exists that an irreversible climate crisis quickly approaches.[1] Scientists warn that once global temperatures rise two degrees Celsius above preindustrial averages, climate tipping points will occur.[2] These include abrupt thaws and collapses of ice sheets, glaciers, and

[1] Mass. v. EPA, 549 U.S. 497, 521–523 (2007); Paris Climate Agreement to the United Nations Framework Convention on Climate Change, 315 U.N.T.S. 79 (Dec. 12, 2015) ("*Recognizing* the need for an effective and progressive response to the urgent threat of climate change") (emphasis in original).

[2] David I. Armstrong McKay et al., *Exceeding 1.5°C Global Warming Could Trigger Multiple Climate Tipping Points*, Science 377, 1 (Sept. 2022) ("Tipping points occur when change in part of the climate system becomes (i) self-perpetuating beyond (ii) a warming threshold as a result of asymmetry in the relevant feedbacks, leading to (iii) substantial and widespread Earth system impacts"). On November 17, 2023, average global temperatures passed this two-degree Celsius milestone for the first time. Scott Dance, *Earth Passed a Feared Global Warming Milestone Friday, At Least Briefly*, WASH. POST (Nov. 19, 2023), https://www.washingtonpost.com/climate-environment/2023/11/19/climate-change-2c-temperature-heat-record/.

permafrosts, forest dieback; and the collapse of ocean convection and circulation.[3] Humans are responsible for these harms through the emission of greenhouse gases.[4] In 2021, transportation accounted for 28% of the United States' greenhouse gas emissions, and 58% of the sector's emissions were accounted for by light-duty vehicles.[5] Consequently, about 16% of the United

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[3] *Id.* at 3.

[4] IPCC, 2023: Summary for Policymakers. In: *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* at 4 (Core Writing Team, H. Lee and J. Romero (eds.)) ("Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming . . . [g]lobal greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, [and] lifestyles and patterns of consumption and production").

[5] U.S. Env't Prot. Agency, *Sources of Greenhouse Gas Emissions*, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#transportation (last updated Oct. 5, 2023); U.S. Env't Prot. Agency, *Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions 1990–2021*, 1 (June 2023), https://www.epa.gov/system/files/documents/2023-06/420f23016.pdf. The Federal Highway Administration and the U.S. Census Bureau categorize light duty vehicles as Class 1-2 (vehicles weighing 10,000 pounds or less), medium duty vehicles as Class 3-6 (vehicles weighing 10,001-26,000 pounds), and heavy duty vehicles as Class 7-8 (vehicles weighing over 26,000 pounds). The Environmental Protection Agency classifies passenger vehicles weighing 8,500 pounds or less as light duty and separately categorizes heavy duty trucks, heavy duty engines, and general trucks.

States' greenhouse gas emissions are attributed to light-duty vehicles.[6] Such a statistic demands a shift away from gas-guzzling to electricity-powered automotives, so that the rise in global temperatures may be curbed.[7]

With a focus on light duty vehicles, this discussion proceeds in five sections. Part II surveys the incentives and regulations driving the transition from a gas-reliant transportation network to an electricity-dependent infrastructure at both the federal and state level. Part III analyzes the existing regulatory framework for gas stations and electric charging ports, including permitting, waste regulation, land use, and the financial sustainability of each network. This analysis will demonstrate the obstacles faced by traditional service stations and the consequent need for a complete energy shift. Part IV explores the existing energy regulatory markets and challenges facing electric vehicle charging stations. Part V proposes a tri-part solution to address those

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U.S. Dep't of Energy, *Alternative Fuels Data Center: Vehicle Weight Classes & Categories*, https://afdc.energy.gov/data/10380 (last visited Oct. 23, 2023).

[6] U.S. Env't Prot. Agency, *Fast Facts*, *supra* note 5.

[7] Electricity-powered vehicles have existed since the early 1800's. Massimo Guarnieri, *Looking Back to Electric Cars*, THIRD IEEE HISTORY OF ELECTRO-TECHNOLOGY CONFERENCE, 1–6 (2012). Rechargeable batteries viable for storing electricity on the vehicles they powered existed in 1859. Nat'l High Magnetic Field Lab'y, *Planté Battery – 1859*, https://nationalmaglab.org/magnet-academy/history-of-electricity-magnetism/museum/plante-battery-1859/ (last visited Oct. 16, 2023). The delay in expansion of these early electric vehicles can be attributed to a lack of electric power infrastructure. Josef Taalbi & Hana Nielsen, *The Role of Energy Infrastructure in Shaping Early Adoption of Electric and Gasoline Cars*, 6 NATURE ENERGY 970–76 (2021).

challenges through the statutory regulation of charging rates, incentives and stimuli, and service distribution for equal access. Part VI summarizes the benefits of and advocates for an electric vehicle charging network in place of existing gas fuel service stations. Although relevant to the transition, the implications of a shifting energy generation mix, costs to consumers related to the Social Cost of Carbon, persistent dependencies on petroleum for car components, and opportunities for charging ports within microgrids and distributed energy resources are outside this discussion's scope and not addressed here.

II. INCENTIVES AND REGULATIONS DRIVING THE TRANSITION

The United States recognizes the urgency of the climate crisis and has adopted a long-term strategy to reach net-zero greenhouse gas emissions by 2050.[8] Together, the Fixing America's Surface Transportation Act of 2015, the Infrastructure Investment and Jobs Act of 2021, and the

[8] U.S. Dep't of State & U.S. Exec. Off. of the President, *The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050*, 3 (Nov. 2021), https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf ("Addressing the climate crisis requires immediate and sustained investment to eliminate net global greenhouse gas emissions by mid-century. . . . [W]e must retool the global energy economy, transform agricultural systems, halt and reverse deforestation, and decisively address non-carbon dioxide emissions").

Inflation Reduction Act of 2022 launched a comprehensive package of incentives for the development, purchase, and installation of electric vehicles and charging equipment.[9]

A. Fixing America's Surface Transportation Act

The 2015 Fixing America's Surface Transportation Act ("FAST Act") authorized $305 billion to fund surface transportation programs.[10] The act mandates the Secretary of Transportation to "designate national electric vehicle charging and hydrogen, propane, and natural gas fueling corridors" and issue a report establishing an "aspirational goal of achieving strategic deployment of electric vehicle charging infrastructure."[11] In 2023, the Federal Highway Administration issued its seventh request for state and local officials to nominate alternative fuel corridors for designation.[12] Following prior rounds for nominations, corridors now exist that meet the

[9] Infrastructure Investment and Jobs Act of 2021, Pub. L. No. 117-58; Inflation Reduction Act of 2022, Pub. L. No. 117-169; Fixing America's Surface Transportation Act of 2015, Pub. L. No. 114-95.

[10] U.S. Dep't of Transp. Fed. Highway Admin., *Fixing America's Surface Transportation Act or "FAST Act": A Summary of Highway Provisions*, https://www.fhwa.dot.gov/fastact/summary.cfm (last updated Feb. 8, 2017).

[11] Fixing America's Surface Transportation Act § 1413.

[12] U.S. Dep't of Transp. Fed. Highway Admin., *Memorandum: Request for Nominations – Alternative Fuel Corridors (Round 7/2023)* (May 18, 2023), https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/nominations/2023_request_for_nominations_r7.pdf.

infrastructure requirements for designation as "Corridor-Ready."[13] The FAST Act also authorizes the Administrator of General Services to "install, construct, operate, and maintain . . . a battery recharging station" in parking areas used by federal employees.[14]

B. Infrastructure Investment and Jobs Act

The 2021 Bipartisan Infrastructure Investment and Jobs Act ("BIL") allocated around $550 billion for investment in America's transportation and water infrastructure, energy resilience, Internet access, and more.[15] The act increased available grant funds allocated to all states and territories for buses and bus facilities to promote low or zero emission vehicles and provides for a

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[13] U.S. Dep't of Transp. Fed. Highway Admin., *Alternative Fuel Corridors,* https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/previous_rounds/ (last updated Aug. 1, 2023). To be designated as "Corridor-Ready," nominated highway segments must meet certain distancing, filling, and access requirements. *See id.*

[14] *Id.*

[15] White House, *Updated Fact Sheet: Bipartisan Infrastructure Investment and Jobs Act* (Aug. 2, 2021), https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/02/updated-fact-sheet-bipartisan-infrastructure-investment-and-jobs-act/. The BIL amended the Energy and Conservation Act to provide for "programs to increase transportation energy efficiency, including programs to help reduce carbon emissions in the transportation sector by 2050 and accelerate the use of alternative transportation fuels for, and the electrification of, [s]tate government vehicles, fleet vehicles, taxis and ridesharing services, mass transit, school buses, ferries, and privately owned passenger and medium- and heavy-duty vehicles." Infrastructure Investment and Jobs Act of 2021, Pub. L. No. 117-58 § 40109; 42 U.S.C. § 6322(d).

fleet transition plan.[16] The BIL also instructed the United States Department of Transportation to establish a carbon reduction formula program lowering transportation emissions and enumerated activities eligible for state funding, including truck stop and port electrification, charging and fueling infrastructure deployment, and the purchase or leasing of zero emission vehicles.[17] The legislation established the Charging and Fueling Infrastructure Discretionary Grant Program to support distribution of accessible electric vehicle charging and alternative fueling equipment, especially along Alternative Fuel Corridors under the FAST Act.[18] Additionally, the BIL provided funding for the Federal Highway Administration Electric Vehicle Charger Reliability and

[16] Infrastructure Investment and Jobs Act § 30018 ("In awarding grants . . . for projects related to zero emission vehicles, the Secretary shall require the applicant to submit a zero emission transition plan;" "the Secretary shall consider eligible projects relating to the acquisition or leasing of low or no emission buses or bus facilities that make greater reductions in energy consumption and harmful emissions, including direct carbon emissions"); *see also* 49 U.S.C. § 5339(a)(5)(A).

[17] Infrastructure Investment and Jobs Act § 11403.

[18] *Id.* § 11401; 23 U.S.C. § 151. Alternative Fuel Corridors are designated by the Federal Highway Administration as a national network of electric vehicle charging and alternative fuel infrastructure along national highway system corridors. U.S. Dep't of Energy, Alt. Fuels Data Ctr., *National Alternative Fuels Corridors*, https://afdc.energy.gov/laws/11675 (last visited Sept. 18, 2023). *See also* U.S. Dep't of Transp. Fed. Highway Admin., *Alternative Fuel Corridors*, https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/index.cfm (last updated May 19, 2023).

