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ARTICLES

THE CREATION OF A CLIMATE CLUB FOR A SUSTAINABLE ECONOMIC FUTURE: THE ROLE OF INTERNATIONAL ECONOMIC LAW AMIDST GEOPOLITICAL CONFRONTATION

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ABSTRACT

As of late July 2023, the month of July 2023 had become the hottest month ever recorded in history.[1] Heads of the governments of small island states have been outspoken about the existential risk their countries face due to rising sea level as a consequence of climate change.[2] Wildfires are more frequent and more negatively impactful than ever before in different parts of the world.[3] It is no wonder that sustainability has become a buzz word in the media, and policymakers all over the world are, more than ever, focusing on trying to achieve a sustainable future.

A sustainable global economy means providing good quality of life for everyone, keeping our planet clean and safe by tackling climate change, and having good-quality trading goods, such as agriculture, oil, and minerals. But how can the European Union (EU) and international law promote a highly

[1] Gloria Dickie, *July 2023 Set to be World's Hottest Month on Record*, REUTERS (July 27, 2023), https://www.reuters.com/business/environment/july-2023-set-be-worlds-hottest-month-record-scientists-2023-07-27.
[2] Isabella Kaminski, *Small Islands Slam 'Endless' Climate Talks at Landmark Maritime Court Hearing*, CLIMATE HOME NEWS (Sept. 11, 2023), https://climatechangenews.com/2023/09/11/small-island-leaders-climate-negotiations-un-maritime-court/; *see also* Spencer Feingold, *Prime Minister of Barbados Calls for 'Urgent Action' on Climate Crisis*, WORLD ECONOMIC FORUM (June 27, 2023), https://www.weforum.org/agenda/2023/06/amnc-2023-mia-mottley-prime-minister-of-barbados-call-for-urgent-action-on-the-climate-crisis/.
[3] Raymond Zhang & Delger Erdenesanaa, *Wildfire Smoke and High Heat Wave Something in Common. Guess What*, N.Y. TIMES (June 28, 2023), https://www.nytimes.com/2023/06/28/climate/heat-smoke-climate-change.html; *see also Wildfires and Climate Change*, CTR. FOR CLIMATE AND ENERGY SOLS., https://www.c2es.org/content/wildfires-and-climate-change/ (last visited Sept. 22, 2023).

sustainable global economy? How can EU countries and others ensure a sustainable global economy?

This article has four sections. Section 1 proposes a climate club for a sustainable economic future. It challenges the view that trade's only impact on the environment is negative. It takes the unconventional view that the trading system goes beyond benefiting the economy and society in that it can also contribute to environmental protection, with a specific focus on decarbonization. This section proposes a paradigm shift in how we approach trade and develops a new theory based on the triple benefit of trade—economic growth, climate change mitigation, and enhancement of energy security. This section incorporates the current trend of bottom-up, rather than top-down, solutions to today's global challenges. It investigates how trade agreements may be more effective legal instruments than environmental agreements for environmental-protection purposes, a possibility that is both counter-intuitive and surprising, and identifies opportunities to promote sustainable energy and environmental protection in future trade agreements.

Section 2 aims to explore the concept of a climate club linked to the international trade regime and proposes a strategy for its implementation the Group of Twenty (G20) framework. Section 2 examines the relevance of this proposal to Saudi Arabia, who is a member of the G20 and a participant in Mission Innovation. Saudi Arabia is one of the world's largest oil producers and exporters, facing both opportunities and challenges in transitioning to a low-carbon economy. Saudi Arabia has expressed its commitment to diversifying its economy, reducing its dependence on oil revenues, and contributing to global efforts to combat climate change. However, Saudi Arabia also faces resistance from some of its trading partners who may perceive its climate policies as a threat to their energy security or competitiveness. Therefore, Saudi Arabia can benefit from joining a climate club that can provide it with access to new markets, technologies, and financing for its green transition.

Section 3 analyzes the Saudi Green Initiative (SGI), launched by Saudi Arabia's Crown Prince and Prime Minister Mohammed bin Salman in March of 2021.[4] The SGI is a comprehensive plan to combat climate change and promote sustainable development.[5] The initiative aims to reduce carbon emissions, increase the use of renewable energy, and protect natural resources in the Kingdom of Saudi Arabia.[6] While the initiative has been praised for its ambitious goals, it has also faced criticism and skepticism from various quarters, which will be analyzed in Section 3.

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[4] *About*, Saudi Green Initiative, https://www.vision2030.gov.sa/en/projects/saudi-green-initiative/ (last visited Oct. 5, 2023).
[5] *Id.*
[6] *Id.*

Section 4 explores the Saudi National Renewable Energy plan that is being implemented by the Saudi Government. This plan and the policy avenues mentioned in the previous paragraphs will be instrumental for a future EU trade law and policy in its bilateral relations with the Gulf Cooperation Council in the context of sustainability.

1. A CLIMATE CLUB FOR A SUSTAINABLE ECONOMIC FUTURE

I. INTRODUCTION

Climate change is one of the greatest challenges humanity faces today. The purpose of this section is to find ways for the international trading system to help mitigate climate change. One way to do so is through the creation of climate clubs.[7] There are several ways to incentivize membership, including through tax incentives or technology transfers to help with climate change mitigation between regions or countries as politically diverse as the EU, the United States (US), China, Australia, Iran, or India.

This raises the question of what it takes to attain membership in this climate club, and, more importantly, why join and stay? There are examples of countries that have joined a club and later left it. For instance, the United Kingdom (UK) left the EU (i.e., Brexit),[8] the U.S. withdrew and later re-joined the Paris Agreement on Climate Change,[9] and Canada withdrew from the Kyoto Protocol.[10] The list goes on. These examples are not standard for what an attractive climate club looks like.

When it comes to membership in a climate club, its design should be such that the major emitters of greenhouse gases (GHGs) need to be on board. One good platform is the G20, where key countries such as Saudi Arabia, strategically located between Asia and Africa, can play a major role in international trade, through fossil-fuel exports, and in renewable energy, through solar or wind.

The G20[11] is a group of nineteen major economies and the European Union, collectively accounting for about 80% of global gross domestic product (GDP) and 75% of global emissions.[12] The G20 plays a significant role in global climate change mitigation, providing leadership, coordination,

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[7] William Nordhaus, *The Climate Club: How to Fix a Failing Global Effort*, FOREIGN AFFS., Apr. 10, 2020.

[8] Benjamin Mueller & Peter Robins, *What Is Brexit? And How Is It Going?*, N.Y. TIMES, Nov. 8, 2021.

[9] Press Release, Antony J. Blinken, Secretary of State, The U.S. Officially Rejoins the Paris Agreement (Feb. 19, 2021), https://www.state.gov/the-united-states-officially-rejoins-the-paris-agreement/.

[10] Canada's Withdrawal from the Kyoto Protocol and Its Effects on Canada's Reporting Obligations Under the Protocol, U.N. Doc. CC/EB/25/2014/2 (Aug. 20, 2024).

[11] The members of the G20 are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Türkiye, the United Kingdom, the United States, and the European Union. *See* https://www.dfat.gov.au/trade/organisations/g20#:~:text=The%20members%20of%20the%20G20,States%2C%20and%20the%20European%20Union.

[12] Claire Tyson et al., Closing the Gap: The Impact of G20 Climate Commitments on Limiting Temperature Rise to 1.5 °Cat 4 (2021) (closingthegap_web.pdf (edcdn.com)).

and resources for addressing this challenge. Moreover, the G20 has an existing platform for cooperation on innovation and technology transfer, called Mission Innovation, which can be utilized to support the climate club.

