Virtuous Cycles: The Interaction of Public and Private Environmental Governance

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ARTICLE

VIRTUOUS CYCLES: THE INTERACTION OF PUBLIC AND PRIVATE ENVIRONMENTAL GOVERNANCE

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ABSTRACT

The climate crisis has provoked a call for action from all sides. Private governance, public regulation, and individual behavior are all vital pieces of our path toward decarbonization and climate adaptation. Despite this, some scholars and policymakers argue that private environmental governance undermines public efforts to regulate climate harms. This paper draws on existing scholarship in law, policy, and psychology to answer these critiques, proposing four taxonomies of beneficial public-private collaboration on environmental governance. It then applies these models, tracking the shift in U.S. environmental legislation from “polluter pays” to “beneficiary pays” strategies to show a shift from rivalry to collaboration between public and private governance. Tracking examples of this shift, it analyzes the ways that the Inflation Reduction Act and Draft Federal Acquisition Regulation demonstrate the potential of public-private climate partnerships. Finally, it analyzes similar collaborative approaches in international law to show that rather than a “race to the bottom,” the interaction of public and private governance can form virtuous cycles that have the capacity to increase decarbonization efforts across sectors.

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INTRODUCTION

United Nations Secretary General Antonio Guttieres opened 2022’s 27th Conference of Parties to the United Nations Framework Convention on Climate Change (COP 27)1 with a sharp warning: Per Guttieres, the world

was on a “highway to climate hell.”\(^2\) Guttieres emphasized the global scale of action required to avoid calamity, stating “[it is] cooperate or perish . . . [i]t is either a Climate Solidarity Pact, or a Collective Suicide Pact.”\(^3\) This dire warning comes nearly thirty years after the international adoption of the United Nations Framework Convention on Climate Change (UNFCCC) and seven years since the first legally-binding global treaty on climate change emerged from COP21 in Paris.\(^4\) The Paris Agreement set a target of limiting global warming to 1.5 degrees Celsius by the end of the twenty-first century.\(^5\) Nearly a quarter century later, none of the world’s most significant emitters—China, the United States, India, Russia, and the European Union—are on track to meet the Paris Agreement’s goals.\(^6\)

Meeting Guttieres’ challenge of cooperation over extinction will require an unprecedented global effort. Leveraging private environmental governance (“PEG”) is a vital tool in that effort. One hundred companies are the source of over seventy percent of industrial emissions,\(^7\) or twelve percent of total global emissions.\(^8\) Decarbonization of just those one hundred corporations would have the same effect as the United States cutting emissions to zero,\(^9\) China halving its emissions, or taking four-fifths

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3. Id.


5. Paris Agreement, supra note 1, at art. 2.


8. See Global Greenhouse Gas Emissions Data, EPA, https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data [https://perma.cc/SA56-YBBH]; see also Working Group III, Intergovernmental Panel on Climate Change (IPCC), Climate Change 2014: Mitigation of Climate Change 123 tbl.a (2014) (showing that 18% of direct emissions stem from the industry sector and 70% of the total industry sector is approximately 12%).

of the vehicles on earth off the road.\textsuperscript{10} Decarbonization simply is not possible without private sector involvement.

Beyond necessity, private environmental governance has been at the forefront of existing decarbonization efforts. In a 2013 piece in the Cornell Law Review, Michael P. Vandenbergh noted the ways in which private governance filled gaps left by U.S. inaction on climate change.\textsuperscript{11} In 2014, Jessica F. Green examined the role of private actors in global environmental projects, demonstrating public governance’s delegation of projects to, and adoption of practices from, private actors at the international level.\textsuperscript{12} Further studies have shown unprecedented action by corporate actors on decarbonization: over eighty percent of the ten largest firms in seven global sectors now include environmental requirements in supply chain contracting,\textsuperscript{13} up fifty percent from fifteen years prior.\textsuperscript{14} Scholars argue that there is massive potential for corporate action to work in concert with government initiatives to accelerate carbon reductions.\textsuperscript{15}

Despite the technical potential of corporate action on climate change, private environmental governance has faced strong pushback. Critics allege that private governance efforts are a form of greenwashing,\textsuperscript{16} distract from

\textsuperscript{10} Transport makes up 21% of global emissions. Of that, road travel accounts for approximately ¾, putting the total decarbonization of road traffic at less than 15.25%. Hannah Ritchie, \textit{Cars, Planes, Trains: Where do CO2 Emissions from Transport Come From?}, OUR WORLD IN DATA (Oct. 6, 2020), https://ourworldindata.org/co2-emissions-from-transport [https://perma.cc/V29C-PFHP].

\textsuperscript{11} See generally Michael P. Vandenbergh, \textit{Private Environmental Governance}, 99 CORNELL L. REV. 129, 133 (2013). In addition to coining the phrase Private Environmental Law, Vandenbergh is a prolific writer in defining the private environmental law space, though hardly the only expert writing on this topic. See, e.g., infra notes 12–19.

\textsuperscript{12} See generally JESSICA F. GREEN, RETHINKING PRIVATE AUTHORITY: AGENTS AND ENTREPRENEURS IN GLOBAL ENVIRONMENTAL GOVERNANCE 1 (2013) (introducing Green’s work on the role of private actors in global environmental remediation at the national and international level).


\textsuperscript{14} Id. at 7; see generally Michael P. Vandenbergh, \textit{The New Wal-Mart Effect: The Role of Private Contracting in Global Governance}, 54 UCLA L. REV. 913 (2007) [hereinafter \textit{The New Wal-Mart Effect}].


the seriousness of the climate threat, undermine public governance in and of itself, and have only minor impacts without parallel enforcement mechanisms. Allegations of “regulatory capture” also abound—many argue that public-private environmental partnerships disproportionately benefit private actors while weakening public governance.

This Article proceeds in three parts to show that far from undermining public governance, private environmental governance has the potential to kick off powerful virtuous cycles which push both public and private sector

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17. Jeff McMahon, No One Seemed to Notice Greta Thunberg’s Critique of the Green New Deal, FORBES (Sept. 22, 2019), https://www.forbes.com/sites/jeffmcmahon/2019/09/22/no-one-seemed-to-notice-greta-thunbergs-critique-of-the-green-new-deal/?sh=193b7c3338da (noting Greta Thunberg’s statement to the United States Congress that “[t]his is not primarily an opportunity to create new green jobs, new businesses, or green economic growth. This is above all an emergency”). While Thunberg has been lauded for her climate campaign, which began at an unusually early age, and has been active in protest movements encouraging governments to meet their climate emissions targets, she has also stated that the detail of what action should be taken has “nothing to do with” her. See Daniel Kraemer, Greta Thunberg: Who is the Climate Campaigner and What are Her Aims? BBC NEWS (Nov. 5, 2021), https://www.bbc.com/news/world-europe-49918719 (https://perma.cc/J3QJ-JQW3).

18. See Robert Falkner, Private Environmental Governance and International Relations: Exploring the Links, 3 GLOB. ENV’T POL’Y 72, 74 (2003) (“[P]rivate governance indicates a long-term shift away from state-centric models of governance to new forms of authority located in the global economy, with private actors emerging as the new sovereigns.”).

19. See Cary Coglianese & Jennifer Nash, Motivating Without Mandates? The Role of Voluntary Programs in Environmental Governance, in DECISION MAKING IN ENVIRONMENTAL LAW 239 (Lee Paddock et al. eds., 2016) (examining what Coglianese and Nash characterize as “voluntary programs” and analyzing their design and impact in empirical terms).

20. For a sampling of these arguments, see, e.g., Jason C. Young, Environmental Colonialism, Digital Indigenousity, and the Politicization of Resilience, 4 EPE: NATURE & SPACE 230, 231 (2021); Patricia Kameri-Mbote & Philippe Cullet, Law, Colonialism and Environmental Management in Africa, 6 REV. EUR. COMM. & INT’L ENV’T L. 23, 23 (1997); Maano Ramutsindela & Bram Büscher, Environmental Governance and the (Re-)Making of the African State, OXFORD R SCH. ENCyclopedia POL. (Mar. 26, 2019), https://oxfordre.com/politics/display/10.1093/acrefore/9780190228637.001.0001/acrefore-e-9780190228637-e-903 [https://perma.cc/P6AE-2674]; Brian J. Gareau, Dangerous Holes in Global Environmental Governance: The Roles of Neoliberal Discourse, Science, and California Agriculture in the Montreal Protocol, 40 ANTIPODE 103, 123 (2008); Falkner, supra note 18, at 80 (“[E]ngaging with firms in a process of global standard setting has become an important form of environmental activism for many NGOs. Yet this trend raises important questions about the nature of the relationship between private actors and activist groups.”). Ironically, Falkner’s work also argues that the reverse is true. See id. at 77. (“States may actually choose to let industry establish systems of self-regulation where there is no overriding demand for public regulation. In these cases, states are saved from the often complex tasks of negotiating international standards and do not pay the costs of implementation and compliance. Rather than suffering from a lack of state capacity, as much of the globalization literature suggests, states can therefore be seen to be benefiting from the more widespread use of public governance mechanisms.”).
actors to entrench and embrace decarbonization efforts. Part I proposes four virtuous cycle models through which to analyze and describe public-private environmental governance collaborations. Part II explores the transition of U.S. law from an adversarial relationship with private governance to a collaborative one which embraces private environmental governance, highlighting examples of these virtuous cycles in public-private environmental collaboration in the Inflation Reduction Act of 2022 (“IRA”) and Draft Federal Acquisition Regulations (“FAR”). Part III discusses the embrace of private environmental governance in public international law and two examples of virtuous cycles in international practice to show that the power of these cycles in situations where public leviathans do not exist or are not efficient.

I. PROPOSED TAXONOMIES OF BENEFICIAL PUBLIC-PRIVATE ENVIRONMENTAL COLLABORATION

Critics of private environmental governance in policy and scholarship have assumed that burden-shifting will create a “race to the bottom” in environmental action, or that private governance will undermine public governance efforts. I suggest that instead, public environmental law and private environmental governance form virtuous cycles which push both sets of actors to take steps towards decarbonization.