Accessibility Accelerator, which supports the repair and replacement of existing, non-operable charging stations by state departments of transportation and local governments.[19]

C. Inflation Reduction Act

In 2022, Congress passed the Inflation Reduction Act ("IRA") and provided about $400 billion, the largest climate investment in history, in funding to put the brakes on climate change.[20] To encourage the transition from gas-fueled to electric-powered transportation in business, the IRA

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[19] Infrastructure Investment and Jobs Act div. J tit. VIII; U.S. Dep't of Transp. Fed. Highway Admin., *National Electric Vehicle Infrastructure Formula Program*, https://www.fhwa.dot.gov/environment/nevi/evc_raa/ (last updated Sept. 14, 2023) (a program to provide funding to states to deploy electric vehicle charging stations and to establish a data collection, access, and reliability network. States must submit plans to the Federal Highway Administration and the Joint Office of Energy and Transportation to receive funding). The BIL also provided for, among other things: (1) a truck emissions reduction study; (2) a clean school bus program (EPA may award up to 100% of the cost); (3) the Congestion Mitigation and Air Quality Improvement Program; (4) Low and Zero Emission Public Transportation Funding; and (5) the Low or Zero Emission Ferry Program. *See* Infrastructure Investment and Jobs Act.

[20] Inflation Reduction Act of 2022, Pub. L. No. 117-169; Cong. Budget Off., *Cost Estimate PL 117-169* (Sept. 7, 2022), https://www.cbo.gov/system/files/2022-09/PL117-169_9-7-22.pdf. *See also* Anne Kelly, *Comment: One Year In, the Inflation Reduction Act is Proving that Climate Action is Good for Business*, REUTERS (Aug. 16, 2023), https://www.reuters.com/sustainability/boards-policy-regulation/comment-one-year-inflation-reduction-act-is-proving-that-climate-action-is-good-2023-08-16/.

provided for a tax credit for the purchase of new electric vehicles and fuel cell electric vehicles meeting certain standards.[21] For individuals, additional tax credits are also available for the purchase of pre-owned electric vehicles and fuel cell electric vehicles.[22] The act also allocated funding to the Environmental Protection Agency ("EPA") for grant awards for heavy-duty zero emission vehicles and associated infrastructure, including the capital, installation, operation, and maintenance costs of charging or refueling infrastructure and workforce development and training.[23] The IRA employs tax benefits to drive a clean energy transition, including at the level of an individual consumer, by mandating that the Internal Revenue Service recognize and implement over thirty different credits and deductions for individuals, businesses, and other entities.[24]

Interestingly, the Alternative Fuel Corridor program established by the FAST Act is now central to the coordinated enterprise of the three federal acts: The BIL attaches the program to funding provisions which provide eligibility based on corridor designations, and the IRA offers consumer

[21] Inflation Reduction Act § 13403. *See also* U.S. Internal Revenue Serv., *Commercial Clean Vehicle Credit*, https://www.irs.gov/credits-deductions/commercial-clean-vehicle-credit (last updated June 22, 2023); 26 U.S.C. § 45W.

[22] Inflation Reduction Act § 13402; 26 U.S.C. §§ 25E, 30D.

[23] Inflation Reduction Act § 60101.

[24] U.S. Internal Revenue Serv., *Credits and Deductions Under the Inflation Reduction Act of 2022*, https://www.irs.gov/credits-and-deductions-under-the-inflation-reduction-act-of-2022 (last updated Sept. 8, 2023).

incentives for the purchase and use of alternatively-fueled vehicles.[25] In this way, and in others, these three legislative channels demonstrate a consistent, federal commitment to the energy transition, especially by investing deliberately in alternative fuel access and development in transportation. Together, the acts offer the majority of funding and incentive opportunities available for achieving net-zero greenhouse gas emissions in the United States in the near future.

D. State Survey

State legislatures enact targeted, policy-aligned laws that operate in conjunction with larger federal schemes to meet emission goals. Consider the following illustrative, yet incomplete, list of statutory, state-level incentives supporting the energy transition by targeting electric vehicles and charging infrastructure.

State	Statutory Incentives
Alabama	• Commercial Property Assessed Clean Energy Program: issuance of debt instruments and other financing methods to support energy efficiency on commercial properties, including installation of electric vehicle charging stations[26] • Grants for electric vehicle charging station infrastructure expansion[27]

[25] Infrastructure Investment and Jobs Act of 2021, Pub. L. No. 117-58 (amending 23 U.S.C. § 151 to update requirements relating to the designation of national alternative fuel corridors and establishing a discretionary grant program); 26 U.S.C. §§ 45W, 25E, 30D.

[26] ALA. CODE §§ 11-81-240–250 (2020).

[27] *Id.* § 40-12-242.

Alaska	• Energy and resilience project support, including construction, installation, and modification of electric vehicle charging stations[28]
Arizona	• Penalties for obstructing an electric vehicle parking space[29] • Local governments must develop and implement vehicle fleet plans to encourage the use of alternative fuels[30]
Arkansas	• Person or corporation supplying electricity to public exclusively to charge electric vehicles is not defined as a public utility[31]
California	• Zero emission vehicle and near-zero emission vehicle component rebates[32] • Alternative fuel vehicle and fueling infrastructure grants[33] • Municipalities may not restrict charging access[34]

[28] ALASKA STAT. § 29.55.100 (2022); H.B. 227, 2022 Leg., 32nd Sess. (Ala. 2022). Note that the Regulatory Commission of Alaska issued an order stating that "entities providing electric vehicle charging stations are not defined as public utilities and are not subject to restrictions on the resale of electric service." Regulatory Commission of Alaska Order U-21-022(2).

[29] ARIZ. REV. STAT. § 28-786 (2021).

[30] *Id.* §§ 9-500.04, 49-474.01, 49-541, 49-571.

[31] ARK. CODE ANN. § 23-1-101(9) (2010).

[32] CAL. HEALTH & SAFETY CODE § 44274.9 (2022).

[33] *Id.* § 44220 (b).

[34] CAL. GOV'T CODE § 65850.9 (2022).

	• Charging station open access requirements[35] • Mandatory charging station building standards[36]
Colorado	• Charging station grants through Charge Ahead program[37] • Charging station property tax exemption[38] • Electric vehicle and infrastructure coaching service through ReCharge Colorado program[39]
Florida	• Local governments may use income from the infrastructure surtax to support property owners installing electric vehicle supply equipment subject to local government ordinances[40] • Condominium associations may not prohibit or restrict the installation of electric vehicle charging stations in residents' designated parking spaces; may not significantly increase the cost of the charging station[41]

[35] CAL. HEALTH & SAFETY CODE §§ 44268, 44268.2 (2022).

[36] CAL. CODE REGS. tit. 24 §§ 2, 11 (2022).

[37] COLO. REV. STAT. § 24-38.5-103 (2018).

[38] *Id.* §§ 38-12-601, 39-3-138.

[39] Colo. Energy Off., *ReCharge Colorado*, https://www.colorado.gov/pacific/energyoffice/recharge-colorado (last visited Nov. 11, 2023).

[40] FLA. STAT. §§ 206.9951, 212.055 (2023).

[41] *Id.* § 718.113.

	• Public electric vehicle charging offered by a non-utility is not a retail sale subject to regulation[42]
Texas	• Alternative Fueling Facilities Program, through the Texas Emissions Reduction Plan, provides grants for the construction of alternative fueling facilities, including electricity[43] • Electric vehicle charging station providers are not regulated as public utilities in areas where customers can choose alternative electricity suppliers[44]

Laws and regulations for electric vehicles and electric vehicle charging stations vary greatly from state to state, but common threads exist. States like Arizona and Arkansas deem entities that sell electricity for electric vehicle charging not to be public utilities, shielding them from additional burdensome regulation and rate approvals.[45] All states, through the BIL's National Electric Vehicle Infrastructure Formula Program, are encouraged to deploy electric vehicle charging equipment along designated corridors.[46] Tax rebates, credits, and grant programs are especially popular and enable the transition from gas-fueled vehicles to electric-powered wheels across the country, but a uniform and comprehensive approach is absent.

[42] *Id.* § 366.94.

[43] TEX. HEALTH & SAFETY CODE §§ 386.153, 393.001–393.007 (2021).

[44] TEX. UTIL. CODE § 37.001 (2021).

[45] ARIZ. REV. STAT. § 40-213 (2022); ARK. CODE ANN. § 23-1-101(9) (2010).

[46] Infrastructure Investment and Jobs Act of 2021, Pub. L. No. 117-58 § 11401; 23 U.S.C. § 151.

III. TWO REGULATORY FRAMEWORKS

This section elaborates upon the existing regulatory schemes for both traditional gas fuel and electric charging stations, in part by examining Texas as a representative sample. By their nature, gas stations invite heavy environmental regulation. Although environmental liability arises in part under federal regimes, states and local governments undertake last-mile regulation of environmental compliance, zoning, and permitting for fuel stations.[47] Electric vehicle charging stations, on the other hand, often require little more than a few permits.[48] These differences show that, at least through a financial lens, the burdens on traditional service stations compromise their viability, while the absence of comparable encumbrances on electric vehicle charging service providers is contrastingly attractive. As statutory incentives pull the transition along, these regulatory schemes cooperatively push forward this infrastructure overhaul from the other direction. Certainly, challenges arise from electric vehicle regulation, or the lack thereof, and are addressed in Part IV.

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[47] *See generally* Comprehensive Environmental Response, Conservation and Liability Act of 1980, 42 U.S.C. § 9601 et seq.; Resource Conservation and Recovery Act of 1976, 42 U.S.C. § 6901 et seq.; U.S. Env't Prot. Agency, *State Authorization under the Resource Conservation and Recovery Act (RCRA)*, https://www.epa.gov/rcra/state-authorization-under-resource-conservation-and-recovery-act-rcra (last updated May 22, 2023); U.S. Env't Prot. Agency, *Delegation of Clean Air Act Authority*, https://www.epa.gov/caa-permitting/delegation-clean-air-act-authority (last updated Jan. 18, 2023).