As for the governance of the climate club, its style of governance should be one that allows countries that believe in more market but less government, like the US, but also countries that believe in strong state intervention, like China. Equally, the club should be prepared to accept the potential dangers of democracy (such as giving ordinary people the right to decide on important questions such as whether a country should withdraw from the EU), authoritative regimes, theocracies, or any other system of governance. The significance of international cooperation remains paramount, irrespective of divergence in governance styles, in order to accomplish the objective. Here, one can think of putting together governance styles as diverse as those of the EU, China, the US, Saudi Arabia, or Russia.

That, in turn, raises the question of how these entities, despite their geopolitical confrontation and geoeconomic fragmentation, will cooperate. As a result of a multipolar world, we are seeing greater divergence, not convergence, between the West[13] and the rest. This fact further complicates the emergence of an effective climate club that brings together countries from various parts of the world.

This section asks two fundamental questions: 1) how can we have international cooperation on climate mitigation in a world of geopolitical confrontation and 2) is the impact of the international trade system on the environment only negative? In posing these questions, this section takes a comprehensive approach to how the trading system can help mitigate climate change and enhance the use of sustainable energy. The section brings together a top-down and bottom-up approach to the governance of sustainability.

Furthermore, it analyzes two of the most relevant global regulatory trends in recent international trade agreements, namely climate change and sustainable energy. The section takes the novel approach of bringing together law, international political economy (IPE), and international relations (IR) to explain sustainable energy as an academic discipline. This is a ground breaking and unconventional interdisciplinary and inter-sectoral approach, combining an analysis of international trade and sustainable energy from the perspectives of law, IPE, and IR. It applies methods of legal analysis, namely a comprehensive analysis of treaties and academic writings from scholars as well as literature from other social science disciplines, such as IR and IPE, to help explore the challenges addressed.

In this section, we analyze the existence of trade when pursuing the climate-club theory. While focusing on its existence, it is crucial to understand this interaction while situating climate clubs in markets.

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[13] By "the West," we mean Europe, Canada, the US, Australia, and New Zealand.

After this introduction, Part II iterates on understanding the question of whether we can actually link climate clubs to markets. As a matter of principle, this interaction rests on the incentives that countries have by virtue of being members of a climate club, outweighing their obligations as members of a climate club. Part III of Section 1 focuses on the interplay of pursuing the climate club theory with trade. It examines arguments that favor interaction between climate clubs and economic planning in creating trade policies. It also provides an overview of whether trade measures can be imposed on climate clubs. Part IV focuses on these continued interactions with climate crisis concerns in mind, specifically through the lens of multilateralism and the energy-security crisis. Part IV addresses how the challenges and dilemmas that involve the dialogue between trade and climate change require the examination of many parameters. Part V concludes by focusing on the road ahead.

II. OVERVIEW OF DIALOGUE BETWEEN TRADE AND CLIMATE CHANGE

Climate change is not just a social issue; it is an economic issue. When an issue involves the possibility of disrupting connectivity and livelihoods, it raises concerns. Modern developments have continued to flourish when trade, through economic interactions, results in a growing interdependency between nations. However, this interdependency is reflected on national and international stages by the presence of strong government institutions and the political willingness of a nation to yield better outcomes for itself. With present-day predicaments, such as growing concerns related to climate change and the unchecked global warming, we face an uncertain future likely to impact trade routes and economic interactions, which remain disrupted following the Covid-19 pandemic.[14]

Increasing fears of countries submerging due to climate change affects the possibility of industrial collapses and political disruptions,[15] all of which can trigger new conflicts between nations.[16] Foreseeable for the time, if countries do not take appropriate action, climate change is very likely to

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[14] Richard Baldwin & Eiichi Tomiura, *Thinking Ahead About the Trade Impact of COVID-19*, ECONS. TIME COVID-19 59, 63 (2020).

[15] *How Does Climate Change Impact on International Trade?*, LONDON SCH. ECON. & POL. SCI. (June 12, 2023), https://www.lse.ac.uk/granthaminstitute/explainers/how-does-climate-change-impact-on-international-trade/#:~:text=As%20well%20as%20the%20disruption,creating%20shortages%20in%20production%20and.

[16] ANTHONY GIDDENS, THE POLITICS OF CLIMATE CHANGE 22-24 (Cambridge: Polity Press 2009).

disrupt political and economic patterns, all of which can have an adverse effect on the interactions for trade.[17]

While recognizing the influence of trade on the economy, it is equally important to establish a shared understanding regarding the economic repercussions of climate change. Generating consensus in this regard is crucial for advancing climate policies that effectively integrate trade and foster economic growth. The intersectionality between trade and climate change can often be seen through scenarios concerning trade commitments and their effectiveness in adopting measures to curb climate change effects through subsequent assessments.[18] This can be observed in present scenarios. This assertion does not only confine countries but also includes the private sector, industries, civil society, and the local public interest as a whole.

Members of the academic regime have argued that the trade regime needs to undergo necessary changes to promote climate-change mitigation, requiring the curbing of the CHG rate.[19] Recent estimates have shown that a quarter of global emissions are linked to international trade flows.[20] Country-specific interventions that interconnect trade liberalization and policies adopted for environmental protection can inform themselves better if the nexus is analyzed through the point of convergence and not through their divergence.[21] However, there is an extensive understanding between policies these days that can be applied further to understand the growing nexus between trade and climate change. The difficulty lies not in implementing these policies, but in inducing countries to collectively reduce GHG emissions on a global scale.

According to many economists,[22] one of the most cost-effective approaches to reducing carbon emissions at a greater scale and speed is by

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[17] *What Future for Trade in a Climate Crisis?,* CLIMATE-KIC (Mar. 5, 2021), https://www.climate-kic.org/news/future-trade-climate-crisis/.

[18] Michael Grubb, *Seeking Fair Weather: Ethics and the International Debate on Climate Change*, 71 INT'L AFFAIRS 463, 479 (1995).

[19] Benjamin Carton and Jean-Marc Natal, *Further Delaying Climate Policies Will Hurt Economic Growth*, IMF Blog (Oct. 5, 2022), https://www.imf.org/en/Blogs/Articles/2022/10/05/further-delaying-climate-policies-will-hurt-economic-growth.

[20] PAUL BRENTON & VICKY CHEMUTAI, THE TRADE AND CLIMATE CHANGE NEXUS: THE URGENCY AND OPPORTUNITIES FOR DEVELOPING COUNTRIES 1 (World Bank Group 2021).

[21] Federica Alfani et al., *Climate Resilience in Rural Zambia: Evaluating Farmers' response to El Niño -induced Drought*, 26 ENV'T & DEV. ECON., 582-604 (2021).

[22] *See* Heather Long, *'This is Not Controversial: Bipartisan Group of Economists Calls for Carbon Tax*, WASH. POST (Jan. 16, 2019), https://www.bing.com/search?pglt=41&q=Heather+Long%2C+'This+is+Not+Controversial%3A+Bipartisan+Group+of+Economists+Calls+for+Carbon+Tax%2C+WASH.+POST+(Jan.+16%2C+2019).&cvid=823a11a2031f4fec9bcb1f7e83622c43&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIHCAEQRRj8VdIBBzM3OWowajGoAgCwAgA&FORM=ANNAB1&PC=U531.

reducing GHG emissions through a carbon tax.[23] While this may sound easy, any implementation approach is plagued by the problem of free-riding, a problem seen in international climate agreements,[24] as observed in the Kyoto Protocol.[25] The problem of free-riding is a market failure that allows a collective set of individuals to benefit from a public good without contributing to the total costs,[26] and countries that do not adopt policies to reduce their domestic emissions usually benefit if other countries adopt measures to mitigate their carbon levels.