This section proposes four descriptive categories for these cycles. The first three are supply-demand cycles formed through supply chain contracting and procurement agreements; adoption-communication cycles formed through adoption and promotion of new technologies or strategies; and subsidy-investment cycles encouraging the proliferation of green infrastructure. The fourth—experimentation-adoption cycles—are derived from the work of Sarah E. Light and Jessica F. Green. Experimentation-adaptation cycles model the iterative adoption of public and private governance systems generating and adopting new initiatives based on each’s others successful experiments. While each of these four cycles follows a similar pattern, their characteristics and drivers vary. All four can be powered or “set off” by either public or private action. It is also important to note that this set of cycles should not be viewed as an exhaustive list, but rather an initial thought experiment to begin framing discussion on the ways public and private governance reinforce and react to each other. Work by Michael P. Vandenbergh et al. in the Michigan Journal of Environmental and Administrative Law suggests that private environmental governance may have an entrenchment effect on environmental regulation which eventually
leads to compliant corporate actors pushing for deeper regulations—future study may reveal the existence of virtuous cycles in that process and elsewhere. Nor does this list imply that destructive cycles do not exist. Instead, it proposes that these four cycles and their adoption in national and international law can provide roadmaps for collaboration between public and private environmental governance.

A. Supply-Demand Cycles

The first virtuous cycle formed by public-private interaction in environmental governance can be described as a “supply-demand cycle”—one side demands sustainable goods or services, and the other increases supply, which reduces the cost and increases the availability of sustainable goods and services, making more buyers on the demand side seek similar goods.

One illustrative example of cycle arises from the interaction between supply chain contracting initiatives, Federal Acquisition Regulations (FAR), and state and local government acquisition initiatives. In 2017, Walmart launched Project Gigaton, which aimed to cut one billion metric tons from their global supply chain by 2030. As a result, companies supplying or seeking to supply Walmart reduced their emissions, increasing the supply of sustainable goods. As more multinational corporations have adopted sustainability measures, costs for sustainable goods have decreased sufficiently to ensure that a Federal Acquisition Regulation requiring environmentally-compliant goods is not cost-prohibitive. The environmental standards created to reduce friction in private supply chain agreements are now incorporated into the FAR, enabling the Federal


government to embrace sustainable supply chain policy without having to go through the onerous (and expensive) process of developing technical standards for suppliers.25

The supply-demand cycle somewhat resembles the flywheel effect in peer-to-peer startups.26 Take the example of Uber—to successfully create a market for Uber in a new city, founders had to create two halves of a market: riders seeking to order cars on their phone, and drivers looking to pick up those riders.27 Without driver supply or rider demand, the business model would fail: drivers would not see enough demand to provide sufficient incentive for them to make the switch to Uber from other employment, and riders would have to wait too long for a given ride.28 To solve the inherent chicken-and-egg problem, Uber subsidized both sides of the equation, paying both drivers and riders to enter the market.29 By contrast, the supply-demand cycle sees different elements of public and private governance working together to guarantee or subsidize demand while expanding (and therefore reducing costs for) supply.

Fig. 1. Supply-Demand Cycle for Environmentally-Desirable Goods

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25. Establishing standards is a long and expensive process. For an in-depth analysis of the theoretical costs and cost-division strategies in standards-setting processes, see Michael B. Spring & Martin B.H. Weiss, Financing the Standards Development Process (Apr. 18, 2003) (unpublished manuscript) (on file with University of Pittsburgh). In 2022, the Biden Administration requested $8 million for “Standards for Critical and Emerging Technologies,” which would not cover in-house development of standards, but merely liaising with private standard-setting organizations. See NAT’L INST. STANDARDS & TECH., FISCAL YEAR 2023 BUDGET SUBMISSION TO CONGRESS 90–91 (2022). The National Institute of Standards and Technology (NIST), the division of the United States Department of Commerce tasked with “advancing measurement science, standards, and technology” to promote U.S. innovation and enhance economic security, had a total budget request of $1,476,549,000 in 2023. See id. at 3, 204.


27. Id.

28. Id.

29. Id. at 90.
B. Adoption-Communication-Normalization Cycles

Social norms, communication, and psychology undergird a second virtuous cycle in public-private cooperation towards decarbonization goals. In adoption-communication-normalization cycles, adoption of an environmental stance or policy encourages investment in communications promoting that stance. Communication increases lead to the normalization of environmental action or governance, which in turn increases social pressure and the development of social norms which encourage deeper adoption of environmental policies, restarting the cycle. Normalization is an extremely powerful force for encouraging adoption—social identity is comprised of one’s membership in a group, and social science research has found that individuals will go to great lengths in adopting the values and behaviors of their groupmates to maintain a sense of belonging.


Take, for example, a company taking on a new solar energy project, as incentivized by the Investment Reduction Act (IRA). The company already realizes certain benefits from the adoption alone: consumers and investors increasingly demand investments in renewable energy, and the company may receive tax benefits and grant funding from IRA initiatives. To realize the consumer- and investor-sentiment benefits of its effort, the company is incentivized to devote marketing dollars towards publicizing its investment. This investment in communications, if successful, can shift consumer sentiment—even if there is backlash, it brings the practice into public conversation. Sufficient shift in consumer sentiment can establish


33. See discussion infra Section II.B; see also infra Figure 5.

powerful normative effects which have the potential to not only spur adoption, but also create constituencies supportive of new regulation or public spending that encourages environmentally-friendly action. On a more basic level, start-ups bringing environmentally-friendly goods to market are incentivized to engage in marketing that encourages consumer demand for their goods. This, in turn, can spur normalization that increases major players in the disrupted industry to build out similar product lines or features.

This cycle is particularly valuable in polarized societies like the United States because of its ability to turn behavioral “toe-holds” within a given community into normalization of pro-environmental action. U.S. conservatives have historically been a challenging population to engage in

Blockbuster Colin Kaepernick Ad?, FAST COMPANY (Sept. 5, 2019), https://www.fastcompany.com/90399316/one-year-later-what-did-we-learn-from-nikes-blockbuster-colin-kaepernick-ad (last visited July 9, 2023) (noting that brands “can’t afford to be neutral” on social issues, and that in a one-year retrospective, Nike claimed “$163 million in earned media, a $6 billion brand value increase, and a 31% boost in sales” off the Kaepernick ad controversy).
environmental action. Social science studies have shown conservatives desire greater in-group consensus and conformity than their liberal peers, and perceive greater in-group consensus and collective efficiency. Conservatives are, perhaps as a result, especially responsive to normalization of climate-mitigation measures by corporate actors. For people of all parties, normative information from individuals who share group or social identities is more powerful than normative information from those in an out-group. This effect is powerful when normative information is shared by influential conservative figures. Social science has found that those identifying as conservative are more likely to conform to authority, and on all sides of the partisan spectrum elite influence can overwhelm individual political ideology because of desire to remain aligned with a perceived representative of one’s in-group.

Therefore, adoption and normalization of environmental action by relatively few influential conservative individuals or corporations could have powerful network effects on conservative circles. This trend has emerged in adoption of solar panels by far-right actors in the United States and abroad. Using private or public action to set off adoption-communication-normalization cycles may, therefore, be a powerful tool to engage conservative Americans on climate issues.

37. A 2021 study found that exposing conservatives to information about what Fortune 500 companies are doing to mitigate climate change increased their support for government and individual actions on decarbonization. Ash Gillis et al., Convincing Conservatives: Private Sector Action Can Bolster Support for Climate Change Mitigation in the United States, 73 ENERGY RISCH. & SOC. SCI. 1, 2 (2021).
38. See generally Robert B. Cialdini & Ryan P. Jacobson, Influences of Social Norms on Climate Change-Related Behaviors, 42 CURRENT OP. BEHAV. SCI. 1, 4 (2021); Dominic Abrams et al., Knowing What to Think by Knowing Who You Are: Self-Categorization and the Nature of Norm Formation, Conformity and Group Polarization, 29 BRITISH J. SOC. PSYCH. 97, 98 (1990).
C. Subsidizing-Investing Cycles

Paralleling the “supply-demand” cycle on supply chain contracting is the “subsidizing-investing” cycle in infrastructure development. In this virtuous cycle, a public or private actor subsidizes a sustainable or decarbonized infrastructure component, causing markets or governments to invest in building similar infrastructure to attract greater public subsidies or increased private investment. This can lead to public or private actors subsidizing that investment in future projects to shape particular projects to their own preferences.

In the U.S. context, an example of this cycle can be seen in the adoption of solar energy in Texas. Several companies, including Anheuser-Busch, have subsidized—or sponsored entirely—solar farm construction to power their Texas facilities. In response, Austin and other Texas cities have identified development of decarbonized grids (and especially solar farms) as a way to attract future investment in their cities.

Internationally, this cycle has been going on for longer, and we can see the beginnings of the full flywheel start to spin. As discussed in Section III.B. below, investment by major companies in “greening” their supply chain led to guaranteed markets for green power, which in turn led foreign direct investment in green energy infrastructure. To paraphrase the 1989 film Field of Dreams, Apple showed investors that “if you build it, [investment] will come:” renewable energy was worth the investment because buyers are

41. Press Release, Anheuser-Busch, Anheuser-Busch Celebrates Early Achievement of 2025 Renewable Electricity Sustainability Goal – Domestic Portfolio Now Brewed with 100% Renewable Electricity from Wind and Solar (June 1, 2021).

42. See Austin Energy, City of Austin, Our Energy Roadmap, at 10 (2014) (describing, as part of a broader modernization plan, the benefits of decarbonized grids for investment and development); see also City of Austin, Austin Strategic Direction 2023 7 (2022) (“A sustainable city finds a balance among three goal areas: (1) prosperity and jobs, (2) conservation and the environment, and (3) community health, equity, and cultural vitality.”); id. at 12–15, 20–23 (emphasizing Austin’s continued investment and financing of environmentally friendly infrastructure projects, including transportation and green spaces). While Austin’s local government does not have a public facing campaign to attract business based on its environmental record, its website readily features green business incentives in the main “Business” menu, and post-2014 investments in green energy have coincided with high levels of investment from environmental-image-sensitive technology companies. See Green Resources, AustinTexas.Gov, https://www.austintexas.gov/page/green-resources [https://perma.cc/88Z7-CWBL] (tracking Austin’s green business incentives); Jill Cowan & Tejal Rao, Are Apple’s Moves a Threat to Silicon Valley?, N.Y. TIMES (Dec. 14, 2018), https://www.nytimes.com/2018/12/14/us/california-today-apple-texas-expansion.html [https://perma.cc/RSRE-NA4G] (describing Apple’s investment in Austin); Margaret O’Mara, California May Lose Some of Its Stars. But Silicon Valley is Forever., N.Y. TIMES (Dec. 28, 2020), https://www.nytimes.com/2020/12/28/opinion/silicon-valley-exodus.html [https://perma.cc/E3Y6-5W8Q] (mentioning Oracle’s move to Austin).
looking for decarbonized grids to purchase energy from, even if they must pay a premium. However, to optimize these projects for their own purposes and suppliers, private parties continue to invest to subsidize (and regulate) new builds— their investment gives them a seat at the table in site selection, design, and other potentially advantageous decisions. For example, in 2018, the Apple-led China Clean Energy Fund expanded its reach, building out wind farms in regions best-suited to meet the needs of Apple’s suppliers. The cycle spins on.