[48] *See* infra III.B.

A. Gas Stations: Sticker Shock and Financial Sustainability

The United States has approximately 160,000 gas stations across the country.[49] Cleanup liability structures potentially impose tremendous costs on each one. Consider just the remediation and removal of underground storage tanks. Station owners and operators are heavily burdened by the costs of cleaning up their sites for redevelopment.[50] These properties are often petroleum brownfields, where reuse and redevelopment is complicated by the presence of hazardous substances.[51] Out of an estimated 450,000 brownfield sites in the United States, half are thought to be contaminated by petroleum and leaking underground storage tanks at old gas stations.[52] State

[49] Energy Info. Admin., *Access to Alternative Transportation Fuel Stations Varies Across the Lower 48 States* (Apr. 30, 2012), https://www.eia.gov/todayinenergy/detail.php?id=6050#tabs_AltTransportFuelStations-1. By comparison, in 2021, public electric service equipment ports totaled almost 116,000. Abby Brown et al., *Electric Vehicle Charging Infrastructure from the Alternative Fueling Station Location: First Quarter 2022*, NAT'L RENEWABLE ENERGY LAB'Y 15 (Sept. 2022), https://afdc.energy.gov/files/u/publication/electric_vehicle_charging_infrastructure_trends_first_quarter_2022.pdf.

[50] *See* Kate Yoder, *The Environmental Disaster Lurking Beneath Your Neighborhood Gas Station*, GRIST & CROSSCUT (June 14, 2023), https://grist.org/accountability/gas-stations-underground-storage-tank-leaks-environmental-disaster/.

[51] U.S. Env't Prot. Agency, *Underground Storage Tanks (USTs): Petroleum Brownfields*, https://www.epa.gov/ust/petroleum-brownfields (last updated Nov. 6, 2023).

[52] *Id.*

agencies implement brownfield cleanup programs, but developing complete inventories and thorough assessments of these sites remains a significant challenge, especially because these processes vary by state.[53] The regulatory scheme potentially places clean-up liability on prospective purchasers and subsequent owners, which arguably chills any private incentive to acquire and repurpose old service station sites.[54]

The estimated cost per tank cleanup in 2020 was around $160,000, an increase of about $20,000 since 2018.[55] Although at least 36 states have active funds to pay for new and ongoing cleanups, the aging tank fleet, increasingly incompatible with emerging fuels, only worsens the existing burden.[56] Taxes and fees imposed on the sales of petroleum fuel usually generate revenue for these funds, but improved fuel efficiency standards (which decrease petroleum usage per mile

[53] *Id.*

[54] *Id. But see* Small Business Liability Relief and Brownfields Revitalization Act of 2002, Pub. L. No. 107-118 (Providing grant funding for site remediation and revitalization, so long as the site is relatively low risk, no viable responsible party exists, the fund applicant is not potentially liable for cleaning up site, and the site is not subject to a RCRA corrective action order; "cleanup and reuse of a petroleum site is a contribution to sustainable environmental practice").

[55] Ass'n of State and Territorial Solid Waste Mgmt. Off., *Sustainability of State Financial Assurance Funds for the Underground Storage Tank Programs* 4 (Feb. 24, 2023), https://astswmo.org/files/Resources/Tanks/2023-02-final-sustainability-paper.pdf.

[56] *Id.* at 1, 5.

traveled), the electric-vehicle advent, and generational behavior changes are deteriorating fund intake.[57]

Service station owners and operators might also find themselves subject to liability under the Comprehensive Environmental Response, Conservation and Liability Act ("CERCLA").[58] CERCLA establishes a system of strict joint and several liability for broad classes of parties associated with releases of hazardous substances.[59] Owners and operators of sites where releases occur, including past owners and operators, and transporters and arrangers for treating and disposing the hazardous waste may all be liable under the act.[60] Although eligible response sites include brownfields, the Small Business Liability Relief and Brownfields Revitalization Act of

[57] *Id.* at 2. The 2022 Energy Information Administration Annual Energy Outlook (through 2050) projects that gasoline consumption will not return to 2019 levels and that sales of internal combustion engine vehicles will decrease from 92% vehicle market share to 79% market share by 2050. Energy Info. Admin., *Annual Energy Outlook 2022 with Projections to 2050: Narrative* 5 (Mar. 2022).

[58] CERCLA addresses the release of hazardous substances from facilities that incur response costs in accordance with a National Contingency Plan. Comprehensive Environmental Response, Conservation and Liability Act of 1980, 42 U.S.C. § 9601 et seq. A release is defined broadly to include leaking, leaching, spills, evaporation, deposit, and potential releases. *Id.* Under the act, liability can extend to current and past owners and operators, transporters, and arrangers. *Id.* Exceptions exist for innocent land purchasers, bona fide purchasers, and others. *Id.*

[59] *Id.*

[60] *Id.*

2002 provides an offramp for certain sites by excluding from liability those where the EPA has conducted an assessment or inspection and concluded that no federal action is warranted at that time.[61] But these determinations are limited to sites entered in the Comprehensive Environmental Response, Conservation, and Liability Information System ("CERCLIS"), and "generally, sites assessed using brownfield grant funds or under Targeted Brownfields Assessment program will not enter the CERCLIS universe."[62] Another liability exit exists for service station dealers who accept and recycle motor oil.[63] These protections for petroleum-related activities seem to work contrary to environmental conservation policies and enable brownfield sites and contamination to

[61] U.S. Env't Prot. Agency, *Memorandum: Regional Determinations Regarding Which Sites are Not "Eligible Response Sites" under CERCLA Section 101(41)(C)(i), as Added by the Small Business Liability Relief and Brownfields Revitalization Act*, 2–3 (Mar. 6, 2023), https://www.epa.gov/sites/default/files/documents/reg-determ-small-bus-mem_0.pdf; 42 U.S.C. § 9601(41).

[62] U.S. Env't Prot. Agency, *supra* note 61 at 3 n.6.

[63] CERCLA § 114(c). The purpose of the Service Station Dealer's Exemption under the act is to encourage service station dealers to accept for recycling used motor oil from do-it-yourself recyclers. These service stations are also exempt from CERCLA § 107(a)(3) generator liability and § 107(a)(4) transporter liability if certain conditions are met. *Id.* §§ 107(a)(3), (4). Under the act, a presumption exists that in these circumstances, a small quantity of used oil is not mixed with hazardous substances if presented by the owner for delivery to oil recycling facility and has been removed from the engine of a light duty motor vehicle or household appliance by the owner. *Id.* § 114(c)(2).

occur in the first place—a somewhat backwards approach that indirectly discourages reusing and repurposing gas stations by limiting the industry's financial and liability exposure in total.[64]

In Texas, for example, an owner of property containing underground storage tanks is also responsible for ensuring compliance with state regulations,[65] and additional aquifer protection requirements may apply.[66] The Texas Commission on Environmental Quality ("TCEQ") maintains a central registry database containing petroleum storage tank records and compliance history, and

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[64] *See* Erin Kelly, *CERCLA and the Exemption of the Oil and Gas Industry*, KLEINMAN CTR FOR ENERGY POLICY (July 6, 2021), https://kleinmanenergy.upenn.edu/news-insights/cercla-and-the-exemption-of-the-oil-and-gas-industry/ ("the neglect of the oil and gas industry from a major environmental statute aimed at protecting environmental and public health hinders comprehensive climate action"); Charles C. Steincamp, *Trends in Environmental Liability for the Oil & Gas Industry: Environmental Liability Developments for Oil and Gas Operators*, 2 ANNUAL OF THE ARK. NATURAL RES. L. INST. (1998) ("normally, both crude oil and refined products are not within the purview of RCRA, however, when they are released, they are at a minimum solid waste that RCRA requires to be cleaned up. There is not an exception for petroleum"); *see also* 42 U.S.C. § 6921(b)(2)(A) ("drilling fluids, produced waters, and other wastes associated with the exploration, development, or production of crude oil or natural gas or geothermal energy shall be subject only to existing State or Federal regulatory programs").

[65] Tex. Comm'n on Env't Quality, *RG-475a: Buying or Selling a Property with Underground Storage Tanks* 1 (Aug. 2019), https://www.tceq.texas.gov/downloads/assistance/publications/rg-475a-buying-or-selling-property-with-underground-storage-tanks.

[66] *Id.*; TEX. WATER CODE § 26 et seq.; tit. 30 TEX. ADMIN. CODE §§ 213, 214 et seq.

the Texas Administrative Code imposes written notification and recordkeeping requirements.[67] To permanently remove the storage tank, a party must first demonstrate that no prior release of a stored regulated substance has occurred.[68] If a release has occurred, cleanup liability may apply. Other alternatives for decommissioning these tanks include permanently filling the tanks in place or conducting permanent changes in service.[69] It is worth considering whether the aging tank fleets and their incompatibility with emerging fuels and egregious environmental records are worth saving.[70]

Gas stations are attacked from the other side, too. From 1994 to 2021, the average yearly wholesale price of gasoline by refiners rose by about $1.50 and the average yearly retail gasoline prices rose by approximately $1.98.[71] Comparatively, the resale margin rose just $0.45 over the

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[67] Tex. Comm'n on Env't Quality, *supra* note 65 at 2; tit. 30 TEX. ADMIN. CODE § 334.9.

[68] Tit. 30 TEX. ADMIN. CODE § 334.55.

[69] *Id.* Tex. Comm'n on Env't Quality, *RG-475m, Permanently Removing Petroleum Storage Tanks from Service* (Aug. 2019), https://www.tceq.texas.gov/downloads/assistance/publications/rg-475m-permanently-removing-petroleum-storage-tanks-from-service.

[70] *See generally* U.S. Env't Prot. Agency, *Underground Storage Tanks (USTs): Emerging Fuels and Underground Storage Tanks (USTs)*, https://www.epa.gov/ust/emerging-fuels-and-underground-storage-tanks-usts (last updated July 19, 2023); Tex. Comm'n on Env't Quality, *RG-475f: Protecting Underground Storage Tanks Against Corrosion* (Aug. 2019), https://www.tceq.texas.gov/downloads/assistance/publications/rg-475f.pdf.