In his article, William Nordhaus points to another type of free-riding problem: while the present generation benefits from goods produced by technologies emitting high carbon levels, future generations will pay for this damage through emission-reduction policies or by finding ways to sustain their livelihoods in a damaged environment.[27] To combat this prisoner's dilemma and to put a stop to the self-interested avocation of countries at the expense of others, the proposal of a climate club has started to spur in the academic and policy making circles, inducing a rapid interaction between the utilization of trade to combat climate change. One can note that such free-riding incentives often impose a barrier, essentially making costs and effort-sharing agreements unsuccessful in a static context.[28] Several studies have instead proposed the use of tariffs or other forms of sanctions on trade to reduce incentives to free-ride.[29]

Mechanisms for climate-trade intervention through a climate club would include the allocation of resources amongst nations. This involves developing

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[23] Melanie Gilarsky et al, How to reduce emissions as much as possible at the lowest cost, Brookings Institute (Apr. 21 2020), https://www.brookings.edu/articles/how-to-reduce-emissions-as-much-as-possible-at-the-lowest-cost/; *see also Economists' Statement on Carbon Dividends*, WALL ST. J. (Jan. 16, 2019) (providing opinions from several economists who have issues a bipartisan agreement for immediate national action plans on ways one can combat climate change).

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

[25] Brian Copeland & M. Scott Taylor, *Free Trade and Global Warming: A Trade Theory View of the Kyoto Protocol*, 49 J. ENV'T ECON. & MGMT. 205, 205 (2005).

[26] E.C. Pasour, *The Free Rider as a Basis for Government Intervention*, 5 J. LIBERTARIAN STUD. 453, 453 (1981).

[27] Nordhaus, *supra* note 24 at 1339 and 1343.

[28] Scott Barrett, *Self-enforcing International Environmental Agreements*, 46 OXFORD ECON. PAPERS 878, 891 (1994).

[29] *See* Terry Eyland & Georges Zaccour, *Strategic Effects of a Border Tax Adjustment*, 14 INT'L GAME THEORY REV. 1250016-1, 1250016-5 and 1250016-19 (2012); *see also* Alaa Khourdajie & Michael Finus, *Measures to Measures to Enhance the Effectiveness of International Climate Agreements: The Case of Border Carbon Adjustments (second revised version),* 124 EUROPEAN ECON. REV. 1, 2 (2020); *cf.* Carsten Helm & Detlef Sprinz, *Measuring the Effectiveness of International Environmental Regimes*, 44(5) J. CONFLICT RESOL. 630, 630 (2000).

new models through strategies and innovative policies that will encourage resource-rich nations to pioneer emergent climate technology. The need for policies supporting climate-friendly technology (CFT) would boost incomes in developing economies sustainably.[30] Having the means to combat climate change will further incentivize these countries to join club initiatives; otherwise, they face the risk of high carbon taxes for nonparticipation. A regional and cooperative approach to climate change mitigation is preferred,[31] an effective method that opens the possibility of incentivizing countries to jointly take measures that their individual domestic policies have not done or that the multilateral framework has not been able to achieve so far.

Countries often decide to enter into trade associations or agreements to enter into reciprocal exchanges of concessions on trade barriers and improve each member's market access, a condition that allows all members to benefit from each other. Another underlying objective is establishing an integrated security arrangement through trade as an increased means of multilateral bargaining power, which means facilitating interaction between third countries through a common trade policy.[32] Lastly, joint action also takes into account the accountability of others and that the success of engaging in a regional accord is higher due to the limited number of members. Negotiating failures at a multilateral level do occur. However, consenting to such agreement(s) is always done on a voluntary basis, indicating that countries have a choice to renew a dialogue that can establish change.

A climate club, therefore, can be regarded as a voluntary group arrangement where countries have consented to adopting measures that will allow them to limit the emission rate and help produce activities that contribute to the public good. According to James Buchannan, a club, in a policy sense, is a member-owned institutional arrangement for a public-private good allocation.[33] This optimization of the public good through club membership indicates that a benefit can be gained by countries that enter the club and prove disadvantageous to those who do not pay for access to the club.[34] From a climate perspective, the club theory is an alternative to obtaining certain resources or benefits, allowing members to share the benefits

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[30] Daniel Hall et al., *Policies for Developing Country Engagement*, *in* HARV. PROJECT ON INT'L CLIMATE AGREEMENTS 1, 7 (2008).

[31] RAFAEL LEAL-ARCAS, CLIMATE CLUBS FOR A SUSTAINABLE FUTURE: THE ROLE OF INTERNATIONAL TRADE AND INVESTMENT LAW (2021).

[32] John Whalley, *Why Do Countries Seek Regional Trade Agreements?*, *in* THE REGIONALIZATION OF THE WORLD ECONOMY 63, 63 (Jeffrey Frankel ed., Univ. of Chicago Press 1998).

[33] Todd Sandler & John Tschirhart, *Club Theory: Thirty Years Later*, 93 PUB. CHOICE 335, 336 (1997) (explaining the basis for club theory in terms of economic optimization).

[34] Nordhaus, *supra* note 24, at 1340.

of a military alliance or technology transfer agreement.[35] Nonetheless, there is a cooperative arrangement between club members to incorporate the objectives of the establishment in return for benefits. Members who do not adhere stand to remain penalized.[36]

Nordhaus points out that for countries to become members of the climate club, they need to put a price on carbon domestically, either through a carbon tax or a cap-and-trade system, and subsequently impose sanctions on non-members.[37] This can either be through regimes that already contain trade sanctions, such as carbon taxes, or carbon allowance requirements for non-participants at a sufficient level. Countries can always have the advantage of controlling the price of carbon through the imposition of carbon taxes.

The difficulty here lies in quantitatively recording the GHG emission reduction, which leaves another alternative: cap and trade to enable countries to cap emissions to some extent.[38] This means that, depending on the policies undertaken by countries to reduce their emissions, the cap can be adjusted. However, countries can be left unaware of the exact price that will be imposed on carbon, a disadvantage of this system.[39] Nordhaus has also proposed using a game model method to form coalitions that impose a uniform percentage tariff on imports from nonparticipants into the coalition, often at a relatively low tariff rate of about 2%.[40] This method, in a given range of carbon price values, can likely induce high participation. In this continuing debate, Martin Weitzman posed a question relevant to the present scenario:

> How should regulators rein in pollution? Should they issue (tradable) pollution permits to firms, thereby picking a quantity? Or should they tax polluters, thereby picking a price? . . . Which you should regulate depends on the relative costs of mistakes. If getting the quantity of pollution slightly wrong is costlier, then quantity should be pinned down. If a

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[35] *Id.*
[36] *Id.*
[37] *Id.* at 1341.
[38] On January 1, 2020, Switzerland became the first country to link its GHG emissions trading system (ETS) with that of the EU. *See* Council Decision 2017/2240, 2017 O.J. (L 322) 1, 2. China and other countries have their own ETS. *See* Chris Busch, *China's Emissions Trading System Will Be The World's Biggest Climate Policy. Here's What Comes Next.*, FORBES (Apr. 18, 2022), https://www.forbes.com/sites/energyinnovation/2022/04/18/chinas-emissions-trading-system-will-be-the-worlds-biggest-climate-policy-heres-what-comes-next/?sh=2a65addc2d59.
[39] Nordhaus considers penalties for nonparticipants in the form of such tariffs varying from 0% to 10%. It is suggested that a rate of at least 4% could induce states to join a club that involves high-income states (given the implications for their trade exports), while a higher rate of 5% or more could be conducive to a club coming closer to achieving its abatement gains. Nordhaus, *supra* note 24.
[40] Nordhaus, *supra* note 24.

