Pulling in Both Directions: How States Are Moving Toward Decarbonization While Continuing to Support Fossil Fuels

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"[T]he United Nations Intergovernmental Panel on Climate Change [IPCC] warned in October that humans have little more than a decade to virtually eliminate greenhouse gas emissions to

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> stand a good chance of averting the worst impacts of global climate change."[1]

> "The challenge is a lack of national [climate change] policy . . . there are 50 different states . . . with different models. . . . It's happening, but it's not cohesive."[2]

I. INTRODUCTION

Simply, "climate change is occurring earlier and more rapidly than expected."[3] Average worldwide global warming is already at 1.0°C above pre-industrial levels.[4] The IPCC's Global Warming of 1.5°C Special Report put into stark relief the differences the world can expect if anthropogenic average temperature increases are stopped at 1.5°C—or are allowed to increase to 2.0°C.[5] Rather than being an aspirational goal, "the review of about 6,000 scientific studies on key aspects of the climate crisis" found that "the Paris Agreement target of 2.0°C average global warming produces impacts far beyond what scientists previously believed."[6]

[1] Gavin Bade, *US Power Sector Carbon Emissions Jump as Gas Boom Outpaces Coal Decline,* UTIL. DIVE (Jan. 8, 2019), https://www.utilitydive.com/news/us-power-sector-carbon-emissions-jump-as-gas-boom-outpaces-coal-decline/545525/ [https://perma.cc/7JKR-SFT5].

[2] Rod Walton, *Accenture IUEC: Beware (and Embrace) the Steep Cliffs of Disruption*, POWER ENGINEERING (Apr. 5, 2019), https://www.power-eng.com/articles/2019/04/accenture-iuec-beware-the-steep-cliffs-of-disruption.html [https://perma.cc/9ZRD-MEGM] (quoting Anna Pramaggiore, Senior Vice President, Exelon, Speech at the Accenture International Utilities and Energy Conference (Apr. 2, 2019)).

[3] Mitchell Beer, *1.5°C is Doable, But Just a Dozen Years Left to Get on a Low-Carbon Pathway*, THE ENERGY MIX (Oct. 8, 2018), https://theenergymix.com/2018/10/08/1-5c-is-doable-but-just-a-dozen-years-left-to-get-on-a-low-carbon-pathway/ [https://perma.cc/ZN9L-M582] (quoting Johan Rockström).

[4] *Id*.

[5] IPCC, SPECIAL REPORT: GLOBAL WARMING OF 1.5°C (Valerie Masson-Delmotte et al. eds., 2018), https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf [https://perma.cc/ML4P-7YJN] [hereinafter IPCC SPECIAL REPORT]. The projected difference between 1.5°C and 2°C include: up to 50% fewer people around the world exposed to water stress; 50% less decline in marine fisheries already suffering from ocean acidification and oxygen loss; 10% of the frequency of ice-free summers in the Arctic; 10 million fewer people affected by sea level rise by 2100; and considerably better odds that more than 10% of the world's coral reefs can survive, among others. *Id*. at 7–9.

[6] Beer, *supra* note 3 (citing IPCC SPECIAL REPORT, *supra* note 5).

The IPCC report warns that "[h]umanity has a dozen years to hold off the accelerated risks of extreme heat waves, wildfires, flooding, drought, sea level rise, and extensive poverty."[7] And this prediction may prove to be overly conservative. Australia's Breakthrough-National Centre for Climate Restoration looked at a 3.0°C scenario in 2050, which is a feasible warming scenario without stronger climate action by world governments. The scenario "provides a glimpse into a world of 'outright chaos', on a path to the end of human civili[z]ation and modern society as we have known it, in which the challenges to global security are simply overwhelming and political panic becomes the norm."[8]

As the scientific community has reached overwhelming consensus on the causes and effects of global warming, the remaining uncertainties for warming scenarios lie in the specific speed, timing, and magnitude of these effects. How fast will temperatures rise, and how quickly will impacts occur? How quickly will ice melt or disintegrate? What will positive or negative feedback loops do to exacerbate or ameliorate disruption from climate change, and what are the triggers for potentially irreversible tipping points? The uncertainties around the melting of Greenland, the Arctic, and Antarctica, and the shutdown of the thermohaline conveyor, which keeps western Europe warm, are just two examples. Acidification is another issue that will have a profound impact; we—policymakers, scientists, concerned members of the public—just do not know exactly when impacts on "the growth, development, calcification, survival, and thus abundance of a broad range of species" will occur.[9]

There is broad agreement that the Paris Accord obligations are insufficient to meet the 2.0°C target, much less keep the average temperature under a 1.5°C increase. "Absent ambitious climate policies . . . global energy consumption will grow 20–30% or more through 2040 and beyond, led largely by fossil fuels."[10] At

[7] *Id*. (citing IPCC SPECIAL REPORT, *supra* note 5).

[8] DAVID SPRATT & IAN DUNLOP, EXISTENTIAL CLIMATE-RELATED SECURITY RISK: A SCENARIO APPROACH 10 (2019), https://docs.wixstatic.com/ugd/148cb0_90dc2a2637f348edae45943a88da04d4.pdf [https://perma.cc/U9CF-63RM].

[9] IPCC SPECIAL REPORT, *supra* note 5, at 9.

[10] RICHARD NEWELL ET AL., RESOURCES FOR THE FUTURE, GLOBAL ENERGY OUTLOOK 2019: THE NEXT GENERATION OF ENERGY III (2019), https://media.rff.org/documents/

this point, there is broad scientific consensus, if not policy consensus. Wood Mackenzie, a leading private research and consultancy firm, envisioned one accelerated decarbonization scenario, which included: oil consumption peaking by 2031; wind and solar representing 40% of total electricity production globally by 2040; the use of internal combustion engine cars and trucks peaking in the late 2020s, with electric vehicles representing 100% of new vehicle sales in the United States and Europe by 2040; electric cars displacing eleven million barrels per day of oil consumption globally; and 64 million autonomous cars on the road globally by 2040.[11] Even assuming each of these ambitious benchmarks is achieved, however, their analysis finds that all these actions combined will not keep warming even to the 2.0°C target, and "[m]uch more radical action would need to occur to achieve" the 1.5° target."[12]

The new scientific information regarding climate comes as more information is also being reported about the impact on climate change from the production and transportation of natural gas.[13] The idea of natural gas as "'a bridge to a renewable future was first put in writing in 1979'" but has, in fact, turned out to be a poor choice for the long-term move towards decarbonization.[14] "[R]ather than being an environment-friendly product that can help solve our climate problems, gas is the new coal . . . . [G]as is also a bigger contributor to climate change than was understood."[15]

While the pace of accelerated decarbonization is still being debated as a political question, the effects of climate change and

GEO_Report_8-22-19.pdf [https://perma.cc/B8C4-5R5U].

[11] WOOD MACKENZIE, WHAT IF DECARBONISATION ACCELERATES? 2 (2019).

[12] *Id.* at 4.

[13] *New Analysis Reveals 'Clean' Natural Gas as 'The New Coal'*, THE ENERGY MIX (Jul. 2, 2019), https://theenergymix.com/2019/07/02/new-analysis-reveals-clean-natural-gas-as-the-new-coal/ [https://perma.cc/N78W-MXG2] ("Methane leaks from liquified natural gas (LNG) and other parts of the gas production chain are making the supposedly 'clean fuel' a climate pollutant on par with coal").

[14] Michael Brune, *Building Our Own Bridge*, SIERRA CLUB (Feb. 28, 2020), https://www.sierraclub.org/michael-brune/2020/02/regenerate-california-natural-gas? [https://perma.cc/8SH4-CVRJ] (quoting Brian Kahn, *Please, For the Love of All Things Holy, Stop Pretending Natural Gas Is a 'Transition Fuel'*, GIZMODO (Feb. 20, 2020), https://earther.gizmodo.com/please-for-the-love-of-all-things-holy-stop-pretendin-1841808812).

[15] *Id.*

associated public awareness of the issue are already impacting business decisions.[16] In response to the increasing impact of natural gas on the climate, the Beyond Coal campaign has now become Beyond Carbon, with a goal of not only shutting down all coal plants by 2030, but also stopping the construction of any new natural gas plants.[17] In California, there are calls for the utility Pacific Gas and Electric ("PG&E") to be broken in two as part of the company's bankruptcy plan—"splitting the natural gas and electric delivery businesses into separate companies."[18] At first glance, the gas business has all the hallmarks of an attractive business acquisition target—the system has 4.3 million customers and generates more than $4 billion in annual

[16] Over 15 GW of coal-fired electricity generation shut down in 2019, which is the third highest annual total retirement. While this paper will primarily deal with business decisions in the energy sector, other businesses and sectors are also determining that climate change is a source of risk and needs to be addressed in the normal course of business. *See, e.g.*, NETWORK FOR GREENING THE FINANCIAL SYSTEM, A CALL FOR ACTION: CLIMATE CHANGE AS A SOURCE OF FINANCIAL RISK (2019) https://www.banque-france.fr/sites/default/files/media/2019/04/17/ngfs_first_comprehensive_report_-_17042019_0.pdf [https://perma.cc/6RRQ-9BCD] (discussing changes central banks and policymakers need to make to address climate change as a source of economic and financial risk within the financial sector). The insurance sector has also determined that it needs to be more focused on climate change, and to take climate change into account when making underwriting decisions.

[17] Robert Walton, *Bloomberg Commits $500M to Phasing Out Coal, Halting New Gas Plants*, UTIL. DIVE (June 7, 2019), https://www.utilitydive.com/news/bloomberg-commits-500m-to-phasing-out-coal-halting-new-gas-plants/556430/ [https://perma.cc/B6U4-5ZFZ] ("'Simultaneously and starting now, Beyond Carbon will extend the successful strategies utilized in the Beyond Coal campaign to other fossil fuels, by working to prevent new construction of gas plants.'"). The money will be used for "lobbying efforts in state legislatures, city councils and public utility commissions" and the expected expenditures are "$500 million in the next three years." Jeff St. John, *Bloomberg Commits $500M to Close All US Coal Plants by 2030, Halt New Natural Gas Plants*, GREENTECH MEDIA (June 7, 2019), https://www.greentechmedia.com/articles/read/bloomberg-commits-500m-to-close-all-us-coal-plants-by-2030-halt-natural-gas [https://perma.cc/QD2J-JWMG].

[18] Robert Walton, *As California Considers Breaking Up PG&E, Utility 'Open to a Range of Solutions'*, UTIL. DIVE (Dec. 28, 2018), https://www.utilitydive.com/news/as-california-considers-breaking-up-pge-utility-open-to-a-range-of-solut/545011/ [https://perma.cc/KG2U-M4KF]. The main driver behind potentially splitting up the company into its constituent parts is to drive safety improvements. Robert Walton, *Split Apart PG&E? The Utility is Open to It, but Warns Rates Would Likely Rise*, UTIL. DIVE (Feb. 21, 2019), https://www.utilitydive.com/news/split-apart-pge-the-utility-is-open-to-it-but-warns-rates-would-likely-r/548869/ [https://perma.cc/3U45-757A].

revenue.[19] However, the potential pool of interested buyers may be limited because of the state's ambitious environmental goals and "stringent regulatory climate," which could lead to PG&E's natural gas infrastructure becoming obsolete by 2045.[20] Bloom Energy, which makes fuel cells that mostly use natural gas, noted that the company "expects headwinds . . . largely driven by uncertainty in key markets" including California and New York, with customers postponing purchasing decisions.[21]

Given the urgency that scientists are indicating is needed to solve this ambition gap, that climate change is seen primarily as an international problem, and that there is a lack of action at the federal level in the United States,[22] it is understandable that there may have been less focus on state decarbonization initiatives. However, some states have attempted to take action to start the decarbonization process, through legislation, executive orders, or regulatory decisions. Economy-wide decarbonization, including specific plans on how states could achieve such an objective, remains an elusive goal, including at the state level. When decarbonization is mentioned most often—by regulators, academics, legislators—the discussion is typically focused on electricity generation, and how electricity can be decarbonized.[23] Some states have enacted renewable portfolio standards to start the transition to clean or carbon-free electricity.[24] States have also taken other actions regarding

[19] David R. Baker, *PG&E May Sell California Assets Nobody Will Want in 20 Years*, BLOOMBERG (Jan. 24, 2019), https://www.bloomberg.com/news/articles/2019-01-24/pg-e-may-be-selling-california-assets-nobody-wants-in-20-years [https://perma.cc/K6C8-NEQ3].

[20] *Id*. ("And California's goals to phase out greenhouse gas emissions by 2045 could render a fossil fuel network worthless.") PG&E's gas challenges are compounded because, while the assets may be worthless by 2045, stakeholders are looking "'to see that there's a plan to invest in the system'" based on previous safety incidents, including the deadly San Bruno pipeline explosion. *Id*.

[21] Jeff St. John, *Bloom Energy Shares Dive on Warnings of a 2020 Market Slowdown*, GREENTECH MEDIA (Aug. 12, 2019), https://www.greentechmedia.com/articles/read/bloom-energy-narrows-losses-in-second-quarter [https://perma.cc/M2KN-3299].

[22] *See* Victor B. Flatt & Heather Payne, *Not One Without the Other: The Challenge of Integrating U.S. Environment, Energy, Climate, and Economic Policy*, 44 ENVTL. L. 1079 (2014).

[23] *See infra* Part I.

[24] *State Renewable Portfolio Standards and Goals*, NAT'L CONF. ST. LEGISLATURES (Dec. 31, 2019), http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx [https://perma.cc/QR5R-HBSZ].

electricity generation, including regulating natural gas peaker plants, to continue to decarbonize their grid.[25]

After electricity generation, policymakers tend to focus on transportation emissions, which are now the largest source of greenhouse gas emissions in the United States,[26] and what requirements or incentives will be needed to decarbonize transportation.[27] Minimal action has been taken on industrial emissions, the third-largest source of greenhouse gas emissions, or on household emissions, the fourth-largest source. In fact, these are the areas where there is continued state support for *increasing* dependence on fossil fuels.[28]

This Article seeks to first demonstrate the focus of state-level decarbonization on electricity generation, and, to a lesser extent, transportation. It then makes the case that these actions are both insufficient to address the scale of the problem we are facing and, in fact, that states continue to support fossil fuel use—intentionally, unintentionally, for political expediency, or perhaps because it was the right approach to achieve policy objectives a decade ago.[29] More coordinated action by states—both in the political sphere and by regulatory bodies—is necessary to confront the challenge from climate change. This intentional, coordinated action will lessen the drag in the system and allow for the financial and political capital to implement the necessary change to achieve deep decarbonization more quickly.

[25] *See infra* Part I.

[26] *Sources of Greenhouse Gas Emissions*, U.S. ENVT'L PROT. AGENCY, https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions [https://perma.cc/B848-RRJU] (last visited Feb. 16, 2020).

[27] *See generally* Andrea Hudson Campbell et al., *Heavy-Duty Vehicles and Freight, in* LEGAL PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES (Michael B. Gerrard & John C. Dernbach, eds., 2019) (discussing how heavy-duty vehicles and rail can help achieve the goal of decarbonizing transportation 75–100% from a 2014 baseline).

[28] *See infra* Part III.

[29] As one editorial board noted: "It sounded good a few years ago: natural gas, cleaner than coal and better for the environment. But now burning more natural gas is sounding like the wrong turn at the wrong time." *A Warning for NC on the Climate Cost of Natural Gas*, RALEIGH NEWS & OBSERVER (Oct. 17, 2019), https://www.newsobserver.com/opinion/article236323113.html [https://perma.cc/W5D9-98TM].