Fig. 3. Subsidizing-Investing Cycle for Green Energy

D. Experimentation-Adoption Cycle

A fourth cycle is suggested by Sarah E. Light’s article *The Role of Universities in Private Environmental Governance Experimentalism*[^44] and Jessica F. Green’s book *Rethinking Private Authority*.[^45] Professor Light suggests that private actors engage in “policy experimentation” in the same way that we look to states as “laboratories of experimentation” for future federal policies.[^46] Professor Green similarly suggests that “private authority” can serve as a model for public governance, adopted either through observation of successful private experiments or private lobbying efforts to spur adoption of privately-created standards.[^47] Expanding on these theories, I propose that both public and private actors can show policy experimentation which the other adopts, experiments with, and then evolves into better policy that other parties in turn adopt for themselves.

Take, for example, supply chain management – environmental supply chain initiatives and certification methods have been experimentation laboratories in the private sector.[^48] At the most basic level, private governance has experimented with mapping supply chains and deepening

[^45]: Green, *supra* note 12.
[^47]: Green, *supra* note 12, at 47, 51.
the penetration of supply chain contracting from merely binding suppliers to creating mandates for suppliers of suppliers and so on. These practices have now been adopted by the U.S. Federal Government, among others. On the other hand, some experiments are less successful: efforts to integrate blockchain into supply chain management and sustainability efforts were proposed and tested by major corporations, but failed to add value and have been quietly phased out.

In the figures below, I illustrate a very basic structure of the experimentation-adoption cycle both in theory and in practice for certification regimes. In Section III.A, we will explore an example of experimentation-adoption in the certification regime by tracking the history and adoption of Marine Stewardship Council certification standards into public governance. In public adoption and experimentation, I suggest that public debate performs an analogous function to some types of private standards adoption—because Kantian leviathans are more limited in the public space, there is some experimentation (i.e. states as “laboratories of democracy” for each other and for the Federal Government), but there is

49. See id. at 156–57.
50. See discussion infra Section II.C (discussing the Draft Federal Acquisition Regulation).
52. Search results for “Blockchain” on the Walmart corporate site show only two results since 2019, one of which is about an NFT project unrelated to supply chain. See Blockchain search results, WALMART https://corporate.walmart.com/search?q=blockchain [https://perma.cc/98DG-ZGNS] (follow hyperlink; then search “blockchain”). For more information on the arguable potential and eventual failures of blockchain in supply chain management, see M. Adeel Munir et al., Blockchain Adoption for Sustainable Supply Chain Management: Economic, Environmental, and Social Perspectives, 10 FRONTIERS ENERGY RESCH. 1, 12 tbl.5 (2022).
53. See New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting) (“It is one of the happy incidents of the federal system that a single courageous state may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country.”); see also Jack L. Walker, The Diffusion of Innovations Among the American States, 63 AM. POL. SCI. REV. 880, 880–81 (describing the
also a great deal of pre-adoption experimentation with ideas and policies without formal adoption. Take, for example, the hundreds of bills that die in committee each year: these proposals operate in much the same way a certification standard without sufficient consensus would. In both cases, a single party representing its own interests (a company, NGO, or Congressperson) has put forward an idea into a body of its peers, but then to gain approval from a sufficient consensus to bring that idea to fruition.

Fig. 4.1. Experimentation-Adoption Cycle - General

![Diagram of Experimentation-Adoption Cycle - General]

Fig. 4.2. Experimentation-Adoption Cycle: Certification Regimes

![Diagram of Experimentation-Adoption Cycle: Certification Regimes]

operation of this principle in practice, including the adoption of innovations among and between States).

54. Committees, U.S. Capitol Visitor Ctr., https://www.visitthecapitol.gov/sites/default/files/documents/resources-and-activities/CVC_HS_ActivitySheets_Committees.pdf [https://perma.cc/85XK-FQQW] (“Most bills are never passed out of their committees .... For instance, in the 112th Congress, Second Session, 5,395 measures were introduced and 148 public bills were enacted into law. Bills ‘die’ in committee for various reasons.”); see also About the Committee System, U.S. Senate, https://www.senate.gov/about/origins-foundations/committee-system.htm [https://perma.cc/ZE4Y-TVVH] (“Only a small percentage of bills considered by committees reach the Senate floor.”); Basic Citation Forms: Bills, 15 FLA. STATE U. L. REV. 166, 166 (1987) (describing the Committee process of reviewing bills and the possibility of bills dying in committee).
II. VIRTUOUS CYCLES IN U.S. LAW

The models discussed in Section I have gained new practical potential as governments shift an adversarial to a collaborative relationship with the private sector on environmental issues. Over the past twenty years, the United States has shifted from using primarily enforcement-based public environmental law tools to combat environmental degradation, to engaging with and encouraging private environmental governance efforts as a primary tool to combat climate change. This section briefly describes that shift and the current U.S. private environmental governance-focused climate strategy, as expressed at COP27. It then summarizes key provisions of the Inflation Reduction Act of 2022 and explains how these provisions reflect a recognition of the capacity for public law/private governance to form the kinds of virtuous cycles conceptualized in Part I.

55. See infra notes 55–71 and accompanying text.
A. Establishing the Shift in U.S. Environmental Law

Early environmental law in the United States focused on forcing polluters to pay for their environmentally harmful effects.⁵⁶ The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA")’s designation of and enforcement actions against “potentially responsible parties;”⁵⁷ Toxic Substance Control Act ("TSCA")’s testing and certification requirements for chemical manufacturers, importers, and processors;⁵⁸ and Section 112 of the Clean Air Act’s maximum achievable control technology standards for major and area sources⁵⁹ all push costs for compliance and remediation of environmental impact on to the polluting party. After a nearly two-decade hiatus from the passage of major environmental regulation,⁶⁰ the IRA marks an emphasis shift to beneficiary-pays: subsidizing the adoption of environmentally friendly practices by those who would benefit from them.

Without historical context, the IRA might be seen as a political fluke. Even taken with other Biden Administration actions, as discussed in Section II.B and II.C, one could argue that the shift to beneficiary-pays climate legislation is a one-off product of the Biden Administration’s struggle to meet campaign promises in the face of a deadlocked Congress. On the contrary, careful examination of domestic U.S. action from the 2000s on reveals a slow but steady shift to a beneficiary pays approach. In 2009, the American Recovery and Reinvestment Act (ARRA) provided $16.8 billion dollars in Energy Efficiency and Conservation grants, including $2 billion in grants for the manufacturing of advanced vehicle batteries and hybrid electrical systems.⁶¹ In 2011, President Barack Obama pledged $2.4 billion in federal grants to support the development of electric vehicles and batteries.⁶² The shift to beneficiary-pays as a primary tool of environmental

⁵⁷. 42 U.S.C. § 9607(a) (outlining four different entities which qualify as PRPs); 42 U.S.C. §§ 9601–9675 (establishing the CERCLA enforcement framework; see also United States. v. Monsanto Co., 858 F.2d 160, 174 (4th Cir. 1988) (stating CERCLA is intended to “spread the costs of responding to improper waste disposal among all parties that played a role in creating the hazardous condition.”).
⁶⁰. Vandenberg, supra note 11, at 129.
remediation has quietly emerged over the course of a decade—the IRA and other Biden-era policies now bring it to the forefront.

This shift in policy was at the forefront of U.S. policy at COP27. The conference promised to be a diplomatic tightrope—President Biden was the only leader of a major polluting country to attend the annual talks. President Xi Jinping of China, President Vladimir Putin of Russia, and Prime Minister Narendra Modi of India, the other three top emitters globally, all declined to attend. While the United States ultimately approved the climate summit’s keystone initiative—a long-demanded loss and damages fund—the focus of the Biden Administration was on harnessing private markets for climate mitigation.

Biden’s comments reflect the U.S. turn to private markets as an important partner for public governance. His speech at COP27 can be summed up by one line: “good climate policy is good economic policy,” emphasizing the importance of government investment in private markets for environmental goods. He lauded the Inflation Reduction Act, citing a Department of Energy estimate that the subsidies and credits included in the act would reduce emissions by 1 billion tons in 2030 “while unleashing a new era of clean-energy-powered economic growth.” He also emphasized commitments to technology development citing an International Energy Agency opinion that the IRA’s investments have the potential to rev up the “clean energy economy.” Even his mentions of adaptation efforts by the U.S. cited collaboration with private governance. While the U.S. pledges to the publicly-stewarded Adaptation Fund were only $100 million, $2 billion was pledged for a project which partnered

64. See Rivera et al., supra note 9.
67. Id.
68. Id.
69. Id.
70. Id. (“My administration has also made the United States the first-ever contributor to the Adaptation Fund last year, and this year we’re doubling our pledge to bringing our
“American firms” and the government of Angola. Biden also urged collaboration with industry in the forestry and shipping sectors, co-launching the “Green Shipping Challenge” with Norwegian delegates to align private companies and ports with the 1.5 C decarbonization goal, and advocating interventions which financialize forest preservation as a tool to prevent deforestation. While President Biden’s remarks cited the work of young people, civil society, climate activists, and Indigenous communities, over 50% of the solutions cited in his speech were private governance focused. The Biden Administration’s Fact Sheet, released the same day as his speech, similarly emphasizes private sector solutions and collaboration. Unquestionably, Biden’s approach to COP27 was one which warmly embraced private governance as a vital tool of public environmental governance.

COP27’s attitude toward private engagement in climate efforts was not universally popular. Familiar critiques emerged, accusing corporations of only being interested in sustainability to greenwash, and alleging corporate involvement as a burden-shifting for governments or, at worst, a tool of colonialism. Coca Cola was a prominent sponsor of the conference, but


73. Id. ("[W]e’re finding consensus, building and understanding and launching new approaches. And the inspiring passion of young people, civil society, climate activists, Indigenous communities is literally galvanizing the world.").