[71] Energy Info. Admin., *Petroleum & Other Liquids, U.S. Total Gasoline Wholesale/Resale Price by Refiners* (June 1, 2022),

same period, which suggests that while consumers have seen the pump price rise at a steeper rate, service stations pocket profits at a slower pace.[72] At the same time, the federal gasoline tax has remained stable at 18.4 cents per gallon and unchanged since October 1, 1997,[73] and the average total state tax is 34.2 cents per gallon.[74] Depending on the introduction of alternative fuels and dominant transportation methods, gasoline demand for light duty vehicles is anticipated to drop by 50 to 70% in the next decade.[75]

To make up for the loss in revenues from gasoline sales, states have enacted legislation creating electric vehicle fee collections where a portion of the funds contribute to, for example, grants for

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https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EMA_EPM0_PWG_NUS_DPG&f=M; Energy Info. Admin., *Petroleum & Other Liquids, U.S. All Grades All Formulations Retail Gasoline Prices* (Sept. 18, 2023), https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=emm_epm0_pte_nus_dpg&f=m.

[72] *Compare* Energy Info. Admin., *Total Gasoline*, *supra* note 71 *with* Energy Info. Admin., *All Grades*, *supra* note 71.

[73] U.S. Dep't of Transp. Fed. Highway Admin., *Table FE-101A, Highway Statistics 2021*, https://www.fhwa.dot.gov/policyinformation/statistics/2021/fe101a.cfm (last updated Jan. 26, 2023).

[74] Energy Info. Admin., *Federal and State Motor Fuel Taxes*, https://www.eia.gov/petroleum/marketing/monthly/xls/fueltaxes.xlsx (last updated July 2023).

[75] Maxwell Woody et al., *Decarbonization Potential of Electrifying 50% of U.S. Light-Duty Vehicle Sales by 2030*, 14 NATURE COMMC'N. 1 (Nov. 2023).

the development of electric vehicle charging stations.[76] At the federal level too, the Leaking Underground Storage Tank Trust Fund, under Subtitle I of the Resource Conservation and Recovery Act and the Solid Waste Disposal Act, offers resources for cleanups, but is financed by a paltry 0.1 cent tax on each gallon of fuel sold.[77] Additionally, the Inflation Reduction Act of 2022 allows certain brownfields to qualify as an energy communities so that developers seeking to repurpose contaminated sites for renewable energy development may receive certain tax credits, and the Infrastructure Investment and Jobs Act of 2021 invested more than $1.5 billion in the EPA's Brownfields program for assessing, cleaning up, and preparing sites for revitalization

[76] *See* ALA. CODE § 40-12-242 (2021) (portion of license and registration fees contribute to the Electric Transportation Infrastructure Grant Program); *see also* S.B. 505, 2023 Leg., 88th Sess. (Tex. 2023) and TEX. TRANSP. CODE § 502.198(a) (establishing a first-time electric vehicle fee of $400 and a $200 registration renewal fee, with proceeds going to the State Highway Fund).

[77] 26 U.S.C. § 4042(b)(2)(B). As of September 2023, the balance of the fund was around $1.4 billion. U.S. Dep't of Treasury, *Leaking Underground Storage Tank Reports – 68X8153*, https://treasurydirect.gov/government/funds-management-program-reports/monthly-financial-reporting/leaktank/ (last visited Nov. 12, 2023). The EPA estimates that there are approximately 542,000 underground storage tanks in the United States – at $160,000 a tank, $86.72 billion are needed for complete and sufficient financial resources to address leaking underground storage tank concerns. U.S. Env't Prot. Agency, *Underground Storage Tanks (USTs)*, https://www.epa.gov/ust (last updated Mar. 24, 2023); Ass'n of State and Territorial Solid Waste Mgmt. Off., *supra* note 55.

projects.[78] However, the fact remains that while aging station infrastructure increases the risk of environmental cleanup liability, tax revenues that fund such efforts have remained stable as the volume of gasoline consumption is projected to decline, leading to a total expected reduction in available resources to assist clean up and remediation projects.

Extensive permitting regimes in each state and locality further burden traditional service stations. In Texas, service fuel stations must comply with state regulations governing environmental compliance, food licenses, alcohol sales permits, and more.[79] Consider only the reporting and permitting requirements pertaining to non-convenience operations. A station must, among other requisites: (1) obtain an Abusable Volatile Chemicals permit through the Texas Department of State Health Services;[80] (2) acquire an air permit authorizing activities that produce

[78] Inflation Reduction Act of 2022, Pub. L. No. 117-169 §§ 13101, 13701; U.S. Env't Prot. Agency, *Underground Storage Tanks and Brownfields: Opportunities for Partnership and Success* (June 2023), https://www.epa.gov/system/files/documents/2023-07/OUST-OBLR%20Discussion%20Paper_%20June%202023.pdf.

[79] Bus. Permit Off. in the Off. of the Tex. Gov., *2022 Texas Business Licenses & Permits Guide* 57 (Feb. 2022), https://gov.texas.gov/uploads/files/business/Texas_Licenses_Permits_Guide.pdf.

[80] Tex. Health and Hum. Serv., *Abusable Volatile Chemicals Program*, https://www.dshs.texas.gov/avc/default.aspx (last visited Nov. 12, 2023); TEXAS HEALTH & SAFETY CODE § 485.011 et seq.; Federal Hazardous Substances Act of 1960, Pub. L. No. 86-613, 15 U.S.C. § 1261 et seq.

more than a de minimis level of emissions from the TCEQ,[81] and meet emission standards for the facility under the Texas Administrative Code;[82] (3) have a Liquefied Petroleum Gas permit from the Railroad Commission of Texas;[83] (4) register with the Texas Department of Licensing and Regulation for Motor Fuel Metering and Quality;[84] (5) register petroleum storage tanks with

[81] Air Permits By Rule, TEX. ADMIN. CODE §106.412: Fuel Dispensing; Tex. Comm'n on Env't Quality, *Keyword Index to Air Permits by Rule*, https://www.tceq.texas.gov/permitting/air/permitbyrule/pbr_index.html (last visited Nov. 12, 2023) ("A permit by rule is the state air authorization for activities that produce more than a de minimis level of emissions but too little for other permitting options").

[82] TEX. ADMIN. CODE § 106.4 (actual emissions from the facility must not exceed statutory limits for carbon monoxide, nitrogen oxides, volatile organic compounds, sulfur dioxide, inhalable particulate matter, or any other air contaminate).

[83] TEX. NAT. RES. CODE § 113.011 ("The commission shall administer and enforce the laws of this state and the rules and standards of the commission relating to liquefied petroleum gas"); *id.* §113.080 et seq.

[84] TEX. OCC. CODE § 2310 et seq.; Tex. Dep't of Licensing and Regul., *Motor Fuel Metering and Quality*, https://www.tdlr/texas.gov/fmq/fmq.htm (last visited Nov. 12, 2023) (note that "effective September 17, 2021, Liquid Petroleum Gas is exempt from registration by the Texas Department of Licensing and Regulation, but [stations] must continue to maintain registration and licensing requirements with the Texas Department of Agriculture").

TCEQ;[85] (6) obtain permits for industrial wastewater and stormwater, if applicable, from TCEQ;[86] (7) receive petroleum-contaminated soil disposal approval from TCEQ for soils containing petroleum product concentrations above a certain limit;[87] and (8) maintain gasoline dispensing facilities in accordance with Stage II vapor recovery equipment requirements.[88]

Beyond these hurdles, service stations must also comply with zoning regulations, which largely have been delegated to municipalities by the states.[89] However, municipalities have already begun to limit and prohibit the construction of new gas stations.[90]

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[85] TEX. ADMIN. CODE § 334 et seq.

[86] Bus. Permit Off. in the Off. of the Tex. Gov., *supra* note 79.

[87] Tex. Comm'n on Env't Quality, *RG-029: Special Waste Regulations in Texas* (Sept. 2006), https://www.tceq.texas.gov/downloads/permitting/waste-permits/publications/rg-029.pdf.

[88] TEX. ADMIN. CODE § 115.

[89] Josh Eagle, *The Practical Effects of Delegation: Agencies and the Zoning of Public Lands and Seas*, PEPP. L. REV. 35, 836 n.2 (2008) ("the Standard State Zoning Enabling Act provides that 'the legislative body of cities and incorporated villages is hereby empowered to regulate and restrict' land uses . . . [and] [e]very state adopted the Standard State Zoning Enabling Act") (internal citations removed). In Blaine, Washington, service stations must be sited consistently "with the health, safety, and general welfare objectives of the city." BLAINE, WASH. CODE § 15.30.010 (1990). San Antonio has added limitations on the locations of gas stations in relation to proximity from family residences, schools, day care facilities, assisted living facilities, boarding homes, and community homes. SAN ANTONIO, TEX. UNIFIED DEV. CODE § 35-397.01 (2023).

[90] *Infra* Part V.C.

B. Electric Charging Stations: A Minimal Scheme

In stark contrast, electric charging stations are not subject to the same volume of regulations as gas stations. States delegate electrical construction standards and requirements to local governments and municipalities.[91] In Houston, for example, just three primary permits are required: (1) an electrical building permit; (2) a Meter Loop Service permit and Temporary Cut-In permit for new buildings and significant upgrades; and (3) a building permit for concrete slabs to which the stations are affixed.[92] Whether a plan must be submitted for approval depends on the

[91] *See e.g.* TEX. LOC. GOV'T CODE ANN. § 214.214 (adopting the National Electrical Code and allowing municipalities to establish procedures to adopt local amendments to the code and administer and enforce the code); *see also* TEX. OCC. CODE ANN. § 1305.101 (requiring the Texas Department of Licensing and Regulation to adopt a revised version of the National Electrical Code every three years); City of Houston, *Administrative Code Provisions for the 2020 National Electrical Code* (as amended through Jan. 25, 2023).

