ARTICLE

CLIMATE NATIONALISM

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Climate change is a global commons problem. The costs of emissions in any given country are mostly borne by foreigners. Absent strong measures to overcome this dynamic, pursuit of national self-interest will lead people and countries to underinvest in decarbonization, relative to what is best for the world as a whole. And we do see such underinvestment. Many countries are not on track to meet their Paris Agreement pledges, and those pledges, even if met, are not ambitious enough to meet the headline temperature stabilization goals of the agreement. This is the fairly banal pursuit of national interest in the climate domain. But we've also seen the emergence of a stranger phenomenon: climate nationalism, or the pursuit of global climate goals through nationalistic means. These means include discriminatory subsidies for green technology production and deployment; proposed carbon tariffs, hoarding of green technology and critical minerals, and unilateral deployment of high-leverage geoengineering. Each of these policy interventions could be deployed in ways that reduce net climate risk and are generally deployed by policymakers that understand themselves to be doing so. However, the nationalist elements of these policies often undermine their effectiveness in mitigating climate risk and generate their own costs, both for the implementing country and the world. Nonetheless, some scholars defend these policy approaches on their merits and others insist that they are necessary to build the domestic coalitions needed to enact strong climate change mitigation policies. This paper assesses the tradeoffs involved in climate nationalism and sets forth a framework for assessing climate policies that contain nationalist elements, including how the governments of countries harmed by the nationalist provision and international legal institutions like the WTO should respond.

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INTRODUCTION

Economic nationalism is having a moment in the U.S. While there have always been substantial pockets of support for protectionism in Congress, the U.S. presidency was a consistent force in favor of relatively open trade for at least four decades leading up to 2016, and arguably longer.[1] While successful presidential candidates have often deployed protectionist rhetoric to appeal to key constituencies on the campaign trail, their actual policies in the office tended to be more supportive of free trade.[2] This makes sense in political economy terms. While protectionism can generate concentrated benefits for key political constituencies, most economists agree that it generally imposes net economic costs for countries that engage in it.[3] Presidents are accountable to a national constituency, and so less subject to the influence of geographically concentrated interests that stand to benefit from protectionism.[4] But this pattern was sharply broken in 2016, with the election of Donald Trump. Trump ran as an economic nationalist and largely stuck to it in the White House, most prominently in the form of Section 232 tariffs on steel and aluminum.[5] And President Biden has largely maintained this posture, defending the Section 232 tariffs, with some adjustments.[6]

Of course, one major discontinuity between the Trump and Biden administrations was their stances on climate policy. Where the Trump administration withdrew from the Paris Agreement, adopted an extremely low social cost of

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1. James C. Capretta & Stan Veuger, *The New Washington Consensus on Trade Is Wrong*, FOREIGN POL'Y (Jun. 12, 2023, at 15:08 PT), https://perma.cc/XG73-3QBX.

2. *See,* e.g., Raoul Lowery Contreras, *Obama, all in on free trade*, THE HILL (May 12, 2015, at 07:30 ET), https://perma.cc/AXH8-FEZQ; Olivia B. Waxman, *4 Things to Know About the History of NAFTA, as Trump Takes Another Step Toward Replacing It*, TIME (Nov. 30, 2018, at 18:05 EST) https://perma.cc/79D7-QN59; Gwen Ifill, *THE 1992 CAMPAIGN: The Democrats; With Reservations, Clinton Endorses Free-Trade Pact*, N.Y. TIMES (Oct 5, 1992), https://perma.cc/D4WY-LULK; Proclamation No. 4697, 3 C.F.R. 77 (1979), *reprinted in* John Woolley & Gerhard Peters, *Proclamation 4697—Agreement on Trade Relations Between the United States of America and the People's Republic of China*, AM. PRESIDENCY PROJECT, https://perma.cc/S84N-3ZGM (archived Mar. 11, 2025); *President Bush Expanded And Enforced Trade Agreements To Open New Markets For American Products*, WHITE HOUSE ARCHIVES, https://perma.cc/2VYV-GZT2 (last visited Feb. 22, 2024).

3. *See* William A. Brock & Stephen P. Magee, *The Economics of Special Interest Politics: The Case of the Tariff*, 68 AM. ECON. REV. 246, 246-47 (1978).

4. George C. Edwards, *The President and Congress: The Inevitability of Conflict*, 8 PRESIDENTIAL STUD. Q. 245, 250 (1978).

5. Adam Posen, *America's Zero-Sum Economics Doesn't Add Up*, FOREIGN POL'Y (Mar. 24, 2023, at 06:00 PT), https://perma.cc/U3VE-LHLR.

6. David J. Lynch, *Biden's course for U.S. on trade breaks with Clinton and Obama*, WASH. POST (Aug. 27, 2023), https://www.washingtonpost.com/business/2023/08/27/biden-trade-trump/; Tobias Burns, *How Trump and Biden killed the free-trade consensus,* THE HILL (Sep. 25, 2023, at 14:57 ET), https://perma.cc/CC7W-TPXB; Chad P. Bown & Katheryn Russ, *Biden and Europe remove Trump's steel and aluminum tariffs, but it's not free trade*, PETERSON INST. FOR INT'L ECON., (Nov. 11, 2021, at 00:00 PT), https://perma.cc/GU7B-H5SL.

carbon (SCC),[7] and repealed the Obama-era Clean Power Plan,[8] the Biden Administration rejoined Paris, restored and then substantially increased the Obama-era SCC, and championed new legislation largely targeted at reducing GHG emissions.[9] But the tentpole climate legislation the Biden Administration succeeded in passing, the Inflation Reduction Act (IRA), was striking in its incorporation of economic nationalism into legislation that was ostensibly designed largely to tackle the global problem of climate change. The Biden Administration went to the 27th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in Sharm El-Sheik (COP 27) and boasted about the passage of IRA, only to find a cold reception to the law among many attendees, especially those from EU member countries.[10] Since COP 27, concern about the protectionist provisions in the IRA, like the domestic content requirements for electric vehicle subsidies, has only intensified.[11]

The reasons for the recent turn toward economic nationalism in US policymaking are not entirely clear. But it seems to be driven, at least in part, by a rising bipartisan tide of anti-China sentiment.[12] This shift, in turn, has been spurred by a change in Chinese government behavior under Xi Jinping, including its own subversion of international trade law, among other abuses.[13] Russia's 2022 invasion of Ukraine has also played some role in further bolstering the rise of U.S. economic nationalism.[14] But neither of these developments can fully explain the

7. The social costs of carbon is an estimate, measured in dollars, of the harm caused by the emission of each additional ton of carbon dioxide. Elijah Asdourian & David Wessel, *What is the social cost of carbon?*, BROOKINGS (Mar. 14, 2023), https://perma.cc/R3DL-K897.

8. The Clean Power Plan was a proposal to regulate greenhouse gas emissions from existing stationary sources, issued by the EPA under the Obama Administration. Implementation was stayed by the Supreme Court late in the Obama Administration. West Virginia v. EPA, 577 U.S. 1126 (2016). The Trump Administration EPA subsequently repealed the Clean Power Plan and issued the Affordable Clean Energy Rule. Repeal of the Clean Power Plan; Emission Guidelines for Greenhouse Gas Emissions From Existing Electric Utility Generating Units; Revisions to Emission Guidelines Implementing Regulations, 84 Fed. Reg. 32520 (July 8, 2019) (to be codified at 40 C.F.R. pt. 60). That action was invalidated by the DC Circuit. Am. Lung Ass'n v. EPA, 985 F.3d 914, 995 (D.C. Cir. 2021), *rev'd sub nom.* West Virginia v. EPA, 597 U.S. 697 (2022). This ultimately led to *West Virginia v. EPA*, 597 U.S. 697 (2022), in which the Supreme Court struck down the (already dead) Clean Power Plan and enunciated the major questions doctrine. 597 U.S. at 723-24, 733-35; *see* Stephen Fotis et al., *Supreme Court Limits EPA's Authority to Regulate Greenhouse Gas Emissions*, VAN NESS FELDMAN LLP (June 30, 2022), https://perma.cc/4LBY-Z3VY.

9. Niina H. Farah, *EPA floats sharply increased social cost of carbon*, E&E NEWS (Nov. 21, 2022, at 06:27 EST), https://perma.cc/XKV5-NMKZ.

10. *See* Adrian Wooldridge, *How the West Can Win the Geoeconomics Revolution*, BLOOMBERG (Jan. 16, 2023, at 21:00 PST) https://perma.cc/7QZ5-789X.

11. Christian Scheinert, *EU's response to the US Inflation Reduction Act (IRA)*, EUR. PARL. 2, 7-8 (June 2, 2023), https://perma.cc/9FTN-L9NR.

12. Eric Levitz, *The Biden Administration Just Declared the Death of Neoliberalism*, N.Y. MAG. (May 3, 2023), https://perma.cc/MQ5V-LJ5T.

13. *Id.*

14. *See id.* Although Russia's violations of international law and norms have been more severe, China has played a more central role in U.S. trade policy discourse, likely due to the

scope of the shift, which includes actions that do not spare key U.S. allies and trading partners, like the EU, from unfavorable trade policy treatment.[15]

Another posited set of explanations is structural. Pascal Lamy posits that the primacy of Congress in setting trade policy and the overrepresentation of farm states in the Senate are important drivers of protectionism in the U.S.[16] Additionally, Lamy notes that American policymakers tend to chafe at any limits imposed by international law that are disadvantageous to the U.S. in the present context.[17] While these factors are surely important drivers of U.S. policy in some domains, several factors limit their explanatory powers over recent developments in trade policy. First, all these factors have been constants throughout the period in which the U.S. transitioned from a champion, albeit an inconsistent and hypocritical one, of free trade and globalization to its present stance. Perhaps it can be argued that the Trump Administration heralded a new zenith in disrespect for international law, but the George W. Bush Administration cared little about international law when deciding to invade Iraq, and the Biden Administration at least offered lip service to the importance of a rules-based international order in a manner similar to prior administrations.[18] The primacy of Congress in policy making has, if anything, waned over the relevant period, as presidents have responded to congressional gridlock by asserting ever-greater executive power.[19] Meanwhile, the overrepresentation of farm states is a poor fit for explaining the measures like Section 232 tariffs on steel and aluminum, whose intended beneficiaries are in states with heavy industry, and from which farm states stand to suffer from retaliatory tariffs on their exports and higher prices for protected industrial products. Lamy also posits that the inadequacy of the American welfare state leaves workers more exposed to the churn generated by trade and technological change.[20] This point is supported by the rhetoric of the Biden and Trump administrations, which each, in their own ways, has emphasized the role of their nationalist policies in supporting high-wage jobs. A related factor raised by defenders of the current wave of industrial policy is the imperative to restore U.S. manufacturing capacity and secure the supply chains the U.S. relies on for critical goods. These imperatives, of course, relate back to the concerns over dependence on China.

Another potential explanation is a global ideological backlash against neoliberal globalism on both the right and the left. While there is little evidence of

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larger size of the Chinese economy. *See id.*

15. Capretta & Veuger, *supra* note 1.

16. Pascal Lamy, *The slow American protectionist turn*, CTR. FOR ECON. POL'Y RSCH. (Mar. 27, 2023), https://perma.cc/2X5U-A9WP.

17. *Id.*

18. WHITE HOUSE, NATIONAL SECURITY STRATEGY 3, 8-10 (2022), https://perma.cc/U2AH-L22M.

19. Erin Peterson, *Presidential Power Surges*, HARV. LAW TODAY (July 17, 2019), https://perma.cc/5NN9-YCYN.

20. Lamy, *supra* note 16.

major shifts in public opinion toward nationalism and against free trade and immigration, political parties opposed to globalization have gained substantial support in recent years.[21] Evidence suggests this may be due to an increase in the political salience of issues related to globalization, which had previously been a domain where pro-globalization elites held disproportionate sway.[22] The literature suggests this heightened salience has been driven by some economic shifts like rising inequality and deindustrialization,[23] and noneconomic changes like the end of the cold war, rising immigration levels, and cultural value changes.[24] As anti-globalization sentiment has become a more active force in politics, major parties around the world have shifted to a more nationalist posture.[25]

Whatever is driving the rise of U.S. economic nationalism, it is now coinciding with a restored commitment to tackling the global problem of climate change under the Biden Administration. Indeed, one key split on climate policy between the Trump and Biden Administrations is over whether the estimate of the SCC used to evaluate regulatory policies considers only U.S. impacts (a domestic SCC) or incorporates impacts on foreigners (a global SCC). In restoring a global SCC, the Biden Administration is eschewing, at least symbolically, a more banal form of national self-interest maximizing in the climate domain.[26] That is, since climate change is a global commons problem, a government seeking to maximize the welfare of its own citizens or some related conception of the national interest, will have limited reasons to consider the impacts of their emissions on foreigners. To be sure, if they have reason to think that other countries will seek to punish them for poor emissions performance, or even that other countries will follow the U.S.'s lead in adopting their own GHG emissions policies, this would give U.S. policymakers some reason to consider impacts on foreigners.[27] But those reasons are unlikely, given the current state of global climate governance, to warrant anything close to the adoption of a fully global SCC.[28] Indeed, much of my prior academic work has been devoted to explaining the

21. Stefanie Walter, *The Backlash Against Globalization*, 24 ANN. REV. POL. SCI. 421, 424-26 (2021).

22. Catherine E. De Vries et al., *Politicizing International Cooperation: The Mass Public, Political Entrepreneurs, and Political Opportunity Structures*, 75 INT'L ORG. 306, 309-11 (2021).

23. Dani Rodrik, *Populism and the economics of globalization*, 1 J. INT'L BUS. POL'Y 12, 15, 24 (2018).

24. PIPPA NORRIS & RONALD INGLEHART, CULTURAL BACKLASH 32, 33, 47 (2019).

25. *See generally* Tarik Abou-Chadi & Werner Krause, *The Causal Effect of Radical Right Success on Mainstream Parties' Policy Positions: A Regression Discontinuity Approach*, 50 BRIT. J. POL. SCI. 829 (2018).

26. Jason Furman (@jasonfurman), X (Nov. 11, 2022, at 13:15 PT), https://perma.cc/VQD7-F7SY.

27. Matthew J. Kotchen, *Which Social Cost of Carbon? A Theoretical Perspective*, 5 J. ASS'N ENV'T & RES. ECONOMISTS 673, 681-2 (2018).