> slightly errant price can do more damage—say, because the need to buy expensive permits could put many firms out of business—then a tax, fixed at a safe level, is the way to go.[41]

In such a dynamic context, to effectively determine the governance of GHG and carbon levels, climate clubs highlight a building-block approach. Additionally, crafting the clubs results in changes to tariffs and carbon price levels based on the capacity of countries to remain incentivized and committed to the rules of the World Trade Organization (WTO), in particular with its principle of non-discrimination.[42]

A. Impact of Trade on Climate Change

With emerging concerns regarding the future and humanity's survival, climate change is a significant environmental concern, forming the fundamental ground for the debate regarding international trade and the environment.[43] Countries are establishing their commitments to trade

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[41] *Martin Weitzman Died on August 27*, THE ECONOMIST (Sept. 5, 2019), https://www.bing.com/search?q=Martin+Weitzman+Died+on+August+27%2C+THE+ECONOMIST&cvid=9fe92a08c07144feb31ff9daaa8d9950&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIHCAEQRRj8VdIBBzM0OGowajmoAgCwAgA&FORM=ANAB01&PC=U531; *see generally* Martin L. Weitzman, *Internalizing the Climate Externality: Can a Uniform Price Commitment Help?*, 4 ECON. ENERGY & ENV'T POL'Y, 37, 37 (2015).

[42] Chiara Galiffa & Ignacio Bercero, *How WTO-Consistent Tools Can Ensure the Decarbonization of Emission-Intensive Industrial Sectors*, 116 AM. J. INT'L. L. 196, 198 (2022)).

[43] *See generally* RAFAEL LEAL-ARCAS, SOLUTIONS FOR SUSTAINABILITY: HOW THE INTERNATIONAL TRADE, ENERGY AND CLIMATE CHANGE REGIMES CAN HELP (2019); RAFAEL LEAL-ARCAS, INTERNATIONAL TRADE RELATIONS OF THE EUROPEAN UNION: A LEGAL AND POLICY ANALYSIS (2022); RAFAEL LEAL-ARCAS, CLIMATE CHANGE AND INTERNATIONAL TRADE (2013); RAFAEL LEAL-ARCAS, INTERNATIONAL TRADE AND SUSTAINABILITY: PERSPECTIVES FROM DEVELOPING AND DEVELOPED COUNTRIES (2022); Rafael Leal-Arcas, "Connections between climate change and international trade," House of Commons, International Trade Committee, UK Parliament (Aug. 2021); Rafael Leal-Arcas et al., *Climate Neutrality and Sustainability in International Trade*, 54 U. PA. J. INT'L L 619, 619 (2023); Rafael Leal-Arcas et al., *Three Steps in the Aftermath of COP26: Trade, Key Players, and Decarbonization*, 31 EUR. ENERGY & ENV'T L. REV. 298, 298 (2022); Rafael Leal-Arcas et al., *A Legal Exploration of the European Union's Carbon Border Adjustment Mechanism*, 31 EUR. ENERGY & ENV'T L. REV. 223, 223 (2022); Rafael Leal-Arcas et al., *Green Bills for Green Earth: How the International Trade and Climate Regimes Work Together to Save the Planet*, 31 EUR. ENERGY & ENV'T L. REV. 19, 19 (2022); Rafael Leal-Arcas et al., *The World Trade Organization and Carbon Market Clubs*, 52 GEO. J. INT'L L. 895, 895 (2021); Rafael Leal-Arcas et al., *International Trade, Energy Transition and Climate Change Obligations: The Perspective of Small Pacific Islands and the Caribbean Community*, 13 TRADE L. & DEV. 198, 198 (2021); Rafael Leal-Arcas & Andrew Filis, *International Cooperation on Climate Change Mitigation: The Role of Climate Clubs*, 30 EUR. ENERGY & ENV'T L. REV. 195, 195 (2021); Rafael Leal-Arcas et al., *Of International Trade, Climate Change, Investment and a Prosperous Future*, 12 TRADE L. & DEV. 405, 405 (2020); Rafeal Leal-

liberalization through regionalism and the creation of a building block dimension for multilateralism. They are also working towards accomplishing the UN Sustainable Development Goals (UN SDGs 2030)[44] and on their obligations under the Paris Agreement on Climate Change,[45] with a growing possibility to negotiate a climate club.

Realizing the effects of trade liberalization on sustainable development presents a significant dilemma. For instance, the welfare effects of reducing one's tariff significantly depends on the imposition of other tariffs and their subsequent interactions with other goods. In other words, maximizing the output from a given input of resources can likely result in environmental sustainability. The growth relationship between a country's per capita income and industrial output can be measured proportionately to the importance placed on the environment and the demands for the resources placed on it and the policies implemented in response to increasing climate concerns. Kym Anderson pointed out that environmental externalities may increase, rather than decrease, the gains from trade.[46] This means that higher income generated from trade will also generate investments in environmental protection.

Some environmentalists also state that imposing trade restrictions is the only leveraging means developed and developing countries have to reduce their GHG rate.[47] However, this is largely dependent on the development of markets which can lead to the expansion of production and consumption. Environmental regulations on production and the effects of climate change may not always result in negative outcomes, but governments nevertheless need to adapt to different standards that will allow them to promote economic efficiencies from a green trade perspective.

The impact that trade can have on climate change is an inquiry into whether economic policy reforms or trade liberalization would allow for higher incomes in return. This means that income growth will open economies and help put more stringent environmental policies in place because of the shift of resources available for improving the environment. Because

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Arcas, *Climate Clubs and International Trade Across the European and International Landscape*, 29 EUR. ENERGY & ENV'T L. REV. 72, 72 (2020); Rafael Leal-Arcas et al., *The Contribution of Free Trade Agreements and Bilateral Investment Treaties to a Sustainable Future,* 23 ZEITSCHRIFT FÜR EUROPARECHTLICHE STUDIEN 3, 3 (2020).

[44] *The 17 Goals*, UNITED NATIONS DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS SUSTAINABLE DEVELOPMENT, https://sdgs.un.org/goals (last visited Oct. 4, 2023).

[45] Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104 [hereinafter Paris Agreement].

[46] Kym Anderson, *Effects on the Environment and Welfare of Liberalizing World Trade: The Cases of Coal and Food*, *in* THE GREENING OF WORLD TRADE ISSUES (K Anderson & R Blackhurst eds., University of Michigan Press 1992).

[47] DANIEL ESTY, GREENING THE GATT: TRADE, ENVIRONMENT, AND THE FUTURE 3-8 (1994).

liberalization expands opportunities, technologies that are climate and environmentally friendly lower the costs of implementing stricter standards.

Trade models need to be modified in ways in which domestic policies and treaties do not result in an increase in greenhouse gas emissions.[48] The Working Group on Trade, Investment, and Climate Policy has found that "trade and investment treaties can be instruments to advance the global climate and development agenda."[49] These rules can be designed in ways that reward models of economic activity adopted by countries to address climate change.[50] One such agreement can come in the form of a climate club, where a trade model is adopted to allow the existence of a policy space allowing the member states to address new climate challenges.