75. See Frontline Leaders Decry Lack of Progress for Real Climate Justice at COP27 and Call for Further Action to Protect Millions of Lives, It Takes Roots,
was heavily accused of greenwashing after a MacArthur Foundation report found that, despite public-facing commitments, the company has increased its production of plastic.76 One delegate from COP26 even called for the revocation of Coca Cola’s position as a sponsor, given its “long history of lobbying to delay and derail regulations that would prevent pollution, keeping us addicted to disposable plastic.” The Biden Administration’s proposal to involve the private sector, and Ambassador John Kerry’s announcement of a carbon offset scheme “designed to help funnel private sector money to developing countries,” were likewise met with pushback. Activists critiqued the initiatives feasibility, while others claimed it was “a smokescreen to keep eyes off U.S. [public governance] failure to deliver on its government commitment to international climate aid.”77 However, these critiques—while important in holding decisionmakers to account—ignore the potential benefits in public-private collaboration.

B. Inflation Reduction Act of 2022

The Inflation Reduction Act of 2022 (“IRA”) was the largest federal action on climate change to date, and one of the only major pieces of federal


77. Justin Worland, Biden Has Had More Climate Wins Than Past Presidents. But It Will Never Be Good Enough, TIME (Nov. 11, 2022, 6:38 PM), https://time.com/6233223/biden-under-climate-pressure-cop27/ [https://perma.cc/3R8A-944E]; see also Oliver Milman, US Receives Stinging Criticism at COP27 Despite China’s Growing Emissions, THE GUARDIAN (Nov. 22, 2022, 2:00 EST), https://www.theguardian.com/environment/2022/nov/22/cop27-us-stinging-criticism-china-emissions [https://perma.cc/LM3N-FABU] (explaining that one activist, Ozawa Binshi Albert of the Climate Justice Alliance, stated that the carbon offset regime proposed by Kerry and his team “will only further condemn the African continent and global south nations to a future of pollution and environmental chaos, all for the benefit of the fossil fuel industry and big business.”); see IT TAKES ROOTS, supra note 75 (providing that Albert’s group, Climate Alliance, opposes the use of any fossil fuels and what it calls “false climate solutions” like carbon capture and any market solution, and opposes carbon markets as continuing to “perpetuate a longstanding legacy of colonialism and inequality.”); Milman, supra note 77 (noting that the focus of climate activists on the United States has led to visible frustration by the Biden Administration. According to Paul Bledsoe, a former Clinton White House climate advisor, Kerry’s team was “sick” of shouldering the blame because of the apparent bias from activists: “somehow the U.S. became the villain despite aggressive action on emissions, meanwhile Russia and China’s emissions are growing like crazy and yet they are not in the crosshairs of activists.”).
environmental legislation passed in twenty years. Devoting an estimated $369 billion to energy security and climate change, the Act was pitched by Senate Democrats as a step towards “reduc[ing] carbon emissions by roughly 40 percent by 2030.” The Act is powerful in its signaling of climate as a transpartisan goal, but also because it marks a significant endorsement of private environmental governance by the Federal Government. By focusing on incentivizing private action, the Federal government not only recognizes the power of private environmental governance but undermines the assumption that public and private environmental action are inherently at odds.

The IRA departs from previous U.S. environmental law. It does not prohibit carbon-intensive activities, nor do its climate provisions provide for any enforcement actions. Instead, it incentivizes private action through a series of subsidies, incentives, and credits, targeting both corporate and individual actors. By doing so, it sets up a remarkable public-private partnership on environmental action.

The primary instrument used to accomplish climate mitigation and adaptation in the Inflation Reduction Act of 2022 is subsidization of private action. This is, in part, a product of political necessity: to avoid a filibuster in the polarized Senate, the IRA was passed as a budget reconciliation bill.

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81. See infra Annex 1; see also Bipartisan Pol’y Ctr., Inflation Reduction Act Summary: Energy and Climate Provisions 17 (2022) (emphasizing the IRA’s emphasis on subsidy).

Despite these pragmatic considerations, it is also a signal of a much greater shift in U.S. environmental law: from a “polluter pays”\textsuperscript{83} approach to a “beneficiary pays” model subsidized by the government.

The following two subsections briefly analyze the beneficiary-pays subsidies found in the IRA, and the ways that they prompt corporate and individual shifts to decarbonization while embracing private environmental governance—setting off the virtuous cycles described in Part A. Summary tables of the relevant provisions of the IRA can be found in Figures 1 and 2.

1. Subsidies for Private Standards and Plans

One of the most explicit endorsements of private environmental governance in the IRA can be found in Sections 60111 and 60112. Section 60111 provides $5 million in federal funding to support “enhanced standardization and transparency of corporate climate action commitments and plans . . . enhanced transparency regarding progress towards [meeting and implementing plans].”\textsuperscript{84} Section 60112 devotes $250 million to the development of a program to support the development, enhanced standardization, and transparency, and reporting criteria for environmental product declarations, as well as grants for the development of greenhouse gas labeling and other environmental product declarations.\textsuperscript{85}

The IRA’s unprecedented pledge of financial and informational support to carbon labeling regimes and corporate climate commitments marks a

\textsuperscript{83}The OECD first described the polluter pays principle, stating that:

The principle to be used for allocating costs of pollution prevention and control measures to encourage the rational use of scarce environmental resources and to avoid distortions in international trade and investment is the so-called “Polluter Pays principle.” This principle means that the polluter should bear the expenses of carrying out the [above-mentioned] measures decided by public authorities to ensure that the environment is in an acceptable state. In other words, the cost of these measures should be reflected in the costs of goods which cause pollution in production and/or consumption. Such measures should not be accompanied by subsidies which would create significant distortions in international trade and investment.


\textsuperscript{85}Id. § 60112.
recognition and endorsement of private environmental governance efforts in the text of the legislation itself. Climate labelling has potential—if properly executed—to shift consumer and producer behavior. Disclosure and analysis of emissions by a corporation has been found to reduce their emissions over time, and assists corporations in identifying the cost-saving potential of emissions reduction. By identifying these private environmental governance tools as not only effective, but worthy of federal resources, Congress legitimatizes their place in the environmental discussion and recognizes their capacity as a tool for decarbonization.

2. IRA Corporate Behavioral Wedge Actions as Subsidizing-Investing Cycles

Beneficiary-pays subsidies, as modeled in the IRA, are a powerful model for shifting corporate action on climate. They are also a powerful example of the IRA’s capacity to harness a subsidization-investment cycle between U.S. companies and public law. Corporate actors are—at least in the view of most economists—rational. They are inherently more susceptible to financial incentives than individuals, who may be motivated by internal heuristics and biases in ways that can be attenuated by shareholder pressure and diffusion of decision-making power through a Board of Directors.

87. See Vandenbergh, supra note 11, at 194.
88. Id. at 159.
91. This proposition, while generally accepted in corporate law, is the subject of a significant forthcoming research project by the author.
Modern businesses have strong incentives to decarbonize: beyond climate change’s existential threat, physical risks from rising sea levels, stronger storms, and changing weather patterns threaten corporate bottom lines. Investors, consumers, and employees increasingly express preferences for decarbonization. While there are some political disincentives to decarbonization, the primary barriers are financial. Even though decarbonization can increase profits, reduce costs, and assist in finding efficiencies in the long term, there can be significant up-front costs to investing in energy efficient systems or even quantifying energy needs. By reducing or paying these up-front costs, subsidization removes financial disincentives for decarbonization and pushes businesses towards the rational act of adopting low-carbon alternatives, which then leads public and private actors to invest in low-carbon infrastructure, subsidizing future adoption.

92. See, e.g., Emma Cox et al., Time to Get Serious About the Realities of Climate Risk, PwC (May 16, 2022), https://www.pwc.com/gx/en/services/sustainability/publications/risks-and-opportunities-of-climate-change-on-business.html [https://perma.cc/CVB3-V4C8]; Larry Fink, A Fundamental Reshaping of Finance, BLACKROCK (2020), https://www.blackrock.com/us/individual/larry-fink-ceo-letter ("Climate risk is investment risk. [Investors] are seeking to understand both the physical risks associated with climate change as well as the ways that climate policy will impact prices, costs and demand across the entire economy.").

93. See VANDENBERGH & GILLIGAN, supra note 90, at 136, 138, 142–43, 146, 149.

94. For example, political officials in Texas and Florida have roundly criticized and threatened enforcement action against investment groups that consider ESG. See Press Release, Att’y Gen. of Tex., Paxton Launches Investigation into S&P Global’s Use of ESG Factors in Credit Ratings, Potentially Violating Consumer Protection Laws (Sept. 28, 2022) (available at https://www.texasattorneygeneral.gov/news/releases/paxton-launches-investigation-sp-globals-use-esg-factors-credit-ratings-potentially-violating [https://perma.cc/98QR-3F7C]); see also Press Release, Governor of Fla., Governor Ron DeSantis Eliminates ESG Considerations from State Pension Investments (Aug. 23, 2022) (available at https://www.figov.com/2022/08/23/governor-ron-desantis-eliminates-egs-considerations-from-state-pension-investments/ [https://perma.cc/BJAL-PFSY]). There has also been occasional customer blowback for actions that align certain companies with “woke” or “liberal” causes, including climate change. Julie Creswell, Beyond Meat is Struggling, and the Plant-Based Meat Industry Worries, N.Y. TIMES (Nov. 24, 2022), https://www.nytimes.com/2022/11/21/business/beyond-meat-industry.html [https://perma.cc/QVX8-HMVJ] ("Deloitte analysis said [a problem with Beyond Meat’s decline] might be resistance to a product that some segment of customers see as ‘woke’ and linked to politically left-leaning ideas. In August, when [Cracker Barrel] stated on its Facebook page that it had begun offering the meatless ‘Impossible Sausage,’ the post was flooded with thousands of comments from irate customers [including] ‘Go woke, go broke.’").

95. VANDENBERGH & GILLIGAN, supra note 90, at 126–27.

96. Id. at 127.
Take, for example, Section 13403 of the IRA, which subsidizes, in the form of a new tax credit (1.A.IV.D.45W) the incremental costs of purchasing electric vehicles as new or replacement commercial vehicles.\textsuperscript{97} Electric vehicles present opportunities for cost savings on their face: a study from the U.S. Department of Energy’s National Renewable Energy Laboratory found that electric vehicles saved drivers up to $14,500 on fuel over 15 years of driving.\textsuperscript{98} Other analyses suggest that “the cost of running an electric car is thought to be the equivalent of $2 per gallon”\textsuperscript{99} – significant savings when compared to today’s average gas price of over $3.50.\textsuperscript{100} Despite this, companies may be discouraged from fleet upgrades to electric vehicles because of their high costs. In 2022, the Nissan Sentra’s base model was available for $21,045, while the 2022 all-electric Nissan Leaf retailed for at least $7,400 more, at $28,495.\textsuperscript{101} Especially for companies looking to purchase in bulk, the wide delta between the two models could be difficult to justify: savings on gas amortize over multiple quarters, whereas high replacement costs hit a balance sheet at a single moment in time, discouraging high-cost expenditures in any given quarter.\textsuperscript{102} The tax credit


\textsuperscript{99} Lydia Noyes, Do Electric Vehicles Save Money on Gas?, LEAFSCORE (Jan. 4, 2023), https://www.leafscore.com/auto/hwo-much-money-can-an-electric-vehicle-save-you-over-a-gas-powered-one/#:~:text=According%20to%20a%20study%20from,for%20every%20year%20of%20driving [https://perma.cc/6VX9-YMLB].