28. Gabriel Weil, *Incentive Compatible Climate Change Mitigation: Moving Beyond the Pledge and Review Model*, 42 WM. & MARY ENV'T L. & POL'Y REV. 923, 937 (2018) [hereinafter Weil, *Incentive Compatible Climate Change Mitigation*].

ways in which the voluntary pledge-and-review model that resulted in the Paris Agreement fails to render it incentive compatible for countries to decarbonize as sharply as would be optimal for the world as a whole.[29] So, while the adoption of a global SCC estimate does not translate directly into actually adopting policies that reduce emissions fast enough to meet the world's stated temperature stabilization targets, it does represent both a rhetorical rejection and a partial substantive separation from nationalist climate policy in this more banal sense.

The emerging climate nationalism I explore in this paper is stranger and more complex. It entails a country seeking a global end—mitigating climate change—via nationalist instruments. In the U.S., this has most prominently taken the form of discriminatory subsidies supporting clean technology deployment. Other potential forms of climate nationalism include carbon tariffs and border adjustments of various forms, unilateral deployment of risky, high-leverage climate interventions (commonly referred to as geoengineering) like stratospheric aerosol injection, and green technology and resource hoarding. What these policies have in common is the combination of means that are typically deployed in service of a narrow and often-misguided conception of the national interest with the claim that they are necessary or at least expedient means of contributing to a global public good.

Some nationalist-flavored policies with some relevance to climate change mitigation do not qualify as climate nationalism. Namely, in May 2024, President Biden announced tariffs on imports of Chinese-made electric vehicles, steel, aluminum, semiconductors, and solar panels.[30] While these tariffs clearly have a climate policy nexus, there is no plausible account on which they directly advance climate action. The best that can be said for these tariffs *as climate policy* is that they are part of a policy package with the IRA subsidies for which political viability depends on a link to America manufacturing jobs.[31] But given the temporal sequence, this amounts to the tenuous claim that future climate action (or avoiding the repeal of existing actions) will be enabled due to the political advantages of these tariffs. Whatever the merits of these claims, they are too indirect for the tariffs themselves to qualify as climate policy instruments.

The rationales for this odd couple combination of means and ends vary but generally fall into two buckets. First, it is sometimes claimed that domestic political constraints limit the U.S. capacity to cut emissions or otherwise contribute

29. *See generally id.*; Gabriel Weil, *The Carbon Price Equivalent: A Metric for Comparing Climate Change Mitigation Efforts Across Jurisdictions*, 124 DICK. L. REV. 475 (2021) [hereinafter Weil, *The Carbon Price Equivalent*]; Gabriel Weil, *Global Climate Governance in 3D: Mainstreaming Geoengineering Within a Unified Framework,* 83 U. PITT. L. REV. 507 (2022) [hereinafter Weil, *Global Climate Governance in 3D*].

30. *FACT SHEET: President Biden Takes Action to Protect American Workers and Businesses from China's Unfair Trade Practices*, WHITE HOUSE (May 14, 2024), https://perma.cc/FNF4-ASSU.

31. *See* Paul Krugman, *Preparing for the Second China Shock*, N.Y. TIMES (May 14, 2024), https://perma.cc/5QSY-A5CT; Robinson Meyer, *13 Ways of Looking at Biden's New China Tariffs*, HEATMAP NEWS (May 14, 2024), https://perma.cc/6XWY-3C23.

to climate change mitigation through non-nationalist means.[32] That is, even if the discriminatory provisions of the IRA are themselves harmful, the IRA could not have passed without them, and the ends justify the means. Second, some advocates claim that climate nationalism is justified on the merits.[33] That is, even if non-nationalistic climate change mitigation efforts of comparable scale were politically feasible, they would not be preferable to climate nationalism. This paper critically examines these two sorts of rationales for each of the four potential forms of climate nationalism.

Part II considers discriminatory subsidies, with a particular focus on the IRA. Part III addresses carbon border charges, including a discussion of which of these measures qualify as forms of climate nationalism. Part IV discuss technology and resource hoarding, including export restrictions of green tech and fossil fuel resources, on conflicting rationales. Part V analyzes the prospect of unilateral deployment of risky, high-leverage climate interventions. Part VI concludes.

I. DISCRIMINATORY SUBSIDIES

The IRA represents the most significant federal legislative action on climate in U.S. history.[34] The Rhodium Group projects that the legislation will push U.S. emissions in 2030 down to 32-42% below 2005 levels, compared to 24-35% under the pre-IRA policy status quo.[35] Key climate-related provisions include tax credits for the purchase of new electric or hydrogen fuel cell vehicles, expanded investment tax credits (ITC) and production tax credits (PTC) for qualifying low-emissions electricity generation, grants to support heat pump production, clean hydrogen PTC, advanced manufacturing PTC, mineral security grants, and grants for waste reduction and recycling infrastructure.[36]

For new light duty clean vehicles, the IRA provides for credits up to $7,500 under several conditions.[37] These conditions include, but are not limited to: the final assembly of the vehicle must take place in North America, a (rising over time) share of battery components must come from North America, a (rising over time) share of critical mineral must come from a country with which the U.S. has

32. Jesse D. Jenkins, *How the Climate Fight Was Almost Lost*, HEATMAP NEWS (Aug. 18, 2023), https://perma.cc/QH22-TTE8.

33. Brian Deese, Dir., Nat'l Econ. Council, Remarks on a Modern American Industrial Strategy at the Economic Club of New York (Apr. 20, 2022) (transcript available at https://perma.cc/ZY58-UKCE).

34. Jason Bordoff, *America's Landmark Climate Law*, INT'L MONETARY FUND 35 (2022), https://perma.cc/8UYT-6Z7J.

35. John Larsen et al., *A Turning Point for US Climate Progress: Assessing the Climate and Clean Energy Provisions in the Inflation Reduction Act*, RHODIUM GRP. (Aug. 12, 2022), https://perma.cc/TV7G-GWAU.

36. *Id.*

37. *Credits for new clean vehicles purchased in 2023 or after*, IRS, https://perma.cc/P4RW-DBC3 (last visited Mar. 21, 2024).

a free trade agreement.[38] The IRA does not define a free trade agreement.[39] The U.S. only has *comprehensive* free trade agreements (the sort of agreement generally that qualifies as a free trade agreement under World Trade Organization (WTO) rules) with twenty countries. Notably, the EU, Japan, and UK do not have comprehensive free trade agreements with the U.S. In April 2023, however, the Department of Treasury proposed regulations interpreting the term free trade agreement, as used in the IRA, to extend to a broader set of countries that sign a critical minerals agreement with the U.S.[40] The entire credit is contingent on assembly in North America, but vehicles can qualify for a $3,750 credit if they meet *either* the critical minerals or the battery component sourcing requirements.[41] The Treasury regulations cite a recent critical mineral agreement as qualifying Japan as a free trade agreement country for the purposes of the IRA electric vehicle tax credit.[42] The EU has since pursued negotiations with the U.S. over a similar critical mineral agreement, but such an agreement has not been concluded to date.[43] This lack of follow through by the EU and other countries on critical minerals agreement be in part explained by the other major accommodation made via regulation. The same April 2023 Department of Treasury regulations indicated that companies leasing vehicles to consumers may claim the commercial clean vehicle credits, which can provide $7,500 without stringent requirements on battery sourcing.[44] More broadly, the commercial clean vehicle tax credits provide up to $7,500 for vehicles less than 14,000 pounds and $40,000 for larger vehicles (or 30% of the purchase price or incremental cost of an internal combustion engine replacement, whichever is lower).[45] Allowing consumer leases of electric vehicles to qualify for the commercial clean vehicle credits effectively enabled leased vehicles to bypass not only the North American assembly and critical minerals requirements of the consumer credit, but also the purchaser income limits.[46] While some observers claim that this interpretation was made to accommodate concerns raised by EU officials,[47] others, including at least one senior Senate staffer involved in drafting the IRA, claim vehicles leased to consumers were always understood to be included under the commercial clean

38. *Id.*

39. SHAYERAH I. AKHTAR, CONG. RSCH. SERV., IN12145, PROPOSED U.S.-EU CRITICAL MINERALS AGREEMENT 1 (2023).

40. Section 30D New Clean Vehicle Credit, 88 Fed. Reg. 23370, 23376 (Apr. 17, 2023) (to be codified at 26 C.F.R. pt. 1).

41. IRS, *supra* note 37.

42. Section 30D New Clean Vehicle Credit, *supra* note 40, at 23376.

43. Marcin Szczepanski, *EU-US critical minerals agreement: Building stronger supply chains together*, EUR. PARL. RSCH. SERV. (2023), https://perma.cc/8M2U-DR47.

44. Section 30D New Clean Vehicle Credit, 88 Fed. Reg. at 23373.

45. 26 U.S.C. § 45W.

46. IRS, *supra* note 37; *Commercial Clean Vehicle Credit*, IRS, https://perma.cc/RVH2-7JVR (last visited Mar 21, 2024).

47. TRADE TALKS: *Episode 184: The US-EU fights over electric vehicles and the Inflation Reduction Act*, 10:53-13:51 (Spotify, May 7, 2023).

vehicle credit provision.[48]

The clean energy PTC is awarded per megawatt-hour of electricity output from qualifying resources, while the ITC is awarded as a percentage of the investment cost. Facilities that meet the 100% domestic content requirements for steel and aluminum used in clean energy projects are eligible for an extra ten percent PTC or an extra ten percentage points ITC.

These domestic content requirements clearly violate WTO rules.[49] Article 3 of the WTO Agreement of Subsidies and Countervailing Measures prohibits "subsidies contingent, whether solely or as one of several other conditions, upon the use of domestic over imported goods."[50] Extending the subsidy eligibility to products assembled and materials originating in Mexico or Canada, or to any country with which the U.S. has a Free Trade Agreement, does not cure the violation.[51] Article III of the General Agreement on Tariffs and Trade (GATT) also requires that:

> The products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favourable than that accorded to like products of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation, distribution or use.[52]

Again, the domestic content requirements in the IRA subsidies clearly violate this requirement.[53]

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48. Conversation with Greg Dotson, Assoc. Professor, U. of Ore. L. Sch., in Washington, D.C. (Jan. 5, 2024). During the 2021-2022 period in which the IRA was drafted, Dotson served as the Democratic Chief Counsel for the U.S. Senate Committee on Environment and Public Works.

49. *See* Steve Charnovitz, *Green Subsidies and the WTO* 25 (World Bank Grp.: Off. of the Chief Economist Pol'y Rsch. Working Paper, Paper No. 7060, 2014), https://perma.cc/EKK2-M684; David Kleimann, *Climate versus trade? Reconciling international subsidy rules with industrial decarbonisation*, BRUEGEL (Feb. 8, 2023), https://perma.cc/D6CL-34DT; James Bacchus, *The Case for Clean Subsidies*, HARV. BUS. REV. (Nov. 13, 2012), https://perma.cc/VXQ9-KJ4F.

50. Agreement on Subsidies and Countervailing Measures art. 3.1(b), Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, 1869 U.N.T.S. 14.

51. Kleimann, *supra* note 49. Extending the subsidy eligibility umbrella to members of the USMCA or U.S. Free Trade Agreement countries may also violate GATT Article I's most-favored nations requirement, but this issue is subject to dispute. GATT Article XXIV's provisions on Free Trade Agreements could be used to defend this discrimination in favor of certain countries: however, this defense would not cure the violations of the Agreement on Subsidies and Countervailing Measures or GATT Article III's national treatment requirement. *See* RAJ BHALA, INTERNATIONAL TRADE LAW: AN INTERDISCIPLINARY, NON-WESTERN TEXTBOOK 666–68 (4th ed. 2021); MITSUO MATSUSHITA ET AL., THE WORLD TRADE ORGANIZATION: LAW, PRACTICE, AND POLICY 348–50 (3d ed. 2015).

52. General Agreement on Tariffs and Trade art. III Oct. 30, 1947, 61 Stat. A-11, 55 U.N.T.S. 194 [hereinafter GATT].

53. Steve Charnovitz also contends that the IRA violates international environmental law. E-mail from Steve Charnovitz, Assoc. Professor of L., Geo. Wash. U. L. Sch., to Gabriel Weil, Assistant Professor of L., Touro L. Ctr. (Apr. 11, 2024, at 15:03 PST) (on file with

It is striking that such clear violations of international law, supported unapologetically by President Biden, come at a time when the Biden Administration claims to prioritize maintenance of a rules-based international order and criticizes China's government for violating those rules.[54] Regardless of whether these violations are likely to result in significant retaliation from U.S. trading partners, they signal that the U.S. commitment to a rules-based international order, even under an administration that claims to champion it, does not include a willingness to be constrained by those rules when doing so is costly or inconvenient. Indeed, these moves have provoked at least a rhetorical backlash. For instance, at a BRICS summit in August 2023 Brazilian President Luiz Inácio Lula da Silva said that BRICS "cannot accept a green neocolonialism that imposes trade barriers and discriminatory measures under the pretext of protecting the environment."[55] Korean Industry Minister Lee Chang-yang has indicated in 2022 that the Korean Government was concerned about the IRA and actively reviewing whether to bring a WTO challenge.[56] Ultimately, South Kora declined to bring a WTO challenge "due to its lack of a functional Appellate Body and chronic delays in proceedings."[57] French President Macron has indicated an interest in implementing similar subsidies with European content requirements, while German Chancellor Scholz is cool to that idea, but agrees on the need to push back against U.S. policy.[58]

At times, U.S. Trade Representative Katherine Tai has welcomed a response like Macron is proposing of Europe adopting its own green subsidy regime.[59] But trade law experts have pointed out that, should Europe move forward with such subsidies, the U.S. is likely to respond with countervailing duties.[60] Others

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author). In making this contention, Charnovitz references his article analyzing the House-passed American Clean Energy and Security Act of 2009. *See generally* Steve Charnovitz, *Reviewing Carbon Charges and Free Allowances under Environmental Law and Principles*, 16 ILSA J. INT'L & COMP. L. 395 (2010).

54. WHITE HOUSE, NATIONAL SECURITY STRATEGY 3, 34 (2022), https://perma.cc/9VZ3-LYEU.

55. Brett Fortnam, *China to BRICS: Hegemonic countries will constrain emerging economies*, INSIDETRADE.COM (Aug. 23, 2023, at 13:30 PT), https://perma.cc/NJR6-LN8Z; Alan Beattie, *The west has too little to offer leaders like Lula*, FIN. TIMES (Apr. 19, 2023), https://perma.cc/VW7A-VZNJ.