[92] HOUSTON, TEX. HOUSTON PUBLIC WORKS CODE § 1056; Houston Public Works, *Electrical Vehicle Charging Outlets Permit*, https://www.houstonpermittingcenter.org/hpwcode1056#apply (last visited Nov. 12, 2023). A Meter Loop Service permit is required when existing service is upgraded for increased capacity to handle additional load, and the Temporary Cut-In permit is sold with the Meter Loop Service permit to allow existing permanent service to be reconnected for a scheduled outage. *Id.* As part of a residential permit application, a homeowner may be required to sign a Deed Restriction Unsworn Declaration. *Id.*

type of installation.[93] However, broader regulations are emerging. For example, in 2023, the Texas Legislature mandated the Texas Commission of Licensing and Regulation to adopt and execute electric vehicle charging station inspection regulations.[94]

Although these regulatory frameworks are not the focus of this article, their analysis shows that a major impetus exists to develop widespread electric vehicle charging infrastructure. Revenue losses for cleanup and highway funds indicate not only that traditional gas service stations are less lucrative, but also that shrinking wallets are increasingly unable to provide the finances for storage tank leaks, accidents, and spills. For a successful infrastructure transition, statutory drivers are necessary to bridge funding gaps, limit the additional construction and operation of gas infrastructure, and promote the cleanup and remediation of leaking underground storage tanks and brownfields. A comparison of these two schemes may suggest that electric vehicle equipment clearly triumphs over that of petroleum gas, but it comes not without its own challenges, especially

[93] HOUSTON, TEX. HOUSTON PUBLIC WORKS CODE § 1056. Level 1 chargers are small installations, typically serve residences, and do not require an approved plan unless structural plans are required for commercial installation; Level 2 chargers serve both residential and commercial needs and do not require an approved plan unless structural plans are required for commercial installation; and Level 3 chargers are large installations for quick charges, often at fueling station, and do require an approved plan. Structural plans must be designed and sealed by a Texas Professional Engineer for securing the stations to existing structures, or to a new foundation or structure. Houston Public Works, *Guide: Building Code Enforcement: Electric Vehicle Charging Station Permits*.

[94] S.B. 1001, 2023 Leg., 88th Sess. (Tex. 2023).

in ensuring consistent and distributed access and consumer protection from unregulated charging rate fluctuations.

IV. Not Full Speed Ahead: Electric Charging Stations and Their Challenges

The transition of our transportation fuel network to one largely comprised of electric vehicle charging ports faces three obstacles: first, the absence of rate regulation between distributors and charging service providers and end consumers; second, the lack of equal access to electric vehicles and charging infrastructure; and third, the persistent incompatibility of electric charging ports with various electric vehicle models now on the roads.

A. A Brief Summary of Existing Power Market Structures: Public Utilities, Transmission, and Distribution

To properly understand the consequences of weak electricity rate regulation for electric vehicle charging port uses and the context in which they arise, a concise survey of rate review in the United States' existing power markets is relevant. The Federal Power Act grants the Federal Energy Regulatory Commission ("FERC") authority over the transmission of electricity in interstate commerce.[95] Regional Transmission Operators have operational control of transmission lines and determine when generators may dispatch.[96] FERC must approve the rates charged by the line

[95] Federal Power Act of 1920, as amended through Pub. L. No. 115-325, § 201(b) (FERC has jurisdiction of (1) transmission of electricity if electricity flows through a power line in which there might be out-of-state electrons, and (2) wholesale sales of electricity in interstate commerce).

[96] Fed. Energy Regul. Comm'n, *Electric Power Markets,* https://www.ferc.gov/electric-power-markets (last updated May 16, 2023) ("Along with facilitating open-access to transmission,

operators of generators for electricity transmission.[97] States retain authority over retail sales of electricity from companies that generate electricity to consumers and over the distribution of electricity within their boundaries.[98] These state distribution markets vary in structure. Some states, like Florida, are entirely regulated.[99] In these systems, utilities serve designated geographic service territories, and the rates they charge are capped.[100] In a deregulated market, as in Texas, the state requires only siting approval for the utility, and the retail rate must be just, reasonable, and nondiscriminatory.[101] Rate review ensures that consumers are charged and pay fair prices for their electricity, yet provisions for similar rate regulation for public electric vehicle charging service providers are lacking.

[Regional Transmission Operators] operate the transmission system . . . and foster competition for electricity generation").

[97] Federal Power Act § 211A.

[98] *Id.* § 201(b).

[99] Committee on Regulated Industries, *Review of Florida's Wholesale Electricity Market, Report Number 2002-147* (Jan. 2002) ("Florida's existing regulated, integrated electricity system . . . provides a very high level of assurance that both ratepayers and utilities will have certain benefits").

[100] *Id.* These rates must be just, reasonable, and nondiscriminatory. FLA. STAT. § 366.06.

[101] *See, e.g.*, TEX. UTIL. CODE §§ 35.032, 39.351, 39.360, 42.0103, 53.003.

B. Challenges

1. No Rate Regulation

A robust framework exists for ensuring electric utility consumer protection by rate regulation.[102] Because states are excluding electric charging service providers from statutory definitions of "public utilities," these providers are *not* subject to rate review.[103] Although this exclusion is an initial positive jump for network development, it may now limit avenues for addressing unjust costs and impracticable variations in the rates charged to consumers.

2. Energy Justice and Access

Climate and energy justice addresses the way in which "law can respond to the unique vulnerabilities of poor communities, communities of color, and communities in the Global South with respect to climate change."[104] Energy justice also has been defined as "a mechanism to achieve procedural and distributive justice," especially regarding the locations of, access to, and resulting benefits from energy infrastructure projects, and as a "global energy system that fairly

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[102] *Supra* Part IV.A.

[103] ARIZ. REV. STAT. § 40-213 (2022); ARK. CODE ANN. § 23-1-101(9) (2010). *See also* Matteo Muratori et al., *Electricity Cost for Electric Vehicle Fast Charging*, NAT'L RENEWABLE ENERGY LAB'Y (Sept. 2018), https://www.nrel.gov/docs/fy19osti/72326.pdf ("charging price for DCFC in the United States varies between less than $0.10/kWh to more than $1/kW, with an average of $0.35/kWh. This variation is due to different capital and O&M cost for different DCFC stations as well as different cost of electricity").

[104] Shalanda H. Baker, *Anti-Resilience: A Roadmap for Transformational Justice within the Energy System*, 54 HARV. C.R.-C.L. L. REV., 1, 23 (2019).

disseminates both the benefits and costs of energy services" with "representative and impartial energy decision-making."[105] However, energy justice "remains rather ahistorical and focused on remediation of harm at the margins, rather than utilizing energy policy as an equity-based tool of empowerment and system transformation."[106]

In the case of electric vehicles and charging stations, access remains inequitable. Hafiz Anwar Ullah Khan and his team articulate it best:

> Current literature addresses some aspects of equitable transition towards electrified transportation and disparities in access to EV charging infrastructure across race and income. For instance, Cheyne et al. conclude that disadvantaged and minority communities are disproportionately affected by environmental and transportation injustice.[107] Hardman et al. extend these results by showing that the current EV charging infrastructure is not equitably

[105] *Id.* at 24; Benjamin K. Sovacool & Michael H. Dworkin, *Energy Justice: Conceptual Insights and Practical Applications*, 142 APPLIED ENERGY 435 (2015). Sovacool and Dworkin identify three key attributes of energy justice: (1) "Costs, or how the hazards and externalities of energy system are imposed on communities unequally;" (2) "benefits, or how access to modern energy systems and services are highly uneven;" and (3) "procedures, or how many energy projects proceed with exclusionary forms of decision-making." *Id.* at 8.

[106] Baker, *supra* note 104 at 24.

[107] Christine Cheyne et al., *Shared Transport: Reducing Energy Demand and Enhancing Transport Options for Residents of Small Towns*, 18 EN. RES. & SOC. SCI. 139 (2016).

> dispersed and EV incentives do not support low–income buyers. This skews the EV buying power towards predominantly White, male, high-income, and educated households.[108] Similarly, lack of access to EV charging infrastructure near multi-unit housing units (mostly inhabited by low-income communities) is a key barrier in EV adoption.[109] A census block group–level analysis in California shows that Black– and Hispanic–majority neighborhoods have lower access to public EV charging infrastructure[110]. . . . Results demonstrate that a high correlation exists between race and grid limits in these regions.[111]

They went on to analyze socio-demographic factors affecting electric vehicle charging station distribution in New York City and concluded that median household income, the percentage of White-identifying populations, and the presence of highways in each area were key

[108] Kathryn Canepa et al., *An Early Look at Plug-In Electric Vehicle Adoption in Disadvantaged Communities in California*, 78 TRANS. POL. 19 (2019).

[109] Chih-Wei Hsu et al., *Public Electric Vehicle Charger Access Disparities Across Race and Income in California*, 100 TRANS. POL. 59 (2021).

[110] Mohammad Zain ul Abideen et al., *A Review of the Tools and Methods for Distribution Networks' Hosting Capacity Calculation*, 13 ENERGY 2758 (2020).

[111] Hafiz Anwar Ullah Khan et al., *Inequitable Access to EV Charging Infrastructure*, 35 ELEC. J. at 3 (2022).

influencing factors.[112] These results indicate that justice-conscious policies are necessary for a successful, expansive, and equitable electric vehicle and charging network transition.

Costs to both charging providers and consumers remain another cause of unequal access to electric vehicles and charging equipment. Installation costs for electric vehicle service equipment are highly variable. For example, the City of Houston reported widely ranging costs depending on the number of circuits and units installed, indoor versus outdoor installation, required electrical upgrades, required ventilation, and the use of direct current fast-charging service equipment.[113] A typical public charging station, including equipment and installation expenses, is estimated to be $15,000 to $18,000 for a Level 2 station, and up to $70,000 for a direct current fast-charging station.[114] These prices are expected to trend downward as electric vehicle supply equipment production volumes increase, but the up-front costs remain steep.[115]

Price fluctuations in vehicle costs and charging rates are also significant impediments to both the consumer and the infrastructure transition. The average electric vehicle currently sells for

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[112] *Id.* at 11.

[113] NAT'L RENEWABLE ENERGY LAB'Y, *Plug-In Electric Vehicle Handbook for Public Charging Station Hosts* 11 (Apr. 2012), https://afdc.energy.gov/files/pdfs/51227.pdf.

[114] *Id.*

[115] *See* Chris Nelder & Emily Rogers, *Reducing EV Charging Infrastructure Costs*, ROCKY MOUNTAIN INST. (2019).