II. STATE ACTION ON DECARBONIZATION—ELECTRICITY GENERATION

The world seemed poised for global action on greenhouse gas emissions with the ratification of the Paris Agreement. Given that globally, electricity generation is the largest source of greenhouse gas emissions, it was expected that the certainty the Agreement brought around the target the world was striving toward and the emphasis on commitments from every country in the world would shift global development from fossil fuels to carbon-free electricity production. Unfortunately, the Paris Agreement did not bring forth a sudden change in either investments or planned investments.[30] "Leading global banks have invested nearly US$2 trillion in fossil projects since the Paris Agreement was signed," including into oil and gas development, liquified natural gas, coal mining, and coal-fired power plants.[31]

The trend of continued fossil fuel investment is reflected by electricity producers in the United States. Indeed, "2019 will see a continuation of the trend to overbuild and over-rely on gas. . . . [T]he utility industry is poised to build three-times more [natural gas combined cycle] capacity than is necessary."[32] The U.S. Energy Information Administration "expects the U.S. grid to add more than 28 GW of gas-fired generation between 2018 and 2022."[33] If that capacity does indeed come online, the

[30] The Paris Agreement "entered into force on 4 November 2016, thirty days after the date on which at least 55 Parties to the Convention accounting in total for at least an estimated 55 % of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the Depositary." *The Paris Agreement*, UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement [https://perma.cc/LV9M-C52N] (last visited Feb. 16, 2020).

[31] *'Alarming' Report Shows $1.9 Trillion in New Fossil Investment Since Paris Accord*, ENERGY MIX (Mar. 20, 2019), https://theenergymix.com/2019/03/20/alarming-report-shows-1-9-trillion-in-new-fossil-investment-since-paris-accord/ [https://perma.cc/K7YW-6GAZ].

[32] Joseph Daniel, *6 Utility Trends to Look Out for in 2019*, UTIL. DIVE (Jan. 4, 2019), https://www.utilitydive.com/news/6-utility-trends-to-look-out-for-in-2019/545213/ [https://perma.cc/A7PJ-MQGP].

[33] Gavin Bade, *10 Trends Shaping the Electric Power Sector in 2019*, UTIL. DIVE (Jan. 2, 2019), https://www.utilitydive.com/news/10-trends-shaping-the-electric-power-sector-in-2019/545119/ [https://perma.cc/FTH8-55BQ]. *See also* Robert Walton, *FERC Infrastructure Report Reveals Phantom 850 MW Coal Plant, Renewables Surpassing*

Federal Energy Regulatory Commission (FERC) projects that 44% of total installed generating capacity in the United States would come from natural gas.[34] "The overbuild in gas plants and infrastructure could lead to over $100 billion in stranded assets, which will either be recovered on the backs of ratepayers or investors."[35]

Right now, "[n]ew combined-cycle gas plants remain competitive with new utility solar" plants, but it is expected that "solar's going to be cheaper than gas almost everywhere around the world" by 2023.[36] However, state policy alone may not be sufficient to stop the development of fossil-fuel resources for electricity generation. When states restructured their electric utilities, the job of ensuring resource adequacy—of making sure that there would be enough electricity available to meet customer demand—in practice shifted from the state regulatory body to the regional transmission organization (RTO) or independent system operator (ISO) that the state joined.[37] That change also somewhat limited the states' ability to determine the generation sources that were going to supply their state's electricity needs.[38] As the economics of the markets now dictate which resources are developed in restructured markets and those economics currently favor natural gas plants, the

Coal, UTIL. DIVE (June 11, 2019), https://www.utilitydive.com/news/ferc-infrastructure-report-reveals-phantom-850-mw-coal-plant-renewables-su/556602/ [https://perma.cc/96QS-5XUH]. "As recently as last year, the EIA forecast that natural gas would remain the country's top source of electricity out to 2050" but the 2020 Annual Energy Outlook predicts that in 2050 renewables will account for 38% of electricity and natural gas for 36%. Karl-Erik Stromsta, *Renewables Set to Overtake Natural Gas in US Power Mix, EIA Says*, GREENTECH MEDIA (Jan. 29, 2020), https://www.greentechmedia.com/articles/read/eia-renewables-will-overtake-natural-gas-in-us-power-mix? [https://perma.cc/DGC8-A4V5].

[34] Walton, *supra* note 33. This compares with more than 21% from coal, just over 24% from renewable energy sources, and almost 9% from nuclear power. *Id*.

[35] Daniel, *supra* note 32.

[36] Karl-Erik Stromsta, *WoodMac: Solar Plants Cheaper Than Natural Gas 'Just About Everywhere' by 2023*, GreenTech Media (May 14, 2019), https://www.greentechmedia.com/articles/read/solar-plants-cheaper-than-natural-gas-just-about-everywhere-by-2023-woodmac#gs.rw7h7l [https://perma.cc/V3PL-9UVN].

[37] State regulatory bodies still perform this function in states with regulated, vertically-integrated utilities.

[38] Hughes v. Talen Energy Mktg., 136 S.Ct. 1288, 1299 (2016) (noting that states cannot tether state incentives to the wholesale electricity markets to incentivize electricity generation to be located within their state boundaries).

extensive buildout currently occurring may lock a RTO like PJM, which serves the 20% of the U.S. population located in the mid-Atlantic,[39] into natural-gas generation for the lifetime of these new plants. Current analysis indicates that "gas will continue to make up around 40 percent of the generation mix" in PJM twenty years from now, "barring dramatic changes to how the energy mix is determined."[40] This is true even though one nonprofit says that "it will be more expensive to run 90% of the gas plants being proposed in the U.S. than it will be to build new wind and solar farms equipped with storage systems" by 2035.[41]

Some climate advocates have come to the same conclusion, noting that "PJM, the nation's largest grid operator and power market, is headed for climate disaster. While PJM has touted its market as a driver of emissions reductions, the story it paints—which relies nearly exclusively on coal-to-gas switching—is fundamentally ephemeral. The nation will never meet the emissions targets necessary to avoid climate disaster by doubling down on gas."[42] Advocates in New York, perhaps worried that the NYISO could have more new gas-fired generation like PJM, rather than more renewable sources,[43]

[39] PJM serves approximately 65 million people. *PJM at a Glance*, PJM INTERCONNECTION, https://www.pjm.com/~/media/about-pjm/newsroom/fact-sheets/pjm-at-a-glance.ashx [https://perma.cc/D4FB-NMH4] (last visited Jan. 18, 2020). At the time of writing, the current population of the United States was around 329 million people. *U.S. and World Population Clock*, U.S. CENSUS BUREAU, https://www.census.gov/popclock/ [https://perma.cc/5P5Y-V8Q3] (last visited Jan. 17, 2020).

[40] Chloe Holden, *As Coal Retires in PJM, Why Aren't Renewables Filling the Vacuum?*, GREENTECH MEDIA (May 20, 2019), https://www.greentechmedia.com/articles/read/as-coal-retires-in-pjm-why-arent-renewables-filling-the-vacuum#gs.rw9mnh [https://perma.cc/8RFA-EHXZ].

[41] *Every American Power Grid is Getting a Lot Greener—Except the One that Matters*, CRAIN'S CHI. BUS. (Sep. 19, 2019), https://www.chicagobusiness.com/utilities/every-american-power-grid-getting-lot-greener-except-one-matters [https://perma.cc/7SPK-P26U].

[42] Miles Farmer & Amanda Levin, *Comparing America's Grid Operators on Clean Energy Progress: PJM is Headed for a Climate Disaster*, UTIL. DIVE (July 2, 2019), https://www.utilitydive.com/news/comparing-americas-grid-operators-on-clean-energy-progress-pjm-is-headed/557994/ [https://perma.cc/6BAD-P56Q]. "PJM is unique in the degree to which its markets have fostered gas development while hindering new development of wind, solar and other zero emissions electricity sources that states and customers want." *Id*.

[43] *Id*. New electricity generation in PJM in 2012–2022 is 75% polluting (mostly gas) versus 25% renewable. *Id*. NYISO is 36% polluting, 64% renewable. *Id*. So, three times as much polluting capacity will have been built in PJM over that time period vs. renewables. In New York, almost twice as much renewable generation will have been built versus polluting. *Id*.

specifically argued that approving a new $1 billion natural gas pipeline in New York could "handcuff New York to fossil fuels and hobble the state's march toward renewable resources."[44] For any gas plant built today, "[t]he potent brew of falling costs for emissions-free renewables could jeopardize facilities that are built to last for decades."[45]

While emissions from electricity generation had been a positive trend toward decarbonization, "emissions from the U.S. power sector increased significantly in 2018 . . . . and increased natural gas-fired generation outpaced a decline in coal power."[46] So the addition of natural gas fired generation more than made up for the decline from coal. Per one scenario, there will continue to be a growth in carbon dioxide emissions "unless there is a shift in current policy and technology trends. Renewable energy, led by wind and solar power, grow rapidly, though they primarily add to, rather than displace, fossil fuels unless more ambitious climate policies are put into place."[47] Some states are attempting to set those more ambitious climate policies.

A. State Goals for Electricity Generation

The main policy remedies that states have proposed for reducing carbon emissions are state renewable portfolio standards (RPS). Typically set by legislative action, RPSs require utilities operating in the state to demonstrate that they have generated a certain percentage of their electricity through renewable sources or have purchased that quantity of renewably-sourced electricity from others. Twenty-nine states

[44] *New York State Rejects $1-Billion Natural Gas Pipeline*, THE ENERGY MIX (May 22, 2019), https://theenergymix.com/2019/05/22/new-york-state-rejects-1-billion-natural-gas-pipeline/ [https://perma.cc/H5KX-R5ZT].

[45] *Every American Power Grid is Getting a Lot Greener—Except the One that Matters*, *supra* note 41.

[46] Bade, *supra* note 1. "Emissions from the transportation, industrial and buildings sectors also rose." *Id*.

[47] Richard Newell et al., *supra* note 10. *See also* Stephen Lacey, *Where is the Global Energy System Headed?*, GREENTECH MEDIA (July 10, 2019), https://www.greentechmedia.com/articles/read/where-is-the-global-energy-system-headed [https://perma.cc/PLJ4-QLQK] (explaining how renewables will enhance the system, not replace current generation on the current trajectory, starting at 25:00).

and the District of Columbia have binding RPS polices that govern electricity generation.[48] However, these standards—and how they can be met—vary greatly across the states that have adopted them. Some states require either 100% carbon-free electricity or renewable electricity: California (by 2045);[49] the District of Columbia (by 2040);[50] Hawaii (by 2045);[51] Maine (by 2050);[52] New Mexico (by 2045);[53] New York (by 2040);[54] Rhode Island (100% by 2030);[55] Virginia (by 2045);[56] and Washington (by 2045).[57] Nevada has a goal of 100% by 2050,[58] as do Wisconsin[59] and Minnesota.[60] New Jersey has indicated by Executive Order

[48] *Updated Renewable Portfolio Standards Will Lead to More Renewable Electricity Generation*, U.S. ENERGY INFO. ADMIN. (Feb. 27, 2019), https://www.eia.gov/todayinenergy/detail.php?id=38492 [https://perma.cc/U8FQ-RP2W].

[49] CAL. PUB. UTIL. CODE § 454.53(a) (Deering 2019) ("zero-carbon resources supply 100 percent of all retail sales of electricity to California end-use customers and 100 percent of electricity procured to serve all state agencies by December 31, 2045.").

[50] D.C. CODE § 34-1432(c)(22) (2019).

[51] HAW. REV. STAT. § 269-92(A)(6) (2019).

[52] ME. REV. STAT. ANN. tit. 35-A, §§ 3210(1-A(B)),(3). The definition of "new source" is codified at ME. REV. STAT. ANN. tit. 35-A, § 3210(2)(B-4).

[53] N.M. STAT. ANN. §§ 62-16-4(A)(5),6) (2019). Definitions of Renewable and Zero Carbon are located in N.M. STAT. ANN. § 62-16-3 (2019). These statutes were recently passed, and are effective on June 14, 2019. They supplement the 20% by 2020 requirement.

[54] S. 6599, 242nd Leg. Reg. Sess. (NY 2019) https://www.nysenate.gov/legislation/bills/2019/s6599 [https://perma.cc/T2X3-EAYA].

[55] Larry Pearl, *Rhode Island governor wants state to be fastest to 100% renewable energy*, UTIL. DIVE (Jan. 21, 2020), https://www.utilitydive.com/news/rhode-island-governor-wants-state-to-be-fastest-to-100-renewable-energy/570700/ [https://perma.cc/Z5BW-KXHT].

[56] Jeff St. John, *Virginia Mandates 100% Clean Power by 2045*, GREENTECH MEDIA (Mar. 6, 2020), https://www.greentechmedia.com/articles/read/virginia-100-clean-energy-by-2050-mandate-law [https://perma.cc/MD5X-M2LY]. *See also* Matthew Bandyk, *Virginia approves 100% clean energy legislation, pushing state toward 2.4 GW storage, RGGI*, UTIL. DIVE (Mar. 6, 2020), https://www.utilitydive.com/news/virginia-clean-energy-legislation-pushes-state-toward-storage-rggi/572349/ [https://perma.cc/BBJ2-PYRR].

[57] 2019 Wash. Sess. Laws S. 5116 § 5 ("It is the policy of the state that nonemitting electric generation and electricity from renewable resources supply one hundred percent of all sales of electricity to Washington retail electric customers by January 1, 2045. By January 5 1, 2045, and each year thereafter, each electric utility must demonstrate its compliance with this standard using a combination of nonemitting electric generation and electricity from renewable 8 resources.").

[58] 2019 Nev. Legis. Serv. S. 358 § 8(2).

[59] DIVISION OF EXECUTIVE BUDGET AND FIN. DEP'T OF ADMIN., STATE OF WISCONSIN EXECUTIVE BUDGET 441 (2019), https://doa.wi.gov/budget/SBO/2019-21%20Executive%20Budget%20Complete%20Document.pdf [https://perma.cc/PV5A-SV28].

[60] *Walz, Flanagan propose plan to achieve 100 percent clean energy in Minnesota by 2050*, MINN. COMMERCE DEP'T (Mar. 4, 2019), https://mn.gov/commerce/media/news/?id

its intention to require 100% by 2050 through development and adoption of the state's new Energy Master Plan.[61]

At the opposite end of the spectrum, Arizona only requires 15% after 2024,[62] Michigan requires 35% by 2025,[63] Missouri requires 15% by 2021,[64] and Indiana requires 10% by 2025.[65] Even with the most ambitious targets, only 63% of electricity retail sales are covered by states with any sort of binding RPS.[66] Where they exist, there is an annual process for utilities to demonstrate that they have met the standard, with those filings made to the state public utility commission, and any enforcement action that needs to be occur taken by the state Public Utilities Commission. These actions, however, demonstrate the most extensive and concerted decarbonization initiatives at the state level.

=17-374074 [https://perma.cc/67WT-GNXV].