56. *Seoul to review possible WTO complaint over US inflation act: industry minister*, KOREA TIMES (Aug. 23, 2022, at 16:17 KST), https://perma.cc/XZ54-8HWX.

57. "Mark" Min Seong Kim, *The Electric Vehicles Dilemma: The Inflation Reduction Act, International Trade Law, and U.S.-Korea Economic Diplomacy*, 25 N.Y.U. J. LEGIS. & PUB. POL'Y 875, 875 (2023).

58. Hans von der Burchard & Clea Caulcutt, *Scholz and Macron threaten trade retaliation against Biden*, POLITICO (Oct. 27, 2022, at 21:19 CET), https://perma.cc/DCC8-WZ24.

59. Greg Ip, *Who Is Going to Police the New World Trading System?*, WALL ST. J. (Jan. 14, 2023, at 05:32 ET), https://perma.cc/6JQ5-F9PV.

60. *See* BGH Edelstahl Siegen GmbH v. United States, 639 F. Supp. 3d 1237 (Ct. Int'l Trade 2023); David Kleimann, *Climate versus trade? Reconciling international subsidy rules with industrial decarbonisation*, BRUEGEL (Feb. 8, 2023), https://perma.cc/UHT2-86EE; SCOTT LINCICOME, CATO INST., POLICY ANALYSIS NO. 710: COUNTERVAILING CALAMITY:

have argued that such a subsidy race, even if it did not escalate to other forms of trade retaliation, would be wasteful and distortionary.[61] Still others, including supporters of the IRA, worry that domestic content requirements will slow down the green transition.[62] This is because China and other key markets that are excluded from some IRA subsidies are the lowest cost and largest scale producers of key products and commodities that support clean energy deployment, including critical minerals, solar panels, and electric vehicles.[63] For a policy that was largely justified on the basis of geopolitical competition with China, many analysts worry that the IRA did too little to include U.S. allies in Europe and Asia, and that it potentially alienated non-aligned countries in the developing world that often cannot afford to deploy similar subsidies of their own.[64]

It is far from clear, however, that any climate legislation of comparable scale could have passed in the 117th Congress without these or similar discriminatory provisions. The case for this view rests squarely on the critical 50th vote in the U.S. Senate, Joe Manchin (D-WV). In an evenly divided Senate with no Republicans willing to offer their support to a climate spending bill of the sort pursued by Congressional Democrats and the Biden White House, Manchin's support was indispensable. And Manchin was not shy about insisting that his bottom lines be met in order to win his support.[65] Perhaps alternative policy concessions could

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HOW TO STOP THE GLOBAL SUBSIDIES RACE 4-5 (2012), https://perma.cc/D7AB-QLNZ; Simon Lester (@snlester), X (Oct. 24, 2022, at 16:53 PT), https://perma.cc/93QD-8DHV; David Kleimann (@DavidKleimann), X (Feb. 5, 2023, at 08:21 PT), https://perma.cc/X3SN-KYHU.

61. Steve Charnovitz, *Green Subsidies and the WTO* 4-5 (World Bank Grp.: Off. Of the Chief Economist Pol'y Rsch. Working Paper, Paper No. 7060, 2014), https://perma.cc/B3MN-GU9N; *The destructive new logic that threatens globalisation*, THE ECONOMIST (Jan. 12, 2023), https://perma.cc/8EQK-6RK6; Rem Korteweg (@remkorteweg), X (Dec. 5, 2022, at 01:57 PT), https://perma.cc/V6NS-EBJJ.

62. Lydia DePillis, *Energy Tax Credits, Meant to Help U.S. Suppliers, May Be Hard to Get*, N.Y. TIMES (Jun. 12, 2023), https://perma.cc/5PML-7U7C; Daniel Gros, *America's Inward Turn on Trade*, PROJECT SYNDICATE (Dec. 12, 2022), https://perma.cc/7FVD-EA5M; Jennifer A. Dlouhy, *Biden's Made-in-USA Mandate for Tax Credit Sparks Solar Dispute*, BLOOMBERG (Mar. 21, 2023, at 08:58 PDT), https://www.bloomberg.com/news/articles/2023-03-21/biden-s-made-in-usa-mandate-for-tax-credit-sparks-solar-spat.

63. THE EZRA KLEIN SHOW: *What Happens When Great Power Conflict and Climate Action Collide?* (N.Y. Times, Aug. 22, 2023).

64. Phred Dvorak, *India Is Losing a Green-Energy Subsidy Race*, WALL ST. J. (Sept. 1, 2023, at 00:02 ET), https://perma.cc/KDY6-M99N ; Ed Ballard, Jason Douglas & Jon Emont, *The Economic Losers in the New World Order*, WALL ST. J. (Aug. 14, 2023), https://perma.cc/H9YF-ZEEQ; Bryce Baschuk, *How World Fell Into a Subsidy Race in Pursuit of Climate Goals*, BLOOMBERG (Jul. 28, 2023, at 03:27 PDT), https://www.bloomberg.com/news/articles/2023-07-28/how-world-fell-into-a-subsidy-race-in-pursuit-of-climate-goals.

65. Joe Manchin, Senator, Manchin Statement On Build Back Better Act (Dec. 19, 2021), https://perma.cc/VY68-8HWF; *see* Ethan Howland, *Manchin, in reversal, backs bill with $369B in climate spending*, UTILITY DIVE (Jul. 27, 2022), https://perma.cc/3J8S-ZVRS; Gavin Bade & Steven Overly, *'It was all about the United States': Democrats unrepentant as allies fume over trade rules*, POLITICO (Dec. 9, 2022, at 04:30 EST), https://perma.cc/C2C4-K37D.

have brought Manchin on board, but the Senator's reactions to Biden Administration efforts to soften the domestic content requirements cast some doubt on this view. In response to the Treasury Department's May 2023 guidance, which allowed leased electric vehicles to qualify for the full $7,500 tax credit, regardless of the country of assembly or the sourcing of critical minerals used, Manchin blasted the Biden Administration,[66] proposed legislation to delay the implementation of electric vehicle tax credits,[67] and threatened lawsuits to block the changes.[68]

If the IRA could not have passed without the discriminatory provisions, then the question is whether it is better for the U.S. to pursue climate nationalism than for it to fail to pass any major climate legislation. From a narrow climate perspective, it seems difficult to make the case that we would be better off without the IRA. To be sure, the domestic content requirements are likely to slow down and raise the cost of clean energy deployment in the U.S. relative to clean versions of the IRA subsidies, but modeling studies suggest they are likely to be much faster than without the legislation.[69] Similarly, the nationalist turn of U.S. climate policy may hinder global cooperation on decarbonization. After all, climate change mitigation is fundamentally a globalist project that depends on countries making economic sacrifices to produce benefits that mostly accrue to foreigners. Some scholars also worry that the U.S. subsidy-based approach to climate policy will undermine the political and economic viability of the European Union's cost-imposing Emissions Trading System.[70] While this certainly casts doubts on the merits of the IRA compared to alternative policy designs, it's hard to believe that global climate cooperation would be better served by continued U.S. inaction. Perhaps the escalating trade tensions between the U.S. and China, to which the discriminatory IRA subsidies contribute, will boil over into a border conflict that derails climate negotiations. But those tensions started long before the IRA and would not have been quelled by its failure. Indeed,

66. Joe Manchin, *Biden's Inflation Reduction Act Betrayal*, WALL ST. J. (Mar. 29, 2023, at 18:19 ET), https://perma.cc/7PMN-E88L ; Jeff Stein & Evan Halper, *White House Is Torn Over Joe Manchin's Fury At Climate Law He Crafted*, WASH. POST (Aug. 19, 2023), https://www.washingtonpost.com/business/2023/08/19/inflation-reduction-act-joe-manchin-biden; David Blackmon, *Manchin Slams Treasury For Effort To End-Run Around Congress*, FORBES (June 12, 2023, at 15:25 EDT), https://perma.cc/J2E3-TTT7.

67. Matthew Daly, *Manchin Pushes to Delay Tax Credits for Electric Vehicles*, AP NEWS (Jan. 25, 2023, at 14:49 GMT-7), https://perma.cc/5HE5-DUN9.

68. Kelsey Tamborrino, *Manchin Lays Out Legal Path for Challenging Biden's EV requirements*, POLITICO PRO (Sep. 28, 2023, at 13:47 EDT) https://perma.cc/ESH7-AUR9.

69. Jesse D. Jenkins et al., *Climate Progress and the 117th Congress: The Impacts of the Inflation Reduction Act and Infrastructure Investment and Jobs Act*, ZENODO (July 14, 2023), https://perma.cc/L8K4-WMW5; MEGAN MAHAJAN ET. AL., ENERGY INNOVATION LLC, UPDATED INFLATION REDUCTION ACT MODELING USING THE ENERGY POLICY SIMULATOR 16, 22 (2022).

70. Chad P. Bown & Kimberly A. Clausing, *How Trade Cooperation by the United States, the European Union, and China Can Fight Climate Change* 6-7, 10-12 (Peterson Inst. for Int'l Econ. Working Paper, Paper No. 23-8, 2023).

undercutting China has become a rare point of bipartisan agreement in Washington over the past decade.

Broadening the aperture beyond climate change mitigation, the picture gets blurrier. While the climate benefits of the IRA are real, so are the economic and geopolitical costs. Most directly, the IRA's discriminatory provisions create economic distortions that raise costs, meaning the consumer benefits of the subsidies are smaller than the government outlays.[71] They can also reduce the competitiveness of U.S. goods in export markets, both by raising the cost of inputs due to exchange rate adjustments and potential trade retaliation.[72] Moreover, if Europe follows the U.S. lead in adopting discriminatory subsidies, as encouraged by Katherine Tai and other Biden Administration officials, this would create strong barriers to entry for developing countries that lack the fiscal capacity to support subsidies of their own.[73]

To complicate the analysis further, we cannot be confident that refusing to include discriminatory provisions in the IRA would have doomed the legislation, though it certainly would have imperiled its prospects for passage. This raises the questions of how both domestic and international stakeholders and institutions should weigh these tradeoffs. Domestic climate advocates have mostly embraced the IRA, defending the discriminatory provisions on their policy merits.[74] It has fallen to policy advocates who prioritize free trade or simply oppose spending-based climate policy (or any substantial climate policy) to criticize the IRA's discriminatory provisions. Few domestic actors seem to truly grapple with tradeoffs. How should they weigh them?

On the international level, there has been significant criticism of the IRA by governments and policy advocates who have demonstrated a commitment to tackling climate change. How far should they take this criticism? If countries harmed by the IRA's discriminatory provisions retaliate, the best-case scenario is that their imposed costs on the U.S. decreases the appeal of future discriminatory policies and gives the U.S. an incentive to repeal existing discriminatory

71. Adam Posen, *U.S.-China Decoupling: America's Zero-Sum Economics Doesn't Add Up*, FOREIGN POL'Y (Mar. 24, 2023, at 06:00 PT), https://perma.cc/RGD4-QHDF.

72. *Id.*

73. *Id.*

74. *See, e.g.*, *What the Inflation Reduction Act Means for Climate*, EARTHJUSTICE (Aug. 16, 2022), https://perma.cc/M4AR-LHYZ; Vanessa Glavinskas, *The Inflation Reduction Act is a Victory for the Climate. Here's What Comes Next*, VITAL SIGNS (Sep. 6, 2022), https://perma.cc/R2LE-72KB; John Larsen et. al., *A Turning Point for US Climate Progress: Assessing the Climate and Clean Energy Provisions in the Inflation Reduction Act*, RHODIUM GRP. (Aug. 12, 2022), https://perma.cc/TV7G-GWAU; Jesse D. Jenkins (@JesseJenkins), X, *So I'm just not convinced that we've seen any clear evidence that IRA's pro-US incentives are slowing decarbonization. Could even be the opposite. Time will tell. . .* (Jul. 25, 2023, at 05:52 PT), https://perma.cc/MLX3-9L6N; Daniel Firger (@dfirgs), X, *Folks this is what's known in the parlance of our time as Losing The Plot. Using old trade law provisions to lodge complaints against your closest geopolitical partner, which is *finally* implementing some new climate law spending, is giving Final-Nail-in-WTO-Coffin vibes* 🔨 (Nov. 7, 2022, at 07:49 PT), https://perma.cc/927R-9HDW.

provisions, without provoking any further retaliation by the U.S. The WTO is, or at least was, a powerful institution, but it has never had the authority to strike down national laws that violate the GATT and other WTO agreement like the U.S. Supreme Court strikes down unconstitutional statutes. When functioning effectively, however, it does authorize retaliation against countries that violate international trade law, a more robust remedy than those available in most international tribunals. In the best case for would-be IRA challengers then, U.S. policymakers would be faced with three choices: (1) adopt "clean" but similarly ambitious climate policies (carbon pricing, non-discriminatory subsidies, etc.); (2) adopt IRA-like climate nationalism and bear the costs of retaliation; and (3) decline to adopt ambitious climate policies. International stakeholders have strong reasons to prefer (1) to (2), but also reasons to prefer (2) to (3). If retaliation, whether authorized by a functional WTO dispute settlement process or otherwise, is strong enough to make (2) unattractive, the relative likelihood of (1) and (3) matters a great deal, as does the relative importance of deterring economic nationalism and encouraging robust climate action.

Elena Cima and Dan Esty argue that WTO rules should be reformed to make more room for green subsidies.[75] Under their proposal, subsidy rules would prioritize sustainability, broadly construed, over minimizing trade distortions.[76] Cima and Esty justify this priority on two grounds. First, they point out that the Marrakesh Agreement that created the WTO contains prominent language recognizing importance of "allowing for the optimal use of the world's resources in accordance with the objective of sustainable development."[77] Second, they contend that climate change constitutes a massive market failure that warrants substantial economic intervention, including subsidies.[78]

Accordingly, Cima and Esty suggest that WTO rules should do more to discourage sustainability-reducing measures like fossil fuel subsidies and production-based agriculture subsidies, even when their trade-distorting effects are minimal.[79] Sustainability-enhancing subsidies, like those supporting renewable energy, by contrast would enjoy a rebuttable presumption of consistency with WTO rules, even when they generate substantial trade distortions.[80] Specifically, trade-distorting subsidies would be permitted provided that they are (1)"transparent and carefully explained;" (2) "effective in advancing sustainability;" (3) do "not constitute a disguised barrier to trade or hidden protectionism;" (4) do "not create a risk of creating a market-dominant competitor who might use the

75. Elena Cima & Daniel C. Esty, *Making International Trade Work for Sustainable Development: Toward a New WTO Framework for Subsidies*, 27 J. INT'L ECON. L. 1, 3 (2024).

