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# CARROTS, STICKS, AND THE EVOLUTION OF U.S. CLIMATE POLICY

*by: Brian Murray & Jonas Monast**

*The Inflation Reduction Act (IRA), enacted by Congress in 2022, is the most significant federal investment in decarbonization in U.S. history. The law makes hundreds of billions of dollars available for clean energy tax credits, grants to state and local governments, and other financial incentives for public and private investments. The IRA's focus on incentives, or "carrots," marks a significant departure from the emphasis on prescriptive regulations and penalties, or "sticks," that are prominent in federal and state climate policies that predate the IRA. This Article situates the IRA within the existing climate policy framework and explores the long-term impacts of the new law.*

*The Article begins with an overview of regulations and tax incentives to reduce greenhouse gas emissions leading up to 2007. The Article then discusses the emphasis on pricing carbon through federal Cap-and-Trade legislation from 2003 to 2011, and the return to prescriptive regulation under the Clean Air Act when those federal bills failed. The Article contrasts these efforts with the positive financial incentives included in the IRA, tracking the evolution of the bill and the political and economic circumstances that created the policy window for Congress to pass such an impactful law. The Article concludes with a discussion of the lasting impacts of the IRA and the interplay between the existing policy instruments.*

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## I. Introduction

In August 2022, the United States Congress adopted the most sweeping package of decarbonization policies in the nation's history. The Inflation Reduction Act ("IRA") provided significant monetary incentives for the development and deployment of low-carbon energy technologies and infrastructure.[1] Early estimates suggest that with the IRA, U.S. greenhouse gas ("GHG") emissions could decline by as much as 42% compared to 2005 levels, helping the nation achieve its emission reduction commitments under the Paris Agreement of 50%–52% below 2005 levels by 2030.[2]

To draw upon an old colloquialism, the sheer size and scope of the IRA, which followed another bill with significant climate-related expenditures [the Infrastructure Investment and Jobs Act ("IIJA")[3]] begs the question of whether U.S. climate policy[4] has moved from an emphasis on restrictions and penalties (sticks) to one focused on positive financial incentives such as tax credits and other government payments (carrots)?[5] The IRA, in particular, is a significant piece of climate

1. Inflation Reduction Act of 2022, Pub. L. No. 117-169, § 60503, 136 Stat. 1818, 2083.

2. John Larsen et al., A Turning Point for US Climate Progress: Assessing the Climate and Clean Energy Provisions in the Inflation Reduction Act 1 (2022), https://rhg.com/research/climate-clean-energy-inflation-reduction-act/ [https://perma.cc/4TBS-WGJT] (comparing the reductions with the IRA to business-as-usual emission reductions of 24%–35% without the IRA).

3. Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021).

4. Climate policy can include two distinct issues: (1) adaptation, which refers to efforts to respond to climate risks in ways that reduce their harms to the environment and society (e.g., by building seawalls against sea-level rise) and (2) mitigation, which refers to the efforts to reduce climate risks by reducing GHG concentrations in the atmosphere through the deployment of technologies and practices that reduce GHG emissions, such as substituting solar or wind power for coal or natural gas in electricity generation. This policy dichotomy roughly follows the taxonomy laid out by working groups of the Intergovernmental Panel on Climate Change, wherein Working Group I explores the underlying science of climate change, Working Group II looks at the impacts of climate change and *adaptation* to it, and Working Group III addresses *mitigation* of climate change through emission reductions and enhancement of carbon sinks. This Article focuses on mitigation policy, specifically GHG emission reductions, where most of the emphasis has been in the U.S. and across the world. *Working Groups and Task Force*, Intergovernmental Panel on Climate Change, https://www.ipcc.ch/ [https://perma.cc/WE9R-XPY5]. As such, whenever we use the term "climate policy" in this Article, it refers to emission mitigation efforts.

5. We are not the first to suggest U.S. climate policy as a contrast of carrot and stick approaches. Indeed, an Article in this journal in 2018 highlights the relative durability of carrots (incentives) over sticks (regulatory mandates) in U.S. climate policy. Jason

legislation that provides tax credits for renewable energy technologies, carbon capture and storage, green hydrogen production, electric vehicles, and other clean energy technologies.[6] This reliance on financial support mechanisms marks a departure from a previous emphasis on carbon pricing and Clean Air Act regulations as primary federal policies to reduce emissions.

While this recent legislation signifies a shift towards positive financial incentives like tax credits and government payments, we argue for a nuanced view that acknowledges the use of a variety of policy instruments, including both incentives and requirements, to support decarbonization. These policies are not the final steps, considering the long-term goal of achieving net-zero emissions. However, once implemented, they create a path dependency that influences future options and their effectiveness.

These legislative actions reflect the Biden Administration's commitment to meeting its stated climate goals, as it worked with Congress to pass the IIJA in 2021 and the IRA in 2022. In 2023, the Administration proposed new rules for power plants under the Clean Air Act,[7] aimed at being ambitious yet responsive to a U.S. Supreme Court decision that limited Environmental Protection Agency ("EPA") authority over GHG emissions (*West Virginia v. EPA*[8]).

While the IRA represents progress towards a mid-century net-zero goal, additional action will be necessary to fully achieve it. The IRA and Clean Air Act demonstrate how different incentives interact, with prescriptive regulation incentivizing investments by imposing compliance costs and payments, shifting some costs to the public. These policies not only increase investment but also influence administrative rulemaking and shape future policies.

This Article situates the new federal laws within this existing climate policy framework to show how policy pieces might fit together in pursuit of broader decarbonization goals. Part II summarizes the key policy instruments that have emerged over the roughly thirty years of U.S. climate policy, describing the general characteristics and history of each. Part III explores the policy window that resulted in the IRA

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S. Johnston, *Regulatory Carrots and Sticks in Climate Policy: Some Political Economic Observations*, 6 Tex. A&M L. Rev. 107, 108 (2018), https://doi.org/10.37419/LR.V6.I1.5. We build on those concepts here by incorporating lessons from the most significant "carrots" approach in U.S. climate policy history, The Inflation Reduction Act of 2022, and by emphasizing the interrelation between these two approaches and the sequential nature of policy development that incorporates both positive monetary incentives and regulatory mandates over time.

6. Inflation Reduction Act of 2022 §§ 13101, 13104, 13401.

7. New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 Fed. Reg. 33240 (May 23, 2023) (to be codified at 40 C.F.R. pt. 60).

8. West Virginia v. Env't Prot. Agency, 142 S. Ct. 2587, 2601 (2022).

as a payments-based form of policy. Part IV explores the interactions between the carrots and sticks approaches, describing them as a form of adaptive policy sequencing. Part V concludes with brief reflections on the evolution of U.S. climate policy to this point and how it might influence future policy directions.

## II. Climate Policy Instrument Choice in the U.S. from the 1990s Through the 2010s: Key Milestones

U.S. climate policy does not have a fixed start date, but the early-mid 1990s was an emergent era globally via the formation of the UN Framework Convention on Climate Change ("UNFCCC") to address anthropogenic climate risks.[9] During this period, the Clinton Administration released a U.S. Climate Action Plan to return to 1990 GHG emissions levels by 2000,[10] and the federal government, some states, and non-government actors began to develop policies to address climate change.