[61] N.J. Exec. Order No. 28, Office of the Governor (May 23, 2018) https://nj.gov/infobank/eo/056murphy/pdf/EO-28.pdf [https://perma.cc/HLM6-HSG9]. The New Jersey Board of Public Utilities has released a draft plan to achieve the goal set out in the Executive Order. Robert Walton, *New Jersey Charts Path to 100% Clean Energy by 2050, With 2 GW of Storage by 2030*, UTIL. DIVE (June 12, 2019), https://www.utilitydive.com/news/new-jersey-charts-path-to-100-clean-energy-by-2050-with-2-gw-storage-by-2/556649/ [https://perma.cc/K5UD-QPUR]. The Governor's Energy Master Plan provided additional details to obtain the clean energy goal. Matthew Bandyk, *New Jersey Outlines Sweeping Plans to Achieve 100% Clean Energy by 2050*, UTIL. DIVE (Jan. 28, 2020), https://www.utilitydive.com/news/new-jersey-outlines-sweeping-plans-to-achieve-100-clean-energy-by-2050/571195/ [https://perma.cc/PK7A-65DK]. Additionally, PSEG, New Jersey's largest utility, has a "'vision of attaining net-zero carbon emissions by 2050,' assuming advances in technological innovation and public support." Robert Walton, *PSEG on Track to Reduce Emissions 80%, Will Divest All Remaining Coal Interests*, UTIL. DIVE (July 25, 2019), https://www.utilitydive.com/news/pseg-on-track-to-reduce-emissions-80-will-divest-all-remaining-coal-inter/559494/ [https://perma.cc/KR9L-9CSU]. PSEG joins other utilities like Xcel with a 100% clean energy goal. *100 percent renewable targets*, ENERGY SAGE https://news.energysage.com/states-with-100-renewable-targets/ [https://perma.cc/MSX2-QA8L] (last visited Feb. 25, 2020).

[62] ARIZ. ADMIN. CODE §§ 14-2-1804, 14-2-1805 (2019). Arizona is currently reviewing their Renewable Portfolio Standards to consider modifying and expanding their goal to 30% renewable energy by 2030. Memorandum from the Office of Chairman Doug Little, Arizona Corporation Commission (Aug. 22, 2016), Docket. No. E-00000Q-16-0289, https://edocket.azcc.gov/Docket/DocketDetailSearch?docketId=19621&documentId#docket-detail-container1 [https://perma.cc/GCQ8-BC42].

[63] MICH. COMP. LAWS SERV. § 460.1001(3) (LexisNexis 2019).

[64] MO. REV. STAT. § 393.1030(1)(4) (2019).

[65] IND. CODE ANN. § 8-1-37-12(a)(3) (West 2019).

[66] *Updated Renewable Portfolio Standards Will Lead to More Renewable Electricity Generation*, *supra* note 48.

B. Other State Actions—Focus on Electricity Generation

Even when looking more broadly at decarbonization initiatives than RPS goals, states have focused on electricity generation. In addition to state RPS goals, some states have started to take other actions around electricity generation decarbonization, such as removing natural gas generation and instead replacing these peaker units with storage, renewable generation, or upgraded transmission.

New York, for example, recently issued a rule which could impact about 3,300 MW of simple-cycle turbines in New York City and Long Island, with one scenario to retire all of the units impacted by the rule.[67] "The proposed rules would give plant owners an option to meet the new standards in part by installing renewables or batteries," helping the state meet its aggressive environmental goals.[68] Other peaker plants in NY state are also under review as potential candidates for replacement with either six- or eight-hour energy storage projects.[69] Ravenswood, a 316 MW eight-hour battery project, will replace 16 existing gas peaker units when fully operational; it is expected to be partially operational by 2021.[70] And New York's last coal-fired power plant is set to close in 2020.[71]

Multiple projects in California have replaced natural gas peaker plants. "California regulators approved four battery projects for utility Pacific Gas & Electric to replace three gas plants that had sought ratepayer support. The batteries,

[67] Robert Walton, *NYISO: Decarbonization Efforts Could be Slowed Without New Transmission*, UTIL. DIVE (May 3, 2019), https://www.utilitydive.com/news/nyiso-decarbonization-efforts-could-be-slowed-without-new-transmission/553977/ [https://perma.cc/358H-RTZ3].

[68] Robert Walton, *New York Moves to Phase Out Older Peaking Plants as it Targets 100% Clean Energy*, UTIL. DIVE (Mar. 1, 2019), https://www.utilitydive.com/news/new-york-moves-to-phase-out-older-peaking-plants-as-it-targets-100-clean-e/549518/ [https://perma.cc/29YY-F6QZ].

[69] HJ Mai, *New York Regulators Assess Potential for Storage To Replace Peaking Units In The State*, UTIL. DIVE (July 3, 2019), https://www.utilitydive.com/news/new-york-regulators-assess-potential-for-storage-to-replace-peaking-units-i/558157/ [https://perma.cc/9KS7-TRH7].

[70] Iulia Gheorghiu, *New York Advances Toward 3 GW Storage Goal With 2.5 Gwh Project to Replace Gas Peakers*, UTIL. DIVE (Sept. 16, 2019), https://www.utilitydive.com/news/new-york-advances-toward-3-gw-storage-goal-with-316-mw-project-to-replace-g/562964/ [https://perma.cc/Z8BR-3SHR] (last updated Oct. 17, 2019).

[71] Carlos Anchondo, *N.Y. Set to Close Last Coal Plant*, ENERGY WIRE (Jan. 6, 2020), https://www.eenews.net/energywire/2020/01/06/stories/1061970813. Interestingly, the plant's owners cited "regulatory uncertainty" as one reason for the closure. *Id*.

including two of the world's largest planned projects, represented the first time that a utility and its regulators sought to directly replace multiple major power plants with battery storage."[72] After aborting a process deemed flawed due to its use of outdated cost data,[73] Southern California Edison moved forward with 195 MW of storage rather than the Puente natural gas peaker plant.[74] The Los Angeles Department of Water and Power (LADWP), a municipal utility, "committed to phasing out gas power rather than rebuilding three plants in its territory."[75] LADWP ended up contracting for "the lowest solar-photovoltaic price in the United States," which equates to "half the estimated cost of power from a new natural gas plant."[76] Calpine withdrew its application for a 255 MW project in Ventura County, which had been opposed by a local Native American tribe, and Glendale, another municipal utility, stopped development of a $500 million gas peaker plant to explore the potential for clean

[72] Bade, *supra* note 33. The capacity was needed for reliability purposes south of the San Francisco Bay. Julian Spector, *Southern California Edison Picks 195MW Battery Portfolio in Place of Puente Gas Plant*, GREENTECH MEDIA (Apr. 25, 2019), https://www.greentechmedia.com/articles/read/sce-picks-major-battery-portfolio-in-place-of-puente-gas-plant#gs.rx393e [https://perma.cc/QQQ2-92MM].

[73] Julian Spector, *In Storage vs. Peaker Study*, *CAISO's Outdated Cost Estimates Produce Higher Price Tag for Storage*, GREENTECH MEDIA (Aug. 31, 2017), https://www.greentechmedia.com/articles/read/energy-storage-nrg-puente-gas-peaker-plant-cost#gs.rx27es [https://perma.cc/CS3M-4NE2].

[74] Spector, *supra* note 72. "Capacity planning was simpler then: predict regional reliability needs, build gas plants to meet them. Batteries were growing their share of the frequency regulation market in PJM territory, but they were not competing for longer-duration power plant duties." *Id*.

[75] *Id*. *See String of Cancellations Could Spell the End of New Gas Plants in California*, ENERGY MIX (June 11 2019), https://theenergymix.com/2019/06/11/string-of-cancellations-could-spell-the-end-of-new-gas-plants-in-california/ [https://perma.cc/6VAG-ZX2B].

[76] Jeff McMahon, *New Solar + Battery Price Crushes Fossil Fuels, Buries Nuclear*, FORBES (July, 1 2019), https://www.forbes.com/sites/jeffmcmahon/2019/07/01/new-solar--battery-price-crushes-fossil-fuels-buries-nuclear/#201521365971 [https://perma.cc/8UVX-8ZCB]. "The Eland Project will not rid Los Angeles of natural gas, however. The city will still depend on gas and hydro to supply its overnight power. But the batteries in this 400-megawatt project will take a bite out of the fossil share of LA's power pie." *Id*.

energy alternatives.[77] A "decades-old jet-fuel-burning peaker" in Oakland will be replaced with a battery.[78]

In Indiana, regulators recently rejected a utility-built gas plant, "highlight[ing] a disjoint between the 30-year or longer lifetime of a major gas plant investment, and the 'environment of rapid technological innovation on both the utility and customer side of the meter.'"[79] Stranded assets were also a concern: "The proposed large scale single resource investment for a utility of Vectren South's size does not present an outcome which reasonably minimizes the potential risk that customers could sometime in the future be saddled with an uneconomic investment or serve to foster utility and customer flexibility. . . ."[80] Rhode Island regulators rejected a 900 MW gas plant, concluding that the plant was unnecessary.[81] It was the first time that the Energy Facility Siting Board had denied an application in its 30-year history.[82] Even Oklahoma is installing

[77] Julian Spector, *Another California City Drops Gas Peaker in Favor of Clean Portfolio*, GREENTECH MEDIA (July 30, 2019), https://www.greentechmedia.com/articles/read/glendale-drops-gas-peaker-in-favor-of-clean-and-distributed-portfolio [https://perma.cc/S3YP-DYWR]; *String of Cancellations Could Spell the End of New Gas Plants in California*, *supra* note 75. As noted, however, there are still natural gas plants looking to be permitted and built in California. Julian Spector, *California's Gas Plant Pipeline Dwindles as Calpine Drops Mission Rock Application*, GREENTECH MEDIA (May 31, 2019), https://www.greentechmedia.com/articles/read/calpine-drops-mission-rock-application-as-californias-gas-plant-pipeline-dw#gs.rxfn7t [https://perma.cc/MQE9-C3RS]. Glendale itself is repowering a natural gas plant as part of the broader deal. Brandon Yung, *Glendale Approved What May be California's Last Natural Gas-Lit Power Plant*, LAIST (July 24, 2019), https://laist.com/2019/07/24/glendale_just_approved_what_may_be_californias_last_natural_gas-lit_power_plant.php [https://perma.cc/D8W4-ZPGZ].

[78] Julian Spector, *What Comes Next After Batteries Replace Gas Peakers?*, GREENTECH MEDIA (July 1, 2019), https://www.greentechmedia.com/articles/read/california-clean-power-outlook-what-comes-after-shorter-duration-batteries? [https://perma.cc/746M-HFVY].

[79] Julian Spector, *Gas Plant Rejection Brings the Energy Transition Home to Indiana*, GREENTECH MEDIA (May 13, 2019), https://www.greentechmedia.com/articles/read/the-energy-transition-comes-home-to-indiana#gs.rwht45 [https://perma.cc/9QF4-J8BG]. Interestingly, the regulators found the utility's RFP to be "unduly restrictive." *Id*.

[80] Gavin Bade, *Indiana Regulators Reject Vectren Gas Plant Over Stranded Asset Concerns*, UTIL. DIVE (Apr. 25, 2019), https://www.utilitydive.com/news/indiana-regulators-reject-vectren-gas-plant-over-stranded-asset-concerns/553456/ [https://perma.cc/2PHE-EM68].

[81] Robert Walton, *Rhode Island Siting Board Rejects Invenergy's 900 MW Gas Plant*, UTIL. DIVE (June 21, 2019), https://www.utilitydive.com/news/rhode-island-siting-board-rejects-invenergys-900-mw-gas-plant/557348/ [https://perma.cc/H5PA-A6SR].

[82] Steve Ahlquist, *It's Over: EFSB Denies Invenergy Application*, UPRISE RI (June 21, 2019), https://upriseri.com/2019-06-21-efsb/ [https://perma.cc/33J7-KPCH]. It now looks unlikely that Invenergy is going to appeal the EFSB's decision, as they have requested the Army

a 700 MW wind, solar, and storage project rather than developing more natural gas plants.[83] Interestingly, a court in Minnesota has rejected an action by the state's regulator that would have allowed a utility that delivers power to ratepayers in both Minnesota and Wisconsin to recoup costs of a gas plant built in Wisconsin from Minnesota ratepayers, arguing that the plant has not passed Minnesota environmental review.[84]

Virginia's Corporation Commission rejected Dominion Energy's 2018 Integrated Resource Plan—the first time it had ever rejected an IRP—"call[ing] out the utility's consistent overestimates in load," which may lead to fewer investments in gas plants (and pipelines) to meet that non-existent load.[85]

Corps to suspend review of the permit application needed to build the transmission line to the facility. Steve Ahlquist, *Invenergy Suspends Their Army Corps of Engineers Application*, UPRISE RI (July 23, 2019), https://upriseri.com/2019-07-23-invenergy/ [https://perma.cc/BZK7-3JWN]. *See also* Steve Ahlquist, *Invenergy Declines to Appeal. Their Proposed Power Plant is Dead.*, UPRISE RI (Nov. 16, 2019), https://upriseri.com/2019-11-16-invenergy-goes-bye-bye/ [https://perma.cc/LW8U-P8Q8] (noting the hope that this decision will signal the end of fossil fuel electricity generation in Rhode Island).

[83] Julian Spector, *'Cheaper Than a Peaker': NextEra Inks Massive Wind+Solar+Storage Deal in Oklahoma*, GREENTECH MEDIA (July 25, 2019), ("In this case, the configuration offered an economic alternative to a natural gas peaker plant. . . . The traditional solution would be to build a natural-gas peaker to deliver that capacity . . . [but] the solar/wind/storage combination . . . [is] actually cheaper, economically, than a gas peaker plant of similar size . . . .").

[84] Robert Walton, *Minnesota appeals court rejects PUC approval of Wisconsin gas plant, orders environmental review*, UTIL. DIVE (Dec. 24, 2019), https://www.utilitydive.com/news/minnesota-appeals-court-rejects-puc-approval-of-wisconsin-gas-plant-orders/569610/ [https://perma.cc/KP8A-FJ6S].

[85] Emma Foehringer Merchant, *Virginia Regulator Asks Dominion Energy for More Accurate Resource Plan*, GREENTECH MEDIA (Dec. 10, 2018), https://www.greentechmedia.com/articles/read/virginia-utility-regulator-dominion-resource-plan-more-accurate#gs.rxbs72 [https://perma.cc/T5WD-7LR9]. The State Corporation Commission (SCC) found that "Dominion 'failed to establish that its 2018 IRP, as currently filed, is reasonable and in the public interest.'" *Id*. "In addition to incorporating the provisions of the state's new energy law the commission also asked that Dominion include fuel transportation costs in its assessment of natural gas capacity. Dominion's attempts to build the Atlantic Coast Pipeline remain contentious, and on Friday Dominion stopped construction on the pipeline due to a permitting issue. While the utility has maintained it needs the pipeline to meet future demand, . . . the SCC order pointing out Dominion's load overestimate 'raises serious questions about the legitimacy of any argument that Dominion needs a new pipeline.' Adding new capacity means added cost for ratepayers." *Id*. The SCC has also denied Dominion's smart meter proposals, not finding that Dominion had proven adequate benefits to consumers in exchange for the costs those consumers would bear. Robert Walton, *Virginia Rejects Majority of Dominion's $6B Grid Modernization Plan, Smart Meter Rollout*, UTIL. DIVE (Jan. 18, 2019),

Northern Indiana Public Service Company's Integrated Resource Plan (IRP) planned on shutting down coal plants early, in 2023 and 2028, finding the retirement of 1.35 GW of coal retiring before the end of its useful life to be "a highly desired economic solution."[86] Similarly, Arizona regulators have instituted a nine-month moratorium on new gas plants larger than 150 MW. The point was to "prevent near-term investments in gas infrastructure that could become stranded assets" if proposed grid reform measures are adopted, as the utility plans "relied primarily on natural gas for keeping the lights [on] over the next 15 years."[87]

So, there is ample evidence that both state legislatures and state-level regulators, to some extent, are taking action on decarbonization of electricity generation. While beneficial—we do need to decarbonize our electricity system and will need to do so while increasing generation capacity as we switch from fossil fuels to electricity for other uses such as transportation and household heating—this transition alone is insufficient to attain the deep decarbonization needed.[88]

https://www.utilitydive.com/news/virginia-rejects-majority-of-dominions-6b-grid-modernization-plan-smart/546361/ [https://perma.cc/CD4A-GWXA].