The main questions, however, involve responding to the changing dialogue on comparative advantages in trade and patterns of production, and to developing consensus on whether climate club formation is a viable option to address interactions between trade and climate through a global climate-trade governance action. For instance, Article 2 of the Paris Agreement on Climate Change states that the world aims to "strengthen the global response to the threat of climate change, in the context of sustainable development . . . by . . . [m]aking finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."[51] It is paramount to pursue these goals and incorporate them into action. In another instance, France's Special Ambassador to the Paris Climate Conference pointed out the pertinent need to establish coherence between trade agreements and climate policy is vital, without which "'we will go nowhere' on climate goals."[52]

Regional interactions, particularly through the inception of climate clubs, can allow countries to prioritize the reduction of trade barriers.[53] Removing barriers to trade can help support a low-carbon future and further facilitate the sharing of knowledge to implement technologies that support the efforts of developing countries.[54] However, doing so may, at times, put domestic

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[48] Kevin P. Gallagher, *Trade, Investment, and Climate Policy: The Need for Coherence*, *in* TRADE IN THE BALANCE: RECONCILING TRADE AND CLIMATE POLICY 5, 5 (2016).
[49] *Id.*
[50] *Id.*
[51] *Id.*
[52] Gallagher, *supra* note 48, at 6; *See also* Rosamond Hutt, *TTIP: What Does it Mean for the Future of Transatlantic Trade??*, WORLD ECON. F. (Apr. 25, 2016), https://www.weforum.org/agenda/2016/04/ttip--transatlantic-trade-obama.
[53] James J. Corbett, *The Maritime Sector's Role in Meeting Trade and Environment Goals*, in TRADE IN THE BALANCE: RECONCILING TRADE AND CLIMATE POLICY 20, 20 (2016).
[54] *Id.*

manufacturers at a disadvantage because of the cap put on the goods and services to reflect climate costs.[55]

The challenge here is facilitating economic transformations in ways that will not only result in governments reducing the price of climate-friendly goods, but also seek the development of domestic renewable energy industries to decrease the price of renewables. This may, however, result in subsequent violations of the General Agreement on Tariffs and Trade (GATT).[56] Due to shortcomings in global arrangements, the understanding between climate clubs can be reflected by considering the economic and regulatory-related climate impacts on the trade and investment policies of the member countries. Climate clubs argue that efforts between countries and creation of cost-sharing agreements can produce global cooperation over time.[57]

Enforcing binding norms can be considered a criteria for members who will be in the climate club, as it links itself to the international trade regime.[58] The reasoning behind a climate club expresses the likelihood that it is easier for large countries, which may also include major corporations, to form smaller groups of countries and reach a solution to mitigate climate change. The rationale of forming climate clubs as a small group of major emitters can be closely related to the process of entering into regional trade agreements, where different blocs enter into negotiations to advance trading relations and economies. This will allow the formation of rules that can be used to reward climate-friendly activities and curb economic activities that exacerbate climate change. The dialogue between trade and climate change rests on policies that include removing tariffs on green goods and improving access to technologies, finance, and knowledge through membership benefits upon understanding the global scenario.

B. Trade in Climate-Friendly Technologies

1. Making a Case

Building resilient policies against climate change is crucial in developing environmental and trade governance.[59] For instance, climate-friendly technologies (CFTs) can be used in trade to increase the availability of goods,

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[55] *Id.*
[56] General Agreement on Tariffs and Trade, Oct. 30, 1947 [hereinafter GATT].
[57] Alejandro Caparrós & Jean-Christophe Péreau, *Multilateral Versus Sequential Negotiations Over Climate Change*, 69 OXFORD ECON. PAPERS 365, 365 (2017).
[58] LEAL-ARCAS, *supra* note 31.
[59] Laurie Goering, *3 Ways to Build Resilience to Climate Change*, WORLD ECON. F. (Sept. 25, 2015), https://www.weforum.org/agenda/2015/09/3-ways-to-build-resilience-to-climate-change/.

like wind turbines and electric cars, in the market.[60] The same can be achieved through the rollout of service technologies the use of climate-friendly goods.[61] The increasing availability of climate-friendly goods and services can reduce overall costs and make industries dependent on emissions reduction more competitive.[62] The important part of developing such technologies is that production capacity, transparency, and accountability need to be ensured. In particular, countries should take consolidated measures to enhance the transparency of their actions and identify and address problems in implementing the rules and standards.

Countries may either collectively implement or organize capacity by building with each other to allow for coordinated technology transfers and the effective allocation of resources.[63] This may allow countries to rethink their strategies and domestic policies through a minilateralist institutionalism, a complementarity of multilateralism and a substitute for traditional inter-governmental cooperation.[64] It may also allow them to align with international standards.[65] Initiatives such as these will help enhance political dialogue, facilitating "great[er] power bargaining," as argued by Robert Falkner.[66] Notably, it has been argued that a policy mechanism, such as cap and trade or a carbon tax that can internalize externalities, will help in addressing barriers that are linked to the costs and benefits related to carbon emissions, leading to an increase in competition between different players to effectively produce low carbon fuels.[67] This will further help in deploying low-carbon technologies and place a greater value on carbon capture.[68]

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[60] World Economic Forum, *Accelerating Decarbonization through Trade in Climate Goods and Services* at 4 (Sept. 2022) https://www3.weforum.org/docs/WEF_Accelerating_Decarbonization_through_Trade_2022.pdf.

[61] *Id.*

[62] *Id.*

[63] Wolfgang Obergassel et al., *A Sectoral Perspective on Climate Clubs,* WUPPERTAL INSTITUT (2020); Robyn Eckersley, *Moving Forward in the Climate Negotiations: Multilaterism or Minilaterism?*, 12 GLOB. ENV'T POL. 24, 24 (2012).

[64] Stewart Patrick, *Making Sense of 'Minilateralism': The Pros and Cons of Flexible Cooperation*, COUNCIL ON FOREIGN RELS. (Jan. 5, 2016, 2:09 PM), https://www.cfr.org/blog/making-sense-minilateralism-pros-and-cons-flexible-cooperation.

[65] *Id.*

[66] Robert Falkner, *A Minilateral Solution for Global Climate Change? On Braining Efficiency, Club Benefits, and International Legitimacy*, 14 PERSPS. ON POLS. 87, 87 (2016).

[67] Marilyn Brow & Benjamin Sovacool, *Barriers to the Diffusion of Climate-Friendly Technologies*, 10 INT'L J. TECH. TRANSFER & COMMERCIALISATION 43, 43 (2011).

[68] Marilyn Brow & Benjamin Sovacool, *Barriers to the Diffusion of Climate-Friendly Technologies*, 10 INT'L J. TECH. TRANSFER & COMMERCIALISATION 43, 43 (2011).

2. Understanding Climate-Friendly Technologies and Its Usage

CFTs are known to reduce greenhouse gas emissions through overall reduction of carbon levels in industrial activities.[69] Economies around the globe are rapidly being affected by the harmful impacts of greenhouse gases.[70] This is likely to have adverse impacts on the environment and increase the risks of climate change related effects in many sectors.[71] The constant interaction between economies that trade appears to remain severally altered, requiring attention through the implementation of CFTs. In a United Nations Framework Convention on Climate Change (UNFCCC) report, four sets of large-scale technologies have been identified:

(i) energy efficiency and conservation improvement,
(ii) advanced fossil-fuel,
(iii) renewable energy technologies, and
(iv) carbon capture and storage.[72]

These technologies include the adoption of new ways of production that can help markets rebuild themselves with a climate-mitigated approach. One can hypothesize that if a climate club implements CFTs to efficient production, member countries may achieve major savings through energy efficiency.

An Intergovernmental Panel on Climate Change (IPCC) report found that diverse policy instruments have been applied to climate mitigation at national and sub-national levels across different sectors.[73] However, coverage and prices have proven insufficient to achieve deep reductions.[74] If a climate club can convince its members to implement these measures with benefits in return, this would not only incentivize other countries to join but also make a difference at a global level. Nevertheless, there exists a need to bridge the gap in fuel efficiency technology and alternative fuels to curtail the emission rate. This requirement is especially crucial at the domestic level to reduce reliance on petroleum fuels, particularly in developing nations. For instance, building R&D markets can be essential for the commercialization of low-emission materials and products and enabling just transitions.[75]

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[69] David Popp, *Innovation and Climate Policy* (Nat'l Bureau of Econ. Rsch., Working Paper No. 15673, 2010).
[70] Christopher W. Callahan & Justin S. Mankin, *National Attribution of Historical Climate Damages*, 172 Climatic Change 40, 40 (2022)
[71] *Id.*
[72] Secretariat, U.N. Framework Convention on Climate Change, *Nationally Determined Contributions Under the Paris Agreement*, at 8-9, U.N. Doc. FCC/PA/CMA/2021/8 (Sept. 17, 2021).
[73] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2021: THE PHYSICAL SCIENCE BASIS (Valerie Masson-Delmotte et al. eds., 2021), https://www.ipcc.ch/report/ar6/wg1/.
[74] *Id.*
[75] *Id.*

In 2018, the private climate finance flows from developed to developing countries fell short of the levels agreed to under the UNFCCC and Paris Agreement, which hoped to mobilize USD $100 billion per year by 2020 in the context of mitigation and transparency.[76] Sharing financial resources between countries can allow them to implement carbon capture projects,[77] which is economically viable and can help reduce emissions in a cost-effective way.[78] Moreover, governance, investment, and social equity considerations can minimize trade-offs through civil society's meaningful participation. The private sector, motived by policy-driven incentives, plays a role in the transfer of CFTs through investments which further influence developments.[79] Once international communities approve stronger alignment of the private sector through financial and policy-based perspectives, prevailing uncertainty can be reduced and greater support for technology development and production upscaling can be incorporated transnationally. Such inclusion can stimulate policy developments and low-emissions technology diffusion by linking different actors and bringing in investments. These interactions can be enhanced through close-knit associations like climate clubs.