From this starting point, the U.S. Congress and state legislatures have relied on a range of policy instruments to reduce GHG emissions and spur adoption of low- or zero-emitting energy technologies. These approaches include prescriptive regulations, primarily through the Clean Air Act, pricing pollution via a carbon market or carbon tax, tax credits, and other pecuniary rewards (or subsidies) for investing in clean energy technologies and other positive environmental behaviors. They also include persuasion by issuing government reports on the economic benefits of adopting low-carbon technologies or requirements that firms report their GHG emissions for all to see.[11]

Many of the early policy efforts encouraged investment in clean energy technologies, a critical element of reducing greenhouse gas emissions. However, they were not designed specifically to address climate change, particularly in earlier years, and their impact was not measured in tons of reduced GHGs (a common metric for evaluating climate policy impacts). Instead, they were often aimed at reducing local and regional air pollutants that are harmful to public health or achieving other goals such as energy independence or economic development.[12] Roughly around 2007, this changed as Congress began serious consideration of "cap-and-trade" legislation to limit the emissions of GHGs

9. United Nations Framework Convention on Climate Change art. 2, May 9, 1992, 1771 U.N.T.S. 107.

10. William J. Clinton & Albert Gore, Jr., The Climate Change Action Plan (1993).

11. This framework borrows from Professor James Salzman's "5 P's" of environmental policy instrument choice. *See* James Salzman, *Teaching Policy Instrument Choice in Environmental Law: The Five P's*, 23 Duke Env't L. & Pol'y F. 363, 364 (2013).

12. *See generally* Energy Policy Act of 2005, Pub. L. No. 109-58, §§ 252, 1234, 119 Stat. 594, 595, 601.

(described further below),[13] and the U.S. Supreme Court affirmed that the Clean Air Act applies to GHG emissions.[14]

### A. *Prescriptive Regulation and Tax Incentives Pre-2007*

When national climate policy interest emerged in the 1990s, the existing toolkit for emission reductions was fairly limited and indirect. One lever was the Corporate Average Fuel Economy ("CAFE") Standards, which were first established by Congress in 1975 in response to the 1973 Arab oil embargo.[15] Under CAFE, each automaker has to meet an average fuel efficiency standard (in miles per gallon, or "mpg") across its entire fleet of light-, medium-, and heavy-duty vehicles.[16] The CAFE standards are not emissions standards per se, and they certainly were not enacted as GHG reduction policy, but transportation GHG emissions come from fuel combustion, and thus, as a first-order effect, higher fuel efficiency reduces fuel use, combustion, and emissions.[17]

Another lever was the Renewable Fuels Standard ("RFS"), created in 2005 and expanded in 2007.[18] The RFS requires a certain volume of qualifying renewable fuel to replace or reduce petroleum-based fuels used in ground transportation, aviation, or heating.[19] Similar to CAFE standards, the RFS is not a GHG emissions standard or primarily targeted at climate mitigation policy (national energy security was a key goal), yet the substitution of renewable fuels like ethanol for fossil fuels such as petroleum can lower the net emissions profile of the fuels under some circumstances.[20]

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13. *See America's Climate Securities Act of 2007: Hearing on S. 2191 Before the S. Comm. On Env't and Pub. Works*, 110th Cong. 3 (2007).

14. Massachusetts v. Env't Prot. Agency, 549 U.S. 497, 528 (2007).

15. Energy Policy and Conservation Act, Pub L. No. 94-163, § 502, 89 Stat. 871, 902 (1975).

16. *Id.*

17. As a second order effect, greater fuel efficiency can lead to more driving, thereby undercutting emission reductions via this "rebound effect." Therein lies an efficiency problem with using performance standards rather than absolute limits on emissions. *An Examination of the Rebound Effect of CAFE Standards*, EPA (Apr. 28, 2023), https://cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/display.abstractDetail/abstract_id/8223/report/0 [https://perma.cc/V9CF-SQC5].

18. The RFS program was established by the Energy Policy Act of 2005, which amended the Clean Air Act (CAA). In 2007, the Energy Independence and Security Act of 2007 (EISA) further amended the CAA and expanded the RFS program by raising the volumetric goals and extending the timeline. *Overview for Renewable Fuel Standard*, EPA (Feb. 10, 2023), https://www.epa.gov/renewable-fuel-standard-program/overview-renewable-fuel-standard [https://perma.cc/TDY4-6JYZ].

19. *Id.*

20. This is a hotly debated topic. In principle, biofuel emissions are "recycled' $CO_2$, as they release $CO_2$ that was captured in the growing of the plant from which the biofuel was produced rather than released from carbon buried as fossil fuels for millions of years. But accounting for emissions from land use change to increase feedstock production has a countervailing effect that can substantially reduce or even negate the emission

Other indirect GHG mitigation policies have included federal tax credits for investment and deployment of renewable energy technologies such as wind and solar electricity generation.[21] While they have helped kick-start low-carbon technologies at the early high-cost stages, the scope and scale of impact on emissions have been somewhat limited, in part because of their interaction with existing mandates (e.g., renewable portfolio standards in 30 states and federal renewable fuels mandates).[22]

In addition to being indirect forms of control, CAFE and RFS rules primarily affect transportation emissions, yet most emissions in aggregate come from stationary sources such as power plants, manufacturing facilities, and commercial and residential buildings.[23] It was ambiguous during this time period whether existing environmental statutes such as the Clean Air Act ("CAA")[24] gave the federal government the authority to directly regulate GHGs. In 1998, the EPA's general counsel issued a legal opinion concluding that the Clean Air Act authorized the EPA to control carbon dioxide ("$CO_2$") emissions.[25] The Clinton administration did not act on this authority, and the EPA under the George W. Bush administration reversed course.[26] The U.S. Supreme Court resolved the issue in its 2007 decision in *Massachusetts v. EPA* when it held that the term "pollutant" in Title II of the Clean Air Act applies to $CO_2$ and other greenhouse gases, requiring the EPA to determine whether the emissions endanger public health and whether emissions from vehicle tailpipes specifically "cause and contribute" to that endangerment.[27] This set the stage for subsequent regulatory actions discussed in Part II.B.

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reduction benefits. *See* A. Mosnier et al., *Alternative U.S. Biofuel Mandates and Global GHG Emissions: The Role of Land Use Change, Crop Management and Yield Growth*, 57 Energy Pol'y 602, 602–03 (2013), https://doi.org/10.1016/j.enpol.2013.02.035.

21. Lynn J. Cunningham & Claire M. Jordan, Cong. Rsch. Serv., R40913, Renewable Energy and Energy Efficiency Incentives: A Summary of Federal Programs (2023), https://crsreports.congress.gov/product/pdf/R/R40913.

22. Brian C. Murray et al., *How Effective are US Renewable Energy Subsidies in Cutting Greenhouse Gases?*, 104 Am. Econ. Rev. 569, 570, 573 (2014), https://doi.org/10.1257/aer.104.5.569 (showing that the emissions reduction benefits of renewable electricity tax credits and biofuel subsidies in place in the early 2010s were fairly limited. Reasons for the limited effect include the redundancy with other policies, such as state renewable portfolio standards, federal renewable fuels standards, and interaction with fossil fuel markets).