[86] John Weaver, *Indiana Gas Plant Spurned – Wind, Solar and Storage Respond*, PV MAGAZINE (Aug. 29, 2019), https://pv-magazine-usa.com/2019/08/29/indiana-gas-plant-spurned-wind-solar-and-storage-respond/ [https://perma.cc/3YGU-P72Z].

[87] Julian Spector, *Arizona Regulators Freeze New Gas Plants, Demand More Clean Energy Planning From Utilities*, GREENTECH MEDIA (Mar. 16, 2018), https://www.greentechmedia.com/articles/read/arizona-regulators-freeze-new-gas-plants-renewables-planning#gs.rxakfq [https://perma.cc/HFH9-JW2V]. The reform proposal has "a focus on energy storage to meet peak power with clean sources." *Id*. As was the situation in Virginia, this was the first time that the Arizona commission did not acknowledge the IRPs submitted by utilities. *Id*. Regulators have since voted to extend the moratorium. CHARLES TELKIN ET AL., THE GROWING MARKET FOR CLEAN ENERGY PORTFOLIOS, ROCKY MOUNTAIN INST. 19 (2019), https://rmi.org/insight/clean-energy-portfolios-pipelines-and-plants [https://perma.cc/KM8G-S5AM].

[88] This is especially true as even utilities that have committed to net zero emissions targets have only done so for their electric generation businesses, not for their natural gas businesses. Esther Whieldon et al., *Holes Remain in US Power Companies' Plans to Achieve Net-Zero Carbon Emissions*, S&P GLOBAL (Nov. 11, 2019), https://www.spglobal.com/marketintelligence/en/news-insights/trending/gFEkONxlUSs3gJoOlQuu_g2 [https://perma.cc/DT6G-3PX8].

III. TRANSPORTATION, INDUSTRY-SECTOR EMISSION, AND HOUSEHOLD DECARBONIZATION

As Part I demonstrated, the main focus of the states as they consider decarbonization has been on electricity generation. States have taken decarbonization action on transportation and industrial-sector emissions to a lesser degree.

A. Transportation

There is no doubt that the transition of transportation away from fossil fuels will be a significant societal challenge. There are signs of initial progress toward decarbonization: there are federal incentives for electrification, [89] and the Volkswagon settlement, which was necessary due to emissions cheating technology installed on diesel vehicles, is bringing both awareness and money to the states for emissions reductions.[90] At the same time, the Tesla Model 3 is the first electric vehicle (EV) to place within the top 10 in domestic vehicle sales by volume.[91]

Even with those glimmers of progress, however, many fewer states have focused on transportation than electricity generation. Of those states that have addressed transportation emissions, California's target of at least 1,000,000 zero-emission and near-zero-emission vehicles by January 1, 2023 is the most aggressive.[92] California is also undertaking an electrification infrastructure planning initiative, but with a ten year planning horizon. [93] Hawaii is providing rebates for charging

[89] *Electric Vehicles: Tax Credits and Other Incentives*, U.S. DEP'T OF ENERGY, ENERGY EFFICIENCY AND RENEWABLE ENERGY, https://www.energy.gov/eere/electricvehicles/electric-vehicles-tax-credits-and-other-incentives [https://perma.cc/N5KN-UHZB] (last visited Jan. 12, 2020).

[90] *About the Settlement*, VW SETTLEMENT CLEARINGHOUSE, https://vwclearinghouse.org/about-the-settlement/ [https://perma.cc/5MDD-CVDZ] (last visited Jan. 12, 2020).

[91] *2019 U.S. Passenger Car Sales Analysis*, GOOD CAR BAD CAR (Jan. 3, 2020), http://www.goodcarbadcar.net/us-passenger-car-sales-figures-by-model/ [https://perma.cc/A8BB-8QNH].

[92] CAL. HEALTH & SAFETY CODE § 44258.4 (West 2019). Generators can seek a waiver if transportation electrical demand significantly exceeded forecasts and generator took reasonable measures. CAL. PUB. UTIL. CODE §§ 399.15 (5)(D)(i), (ii) (West 2019).

[93] Kavya Balaraman, *California proposes 10-year transportation electrification planning process for SCE, other IOUs*, UTIL. DIVE (Feb. 11, 2020), https://www.utilitydive.com/news/cpuc-10-year-transportation-electrification-planning-process/572066/ [https://perma.cc/8R6Z-BC43].

infrastructure installations.[94] New York has a goal of 850,000 electric vehicles by 2025, and is providing rebates for the purchase of EVs as well as developing a plan to install charging infrastructure.[95] New Jersey is also providing rebates for electric vehicles as well as incentives to build out charging infrastructure,[96] including setting a target of two million EVs by 2035.[97]

Other states provide (or have provided) tax benefits. Colorado, [98] the District of Columbia, [99] New Jersey, [100] and Washington.[101] Connecticut,[102] Hawaii,[103] Massachusetts,[104] New

[94] Olivia Peterkin, *Hawaii Energy launches new electric vehicle charging incentive program*, PAC. BUS. NEWS (Jan. 13, 2020), https://www.bizjournals.com/pacific/news/2020/01/13/hawaii-energy-launches-new-electric-vehicle.html [https://perma.cc/2PTB-3UJ4].

[95] Press Release, Governor Cuomo Announces "Make Ready" Program for Electric Vehicles, Jan. 17,2020, https://www.nyserda.ny.gov/About/Newsroom/2020-Announcements/2020-01-17-Governor-Cuomo-Announces-Make-ready-Program-For-Electric-Vehicles (last visited Apr. 2, 2020) [https://perma.cc/E3YA-ED79].

[96] Tom Johnson, *Environmentalists Score Big Win on Electric Vehicles, but Bag Ban Among Measures that Falter*, NJSPOTLIGHT (Jan. 14, 2020), https://www.njspotlight.com/2020/01/environmentalists-score-big-win-on-electric-vehicles-but-lose-on-other-key-measures/ [https://perma.cc/25R3-UTH8].

[97] Larry Pearl, *New Jersey sets high standard with passage of EV incentive bill, advocates say*, UTIL. DIVE (Jan. 15, 2020), https://www.utilitydive.com/news/new-jersey-sets-high-standard-with-passage-of-ev-incentive-bill-advocates/570455/ [https://perma.cc/E75D-NDZR].

[98] COLO. REV. STAT. ANN. §§ 39-22-516.7 (4)(a)(II),(b)(II) (West 2019) ($5,000 rebate through 2019).

[99] D.C. CODE ANN. § 50-2201.03(j) (West 2019).

[100] N.J. REV. STAT. ANN. § 54:32B-8.55 (West 2019).

[101] WASH. REV. CODE ANN. § 82.08.020 (West 2019).

[102] *EV Connecticut, CHEAPR F.A.Q.*, CONN. DEP'T ENERGY & ENVTL. PROT., https://www.ct.gov/deep/cwp/view.asp?a=2684&q=561426&deepNav_GID=2183 [https://perma.cc/U76L-M8QX] (last visited Feb. 22, 2020).

[103] Olivia Peterkin, *Hawaii Energy Launches New Electric Vehicle Charging Incentive Program*, PACIFIC BUS. NEWS (Jan. 14, 2020, 9:42 AM), https://www.bizjournals.com/pacific/news/2020/01/13/hawaii-energy-launches-new-electric-vehicle.html [https://perma.cc/DJ79-HNYG].

[104] *Mor-Ev Program Statistics*, MASS. OFFERS REBATES FOR ELEC. VEHICLES, https://mor-ev.org/program-statistics [https://perma.cc/C8TB-ZM4K] (last visited Feb. 22, 2020).

Jersey,[105] New York,[106] Oregon,[107] and Pennsylvania[108] provide rebates of some sort for electric vehicles. Vermont is currently designing an incentive program that would benefit low-income Vermonters in adopting electric vehicles.[109] Oregon has started the process to look at incentives, rest area electrification, and truck stop electrification, with likely action in 2020.[110] Minnesota regulators have approved a $25 million EV pilot program, despite petroleum groups' opposition.[111] Los Angeles has committed to electric waste vehicles by 2035, with the initial fleet procurement to be for approximately 10% of vehicles that manage waste for the city.[112] New York's Department of Sanitation has a goal of 100% fleet electrification by 2040.[113] New

[105] Larry Pearl, *New Jersey Sets High Standard with Passage of EV Incentive Bill, Advocates Say*, UTIL. DIVE (Jan. 15, 2020), https://www.utilitydive.com/news/new-jersey-sets-high-standard-with-passage-of-ev-incentive-bill-advocates/570455/ [https://perma.cc/2VZC-MCTC].

[106] *How the Drive Clean Rebate Works*, N.Y. ST. ENERGY RES. & DEV. AUTH., https://www.nyserda.ny.gov/All-Programs/Programs/Drive-Clean-Rebate/How-it-Works [https://perma.cc/VM4P-9SZA] (last visited Feb. 22, 2020).

[107] *Oregon Clean Vehicle Rebate Program*, OR. DEP'T ENVTL. QUALITY, https://www.oregon.gov/deq/aq/programs/Pages/ZEV-Rebate.aspx [https://perma.cc/YZG5-W2RX] (last visited Feb. 22, 2020).

[108] *Alternative Fuel Rebates for Consumers*, PA. DEP'T ENVTL. PROT., https://www.dep.pa.gov/Citizens/GrantsLoansRebates/Alternative-Fuels-Incentive-Grant/Pages/Alternative-Fuel-Vehicles.aspx#.Vl9K83arSUk [https://perma.cc/S449-C4YR] (last visited Feb. 22, 2020).

[109] 2019 Vt. Legis. Serv. No. 59 (West).

[110] *Idaho Power Application for Transportation Electrification Plan No. 2035*, OR. PUB. UTIL. COMM'N, https://apps.puc.state.or.us/edockets/docket.asp?DocketID=22172 [https://perma.cc/Y4ZZ-HE68].

[111] Catherine Morehouse, *Minnesota Shuts Down Oil, Manufacturing Groups' Attempt to Derail Xcel EV Pilot*, UTIL. DIVE (Oct. 9, 2019), https://www.utilitydive.com/news/minnesota-shuts-down-oil-manufacturing-groups-attempt-to-derail-xcel-ev-p/564637/ [https://perma.cc/L5FR-JX98] ("opposition . . . is primarily driven by the fact that the oil industry is beginning to see rapid EV adoption as 'an existential threat to their business' . . . .").

[112] E. A. Crunden, *Los Angeles Commits to 100% Electric Sanitation Fleet by 2035. Other Cities Aren't Ready to Follow*, WASTE DIVE (Jan. 29, 2020), https://www.wastedive.com/news/los-angeles-sanitation-truck-fleet-100-percent-electric/571166/ [https://perma.cc/TRF5-WRW9].

[113] Cole Rosengren, *Electric refuse trucks on the road or on the way in rising number of states*, UTIL. DIVE (Mar. 9, 2020), https://www.utilitydive.com/news/electric-refuse-trucks-byd-lion-mack-dsny-ecomaine/573645/ [https://perma.cc/56DM-LZ8J].

York City, Chicago and Los Angeles have announced plans to go all electric with their bus fleets.[114]

Most other actions are part of larger, but less concrete, initiatives. Eight states are cooperating to "create[e] an Intermountain West EV Corridor that will make it possible to drive an EV across major transportation corridors in the west."[115] California, Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island, and Vermont are taking "coordinated action to ensure the successful implementation of their state zero-emission vehicle (ZEV) programs. . . . Collectively these states are committed to having at least 3.3 million ZEVs operating on their roadways by 2025."[116]

All these programs together, however, are far less aggressive than what states have committed to doing on decarbonization around electricity generation. With the proper incentives, though, a significant impact on transportation could happen relatively quickly: the average life expectancy of a new vehicle in the United States is around eight years.[117] The good news is that there is at least some forward momentum toward electrification.[118]

[114] Jason Plautz, *Transportation is 'climate enemy #1'—EVs and behavioral changes are the answers: report*, UTIL. DIVE (Feb. 26, 2020), https://www.utilitydive.com/news/environment-america-report-zero-carbon-transportation/573001/ [https://perma.cc/BZ3K-D5FW].

[115] The eight states are Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming. *REV West*, NAT'L ASS'N ST. ENERGY OFFICIALS, https://www.naseo.org/issues/transportation/rev-west [https://perma.cc/6BZZ-WEQA] (last visited Feb. 22, 2020).

[116] ZEV PROGRAM IMPLEMENTATION TASK FORCE, MULTI-STATE ZEV ACTION PLAN (2014), https://www.ct.gov/deep/lib/deep/air/electric_vehicle/path/multi-state_zev_action_plan_may2014.pdf [https://perma.cc/7RC9-PCNS].

[117] Herb Weisbaum, *What's the Life Expectancy of My Car?*, NBC NEWS (Mar. 28, 2006), http://www.nbcnews.com/id/12040753/ns/business-consumer_news/t/whats-life-expectancy-my-car/#.XT4ShuhKjZs [https://perma.cc/5AHZ-NHF5]. Although the author admits to having a 1985 Mercedes 300 TD station wagon with 376,000 miles in addition to a Tesla Model 3, so recognizes that there are certainly outliers from that average. Indeed, there is some indication that electric vehicles are replacing cars that have not yet come to the end of their useful life—owners are switching out even when they don't have to. However, current models of adoption of EVs tend to assume that replacements will happen only when needed—so the transition from ICEs to EVs may happen more quickly than is currently being predicted.

[118] Other countries are far ahead of the US in this regard. "Norway, France, the United Kingdom, India and China have announced intentions to give up and do away with gas-powered cars. Although the proposals vary in method, timing, and formal adoption, all

B. Industry-Sector & Residential and Commercial Emissions

While the industrial sector is the third-largest producer of greenhouse gas emissions,[119] most of these emissions come from the consumption of fossil fuels for energy,[120] which is being addressed through efficiency, fuel switching, and additional electrification.[121] And the amount of greenhouse gas emissions from the industrial sector is trending down.[122]

The fourth sector—residential and commercial emissions of greenhouse gases—will also be critical for decarbonization. "To fully decarbonize, we must eventually eliminate carbon emissions from our homes."[123] Unlike the indirect emissions from electricity attributable to this sector—which are trending down—direct emissions have stayed constant for almost the last thirty years.[124] Additionally, unlike vehicles, which have a relatively short life expectancy despite their high initial cost, appliances within homes will take a much longer timeframe to phase out. The average life expectancy of a furnace is between sixteen and twenty years,[125] a stove lasts thirteen to fifteen

seek elimination of the combustion engine to reduce unhealthy air pollution, stave off catastrophic climate change, or both." Madeline June Kass, *The End of the Road for Gas-Powered Automobiles?,* 32 NAT. RESOURCES ENV'T, Spring 2018, at 53.

[119] *Sources of Greenhouse Gas Emissions*, *supra* note 26.

[120] *Id*. at Industry Tab. "Most direct emissions come from the consumption of fossil fuels for energy." *Id*. Direct emissions, rather than indirect, account for approximately 75% of the total emissions from the industrial sector. *Id*. Indirect emissions from the industry sector are produced when fossil fules are burned to make eletricity. *Id*.

[121] *Id*. *See also* Manfred Fischedick et al., *Industry*, *in* CLIMATE CHANGE 2014: MITIGATION OF CLIMATE CHANGE. CONTRIBUTION OF WORKING GROUP III TO THE FIFTH ASSESSMENT REPORT OF THE IPCC (Ottmar Edenhofer et al. eds., 2014), https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter10.pdf [https://perma.cc/96VU-R6MB].

[122] *Sources of Greenhouse Gas Emissions*, *supra* note 26, at Industry Tab.