International trade also becomes an important channel for transferring CFTs into developing economies. The demand for renewable energy increased by about 1.5% in the first quarter of 2020 (Q1) through the completion of new wind and solar projects,[80] with demands likely to increase.[81] Transitioning to low-carbon development includes collaborating with the private and public sectors. Reallocation of labor resources from carbon-intensive industries to cleaner alternatives is necessary to preserve economic opportunities. This ensures an equitable transition from varying levels of carbon dependencies between economies. The International Energy Agency (IEA) identified two focus areas for nations:

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[76] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2022: MITIGATION OF CLIMATE CHANGE, at 13 (Valerie Masson-Delmotte et al. eds., 2022), available at https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Full_Report.pdf.

[77] Howard Herzog, *Carbon Capture*, MIT CLIMATE PORTAL, https://climate.mit.edu/explainers/carbon-capture (last updated Jan. 20, 2023).

[78] *Id*. ("Carbon capture and storage (CCS) refers to a collection of technologies that can combat climate change by reducing carbon dioxide (CO_2) emissions. The idea behind CCS is to capture the CO_2 generated by burning fossil fuels before it is released into the atmosphere.").

[79] Kanika Chandaria et al., *The Next Generation of Climate Innovation* (Mar. 22, 2021), https://www.bcg.com/publications/2021/next-generation-climate-innovation.

[80] INTERNATIONAL ENERGY AGENCY, GLOBAL ENERGY REVIEW 2020: THE IMPACTS OF THE COVID-19 CRISIS ON GLOBAL ENERGY DEMAND AND CO2 EMISSIONS 12 (Apr. 2020). https://iea.blob.core.windows.net/assets/7e802f6a-0b30-4714-abb1-46f21a7a9530/Global_Energy_Review_2020.pdf.

[81] *Id.* at 4.

(i) Mitigating risks, which includes aligning methods of achieving low-carbon transition through "carbon-specific net zero emission goals, carbon taxes, regulations, [and] investment in alternative energy[ies]"; and
(ii) Capitalizing on efficiencies through technology enhancements to increase future investment outlook, directing club members to consider developing their sectors innovatively and procuring new opportunities for club members.[82]

In 2020, the Ministry of Economic Development of the Russian Federation adopted a strategy to reduce GHG emissions by 2050.[83] A goal of this strategy included achieving carbon neutrality by 2060.[84] Given the present energy crises and decisions to move away from depending on Russia for energy, we should consider the following areas of interest for climate club perusals: (1) improving efficient use of materials, recycling ratios, and utilization of secondary energy sources; and (2) developing technology to capture, process, use, and dispose of CO_2 emissions from industrial and energy production process.[85] The decarbonization approach requires implementing a system that requires cooperation between nations and prospective club members.

Several gaps hinder the full, efficient utilization of CFTs. High tariffs on environmental related technologies have emerged as a major barrier to developing a wider use of these technologies. Countries that produce and manufacture these technologies impose a tariff structure that places lower tariffs on parts and equipment used in production and higher tariffs on complete CFT products.[86] Specifically, middle-income countries with higher tariffs need to adopt a liberalized approach that can eliminate tariffs and increase trade. With the evolution and growth of non-tariff barriers (NTBs) or non-trade-related barriers, policymakers and trade analysts need to address the effective diffusion of CFT. From this perspective, technological diffusion may produce strong network effects, affecting firms and industry associations, connecting them directly to the global structure of a climate club.

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[82] Danielle Sugarman & Jessica McDougall, *Climate Risk and the Transition to a Low-Carbon Economy*, HARV. L. SCH. F. ON CORP. GOVERNANCE (Mar. 2, 2021), https://corpgov.law.harvard.edu/2021/03/02/climate-risk-and-the-transition-to-a-low-carbon-economy.

[83] *Statement by Alexey Overchuck at the Conference of Parties to the UN Framework Convention on Climate Change*, The Russian Government (Nov. 9, 2021, 9:55 PM), http://government.ru/en/news/43759/.

[84] *Id.*

[85] A.F. Ryzhkov et al., *Creation of Energy-efficient and Environmentally Friendly Energy Sources on Fossil Fuels to Address Global Climate Issues*, 1677 J. PHYSICS: CONF. SERIES 1, 2 (2020).

[86] Solmaria Halleck-Vega et al., *Accelerating Diffusion of Climate-friendly Technologies: A Network Perspective*, 152 ECOLOGICAL ECONS. 235, 235 (2018).

C. Situating Climate Clubs: Practices and Measures Implemented

Climate mitigation requires adopting solutions outside the multilateral regime. William Nordhaus highlighted that states in smaller groups can come together motivated by common objectives and shared interests.[87] Creating clubs, however, does solve this problem if major emitters continue to fail to overcome their geopolitical or other trade related conflicts and refuse to work together. Analysis has shown that no major economy, including the G20 countries, is currently able to mitigate climate change and implement plans to meet its required obligations under the 2015 Paris Agreement.[88]

The United Nations Environment Programme's 2018 Emissions Gap Report found that G20 members are not on track to meet their Nationality Determined Contributions (NDC)[89] under the Paris Agreement.[90] A climate club may be a suitable mechanism to address these shortcomings. In line with the 2°C target, the World Resources Institute (WRI) analyzed four criteria that would improve the efficacy of climate clubs:

1) an ambitious vision;
2) clear membership conditions;
3) considerable member benefits; and
4) a clear pathway from immediate action to expansion (i.e., increase in ambition and potentially membership) over time.[91]

These criteria can be considered the starting point for forming a club. The voluntary nature of clubs aims to produce a public good or provide benefits that will lead to positive externalities, such as establishing a club's reputation for mitigating climate change. G20 economies have come under scrutiny for their slow pace in achieving the objective of capping global warming.[92] Creating clubs based on the criteria the WRI identified, alongside Buchanan-

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[87] Nordhaus, *supra* note 7.
[88] Ivana Kottasova, *Not a Single G20 Country is in Line with the Paris Agreement on Climate, Analysis Shows*, CNN (Sept. 16, 2021), https://edition.cnn.com/2021/09/15/world/climate-pledges-insufficient-cat-intl/index.html.
[89] *All About the NDCs*, U.N., https://www.un.org/en/climatechange/all-about-ndcs (last visited Oct. 6, 2023).
[90] U.N. Env't Programme, Emissions Gap Report 2018, at XVII (2018).
[91] Jennifer Morgan & Lutz Weischer, *Two Degrees Clubs: How Small Groups of Countries Can Make a Big Difference on Climate Change*, WORLD RES. INST. (Oct. 29, 2012), https://www.environmental-expert.com/news/two-degrees-clubs-how-small-groups-of-countries-can-make-a-big-difference-on-climate-change-323773.
[92] Julliete Portala, *G20 Economies Slow Pace of Decarbonization, PwC Study Shows*, REUTERS (Sept. 21, 2022) https://www.reuters.com/world/g20-economies-slow-pace-decarbonisation-pwc-study-shows-2022-09-20/; *see also Net Zero Economy Index 2023*, PWC https://www.pwc.co.uk/services/sustainability-climate-change/insights/net-zero-economy-index.html (last visited Oct. 7, 2023).

style clubs,[93] can help meet agreed upon goals. Members will be held to standards greater than their domestic regulations for environmental standards and establish clear goals.[94] These measures should motivate other nations to integrate and join the club.