23. S*ources of Greenhouse Gas Emissions*, EPA (Aug. 25, 2023), https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions [https://perma.cc/8MFL-SDBV].

24. 42 U.S.C. § 7401.

25. Memorandum from Jonathan Z. Cannon, Off. of Gen. Couns., EPA, to Carol M. Browner, Adm'r, EPA (Apr. 10, 1998), https://biotech.law.lsu.edu/blog/EPA-Cannon-memo-1998.pdf [https://perma.cc/52FF-BHG2].

26. Control of Emissions from New Highway Vehicles and Engines, 68 Fed. Reg. 52922 (Sept. 8, 2003) (denying petition for EPA to regulate carbon dioxide emissions).

27. Massachusetts v. Env't Prot. Agency, 549 U.S. 497, 528–29, 534–35 (2007).

### B. *Carbon Pricing: Cap-and-Trade Bills of 2003–11*

Without clarity on the scope and scale of existing statutory authority, efforts to develop new federal legislation to price carbon via a "cap-and-trade" system became the centerpiece of federal climate policy just after the turn of the 21st century.[28] The main advantages attributed to carbon pricing are that it provides a continuous economic incentive to reduce emissions, forces emitters to internalize costs that would otherwise be borne by society, and gives regulated emitters flexibility to determine the most cost-effective ways to comply with the regulation.[29]

As the name suggests, cap-and-trade has two fundamental components. First is a cap on the emissions from regulated entities.[30] The cap is enforced by emissions monitoring and a requirement that each regulated source has enough government-issued emission permits (allowances) to match the quantity of its monitored emissions.[31] The total number of government-issued allowances equals the aggregate size of the cap.[32]

On the first point, some confusion can arise when these cap-and-trade programs are described as "market-based"—as if reducing emissions were not required but voluntary if an emitting party chooses to enter the market. Those types of markets do exist, but the bills referenced here have regulatory mandates.[33] The market-based nature of cap-and-trade arises because the fixed set of allowances can be traded among regulated sources.[34] If Plant A needs more allowances to match its monitored emissions, it can procure allowances from another source (Plant B) that has more allowances than needed to match its emissions. These allowances have economic value (emitters who hold them can avoid incurring costs to reduce the corresponding unit of emissions), and thus, the trade will be for a price ($/ton) paid by the buyer to the seller.[35]

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28. Ann E. Carlson, *Designing Effective Climate Policy: Cap-and-Trade and Complementary Policies*, 49 HARV. J. ON LEGIS. 207, 208 (2012).

29. Richard G. Newell et al., *Carbon Markets: Past, Present, and Future*, 6 ANN. REV. OF RES. ECON. 191, 205–206 (2014), https://doi.org/10.1146/annurev-resource-100913-012655.

30. Carlson, *supra* note 28, at 209.

31. *Id.*

32. *Id.*

33. There are in fact voluntary markets of this nature: for ample evidence of their scale and scope, see Press Release, Ecosystem Marketplace Insights Team, Voluntary Carbon Markets Rocket in 2021, On Track to Break $1B for First Time (Sept. 15, 2021), https://www.ecosystemmarketplace.com/articles/press-release-voluntary-carbon-markets-rocket-in-2021-on-track-to-break-1b-for-first-time/ [https://perma.cc/TDW2-7EWX]. However, this Article focuses on markets created by regulatory mandates (also known as "compliance markets").

34. Carlson, *supra* note 28, at 209.

35. In some cases, the initial seller of the allowances is the government regulatory authority, which may either do so at auction, thereby inducing a bidding process that produces an allowance price, or give them away for free ("grandfathering" them) to some or all of the regulated emitters. It's important to recognize that even if the allowances are grandfathered, they still have value to the regulated emitters and thus can still be expected to trade at a positive price.

Another form of carbon pricing that exists in a number of jurisdictions throughout the world is a *carbon tax*, wherein regulated emitters are required to pay a fee to the regulator for every ton of GHGs emitted.[36] Carbon taxes have been imposed in several parts of the world, but none have garnered the level of interest in the U.S. that the economy-wide cap-and-trade bills discussed below have, and thus, we do not address carbon taxes further in this Article.[37]

There was an important political dimension to the focus on cap-and-trade policies during this time period, as market-based regulatory approaches were assumed to be more palatable to lawmakers who might otherwise be opposed to prescriptive command-and-control measures to reduce emissions. This perception was formed by the relatively successful use of cap-and-trade (also called "emissions trading") to control other pollutants, such as lead in gasoline and sulfur dioxide from power plants.[38] These programs were enacted under Republican presidents Ronald Reagan and George H.W. Bush, and incorporated into the Clean Air Act Amendments of 1990 that passed by overwhelming margins by both political parties: 401–21 in the House of Representatives and 89–11 in the Senate.[39]

Given the growing interest in addressing climate change in Congress in the early 2000s, the lack of a clear statutory mandate to regulate GHGs under the Clean Air Act to do so, and the seemingly bipartisan support for cap-and-trade measures as a form of cost-effective regulation, it is unsurprising that Congress responded with proposed legislation to create a national cap-and-trade program to control GHGs.

The first such effort to make its way to a vote was the bipartisan Climate Stewardship Act of 2003, introduced in the 108th Congress by Senators John McCain (R-Arizona) and Joseph Lieberman (D-Connecticut).[40] This bill proposed to control GHGs from electric power generation, manufacturing, commercial operations, and transportation, which together accounted for 85% of national emissions,[41] using

36. *Carbon Tax Basics*, Ctr. for Climate & Energy Sols., https://www.c2es.org/content/carbon-tax-basics/ [https://perma.cc/9ZZ7-F5NA].

37. One specific example of a carbon tax is in Canada's British Columbia. *See, e.g.*, Brian Murray & Nicholas Rivers, *British Columbia's Revenue-Neutral Carbon Tax: A Review of the Latest "Grand Experiment" in Environmental Policy*, 86 Energy Pol'y 674, 674 (2015), https://dx.doi.org/10.1016/j.enpol.2015.08.011. A list of countries with carbon taxes in place can be found at the World Bank's Carbon Pricing Dashboard. *Carbon Pricing Dashboard*, World Bank, https://carbonpricingdashboard.worldbank.org/ [https://perma.cc/3C65-UXX5].

38. Richard Schmalensee & Robert N. Stavins, *Lessons Learned from Three Decades of Experience with Cap and Trade*, 11 Rev. Envt'l Econ. & Pol'y, 59, 60, 62 (2017), https://doi.org/10.1093/reep/rew017.

39. *Lessons in Bipartisanship: The 1990 Clean Air Act Amendments*, Env't Am. (Nov. 15, 2017), https://environmentamerica.org/articles/lessons-in-bipartisanship-the-1990-clean-air-act-amendments/ [https://perma.cc/G9JA-36PZ].