\textsuperscript{100} National Average Gas Prices, AAA GAS PRICES, https://gasprices.aaa.com/ [https://perma.cc/7SHL-DUM6]. The average American gas price for November 22, 2022 was $3.636. \textit{Id}. Six days prior, California drivers (who paid the highest average gas price reported on that date) paid an average of $5.402 per gallon of gas. \textit{California Average Gas Prices, AAA GAS PRICES, https://gasprices.aaa.com/?state=CA [https://perma.cc/VQ4U-EN9U]. Even in the lowest gas cost state reported (Texas, at $3.162 per gallon), drivers on November 10, 2022 would have saved above $1 per gallon on an electric vehicle. Texas Average Gas Prices, AAA GAS PRICES, https://gasprices.aaa.com/?state=TX [https://perma.cc/GAP4-KLPT].


for incremental costs of electric vehicle purchase removes the financial disincentives of short-term savings, equalizing the cost of electric and alternative vehicles at the outset. By doing so, the credit encourages rational corporate actors to select electric vehicles, given their potential long-term savings are no longer outweighed by the short-term benefits of a gas model’s sticker price.

While the tax credits and push to inspire green behavior in day-to-day corporate action are significant in the fight against climate change, they are less interesting to scholarship than the explicit endorsement of private environmental governance in the text of the Act itself. In several places, the IRA provides federal funding to encourage companies to enter into private environmental governance initiatives. Section 23002 provides States with funding for competitive grant programs targeting small owners of forest land. Section 23002 explicitly funds grants to encourage forest owners to “participate . . . in emerging private markets for climate mitigation and forest resilience.” While paired with other opportunities to directly fund climate mitigation and forest resilience with federal grants, this recognition of participation in private environmental markets is a significant departure from the adversarial polluter pays principle. Instead, Section 23002 recognizes private markets for climate mitigation as a tool in public governance’s arsenal: if Federal funds can provide the impetus for forest owners to enter private environmental markets, economic forces within those markets will encourage and shape desired environmental practices.

Section 23002 is not the only endorsement of private environmental governance in the IRA. Section 40007 includes in its desired criteria for recipients of grants for the development of sustainable aviation fuel that they have “the capacity to . . . develop supply chain partnerships in the

VWCD). At a base level, the issue is more in raw cost difference than in savings over time versus up-front costs, though the incentives to avoid short-term costs can be significant in certain contexts.

103. See Keith Barry, Electric Cars and Plug-In Hybrids That Qualify for Federal Tax Credits, CONSUMER REPS. (Apr. 20, 2023), https://www.consumerreports.org/cars/hybrids-evs/electric-cars-plug-in-hybrids-that-qualify-for-tax-credits-a7820795671/#:~:text=New%20electric%20and%20fuel%2Dcell,will%20also%20continue%20to%20qualify.&text=Only%20vehicles%20that%20cost%20below,vans%2C%20the%20threshold%20is%20%2480%2C000 [https://perma.cc/S7BF-AP8W] (explaining that the Inflation Reduction Act “offers a tax credit of up to $7,500 on new EVs”).


105. See id. § 23002.

106. Id. § 23002(a)(1)–(2).
Sections 13702 and 13502 both create tax credits that target novel elements of private markets to maximize incentives for clean energy production: 13702 provides tax credits for investors in qualified renewable energy production facilities or energy storage facilities, while 13502 credits manufacturers of solar and wind energy components. Compared to prior laws, which merely targeted producers of renewable energy itself, the IRA recognizes that private governance forces, from investor pressure to supply chain negotiation, can shape decarbonization, and targets each in turn. Even contractors receive incentives for decarbonization: Section 50121(b) provides contractors performing home energy efficiency retrofits or aggregators of claims $200 for the retrofit of each home in a disadvantaged community that receives a home energy efficiency retrofit for which a rebate is provided under 50121(c)’s larger HOMES retrofit incentives. This not only incentivizes the contractors themselves to carry out qualified retrofits, but creates incentives for contractors and “aggregators” (most likely, developers) to market retrofits to consumers in order to cash in their tax credit. Contractors are also incentivized to train on energy efficiency. Perhaps fearing that the market for contractors capable of carrying out Section 50122-funded efficiency projects would be too lean, Congress included Section 50123, which subsidizes the training and certification of contractors on the installation of energy efficient devices.

The IRA goes as far as recognizing the power of merely convening relevant stakeholders in a particular market. Section 50153 appropriates $100 million “to pay expenses associated with convening relevant stakeholders to address the development of interregional electricity transmission” and integration of offshore wind energy, as well as planning, modeling, and other research requirements related to this integration. Interestingly, the language of what the funding is to discuss includes “the benefits of increased interconnections . . . between or among the Western Interconnection, the Eastern Interconnection, the Electric Reliability Council of Texas, and other interconnections . . . “ and the “economic development opportunities for communities” arising from interregional and offshore wind transmission. These clauses are fascinating because they aim to collaborate between and coordinate a variety of non-profit corporations

107. Id. § 40007(b)(3).
108. See id. §§ 13502, 13702.
110. See id. § 50123(a).
111. Id. § 50153.
112. Id. § 50153(2)(G), (J).
that run the United States’ electric grids to spur public economic development. The Electric Reliability Council of Texas (ERCOT) and the Eastern and Western Connections are, or are made up of, 501(c)(4) corporations. While they work closely together and in conjunction with the Department of Energy (DOE), they also operate as private corporations, including developing long-term energy supply futures markets. Bringing together these corporations, with DOE as a convenor, to discuss economic developments and joint benefits abuts with political antitrust scrutiny of environmental collaboration. Even more fascinating is the use of the IRA to spur economic development: as discussed below, the use of private actors (here, ERCOT and its peers) to spur economic development, which in turn can attract private actors, has the potential to spur a virtuous cycle of public and private environmental action.

The most powerful force harnessed by the IRA, perhaps, is the openness of corporate actors to financial incentives. Companies, the logic goes, should “skate to where the money will be.” The panoply of financial incentives provided by the IRA has spurred new investment in decarbonization markets. Public legislation and public money are spurring private environmental governance. Trade publications indicate shifting preferences by fleet owners on vehicle procurement: not only are fleet owners incentivized by IRA Section 13403’s incremental replacement cost tax credit to purchase an electric vehicle instead of a gas vehicle when replacing or expanding fleet cars, but increased availability of electric cars.


114. DOE OFF. OF ELEC., supra note 113.


vehicles is leading companies to seek out contracts with electrified fleets.\footnote{118} Markets for electric fleet-as-a-service are growing, spurring investment in electrified fleets\footnote{119} and incentivizing owners to enter the market by growing the electrified shares of their own fleets.\footnote{120} Sector growth arising from the IRA is even more visible in the U.S. battery sector, where both actualized and prospective government subsidies for electrification is leading to a gold rush to build enabling infrastructure for battery production. North Carolina, which had seen an exodus of lithium companies due to outsourcing, is seeing investment flow back in the wake of the IRA.\footnote{121} The IRA “turbocharged” interest in U.S. battery production, with companies committing over $13.5 billion in investments in the first two months after its enactment.\footnote{122} Other states, including Georgia, Arizona, and West Virginia\footnote{123} are also seeing significant investment: an $850 million polyvinylidene fluoride plant has been sited in Georgia by chemicals groups Solvay and Orbia, and project developer EVelution Energy has committed to building a $150 million cobalt refinery in Arizona.\footnote{124}

Overwhelmingly, the IRA’s corporate behavioral wedge actions follow a trend established in U.S. law throughout the 2000s and 2010s towards embracing private governance as an amplifier for public climate goals. The IRA’s subsidies are meant to spark—and already have started—supply-demand cycles within private markets for environmentally friendly goods. These actions are only enhanced by the adoption of individual behavioral wedge actions, which increase demand-side pressure for environmental goods and encourage individual adoption and identification with climate goals.

\footnote{118. Id.}
\footnote{119. Id. (FaaS provider Zeem “recently secured a $50 million investment from ArcLight Capital Partners to expand its FaaS offerings, which provides companies with battery-electric trucks, vans, and shuttle buses for a monthly fee.”).}
\footnote{121. Harry Dempsey & Myles McCormick, Billions Flow to Nascent US Battery Sector with Push from Climate Law, FIN. TIMES (Nov. 16, 2022), https://www.ft.com/content/05e7a6ba-bdde-4c3b-b7d1-657523204021 [https://perma.cc/Z6S7-PMLW].}
\footnote{122. Id.}
\footnote{123. Id. (discussing a company called Sparkz which intends to build “a battery plant in rural West Virginia that will hire coal miners displaced as use of the fossil fuel declines.”).}
\footnote{124. Id.}
3. IRA Individual Behavioral Wedge Actions as Adoption-Communication-Normalization Cycles

The Inflation Reduction Act also subsidizes individual actions to decarbonize. This section briefly discusses the ways individual action fits into the virtuous cycle framework, and then describes the IRA provisions which subsidize individual behavior.

As discussed in more detail in Section I.B., subsidizing individual action can be a powerful driver of virtuous cycles because of the network and communications effects it incurs. To the extent that consumer behavior shapes corporate action, subsidizing individual decarbonization can also increase consumer demand for decarbonized goods and services: Harvard Business Review identifies social influence and domino effects as primary drivers of green action by consumers,125 both of which are magnified by adoption subsidies.

The IRA subsidizes individual action in three primary categories: Electric Vehicle adoption, residential energy efficiency, and renewable energy adoption. In the latter two categories, the IRA also extends its behavioral wedge initiatives to multi-family home units, allowing subsidization of developers and collectives controlling multiple dwellings. For multi-family units run as small or medium-size businesses, or for corporations who own multiple single-family units and are eligible for multiple incentive payments, many of the cycles described in Section I.A.ii apply. The below table summarizes the Sections of the IRA which provide incentives or subsidies for individual or private adoption of decarbonization measures.