[123] Robert Walton, *ERCOT Weathers Steamy August, but Could Texas Become a Winter-Peaking System?*, UTIL. DIVE (Oct. 3, 2019), https://www.utilitydive.com/news/ercot-weathers-steamy-august-but-could-texas-become-a-winter-peaking-syste/564218/ [https://perma.cc/53LN-LLFW]. At least one study shows that Texas could electrify household uses of natural gas using existing technology. *Id*.

[124] *Sources of Greenhouse Gas Emissions*, *supra* note 26, at Commercial/Residential Tab.

[125] *When is it Time to Replace Your Oil or Natural Gas Furnace?*, PETRO, https://www.petro.com/heating/is-it-time-for-a-new-furnace [https://perma.cc/HAA2-YJ7E] (last visited Feb. 21, 2020). Research in Europe has also demonstrated that lock-in of natural gas for heating can occur through path dependency, and that "policymakers aiming to decarbonize heating in gas dependent countries should seek to encourage increasing returns to adoption of low carbon heating technologies over an extended

years,[126] a dryer lasts ten to thirteen years,[127] and a water heater lasts eight to twelve years.[128] Hawaii requires new single-family residential construction to have a solar hot water heater unless a variance is approved.[129] That is the only mandate at the state level by any state that proscribes the use of fossil fuels for one of these basic residential functions. California recently adopted an incentive program for heat pump water heaters, but is not mandating their use, despite natural gas and propane being the fuel source for the vast majority of furnaces and hot water heaters in California.[130] New Mexico provides an incentive for thermal solar equipment for hot water.[131] Other locations are attempting to use energy efficiency to reduce fossil fuel use in buildings, but not eliminate it. Maine has proposed changes that include the removal of mid-size natural gas heaters, boilers and warm air heaters from efficiency programs.[132] Still, given the long lives of these assets, if we are going to address decarbonization from the household and commercial sector, we have already almost ensured that it will not happen by 2030.[133]

period of policy implementation" as "network infrastructure, technologies, markets and institutions coevolve," but that other EU countries have been successful in decarbonizing their heating sector. Robert Gross & Richard Hanna, *Path Dependency in Provision of Domestic Heating*, 4 NATURE ENERGY 358 (2019).

[126] Taryn Fiol, *The Life Expectancy of 7 Major Appliances*, H&R BLOCK (Oct. 21, 2013), https://www.hrblock.com/tax-center/lifestyle/how-long-do-appliances-last/ [https://perma.cc/7QYS-U6GQ].

[127] *Id*.

[128] *When to Replace a Water Heater*, LOWES, https://www.lowes.com/n/how-to/when-to-replace-a-water-heater (last visited Feb. 21, 2020).

[129] HAW. REV. STAT. ANN. § 196-6.5(A) (West 2019).

[130] Justin Gerdes, *California Moves to Tackle Another Big Emissions Source: Fossil Fuel Use in Buildings*, GREENTECH MEDIA (Feb. 4, 2020), https://www.greentechmedia.com/articles/read/california-moves-to-tackle-another-big-emissions-source-fossil-fuel-use-in-buildings? [https://perma.cc/M8SJ-HV7W].

[131] Morgan Lee, *New Mexico governor signs solar energy, grid update bills*, ASSOCIATED PRESS (Mar. 4, 2020), https://apnews.com/c99fdab2bae35f3abcc9b7471371e6e8 [https://perma.cc/7932-LZFD].

[132] *Efficiency Maine Trust No. 2018-00321*, ME. PUB. UTIL. COMM'N, https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/CaseMaster.aspx?CaseNumber=2018-00321&FRM=0 [https://perma.cc/RL9J-5C58].

[133] Research with supportive policies in place has demonstrated how difficult retrofitting older housing stock is. Jason Deign, *UK Electrification Strategy Should Emphasize Heating Over EVs, Researcher Says*, GREENTECH MEDIA (July 5, 2019), https://www.greentechmedia.com/articles/read/uk-electrification-strategy-should-emphasize-heating-over-evs? [https://perma.cc/T4BC-BWJX] ("[T]he share of heat pumps in new homes has risen from less than 1 percent in 2000 to 23 percent in 2016,

While the actions by Hawaii and Maine are a good start, we will need much, much more of this type of action.

Scientists are also recognizing that limited continued use of fossil fuels may be necessary in some industrial applications for a longer period of time. "Take, for instance, industrial heat: the extremely high-temperature heat used to make steel and cement. It's not sexy, but it matters."[134] On the positive side, if we solve everything else, those facilities can both pay the necessary price for maintaining the infrastructure supplying them (which will increase per unit as other uses are decreased) and for whatever mechanisms are required by regulators to offset the continued use of emitting fuels.

The challenge, however, is that the actions taken thus far are insufficient to address the scale of the problem that we are facing. And, in reality, states continue to support the use of fossil fuels.

IV. SUPPORT FOR FOSSIL FUEL USES

States continue to support fossil fuel use. Based on the Energy Information Agency's data, "the country's overreliance on natural gas-fired power plants" was the "ultimate culprit" in the country's increased carbon dioxide emissions in 2018, and the possibility exists of "gas capacity potentially doubling over 2017

thanks to a range of policies including a market incentive program for renewable heat and a federal renewable energies heat law. Admittedly, the German market has also shown that retrofitting heat pumps to existing homes could be a challenge. Despite all incentives, only 1.7 percent of old homes in Germany had heat pumps in 2015, up from 0.2 percent in 2005 . . . .").

[134] There are some industries that will need additional research and development to understand how to fully decarbonize. David Roberts, *This Climate Problem is Bigger than Cars and Much Harder to Solve*, VOX (Jan. 31, 2020, 9:32 AM), https://www.vox.com/energy-and-environment/2019/10/10/20904213/climate-change-steel-cement-industrial-heat-hydrogen-ccs/ [https://perma.cc/4D44-NK3G] ("And actually, there are some sectors, some uses of fossil fuels, that we do not yet know how to decarbonize."). This will also be important because, like electricity and natural gas infrastructure, some of these pieces of equipment are designed for exceedingly long lives—most "equipment [is] meant to last between 20 and 50 years. Blast furnaces sometimes make it to 60 years. These are large, long-term capital investments, with relatively low stock turnover." *Id*.

levels."[135] U.S. utilities are "on track to spend roughly $1 trillion on new gas-fired power plants by 2030, including 68 gigawatts of new capacity."[136] One study found that "90% of proposed gas-fired capacity would be more expensive" than meeting those electricity needs through clean energy, and that "US electricity consumers could save US$29 billion (NPV) investing in" clean energy instead of gas-fired generation.[137]

In electricity generation, as one example, Wyoming requires "utilities to put their coal plants up for sale before shutting them down early—so that someone else might keep them going."[138] A draft bill would require utilities to transmit power from that facility over their lines, something not allowed today. Additionally, another Wyoming bill would allow regulators to require transition assistance for any community where a coal plant shuts down—including the cost of lost jobs and taxes, which could add millions to the cost of shutting down a plant.[139] An Indiana bill prevents utilities "from retiring their coal plants early, or even reducing operations, unless explicitly directed by the Trump administration or through proving public

[135] Joseph Daniel, *The Rush to Overbuild Gas-Fired Power*, UNION CONCERNED SCIENTISTS (Jan. 30, 2019, 9:42 AM), https://blog.ucsusa.org/joseph-daniel/rush-to-overbuild-gas-fired-power/ [https://perma.cc/4TU3-FGVB].

[136] Michael O'Boyle, *Utility Investors Risk Billions In Rush To Natural Gas: Is It A Bridge To Climate Breakdown?*, FORBES (Mar. 4, 2020), https://www.forbes.com/sites/energyinnovation/2020/03/04/utility-investors-risk-billions-in-rush-to-natural-gas-is-it-a-bridge-to-climate-breakdown [https://perma.cc/E3DW-7AVG] (noting that new natural gas generation units are an investment risk).

[137] ROCKY MOUNTAIN INST., A BRIDGE BACKWARD?, https://rmi.org/wp-content/uploads/2019/09/clean-energy-portfolio-two-pager.pdf/ [https://perma.cc/T2AW-U8UR]. The Rocky Mountain Institute found that, in addition to the $29 billion financial benefit, it would also reduce carbon dioxide emissions by 100 million tons per year. TEPLIN ET AL., *supra* note 87, at 7.

[138] Cassandra Profita, *PacifiCorp Plan to Move Away from Coal Exposes Deep Divide Among Western States*, OPB (Oct. 9, 2019), https://www.opb.org/news/article/pacificorp-coal-renewable-energy-plan-western-states/ [https://perma.cc/4NQ7-V7VE].

[139] Angus M. Thuermer, Jr., *Chasing Coal Plant Longevity, Bills Open Door to Deregulation*, CASPER STAR TRIB. (Nov. 20, 2019), https://trib.com/business/energy/chasing-coal-plant-longevity-bills-open-door-to-deregulation/article_1f32aa8e-3ff7-53be-b523-5c3dae1cee86.html [https://perma.cc/N85H-WGF7]. Parts of the bill appear to "run afoul" of the Wyoming Constitution by taking private property for public use without just compensation. *Id*.

necessity . . . ."[140] West Virginia is providing a "recomputation" of taxable generating capacity for coal units placed in service before 1995.[141] Farmington, New Mexico, is attempting to require the local coal-fired power plant to install carbon capture and sequestration (CCS) technology to stay operational, even though the utility wants to shut it down.[142] Wisconsin is looking at building new liquid natural gas ("LNG") facilities, part of a utility's "plan to expand [its] regulated natural gas

[140] Catherine Morehouse, *Indiana Bill Would Require Trump Administration or State Regulator Blessing to Retire Coal Plants Early*, UTIL. DIVE (Jan. 16, 2020), https://www.utilitydive.com/news/indiana-bill-would-require-trump-administration-blessing-to-retire-coal-ear/570530/ [https://perma.cc/7STW-TCV7]. The bill passed after "Democratic Senate and House representatives" were removed from the conference committee, and the final version "adds layers to the coal plant retirement process." Catherine Morehouse, *Indiana passes coal plant support bill as Democrats removed from conference committee deliberations*, UTIL. DIVE (Mar. 11, 2020), https://www.utilitydive.com/news/indiana-passes-coal-plant-support-bill-as-democrats-removed-from-conference/573902/ [https://perma.cc/9CZ3-X9WX].

[141] S.B. 793, 2020 Leg., Reg. Sess. (W. Va. 2020) http://www.wvlegislature.gov/Bill_Status/Bills_history.cfm?input=793&year=2020&sessiontype=RS&btype=bill; http://www.wvlegislature.gov/Bill_Text_HTML/2020_SESSIONS/RS/bills/SB793%20SUB1%20ENR.pdf.

[142] Catherine Morehouse, *PNM: Carbon Capture Would Raise San Juan Transition Cost to $6B, as PRC, Legislator Battle Rages*, UTIL. DIVE (Nov. 25, 2019), https://www.utilitydive.com/news/pnm-carbon-capture-would-raise-san-juan-transition-cost-to-6b-as-prc-le/567937/ [https://perma.cc/V7TT-Z4RS] [hereinafter Morehouse, *PNM Carbon Capture*]. According to one review, the company proposing to use CCS "is underestimating the project's cost and overestimating its viability," putting $450 million of investment at risk due to high capacity factor assumptions. Catherine Morehouse, *New Mexico's San Juan Coal Carbon Capture Project Could Put Investors at Risk for $450M: IEEFA*, UTIL. DIVE (Feb. 13, 2020) https://www.utilitydive.com/news/san-juan-carbon-capture-could-put-investors-at-risk-for-450m-ieefa/572234/ [https://perma.cc/HN7A-Q44F] [hereinafter Morehouse, *Investor Risk*]. The PRC did approve PNM's request to shut down the San Juan coal plant and finance the exit through securitization. Catherine Morehouse, *New Mexico Approves PNM Exit from San Juan Coal Plant, but CCS Could Still Save Facility*, UTIL. DIVE (Apr. 2, 2020), https://www.utilitydive.com/news/new-mexico-must-apply-clean-energy-law-to-the-san-juan-coal-retirement-but/571464/ [https://perma.cc/G57S-QJHD] [hereinafter Morehouse, *CCS*]. At least one group has already said that they will appeal that decision. Michael Gerstein, *PRC to decide Wednesday whether PNM can abandon San Juan coal plant*, SANTA FE NEW MEXICAN (Mar. 31, 2020), https://www.santafenewmexican.com/news/local_news/prc-to-decide-wednesday-whether-pnm-can-abandon-san-juan-coal-plant/article_d20371ee-6e01-11ea-b764-c7fde817dbc3.html [https://perma.cc/7LAB-34LK].

infrastructure"[143] and also to allow a new natural gas power plant.[144] Minnesota's Xcel Energy is proposing a new natural gas-fired power plant, even as the utility pledges to be carbon-free by 2050.[145] Even California has proposed extending the life of almost 5 GW of natural gas generation units due to close in 2020.[146] The delay—rather than outright denial, which might be easier to fight—troubles residents who want to move to a carbon-free future.[147] Perhaps worse, the state has created "a loophole for new gas generation as long it was coupled with battery storage."[148] Perhaps more concerning, the California Independent System Operator is requesting state regulators consider possible increases in gas usage.[149] Even utilities that

[143] Matt Kasper, *WEC Energy Files Application for LNG Peaking Facilities; Emails Show Company Discussed Project with PSC Before Filing*, ENERGY AND POL'Y INST. (Nov. 13, 2019), https://www.energyandpolicy.org/wec-energy-files-application-for-lng-peaking-facilities-as-it-increases-gas-investments/ [https://perma.cc/46NK-E28Q].

[144] Chris Hubbuch, *Utility Regulators Approve Controversial $700M Natural Gas Plant in Superior*, WIS. ST. J. (Jan. 17, 2020), https://madison.com/wsj/news/local/environment/utility-regulators-approve-controversial-m-natural-gas-plant-in-superior/article_e1b89994-e9e5-5438-ba51-9e00854b63db.html/ [https://perma.cc/P3ZJ-5QG3].

[145] Kirsti Marohn, *As Xcel moves toward coal-free, will natural gas remain part of energy mix?*, MPR NEWS (Jan. 31, 2020 5:00 AM), https://www.mprnews.org/story/2020/01/31/as-xcel-moves-toward-coalfree-will-fossil-fuels-remain-part-of-energy-mix/ [https://perma.cc/5KML-ULBN]. Current projections are that gas would increase from 13% of Xcel's generation mix in 2020 to 25% in 2034. Greg Stanley, *Plans to Retire Coal Plants in Minnesota Could Rely on Extending Nuclear Power*, STAR TRIB. (Feb. 29, 2020), https://www.startribune.com/plans-to-retire-coal-plants-in-minnesota-could-rely-on-extending-nuclear-power/568347972/ [https://perma.cc/QQ4M-PASY].

[146] Iulia Gheorghiu, *California Proposes Extending 4.8 GW Gas Capacity as Bridge to 3.3 GW of New Clean Energy by 2023*, UTIL. DIVE (Nov. 11, 2019), https://www.utilitydive.com/news/california-proposes-extending-48-gw-gas-capacity-as-bridge-to-33-gw-of-ne/567035/ [https://perma.cc/2SE4-372T].

[147] Sammy Roth, *California Faces a Crossroads on the Path to 100% Clean Energy*, L.A. TIMES (Dec. 12, 2019), https://www.latimes.com/environment/story/2019-12-12/california-clean-energy-gas-plants? [https://perma.cc/2D68-XBSB] ("But clean energy advocates worry a decision to extend the coastal power plants could set a precedent that reverberates for years.").

[148] Gheorghiu, *supra* note 146.