40. S. 139, 108th Cong. (2003).

41. *Congress Climate History*, Ctr. for Climate & Energy Sols., https://www.c2es.org/content/congress-climate-history/ [https://perma.cc/5HWU-JEBU].

a cap-and-trade system to limit 2010 emissions to 2000 levels.[42] The bill was voted down in the Senate 55–43, largely along party lines, though there were six Republicans who voted for the bill and ten Democrats who voted against it.[43] Subsequent versions of the bill and House companions to it were introduced in the 109th and 110th Congresses but did not advance to a full vote.[44]

2009 brought a change of party and perspective in the White House as George W. Bush exited and Barack Obama entered with a platform to aggressively address climate change.[45] That year, in the House of Representatives, Henry Waxman (D-California) and Edward Markey (D-Massachusetts) introduced the American Clean Energy and Security Act ("Waxman-Markey bill"), an economy-wide cap-and-trade bill with similar sectoral coverage to the McCain-Lieberman bill, but with far more ambitious targets.[46] It included seven greenhouse gases, rather than just $CO_2$, and called for an 83% reduction in emissions below 2005 levels by 2050.[47] The bill also included a number of complementary measures to the central cap-and-trade components, such as a federal renewable electricity and efficiency standard, direct support for carbon capture and storage technology, performance standards for new coal-fueled power plants, research and development support for electric vehicles, and support for smart grid deployment.[48] The Waxman-Markey bill passed the House of Representatives by a narrow vote of 219–212.[49] The Senate Democratic leadership was to take the House version and combine it with features of other legislative proposals in the 111th Congress, including some bipartisan bills, to develop a comprehensive cap-and-trade-based bill for a vote in the Senate in 2010, the most notable being efforts by Senators John Kerry (D-Massachusetts), Lindsay Graham (R-South Carolina), and Joseph Lieberman (I-Connecticut).[50] However, by this time, the full brunt of the global financial crisis was being felt, intense lobbying against the bill arose,[51] and other legislative

42. S. 139, 108th Cong. § 331 (2003).

43. *Roll Call Vote Summary 108th Congress, 1st Session: On Lieberman Amendment No. 2028*, U.S. Senate (Oct. 30, 2003), https://www.senate.gov/legislative/LIS/roll_call_votes/vote1081/vote_108_1_00420.htm [https://perma.cc/GJ9D-MXE8].

44. *Congress Climate History*, *supra* note 41.

45. Barack Obama, *Renewing American Leadership*, Foreign Affs., July/Aug. 2007, at 2, 13.

46. American Clean Energy and Security Act, H.R. 2454, 111th Cong.§ 724 (2009).

47. *Id.* §§ 703, 711.

48. *Id*. §§ 101, 114–15, 116, 121–24, 142–46.

49. John M. Broder, *House Passes Bill to Address Threat of Climate Change*, N.Y. Times (June 26, 2009), https://www.nytimes.com/2009/06/27/us/politics/27climate.html [https://perma.cc/UH67-7CMR].

50. Jim Tankersley, *Climate Bill Abruptly Put on Hold,* L.A. Times (Apr. 24, 2010), https://www.latimes.com/archives/la-xpm-2010-apr-24-la-na-climate-graham-20100425-story.html [https://perma.cc/Y6NR-TAVC].

51. Kyle C. Meng & Ashwin Rode, *The Social Cost of Lobbying over Climate Policy*, 9 Nature Climate Change 472, 473 fig.2 (2019), https://doi.org/10.1038/s41558-019-0489-6.

priorities prevailed, leaving the prospects of an economy-wide cap-and-trade bill flapping in the wind.[52] No other such proposals have been introduced since.

### C. *Prescriptive Regulation Take 2: Climate Policy Via the Clean Air Act*

Following *Massachusetts v. EPA* and the failure of the Waxman–Markey bill to advance into law, federal climate policy largely focused on the use of the Clean Air Act. Between 2009 and 2016, the EPA finalized major rules limiting emissions from motor vehicles,[53] GHG reporting and permitting requirements for power plants and other stationary sources,[54] and performance standards for new and existing fossil fuel-fired power plants.[55]

The first steps focused on motor vehicle emissions, as these were the sources specifically at issue in *Massachusetts v. EPA*. These steps were relatively uncontroversial, at least for Clean Air Act regulations. During this period, California was acting under its authority to exceed the EPA's requirements for tailpipe emissions issued under the Clean Air Act, subject to the EPA approving a waiver request from the state.[56] This subnational action to limit greenhouse gas emissions from motor vehicles created an additional factor underlying the new greenhouse gas rules. States have the option to adopt California's more stringent approach, thereby allowing a maximum of two vehicle emission

52. Ryan Lizza, in his article *As the World Burns*, provides a dramatic version of events leading up to the collapse of the cap-and-trade legislation in the 111th Congress. Ryan Lizza, *As the World Burns*, New Yorker (Oct. 3, 2010), https://www.newyorker.com/magazine/2010/10/11/as-the-world-burns [https://perma.cc/2BPZ-7M9L].

53. Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 Fed. Reg. 25324, 25405 (May 7, 2010) (to be codified at 40 C.F.R. pts. 85, 86, 600; 49 C.F.R. pts. 531, 533, 536, 537, 538); 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62624, 62638 (Oct. 15, 2012) (to be codified at 40 C.F.R. pts. 85, 86, 600; 49 C.F.R. pts. 531, 533, 536, 537, 538); Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. 57106, 57288 (Sept. 15, 2011) (to be codified at 40 C.F.R. pts. 85, 86, 600, 1033, 1036, 1037, 1039, 1065, 1066, 1068; 49 C.F.R. pts. 523, 534, 535).

54. Mandatory Reporting of Greenhouse Gases, 74 Fed. Reg. 56260, 56377 (Oct. 30, 2009) (to be codified at 40 C.F.R. pts. 86, 87, 89, 90, 94, 98, 1033, 1039, 1042, 1045, 1048, 1051, 1054, 1064); Reconsideration of Interpretation of Regulations that Determine Pollutants Covered by Clean Air Act Permitting Programs, 75 Fed. Reg. 17004, 17020–21 (Apr. 2, 2010) (to be codified at 40 C.F.R. pts. 50, 51, 70, 71); Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 75 Fed. Reg. 31514, 31567 (June 3, 2010) (to be codified at 40 C.F.R. pts. 51, 52, 70, 71.

55. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 34830 (June 18, 2014) (to be codified at 40 C.F.R. pt. 60); Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64662, 64702 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60).

56. 42 U.S.C. § 7543(e)(2)(A).

standards in the United States.[57] In 2002, the California legislature passed a law seeking to cut 30% of tailpipe GHG emissions between 2009 and 2016.[58] The state's Air Resources Board issued regulations in 2004 that were scheduled to go into effect in 2009.[59] After initially denying the request, the EPA approved the waiver request on June 30, 2009.[60] By 2007, 13 states had adopted or pledged to adopt the California standards.[61] This step, combined with the new GHG Endangerment Finding, created a sense of inevitability that there would be at least one, and perhaps two, GHG standards.[62] As a result, auto manufacturers had an incentive to work with the executive branch to design a single national approach.

These factors led to negotiations between the EPA, automakers, the U.S. Department of Transportation, California officials, environmental groups, and a labor union.[63] In the end, the EPA and the Department of Transportation issued the so-called "Tailpipe Rule" and revised CAFE standards, respectively. Both the Tailpipe Rule and the revised CAFE standards required automakers to achieve the equivalent of 34.1 miles per gallon averaged across their fleets for model year 2016, and subsequent rules increased the requirement to 54.5 miles per gallon by model year 2025.[64] The resulting regulations were largely uncontroversial, at least among the automobile industry,[65] even though they required doubling the 2009 average vehicle efficiency by 2025.[66]

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57. *Id.* § 7543(e)(2)(B).