$4,600 more than the median gasoline car.[116] Matt Webber, with Investopedia, estimates that it costs a driver between $10 and $30 to charge the electric vehicle while traveling from empty to almost full.[117] Yet commercial charging rates can be double or triple residential rates and vary by more than 50% within same network, whereas gas prices vary by 10% or less.[118] Further, the electric charging pricing systems are not directly comparable – most pricing formulas are a combination of per kilowatt hour, per unit of time, and per session bases.[119] For example, Level 2 chargers, which add about 30 miles of range per hour, can range from 20 cents per kWh to free,

[116] Michael J. Coren, *Is It Cheaper to Refuel your EV Batter or Gast Tank? We Did the Math in all 50 States*, WASH. POST (Aug. 14, 2023), https://www.washingtonpost.com/climate-environment/interactive/2023/electric-vehicle-charging-price-vs-gasoline/.

[117] Matt Ryan Webber, *How Much Does It Cost to Charge an EV on a Road Trip?*, INVESTOPEDIA, https://www.investopedia.com/cost-to-charge-ev-road-trip-5219817 (last updated May 31, 2023).

[118] *Id.* Consider pricing for a gallon of gasoline – the price is determined by four elements: (1) the cost of crude oil, (2) taxes, (3) refining expenses, and (4) distribution and marketing costs. U.S. Gov't Accountability Off., *Motor Fuels: Understanding the Factors That Influence the Retail Price of Gasoline* 5 (May 2005), https://www.gao.gov/assets/gao-05-525sp.pdf. The price of oil is determined by supply and demand in the world market. *Id.* at 10. Members of the Organization of Petroleum Exporting Countries (OPEC) influence the world oil price through its supply decisions and has an established target price per barrel for its basket of crude oil. *Id.* at 13–14.

[119] Webber, *supra* note 117.

and fast chargers, or Level 3 chargers, can deliver 80% battery charge in as little as 20 minutes and typically cost 30-48 cents per kWh, a price equivalent to gasoline in some places.[120]

Promisingly, prices of electric vehicles are quickly falling below those of comparable gas-fueled cars.[121] Despite the high sticker price, net consumer benefits are expected to outweigh costs beginning in 2024.[122] Already, for example, the EPA estimates that it costs an electric vehicle

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[120] Coren, *supra* note 116.

[121] Jack Ewing, *Electric Vehicles Could Match Gasoline Cars on Price This Year*, N.Y. TIMES (Feb. 14, 2023), https://www.nytimes.com/2023/02/10/business/electric-vehicles-price-cost.html. Consider, however, the persistent emissions cost: "America's electricity mix emits just under a pound of carbon emissions for every kWh generated." Coren, *supra* note 116; Energy Info. Admin., *How Much Carbon Dioxide is Produced per Kilowatthour of U.S. Electricity Generation?*, https://www.eia.gov/tools/faqs/faq.php?id=74&t=11&itid=lk_inline_enhanced-template (last updated Nov. 7, 2023).

[122] Peter Slowik et al., *Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits in the United States in the 2022-2035 Time Frame*, INT'L COUNCIL ON CLEAN TRANSP. iv (2022) ("[A]nnual costs are greatest in 2022 at about $4.5 billion, when BEVs' [battery electric vehicles] upfront incremental price is the greatest. As annual BEV sales increase and upfront incremental prices are reduced, BEVs begin to reach first-owner cost of ownership parity with conventional vehicles. The net consumer benefits outweigh the costs beginning in 2024, and the net benefits continue to grow as BEV sales increase. By 2027, the annual net present value of consumer benefits surpasses $18 billion and reaches about $70 billion by 2030. . . . On average, the individual first-owner consumer savings for new 300-mile range BEVs purchased in 2030 is about $9,000").

owner $3.84 to drive a 2022 Chevrolet Bolt for 100 miles at average electricity rates, compared to $13.40 in a gas-powered subcompact Chevrolet Trailblazer with 28 miles per gallon.[123] By another analysis, it is cheaper for the consumer to fill up on a charge than with gasoline,[124] especially assuming drivers recharge at home 80% of the time.[125]

3. Electric Charging Compatibility

Electric charging infrastructure has grown through the innovation of private companies separate from existing electric utilities. ChargePoint has about 50,000 individual charging ports across the country and allows property owners to set the pricing, although many are free to use.[126] Tesla, through its SuperCharger network, has approximately 28,000 stations initially only available to Tesla vehicles, although it has opened its ports to all electric vehicles, subject to a rate

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[123] Jim Gorzelany, *By the Numbers: What it Costs to Run and Charge an Electric Car*, FORBES (Sep. 15, 2022) https://www.forbes.com/sites/jimgorzelany/2022/09/15/by-the-numbers-what-it-costs-to-run-and-charge-an-electric-car/?sh=1433369f438c. *See also* Am. Council for an Energy-Efficient Econ., *Green Car Calculator*, https://greenercars.org/news/electric-vehicle-calculator (last visited Nov. 13, 2023).

[124] Coren, *supra* note 116.

[125] Michael Blonksy et al., *Incorporating Residential Smart Electric Vehicle Charging in Home Energy Management Systems*, NAT'L RENEWABLE ENERGY LAB'Y 1 (APR. 2021), https://www.nrel.gov/docs/fy21osti/78540.pdf?itid=lk_inline_enhanced-template.

[126] Steven Loveday, *A Comprehensive Guide to U.S. EV Charging Networks*, U.S. NEWS (Jan. 4, 2023), https://cars.usnews.com/cars-trucks/advice/ev-charging-stations.

surcharge.[127] Interestingly, charging station providers are partnering with motor vehicle giants to expand infrastructure as electric vehicles increase in market share.[128] Electrify America, a part of the Volkswagen Group of America, has partnered with Ford, EVgo collaborates with General Motors, and Greenlots was acquired by Shell Recharge Solutions.[129] Because these developments have arisen through various independent private channels, charging ports are infrequently

[127] Recently, auto manufacturers like BMW, Ford, and General Motors have announced adopting Tesla's North American Charging Standard port for improved compatibility, and Tesla has opened its Supercharging network to other electric vehicle users who can use a "Magic Dock" to connect. Eric Stafford, *Tesla Charging Network: All the Upcoming Compatible EVs*, CAR & DRIVER, https://www.caranddriver.com/news/a44388939/tesla-nacs-charging-network-compatibility/ (last updated Nov. 7, 2023); Jim Motavalli, *Tesla's Supercharger "Magic Docks" Open to All EVs*, U.S. NEWS (Feb. 24, 2023), https://cars.usnews.com/cars-trucks/features/tesla-magic-dock-arrives-in-us. On the other hand, gasoline pumps dispensing into motor vehicles are universally regulated by standards set by the Environmental Protection Agency – no discrimination at the pump exists. 40 C.F.R. §§ 80.22, 1090.1550.

[128] Stafford, *supra* note 127.

[129] Loveday, *supra* note 126. Electrify America arose out of the Clean Air Act 2.0 Liter Partial Settlement between Volkswagen and the Environmental Protection Agency, which required Volkswagen to invest $2 billion in zero emission vehicle charging infrastructure and in promoting zero emission vehicles. Partial Consent Decree, 3:15-md-02672-CRB, 1973-1, 4, Appendix C (Sept. 30, 2016).

compatible with the various connectors on electric vehicles and create an inaccessible charging system.[130]

[130] Charging ports are categorized by level, and a station can supply multiple ports. U.S. Dep't of Energy, *Alternative Fuels Data Center: Developing Infrastructure to Charge Electric Vehicles*, https://afdc.energy.gov/fuels/electricity_infrastructure.html (last visited Nov. 14, 2023). Level 1 charging ports provide five miles of range per hour of charging, assuming a 1.9 kW charging power, and can plug into a 120 Volt outlet (a standard home outlet). *Id.* Level 2 charging ports provide 35 miles of range per hour of charging, assuming a 6.6kW charging power, and require a 240 Volt outlet. *Id.* Level 2 ports can be residential or commercial and comprise about 80% of public ports in the United States. *Id.* Level 3 ports are DC Fast Charging ports – they provide 100-200 miles of range per 30 minutes of charging. *Id.* However, Level 3 ports can have 3 different types of connectors, which increases the risk that an electric vehicle driver searching for a charge may not be able to connect in a rural, isolated area and highlights the need for a universal port connector or available and accessible adapters. *Id.* Most electric vehicles come with a standard connector 3-prong household plug. *Id.* Level 2 chargers use the same connector equipment as Level 1 chargers. *Id.* All commercially available electric vehicles in the United States can charge using Levels 1 and 2 equipment. *Id.* The Texas 88th Legislature passed a bill, now codified in the Texas Occupations Code, mandating that for public charging stations installed after December 1, 2024 and funded through public grants or state rebate programs, the Texas Department of Licensing and Regulation and the Department of Transportation must adopt standards for charging stations that require the station to be equipped with a standard electric vehicle charging connector

These challenges, combined with financial and regulatory stressors and incentives, demonstrate that a comprehensive statutory and regulatory framework be enacted to address access, cost, and compatibility concerns, and to directly motivate the transformation of the United States' vehicle fueling infrastructure.

V. A Tricycle Approach to Electric Charging Station Regulation

At present, little regulation exists to monitor the rates these charging stations charge consumers and their accessibility. States deliberately declare these electricity providers not to be public utilities.[131] Initially, this encourages development and expansion of infrastructure, because financial and economic resources are not redirected to extensive permitting, application, or litigation obligations over meeting retail rate conditions. It is time for thorough evaluation. A three-prong statutory approach that combines rate regulation, incentives and subsidies, and limitations on gasoline infrastructure development would not only fuel the transition to a complete electric charging network, but also address energy and access injustices limiting such a total shift.

A. Rate Regulation

Electric utility consumers are protected by comprehensive rate regulation.[132] The same cannot be said for those electric vehicle owners who find themselves subject to fluctuations among different public charging stations and between residential and commercial rates.[133] However, state

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that is "widely compatible with as many electric vehicles as practicable." Tex. Occ. Code § 2311 et seq.

[131] *Supra* Part II.D.

[132] *Supra* Part IV.A.