[149] Kavya Balaraman, *CAISO urges CPUC to Consider Increased Interim Natural Gas Needs as Part of Long-term State Transition*, UTIL. DIVE (Mar. 4, 2020), https://www.utilitydive.com/news/caiso-urges-cpuc-to-consider-increased-interim-natural-gas-needs-as-part-of/573418/ [https://perma.cc/QZ4T-Y7UK].

have a stated goal of getting to net zero emissions by 2050 are still adding gas generation.[150]

And, of course, not all states or utilities are interested in decarbonization. For example:

> utilities in the Southeast are taking decades to phase out coal assets while planning significant new fossil-fuel generation additions. If Duke Energy sticks to its current integrated resource plan, it will still rely on coal for 17% of its power capacity in 2033. Natural gas will account for 25% of its capacity—Duke Energy plans on adding 9,534 megawatts (MW) of new gas capacity, compared with just 3,671 MW of solar.[151]

The company has said that it intends to use an "all of the above" strategy until 2050, with natural gas generation "critical to decarbonization" and "the backbone" of their system.[152] "[The Tennessee Valley Authority] also leans heavily on gas in its plan for the next two decades, allowing for up to 17,000 MW of additions."[153] While one unit is closing at a coal plant in northern Arizona, two other units at the plant will continue operating until at least 2025, and another coal plant in the utility's fleet will continue operating through 2032.[154] Customers of Northwestern Energy in Montana are advocating against that utility's plan to run a coal plant through 2042 and build four new

[150] Dan Gearino, *Utilities Have Big Plans to Cut Emissions, But They're Struggling to Shed Fossil Fuels*, INSIDE CLIMATE NEWS (Jan. 6, 2020), https://insideclimatenews.org/news/06012020/xcel-utility-renewable-energy-100-percent-roadmap-2019-year-review-duke-dte-southern-pseg-natural-gas-coal/ [https://perma.cc/CJ9G-EE7E] (discussing utility emissions goals and their procurement of new gas generation).

[151] Michael O'Boyle, *The U.S. Southeast: A Hotspot for Uneconomic Fossil Power, Already Costs Consumers Millions*, FORBES (Oct. 8, 2019), https://www.forbes.com/sites/energyinnovation/2019/10/08/the-us-southeast-a-hotspot-for-uneconomic-fossil-power-already-costs-consumers-millions/#f494a4671be7/ [https://perma.cc/KC2E-KS92].

[152] Catherine Morehouse, *Duke VP Likens Gas Plant Buildout Strategy to 15-Year Home Mortgage on Path to Zero Carbon*, UTIL. DIVE (Oct. 18, 2019), https://www.utilitydive.com/news/duke-vp-likens-gas-plant-buildout-strategy-to-15-year-home-mortgage-on-path/565328/ [https://perma.cc/9EAK-68ML] [hereinafter Morehouse, *Duke*] (including calls to hold the utility accountable).

[153] O'Boyle, *supra* note 151.

[154] Ryan Randazzo, *Arizona Coal Generator to Close in 2020, While Another Given Lifeline as Decline of Plants Across West Continues*, AZCENTRAL (Jan. 7, 2020), https://www.azcentral.com/story/money/business/energy/2020/01/07/pacificorp-close-generator-cholla-power-plant-northern-arizona/2829342001/ [https://perma.cc/U624-HBKL].

natural gas plants,[155] although Northwestern has been successful at having regulators agree to their plans in the past.[156] Utility customers are seeing stranded cost issues with coal plant retirements, and clean energy advocates expect the same conversations around natural gas plants in 10 or 15 years.[157] And one state, Ohio, is actively providing additional subsidies to existing coal-fired facilities.[158]

Another way states continue to support fossil fuels is by allowing their utilities to "self-schedule" coal plants.[159] Without self-scheduling, in just one part of the country between 2015 and 2017, coal-powered generation "would have dropped [by] 10%."[160] Allowing regulated utilities the ability to run uneconomic coal

[155] Eric Tegethoff, *MT Ratepayers Rebel Against Utility Fossil Fuel Investments*, PUB. NEWS SER. (Dec. 9, 2019), https://www.publicnewsservice.org/2019-12-09/energy-policy/mt-ratepayers-rebel-against-utility-fossil-fuel-investments/a68547-1/ [https://perma.cc/3ELX-PCUQ].

[156] *See, e.g.*, Bear Gulch Solar, LLC. v. Mont. Pub. Serv. Comm'n, 356 F. Supp. 3d 1041, 1046 (D. Mont. 2019), *aff'd in part, rev'd in part*, 775 Fed. Appx. 295 (9th Cir. 2019) (Public Utility Regulatory Policies Act ("PURPA") payments).

[157] Morehouse, *Duke*, *supra* note 152.

[158] John Funk, *Ohio Gov DeWine Signs Controversial Nuke Subsidy Bill*, UTIL. DIVE, (July 23, 2019), https://www.utilitydive.com/news/breaking-ohio-passes-controversial-nuke-subsidy-bill-by-one-vote/559342/ [https://perma.cc/BF7L-VJZJ]; Jeff St. John, *Ohio Delays Bill to Bail Out Nuclear and Coal Plants, Gut Renewable Spending*, GREENTECH MEDIA (July 18, 2019), https://www.greentechmedia.com/articles/read/ohio-delays-bill-to-bail-out-nuclear-and-coal-plants-gut-efficiency-and-ren? [https://perma.cc/K66G-PJ2K].

[159] Self-scheduling is the utility practice of operating "units based on their own scheduling rather than relying on market signals to determine when running that plant would be most economic." Catherine Morehouse, *Inefficient Coal Plant Scheduling Cost Ratepayers $3.5B From 2015 to 2017, Report Says*, UTIL. DIVE (Oct. 23, 2019), https://www.utilitydive.com/news/inefficient-coal-plant-scheduling-cost-ratepayers-35b-from-2015-to-2017/565648/ [https://perma.cc/LK87-PY4A]. This practice allows regulated utilities to show a higher capacity factor for a given plant, so "on paper it looks like that plant is needed and should be kept online rather than retired early." *Id*. *See also* JEREMY FISHER, SIERRA CLUB, PLAYING WITH OTHER PEOPLE'S MONEY (2019), https://www.sierraclub.org/sites/www.sierraclub.org/files/Other%20Peoples%20Money%20Non-Economic%20Dispatch%20Paper%20Oct%202019.pdf/ [https://perma.cc/NH5R-7R23] (discussing how regulated utilities use self-scheduling, that this allows plants to run more often, and the lack of transparency which has perpetuated the practice). The practice also distorts energy markets. Joseph Daniel, *Self-Scheduling: How Inflexible Coal is Breaking Energy Markets,* UNION CONCERNED SCIENTISTS (Apr. 24, 2019), https://blog.ucsusa.org/joseph-daniel/inflexible-coal-breaking-energy-markets [https://perma.cc/2VJ9-YXBH].

[160] Morehouse, *Regulator Attempt to Bypass supra* note 159.

plants cost ratepayers over $3.5 billion during that time period.[161] Ratepayers in Arizona could also save around $3.5 billion if utilities were required to retire their coal plants and switch to cheaper non-fossil fuel resources.[162] It also appears that additional savings would be possible in Wisconsin if the practice was stopped and the coal plants shuttered.[163] And self-commitments of uneconomic coal resources in the Southwest Power Pool are leading to lower prices for wind generators.[164]

While some regulators are looking at self-commitments, they are the exception.[165] States are also letting fossil fuel companies either self-bond or not take reclamation actions.[166] This enables

[161] *Id*. A utility has even realized they could do better: Xcel Minnesota has told regulators they will only run coal plants seasonally, which will save it anywhere between $8.5 million and $28.5 million annually on fuel costs. Catherine Morehouse, *Xcel Minnesota: Running Coal Seasonally Will Save Customers Millions, Reduce Emissions*, UTIL. DIVE (Jan. 8, 2020), https://www.utilitydive.com/news/xcel-minnesota-running-coal-seasonally-will-save-customers-millions-reduc/569971/ [https://perma.cc/49KJ-Q429]. *See also* Maya Weber, *Non-Profit Study Sees 'Self-Committed Coal' Distorting MISO Market Signals*, S&P GLOBAL (Nov. 20, 2019), https://www.spglobal.com/platts/en/market-insights/latest-news/coal/112019-non-profit-study-sees-self-committed-coal-distorting-miso-market-signals? [https://perma.cc/2QEV-6D9G].

[162] Robert Walton, *Arizonans Could Save $3.5B With Quicker Coal to Solar+Storage Transition, Report Finds*, UTIL. DIVE (Sept. 18, 2019), https://www.utilitydive.com/news/arizonans-could-save-35b-with-quicker-coal-to-solarstorage-transition-r/563123/ [https://perma.cc/6AG6-DVWW].

[163] Chris Hubbuch, *In Fight Against Coal, Sierra Club Focuses on Economics; Asks if Ratepayers are Paying for Operating Losses*, WIS. ST. J. (July 31, 2019), https://madison.com/wsj/news/local/environment/in-fight-against-coal-sierra-club-focuses-on-economics-asks/article_19b395e5-9277-52ae-8a57-5b2616913d7f.html/ [https://perma.cc/F4EM-SPV9]; Chris Hubbuch, *Sierra Club: Shuttering Coal Plants Could Save Ratepayers $138M a Year*, WIS. ST. J. (Aug. 29, 2019), https://madison.com/news/local/environment/sierra-club-shuttering-coal-plants-could-save-ratepayers-m-a/article_d5f6ca64-c50c-57b3-94f8-06b867cb0dc4.html/ [https://perma.cc/G366-93FD].

[164] Catherine Morehouse, *Self-Committing Coal Suppressing Southwest Power Pool Prices by $2/Mwh, Market Monitor Concludes*, UTIL. DIVE (Dec. 11, 2019), https://www.utilitydive.com/news/self-committing-coal-suppressing-southwest-power-pool-prices-by-2mwh-mar/568828/ [https://perma.cc/MR8H-T27R].

[165] Karen Uhlenhuth, *Missouri Regulators Vow to Keep Closer Eye on Power Plant 'Self-Scheduling'*, ENERGY NEWS NETWORK (Sept. 17, 2019), https://energynews.us/2019/09/17/midwest/missouri-regulators-vow-to-keep-closer-eye-on-power-plant-self-scheduling/ [https://perma.cc/KV5X-FNJ5].

[166] *See, e.g.*, Kiah Collier, *Texas Coal Companies are Leaving Behind Contaminated Land. The State is Letting Them*, TEX. TRIB. (Oct. 30, 2019), https://www.texastribune.org/2019/10/30/how-texas-lets-coal-companies-leave-behind-contaminated-land/ [https://perma.cc/ZY6T-UCAJ] ("Five current and former division staffers . . . told The

fossil fuel companies to side-step environmental regulations, passing these clean-up costs on to taxpayers.

Regarding transportation, while some states have taken action toward electrification, most have not. And, at the other end, some states, like Oklahoma and Pennsylvania, are expressly providing incentives to power vehicles with natural gas.[167] Dominion is also supporting the use of liquified natural gas, compressed natural gas and hydrogen fuels in transportation.[168] The federal government also provides incentives for natural gas-powered vehicles.[169] Globally, "there are more than 400,000 units of natural gas vehicles" on roads today.[170] This compares with more than 272 million vehicles on

Texas Tribune and Grist that both men helped mining companies throughout Texas avoid penalties and minimize their reclamation responsibilities . . . . The Railroad Commission has increasingly allowed companies to do the bare minimum when cleaning up their mining sites, approving a growing number of requests to apply the least stringent restoration standards for their shuttered mines—regardless of whether companies can justify the lower standard.").

[167] OKLA. STAT. ANN. tit. 68, § 2357.22 (West 2019); *Alternative Fuel Rebates for Consumers*, PA. DEP'T ENVTL. PROT., https://www.dep.pa.gov/Citizens/GrantsLoans Rebates/Alternative-Fuels-Incentive-Grant/Pages/Alternative-Fuel-Vehicles.aspx#.Vl9K83arSUk [https://perma.cc/7D9E-2QPP] (last visited Feb. 22, 2020). Pennsylvania also has had questions of political influence around new pipeline permits, including one "that now faces two criminal investigations stemming from widespread environmental and property damage. The 350-mile, $2.5bn Mariner East 2 natural gas liquids pipeline through southern Pennsylvania has sparked growing outrage. It has caused roughly 140 documented industrial waste spills into wetlands and waterways, destroying numerous residential water wells, and opening large sinkholes just steps from residents' homes." Will Parrish, *Pennsylvania Governor Under Scrutiny for Role in Approving Pipeline*, GUARDIAN (Apr. 8, 2019), https://www.theguardian.com/us-news/2019/apr/08/pennsylvania-governor-pipeline-tom-wolf-permits [https://perma.cc/7D9E-2QPP] (last visited Feb. 22, 2020).

[168] Robert Walton, *Dominion Energy sets 2050 net-zero carbon goal, buys Southern's stake in Atlantic Coast Pipeline*, UTIL. DIVE (Feb. 12, 2020), https://www.utilitydive .com/news/dominion-energy-sets-2050-net-zero-carbon-goal-buys-southerns-stake-in-at/572163/ [https://perma.cc/UAU9-3CTV].

[169] *Search Federal and State Laws and Incentives*, U.S. DEP'T ENERGY, https://www.energy.gov/eere/electricvehicles/electric-vehicles-tax-credits-and-other-incentives [https://perma.cc/44SE-G2J2] (last visited Jan. 18, 2020).

[170] *Press Release: Automotive Natural Gas Vehicle Market - 2019 Industry Size, Share, Statistics, Sales, Growth, Trends, Competitive Landscape, With Regional Forecast To 2023*, MARKET WATCH (Jul. 25, 2019), https://www.marketwatch.com/press-release/automotive-natural-gas-vehicle-market---2019-industry-size-share-statistics-sales-growth-trends-competitive-landscape-with-regional-forecast-to-2023-2019-07-25 [https://perma.cc/C4SZ-WQ7V] (last accessed Feb. 22, 2020).

the road in the United States alone as of 2017.[171] While obviously not a large market, continued use of fossil fuels for transportation is against decarbonization goals. Even with the current electricity generation mix, it is better to drive an EV than one powered by fossil fuels.[172]

While these actions are not encouraging, when we look at household and small commercial uses of fossil fuels, the actions by the states are even less hopeful. Very little has been done to address natural gas use in the home—for heating, cooking, hot water, and laundry. Some states have adopted efficiency standards,[173] and states and individual utilities offer rebates.[174] But efficiency standards and rebates for installing more efficient units do not eliminate the use of fossil fuels in the home for these uses, and certainly do not move toward electrification. Therefore, while states have taken some policy actions on electricity generation and transportation, policy on home heating, cooking, laundry, and hot water is severely lacking, and may actually be spurring the use of natural gas instead of electrification.[175]

[171] *Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances*, BUREAU TRANSP. STAT., https://www.bts.gov/content/number-us-aircraft-vehicles-vessels-and-aother-conveyances (last accessed Feb. 18, 2020.

[172] Tom Moloughney, *UCS: Here's Why Electric Cars Are Truly Better for the Environment*, INSIDE EVS (Feb. 13, 2020), https://insideevs.com/news/398551/evs-better-climate-ucs-report/ [https://perma.cc/8EEN-7XR5] (last visited Feb. 22, 2020).

[173] See, e.g., CONN. GEN. STAT. § 16a-48 (d)(j) (2019) (requiring higher AFUE for gas furnaces than federal standard (90% vs. 80%).