58. Act of July 22, 2002, ch. 200, 2002 Cal. Stat. (codified as amended CAL. HEALTH & SAFETY CODE §§ 42823, 43018.5 (2003)).

59. CAL. CODE REGS. tit. 13, § 1961.1 (2005); *California's Greenhouse Gas Vehicle Emission Standards Under Assembly Bill 1493 of 2022 (Pavley)*, CAL. AIR RES. BD., https://www.arb.ca.gov/cc/ccms/ccms.htm [https://perma.cc/Z2XL-JYFC].

60. California State Motor Vehicle Pollution Control Standards; Notice of Decision Granting a Waiver of Clean Air Act Preemption for California's 2009 and Subsequent Model Year Greenhouse Gas Emission Standards for New Motor Vehicles, 74 Fed. Reg. 32744 (July 8, 2009).

61. Jody Freeman, *The Obama Administration's National Auto Policy: Lessons from the "Car Deal,"* 35 HARV. ENV'T. L. REV. 343, 346 (2011).

62. *Id.* at 351–53.

63. *Id.* at 362–63.

64. Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 Fed. Reg. 25324, 25330 (May 7, 2010) (to be codified at 40 C.F.R. pts. 85, 86, 600; 49 C.F.R. pts. 531, 533, 536, 537, 538); 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62624, 62627 (Oct. 15, 2012) (to be codified at 40 C.F.R. pts. 85, 86, 600; 49 C.F.R. pts. 523, 531, 533, 536, 537).

65. Freeman, *supra* note 61, at 364 ("The new policy benefited the auto industry by harmonizing a patchwork of potentially inconsistent regulations, and removing, at least through 2016, the threat that California would implement its own separate and more stringent standards. The new policy thus responded to the auto industry's wish for regulatory clarity, certainty, and uniformity, which it had long sought from Congress and the courts.").

66. Prior to the Tailpipe Rule, the CAFE standard for light duty vehicles passenger vehicles was 27.5 miles per gallon. Energy Policy and Conservation Act, *supra* note 15, at 902–03. The 2016 standard is 34.1 mpg and the 2025 standard is 54.5 mpg. Light-Duty

The Obama administration's approach to power plant emissions met far greater opposition from significant parts of the regulated industry and from petitioners to the Supreme Court. The EPA proposed GHG performance standards for new coal and natural gas-fired power plants in 2014.[67] The typical performance standard process under § 111 of the Clean Air Act would end at this stage.[68] In the rare circumstances where a new source performance standard ("NSPS") applies to a pollutant, such as $CO_2$ or methane ("$CH_4$"), that is not also regulated under the National Ambient Air Quality Standards ("NAAQS") program or as a hazardous air pollutant, the Clean Air Act also requires states to develop performance standards for existing sources.[69]

Clean Air Act § 111 requires that performance standards "reflect[] the . . . emission limitation achievable through the application of the best system of emission reduction . . . ."[70] When identifying the best system of emission reduction ("BSER"), the EPA must consider cost, "nonair quality health and environmental impact[s] and energy requirements," and whether the system has been "adequately demonstrated."[71] Section 111 typically applies to performance standards for new sources of pollution, such as power plants or industrial facilities, or those undergoing a major modification.[72]

The Clean Power Plan ("CPP"), the Obama administration's rule covering $CO_2$ emissions from existing fossil-fuel-fired power plants, broke from § 111 precedent by including actions that could occur at a covered power plant as well as some actions that were beyond the direct control of covered power plants in the BSER ("outside the fenceline").[73] Specifically, the CPP defined the best system as efficiency upgrades at coal-fired power plants, increased utilization of natural gas-fired power plants, and renewable energy investments.[74] Because § 111(d) allows states to develop compliance plans for covered sources within their borders, the EPA used these "building blocks" to calculate emission targets for each state.[75] To better enable this systemwide approach,

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Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, s*upra* note 53; 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards; Final Rule, *supra* note 53.

67. Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 1430, 1433 (Jan. 8, 2014) (to be codified at 40 C.F.R. pts. 60, 70, 71, 98).

68. Clean Air Act, 42 U.S.C. § 7411(b).

69. *Id*. § 7411(d).

70. *Id.* § 7411(a)(1).

71. *Id.*

72. West Virginia v. Env't Prot. Agency, 142 S. Ct. 2587, 2601 (2022).

73. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64662, 64663, 64765 (Oct. 23, 2015) [hereinafter Electric Utility Generating Units] (rejecting comments arguing that beyond the fence line regulation is unlawful).

74. *Id.* at 64717.

75. *Id.* at 64667.

the CPP allowed for emissions trading among sources, which provided an economic incentive and practical means to move generation from higher-emitting to lower-emitting sources.[76] In that regard, the CPP included both prescriptive regulatory standards and carbon pricing.[77]

The CPP's novel approach met legal challenges from the outset that ultimately put it on hold by the end of the Obama Administration, as the Supreme Court granted a stay on the CPP in February 2016, pending resolution of a lawsuit filed by 28 states and hundreds of companies, *West Virginia v. EPA*.[78] Moreover, upon taking office, the Trump Administration repealed the CPP and replaced it with the Affordable Clean Energy ("ACE") rule,[79] which took a far more modest and "within the fenceline" approach to regulating GHGs from electric power plants. The ACE rule faced its own legal challenges and was vacated by the DC Circuit Court in 2021.[80]

## III. Payments as Policy in the Early 2020s: Inflation Reduction Act

As described in the previous section, much of the emphasis during the first three decades of U.S. national climate policy was on prescriptive regulation, emissions trading/carbon pricing, and a combination of state and federal tax credits for clean energy technologies.[81] Congress had already largely abandoned carbon pricing proposals by the time President Biden was elected, although states continued to implement and operate them.[82] The major federal climate bills that were introduced in 2019 and 2020 focused on clean energy standards, worker transition support, and speeding the adoption of electric vehicles, or more generally, on achieving net zero emissions by 2050.[83]

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76. Franz Litz & Brian Murray, *Mass-Based Trading Under the Clean Power Plan: Options for Allowance Allocation 1–2 (Nicholas Institute for Envt'l Pol'y Sols.*, Working Paper NI WP 16-04, 2016), https://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/27351/ni_wp_16-04_0.pdf?sequence=2&isAllowed=y [https://perma.cc/9NPC-XB6A].

77. Electric Utility Generating Units, *supra* note 73, at 64662.

78. West Virgina v. Env't Prot. Agency, 136 S.Ct. 1000 (2016) (Mem).

79. Repeal of the Clean Power Plan; Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units; Revisions to Emission Guidelines Implementing Regulations, 84 Fed. Reg. 32520, 32521 (July 8, 2019) (to be codified at 40 C.F.R. pt. 60).

80. Brook J. Detterman et al., *D.C. Circuit Vacates Trump ACE Rule: What's Next for Power Plant CO2 Regulation?*, Nat'l L. Rev. (Feb. 4, 2021), https://www.natlawreview.com/article/dc-circuit-vacates-trump-ace-rule-what-s-next-power-plant-co2-regulation [https://perma.cc/XVB6-4EMH].