76. *Id.* at 3, 12.

77. *Id.* at 2; *Marrakesh Agreement Establishing the World Trade Organization*, Apr. 15, 1994, 1867 U.N.T.S. 154, 33 I.L.M. 1144 (1994) [hereinafter Marrakesh Agreement or WTO Agreement].

78. Cima & Esty, *supra* note 75, at 8.

79. *Id.* at 12-13.

80. *Id.* at 14-15.

support provided to under-price competitors and drive them out of the marketplace;" and (5) meet "a proportionality test, which would assess the scale of trade distortion against sustainability gains."[81] This proposal was largely incorporated into the Villars Framework adopted by the Remaking the Global Trading System for a Sustainable Future Project.[82]

Would the IRA's subsidies supporting renewable energy and electric vehicles pass muster under this reformed subsidies regime? Requirement (1) seems to be satisfied. Regarding (2), the IRA subsidies do advance sustainability relative to a no-action alternative, but not compared to a non-discriminatory approach. On my reading, this likely satisfied (2). By contrast, it seems hard to argue that the discriminatory components of the IRA subsidies satisfy (3). Similarly, while it seems unlikely that IRA subsidies would run afoul of (4), it is far from clear that they would satisfy the proportionality test of requirement (5). Although Cima and Esty's paper was published well after the passage of the IRA, they decline to weigh in directly on how those green subsidies would fare under their framework.[83]

Steve Charnovitz also considers the case for reforming WTO subsidy rules. In particular, he focuses on the conflicts between international environmental law principles and WTO rules.[84] Charnovitz finds some normative rationale for relaxing restrictions on subsidies to domestic producers that incidentally cause adverse effects on exporters seeking to compete in either the U.S. market or third country markets.[85] But he finds no basis for opening the door to subsidies with local content requirements.[86] His analysis is worth quoting at some length:

> If there is a case for reconsidering the SCM rule against subsidies contingent on LCRs, the case would have to be that such a measure constitutes a best-practice domestic policy. But an LCR cannot possibly be a best practice because if all countries did it, then all would be worse off. With such a collective action dilemma, the ideal policy is cooperation by all players to agree not to engage in

81. *Id.* at 15.

82. JOEL P. TRACHTMAN ET. AL., REMAKING TRADE FOR A SUSTAINABLE FUTURE, VILLARS FRAMEWORK FOR A SUSTAINABLE GLOBAL TRADE SYSTEM VERSION 2.0, at 45-40 (2024).

83. In email correspondence with the author, Dan Esty clarified that he thinks the IRA's domestic content requirements would violate requirement (3) that green subsidies do "not constitute a disguised barrier to trade or hidden protectionism." However, Esty does note his view that the IRA would satisfy requirement (5)'s proportionality test, indicating that "the value of having the United States seriously engaged on climate change is huge (as is the momentum toward a clean energy future created by the IRA subsidies), while the burden of the rough edges of the IRA are relatively much smaller. Indeed, I believe that, with a few minor adjustments, the IRA would fully meet the Cima-Esty criteria for a subsidy to be given a green light under our sustainability-updated WTO framework." E-mail from Dan Esty, Hillhouse Professor of Env't L. & Pol'y, Yale U., to Gabriel Weil, Assistant Professor of L., Touro L. Ctr. (Apr. 11, 2024) (on file with author).

84. Charnovitz, supra note 49, at 61.

85. *Id.* at 61-69.

86. *Id.* at 61-69.

> this counterproductive practice (which at its limits is autarky). Mattoo and Subramanian reach a similar conclusion in observing that LCR "subsidies do not have the environmental benefits of other subsidies because they merely induce the substitution of more costly domestic inputs for cheaper foreign alternatives, and therefore do not further--they may even hinder attaining--environmental objectives." Therefore, LCRs are a political economy failure, not a sustainable development solution.[87]

So, who's right? While climate change undoubtedly constitutes a substantial market failure, it does not follow that distortionary trade subsidies are the proper response. After all, the standard economists' response to a diffuse negative externality that like the change induced by GHG emissions is to impose a Pigouvian tax.[88] Carbon taxes, if applied to a consumption base with a symmetric border-adjustment, do not distort trade and do not require any changes to WTO rules. This does not necessarily defeat Cima and Esty's case, however. Perhaps carbon taxes set at rates consistent with meeting the goal of avoiding dangerous anthropogenic interference with the earth's climate are simply infeasible. This may be due to domestic political opposition to policies that make the cost of climate change mitigation salient[89] or to geopolitics of burden sharing for addressing a global commons problem.[90] This is plausible enough. Indeed, while I strongly favor carbon pricing, my past work has emphasized the importance of global climate governance allowing the flexibility for countries to adopt a range of climate policy approaches, so long as they achieve the common goal of decarbonization.[91]

The question still remains whether discriminatory subsidies are a necessary component of politically viable and sufficient effective climate policy. If they are, this would at least call into question Charnovitz' claim that local content requirement subsidies are never the best feasible policy. Certainly, some countries have managed to take stronger climate actions than the U.S. without relying on discriminatory subsidies.[92] But the U.S. has manifestly struggled to adopt strong climate policy, and the IRA does genuinely represent a breakthrough. Cima & Esty's proposal plausibly accounts for such considerations; perhaps the viability of alternative policy is implicitly incorporated in requirements (2), (3), and (5). If not, it might incorporate such considerations explicitly into future

87. *Id.* at 65 (citations omitted).

88. Economists' Statement on Carbon Dividends, CLIMATE LEADERSHIP COUNCIL, https://perma.cc/4LL8-FJ4J (archived Mar. 11, 2025).

89. JEROEN BARREZ & KRIS BACHUS, E4BEL, PUBLIC ACCEPTABILITY OF CARBON PRICING: A LITERATURE REVIEW 8 (2023); BARRY G. RABE, CAN WE PRICE CARBON? 14-17 (2018); Gary M. Lucas Jr., *Behavioral Public Choice and the Carbon Tax*, 2017 UTAH L. REV. 115, 143 (2017).

90. *See* Weil, *Incentive Compatible Climate Change Mitigation*, *supra* note 28, at 927-943.

91. Weil, *The Carbon Price Equivalent*, *supra* note 29, at 520 (2021).

92. *Countries*, CLIMATE ACTION TRACKER, https://perma.cc/3UE7-NNWT (archived Aug. 9, 2025).

WTO reform proposals. It must be noted, however, that doing so essentially reward countries for their own failure to adopt non-trade distorting climate policies by allowing them to engage in subsidies that would otherwise violate WTO rules. Indeed, Brian Galle argues that relying on policy carrots like subsidies to address environmental externality actually exacerbates the political dynamics that make sticks like emissions taxes difficult in the first place, inducing polluters to "raise the political stakes either by cranking out more negative externalities or withholding benefits.[93] That is the dilemma facing all stakeholders at the climate-trade nexus, including trade reformers like Cima and Esty.

II. CARBON BORDER CHARGES

Carbon border charge proposals come in at least three forms. First, there are (ideally) trade-neutral border adjustments of domestic carbon prices. Such measures may be implemented on a unilateral basis, but are not best understood as a form of climate nationalism. In its simplest form, a border-adjusted carbon tax would simply apply the domestic carbon tax rate to the embodied carbon in all imports, and rebate any carbon taxes paid during the production of export goods.[94] The Baker-Shultz Carbon Dividends Plan, on which I worked at the Climate Leadership Council prior to joining the academy, includes a border adjustment like this.[95] This sort of border adjustment shifts a carbon tax from a domestic production base to a domestic consumption base, consistent with the destination principle of international trade law, which holds that products are to be taxed by the country in which they are consumed.[96] In this sense, a border-adjusted carbon tax is similar to a value-added tax (VAT), which is routinely border-adjusted. Border adjustment of carbon prices implemented via emissions trading systems raises greater technical and trade law challenges, but the underlying principle is the same.[97] The European Union's (EU) proposed Carbon Border Adjustment Mechanism (CBAM), which would be attached to the EU's existing Emissions Trading System (ETS), is best thought of primarily as an attempt to implement a trade-neutral border adjustment, though some of its design features deviate from this ideal and are a source of controversy.[98]

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93. Brian Galle, *The Tragedy of the Carrots: Economics & Politics in the Choice of Price Instruments*, 64 STAN. L. REV. 797, 797 (2012).

94. Catherine Wolfram & Aaron Krol, Carbon Border Adjustments, MIT CLIMATE PORTAL (Dec. 11, 2023), https://perma.cc/V9TL-ZEE3.

95. DAVID BAILEY, GEOFFREY DOLPHIN, & RYAN RAFATY, CLIMATE LEADERSHIP COUNCIL, THE CASE FOR AN ECONOMY-WIDE CARBON FEE 14 (2019).

96. Matthew C. Porterfield, *Border Adjustments for Carbon Taxes, PPMs, and the WTO*, 41 U. PA. J. INT'L L. 1, 14 (2019).

97. *Id.* at 17-19.

98. For instance, the CBAM gives credit for explicit carbon prices paid, but not other cost-imposing carbon emissions policies, like tradeable performance standards. This means it is not entirely trade neutral. *See,* e.g., Shuting Pomerleau, *What's in the Latest EU Carbon Border Adjustment Provisional Agreement?*, NISKANEN CTR. (Jan. 9, 2023),

Second, there are coercive border charges tied to the exporting countries' climate policy efforts and/or emissions performance. The most prominent proposal along these lines is William Nordhaus's climate club idea. In Nordhaus's formulation, club countries would agree to set a minimum economy-wide carbon price and impose across-the-board tariffs on non-club countries.[99] Nordhaus presents game theory modeling suggesting that a 5% across-the-board tariff would be sufficient to achieve near-total participation in a climate club up to a required $50/ton carbon price.[100] There are reasons to be skeptical of the modeling assumptions that drive this conclusion, which include no retaliation on the part of non-member countries and economic benefits accruing to club countries due to improved terms of trade.[101] More recent work by Ahmad Lashkaripour and Farid Farrokhi suggests that a Nordhaus-style carbon club could still produce broad participation even if the no-retaliation assumption is eliminated.[102] However, neither of these modeling efforts addresses the domestic political constraints that block most countries from adopting high economy-wide carbon prices. Alternative proposals for Nordhaus-style carbon clubs could allow for more policy instrument flexibility, so long as member countries achieve a specified minimum level of policy effort. The carbon price equivalent metric that I developed in a prior article could be used to implement such a flexible carbon club.[103] Other potential variations could involve softening the sharp dichotomy between members and non-members, allowing for intermediate credit for countries making substantial, but insufficient, efforts to reduce their GHG emissions. Finally, Nordhaus-style carbon clubs could change their enforcement mechanism, shifting from across-the-board tariffs to border charges that reflect the carbon content of imports, or even to non-trade measures. It is worth noting, however, that Nordhaus himself is skeptical of the prospects for carbon content charges as instrument for promoting international cooperation on climate change mitigation.[104]

One key feature that unifies these different variants, however, is their plurilateral nature. The point of a coercive, Nordhaus-style carbon club is to make club membership sufficiently attractive (and non-membership sufficiently unattractive) that countries will choose to join and ramp up their level of policy effort accordingly.[105] Accordingly, while Nordhaus-style carbon clubs are decidedly not trade-neutral, they are also inherently non-nationalistic, as they are designed

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https://perma.cc/US2E-8N56.

99. William Nordhaus, *Climate Clubs: Overcoming Free-riding in International Climate Policy*, 105 AM. ECON. REV. 1339, 1341 (2015).

100. *Id.* at 1358.

101. Weil, *Incentive Compatible Climate Change Mitigation*, *supra* note 28, at 942-944.

102. Farid Farrokhi & Ahmad Lashkaripour, *Can Trade Policy Mitigate Climate Change?*, 93 ECONOMETRICA (forthcoming 2025) (manuscript at 34-37) (on file at https://perma.cc/D644-JGT9).

103. *See* Weil, *The Carbon Price Equivalent*, *supra* note 29.

104. Nordhaus, *supra* note 99, at 1345.

105. *Id.* at 1340.

to foster international cooperation. This leads us to the third category of border carbon measures, which can stray into climate nationalism.

The third type of border measure is neither trade-neutral nor inherently open and plurilateral. While there is substantial variation among these proposals, the central feature is a border charge on carbon embodied in imports that is not tethered to a domestic carbon price. In some variations, such as the Fair, Affordable, Innovative, and Resilient Transition and Competition Act (FAIR Act) introduced by Senator Chris Coons and Congressman Scott Peters, the border charge is based on some measure of the compliance cost associated with non-pricing domestic climate policies.[106]

In others, it is not tethered to any specific domestic policy, but rather designed to acknowledge and credit the lower carbon intensity of domestic production in specific sectors. For instance, the Foreign Pollution Fee Act, introduced by Senators Bill Cassidy and Lindsay Graham, would create new import charges for specified carbon-intensive goods, with tariff rates tariff rates the increase step-wise for imports whose carbon intensity exceeds the U.S. average by specific threshold rates.[107] The bill does not specify the tariff rates, instead delegating this task to the Department of Treasury, but there is no indication in the legislative text that tariff rates are to be based on any measure of domestic climate policy.[108] On the contrary, the "policy details" sheet released along with the legislation takes pains to clarify that it imposes "no fee on any U.S." producer, even those producers whose products exceed average U.S. carbon intensity by amounts that would trigger tariffs for imports.[109] As a fig leaf gesture toward WTO compliance, the "policy details" sheet does indicate that "The rate of the Foreign Pollution Fee is set to correlate to the environmental performance of U.S. production and U.S. imports to qualify for the WTO's environmental policy exception."[110] But this rate seems to be based solely on the actual emissions intensity of domestic and imported products, with no effort made to determine whether those differences in carbon intensity are driven by climate policy, as opposed to other features like resource endowments, levels of economic development, path-dependent development patterns, etc.

Other ideas discussed include basing a border charge on the US Government's estimate or the social cost of carbon (SCC) or simply picking a rate based on political considerations.[111] A more fleshed-out proposal along these lines is

106. H.R. 4534, 117th Cong. (2021).

107. Shuting Pomerleau, *What's in Senator Cassidy's Foreign Pollution Fee bill* NISKANEN CTR. (Nov. 29, 2023), https://perma.cc/E2NV-CFSS.