[174] *See, e.g.*, *Heating Equipment Rebates*, XCEL ENERGY, https://www.xcelenergy.com /programs_and_rebates/residential_programs_and_rebates/heating_and_cooling/heating_equipment_rebates [https://perma.cc/9Y3Q-SH2U] (last visited Feb. 22, 2020); *Home Heating,* DC SUSTAINABLE ENERGY UTIL., https://www.dcseu.com/homes/home-heating [https://perma.cc/E2UJ-2FUG] (last visited Feb. 22, 2020); N.H. REV. STAT. ANN. § 362-F:10 (VIII) (2019); *Residential Bulk-Fed Wood-Pellet Central Boilers and Furnace Rebate Program,* N.H. PUB. UTIL. COMM'N, http://www.puc.nh.gov/Sustainable%20 Energy/RenewableEnergyRebates-WP.html [https://perma.cc/CT55-KHCT] (last visited Feb. 22, 2020) (providing a rebate for installation of a high efficiency bulk-fed wood pellet boiler or furnace); N.M. STAT. ANN. § 7-2-18.24 (West 2019); N.M. CODE R. § 3.3.32.8 (LexisNexis 2019) (providing tax credits for installation of a geothermal heat pump).

[175] Electrifying all these applications at the residential level will increase electricity load, which will need to be fulfilled by carbon-free sources if the climate benefits are to be realized. And the US is not alone in not having policies for household emissions either: "There are 169 countries, at the national or state/provincial level, that have passed renewable energy targets. . . . '[O]nly 47 countries had targets for renewable heating and cooling, while the number of countries with regulatory policies in the sector fell from 21

Even states and municipalities that are considered leaders of decarbonization have taken insufficient action. Santa Monica, for example, aims to reduce fossil fuel use in buildings by 20% (far from a 100% target),[176] and even New York City's Climate Mobilization Act is focused on energy efficiency, rather than electrifying heating, cooking, laundry, and hot water.[177] The total elimination of fossil fuels for these household uses will be necessary in order to keep climate change from rising above 2°C.

States that are taking action toward deep decarbonization for electricity generation or transportation are still offering incentives for fossil fuel use in residential applications. The District of Columbia offers rebates for gas furnaces,[178] as does New York.[179] Maine provides incentives for gas furnaces[180] and gas hot water heaters.[181] New Jersey offers incentives for gas

to 20.' Fewer than a third of all countries worldwide have mandatory building codes, 'while 60% of the total energy used in buildings in 2018 occurred in jurisdictions that lacked energy efficiency policies.'" David Roberts, *The Global Transition to Clean Energy, Explained in 12 Charts*, VOX (June 26, 2019), https://www.vox.com/energy-and-environment/2019/6/18/18681591/renewable-energy-china-solar-pv-jobs [https://perma.cc/SVM5-QYCC].

[176] Jason Plautz, *Santa Monica, CA Passes $800M Plan to Go Carbon Neutral by 2050*, SMART CITIES DIVE (May 29, 2019), https://www.smartcitiesdive.com/news/santa-monica-ca-passes-800m-plan-to-go-carbon-neutral-by-2050/555693/ [https://perma.cc/C5KY-QLS7].

[177] Chris Teale, *NYC Passes Sweeping 'Climate Mobilization Act'*, SMART CITIES DIVE (Apr. 22, 2019), https://www.smartcitiesdive.com/news/new-york-city-climate-mobilization-act/553134/ [https://perma.cc/6J7T-LRYQ]; Jeff St. John, *New York City Set to Pass Ambitious Energy Efficiency Mandate*, GREENTECH MEDIA (Apr. 18, 2019), https://www.greentechmedia.com/articles/read/new-york-city-set-to-pass-ambitious-building-energy-efficiency-bill#gs.sdecwm [https://perma.cc/27BM-ZGEG] (last accessed Feb. 22, 2020).

[178] DC SUSTAINABLE ENERGY UTIL., *supra* note 174.

[179] *Appliance and Product Rebates*, PSEG LONG ISLAND, https://www.psegliny.com/saveenergyandmoney/energystarrebates [https://perma.cc/JT2S-L4CM] (last visited Feb. 22, 2020); *Upgrade Heating and Cooling Equipment*, CON EDISON, https://www.coned.com/en/save-money/rebates-incentives-tax-credits/rebates-incentives-tax-credits-for-residential-customers/receive-a-rebate-of-up-to-1000 [https://perma.cc/5XTR-KLCN] (last visited Feb. 22, 2020); *Residential Energy Efficiency Incentives*, SAVINGS CENTRAL-CENTRAL HUDSON, http://www.savingscentral.com/rebates/index.htm [https://perma.cc/8XU7-6GKD] (last visited Feb. 22, 2020).

[180] *Heating Solutions*, EFFICIENCY ME., https://www.efficiencymaine.com/heating-solutions/ [https://perma.cc/FT6S-LXEQ] (last visited Feb. 22, 2020).

[181] *Water Heating Solutions*, EFFICIENCY ME., https://www.efficiencymaine.com/at-home/water-heating-solutions/ [https://perma.cc/RL9L-949L] (last visited Feb. 22, 2020).

furnaces, boilers, and hot water heaters.[182] Oregon provides incentives for an even greater number of uses—for gas furnaces, boilers, and heat pumps,[183] and discounts on gas hot water heaters.[184] Rhode Island provides incentives for gas furnaces and boilers.[185] Virginia allows for an income tax deduction for a percentage of gas heat pumps[186] and gas hot water heaters.[187] Oklahoma actually still has some utilities offering incentives to switch from electric to gas cooking equipment.[188]

At best, these pro-fossil fuel incentives create the equivalent of aerodynamic drag in pursuit of policy objectives around decarbonization and electrification. At worst, the incentives could be undermining the policy goals of a state around decarbonization and electrification completely.[189] One way to think about this is the tug-of-war between the Ford F150 and the Tesla Cybertruck.[190] The Cybertruck does still win by pulling the F150 past the original midpoint between them—but it takes

[182] N.J. STAT. ANN. § 48:3-98.1 (West 2019); *WARMAdvantage*, N.J. BOARD PUB. UTIL., http://www.njcleanenergy.com/WARM [https://perma.cc/FM2H-MG2C] (last visited Feb. 22, 2020).

[183] *Heating and Cooling*, ENERGY TRUST OR., https://www.energytrust.org/solutions/heating-and-cooling/ [https://perma.cc/A3TC-SMWB] (last visited Feb. 22, 2020); OR. REV. STAT. ANN. § 757.612 (West 2019).

[184] *Water Heating and Treatment*, ENERGY TRUST OR., https://www.energytrust.org/solutions/water-heating-and-treatment/ [https://perma.cc/Z89D-KDS8] (last visited Feb. 22, 2020).

[185] *Heating Your Home*, NAT'L GRID, https://www.nationalgridus.com/RI-Home/Energy-Saving-Programs/Heating-Your-Home [https://perma.cc/4A3N-QUGP] (last visited Feb. 22, 2020).

[186] VA. CODE ANN. § 58.1-322.03(12)(iii) (West 2019).

[187] *Id.*

[188] *Efficiency Programs and Rebates*, CENTER POINT ENERGY, https://www.centerpointenergy.com/en-us/residential/save-energy-money/efficiency-programs-rebates/?sa=ok [https://perma.cc/3H67-LU5F] (last visited Feb. 22, 2020). *See also Homeowner Program*, OK. NAT. GAS, https://www.oklahomanaturalgas.com/rebate-programs/homeowners [https://perma.cc/B2PQ-DYRX] (last visited Feb. 22, 2020).

[189] One estimate is "that fossil fuel subsidies worth $700 billion are stalling the energy transition. . . . $700 billion is a low estimate because it doesn't account for the related health and environmental costs that are borne by the general public." Wal van Lierop, *Yes, Fossil Fuel Subsidies Are Real, Destructive, And Protected by Lobbying*, FORBES (Dec. 6, 2019), https://www.forbes.com/sites/walvanlierop/2019/12/06/yes-fossil-fuel-subsidies-are-real-destructive-and-protected-by-lobbying/#5f3d13de417e [https://perma.cc/5DSN-R5WW].

[190] Engadget, *Tesla Cybertruck vs. Ford F150: Who Will Win?*, YOUTUBE (Nov. 26, 2019), https://www.youtube.com/watch?v=yo23xYwODdI [https://perma.cc/AG5B-LJ4U] (last visited Feb. 22, 2020).

much more energy to get the Cybertruck plus the F150, which is pulling in the other direction, to that point, and the Cybertruck is slower in reaching its objective than it would be without the F150 attempting to go in the opposite direction. How much faster could the transition be if the energy needed to overcome the drag created by legacy systems didn't exist? That is what states need to focus on—how to release existing incentives that continue to support fossil fuels and, at the same time, create drag toward the policy goals of decarbonization and electrification. As has been noted around power plants, "[i]nvesting in carbon-emitting resources, like gas-fired power plants, diverts funds from cleaner sources of energy like efficiency, wind, and solar."[191] Quite simply, we need those funds for deep decarbonization. The same is true for all the other incentives states offer—every time money is spent on something that does not support decarbonization and electrification, it diverts funds and slows the transition.

V. COORDINATED ACTION

It should, by now, be obvious that states continue to support fossil fuel use—intentionally, unintentionally, for political expediency, or perhaps because it was the right approach to achieve policy objectives a decade ago. Certainly, some states want to continue supporting the fossil fuel industries that exist within their borders. Other state programs, like those that aid with the installation of more efficient natural gas appliances, probably seemed like the correct answer over a decade ago when policy makers talked about natural gas as a "bridge fuel" and there was less understanding of its harm to the climate. "After all, as recently as a few years ago, gas was widely touted as the 'bridge' from a coal-powered past to a clean-energy future. It seemed like a safe bet. But things have changed dramatically in that time, triggering a need to urgently rethink any future investments in gas infrastructure."[192]

[191] Daniel, *supra* note 135.

[192] Bruce Nilles & Mark Dyson, *Rethinking Future Investments in Natural Gas Infrastructure*, GREENTECH MEDIA (Nov. 8, 2019), https://www.greentechmedia.com/articles/read/rethinking-future-investments-in-natural-gas-infrastructure [https://perma.cc/FT5S-33P6].

Being more efficient then was enough. It is not anymore. And yet those programs continue to exist, potentially for multiple reasons: because no one has considered that they make the goal of electrification harder by installing new capital assets with relatively long asset lives; because they are likely popular with constituents; or because there is a belief that the potential local benefits of lower criteria air pollutants outweighs the long-term climate harm.

Transitioning from heat oil boilers to ones fueled by natural gas is another example of short-sighted policy. When there were pipeline constraints around natural gas which potentially stopped conversions, there was an uproar around the stoppage—but that potentially was not the correct question to ask. Rather than asking how to get more natural gas for conversions, the question to ask might have been whether the program needed to evolve into one that focused instead on electrification of those uses. More coordinated action by states—both in the political sphere and by regulatory bodies—is necessary to confront the challenge from climate change, and from our continued support of fossil fuels.

Two recent examples might provide some insight as states work toward implementing their policy objectives, especially as the group typically responsible for actually implementing policy around decarbonization at the state level is the state public utility commission, rather than direct action by the legislature. What has unfolded in New Mexico and South Carolina—and their different outcomes—is instructive.

In New Mexico, the legislature passed the Energy Transition Act in mid-2019. The law "includes provisions for getting the state to 100% carbon-free energy by 2045, as well as applying securitization to help retire the 847-MW coal . . . assets" of the San Juan Generating Station.[193] The coal plant had a remaining

[193] Catherine Morehouse, *New Mexico Regulators Attempt to Bypass San Juan Securitization, to PNM's Surprise*, UTIL. DIVE (July 12, 2019), https://www.utilitydive.com/news/new-mexico-regulators-attempt-to-bypass-san-juan-securitization-to-pnms-s/558641/ [https://perma.cc/B6YG-PSQ8] [hereinafter Morehouse, *Regulator Attempt to Bypass*] (last accessed Feb. 22, 2020). Securitization allows for utilities with stranded assets "to recover the related stranded costs in rates charged to customers and to issue bonds backed by such charges." J. Paul Forrester, *Unstranding "Stranded Cost" Securitizations: New Applications for a Proven Technology*, 14 J. STRUCTURED FIN. 33 (2018).

undepreciated capital asset value of $320 million,[194] which gave the regulated monopoly utility an incentive to continue operating the plant until it was fully depreciated. Recognizing that a different incentive was necessary to speed the transition to decarbonize the electricity sector quickly (or, at least, to get buy-in from the utility that faster decarbonization was better),[195] the legislature mandated securitization, which "will free up around $40 million for worker release and economic development for the San Juan community and will save customers hundreds of millions of dollars."[196] Securitization would allow the utility to recoup its capital investment, even if the plant was shut down before the end of its useful life. That securitization was seen as "one of the keys to transitioning the state's coal-heavy economy toward clean energy sources."[197]

As with many of the policies that deal with our energy system, however, the legislature is not the branch that implements such a policy—that falls to utility regulators, often an independent agency. In New Mexico, that regulatory agency is the Public Regulation Commission (PRC). When the utility filed plans for closing the San Juan Generating Station after the effective date of the Energy Transition Act, everyone assumed the Act would apply. However, the PRC made a different decision, instead putting the question of how much the utility could recover into a docket that had been opened in January, 2019.[198] This action "effectively circumvents" the Act by allowing the PRC to determine the treatment of the utility assets rather than using securitization, which the legislature had prescribed.[199]

[194] Morehouse, *Regulator Attempt to Bypass*, *supra* note 193.

[195] Morehouse, *PNM*, *supra* note 142 ("PNM notes that while its shareholders wouldn't take a loss on their investment through securitization, they wouldn't profit either. 'One of the things we've seen is that vertically integrated utilities that have, like PNM did, a guaranteed revenue source' from unspent capital invested in a coal plant 'there's not a great incentive to close the plant early' even if renewable resources would be a cheaper cost to customers . . . .").

[196] Morehouse, *Regulator Attempt to Bypass*, *supra* note 193.

[197] *Id*.

[198] *Id*. ("The discussion was that 'Well, we'll just take PNM's application, at least related to financing and securitization, and we'll take it out of the new document and put it into the old docket,' . . . And then the old docket predated the ETA, so the ETA won't apply.").

[199] *Id*. ("This is an intentional action by a regulatory agency to disrupt a legislative process, which is inappropriate and not legally sound . . . . My hope is out of this stew we

At least one commissioner of the PRC—an elected position in New Mexico—acknowledges that the Act was "a policy decision by the legislature to resolve the problem of closure costs independent of the PRC."[200] Even with the clear direction of the legislature, the PRC is currently blocking the possibility of securitization, and the matter was heard before the New Mexico Supreme Court.[201] It seems that staff from the PRC wanted the plant to continue operating and burning coal—perhaps with carbon capture and sequestration technology—which the utility has rejected and which would likely cost ratepayers more than the legislatively-mandated securitization.[202]

At the governor's request, the New Mexico Supreme Court determined whether it can "force . . . the commission [to] immediately apply the new law to the PNM case, and to allow PNM to abandon the San Juan Generating Station and recover investments it made in the coal plant."[203] Oral arguments occurred on January 29, 2020.[204] While it was contemplated that the New Mexico Supreme Court would send the case back to the PRC for an order rather than deciding whether they may consider an interlocutory appeal, the decision on whether the

will get the commission and officers to realize it's not their role to undermine a law that has been enacted . . . .").