81. *See supra* Section II.A–C.

82. *See Welcome*, Reg'l Greenhouse Gas Initiative, www.rggi.org [https://perma.cc/MN7A-47GD]; *Cap-and-Trade Program*, Cal. Air Res. Bd., https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program [https://perma.cc/4QW6-A6NV].

83. *See* CLEAN Future Act, H.R. 1512, 117th Cong. (2021); 100% Clean Economy Act of 2019, H.R. 5221, 116th Cong. (2019).

President Biden entered office during a period of massive public investment to address the global COVID-19 pandemic. Congress had already adopted the $2.2 trillion Coronavirus Aid, Relief, and Economic Security ("CARES") Act[84] in March 2020 and included an additional $900 billion for pandemic relief in an appropriations bill adopted nine months later.[85] Biden had embraced climate change as a key part of his agenda, but he offered few details during his campaign. Once in office, the Biden administration advocated for the Build Back Better Act, a $2.2 trillion bill that incorporated climate change goals and funding for numerous pandemic relief programs.[86]

The broader framing for climate change and society has its roots in proposals for a *Green New Deal* and related policies.[87] Past efforts at mitigating climate change, which treated it primarily as an economic and technological issue, focused on cost-effective emissions abatement and incentivizing the development and deployment of clean energy technologies.[88] In contrast, the Green New Deal proposals addressed climate change as part of a much broader set of challenges facing

84. CARES Act, Pub. L. 116–136, 134 Stat. 281 (codified at 15 U.S.C. § 9001 et seq.).

85. Consolidated Appropriations Act, 2021, Pub. L. No. 116–260, 134 Stat. 1182 (2020); *see also* Emily Cochrane, *Congress Passes a $900 Billion Pandemic Relief Bill*, N.Y. Times (Dec. 22, 2020), https://www.nytimes.com/2020/12/22/world/congress-passes-a-900-billion-pandemic-relief-bill.html [https://perma.cc/9J7L-KSTB].

86. *FACT SHEET: President Biden's Build Back Better Agenda Will Deliver Historic Investments in American Families and Communities*, White House (Aug. 13, 2021), https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/13/fact-sheet-president-bidens-build-back-better-agenda-will-deliver-historic-investments-in-american-families-and-communities/ [https://perma.cc/4NPX-7SAG]. President Biden also enacted numerous executive orders focused on climate change, renewable energy, worker transitions, and environmental justice. For a summary of these executive orders, see Gianna Melillo, *A Look at Biden's Past Executive Orders on Climate Change*, Hill (Aug. 16, 2022), https://thehill.com/changing-america/sustainability/climate-change/3603947-a-look-at-bidens-past-executive-orders-on-climate-change/ [https://perma.cc/K6ZV-BHWH] (summarizing executive orders focused on climate change).

87. *See, e.g.*, David Wallace-Wells, *In Compromise, the Climate Left May Be Vindicated*, N.Y. Times (July 29, 2022), https://www.nytimes.com/2022/07/29/opinion/environment/joe-manchin-climate-inflation-bill.html [https://perma.cc/F43V-PVBZ] (arguing that the IRA results from President Biden's adoption of "New Deal-scale green investment" as a top policy priority); Matthew Miles Goodrich, *We Can Thank Green New Dealers for the Inflation Reduction Act*, Nation (Aug. 17, 2022), https://www.thenation.com/article/environment/thank-green-new-deal-inflation-reduction-act/ [https://perma.cc/4LQ5-TMVM] (arguing that the Green New Deal created the political foundation for state-led investments in low carbon technologies). For an opposing view, see Matthew Yglesias, *How the Green New Deal Became the Inflation Reduction Act*, Slow Boring (Aug. 2, 2022), https://www.slowboring.com/p/how-the-green-new-deal-became-the [https://perma.cc/FL2W-XBVE] (arguing that the IRA owes the Green New Deal "relatively little"). Press Release, Markey and Ocasio-Cortez Reintroduce Green New Deal Resolution (Apr. 20, 2023), https://www.markey.senate.gov/news/press-releases/markey-and-ocasio-cortez-reintroduce-green-new-deal-resolution [https://perma.cc/VB78-EBNK] (claiming that the "core tenets of the Green New Deal [are] reflected in the Inflation Reduction Act").

88. Jonas J. Monast, *The Ends and Means of Decarbonization: The Green New Deal in Context*, 50 Env't. L. 21, 34–41 (2020) (examining the technological, social, and fiscal goals of cap-and-trade bills and Clean Air Act regulations).

society, linking job creation, environmental justice, and emission reduction goals.[89]

Although the comprehensive Build Back Better framework failed in the Senate, the strategy of incorporating climate change mitigation into economic recovery efforts continued. Congress ultimately adopted pieces of the Build Back Better framework into the IRA,[90] the IIJA,[91] and the Creating Helpful Incentives to Produce Semiconductors ("CHIPS") Act.[92] Each of these laws embraced public investments, primarily through federal tax credits, as the key pillar of social, industrial, and public health policies.

The tax incentives-based approach to climate policy and energy infrastructure took advantage of the narrow policy window created by the COVID-19 pandemic and Congress' willingness to enact major new spending programs. To attract support from moderate lawmakers, and West Virginia Senator Joe Manchin in particular, the policy linked inflation reduction, economic development, and national security concerns due to the Russia–Ukraine War.[93]

A complete summary of the IRA is beyond the scope of this Article. In general, the climate provisions in the law rely on tax credits and grants to incentivize GHG emission reductions in the electric power, transportation, manufacturing, building, oil and gas, and agriculture sectors.[94] This funding is aimed at investments in existing renewable energy technologies, electric vehicle adoption, energy infrastructure, major new investments in hydrogen production and carbon capture and

89. *Id.* at 28–34 (comparing the Green New Deal with earlier climate policies).

90. *See Roll Call 385 | Bill Number: H. R. 5376*, Clerk of U.S. House of Representatives (Nov. 19, 2021, 9:44 AM), https://clerk.house.gov/Votes/2021385 [https://perma.cc/TU6Z-F4AW]; Inflation Reduction Act of 2022, H.R. 5376, 117th Cong. § 70311 (as reported to the House of Representatives, Sept. 27, 2021); Inflation Reduction Act of 2022, Pub. L No. 117-169, § 50231, 136 Stat. 1818, 2053; *H.R. 5376 (117th): Inflation Reduction Act of 2022*, Govtrack (Aug. 19, 2022), https://www.govtrack.us/congress/bills/117/hr5376/summary [https://perma.cc/LJV2-DMFV] ("H.R. 5376 was originally introduced as the Build Back Better Act, President Biden's signature legislative proposal in 2021, but after the bill failed to gain enough support in the Senate to pass, it was replaced in whole with new legislative text in 2022 and named the Inflation Reduction Act of 2022.").

91. *See* Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429.

92. *See* CHIPS Act of 2022, Pub. L. No. 117-167, 136 Stat. 1366.