108. *Id.*

109. OFF. U.S. SENATOR BILL CASSIDY, FOREIGN POLLUTION FEE 2 (2023), https://perma.cc/YAM2-6LZN.

110. *Id.* at 4.

111. These ideas have not been included in formal proposals (that the author is aware) but have been mentioned as possibilities in discussions with multiple participants in the federal legislative process.

actually a hybrid between a border-adjusted carbon price and a standalone border adjustment. In June 2022, Senator Whitehouse introduced the Clean Competition Act, which would have established a domestic carbon fee and border adjustment, including an export rebate, but the fee would only have kicked in for emissions in excess of the US industry average.[112] The system would have applied to energy-intensive products, including fossil fuels, refined petroleum products, petrochemicals, fertilizer, hydrogen, adipic acid, cement, iron and steel, aluminum, glass, pulp and paper, and ethanol.[113] Over time, the emissions excluded from the fee would fall, gradually converting the program into a border-adjusted sectoral carbon fee.[114]

Trade-neutral border adjustments of domestic carbon prices should not be thought of as a form of climate nationalism. For carbon taxes, they are straightforwardly compliant with the destination principle, which holds that goods should be taxed in the country where they are consumed.[115] Just as value-added taxes (VAT) are not considered nationalist policies, border-adjusted carbon taxes are best thought of as one way of implementing domestic carbon emissions and tax policies, which happens to involve an adjustment at the border.[116]

A similar analysis applies to genuinely trade-neutral symmetrically border adjusted emissions trading programs, given that carbon taxes and cap-and-trade programs are two ways of achieving the economic and environmental effects of carbon pricing.[117] In principle, there are many ways to adjust emissions taxes and emissions trading systems so that each can take on more of the features of the other. Allowance price collars, and banking and borrowing of allowances, produces more stable carbon prices, at the expense of near-term emissions certainty.[118] Emissions assurance mechanisms, by contrast, can provide more emissions certainty in emissions taxes, at the expense of reduced price certainty.[119] From an international trade perspective, the key feature of emissions trading systems that is relevant to the legitimacy of border adjustment is the method for allocating allowances. Systems that auction allowances function most similarly to a carbon tax and so the economic arguments for border adjustment run through similarly. But systems that allocate at least some portion of allowances freely, say in proportion to production, effectively combine a carbon price with a

112. S. 4355, 117th Cong. (2022).

113. *Id.*

114. *Id.*

115. Porterfield, *supra* note 96, at 15.

116. *Id.* at 117-19

117. Marc Hafstead, *Carbon Pricing 101*, RES. FOR FUTURE (Mar. 3, 2022), https://perma.cc/XW3A-YL55.

118. Richard Schmalensee & Robert N. Stavins, *Lessons Learned from Three Decades of Experience with Cap and Trade*, 11 REV. ENV'T ECON. & POL'Y 59, 68-69 (2017).

119. Gilbert E. Metcalf, *An Emissions Assurance Mechanism: Adding Environmental Certainty to a U.S. Carbon Tax*, 14 REV. ENV'T ECON. & POL'Y 114, 116-17 (2020).

production subsidy. Border-adjusting a system like that is not trade-neutral.[120] To address this concern, the EU's CBAM is scheduled to phase out free allowances under the EU ETS as the border charges ramp up.[121]

But the economics of border adjustment for emissions trading systems do not straightforwardly translate into international trade law. There is no equivalent of the destination principle for taxes that allows border adjustment of carbon prices that are implemented as emissions trading systems.[122] This is why the EUs proposed CBAM instead relies on GATT Article XX(g), which exempts measures "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption" from the GATT's most-favored nation (MFN), national treatment, tariff binding requirements.[123]

There are two challenges with this compliance pathway. First, the GATT Article XX does not apply to the Agreement on Subsidies and Countervailing Measures (SCM).[124] This means it cannot be used to exempt an export rebate from qualifying as an actionable or prohibited subsidy. For this reason, the EU CBAM only applies to imports and does not include an expert rebate. From an economic perspective, this means it is not trade-neutral. Assuming the policy works as advertised and free allowances phase out as the CBAM ramps up, it creates a level competitive playing field for all carbon-intensive production in the EU market. But EU producers of carbon-intensive products for the export market are still subject to a carbon price not faced by their competitors. In this sense, exporters are hurt by the shift from free allowance allocations to the import CBAM. In equilibrium, the reduced competitiveness of carbon-intensive EU exporters should cause the value of the Euro to adjust downward, resulting in some

120. The EU Emissions Trading System: Method and Effects of Free Allowance Allocation, at 16, EUR. PAR. DOC. PE 755.098 (2023).

121. *Carbon Border Adjustment Mechanism*, EUR. COMM'N, https://perma.cc/M3N7-Q8ZV (archived Aug. 9, 2023).

122. Joost Pauwelyn, *Carbon Leakage Measures and Border Tax Adjustments under WTO*, *in* RESEARCH HANDBOOK ON ENVIRONMENT, HEALTH AND THE WTO 448, 464-65 (Geert Van Calster & Denise Prévost eds., 2013).

123. GATT art. XX(g).

124. Nu Ri Jung, *Article: Are There 'Exceptions' to the SCM Agreement? Applicability of the GATT Exceptions Vis-à-Vis the International Rules on Subsidies*, 57 J. WORLD TRADE 457, 471-72 (2023). While this is the mainstream view, Simon Lester has long advocated for applying Article XX's exceptions to the other WTO goods agreements. Simon Lester, *USTR's View of GATT Exceptions in Relation to Non-GATT Goods Agreements*, INT'L ECON. L. & POL'Y BLOG (Feb. 22, 2021, at 17:17 PT), https://perma.cc/XFB5-NJRC. In support of Lester's view, an submission made by the Office of the United States Trade Representative in a recent dispute with Hong Kong over the marking of origin argues that GATT Article XXI's national security exception applies to the Agreement on Rules of Origin, a later WTO goods agreement. Simon Lester, *More on USTR's View of GATT Exceptions in Relation to Non-GATT Goods Agreements*, INT'L ECON. L. & POL'Y BLOG (July 11, 2021, at 20:46 PT), https://perma.cc/NPP9-BTTR. The same logic supporting this contention would seem to support the view that Article XX's general exceptions apply to the Agreement on Subsidies and Countervailing Measures.

combination of reduced EU imports and increased EU exports of less carbon-intensive goods and services.[125] These are substantial trade distortions, but they are artifacts of the structure of international trade law, not any EU effort to circumvent that body of law.

The second challenge with the EU's chosen compliance pathways is Article XX's chapeau, which requires that "measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade."[126] This requirement is distinct from the MFN and national treatment provisions that Article XX provides exceptions to. Instead of prohibiting discrimination with respect to treatment of "like products"[127] the chapeau focuses on "countries where the same conditions prevail."[128] The WTO Appellate Body has interpreted this language as prohibiting attempts to coerce "specific policy decisions made by foreign governments." For example, in the so-called Shrimp-Turtle case ("U.S.—Shrimp"), the original U.S. ban was found inconsistent with the chapeau because it required other countries to "adopt essentially the same policy."[129] The Appellate Body approved a modified U.S. provision conditioning market access on "the adoption of a program comparable in effectiveness," finding that this "allows for sufficient flexibility in the application of the measure so as to avoid 'arbitrary or unjustifiable discrimination.'"[130]

In the context of GHG emissions, this could be read to require any border adjustment mechanism using an Article XX compliance pathway to account for existing emissions regulations in exporting countries, regardless of whether they take the same form as those in the importing country.[131] This is not what the EU CBAM does. Instead, it only offers credit for explicit carbon prices. This could be viewed as an attempt to coerce other countries to adopt "essentially the same policy"[132] as the EU—carbon pricing. It is worth noting, however, that the policy that was disfavored in U.S.—Shrimp involved a complete ban on imports from countries that failed to adopt the required policies,[133] whereas imports to the EU would merely be required to purchase CBAM credits in order to gain market access. It is possible, therefore, that the WTO dispute settlement system, should it be sufficiently functional to hear a challenge to the CBAM, would look more favorably on this provision.

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125. Nick Lioudis, *How the Balance of Trade Affects Currency Exchange Rates*, INVESTOPEDIA (Nov. 13, 2024), https://perma.cc/J8V4-LMDJ.

126. GATT art. XX.

127. GATT arts. III, IX.

128. GATT art. XX.

129. Appellate Body Report, *United States—Import Prohibition of Certain Shrimp and Shrimp Products*, ¶ 161, WTO Doc. WT/DS58/AB/R (adopted Nov. 6, 1998).

130. *Id.*

131. Pauwelyn, *supra* note 122, at 24.

132. *See supra* note 129 and accompanying text.

133. *Id.*

What is clearer is that this aspect of the CBAM is also not completely trade-neutral. A trade-neutral (on the import side) policy would credit neither explicit carbon prices nor other emissions policies, simply charging the prevailing allowance price on the EU ETS for all imports, regardless of their country of origin. If some of the exporting countries are enforcing domestic carbon prices or other cost-imposing emissions policies, they could offer export rebates to offset those costs. But crediting only explicit carbon prices opens the door to a multitude of distortions and perverse incentives, whereby countries can avoid the CBAM by adopting high explicit carbon prices and then undermine the emissions and trade impact of those prices using other policy tools.[134] Nonetheless, it seems clear that the CBAM is a good faith effort to construct a border-adjusted carbon price, subject to constraints imposed by the SCM, which likely prohibits an export rebate attached to an emissions trading system, the EU's own internal rules that would make it difficult to convert the ETS into a carbon tax, and the practical difficulty of determining how much credit to give for non-pricing emissions policies.[135] The carbon price equivalent methodology I developed in prior work might help overcome these practical barriers, though it would have to be modified to avoid crediting emissions-reducing policies that do not impose a cost on domestic producers, like the subsidies in the U.S. IRA.[136] An intermediate approach, promoted by Goran Dominioni and Dan Esty, would credit effective carbon prices, which include policies like fuel taxes that are not explicit carbon prices.[137] It's also worth noting that the EU's approach is already showing signs of success in inducing other countries to adopt stronger climate change mitigation policies. Turkey, Indonesia, Vietnam, and Thailand, for example, are giving serious consideration to domestic carbon pricing policies.[138] The EU's actions have also pushed the similar border adjustment measures onto the table in the UK, Canada, and Australia, which already have domestic carbon prices.[139]

More broadly, carbon border charges may be warranted to the extent that they serve at least one of two functions: enabling greater domestic emissions reductions or encouraging other countries to adopt strong emissions policies. Border-adjusted carbon prices are optimized for the first purpose. They are trade-neutral, and so offer other countries little incentive to increase the ambition of

134. *See* Weil, *The Carbon Price Equivalent*, *supra* note 29, at 520.

135. Vasiliki Papouliakou & Jost Angerer, *General tax policy*, EUR. PARL. (Apr. 2025), https://perma.cc/8XSG-3H54.

136. *See generally*

137. Goran Dominioni & Daniel C. Esty, *Designing Effective Border-Carbon Adjustment Mechanisms: Aligning the Global Trade and Climate Change Regimes*, 65 ARIZ. L. REV. 1, 9-10 (2023).

138. Kimberly Clausing & Catherine Wolfram, *Putting Progress Over Protectionism in Climate Policy*, PETERSON INST. FOR INTL. ECON. (Dec. 19, 2023, at 10:50 PT), https://perma.cc/G4LE-WU8N.

139. See Aaron Cosbey et al., Developing Guidance for Implementing Border Carbon Adjustments: Lessons, Cautions, and Research Needs, 13 REV. ENV'T ECON. & POL'Y 3, 5–6 (2019).

their climate policies, though they do offer foreign exporters some incentive to decarbonize their production. More importantly, a border adjustment is necessary for a carbon price to cover the energy-intensive trade exposed sectors, without offsetting subsidies or free allowances, without eviscerating domestic production in those sectors. Consequently, it is also essential for the political viability of an economy-wide carbon price that foregoes such subsidies or free allowances. And compared to subsidies and free allowances, border-adjustments will tend to enable the achievement of greater emissions reductions at the same economic costs, the same emissions reductions at lower economic cost, or some combination. This is because subsidies and free allowances that scale with output dilute the signal sent by the carbon price, so the incentive for decarbonization is not present across all relevant margins. Also, the outlays or lost revenue from subsidies or free allowances generally must be made up for with increases in other distortionary taxes, spending cuts in other areas, or increases in government borrowing, each of which has its own costs.

Approaches like Nordhaus's climate club proposal, discussed above, are optimized for the second purpose: coercing foreign governments to adopt stronger climate change mitigation policies. While under Nordhaus's modeling assumptions member countries benefit from imposing across-the-board tariffs on non-member countries, there are reasons to be skeptical of these assumptions.[140] The more straightforward benefits of such a club formulation are the incentives for other countries to strengthen their emissions policies.

Genuine hybrid policy designs are also possible. The EU's CBAM proposal arguably fits this mold, since it combines an attempt to border-adjust a domestic carbon price with an explicit incentive for other countries to adopt their own carbon prices. Alternative formulations could also credit non-pricing emissions policies that impose costs on carbon-intensive production methods, such as tradable performance standards. At the expense of greater potential trade distortion, they could credit any emissions-reducing policy, as measured by the carbon price equivalent, regardless of whether it is cost-imposing or applied to the particular goods subject to the CBAM. This would increase the incentives for exporting-country governments to adopt stronger emissions-reducing policies, but would likely result in excess advantages for certain carbon-intensive exports. For instance, U.S. exports to the EU would receive credit for the emissions-reducing impacts of the IRA, even though the IRA's subsidies generally have the effect of lowering production costs, even for carbon-intensive goods. Multilateral clubs based on border charges that scale with embodied carbon, rather than Nordhaus's proposed across-the-board tariffs, are also possible.

However, some proposed carbon border measures do little to advance either of these objectives, while substantially distorting international trade. Measures of the third type discussed above, that are neither trade-neutral border adjustments of domestic carbon prices nor open and plurilateral are most likely to fall

140. Weil, *Incentive Compatible Climate Change Mitigation*, *supra* note 28, at 943.

short on these objectives. To be sure, some hybrid policies may fall into this category. For instance, the EU CBAM is neither purely trade neutral, nor inherently open and plurilateral, but it does significantly advance the goal of enabling a truly economy-wide carbon price with no free allowances, while also giving other countries some incentive to adopt their own carbon price. However, policies that impose a border carbon charge that is untethered from any domestic climate policy, as has been discussed in U.S. climate and trade policy circles, would neither facilitate stronger domestic policies nor substantially encourage other jurisdictions to strengthen their climate policies.[141]

The Coons-Peters proposal mentioned above would base its carbon border charge on the average "domestic environmental cost" incurred in each covered sector and in the production of each covered fuel.[142] This "domestic environmental cost" figure would in turn be based on the total average cost imposed by federal, state, regional and local environmental laws and regulations, including those under the Clean Air Act, greenhouse gas emissions standards for passenger cars and light trucks, and State, regional, or local law, regulation, policy, or program that imposes a cap-and-trade system with respect to, or a tax or fee on, carbon dioxide.[143] The proposal would apply only to imports and would not offer any credit for foreign emissions policies.