A condition of a successful club is excluding or penalizing non-members at low cost to member.[95] The main goals of a club are for its members to produce and allocate goods, closely linking trade strategies in a composed way. Under a "consumption-ownership membership" model,[96] club members exclusively own their goods and consume them. For climate clubs, members attain benefits that are exclusively reserved for them, allowing them to mitigate the effects of climate change or contribute towards policies curbing greenhouse emissions. They procure these benefits through "monetary and nonmonetary costs of adopting and adhering to the club's membership requirements."[97] Membership requires adhering to the club's norms or legal standards.[98] A few scholars assessed different club structures and found further support for club formation.[99] In this section, we focus on three primary structures identified by these scholars, listed in Table 1 below.[100]

Table 1: Club architectures scenarios

Mitigation only club	Cooperation is focused on abatement where countries cooperate to reduce emissions in a cost-effective way across sectors (wide carbon price and market).
Finance and technology club	Technological spill-overs on low carbon technologies are fostered between countries and transfers are in line with Article 10 of the Paris Agreement on Climate Change.
Finance, technology, and trade club (full-club scenario as designated by the scholar to this distinction)	Club members establish a common trade area on equipment goods and low carbon technologies.

[93] Todd Sandler, *Buchanan Clubs*, 24 CONST. POLIT. ECON. 265, 265–284 (2013).
[94] Nordhaus, *supra* note 7.
[95] Nordhaus, supra note 24, at 1340.
[96] Wolfgang Obergassel, et. al., *A Sectoral Perspective on Climate Clubs*, WUPPERTAL (Aug. 30, 2023), https://d-nb.info/1214296874/34.
[97] *Id.* at 776.
[98] *Id*. at 773.
[99] *See, e.g.,* RAFAEL LEAL-ARCAS, CLIMATE CLUBS FOR A SUSTAINABLE FUTURE: THE ROLE OF INTERNATIONAL TRADE AND INVESTMENT LAW (2021).
[100] Leonidas Paroussos et al., *Climate Clubs and the Macro-economic Benefits of International Cooperation on Climate Policy*, 9 NATURE CLIMATE CHANGE 542, 542 (2019).

III. PURSUING THE CLIMATE-CLUB THEORY WITH GREEN TRADE

Countries that cooperate on a close-knit basis or in smaller groups tend to be catalysts for change. For instance, the renewed growth of regionalism has sparked changes in sustainable development, technology transfer, and competition, changes that the multilateral framework has failed to achieve.[101] Legally binding instruments addressing environment and trade are gradually evolving. Countries need to politicize ways to eliminate emissions to avoid future risks, which are gradually increasing in a more binding manner. To a certain extent, international environmental standards have proven ineffective in concretely altering climate emissions rates.[102] A solution involves the creation of climate clubs and incentivizing countries with benefits that are greater than obligations, much from a trade perspective.[103]

The pathway towards an integrated approach between countries on a global scale involves countries coming together to mitigate climate change via the club approach. It is vital to realize that an integrated approach is a more effective and faster means to tackle these issues on a global level. Countries should use trade agreements or similar mergers in trade and environmental chapters between nations, bilateral or plurilateral, that will allow countries to create a club or enter into a club.

Figure 1 below shows consumption-based CO_2 emissions from major emitters around the globe from 1990 to 2020.[104] Consumption-based emissions include energy production emissions and direct emissions from industries like steel and cement. Based on this data, developed countries—those with high or upper middle income—can reduce their carbon intensive production through the "pollution haven" hypothesis, resulting in lower territory-based emissions.[105] This further highlights the large differences in the stringency, quantity, and enforcement of environmental regulations between developed and developing countries. Environmental protection can impose certain regulatory barriers that affect business entry and investment in

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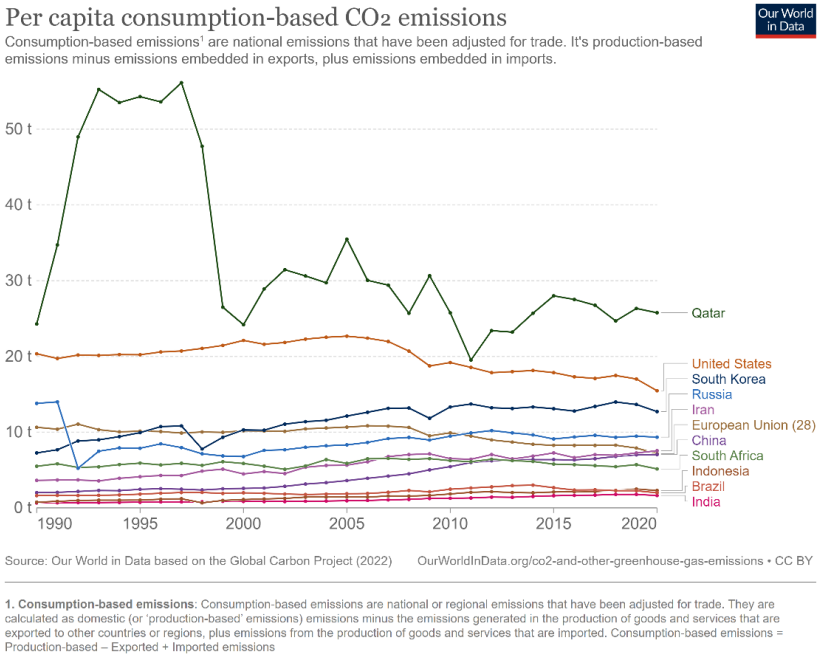
[101] *See generally* Rafael Leal-Arcas et al., *Climate Neutrality and Sustainability in International Trade*, 44 U. PA. J. INT'L L. 619 (2023).
[102] Rafael Leal-Arcas et al., *The Paris Agreement: Critical Assessment and Proposals for Key Clean Energy Initiatives*, 17 IUP J. INT'L RELS. 43 (2023).
[103] LEAL-ARCAS, *supra* note 31, at 10.
[104] *Per Capita Consumption Based CO2 Emissions*, OUR WORLD DATA, https://ourworldindata.org/grapher/consumption-co2-per-capita?tab=chart&country=USA~GBR~OWID_EU27~CHN~IND~AUS~BRA~ZAF~QAT#all-charts (last visited Oct. 8, 2023).
[105] Mita Bhattacharya et al., *Consumption-based and Territory-based Carbon Emissions Intensity: Determinants and Forecasting Using Club Convergence Across Countries*, 86 ENERGY ECON. 1, 2 (2020).

foreign markets,[106] an important consideration for governing trade relations between countries.[107] Two scholars have pointed out consumer-related greenhouse gas emissions were higher than producer related emissions.[108] This means that if countries decide to come together to increase their total factor productivity (TFP) through renewable energy consumption and renewable sources of trading, it may decrease the intensity of carbon emissions.