93. *See generally* John W. Kingdon, Agendas, Alternatives, and Public Policies 19, 165–66 (2d ed. 1984) (stating that a policy window requires three elements: a problem stream, a policy stream, and a politics stream). When these streams align, meaning policymakers understand the problem, identify an available policy response, and have the political will to act, policy change is possible. Ramsey Touchberry, *Manchin Links Ukraine War to Inflation Reduction Act*, Wash. Times (Jan. 19, 2023), https://www.washingtontimes.com/news/2023/jan/19/joe-manchin-links-ukraine-war-inflation-reduction-/ [https://perma.cc/QNQ3-WW2V].

94. For a full summary of the IRA, see Jane A. Leggett & Jonathan L. Ramseur, Cong. Rsch. Serv., Inflation Reduction Act of 2022 (IRA): Provisions Related to Climate Change (2022).

storage, electric vehicle manufacturing, energy efficiency, conservation, and state policy support.[95]

Early analysis of the IRA projected that the law could cause U.S. GHG emissions to decline to 32%–42% below 2005 levels by 2030, compared to a projected 24%–35% reduction without the IRA,[96] although the actual reductions will depend on the degree to which companies, states, and individuals take advantage of the tax credits.[97] This, in turn, could be affected by supply chain constraints, siting and transmission challenges, and impacts on local communities.[98] The IRA's cost is similarly uncertain at this stage. Early projections suggest that the climate provisions could cost $392 billion by 2032, but it could be lower because of the deployment hurdles just mentioned or significantly higher because many of the tax credits are uncapped.[99]

## IV. Policy Robustness: Mixing Carrots and Sticks

Although the scale and ambition of the IRA are projected to have a transformative impact on the nation's energy production and consumption, the law does not operate in isolation. Rather, it joins a complex matrix of federal and state energy and environmental policies, including federal and state tax incentives, state-based cap-and-trade programs,[100] federal Clean Air Act regulations on other pollutants,[101] and federal and state laws governing electricity rates and infrastructure siting.[102] Moreover, new laws can beget new policy actions in response, some of which may be different in nature from the antecedent.[103] The IRA's impact, therefore, extends beyond the emission reductions directly tied to the tax credits and grants.

Laws like the IRA, which provide subsidies and other financial support mechanisms for certain actions, could facilitate future regulatory mandates by lowering compliance costs due to direct subsidies or by

95. *Id.*

96. Larsen et al., *supra* note 2.

97. Leggett & Ramseur, *supra* note 94, at 2.

98. Jesse D. Jenkins et al., REPEAT Project, Climate Progress and the 117th Congress: The Impacts of the Inflation Reduction Act and the Infrastructure Investment and Jobs Act 12 (2023), https://doi.org/10.5281/zenodo.8087805.

99. John Bistline et al., *Economic Implications of the Climate Provisions of the Inflation Reduction Act*, Brookings Papers on Econ. Activity, Spring 2023, at 5, 6 tbl.1.

100. *See* Press Release, EPA, EPA Proposes New Carbon Pollution Standards for Fossil Fuel-Fired Power Plants to Tackle the Climate Crisis and Protect Public Health (May 11, 2023), https://www.epa.gov/newsreleases/epa-proposes-new-carbon-pollution-standards-fossil-fuel-fired-power-plants-tackle [https://perma.cc/2YPX-CYWK].

101. *See,* e.g., *NAAQS Table*, EPA (Mar. 15, 2023) https://www.epa.gov/criteria-air-pollutants/naaqs-table [https://perma.cc/GZV4-MZD6] (outlining federal air quality regulations under NAAQS).

102. Alexandra Klass, et al., *Grid Reliability through Clean Energy*, 74 Stan. L. Rev. 969, 990–93 (2022).

103. *See* Michael Pahle et al., *Sequencing to Ratchet Up Climate Policy Stringency*, 8 Nature Climate Change 861, 862–63 (2018), https://doi.org/10.1038/s41558-018-0287-6.

spurring cost reductions due to increased demand for technologies. This is in line with the notion of optimal *policy sequencing* noted by other scholars in the field.[104]

The basic notion of policy sequencing is that policymaking is not a one-shot deal in which a single option rises to the top and establishes the full set of rules for the game henceforth.[105] Rather, and especially with a problem as far-reaching and complex as climate change, policy comes as a sequence of decisions over time at different jurisdictional levels with path dependencies and feedback loops.[106] For instance, whatever the positive merits of prescriptive regulation and carbon pricing might be for controlling GHG emissions, they are salient instruments in which the costs are highly visible and the benefits are diffuse.[107] These features can engender political opposition from the parties bearing the costs (often regulated companies and their customers) and thereby impede passage into law.[108] In contrast, policies that provide direct payments from the government to parties for the adoption of climate-friendly technologies (like the IRA) have salience features that work in the other direction—well-defined beneficiaries (firms and individuals receiving tax credits and grants and diffuse bearers of the costs (taxpayers)[109]).[110] The latter carrot-based approach may provide an easier political pathway to passage, especially with a narrowly divided legislature. To wit, the IRA passed the Senate by a vote of 51–50, along party lines, with Vice President Kamala Harris casting the tie-breaking vote.[111] And once adopted, policies define the framework from which future policy measures can arise.[112]

Indeed, as this Article is written, the EPA has issued new proposed technology-based performance standards under § 111 of the Clean Air Act to control GHGs from fossil fuel-fired electric power generating units,[113] the largest single stationary source of GHGs in the U.S.,

104. *See* Jonas Meckling et al., *Policy Sequencing Toward Decarbonization*, 2 NATURE ENERGY 918, 918 (2017), https://doi.org/10.1038/s41560-017-0025-8.

105. *See* Pahle et al., *supra* note 103, at 861.

106. *Id.*

107. Jesse D. Jenkins, *Political Economy Constraints on Carbon Pricing Policies: What Are the Implications for Economic Efficiency, Environmental Efficacy, and Climate Policy Design?*, 69 ENERGY POL'Y 467, 468–69, 474 (2014), http://dx.doi.org/10.1016/j.enpol.2014.02.003.

108. *Id.* at 472.

109. Jenkins, *supra* note 107, at 468–69.

110. *See* Johnston, *supra* note 5, at 110.

111. *Roll Call Vote Summary 117th Congress, Second Session: On Passage of the Bill H.R. 5376, As Amended*, U.S. SENATE, (Aug. 7, 2022), https://www.senate.gov/legislative/LIS/roll_call_votes/vote1172/vote_117_2_00325.htm [https://perma.cc/7FYH-QQFC].

112. *See* Pahle et al., *supra* note 103, at 862.

113. New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 Fed. Reg. 33240 (May 23, 2023) (to be codified at 40 C.F.R. pt. 60) [hereinafter Proposed Carbon Pollution Standards].

accounting for 25% of all emissions.[114] The EPA's proposals show how the IRA significantly changes the compliance costs for the rules. Because the IRA is an act of Congress that preceded the proposed performance standards, the EPA incorporated the tax incentives into its baseline.[115] In other words, the agency's analysis, which assumes power plant operators will make rational economic decisions, projects major new investments in the clean energy technologies incentivized by the IRA. The Regulatory Impact Analysis performed for the proposed rule specifically flags the cost-reducing features of the IRA by demonstrating the cost differences between a "with IRA" baseline (lower cost) and a "without IRA" baseline (higher cost).[116] The IRA tax credits for green hydrogen (i.e., hydrogen produced using renewable energy) and carbon capture and storage are particularly important, as the EPA based the proposed standards on the availability of both options.[117]

The enabling connection between the IRA and the Clean Air Act is evident, including IRA amendments to the Clean Air Act and legislative history calling for the EPA to incorporate tax incentives into Clean Air Act rulemaking.[118] That said, it's not clear that this is a case of optimal policy sequencing—a deliberate effort by Congress to lead with carrots in order to reduce the impacts of the stick—or merely a case of getting what you can in response to rapidly shifting political winds.