<table>
<thead>
<tr>
<th>Section</th>
<th>Category</th>
<th>Funding Allocated (in Billions of dollars)</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>60103</td>
<td>Residential Energy Efficiency &amp; Renewable Energy</td>
<td>27 (7 to State, local, and non-profit agencies, 20 to non-profits)</td>
<td>Grants for rapid deployment of low- and zero- emission technologies, including 20 billion expressly for non-profits to leverage private investment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>60201</td>
<td>Residential Energy Efficiency</td>
<td>1.5 Residential building shell incremental costs, included in grants and technical assistance to implement community-led projects in environmental justice communities.</td>
</tr>
<tr>
<td>50121</td>
<td>Residential Energy Efficiency</td>
<td>4.3 Through State energy offices, extends the HOMEs rebate program through 2021.</td>
</tr>
<tr>
<td>50122</td>
<td>Residential Energy Efficiency</td>
<td>4.5 Through state energy offices and Indian Tribes, implementation of a rebate program for the adoption of energy-efficient home appliances (stoves, cooktops, etc.).</td>
</tr>
<tr>
<td>30002</td>
<td>Residential Energy Efficiency</td>
<td>0.837 Direct loans and grants to projects that will improve energy/water efficiency and lower emissions in residential properties.</td>
</tr>
<tr>
<td>13301</td>
<td>Residential Energy Efficiency</td>
<td>n/a Extends and increases the Internal Revenue Code’s § 45L credit for energy efficiency (Energy Star) single-family new homes or manufactured homes and Energy Star Multifamily New Construction homes.</td>
</tr>
<tr>
<td>13401</td>
<td>Electric Vehicle Adoption</td>
<td>n/a Maintains tax credits in Internal Revenue Code § 30D, and increases available tax credit for certain income brackets in 2024 and 2026.</td>
</tr>
<tr>
<td>13402</td>
<td>Electric Vehicle Adoption</td>
<td>n/a Creates tax credit in Internal Revenue Code § 25E for consumers purchasing a previously owned electric vehicle.</td>
</tr>
<tr>
<td>80003</td>
<td>Renewable Energy</td>
<td>.150 Through the Bureau of Indian Affairs, electrification.</td>
</tr>
</tbody>
</table>

126. This section is difficult to qualify as either public or private governance, given the unique legal status of Indian Tribes under U.S. law. On the one hand, the Bureau of Indian Affairs (BIA) is a public agency that will deliver services to individual tribes, including electrification. *See Indian Energy Service Center, U.S. Dep’t of the Interior Indian Affs., https://www.bia.gov/bia/ots/iesc [https://perma.cc/W4CK-6LAU]. On the other hand, the BIA is likely to engage this primarily through subsidization of individual tribal action or
renewable energy transition, and retrofit and repair of Tribal homes.

Far from being weakened by private environmental governance, the individual behavioral wedge provisions of the IRA would have almost no impact\textsuperscript{127} without private action, and in fact are only strengthened by private environmental governance efforts. Take, for example, the much-hyped tax credit for electric vehicle adoption in IRA § 13401. The IRA provides a tax credit for certain electric vehicles, but that tax credit is near-meaningless if consumers cannot afford an electric vehicle in the first place, or if the transition to an electric vehicle requires too much sacrifice on their part. We can think about these dual challenges through the lens of a feasibility analysis: if a tax credit is only available for those who purchase a $1 million vehicle, we know that the pool of those who could use the credit is very small. If the same vehicle required drivers to stop for 30 seconds every five minutes of driving, then it would strain the potential behavioral plasticity of the adopters—the behavior change required for use would be too great for any trade-off to be worth it. Either way, the tax credit would have limited or no impact on consumer behavior. While these examples are extreme, both the pool of potential adopters of electric vehicles and the behavioral plasticity of each additional adopter is a vital consideration to the success of the tax credit: electric vehicles remain out of reach for many Americans because their price exceeds that of a similar gas-powered vehicle, and infrastructure has not yet proliferated to an extent which makes adoption frictionless: electric vehicle owners must change their driving habits to account for charging necessities as opposed to gas stations. However, by subsidizing consumer adoption of an electric vehicle through a tax credit, public governance spurs private action: car manufacturers see a subsidized market, and have expanded their operations in the United States to fill that market.\textsuperscript{128} Seeing subsidies and market growth, investors have expanded their ESG activity: Fidelity’s Environmental and Alternative Energy Fund manager, Asher Anolic, quickly issued promotional materials citing the

\textsuperscript{127} See \textit{supra} text accompanying note 126 for discussion of state and local government-driven initiatives and the BIA initiatives.

\textsuperscript{128} Michelle Ma, \textit{Companies are Finally Investing in Making EVs in the US. Here’s a Running List.}, PROTOCOL (Oct. 10, 2022), https://www.protocol.com/climate/ira-ev-tax-credits-us [https://perma.cc/38QH-SW34].

https://digitalcommons.pace.edu/pelr
IRA’s climate section, predicting that “companies that design and produce products or services to fight global warming will see increased demand for their businesses, likely at a greater pace than that of US GDP, from both the public and private sectors.”

Similarly, the behavioral wedge actions in the IRA have the ability to establish “toe-holds” in conservative communities to reduce behavioral friction towards adoption of environmental policies. As mentioned in Section I.B., conservative-identified social groups are strongly influenced by social modeling of in-group elites. Though behavioral friction will prevent some individuals from uptake of behavioral wedge initiatives in the IRA, the corporate wedge provisions listed in Figure 6 provide powerful incentives for rational corporate actors to adopt some environmentally friendly behaviors. Once adopted, their social norm-setting has the capacity to break some group norm-based behavioral friction amongst conservative consumers, and remove fears of social ostracization for defection from group norms. This removal of potential sources of behavioral friction encourages more and more people to take economically rational steps to decarbonize as incentivized by Figure 5’s listed individual provisions, making full or near-full uptake of the IRA’s behavioral wedge provisions more likely. In turn, individual adoption and normalization of environmentally friendly actions in conservative communities remove disincentives for corporations with large conservative consumer or investor bases to decarbonize, which in turn allows them to take advantage of the plethora advantages of decarbonization. In this way, the corporate provisions and individual behavioral wedge provisions of the IRA form a powerful adoption-communication-normalization cycle.

C. Bringing Cycles Together: Draft Federal Acquisition Regulation

Another important public endorsement of private environmental governance came on November 14th, 2022, with the promulgation of the Federal Acquisition Regulation: Disclosure of Greenhouse Gas Emissions and

130. See supra text accompanying notes 35–40.
132. See Gillis et al., supra note 37, at 8 (suggesting conservatives are particularly susceptible to corporate social norm-setting in the climate space).
Climate-Related Financial Risk ("Draft FAR"). The FAR, which was jointly proposed by the Defense Department ("DoD"), General Services Administration ("GSA"), and National Aeronautics and Space Administration ("NASA"), imposes disclosure requirements on major and significant suppliers of goods and services.

The FAR requires that significant contractors (those whose contracts with the federal government give rise to $7.5-$50 million in obligations per year) and major contractors (greater than $50 million in obligations per year) disclose GHG emissions and climate-related financial risks. The FAR also requires that these two groups, which it collectively calls "major Federal suppliers" set targets to reduce their GHG emissions using the Science-Based Target Initiative's ("STBi") standards and post these commitments on a public-facing website. This incorporation-by-reference of the STBi provides a clear example of an experimentation-adoption cycle: STBi is a private environmental governance standard which provided powerful proof-of-concept and credible organizational structure that the Federal Government can now piggyback on, validating the private governance structure through incorporation into public standards while preventing trial-and-error expenditures of valuable time and resources by Federal Agencies.

The FAR begins with a recognition of the importance of public disclosure in part because:

The global, rapid shift away from carbon-intensive energy sources and industrial processes towards decarbonized, climate-resilient economies will help to mitigate [physical and other climate-caused] risks while also enhancing U.S. competitiveness and economic growth, promoting

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134. Id. ("The purpose of this proposed rule is to amend the [Federal Acquisition Regulation] to establish a policy to ensure major Federal suppliers make the required disclosures and set targets to reduce their GHG emissions.").

135. Id. at 68,313 (defining significant and major contractors and required disclosures, respectively).

136. Id. at 68,314.

environmental justice, and creating well-paying job opportunities for American workers.138

This preamble recognizes the importance of private sector decarbonization to achieve climate goals. However, the FAR itself goes much further, setting off far-reaching effects beyond the government’s own supply chains.

The draft FAR has the potential for massive impact on private environmental governance. Government contracting pays out $637 billion from the Federal Government to its contract partners each year.139 While the FAR only covers contracts from the DoD, NASA, and GSA, the DoD alone spends $421.8 billion a year on contracting: $203.6 billion on services and $218.1 billion on goods.140 The GSA and NASA spend only a fraction of that ($17.5 billion141 and $19.5 billion142 respectively on combined goods and services contracts) but still have massive financial weight. Further, the FAR does not merely extend to those in contractual privity with the Federal Government. Instead, the disclosure requirements have the potential to influence not only those with existing contracts, but those who hope to have a contract. Because suppliers must be in compliance with the federal disclosure requirements, those competing for government contracts must also be—or be reasonably well-equipped to—come into compliance if that contract were to be awarded, extending the incentives to disclose from those actually contracting with the government to any company who wants to pursue a contract with the government. Given the financial opportunities available through these contracts,143 the FAR provides strong incentives for firms to disclose.

The draft FAR also endorses existing private environmental governance initiatives and standards. It adopts the Office of Management and Budget’s recommendation on incorporating private environmental standards, such as the TCFD and CDP, into federal regulations.\textsuperscript{144} By doing so, OMB and the FAR’s proposing agencies recognize that these private standards can work in tandem with government action. While the EPA could certainly promulgate its own standards, it has little incentive to do so when private initiatives have already expended the financial effort and technical expertise required to set, test, and spur adoption of climate standards. Incorporating the work of SBTi, Carbon Disclosure Project (“CDP”), Task Force on Climate Related Disclosures (“TCFD”) and others allows limited federal resources to be diverted elsewhere, ultimately providing a fuller scope of environmental governance overall.

\section*{III. EMBRACE OF PRIVATE ENVIRONMENTAL GOVERNANCE IN PUBLIC INTERNATIONAL LAW AND POLICY}

International law is especially well-set-up for embrace of private environmental governance. Private environmental governance is a useful gap-filler in areas where leviathan-implemented or -enforced rules are impractical or impossible. International law can be especially prone to these kinds of gaps.\textsuperscript{145} This section discusses two examples of private environmental governance filling gaps in public environmental law at the international level that have since sparked virtuous cycles: the Marine Stewardship Council’s development of fisheries certification standards, and the subsidization of green energy by Apple and other corporate actor’s supply chain requirements.