While this approach could have some benefits in terms of enabling greater domestic emissions policy ambition, it also has several important liabilities. First, it would do little to encourage exporting countries to adopt stronger emissions policies, since they would not benefit from a lower import fee rate if they did so (though any reductions in the carbon intensity of their exporters would mechanically result in a benefit). Second, it would substantially distort international trade, since even exporters that are subject to explicit carbon prices, like EU steel producers, would still be subject to the import fee. It is also difficult to imagine an equilibrium in which this policy design meshes well with other countries' border carbon policies. If every country adopted a similar policy, with no export rebate or credit for exporting country emissions policies, it would result in a substantial aggregate bias toward consumption of domestically produced

141. *See* Foreign Pollution Fee Act, S. 3198, 118th Cong. (2023). Much of the private discussion that I was privy to during my time at the Climate Leadership Council centered around border charges that were not linked to any domestic policy. The only other carbon border charge bill with any Republican co-sponsors is a proposal to have the Department of Energy study the possibility of a border adjustment and generate the data needed on carbon intensity, with no proposed domestic policy basis for any eventual border charge. Maxine Joselow, *A bipartisan plan to punish global climate laggards: Tax them*, WASH. POST (June 7, 2023), https://www.washingtonpost.com/climate-environment/2023/06/07/carbon-border-tax/; Providing Reliable, Objective, Verifiable Emissions Intensity and Transparency Act, S. 1863, 118th Cong. (2023); *Fireside Chat on CBAM, Fair Access to Banking Act, Permitting Reform*, OFF. U.S. SENATOR KEVIN CRAMER (Feb. 17, 2023), https://perma.cc/4VSR-BVRG.

142. Fair, Affordable, Innovative, and Resilient Transition and Competition Act, S. 2378, 117th Cong. § 9902 (2021).

143. *Id.*

carbon-intensive goods. As conceived, it also almost certainly violates WTO rules. As with the EU's CBAM, it would have to appeal to an Article XX exception. But it would have an even harder time satisfying the chapeau than the EU ETS, since it would impose border carbon charges even on products from countries with stronger emissions policies, including explicit carbon prices, than the U.S.[144] The inclusion of other domestic environmental regulations, including those targeting non-GHG pollutants in the average cost calculation may also raise some concerns. Additionally, it is worth noting that greenhouse gas emissions standards for cars and light trucks are already border-adjusted in the sense that imported cars have to comply with those standards.[145] So, charging an import fee reflecting the cost of complying with those regulations would be redundant. There are also substantial administrability and WTO compliance concerns with applying a border charge based on state, local, and regional policies that vary widely across the country. Finally, basing a border carbon charge solely on the costs associated with environmental regulations, rather than their impact on emissions, would generate incentives to adopt costly policies that can be plausibly labeled as climate or environmental policies, but that largely serve other political or policy functions. It would not reward the adoption of more cost-effective emissions policies.

The Foreign Pollution Fee Act, introduced by Senators Bill Cassidy and Lindsay Graham, is even less defensible, at least a climate policy instrument. Like Coons-Peters, the Cassidy Collins proposal would clearly violate WTO rules and generate substantial trade distortions, without creating meaningfully incentives for other countries to strengthen their own emissions policies. But since the policy-important charges would not be tethered to any measure of domestic emissions policy, it would also do little to promote or enable stronger domestic emissions policies. In sum, this proposal generates all the diplomatic and economic costs associated with carbon border charges, without producing any promising or substantial emissions reductions benefits, either domestically or globally.

Senator Whitehouse's Clean Competition Act more plausibly fulfills the function of enabling stronger domestic emissions policies. The Clean Competition Act would impose a sectoral carbon price on domestic and foreign goods, but only for goods whose carbon intensity exceeds the U.S. industry average, and only on the portion of the embodied carbon in excess of that average.[146] Under this design, the cleaner half of U.S. producers would not pay any carbon fee initially. Since U.S. industries have a lower carbon intensity than most of their competitors in the covered sectors, this policy would have the effect of favoring U.S. producers in the domestic market, while also giving the dirtier half of U.S.

144. Fair, Affordable, Innovative, and Resilient Transition and Competition Act, H.R. 4534, 117th Cong. § 9904(2) (2021).

145. 40 C.F.R. § 85 (2023).

146. Clean Competition Act, S. 4355, 117th Cong. (2022).

producers an incentive to reduce their carbon intensity.[147] Domestic producers would be rebated any carbon fees paid upon exports.[148] This means that the policy is, in essence, a symmetrically border-adjusted sectoral carbon fee with an exclusion for the first X tons per unit of output, where X is the domestic industry average. Importantly, however, the exclusion benchmark declines by 2.5 percentage points per year for the first four years, then by 5 percentage points per year after that.[149] After 12 years, the exclusion would only cover half the initial industry-average carbon intensity.[150] After 22 years, it would convert into a full sectoral carbon price with no exclusions.[151] In this way, the policy design threads the needle between appealing to the nationalist sentiments toward policy that favors U.S. producers, while genuinely enabling stronger emissions policies and minimizing trade distortions. It is also likely compliant with WTO rules, since taxes are border adjustable under the destination principle, and domestic products are treated the same as foreign products, except inasmuch the initial exclusion benchmark is based on the U.S. industry average and therefore tends to favor U.S. producers. The other reason the policy tends to benefit U.S. producers is that the legislation arguably cherry picks sectors where U.S. producers do have a carbon intensity advantage, declining to impose the carbon price on an economy-wide basis. While an economy-wide carbon price would surely be preferable, and Senator Whitehouse may be the most important congressional champion of carbon pricing, this policy seems like a clear win for the climate, despite its mild nationalist overtones.

The U.S.'s turn toward climate nationalism has generated tensions in U.S.-EU relations at the nexus of climate and trade. Consistent with its subsidy-based approach to climate policy, the Biden Administration floated a proposal in December 2022 for a Global Arrangement on Sustainable Steel and Aluminum (GASSA).[152] The U.S. conception is that GASSA would function as a sort of sectoral carbon club. The members of the club would impose common tariffs on imports of steel and aluminum, based on their embodied emissions, and those tariffs would replace the Trump-era steel and aluminum tariffs and supersede the EU's CBAM.[153] That is, the U.S. phases out tariffs that were widely instituted on pretextual national security grounds and widely viewed as protectionist in

147. Catrina Rorke & Greg Bertelsen, *America's Carbon Advantage,* CLIMATE LEADERSHIP COUNCIL, https://perma.cc/9CL5-NP22 (archived Feb. 2, 2025). *See* Joseph E. Aldy, *Carbon Tariffs Won't Work the Way You Think*, 13 REV. ENV'T ECON. & POL'Y 43, 49–50 (2019).

148. *See* Clean Competition Act, S. 4355, 117th Cong. § 4693 (2022).

149. *See id.* § 4692(b).

150. *See id.*

151. *See id.*

152. Ana Swanson, *US Proposes Global Green Steel Club That Would Put Tariffs on China*, N.Y. TIMES (Dec. 7, 2022), https://perma.cc/4ZSJ-CS4W.

153. Gautam Jain et al., *Q&A | Why 2024 Is Critical for Climate and Trade Policies in the Years to Come*, CTR. ON GLOB. ENERGY POL'Y AT COLUM. UNIV. SCH. INT'L & PUB. AFFS. (Jan. 17, 2024), https://perma.cc/2L2N-DZ9K.

exchange for the EU not only exempting the U.S. from the CBAM, but also cooperating with and legitimizing U.S. carbon tariffs on steel and aluminum that are not linked to any domestic carbon price as part of a set of tariffs adopted in common with the EU (whose carbon border charges are linked to the EU ETS under the CBAM).[154] Understandably, the EU has been reluctant to agree to such terms. But that means the Section 232 tariffs on steel and aluminum initiated during the Trump administration are still in the place.[155] U.S. Trade Representative Katherine Tai is now warning the EU not to bring a case before the WTO challenging those tariffs, claiming that doing so would sink negotiations over WTO reform, including reviving the dispute settlement process.[156] In this way, tensions arising from the U.S. turn to climate nationalism are hampering transatlantic cooperation on a broad range of issues related to both trade and climate.

III. GREEN TECHNOLOGY/RESOURCE HOARDING

The previous two Parts addressed policies that seek to protect the domestic market for climate-relevant goods from foreign competition or to promote the export of those goods by domestic firms. This Part addresses policies designed to do the opposite, placing limits on the export of resources or technologies that could play a crucial role in decarbonization. These restrictions come in four potential forms. First, and simplest, are bans or restrictions on the export of specific resources or technologies, regardless of the destination country. These restrictions seem to be primarily motivated by some combination of economic/national security concerning access to the resources at issue and a desire to advantage downstream domestic producers vis-a-vis foreign competitors. This has been observed in the form of countries like China[157] and Malaysia[158] placing restrictions on the export of rare earth elements, and other resources, like graphite, that are key components of lithium-ion batteries. These restrictions, in turn, may have helped motivate the country of origin restrictions for critical minerals

154. Bown & Clausing, *supra* note 70, at 16; Emily Benson, *Transatlantic Trade and Climate: Evaluating Differences and Commonalities in Mutual Approaches*, CTR. FOR STRATEGIC & INT'L STUD. (Dec. 18, 2023), https://perma.cc/U83J-L2H9; Noah Kaufman et al., *As US-EU trade tensions rise, conflicting carbon tariffs could undermine climate efforts,* THE CONVERSATION (Jan. 23, 2023, at 08:24 EST), https://perma.cc/VNP2-2XAQ; David Kleimann, *Section 232 reloaded: the false promise of the transatlantic 'climate club' for steel and aluminum* 4-7, (Bruegel, Working Paper No. 11/2023, 2023).

155. Some steel and aluminum imports from the EU are exempt under a tariff rate quota agreement. *E.g.*, Nick Lazzaro, *US confirms extension of steel, aluminum TRQ for EU through 2025,* EUROMETAL (Dec. 30, 2023), https://perma.cc/P3M7-QN8N.

156. Jorge Valero & Eric Martin, *US Warns EU That Reviving Steel Case Would Sink WTO Reform*, BLOOMBERG (Mar. 15, 2024, at 15:41 PDT), https://perma.cc/FLY6-Q9TW.

157. Christopher R. LeWand et al., *China's Export Controls on Critical Minerals*, FTI CONSULTING (Dec. 19, 2023), https://perma.cc/7KKR-GE9T.

158. A. Ananthalakshmi & Mai Nguyen, *Malaysia to ban export of rare earths to boost domestic industry*, REUTERS (Sep. 11, 2023, at 03:54 PDT), https://perma.cc/UNV5-TBP3.

in the IRA subsidies.[159]

Second, countries or coalitions of countries may wish to cut off specific rivals from accessing critical resources or technologies. This form of restriction has not yet been observed in the climate domain. The U.S. is currently engaged in an effort to restrict China's access to the most advanced computer processing chips, those used to train artificial intelligence systems, as well the chip fabrication equipment that would be needed to build up a domestic chip production industry.[160] This effort is not primarily about controlling exports from the U.S. Indeed, the dominant players in both chip production (Taiwan Semiconductor Manufacturing Company, commonly referred to TSMC)[161] and production of the chip fabrication machines (ASML, based in the Netherlands)[162] are located outside the U.S.[163] The closest that this sort of technology control effort has come to climate and energy is the nuclear non-proliferation regime, but this regime is specifically designed to enable the peaceful use of nuclear energy.[164]

Third, countries may restrict exports of fossil fuels, at least in part motivated by the goal of reducing foreign GHG emissions. We have seen a weak form of this recently, with the Biden Administration pausing approvals on export terminals for liquified natural gas (LNG).[165] In the specific case of LNG exports, the climate impacts are ambiguous. To the extent that LNG exports displace foreign coal combustion, export restrictions would tend to increase foreign emissions.[166] But, especially in the long run, LNG exports may displace zero-carbon energy sources like solar, wind, and nuclear, and may facilitate greater total energy consumption and permit new export infrastructure to produce lock-in.[167]

Fourth, and more prosaically, countries may simply slow the diffusion of

159. Bown & Clausing, *supra* note 70, at 16.

160. Michelle Toh & Kayla Tausche, *US escalates tech battle by cutting China off from AI chips*, CNN (Oct. 18, 2023, at 10:43 EDT), https://perma.cc/56EW-BRXF.

161. Yang Jie, Stephanie Yang & Asa Fitch, *The World Relies on One Chip Maker in Taiwan, Leaving Everyone Vulnerable*, WALL ST. J. (June 19, 2021), https://perma.cc/5Y7Z-RCAH; *Taiwan's dominance of the chip industry makes it more important,* THE ECONOMIST (Mar. 6, 2023), https://perma.cc/WMJ9-Y4RX.

162. Mehul Reuben Das, *The semiconductor monopoly: How one Dutch company has a stranglehold over the global chip industry*, FIRSTPOST (Jan. 23, 2023, at 09:48 IST), https://perma.cc/D6RY-CEFS; Robert Hwang, *ASML: The Little-Known Source of the World's Technological Progress*, MICH. J. ECON. (Apr. 5, 2023), https://perma.cc/Y5CW-2HRK.

163. *Don Clark, How Nvidia Built a Competitive Moat Around A.I. Chips*, N.Y. TIMES (Aug. 21, 2023), https://perma.cc/PF3Y-RCR8.

164. Treaty on the Non-Proliferation of Nuclear Weapons, *opened for signature* July 1, 1968, 21 U.S.T. 483, 729 U.N.T.S. 161.

165. Halle Parker, *U.S. pauses build-out of natural gas export terminals to weigh climate impacts*, NAT'L PUB. RADIO (Jan. 27, 2024), https://perma.cc/GE4W-DMMJ.