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114. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2021, at 2-28 (2023), https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-andsinks-1990-2021 [https://perma.cc/5DXB-R65S].

115. EPA, Regulatory Impact Analysis for the Proposed New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule 3-11 (2023).

116. EPA, Regulatory Impact Analysis for the Proposed New Source Performance Standards for Greenhouse Gas Emissions from New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions from Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule 3-15 (2023) ("The impact of the IRA is to increase the cost-competitiveness of low-emitting technology, with the result that emissions are projected to fall significantly over the forecast period under the baseline.").

117. *See* Press Release, *supra* note 100.

118. *See, e.g.*, Inflation Reduction Act of 2022, Pub. L. No. 117-169, § 60107, § 135, 136 Stat. 1818 (amending the Clean Air Act to fund promulgation of regulations that go beyond emission reductions anticipated from the use of low-GHG hydrogen); Proposed Carbon Pollution Standards, *supra* note 78, at 33300 ("The legislative history of the IRA makes clear that Congress was well aware that the EPA may promulgate rulemaking under CAA section 111 based on CCS and explicitly stated that the EPA should consider the tax credit to reduce the costs of CCUS (i.e., CCS). Rep. Frank Pallone, the chair of the House Energy & Commerce Committee, included a statement in the Congressional Record when the House adopted the IRA in which he explained: 'The tax credit[] for CCUS . . . included in this Act may also figure into CAA Section 111 GHG regulations for new and existing industrial sources . . . . Congress anticipates that EPA may consider CCUS . . . as [a] candidate[] for BSER for electric generating plants . . . . Further, Congress anticipates that EPA may consider the impact of the CCUS . . . tax credit[] in lowering the costs of [that] measure[].'").

A critical issue, though, is the extent to which the IRA and other proximate federal subsidy and grant legislation sets the stage for future climate and energy policies. The IRA, even under the rosiest adoption scenarios, does not deliver ambitious mid-century GHG emission targets on its own. The EPA power plant rules proposed in 2023 may be the first step to take things further, but that is only one sector. What else will be needed for transportation and industrial emissions, which are notoriously more challenging to abate than power generation and transportation? Will the time it would take to regulate emissions sector by sector through the Clean Air Act force renewed interest in a comprehensive carbon-pricing approach like an economy-wide cap-and-trade or carbon tax policy once the cost of decarbonization has been reduced via the investments spurred by the IRA?

Although the main focus of this Article is on U.S. federal climate policy, these cycles turn at both the federal and state levels, often as part of a feedback loop in which states take action when the federal government does not, and the federal government takes actions that were incubated in the states. California is a prime example. As referenced above, California has sought and received waivers on federal vehicle standards, which has enabled them to have standards that are stricter than the federal ones, and other states have been allowed to adopt those stricter standards. California also launched an economy-wide state cap-and-trade program in 2013, in the wake of failed efforts to do so at the national level (Waxman-Markey and Kerry-Graham-Lieberman).[119] Approximately 30 states have established renewable portfolio standards ("RPS"), requiring a minimum percentage of electricity to be produced from qualifying renewable sources.[120] While studies are mixed on the efficacy of RPS programs that operate exclusively at the state level,[121] state RPSs may have made federal laws like the IRA and EPA power-sector regulations more palatable by playing a role in reducing the cost of renewable deployment through scale effects and learning by doing.[122]

119. *Cap-and-Trade Program: About*, Cal. Air Res. Bd., https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/about [https://perma.cc/X4FX-KCF7].

120. *State Renewable Portfolio Standards and Goals*, Nat'l Conf. State Legislatures (Aug. 13, 2021), https://www.ncsl.org/energy/state-renewable-portfolio-standards-and-goals [https://perma.cc/9CXG-66CB].

121. Studies are mixed on the efficacy of state RPSs. There is evidence of positive GHG emission reduction benefits but also indications that a collection of state RPSs are not a cost-effective means to get emission reductions. *See* Ryan Wiser et al., A Retrospective Analysis of the Benefits and Impacts of U.S. Renewable Portfolio Standards, at vii–viii, 4 (2016), https://www.nrel.gov/docs/fy16osti/65005.pdf [https://perma.cc/M2NM-RAW6].

122. *See e.g.*, Bryan Bollinger & Kenneth Gillingham, *Learning-by-Doing in Solar Photovoltaic Installations* 1 (Working paper, 2019), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2342406 [https://perma.cc/5HS5-GSVJ].

## V. Conclusion

Climate policy is a messy game. U.S. policymakers have tried and re-tried numerous ways to tackle GHG emission reductions over the last several decades—from regulatory standards with and without market-based elements packed in, to transfer payments that directly support decarbonization. Clean, elegant solutions are easier to propose than they are to pass, implement, and retain.

A reason for the messiness is the sheer scale and complexity of climate change mitigation, which essentially requires a reengineering of the global economy over several decades. And while the core elements of an economy-wide decarbonization strategy are fairly well-recognized at the time, there are still technical, economic, social, and institutional uncertainties in play that require an adaptive policy roadmap.[123]

The climate policy toolkit is comprised of different instruments that have been deployed over time. Some place restrictions on the choice of technology that can be used, either through mandatory performance standards or by creating an explicit price on emissions. Decarbonizing in that environment is a matter of minimizing the cost of complying with the rules. This can be a powerful means to accomplish the goal, but also can create political and legal hurdles to policy adoption in the first place. Alternatively, policies can positively reward good behavior by the government paying parties to—or more often the case, sharing in the cost of—adopting cleaner technologies and practices.

The IRA enacted in 2022 is primarily an example of the latter.[124] Whether or not the IRA achieves deep emission reductions will depend substantially on other incentives and barriers that affect private sector deployment of zero-carbon technologies. Given the need to significantly decarbonize the economy over the next two to three decades, the IRA is best viewed as an accelerator of progress rather than the ultimate mechanism to do all the work. The funding, while substantial, falls far short of the amount needed to achieve long-term decarbonization goals, and the positive economic incentives from government payments alone may not be sufficient to move producers and consumers away from high-emitting means of production and use. It will be important to have regulatory backstops such as those embedded in the Clean Air Act, and for the U.S. Congress to continually evaluate whether and what new legislation is needed to ensure the country's fulfillment of its long-term emission goals.

123. Jackson Ewing et al., Pathways to Net-Zero for the U.S. Energy Transition 45 (2022).

124. The IRA does include some penalties as well as positive incentives. For example, there is a fee imposed on methane emissions from oil and gas production. Inflation Reduction Act of 2022, Pub. L. No. 117-169, § 60113, § 136, 136 Stat 1818.