\subsection*{A. Experimentation-Adoption: The Marine Stewardship Council Certification and the United Nations Food and Agriculture Organization}

The birth, growth, and embrace of Marine Stewardship Council (MSC) certification is a powerful example of a warming attitude to private environmental governance in international law. Certification and labeling systems are archetypal examples of private environmental governance and

\begin{footnotesize}
\textsuperscript{144} See Memorandum from Shalanda D. Young, Brenda Mallory & Gina McCarthy, Exec. Off. of the President, to the Heads of Executive Departments and Agencies (Dec. 8, 2021), https://www.whitehouse.gov/wp-content/uploads/2021/12/M-22-06.pdf [https://perma.cc/MFZ7-YSQ5].

\textsuperscript{145} See GREEN, supra note 12, at 39, 47.
\end{footnotesize}
demonstrate the power of experimentation-adoption cycles in strengthening public and private governance.\textsuperscript{146}

The MSC emerged as a result of chronic overfishing stemming from gaps in public governance of fisheries.\textsuperscript{147} In 1992, the Canadian government announced an indefinite shutdown on cod fisheries in Newfoundland and Labrador after advances in fishing technology and a growing demand for cod led to a precipitous decline in cod populations.\textsuperscript{148} Prior to the moratorium, Canada had attempted to limit exploitation of its cod fisheries by establishing a quota system within its territorial waters.\textsuperscript{149} Despite cooperation from other sovereign governments and an expansion in the scope of territorial waters,\textsuperscript{150} overfishing continued, spurred by efficient fishing technology, overexploitation of cod populations in the extra-jurisdictional zones at the “nose and tail” of the fishery in international waters, and defection from the quota system by EU nations.\textsuperscript{151} Within Canada’s territorial waters, the Canadian government ignored warnings to lower quotas: the sovereign had to balance the short-term threat of unemployment against a somewhat longer-term risk of cod population collapse, and chose to maintain employment at the risk of the cod.\textsuperscript{152} The biomass of northern cod dropped ninety-three percent in 30 years, reduced to only 110,000 tonnes in 1992.\textsuperscript{153}

While the collapse of the northern Atlantic cod fishery was a result of rational, economically driven behavior by nation-states, it served as a wake-up call to the fishing industry and environmental groups. In 1996, conservationists from the World Wildlife Fund began talks with Unilever—a massive consumer goods conglomerate and one of the world’s biggest

\textsuperscript{146} See Vandenbergh, supra note 11, at 148–50.
\textsuperscript{147} Id. at 149; Statement of Intent, UNILEVER & WORLD WILDLIFE FUND, http://20-years.msc.org/media/agreement-wwf-unilever-msc-lr_vwbjzz.jpg [https://perma.cc/495X-JTJY] (“Worldwide consumer demand for fish is steadily rising; but scientists warn that fish stocks are in serious decline.”).
\textsuperscript{149} Id.
\textsuperscript{150} In 1977, Canada, the United States, and other coastal nations expanded their jurisdiction to 200 nautical miles beyond their coastlines. Id.
\textsuperscript{151} In 1986, after the EU started setting competing quota systems, its “harvest of cod, flounder, and redfish . . . was five times the NAFO quota [while] some countries avoided . . . regulations by registering their vessels to non-NAFO nations and flying flags of convenience.” Id.
\textsuperscript{152} Id.
buyers of fish\textsuperscript{154}—to investigate new ways to prevent population collapse.\textsuperscript{155} Unilever, motivated both by supply chain risks and pressure campaigns from NGOs like Greenpeace,\textsuperscript{156} recognized the need for what MSC now calls “synerg[ies] [between] commerce and conservation.”\textsuperscript{157} In other words, they hoped to develop a system of private governance.

Unilever and MSC looked to the lessons of public governance—and the model set by another certification system, the Forest Stewardship Council (FSC) to create their system.\textsuperscript{158} They worked to separate the Marine Stewardship Council from subsidiarization under either Unilever or WWF, understanding that buy-in from other organizations and consumers would require independence.\textsuperscript{159} In crafting their certification regime, they looked to the American Administrative Procedure Act for inspiration, adopting many of its core functions.\textsuperscript{i} As the MSC gained respect and proliferated through global fisheries in the early 2000s, it in turn served as a model for the United Nations Food and Agriculture Organization’s Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Facilities, which used the successful certification regime to establish a baseline threshold for ecolabelling of fisheries in general.\textsuperscript{160}

MSC is an archetypal example of the kinds of success that experimentation-adoption cycles can provide to both public environmental law and private environmental governance. MSC was successful in part because of its adoption of the American Administrative Procedure Act—a standard that had a proven history of demonstrating critical administrative law values such as transparency and uniformity.\textsuperscript{161} In turn, the success of

\begin{itemize}
  \item \textsuperscript{154} \textsc{Unilever \& World Wildlife Fund, supra note 147} (identifying Unilever as “a major buyer of frozen fish and manufacturer of many of the world’s best known frozen fish products…”); \textit{see also Unilever, Fishing for the Future II: Unilever’s Fish Sustainability Initiative I} (2020) (identifying Unilever as one of the world’s biggest buyers of fish) [hereinafter \textit{Fishing for the Future II]}.
  \item \textsuperscript{155} \textit{Fishing for the Future II, supra note 154, at 2} (explaining that in the era after the MSC’s development, the proliferation of governance on fishing practices has only grown more pressing. According to Unilever’s sustainable fisheries report, over one billion people in Asia and Africa depend on ocean fish for their protein, while seafood consumption in the U.S. and Europe have doubled in 30 years.).
  \item \textsuperscript{156} \textit{The Press Ass’N \& Marine Stewardship Council, Sustainable Seafood: The First 20 Years} (2017), http://20-years.msc.org/ [https://perma.cc/9DH4-8X8G].
  \item \textsuperscript{157} \textit{id.}
  \item \textsuperscript{158} \textit{id.}
  \item \textsuperscript{159} \textit{id.}
  \item \textsuperscript{160} \textit{See generally U.N. Food \& Agric. Org., Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries 6–11} (2005).
\end{itemize}
the MSC certification provided public governance institutions like the Food and Agriculture Organization with a successful model for their own standards, and a successful baseline which they could set for future competitive certification regimes. By passing the FAO’s new standards for certification regimes, MSC strengthens trust in the FAO by showing their standards are based in reality, and proves its own merit as a certification regime. Both public and private governance strengthened, experimented with, and learned from the adoption and proliferation of each other’s certification systems.

B. Supply-Demand: Apple, Pepsi, and Carbon Markets

Although many at COP27 decried private investment as a vehicle for environmental remediation, private environmental governance through supply chain requirements has been a powerful tool for environmental change. The positive supply-demand cycles sparked by supply chain requirements on global decarbonization are even more apparent when analyzed in conjunction with their relationship to public governance. Private environmental governance, paired with public efforts to attract and secure sustainable investment, form a strong virtuous cycle.

Take, for example, investment in decarbonization in Southeast Asia. In 2015, Apple announced that its operations in China were decarbonized, in programs that they predicted would “avoid over 20 million metric tons of greenhouse gas pollution in the country between [2015] and 2020.” To accomplish this goal, they constructed 40 megawatts of solar projects in Sichuan Province, and committed to partnering with its suppliers and manufacturers to install more than 2 gigawatts of clean energy infrastructure (400 megawatts at Foxconn alone). This investment served

162. See IT TAKES ROOTS, supra note 75 (discussing COP27 critiques of non-no-strings-attached climate project funding).


164. Id. (explaining that Foxconn is the main factory facility for manufacture of Apple’s iPhones, among other devices. Foxconn is the world’s largest technology manufacturer and is the largest private employer in the People’s Republic of China. While Foxconn has now positioned itself as a leader in green technologies, it has not been without its controversies, however, including a spate of suicides in the 2010s linked to brutal working conditions and low pay.); see also Brian Merchant, Life and Death in Apple’s Forbidden City, THE GUARDIAN (June 18, 2017, 4:30 EDT), https://www.theguardian.com/technology/2017/jun/18/foxconn-life-death-forbidden-city-longhua-suicide-apple-iphone-brian-merchant-one-device-extract [https://perma.cc/7R98-HNN3]; ESG Vision & Strategic Goals, FOXCONN,
as “proof of concept” for the value of decarbonized grids, and Foreign Direct Investment (“FDI”) flowed into other countries in Southeast Asia looking to develop their own decarbonized grids and sell the energy therefrom. In Laos alone, FDI tripled between 2021 and 2022 from $989 million to over $3 billion because of investment in a new hydropower system. By showing that they were willing to pay to build out their own green energy infrastructure, Apple powerfully demonstrated that there was demand for green electricity. In turn, Foreign Direct Investment was able to target funding in green infrastructure to maximize returns for host governments.

COP27 also showed the international embrace of private demand as a tool for climate mitigation in its approach to investment in the African Continent. Two key initiatives, the African Carbon Markets and Rainforest Alliance, embraced private demand for environmental goods as powerful tools for decarbonization. COP27 saw the launch of the African Carbon Markets initiative, which aims to “produce 300 million carbon credits annually on the continent by 2030, unlock $6 billion in revenue, and support the creation of 30 million jobs.” Democratic Republic of Congo, joined by Indonesia and Brazil, looked towards monetization of their tropical forests as a way to protect their powerful carbon sink potential. Both of these efforts show an embrace for private environmental governance, especially when public governance is slow to protect the environment.


CONCLUSION

Private environmental governance is essential to our efforts to mitigate the worst impacts of the pending climate crisis. Despite this, critics continue to allege that private environmental governance undermines public environmental efforts. This paper proposes four models through which public and private governance interact to mutually reinforce efforts to decarbonize, then demonstrates the power of these models through public governance’s embrace of private environmental initiatives in the United States and abroad. Neither public nor private governance can solve the problems posed by a warming climate and deeply carbonized economy alone. Fortunately, the efforts of the IRA, Draft FAR, and other policies which use public and private governance to mutually reinforce have strong potential to help us avoid the worst impacts of a carbonized world. By using these virtuous cycles as models for policy-making, legislators, decisionmakers, and advocates can maximize the impact of both public and private commitments to decarbonization.