166. SELINA ROMAN-WHITE ET AL., U.S. DEP'T ENERGY, LIFE CYCLE GREENHOUSE GAS PERSPECTIVE ON EXPORTING LIQUEFIED NATURAL GAS FROM THE UNITED STATES: 2019 UPDATE, at 33 (2019).

167. Arvind P. Ravikumar, *We are having the wrong debate about Biden's decision on liquefied natural gas*, MIT TECH. REV. (Feb. 6, 2024), https://perma.cc/3EYA-C3WH.

green technology by aggressively asserting their intellectual property rights in world markets. This is the norm for technologies across a wide range of sectors. Nonetheless, there is scope for countries to spur global decarbonization by facilitating the diffusion of clean technologies on terms that would not maximize the returns for the country where the technology was developed.[168]

Unlike the discriminatory subsidies and carbon border charges discussed in the prior two Parts, there is no plausible climate policy rationale for at least the first two forms of export restrictions. Hoarding of critical minerals or green technology may give domestic green technology firms a leg up, but they almost certainly slow the global pace of decarbonization. Perhaps there could be circumstances under which critical mineral export restrictions are the linchpin of a domestic political coalition for stronger climate policies, as the discriminatory subsidies in the IRA plausibly were, but such policy linkage is not evident to date. Similarly, cutting off specific countries from access to green technology or resources needed for decarbonization is would clearly be counterproductive from a climate change mitigation perspective. The only caveat to this analysis is that setting conditions on technology transfer, whether of climate-relevant other technological advances, could be used as a tool of coercive climate diplomacy to motivate other countries to decarbonize faster.[169] Otherwise, while export restrictions on carbon-reducing technologies and resources may sometimes be an expedient foreign policy tool, they will generally be at odds with climate change mitigation.

The case is murkier for export restrictions on fossil fuels and other "dirty" resources and technologies. As noted above, even the first- and second-order effects of LNG exports on foreign emissions are ambiguous. But those effects do not exhaust the climate impacts. Restricting exports also puts downward pressure on domestic prices. If export restrictions are not paired with policies targeting domestic demand, this pushes domestic consumption up even as domestic demand is pushed down.[170] A similar dynamic came into play with proposals for state and federal gas tax holidays in 2022, when gas prices spiked in the wake of Russia's invasion of Ukraine and the sanctions imposed on Russia. Namely, by putting downward pressure of domestic prices, a gas tax holiday increases domestic consumption, which means net exports go down.[171] The effects of increased domestic natural gas consumption on domestic emissions exhibit a

168. *See* MIRIA A. PIGATO ET AL., WORLD BANK GRP., TECHNOLOGY TRANSFER AND INNOVATION FOR LOW-CARBON DEVELOPMENT 16 (2020).

169. For an in-depth discussion of coercive climate diplomacy, see generally Weil, *Incentive Compatible Climate Change Mitigation*, *supra* note 28.

170. U.S. ENERGY INFO. ADMIN., EFFECT OF INCREASED NATURAL GAS EXPORTS ON DOMESTIC ENERGY MARKETS, 6-8 (2012).

171. Beia Spiller & Heather Stephens, *To Tax or Not to Tax? The Answer May Surprise You*, RES. FOR FUTURE (May 20, 2022), https://perma.cc/VH2Q-UX42; Josh Barro, *If You're Going To Do Gimmicky Handouts, Why Student Debt Relief Over A Gas Tax Holiday?*, VERY SERIOUS (May 3, 2022), https://perma.cc/PBA7-R3NY.

similar ambiguity to that in the foreign case.[172] That is, cheaper domestic natural gas may displace coal in the short-term but may also inhibit the deployment of renewables. There are also potential downstream geopolitical effects.[173] These are even tougher to assess, but likely do not support global cooperation on decarbonization. In sum, the LNG export pause is not clearly justified in terms of its narrow impact on global emissions. Factoring in the economic and geopolitical costs, the case looks considerably weaker.

In principle, there could be a stronger climate case for export restrictions on fuels or technologies that would not tend to displace dirtier fuels or technologies, at least if paired with constraints on domestic consumption. For instance, if the U.S. restricted exports of coal, while continuing to retire coal-fired power plants domestically, this would tend to put upward pressure on coal prices on the global market and reduce consumption.[174] In some limited contexts, this could inhibit displacement of even dirtier fuels like wood, but the availability and price of coal on global markets is typically not a major factor on this margin of substitution.[175] U.S. coal reserves are also mostly bituminous and subbituminous,[176] which are less somewhat carbon-intensive than the anthracite and lignite that predominate in some parts of the world.[177] Actual proposals for supply-side or export constraints have tended to focus more heavily on petroleum, which is less carbon-intensive than coal, but also more supply constrained.[178]

Finally, consider aggressive enforcement of intellectual property rights regarding green technology. Unlike other forms of alleged climate nationalism, this profit-maximizing behavior does not depend on any kind of exotic economic or national security rationale. Basic economic theory predicts that companies will seek to maximize their profits and that national governments will tend to

172. John Wihbey, *Pros and cons of fracking: 5 key issues*, YALE CLIMATE CONNECTIONS (May 27, 2015), https://perma.cc/6YYT-TYXC .

173. Benjamin Jensen & Yasir Atalan, *Why Pausing LNG Exports Is Bad Foreign Policy*, CTR. FOR STRATEGIC & INT'L STUD. (Feb. 12, 2024), https://perma.cc/ARJ3-J3RP.

174. PHILIPP M. RICHTER ET AL., DIW BERLIN, MARKET POWER RENTS AND CLIMATE CHANGE MITIGATION: A RATIONALE FOR COAL TAXES? 3, 13, 25-26 (2015).

175. John D. Sterman, Lori Siegel, & Juliette N. Rooney-Varga, *Does replacing coal with wood lower CO2 emissions? Dynamic lifecycle analysis of wood bioenergy*, 13 ENV'T RSCH. LETTERS, at 11 (2018).

176. *Subbituminous and bituminous coal dominate U.S. coal production*, U.S. ENERGY INFO. ADMIN. (Aug. 16, 2011), https://perma.cc/3AXP-LZ2W.

177. *Coal explained*, U.S. ENERGY INFO. ADMIN. (Oct. 24, 2023), https://perma.cc/BQK5-T4Q3; *see Coal Explained: Coal Ranks* U.S. ENERGY INFO. ADMIN. (June 4, 2020), https://perma.cc/WEN8-VQSW (reporting that anthracite contains 86–97% carbon, lignite 25–35%, bituminous 45–86%, and subbituminous 35–45%); *How Much Carbon Dioxide Is Produced When Different Fuels Are Burned?*, AM. GEOSCIS. INST. (2020), https://perma.cc/AAT8-JAZZ (showing anthracite produces 228.6 pounds of carbon dioxide per million British thermal units, compared to 205.7 pounds for bituminous and 214.3 pounds for subbituminous).

178. Lorenzo Pellegrini & Murat Arsel, *The Supply Side of Climate Policies: Keeping Unburnable Fossil Fuels in the Ground*, 22 GLOB. ENV'T POL. 1, 6-7 (2022).

prioritize the interests of domestic firms over foreign consumers.[179] This stands in contrast to the case for free trade, where standard economic theory suggests that trade barriers are costly for the countries that impose them, not just their trading partners.[180] Nonetheless, there is a clear conflict between the interests of creator of a new technology, which benefits from the monopoly profits it can extract from intellectual property protects, and the interests of potential consumers of that technology. These monopoly profits, and the attendant slowing of technology diffusion associated with intellectual property protections, are typically justified on the basis that the expectation of monopoly profits is needed to motivate investments in innovation.[181] While the costs and benefits of intellectual property protections are hotly contested, the basic tradeoff between providing incentives for innovation and promoting rapid diffusion are well understood and not unique to the climate context.[182] The additional wrinkle that is added with clean technology is that diffusion of green tech produces positive externalities, in the form of reduced GHG emissions (and other forms of pollution, but those benefits may be more localized to the consuming country). Of course, the invention of new clean technologies also generates similar positive externalities; that is, emissions reductions externalities, in addition to the standard positive externalities associated with generic innovation. On balance, the effect of these externalities on the optimal balance between production incentives and diffusion of green technologies is ambiguous. Perhaps this points to a greater role for government subsidies for green innovation, but this move just pushes the problem up a level. Even if green innovation is heavily subsidized, national governments will still be tempted to cover their investment, directly or indirectly, which means the tradeoff between profit maximization and rapid technology diffusion is not eliminated. One answer here may be to raise the salience of technology transfer agreements and initiatives as an additional pathway for developed countries to contribute to climate change mitigation.

IV. UNILATERAL HIGH-LEVERAGE GEOENGINEERING

Some climate interventions, particularly stratospheric aerosol injection, are sufficiently high-leverage that a single country could afford to deploy them at a scale that would dramatically and rapidly alter the earth's climate system.[183] Stratospheric aerosol injection, the most commonly discussed form of solar

179. Stan Liebowitz, *Intellectual Property*, ECONLIB, https://perma.cc/3H4P-P92H (archived Mar. 11, 2025).

180. Jagdish Bhagwati, *Protectionism*, ECONLIB, https://perma.cc/Y5G7-9ZJS (archived Mar. 11, 2025).

181. Liebowitz, *supra* note 179.

182. *Id.*

183. Scott Barrett, *The Incredible Economics of Geoengineering*, 39 ENV'T RSCH. ECON. 45, 49 (2008); Edward A. Parson & Lia N. Ernst, *International Governance of Climate Engineering*, 14 THEORETICAL INQUIRIES L. 307, 313–14 (2013).

radiation management, involves injecting aerosol particles like sulfates into the upper atmosphere—mimicking the effect of a volcano.[184] This intervention was first proposed in the mid-1970s and gained greater attention after the 1991 eruption of Mount Pinatubo in the Philippines, which resulted in a temporary global cooling that peaked at about 0.5°C.[185] Once deployed, stratospheric aerosol injection would start to reduce temperatures within a year.[186] Stratospheric aerosol injection would offer much greater leverage and lower implementation costs compared to other interventions. In theory, the direct cost to deploy stratospheric aerosol injection at a scale sufficient to substantially reduce global warming could be as low as $2 billion dollars per year,[187] though other estimates suggest a minimum annual cost of $10 billion.[188] Even extending stratospheric aerosol injection in perpetuity, the present discounted direct cost could be as low as $100 billion.[189] This compares to estimates on the order of $500 billion to $1 trillion per year for the global cost of conventional mitigation.[190]

However, there is significant uncertainty about the magnitude of the stratospheric aerosol injection cooling response and concerns about the secondary effects stratospheric aerosol injection deployment could have, such as on stratospheric ozone and high-altitude tropospheric clouds.[191] Additionally, all solar radiation management intervention, including stratospheric aerosol injection, share three important differences. First, solar radiation management interventions do not directly address ocean acidification, whereas interventions that reduce the atmospheric concentration of CO_2 would mitigate ocean acidification in tandem with reducing expected warming.[192] Even if solar radiation management interventions otherwise mimicked GHG interventions, this would be a significant shortcoming that would militate against treating solar radiation management

184. ROYAL SOC'Y, GEOENGINEERING THE CLIMATE: SCIENCE, GOVERNANCE AND UNCERTAINTY 29 (2009).

185. *Id.*

186. *Id.* at 31.

187. Wake Smith & Gernot Wagner, *Stratospheric Aerosol Injection Tactics and Costs in the First 15 Years of Deployment*, 13 ENV'T RSCH. LETTERS, at 1 (2018); Barrett, *supra* note 183, at 45.

188. Ryo Moriyama et al., *The Cost of Stratospheric Climate Engineering Revisited*, 22 MITIGATION & ADAPTATION STRATEGIES FOR GLOB. CHANGE 1207, 1207 (2017).

189. David G. Victor, *On the Regulation of Geoengineering*, 24 OXFORD REV. ECON. POL'Y 322, 326 (2008).

190. Per-Anders Enkvist, Tomas Nauclér & Jerker Rosander, *A Cost Curve for Greenhouse Gas Reduction*, 42 MCKINSEY Q., no. 1, 2007, at 44-45.

191. *See* Alan Robock, 20 Reasons Why Geoengineering May Be a Bad Idea, 64 BULL. ATOMIC SCIENTISTS 14, 16–18 (2008).

192. NAT'L RSCH. COUNCIL, CLIMATE INTERVENTION: REFLECTING SUNLIGHT TO COOL EARTH 39–40 (2015); *but see* David W. Keith, Gernot Wagner & Claire L. Zabel, *Solar Geoengineering Reduces Atmospheric Carbon Burden*, 7 NATURE CLIMATE CHANGE 617, 617 (2017) (arguing that "[s]olar geoengineering reduces the carbon burden, and therefore ocean acidification, due to the three pathways explored here: carbon-cycle feedback, reduced permafrost melting, and reduced energy-sector emissions") (footnotes omitted).

interventions as favorably as CO_2 intervention per unit of radiative forcing. Those who are particularly concerned with ocean acidification, moreover, may worry that the potential to reduce global temperatures and extreme weather events with solar radiation management may dampen incentives for decarbonization and thereby exacerbate ocean acidification. However, it is possible that other non-CO_2 interventions could somewhat ameliorate the ocean acidification problem.[193] Note also that this first feature of solar radiation management interferences is shared by abatement or removal of GHGs other than CO_2 and by cirrus cloud thinning. To the extent that the objection to solar radiation management is its failure to address ocean acidification, we should be equally concerned about strategies that emphasize abatement of GHGs like methane, nitrous oxide, and fluorinated gasses.

Second, solar radiation management would imperfectly counteract atmospheric GHG-driven climate change. Depending on the precise pattern of deployment, the effects on precipitation and temperature are likely to be somewhat uneven.[194] Solar radiation management tends to cool the tropics more than the poles, such that the tropics may have to be cooled below pre-industrial temperatures to stop the melting of polar ice sheets.[195] Solar radiation management is also more effective at reducing anthropogenic precipitation anomalies than temperature.[196] This means that, for a given temperature target, solar radiation management interventions are expected to lead to a drier world than GHG interventions or cirrus cloud thinning. The environmental, economic, and social consequences of each class of intervention will vary significantly across regions.