[133] Coren, *supra* note 116.

statutes that initially protect charging station providers from steep regulatory costs simultaneously prevent the current model from expanding its applicability over them.[134] These protections, although initially a positive jump start in the development of the charging network, now limit avenues for addressing unjust rates and impractical and unpredictable rate variations.[135]

To address this gap, state legislatures should construct and incorporate into existing regulatory schemes the same standards currently imposed on public electricity utilities for electric vehicle charging service providers. Texas, for example, has stepped one foot in the right direction. Although unique in its power market, the state recently passed a package of bills to bring private sector investment within regulatory reach while simultaneously encouraging electric utilities to invest in charging infrastructure through affiliated, competitive entities.[136] The 2023 Texas Legislature recognized its "long-standing policy of supporting private sector investment in infrastructure" and found it in the best interest of the state to "establish a framework designed to encourage competitive private sector investment in the deployment of public electric vehicle

[134] *Supra* Part II.D; *see also* ARIZ. REV. STAT § 40-213, ARK. CODE ANN. § 23-1-101(9) (2010), and FLA. STAT. § 366.94 (2012) (deeming companies that sell electricity for purposes of electric vehicle charging not to be a public utility).

[135] *See* note 134 and accompanying text.

[136] S.B. 1002, 2023 Leg., 88th Sess. (Tex. 2023); TEX. UTIL. CODE § 42 et seq. (2023); S.B. 1732, 2023 Leg., 88th Sess. (Tex. 2023); TEX. OCC. CODE § 2311 (2023); S.B. 1699, 2023 Leg., 88th Sess. (Tex. 2023) (amending the Utilities Code to provide for aggregate distributed energy resources and demand response programs).

charging stations."[137] At the same time, the body found it "necessary to . . . develop and implement competitively neutral electricity tariffs that are optimized for public electric vehicle charging stations and based on cost causation principles while ensuring transparency in pricing."[138] The system it created applies to electric utilities and transmission and distribution utilities while distinguishing them from "electric vehicle charging provider[s]."[139] Under the statute, electric utilities and their affiliates not subject to regulation by the Energy Regulatory Commission of Texas ("ERCOT") are "subject to the same tariffs of the electric utility that apply to any other entity receiving from the utility electric service that is used to provide electric vehicle charging service."[140] Importantly, the statute indicates a budding recognition that rate regulation, in some form, will encourage further development by mandating that electric utilities offer "nondiscriminatory rates, terms, and conditions . . . to electric vehicle charging operators in the utility's service area for the operation of public electric vehicle charging stations."[141] The rates charged by the utility for public electric vehicle charging services must be set by the commission and be reasonable, ensuring competition is not impaired.[142] A nested incentive exists, too. Electric utilities authorized to construct and operate public electric vehicle charging stations can recover

[137] S.B. 1002, 2023 Leg., 88th Sess. (Tex. 2023); TEX. UTIL. CODE § 42.0101 (2023).

[138] TEX. UTIL. CODE § 42.0101(d)(2).

[139] *Id.* § 42.0102(3).

[140] *Id.* § 42.0103(c).

[141] *Id.* § 42.0103(b)(3).

[142] *Id.* §§ 742.0103(e), 42.0103(m) (note that rates may be set differently for different locations and times of day, and for different types of electric vehicle charging service).

reasonable and necessary costs.[143] For transmission and distribution utilities within ERCOT, the structure is similar. These utilities must also offer "the same nondiscriminatory rates, terms, and conditions" it offers to other electric vehicle charging providers in the utility's service area.[144] But in order for a transmission and distribution utility to affiliate itself with an affiliate to provide charging services from a public charging station through a separate entity, the Department of Energy's alternative fuel data center map must "not show that a public electric vehicle charging station owned or operated by an electric vehicle charging provider . . . is located less than 50 miles from the location" of the proposed new charging service.[145] At first glance, this provision appears to limit the development of charging infrastructure. In fact, by requiring that no other charging station owned by a provider is located within a 50-mile radius of another, the language constructively requires the expansion of services into regions lacking in access to these ports and effectively addresses access as an obstacle to development. But after extended growth, the distance requirement may limit deployment of a complete charging network.

This model is an adequate first step towards addressing gaps in electricity consumer protection.[146] States should consider adopting similar frameworks, with two modifications. First, provisions should be incorporated into existing retail-rate review regimes to require last-gap rate

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[143] *Id.* § 42.0103(n).

[144] *Id.* § 42.0104(a)(4).

[145] *Id.* § 42.0104(a)(3)(B).

[146] *See* Emily Foxhall, *With More Electric Vehicles Expected in Texas, Two Bills Pave the Road for Fast-Charging Stations Statewide*, TEX. TRIBUNE (Apr. 3, 2023), https://www.texastribune.org/2023/04/03/texas-electric-vehicle-charging-bills/.

regulation between the provider and the consumer. This review occurs for retail electricity sales between utilities and distributors and consumers,[147] but the intentional exclusion of charging providers from the public utility umbrella leaves customers exposed here. Residential customers face no change – their charging systems pull from the same source as the rest of the home, and utilities may even offer rebates or incentives to lower these costs.[148] Second, 50-mile radius provisions, like Texas's, should remain (or be enacted where lacking) to initially promote expansion and accessibility of charging stations in rural and underserved regions. But states should go one step further – after regional concentration targets are reached, the statute should trigger the option for utilities to install stations within those circumferences. This confirms that, when needed, utilities' resources can be redirected to fill in gaps and expand equipment within populated or rural regions. Here, a distinction should be made between public utilities collaborating with affiliate entities to expand the network and private entities operating independently. The trigger should only apply to such public utilities to ensure competition in this developing sector. Independent private entities should be encouraged to expand their growth into rural and underserved areas, but are simultaneously incentivized, working alongside states, to install charging points along national highway systems to obtain alternative fuel corridor designations.

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[147] *Supra* Part IV.A.

[148] *See e.g.*, U.S. Dep't of Energy, *Inflation Reduction Act Home Energy Rebates* (Oct. 13, 2023) https://www.energy.gov/sites/default/files/2023-10/home-energy-rebate-programs-requirements-and-application-instructions_10-13-2023.pdf; Austin Energy, *Plug-In Austin Electric Vehicles: Home Charging*, https://austinenergy.com/green-power/plug-in-austin/home-charging (last updated July 8, 2022).

These two modifications, layered on top of Texas's current scheme, would address consumer rate protection and accessibility concerns.

B. Statutory Stimulus

Increased regulation has the potential to chill development and innovation.[149] To ease resulting hesitation in expanding electric charging services, regulatory and legislating bodies should offset new burdens by continuing incentives and subsidies. Already, federal and state governments apparently have recognized the benefits of rebates, tax credits, and grant programs.[150] Beyond current measures, new focus ought to be on three key areas: residential development, infrastructure use transformation, and per area and capita minimum station requirements. Not only would additional impetus here encourage the extension of a public network into neighborhoods and homes, but also, when combined with density standards, could address unequal distribution and access concerns.

1. Residential Development

In 2023, the California legislature considered several proposals that targeted improved accessibility of electric vehicle charging networks. One bill would have required the Energy Commission to create a program to award grants to promote electric vehicle sharing services operated at affordable housing facilities.[151] Eligible entities for the funds would include public housing agencies, local governments, local air quality management districts, and nonprofit

[149] *See generally* Philippe Aghion et al., *The Impact of Regulation on Innovation*, 113 AM. ECON. REV. 2894 (2023).

[150] U.S. Dep't of Energy, *supra* note 148; *see supra* Part II.

[151] Proposed S.B. 529, 2023 Leg. (Ca. 2023).

organizations.[152] The grant funds would have provided for the purchase of new or used light duty vehicles and expenses relating to the purchase, installation, and maintenance of Level 2 vehicle service equipment.[153] The proposal also would have required grant recipients to purchase or commit to purchasing a minimum of two electric vehicles and two charging stations with Level 2 service equipment.[154] Another bill expressed the legislative intent that local agencies do not adopt ordinances unreasonably barring the installation of zero emission vehicle infrastructure and charging stations.[155] It also would have required the implementation of consistent statewide standards for installing charging stations.[156]

2. Infrastructure Use Transformation

As detailed in Part III, site remediation for traditional gas service stations can incur high price tags.[157] Moreover, the ability for drivers to charge their vehicles at home reduces the need for sprawling station networks at each existing service station lot.[158] This turning point in the transportation transition presents a unique opportunity for directing funds toward complete service station repurposing.

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[152] *Id.*

[153] *Id.*

[154] *Id.*

[155] Proposed A.B. 1504, 2023 Leg. (Ca. 2023).

[156] *Id.*

[157] *Supra* Part III.

[158] *Supra* Part IV.B.2.

The EPA has long advocated for and presented redevelopment options for petroleum brownfields.[159] Its redevelopment tool proposes five different categories of use (commercial, public, residential, greenspace, and mixed-use) and highlights the economic advantages of such projects, including engaging local development partners and agencies and involving resident communities.[160] Across the country, land parcels that previously hosted petroleum service stations are now sites for clean and functional purposes – reuse options range from new bank branches and commercial office space to biofuel stations, coffee shops, and residential units.[161] Even the famed Ben & Jerry's got its start in a renovated gas station in Burlington, Vermont.[162] Finally, interest exists in maintaining and preserving stations for their historic significance, materials, and designs.[163]

By either raising state and federal fuel taxes, imposing annual electric vehicle registration fees, or re-allocating current distributions of funds among highway and remediation needs, state

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[159] U.S. Env't Prot. Agency, *Petroleum Brownfields: Selecting A Reuse Option* (2009), https://www.epa.gov/sites/default/files/2014-03/documents/pubspbfreuseoption.pdf.

[160] *Id.* at 1.

[161] *Id.* at 4–16. *See also* Laura Furr, *Bourbon Bar to Open in Former Heights Gas Station*, HOUS. BUS. J. (Dec. 18, 2015), https://www.bizjournals.com/houston/news/2015/12/18/bourbon-bar-to-open-in-former-heights-gas-station.html.

[162] Merrill Fabry, *Ben & Jerry's is Turning 40. Here's How They Captured a Trend That Changed American Ice Cream*, TIME (May 4, 2018), https://time.com/5252406/ben-jerry-ice-cream-40/.

[163] Chad Randl, *Preservation Briefs: The Preservation and Reuse of Historic Gas Stations*, NATL PARK SERV. (Sept. 2008).

legislatures and Congress could alleviate concerns surrounding the purchase, restoration, and repurposing of old stations and brownfields to transform these sites.

C. Limits on Petroleum Gas Infrastructure

While governments promote the expansion of electric vehicles and charging stations, the multi-faceted approach would require tandem limitations on new development for petroleum gas infrastructure to curtail existing and additional opportunities for sustained reliance on gas-powered transportation.