[200] Catherine Morehouse, *New Mexico Governor Wants to Upend PRC as Regulators Skirt Clean Energy Law*, UTIL. DIVE (Aug. 8, 2019), https://www.utilitydive.com/news/new-mexico-governor-wants-to-upend-prc-as-regulators-skirt-clean-energy-law/560467/ [https://perma.cc/EK6T-XBBX]. Additionally, the governor and legislature are looking to amend the state's constitution, dropping the number of PRC commissioners from five to three and having those members be appointed rather than elected. *Id*. Even more extreme, one state legislator "asked legislative lawyers to begin exploring impeachment" of some of the commissioners. Catherine Morehouse, *New Mexico Senator Moves to Impeach Utility Commissioners as Tensions Rise Over San Juan Closure*, UTIL. DIVE (Aug. 16, 2019), https://www.utilitydive.com/news/new-mexico-senator-moves-to-impeach-utility-commissioners-as-tensions-rise/561043/ [https://perma.cc/K358-M7JM].

[201] Michael Gerstein, *High Court to Hear Oral Arguments in Energy Law Case*, SANTA FE NEW MEXICAN (Jan. 16, 2020), https://www.santafenewmexican.com/news/local_news/high-court-to-hear-oral-arguments-in-energy-law-case/article_48b880aa-38b4-11ea-a7b8-6b3aa9dbb98f.html [https://perma.cc/KCT2-9LKN].

[202] Morehouse, *CCS*, *supra* note 142 (discussing how CCS would add $1.3 billion over the utility's preferred closure scenario and other issues with CCS). *See also* Catherine Morehouse, *Can Carbon Capture Save the San Juan Coal Plant?*, UTIL. DIVE (Nov. 21, 2019), https://www.utilitydive.com/news/can-carbon-capture-save-the-san-juan-coal-plant/567678/ [https://perma.cc/J9QS-E9YT].

[203] Gerstein, *supra* note 201.

[204] *Id*.

legislative policy goals adopted will be put into effect could linger, leading to more uncertainty and drag.[205] Instead, the New Mexico Supreme Court ruled that the clean energy law will apply to the retirement of the plant.[206] According to the utility examiners assigned to the case, hearings have demonstrated that abandonment using the securitization provisions in the Act will cost ratepayers less, and recommended the PRC approve PNM's plan.[207] New Mexico regulators agreed to apply the Act and approved PNM's request.[208]

South Carolina has been going through a similarly fraught transition with regards to the addition of more utility-scale solar to the state, as opposed to the retirement of coal resources. The South Carolina Energy Freedom Act, passed in May 2019,[209] "was supposed to help renewable energy expand in South Carolina," according to one of the bill's sponsors.[210] However, the rate paid by the large investor-owned utilities in the state to solar developers (termed the "avoided cost") is determined by the South Carolina Public Service Commission (PSC), which also sets the terms of standard contracts between the investor-owned utilities and solar companies. The "PSC voted against rates sought by solar companies that do business with utilities and against long-term contracts sun energy companies say they need

[205] Edward Klump, *Utility Braces for Return to Court Over N.M. Plant Closure*, ENERGYWIRE (Nov. 5, 2019), https://www.eenews.net/stories/1061464707 [https://perma.cc/8MCK-HGFZ].

[206] Catherine Morehouse, *New Mexico Must Apply Clean Energy Law to the San Juan Coal Retirement, but CCS Could Still Save Plant,* UTIL. DRIVE (Jan. 31, 2020), https://www.utilitydive.com/news/new-mexico-must-apply-clean-energy-law-to-the-san-juan-coal-retirement-but/571464/ [https://perma.cc/7QWF-DZQD]. *See also* Susan Montoya Bryan, *New Mexico Supreme Court: New Law Applies to Energy Case*, POWERGRID INT'L (Jan. 20, 2020), https://www.power-grid.com/2020/01/29/new-mexico-supreme-court-new-law-applies-to-energy-case/#gref [https://perma.cc/TV6Q-P328].

[207] *New Mexico Utility Examiners Recommend Closing Energy Plant*, ASSOCIATED PRESS (Feb. 25, 2020), https://apnews.com/28b3822c7e5b87a741e1a49a6d576fef [https://perma.cc/GQ3S-RRFV].

[208] Morehouse, *CCS*, *supra* note 142.

[209] S.C. Energy Freedom Act, 2019 S.C. Acts H. 3659.

[210] Sammy Fretwell, *When Solar Power Took a Hit From the PSC, People Got Mad. Now Many Want Changes*, STATE (Dec. 11, 2019), https://www.thestate.com/news/local/environment/article238243329.html [https://perma.cc/95FF-YMMG] ("'The PSC did exactly the opposite of what every elected official in the state wanted to have done,' said Ballentine, a Republican from the Chapin area. 'We sure as heck didn't want it to go backwards.'").

to survive in South Carolina. The PSC's decision granted shorter-term contracts and rates more favorable to Dominion Energy and Duke Energy, utilities that serve most of the state."[211]

In South Carolina, unlike in New Mexico, commissioners must be voted on by the state legislature. With four seats that will need to be filled—either with two PSC commissioners seeking to be reappointed[212] or new candidates—the legislature might be able to take more immediate action.[213] As the decision was "widely criticized" including by "lawmakers who passed legislation last year to expand solar power in the state," it seems that the PSC commissioners took note.[214] Based on a request for reconsideration from an intervenor,[215] the PSC announced a change in course, agreeing unanimously that an investor-owned utility "should pay solar farm developers more for the power they produce than the commission had approved" previously.[216] The rate almost doubled, with commissioners noting "more information" that swayed them between the two rulings.[217] Whether other contract terms, such as duration, will also be changed is still to be decided.[218]

Similarities between the situations in New Mexico and South Carolina include a legislature making specific policy decisions around energy transition, and a regulatory body which was at least initially not open and receptive to that policy direction. However, the current implementation state of the legislative goals is vastly different. One is implemented but with continued talk of structural change for the regulatory body by the legislature and executive branches, whereas the other has been

[211] *Id*.

[212] Andrew Brown, *SC Utility Regulators Reverse Course in Case Between Dominion and Solar Developers*, POST & COURIER (Jan. 3, 2020), https://www.postandcourier.com/business/sc-utility-regulators-reverse-course-in-case-between-dominion-and/article_64a1f44a-2e55-11ea-a648-5701b68a5f53.html [https://perma.cc/PM3T-ENXN].

[213] Fretwell, *supra* note 210.

[214] Brown, *supra* note 212 ("[T]he utility regulators have recognized the public outcry their earlier decisions raised, especially among state lawmakers.").

[215] *Id*.

[216] Sammy Fretwell, *Will Solar Ruling Cause SC Power Bills to Rise? It Sure Looks That Way, Utility Says*, STATE (Jan. 4, 2020), https://www.thestate.com/news/local/environment/article238946483.html.

[217] *Id*.

[218] *Id*.

implemented such that it will start to bring about the goals envisioned by those who passed it. The nature of how regulators are chosen—elected versus appointed—and the fact that so many of the South Carolina commissioner seats are up for approval this year may have provided the necessary impetus for the South Carolina PSC to reexamine its ruling in the face of criticism, where the New Mexico PRC has been unwilling to do so in a similar situation. If so, the issue is mostly a political challenge that would need a political solution, such as an increased focus on commissioner elections or, as the governor of New Mexico has suggested, changes in the body itself.[219]

Whatever the specific reason for the divergence in regulatory behavior, this difference in implementation outcomes demonstrates again that, in order to move toward decarbonization and electrification, work must be done to minimize friction that can slow the transition. Whether that friction is created by regulatory bodies which are unwilling to take policy direction from elected legislatures, or by incentives which continue to support uses of fossil fuels, any energy and capital expended on this friction would be better spent on the transition away from carbon. Imagine what could happen if the energy system were freed from that excess weight.

If, as is likely the case with many of the incentives mentioned, the mismatch between incentives and policy objectives is unintentional—the situation is simply that new policy objectives have been adopted without fully understanding everywhere that old ones might still be operational—then the fix is not a political one, but rather a focus on detailed review. When a new policy objective, like a 100% carbon-free target, is passed by a state legislature, it should require a detailed review of all incentives and programs that are in any way paid for by the state (rebates, state funding, state buildings, etc.). The review should ensure that the state programs are in complete compliance with the decarbonization policy. Following this review, legislatures and regulators should take steps to stop programs that, for example,

[219] I do not take a position on whether, in general, any particular method of selection (election, appointment or appointment with legislative approval) would suggest regulators take action most in line with legislative direction or in the public interest. I am merely pointing out a difference that existed between these two cases.

incentivize the use of natural gas appliances, even more efficient ones.

This will become even more pressing, but the shape of the challenge will change based on political decisions. Major Democratic candidates running for president have energy efficiency plans that they have put forward.[220] Should one of them be elected, the specific implementation plans, based on state programs discussed in this piece, could include fossil fuel appliances. That would be a mistake, and would create further carbon lock-in. Instead, the focus should be on ensuring any appliances purchased or funded through the program are electric. House Democrats are also outlining a vision for net-zero carbon emissions by 2050, which could be beneficial—but right now includes "greater reliance on natural gas," which, again, would be the wrong direction.[221]

If, on the other hand, we continue to see a dearth of leadership on decarbonization at the federal level, then state actors—governors and legislatures—will need to continue to lead on decarbonization efforts,[222] and to ensure that those regulators tasked with implementation are pulling toward the same goals. Alignment will be key.

We also cannot expect utilities to act altruistically and design programs that are the most beneficial for decarbonization and electrification efforts. Utilities played "an outsized role in paving the way" for energy efficiency programs; "utilities have helped to bring down the cost of energy efficient products and services for consumers and businesses through the rebates and incentives provided through highly regulated demand-side management programs."[223] However, gas utilities will want to

[220] Mark K. Matthews, *Cutting Carbon in Homes: 'It is a Head Change for People'*, CLIMATE WIRE (Nov. 15, 2019), https://www.eenews.net/climatewire/stories/1061551849 [https://perma.cc/CG3P-GZU9].

[221] Rebecca Beitsch, *Democrats Outline Sweeping Legislation to Make U.S. Carbon Neutral by 2050*, HILL (Jan. 8, 2020), https://thehill.com/policy/energy-environment/477435-dems-outline-sweeping-legislation-to-make-us-carbon-neutral-by-2050 [https://perma.cc/M5GM-KBX5].

[222] Julia Pyper, *Tracking Progress on 100% Clean Energy Targets*, GREETECH MEDIA (Nov. 12, 2019), https://www.greentechmedia.com/articles/read/tracking-progress-on-100-clean-energy-targets [https://perma.cc/C4HG-T3NA].

[223] Michael Mernick, *These Trends are Defining the Future of Energy Efficiency: Here's How Utilities Can Prepare*, UTIL. DIVE (Oct. 8, 2019) https://www.utilitydive.com

continue to incentivize customers to purchase appliances that will extend the reliance on their infrastructure and lead to higher transition costs.

Of course, a switch to electrification to decarbonize parts of our economy will require a build out of even more carbon-free electric generation, which will lead to other challenges. A recent Brattle study described a "high electrification" case, which assumed electrification of "all transportation and space and water heating needs by 2050" and found that significant transmission investments would be needed over the next several decades.[224] For New England Brattle determined that:

> if the region engaged in a mass switch from fossil fuel sources to electricity[, d]emand for electricity would roughly double by 2050, despite efficiency measures. This increase in demand is similar to that of the U.S. as a whole, if it were to follow a similar path, the consultancy said. To supply that power, about four to eight times more renewables than what is currently planned for the region would need to come online annually across the 2020s.[225]

A Wood Mackenzie report found that:

> renewables growth is well ahead of electrification trends but, in time, the two will converge. This is the 'point of singularity', when the world rings out the old and rings in the new. . . . We think this point of singularity will happen by 2035, less than 20 years away."[226]

/news/these-trends-are-defining-the-future-of-energy-efficiency-heres-how-utili/564505/ [https://perma.cc/ALT5-BB58].

[224] Robert Walton, *Brattle: Electrification Could Drive $600B in Transmission Spending by 2050*, UTIL. DIVE (Mar. 7, 2019), https://www.utilitydive.com/news/brattle-electrification-could-drive-600b-in-transmission-spending-by-2050/550010/ [https://perma.cc/7DKE-PMEN].

[225] Energywire, *Study: Northeast clean energy plans inadequate to meet climate goals*, ENERGY NEWS NETWORK (Oct. 8, 2019), https://energynews.us/2019/10/08/northeast/study-northeast-clean-energy-plans-inadequate-for-climate-goals/ [https://perma.cc/YGV8-AJNU].

[226] *Thinking Global Energy Transitions: The What, if, How and When,* WOOD MACKENZIE (Oct. 17, 2018), https://www.woodmac.com/reports/macroeconomics-risks-and-global-trends-thinking-global-energy-transitions-the-what-if-how-and-when-23699 [https://perma.cc/JNN8-GQXS].

However, should there be political will to transition to renewables faster, one estimate is that it will cost $4.5 trillion to transition the US to 100% renewables by 2030.[227] The $4.5 trillion also "doesn't even include the stranded cost of the oil, gas and coal industries that would be disrupted by 100% renewables . . . ."[228] The price goes down by $500 billion if we keep nuclear in the mix.[229]

VI. CONCLUSION

By not addressing state-based incentives for continued development of fossil fuel infrastructure, in the words of Professor Sam Kalen, "we lack the institutional willingness to avoid yet another folly. Consequently, our new natural gas infrastructure could become either a shackle retarding a zero-carbon energy future by 2050 or a bridge to nowhere."[230]

Unfortunately, without all levels of government doing more, the world is likely due for a 3°C warming planet, far from the goal of 1.5°C. One consultancy "ascribe[s] a very low degree of confidence that 2 degrees can be achieved due to the challenges across technology, policy, regulation and cost; intergovernmental constraints; trade and consumer choice; and what is built into the current energy systems of today."[231] Some reasons for this pessimism are that the "lack of proper incentives and regulations is resulting in each asset class operating independently to maximize its returns" and that "decarboni[z]ation is only slowly taking hold beyond the power sector."[232]

[227] Iulia Gheorghiu, *Transitioning US to 100% Renewables by 2030 will Cost $4.5 Trillion: Wood Mackenzie*, UTIL. DIVE (July 1, 2019), https://www.utilitydive.com/news/transitioning-us-to-100-renewables-by-2030-will-cost-rate-payers-45t-wo/557832/ [https://perma.cc/2AY5-EE8F].

[228] *Id.*

[229] Chloe Holden, *The Price of a Fully Renewable US Grid: $4.5 Trillion*, GREENTECH MEDIA (June 28, 2019), https://www.greentechmedia.com/articles/read/renewable-us-grid-for-4-5-trillion? [https://perma.cc/3EAS-B5KC].

[230] Sam Kalen, *A Bridge to Nowhere?: Our Energy Transition and the Natural Gas Pipeline Wars*, MICH. J. ENVTL. & ADMIN. L. 7–8 (forthcoming).

[231] Jonny Sultoon et al., *Energy Transition Outlook 2019*, WOOD MACKENZIE (Aug. 2019), https://www.eto.think.woodmac.com/ [https://perma.cc/8DFY-KSZW].

[232] *Id.*

To change this result, we must coordinate the incentives available at all levels to focus on electrification—and to ensure this focus encourages electrification of all sectors. As demonstrated in this Article, neither the federal government nor any state has taken sufficient decarbonization action. As electricity generation, transportation, industrial, and household uses demonstrate, states continue to support fossil fuel use—intentionally, unintentionally, for political expediency, or perhaps because it was the right approach to achieve policy objectives a decade ago. That must stop. More coordinated action by states—both in the political sphere and by regulatory bodies—is necessary to confront the challenge of climate change. This intentional, coordinated action will lessen the drag in the system and allow for the financial and political capital to implement the necessary change to achieve deep decarbonization more quickly. No state has fully unlocked the potential of aligning incentives around decarbonization and electrification. Only by properly aligning incentives that do precisely that to maximize overall health and wellbeing of our climate will we be able to ensure a livable future.