Third, solar radiation management interventions, once implemented, would produce changes in global temperatures much faster than GHG interferences.[197] GHG interventions increase or decrease the rate at which GHGs are emitted or removed from the atmosphere. But the radiative forcing produced by GHGs is dependent on the stock of GHGs in the atmosphere—the result of cumulative GHG emissions and removals over the full history of the earth's atmosphere. Unlike other pollution, such as acid rain precursors, dramatically reducing emissions of CO2—the most important GHG—has little short-term effect on the

193. DAVID G. VICTOR, GLOBAL WARMING GRIDLOCK: CREATING MORE EFFECTIVE STRATEGIES FOR PROTECTING THE PLANET 184 (2011).

194. Jesse L. Reynolds & Joshua B. Horton, *An earth system governance perspective on solar geoengineering*, 3 EARTH SYS. GOVERNANCE (2020).

195. Nicholas J. Lutsko, Jacob T. Seeley, and David W. Keith, *Estimating Impacts and Trade-offs in Solar Geoengineering Scenarios with a Moist Energy Balance Model*, 47 GEOPHYSICAL RSCH. LETTERS, at 6-8 (2020), available at https://keith.seas.harvard.edu/files/tkg/files/2020_may_lutsko-seeley-keith.pdf. *But see* Simone Tilmes et. al., *CESM1(WACCM) Stratospheric Aerosol Geoengineering Large Ensemble Project*, 99 BULL. AM. METEOROLOGICAL SOC'Y 2361, 2361-62 (2018) (suggesting that strategic injection at multiple sites could greatly reduce the unevenness of induced cooling).

196. David Keith, Daniel Raimi, & Elizabeth Wason, *Reflecting on Solar Geoengineering, with David Keith*, RES. RADIO (May 12, 2020), https://perma.cc/7WGV-EB6S.

197. ROYAL SOC'Y, *supra* note 184, at x.

atmospheric concentration of CO2. Changes in the flow of GHGs take decades to significantly alter atmospheric GHG concentrations.[198] Solar radiation management interferences, by contrast, can realize their full effect on radiative forcing relatively soon after implementation. It does take as long as a few years for the climate system to fully adjust to a sudden change in radiative forcing and settle at a new temperature equilibrium, but this is much faster than the decades that sustained GHG interferences take to realize their full effects.[199]

In prior work, relying heavily on Joshua Horton's analysis, I argued that unilateral deployment of high-leverage geoengineering is unlikely.[200] This case relied on five key arguments, which I will only briefly summarize here. First, the direct implementation costs for controversial unilateral deployment would be significantly higher than for consensus multilateral deployment, due to added costs of defensive measures.[201] Second, unilateral deployment runs the risk of destructive interference with other countries' unconventional climate interventions.[202] Third, any country that initiated a large-scale high-leverage short-duration solar radiation management deployment would confront the so-called termination problem—rapid warming would occur if they ever halted deployment.[203] Fourth, governments that strongly oppose a unilateral geoengineering deployment have a number of options for offsetting its effects, including intentional black carbon deposition to increase the earth's surface albedo and emission of highly potent, short-lived GHGs like hydrofluorocarbons.[204]

I still believe this analysis accurately characterizes the incentives for unilateral deployment of stratospheric aerosol injection of other forms of high-leverage solar radiation management. To the extent that national governments behave like rational maximizers of their citizen's welfare or some other coherent conception of the national interest, this analysis suggests that unilateral deployment is indeed unlikely, at least if the global governance tools to enable coordination of a multilateral deployment are available. However, two additional considerations that fall outside of the scope of this analysis give some reasons for worry.

First, the reemergence of great power conflict, now between the U.S. and China, and the more general rise in nationalist sentiment in much of the world, suggests that national governments may be less inclined toward multilateralism and more willing to accept the risk of retaliation. After all, some of the same downside risks of unilateral geoengineering can be ascribed to protectionist trade policies. In particular, discriminatory subsidies and carbon border measures can

198. *Id.*

199. *Id.*

200. Weil, *Global Climate Governance in 3D*, *supra* note 29, at 579-582; Joshua B. Horton, *Geoengineering and the Myth of Unilateralism: Pressures and Prospects for International Cooperation*, 4 STAN. J.L. SCI. & POL'Y 56, 59-62 (2011).

201. Horton, *supra* note 200, at 59.

202. *Id.* at 60.

203. *Id.*

204. *Id.* at 62.

be offset by countervailing duties and export subsidies and could result in forms of retaliation whose economic costs exceed any domestic benefits achieved by the original policy.

Second, the willingness of countries to engage in nationalist means of tackling a global problem suggests that high-leverage geoengineering deployment may be subject to a strong form of the unilateralist's curse. The unilateralist's curse, first examined by Oxford University researchers Nick Bostrom, Thomas Douglas, and Anders Sandberg, applies in situations where independent agents each have an opportunity to undertake that would have significant, but uncertain effects on other agents.[205] They show that, even if all the agents act altruistically, based on their own judgment of what is best for the group, the unilateral action will tend to be undertaken more often than is optimal.[206] This is because the agents are likely to have a range of assessments regarding the likely effects of the action, and it only takes one agent that assesses the action to have overall positive effects for the action to be taken.[207]

Recall the explanations canvassed above for the U.S. turn toward climate nationalism and related forms of economic nationalism. These included geopolitical rivalry, especially with China and Russia, institutional factors that disproportionately empower certain concentrated domestic constituencies, and a general ideological backlash against neoliberal globalism. At least among elite actors on the left, this backlash has coincided with high and rising prioritization of tackling the global problem of climate change.[208] It is easy to imagine this mix leading U.S. policymakers to downplay the second-order risks of unilateral geoengineering if they judge a deployment to be in the U.S. national and/or the global interest based strictly on the climate impacts. Similar stories can likely be told about the strategic and domestic political considerations that might lead other countries to act on their own assessment of the risks and benefits of a deployment. If a rising tide of nationalism makes it more difficult to coordinate on a decision procedure for selecting the timing, circumstances, and manner of any potential multilateral deployment, many countries may be tempted to go it alone. Importantly, moreover, they may be tempted to do so even if they place significant weight on the interests of other countries, so long as they trust their own judgment regarding what course of action is likely to serve those interests. Given that even the current wave of climate nationalism does involve a substantial degree of relative downweighting of the value of the foreigner's welfare, the uneven geographical distribution of the benefits and risks of high-leverage

205. Nick Bostrom, Thomas Douglas, & Anders Sandberg, *The Unilateralist's Curse and the Case for a Principle of Conformity*, 30 SOC. EPISTEMOLOGY 350, 351 (2016).

206. *Id.* at 353-356.

207. *Id.* at 353-355.

208. Matthew Yglesias, *Climate politics for the real world*, SLOW BORING (Mar. 16, 2022), https://perma.cc/RSE8-GESB; Alexander C. Furnas & Timothy M. LaPira, *Political Elites Are More Supportive of Progressive Policies Than the Average Voter*, DATA FOR PROGRESS (Dec. 9, 2021), https://perma.cc/8K7L-LBP9.

geoengineering is also likely to be an important factor.

To lift the unilateralist's curse, Bostrom, Douglas, and Sandberg propose the Principle of Conformity. "When acting out of concern for the common good in a unilateralist situation, reduce your likelihood of unilaterally undertaking or spoiling the initiative to a level that ex ante would be expected to lift the curse."[209] In turn, they offer three potential pathways complying with this principle: the collective deliberation model, the meta-rationality model, and the moral deference model.[210] The collective deliberation model relies on sharing information between agents with the hopes that they arrive at a consensus regarding the best course. In cases where there are barriers to information sharing, or deliberation fails to produce consensus, the authors suggest moving on to one of the other two models.

A meta-rational agent conditions their estimate of the value of a given unilateral undertaking on the agent's estimate of the first-order value of the undertaking being the highest (which it would be in cases where the agent deciding to act unilaterally would be decisive).[211] This approach would cause countries capable of unilateral high-leverage geoengineering deployment to be more reluctant to do so than their first-order estimation of the value of such a deployment would suggest, and the magnitude of this reluctance would increase with the number of countries or other players that are capable of a unilateral deployment.[212] Needless to say, this model of meta-rationality is extremely unlikely to be implemented by all of the countries that are capable of unilateral high-leverage geoengineering deployments.

Perhaps the most promising approach in the context of high-leverage geoengineering deployment is the moral deference model. In this model, the agent need not defer to the group in forming beliefs about the value of the initiative, only in deciding whether to act on those beliefs.[213] One example of a norm consistent with this model is picking a single arbitrary member of the group to decide whether to take the action at issue. Since this approach has some obvious practical and normative shortcomings, the authors propose three more appealing ways of implementing the moral deference model.

(1) When in a unilateralist's situation, defer to existing institutions, such as laws or customs, if universal deference to those institutions would lift the unilateralist's curse.

(2) When in a unilateralist's situation, promote the holding of a majority vote among those capable of undertaking the initiative. If the vote takes place, then (a) defer to its verdict, and (b) encourage others to do likewise.

209. Bostrom, Douglas, & Sandberg, supra note 205, at 357.
210. *Id.* at 357-60.
211. *Id.* at 357-58.
212. *Id.* at 359.
213. *Id.* at 360.

(3) When in a unilateralist situation, bring about the outcome if and only if you judge that a majority vote among those capable of undertaking the initiative would yield a majority in favor of doing so.

Option (1) doesn't work in the high-leverage geoengineering deployment context, since the existing laws and customs, even if followed by countries with the power to violate them, probably do not place meaningful constraints on high leverage geoengineering deployment decisions. Option (2) seems the most promising, with the caveat that a binding majority vote among all countries and other agents with the capacity to engage in a unilateral high-leverage geoengineering deployment is geopolitically unrealistic, given the likely power imbalance among members of that group. Option (3) seems unrealistic for reasons similar to those suggesting most national governments are unlikely to adopt a meta-rational epistemological stance. The political processes that generate nationalist policies point in the opposite direction, toward placing excessive weight on the inside-view and actively distrusting the views of at least some other members of the decision-relevant group.

The upshot of this analysis is to underscore the urgency of crafting robust governance tools to enable coordination around a multilateral process for deciding when, under what circumstances, and in what manner to engage in high-leverage geoengineering. In my prior article on geoengineering governance, I emphasized two reasons for acting early to set up this framework, before scientific research to characterize the risk and benefits of various interventions is complete.[214] First, early action enables the key players to agree on basic geoengineering governance principles and decision rules while still behind a partial veil of ignorance regarding the precise contours of their interests.[215] Second, early action allows more time for greater influence over high-leverage multilateral geoengineering deployment decisions to be used as an inducement for countries to improve their GHG emissions reduction policies.[216]

Heading off the unilateralist's curse provides a third reason. If national governments are likely to rely too heavily on their own inside views of the benefits of high-leverage geoengineering and downplay the risks of retaliation or destructive interference, then it is all the more important to establish clear rules and decision procedures before any government concludes that unilateral deployment is warranted. To be sure, the same nationalist forces that lead some countries to flout WTO may lead some governments to violate any international legal constraints on unilateral geoengineering deployment. Likewise, rising nationalist sentiment and great power conflict is likely to complicate any effort to negotiate a geoengineering governance framework. Nonetheless, such an agreement seems worth pursuing. The history of successful U.S.-Soviet arms control negotiations

214. Weil, *Global Climate Governance in 3D*, *supra* note 29, at 594.
215. *Id.*
216. *Id.*

shows that major agreements are possible even during periods of conflict and distrust. Similarly, the prevailing taboo on geoengineering may make it easier to achieve compliance with an agreement to forego unilateral deployment, even if the taboo would not be sufficient on its own to prevent unilateral deployment in the absence of a global governance framework. Also, at least some of the arguments for ignoring WTO rules—they are outdated and stand in the way of tackling climate change, China is already cheating on trade on and stealing foreign intellectual property, it is based on discrediting neoliberal economic idea—would not apply with the same force to a geoengineering governance framework, which would be specifically designed with climate change in mind, would likely enter force in a world where no country has ever in engaged in a large-scale high-leverage geoengineering deployment, and has little to do with the economic theories associated with economic globalization.

CONCLUSION

Climate change is a global commons problem. In the absence of a strong global political authority, either in the form a single dominant hegemon or supranational political authority, a cohesive coalition of state with strong motivation and coercive capacity, or an effective system of decentralized mutual coercion, independent states pursuing their national interests in a clear-eyed fashion will struggle to coordinate on decarbonization. So long as there are incremental investments in reducing emissions that cost more than the domestic benefits they produce, but less than their global benefits, climate policy is likely to fall short of the global ideal. But it has become increasingly clear that countries are not behaving like clear-eyed national interest maximizer in the climate domain. Unfortunately, this deviation from national interest maximization too seldom (though not never, see the Biden and Obama Administrations' adoption of a global value for the social costs of carbon), takes the form of cosmopolitan eagerness to contribute to global public goods. Instead, it too often deviates in a more pernicious fashion, with countries pursuing beggar-thy neighbor policy like discriminatory subsidies and trade restrictions that have find their foundations in the logics of domestic policy coalition-building and nationalist ideology more then straightforward pursuit of either the national or the global interest. Strangely, those nationalist policies often come bundled with decarbonization efforts that arguably exceed what can be justified on narrow national interest grounds.

It is well enough to lament the resurgence of nationalist sentiment in the U.S. and around the world. But it is a reality. Policymakers, advocates, scholars, and other domestic and international stakeholders need to be prepared to grapple with the tradeoffs involved in confronting climate nationalism. When is it worth tolerating economic nationalism when they come bundled with contributions to global public goods? Should international institutions seek to account for the likely domestic political response to any efforts to exert discipline against acts of

climate nationalism? Or would doing so merely enable and exacerbate the political dynamics that driving the nationalist turn? There are no simple answers, only hard choices.

That said, some principles do seem clear. While it may sometimes be wise to tolerate discriminatory subsidies, imposing them should, at the very least, not be viewed as an equivalent contribution to global climate change mitigation as non-trade distorting policies with similar emissions impact. When it comes to border carbon charges, pretextual "border adjustments" that are not actually border adjusting any domestic climate be treated as ordinary tariffs, not environmental measures. Border adjustment of cost-imposing climate policies may be justified but should be treated with scrutiny. Good faith attempts, even if imperfect due to domestic constraints (like the EU CBAM), to border adjust domestic carbon prices should be treated favorably. Resource and technology hoarding should generally be disfavored, though the tools available to discipline such practices are currently quite limited. Unilateral deployment of high-leverage geoengineering is undesirable and potentially destabilizing. The phenomenon of climate nationalism should make us update to thinking that the risk of controversial unilateral deployment is higher than we would have otherwise thought. This strengthens the case for early action of construct a legitimate and enforcement global climate governance regime that includes high-leverage solar radiation management and other interventions typically discussed under the banner of geoengineering.