One possible method to implement these limits is to ban the construction and operation of new gas stations. Petaluma, California issued a moratorium on the approval of applications for new gas stations by ordinance in 2019, which it found necessary "to protect the public safety, health, and welfare" of its population. [164] Also, the Petaluma Zoning Code prohibits alterations to existing stations that increase the storage and dispensing of fossil fuels, but allows station modification to accommodate battery charging stations.[165] Louisville, Colorado has acted similarly by adopting changes to its zoning code by ordinance to limit the construction of new gasoline and service stations.[166] The ordinance caps the number of stations to six in the area, which may be increased

[164] City of Petaluma, Ordinance No. 2681 N.C.S., May 6, 2019 (available at https://cccclimateleaders.org/wp-content/uploads/2020/05/Petaluma-CA-May-6-2019-Ordinance-2681-N.C.S.-05062019.pdf).

[165] PETALUMA, CA. ZONING CODE §§ 22.035(A), (C), (F) (no permit required for such modification).

[166] Louisville, Colo., Ordinance 1851 (2023). The ordinance also requires that any new service station or expansion or modification requires the installation of Level 3 direct current or better

up to seven "if approved through a new land use application for a single-user retail center" that includes a service station accessory to the retail center on the same or adjoining parcel.[167] In enacting the limit, Louisville recognized that the Colorado Energy Office had reported about 66,600 electric vehicles registered in the state, that electric vehicle ownership increasing, and that in a period of six months prior to the adoption of the ordinance, 8.62% of new vehicle registrations in Boulder County were for electric vehicles, indicating that the trend would likely impact future viability of gasoline service stations.[168]

Another approach is to prohibit the sale of gasoline-powered vehicles. Already, Connecticut, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Washington have

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electric vehicle charging ports in an amount equal to 20% of the number of gas pumps at the station, but at minimum no less than two. *Id.* However, the ordinance comes not without opposition. I.S. Petersen, *Denver Suburb's Temporary Ban on New Gas Stations*, MAVERICK OBSERVER (Aug. 7, 2023) ("A requirement for charging stations at a fuel stop could mean thermal runaway potential;" "three-fourths of [the state's] public charging stations sit within an 80-mile radius or 20,000 square miles near Denver;" "Louisville seeks to coerce [electric vehicles] into common use").

[167] Louisville, Colo., Ordinance 1851 (2023). *See also* Andrea Grajeda, *Louisville Sets Maximum Number of Six Gas Stations Within City*, DAILY CAMERA (Mar. 22, 2023), https://www.dailycamera.com/2023/03/21/louisville-sets-maximum-number-of-six-gas-stations-within-city/.

[168] Louisville, Colo., Ordinance 1851 (2023).

followed in California's footsteps to adopt bans on such vehicles.[169] In 2022, California's Air Resources Board adopted a rule requiring that all new cars sold in the state by 2035 be emission-

[169] Ca. Air Res. Bd., Advanced Clean Cars II Regulations Resolution 22-12 (Aug. 25, 2022); CONN. PR2023-023 (2023); Press Release, *Governor Moore Announces Maryland Adoption of the Advanced Clean Cars II Rule to Combat the Effects of Climate Change*, Off. of Gov. Wes Moore (Mar. 13, 2023), https://governor.maryland.gov/news/press/pages/Governor-Moore-Announces-Maryland-Adoption-of-the-Advanced-Clean-Cars-II-Rule-to-Combat-the-Effects-of-Climate-Change.aspx; MASS. GEN. LAWS c.111 § 142K (2020) (requiring the state to adopt California motor vehicle emission standards if the standards achieve greater emissions reductions than federal standards); Press Release, *Governor Murphy Announces Filing of Landmark Advanced Clean Cars II Proposal*, Off. of Gov. Phil Murphy (July 17, 2023), https://www.nj.gov/governor/news/news/562023/approved/20230717b.shtml#:~:text=TRENTON%20%E2%80%93%20Governor%20Phil%20Murphy%20today,to%20100%25%20ZEVs%20by%202035; Press Release, *DEC Announces Adoption of Advanced Clean Cars II Rule for New Passenger Cars and Light-Duty Truck Sales*, Dep't of Env't Conservation (Dec. 29, 2022), https://www.dec.ny.gov/press/126879.html; Or. Admin. Order DEQ-23-2022 (2022); R.I. Proposed Rule 250-RICR-120-05-37 (2022); and WASH. ADMIN. CODE § 173-423 et seq. The Clean Air Act permits California to seek a waiver of preemption which prohibits states from enacting emission standards for new motor vehicles. Clean Air Act, 42 U.S.C. § 209. Other states may adopt California's standards under Section 177 of the Act, so long as the standards are the same as the California standards for which the waiver is granted. *Id.* § 7507.

free (the Advanced Clean Cars II regulation).[170] These new limits have waterfalled into carmakers' business plans—General Motors has said it will sell only zero emission vehicles by 2035,[171] and others, including Jaguar, Volvo, and Honda, have made similar commitments.[172]

For those states cautious of such sweeping measures, increasingly restrictive emission targets at the federal level, set by the EPA, will gradually force gas-powered vehicles off the road.[173] In fact, in April, 2023, the EPA proposed emission standards for model years 2027 and later light and medium duty vehicles.[174] The standards would result in a 56% reduction in average greenhouse gas emissions relative to the existing model year 2026 standards for light duty vehicles

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[170] Ca. Air Res. Bd., Advanced Clean Cars II Regulations Resolution 22-12 (Aug. 25, 2022); Coral Davenport et al., *California to Ban the Sale of New Gasoline Cars*, N.Y. TIMES (Aug. 24, 2022), https://www.nytimes.com/2022/08/24/climate/california-gas-cars-emissions.html.

[171] Neal E. Boudette & Coral Davenport, *G.M. Will Sell Only Zero-Emission Vehicles by 2035*, N.Y. TIMES (Oct. 1, 2021), https://www.nytimes.com/2021/01/28/business/gm-zero-emission-vehicles.html.

[172] *See e.g.*, Tyler Duffy, *What Will the New Jaguar Look Like? Here's What We Know*, GEAR PATROL (Sep. 6, 2023), https://www.gearpatrol.com/cars/g42736489/jaguar-future-2025/; Volvo, *Volvo Cars to be Fully Electric by 2030*, (Mar. 2, 2021), https://www.media.volvocars.com/us/en-us/media/pressreleases/277409/volvo-cars-to-be-fully-electric-by-2030.

[173] Clean Air Act, 42 U.S.C. § 202 et seq.

[174] Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, 88 Fed. Reg. 29184 (proposed Apr. 12, 2023, published May 5, 2023) (to be codified at 40 C.F.R. pts. 85, 86, 600, 1036, 1037, and 1066).

and a 44% reduction in average greenhouse gas emissions relative to the current model year 2026 standards for medium duty vehicles.[175] Some states are not so embracing of driving these changes via stronger emissions standards. Following the EPA's proposal of its new vehicle emissions rules, Texas, Alabama, Alaska, Arkansas, Indiana, Kentucky, Louisiana, Mississippi, Missouri, Montana, Nebraska, Ohio, Oklahoma, South Carolina, and Utah petitioned for review of the agency's final action.[176] The states argue that the rule will compromise the electric grid and forces the restructuring of an entire industry, raising major questions issues like those in *West Virginia v. EPA*. [177]

A comprehensive approach that utilizes these strategies goes far. But for an entirely successful transition, the EPA must enact new standards and deadlines for the repair, replacement, or removal of existing stations and underground storage tanks – the last one was in December

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[175] U.S. Env't Prot. Agency, *Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles*, (Apr. 2023), https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017626.pdf. The EPA estimates that the proposed standards will increase the costs to auto manufacturers by about $1,200 per vehicle in 2032, but a battery electric vehicle owner of a 2032 electric vehicle would save an estimated $9,000 on average on fuel, maintenance, and repairs over 8 years. *Id.*

[176] Petition for Review, Tex. v. EPA, No. 22-1031 (D.C. Cir. Feb. 28, 2022).

[177] W. Va. v. EPA, 142 S. Ct. 2587 (2022); *see also* Jennifer Hijazi, *Major Questions, Standing to Take Stage for Car Rules Arguments*, BLOOMBERG L. (Sept. 13, 2023), https://news.bloomberglaw.com/environment-and-energy/major-questions-standing-to-take-stage-for-car-rules-arguments?source=newsletter&item=body-link&region=text-section.

1998.[178] States, too, must refrain from sunsetting cleanup funds. New standards and deadlines, supported by reliable funding sources, would secure the compatibility of tanks with improving fuel blends and cap environmental damage from petroleum gas leaks and spills until the transition is complete.

V. Conclusion

To conclude, the need for a complete transition away from gas reliant vehicles exists – the effects of our greenhouse gas emissions are catastrophic. Current liability schemes, financial sustainability considerations, and statutory incentives have already begun to drive the shift towards deploying dispersed electric vehicle charging networks. But the transition has not yet accounted for rate regulation that parallels protective regimes in place, or for equal access and distribution to these resources.

To address these obstacles and further promote the transition towards a complete electric vehicle charging infrastructure, a solution has been proposed here in three parts: (1) the regulation of rates charged to consumers at public charging stations and distance and density requirements for the spacing of these ports; (2) statutory stimuli targeting the expansion of stations into residential developments and the transformation of existing infrastructure; and (3) the limiting of petroleum gas infrastructure by prohibiting or conditioning new gas station construction, prohibiting the sale of new gas-reliant vehicles, and establishing sunset windows or upgrading requirements for existing infrastructure. In total, this approach takes the transition to the next level

[178] Ass'n of State and Territorial Solid Waste Mgmt. Off., *supra* note 55.

and helps navigate the transportation sector towards sustainable fueling infrastructure and development.[179]

[179] Soon, these considerations will be relevant for other modes of transportation. In late 2023, a commercial plane flew across the Atlantic Ocean without using fossil fuels for the first time. Nicolás Rivero, *A Plane Fueled by Fat and Sugar has Crossed the Atlantic Ocean*, WASH. POST (Nov. 28, 2023), https://www.washingtonpost.com/climate-solutions/2023/11/28/virgin-atlantic-sustainable-flight-lands-saf/.