ANNEX 1

Fig. 6: Summary Table of the IRA’s Corporate Behavioral Wedge Actions and Private Environmental Governance Endorsing Provisions

<table>
<thead>
<tr>
<th>Section</th>
<th>Financial Incentive</th>
<th>Funding Cap (Billion USD)</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>13101, 13102</td>
<td>Tax Credit</td>
<td>n/a</td>
<td>Extension and expansion of eligibility for tax credits arising from Internal Revenue Code §§ 45(d) and 48 for production, storage, and distribution of energy from renewable sources, including extension of credits to energy storage technology producers, qualified biogas properties, and microgrid controllers.</td>
</tr>
<tr>
<td>13103</td>
<td>Tax Credit</td>
<td>n/a</td>
<td>Creation of expanded tax credits for facilities which generate certain types of clean energy and are located in low-income communities or on Indian land, including facilities incorporated into certain rental buildings and cooperatives.</td>
</tr>
<tr>
<td>13104</td>
<td>Tax Credit</td>
<td>n/a</td>
<td>Extension and expansion of Internal Revenue Code §</td>
</tr>
<tr>
<td>Code</td>
<td>Type</td>
<td>Description</td>
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<td>------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>13105</td>
<td>Tax Credit</td>
<td>45Q(d) credits for carbon sequestration facilities.</td>
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<tr>
<td>13201,</td>
<td>Tax Credit</td>
<td>Creation of a tax credit (Internal Revenue Code 1.A.IV.D.45U) for zero-</td>
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<tr>
<td>13202,</td>
<td></td>
<td>emission nuclear power facilities.</td>
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<td>13203</td>
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<tr>
<td>13204</td>
<td>Tax Credit</td>
<td>Extension and creation of tax credits for alternative fuel production,</td>
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<tr>
<td></td>
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<td>including biodiesel, renewable diesel, alternative fuels, and second</td>
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<tr>
<td></td>
<td></td>
<td>generation biofuels. Creation of a tax credit for the production of</td>
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<tr>
<td></td>
<td></td>
<td>sustainable forms of aviation fuel produced in the United States.</td>
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<tr>
<td>13303</td>
<td>Tax Credit</td>
<td>Creation of a tax deduction for outfitting or retrofitting commercial</td>
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<tr>
<td></td>
<td></td>
<td>buildings so that their total annual energy and power costs are certified</td>
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<tr>
<td></td>
<td></td>
<td>to be reduced by over 25 percent.</td>
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<tr>
<td>13304</td>
<td>Tax Credit</td>
<td>Extension of Internal Revenue Code 45L(g) credits for energy efficient</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>dwelling units.</td>
<td></td>
</tr>
<tr>
<td>13401</td>
<td>Tax Credit</td>
<td>Maintains and expands tax credits in Internal Revenue Code § 30D, but</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>requires vehicle manufacturers to onshore certain production elements and</td>
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<td></td>
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<td>work with dealers to report Vehicle Identification Numbers of vehicles</td>
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<td></td>
<td></td>
<td>before they are eligible for tax credits.</td>
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</tr>
<tr>
<td>13403</td>
<td>Tax Credit</td>
<td>Subsidizes, in the form of a new tax credit (1.A.IV.D.45W) the incremental</td>
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<tr>
<td></td>
<td></td>
<td>costs of purchasing electric vehicles as new or replacement commercial</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>vehicles.</td>
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<tr>
<td>Code</td>
<td>Type</td>
<td>Value</td>
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<td>-------</td>
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<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>13501</td>
<td>Tax Credit</td>
<td>10</td>
<td>Extends and funds the IRC 48A credit for Advanced Energy Projects.</td>
</tr>
<tr>
<td>13502</td>
<td>Tax Credit</td>
<td>n/a</td>
<td>Creates a tax credit (IRC 1.A.IV.D.45X) for the manufacture of components for solar and wind energy production, including thin film photovoltaic sheets, crystalline photovoltaic cells, photovoltaic wafers, solar grade polysilicon, polymeric backsheets, solar modules, and wind energy components.</td>
</tr>
</tbody>
</table>
| 13701 | Tax Credit      | n/a   | Creates a tax credit (IRC 1.A.IV.D.45Y) for any qualified producer of electricity, so long as the facility has a greenhouse gas emissions rate of less than zero.  
169. Compare Inflation Reduction Act of 2022, Pub. L. No. 117–169, § 13301–13302 136 Stat. 1942 (2022), with § 13701 (noting here the differences from 13301 and 13302’s specific tax credit for certain production facilities here. This is a much broader available tax credit, and is designed to be forward looking—it does not provide credits for facilities which are placed into service before December 31st, 2024, and is, based on the legislative history, designed to spur innovation in renewable energy generation). |
<p>| 13702 | Tax Credit      | n/a   | Creates a tax credit (IRC 1.A.IV.E.48E) for investors in qualified renewable energy production facilities or energy storage facilities. |
| 13704 | Tax Credit      | n/a   | Creates a tax credit (IRC 1.A.IV.D.45Z) for sale of clean fuel.             |
| 21001 | Agricultural Subsidy | 8.45 | Subsidization through the Commodity Credit Corporation, proposals which improve the environmental impact of agriculture, including but not limited to improving soil carbon; reduction of nitrogen losses; reduction, capture, avoidance, and sequestration of greenhouse gases. |
| 22001 | Loans           | 1     | Provision and forgiveness of up to 50% of loans for rural electricity storage. |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>22002</td>
<td>Grants</td>
<td>1170</td>
</tr>
<tr>
<td>22003</td>
<td>Grants</td>
<td>0.5</td>
</tr>
<tr>
<td>22004</td>
<td>Loans, Forgiveness, and Modifications</td>
<td>9.7</td>
</tr>
<tr>
<td>23002</td>
<td>Grants</td>
<td>0.45</td>
</tr>
<tr>
<td>40007</td>
<td>Grants</td>
<td>0.297</td>
</tr>
</tbody>
</table>

170. *Id.* § 22002(a) (providing that, to be more precise, 1,000,526,000. The program funds 820,250,000 for fiscal year 2022, then reduces funding available to 180,276,500 for fiscal year 2023 through 2027).
| 50121(b) | Rebates | n/a | Within a larger residential efficiency framework, provides contractors performing home energy efficiency retrofits or aggregators of claims $200 for the retrofit of each home in a disadvantaged community that receives a home energy efficiency retrofit for which a rebate is provided under 50121(a)’s larger HOMES retrofit incentives. Additionally provides incentives for owners of multifamily units to upgrade their housing stock to improve energy efficiency. |
| 50122 | Rebates | 0.6 | Income-based rebates for low- and moderate-income households or owners of multifamily buildings majority-occupied by low-and moderate-income households to carry out projects which purchase and install electric heat pump water heaters, clothes dryers, or space heaters/coolers; electric stoves, ranges, cooktops, or ovens; air sealing or insulation; electric wiring; or other qualified projects which increase home energy efficiency. |
| 50123 | Subsidies | 0.2 | Funding to States explicitly used to subsidize the training and certification of contractors on the installation of energy efficient devices. |
| 50142 | Loans | 3 | Providing direct loans for reequipping, expanding, or establishing a manufacturing |

171. Id. § 50121(b)(5).
172. Id. § 50121(c)(2)(B)–(C).
or engineering integration facility for “advanced technology vehicles” which “emit, under any possible operational mode or condition, low or zero exhaust emissions of greenhouse gases.”

| 50143 | Grants | 2 | Grants for the production of “efficient hybrid, plug-in electric hybrid, plug-in electric drive, and hydrogen fuel cell electric vehicles.” |
| 50144 | Loans  | 5 | Loans for electric utilities to carry out projects which retool, repower, repurpose, or replace energy infrastructure or enable operating energy infrastructure to avoid, reduce, utilize, or sequester air pollutants or GHG emissions.173 |
| 50153 | Payments | 0.1 | To pay expenses associated with convening relevant stakeholders to address the development of interregional electricity transmission and transmission of offshore wind energy, as well as to develop models, plans, and research required for clean energy |

<table>
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<tr>
<th>Code</th>
<th>Type</th>
<th>Amount</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50161</td>
<td>Grants</td>
<td>5.812</td>
<td>To give financial assistance on a competitive basis to projects which install or upgrade advanced industrial technology, with priority consideration to projects which reduce greenhouse gas emissions and which partner with purchasers of the facility’s products.</td>
</tr>
<tr>
<td>60101</td>
<td>Grants</td>
<td>1</td>
<td>Grants for eligible contractors for the incremental costs of electric vehicles, for purchase, installing, operating, and maintaining charging infrastructure, and for workforce training on the operation and maintenance of zero-emission vehicles.</td>
</tr>
<tr>
<td>60102</td>
<td>Grants</td>
<td>2.25</td>
<td>Grants to ports to purchase, install, or permit zero-emission technology or to develop &quot;qualified climate action plans.&quot;</td>
</tr>
<tr>
<td>60103</td>
<td>Grants</td>
<td>7</td>
<td>Creation of a Greenhouse Gas Reduction Fund, with funding flowing through States, Tribal governments, and municipalities to award grants, loans, or financial assistance to deploy or benefit from zero-emission technologies.</td>
</tr>
<tr>
<td>60104</td>
<td>Grants</td>
<td>0.06</td>
<td>Grants to identify and reduce diesel emissions resulting from goods movement facilities and vehicles serving them in qualified communities.</td>
</tr>
<tr>
<td>60107</td>
<td>Grants</td>
<td>0.051</td>
<td>$17 million each for consumer related education and partnerships; education to low-income and disadvantaged communities; and industry-related outreach, technical assistance, and partnerships; each relating to reductions in greenhouse gas emissions resulting from domestic energy</td>
</tr>
<tr>
<td>Code</td>
<td>Type</td>
<td>Amount</td>
<td>Description</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>60111</td>
<td>General Funding</td>
<td>0.005</td>
<td>Funding to support “enhanced standardization and transparency of corporate climate action commitments and plans . . . enhanced transparency regarding progress towards [meeting and implementing plans].”</td>
</tr>
<tr>
<td>60112</td>
<td>General Funding</td>
<td>0.25</td>
<td>Development of a program to support the development, enhanced standardization, and transparency, and reporting criteria for environmental product declarations, as well as grants for the development of greenhouse gas labeling and other environmental product declarations.</td>
</tr>
<tr>
<td>60113</td>
<td>Grants</td>
<td>0.850</td>
<td>Grants, contracts, rebates, loans, and others to provide “technical assistance to owners and operators of [natural gas and petroleum] facilities to prepare greenhouse gas reports” and mitigate legacy air pollution, including the installation of emissions mitigation measures.</td>
</tr>
<tr>
<td>70002</td>
<td>Grants</td>
<td>1.29</td>
<td>Purchase by the U.S. Postal Service of zero-emission delivery vehicles.</td>
</tr>
</tbody>
</table>