Figure 1: Per Capita consumption based CO_2 emissions (1990-2020)



Another way to decrease carbon emissions is by opening trade, an advantage of club membership.[109] Forming a club composed of countries that are major emitters may decrease the density of oil and coal usage in electricity generation, leading to lower CO_2 emissions. Increasing renewable energy

[106] Stefan Ambec et al., *The Porter Hypothesis at 20: Can Environmental Regulation Enhance Innovation and Competitiveness?*, 7 REV. ENV'T ECON. & POL'Y 1, 12 (2013).
[107] Jorge Rivera & Chang Hoon Oh, *Environmental Regulations and Multinational Corporations' Foreign Market Entry Investments*, 41 POL'Y STUDIES J. 243, 243 (2013).
[108] Harry C. Wilting & Kees Vringer, *Carbon and Land Use Accounting from a Producer's and a Consumer's Perspective – An Empirical Examination Covering the World*, 21 ECON. SYS. RSCH. 291, 299 (2009).
[109] Yiming Wang et al., *Convergence behavior of carbon dioxide emissions in China*, 43 ECON. MODEL 75-80 (2014).

consumption depends on industrial policies focused on utilizing low-carbon economies. This approach is possible through a climate club. Countries can focus on improving energy efficiency and consumption through good macroeconomic policy, increasing the TFP.

Many scholars have indicated that richer countries are willing to invest more in renewables, allowing other countries to benefit from these improvements.[110] Another effective option to decrease emissions is by placing carbon taxes on the production of renewables, as seen in China and South Korea.[111] In countries where the cost to reduce emissions is lower than a carbon tax, a reduction in emissions is expected.[112] Where reduction in emissions exceeds a tax, the tax will be implemented.[113] This will increase the cost of using fossil fuels in proportion to their carbon content. By contrast, in a climate club, regulating countries based on their direct emissions is an effective way to monitor the reduction of emissions in each sector of the economy.

According to various studies, global carbon emissions continue to increase because there is more CO_2 in the atmosphere than can be absorbed by the ocean and land ecosystems.[114] Though progress has improved through the use of renewable energy and implementation of new governmental and corporate policies, many targets remain unfulfilled, exemplified in Figure 2. Figure 2 shows the per capita CO_2 emissions from an industrial perspective over the years.

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[110] Victor Moutinho et al., *Factors Affecting CO2 Emissions in Top Countries on Renewable Energies: A LMDI Decomposition Application*, 90 RENEWABLE & SUSTAINABLE ENERGY REV. 605, 616 (2018).
[111] Duy Nong et al., *Greenhouse Gas Emissions vs CO2 Emissions: Comparative Analysis of a Clobal Carbon Tax*, 298 APPLIED ENERGY 1, 1-2 (Sept. 15, 2021).
[112] RAFAEL LEAL-ARCAS, CLIMATE CHANGE AND INTERNATIONAL TRADE (2013).
[113] *Id.*
[114] Pep Canadell et al., *Global Carbon Emissions at Record Levels with no Signs of Shrinking, New Data Shows*, THE CONVERSATION (Nov. 13, 2022), https://theconversation.com/global-carbon-emissions-at-record-levels-with-no-signs-of-shrinking newdatashowshumanityhasamonumentaltaskahead193108#:~:text=Global%20carbon%20dioxide%20emissions%20from,an%20international%20body%20of%20scientists.

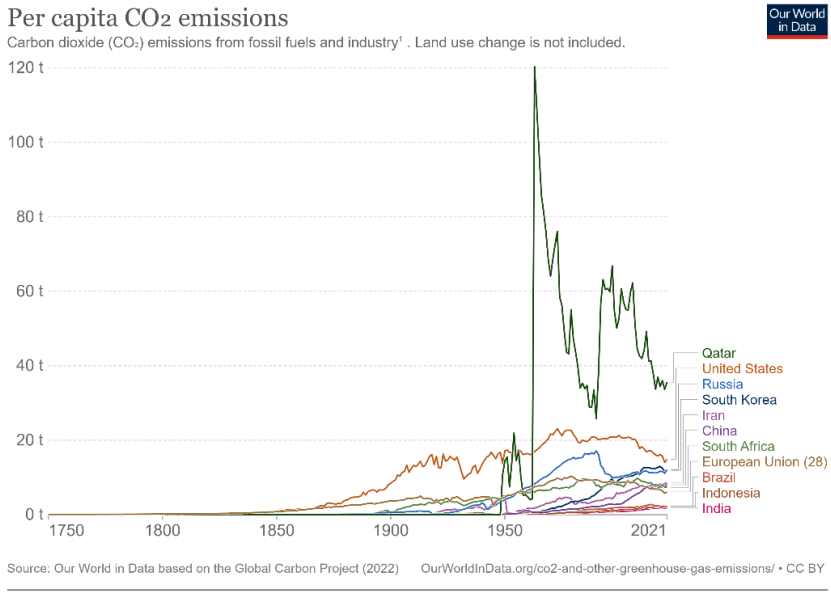

Figure 2: Per Capita CO_2 emissions (1750-2021)

It is important that countries rethink their approach and focus more on renewable energy. Countries can also benefit by implementing industrial policies combining renewable energy, CFTs, and sciences to mitigate climate change.[115] During the United Nations Framework Convention on Climate Change (COP27) in 2022, the Global Carbon Budget reported on "the gap between the promises governments, companies and investors . . . made to cut planet-warming emissions . . . and their actions today."[116] This highlights the urgent need for formulating better policy structures, one structure being the formation of a climate club. Estimates have indicated that the increase in emissions in 2022 was primarily driven an increase in oil emissions as global travel resumed after the Covid-19 pandemic.[117]

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[115] ARMORY LOVINS ET AL., WINNING THE OIL ENDGAME: INNOVATION FOR PROFITS, JOBS, AND SECURITY (Beatrice Arrow ed., 2004).
[116] Kate Abnett, *COP27: Global CO2 Emissions to Rise Again, Climate Goals at Risk, Scientists Say*, REUTERS (Nov. 11, 2022), https://www.reuters.com/business/cop/cop27-global-co2-emissions-rise-again-climate-goals-risk-scientists-say-2022-11-11/.
[117] Pierre Friedlingstein et al., *Global Carbon Budget 2022*, 14 EARTH SYST. SCI. DATA 4811, 4811.

Countries have started to commit themselves to carbon-neutrality domestically[118] but, to be successful, their initiatives must be linked multilaterally to the Paris Agreement in order to address capacity gaps.[119] A climate club venture can align countries diplomatically,[120] politically,[121] strategically,[122] and economically[123] to pursue an integrated path to influence climate action in the club and beyond. It is vital to note that such a merger should include nations that are dominant global players, motivating countries economically or politically to remain a part of the dialogue.

While keeping climate club formation in mind, it is important to realize that countries have carbon trading agreements. Carbon trading agreements are more easily implemented than regulation and carbon taxes.[124] The advantage of these agreements from a regional approach is that they can provide a speedy method of decarbonizing the globe.[125] The disadvantage, however, is incentivizing countries to limit their right to emit, a challenge in light of domestic political interference. This can lead to collapses in prices and prove ineffective in reducing emissions. If countries become dissatisfied with limits on their emissions, it is likely that the interests of trade may be favored over environmental standards, especially if the matter is taken to the WTO. This would renew debate surrounding the choice between trade and climate change. However, if a multilateral club approach regarding carbon trading is taken, legitimate standards and regulations affecting substantially all the trade would be established in accordance with Article XXIV of the GATT.

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[118] *These Countries Have Committed to a Net Zero Carbon Emissions Goal – Could it Solve the Climate Crisis?*, WORLD ECONOMIC FORUM (July 2019), https://www.weforum.org/agenda/2019/07/the-growing-list-of-countries-committing-to-a-net-zero-carbon-emissions-goal/.

[119] Mizan Khan et al., *Capacity Building Under the Paris Agreement*, EUR. CAPACITY BLDG. INITIATIVE, at 1 (Oct. 2016).

[120] Susanne Droege & Marian Feist, The G7 Summit: Advancing International Climate Cooperation?, DEUTCHES INSTITUT FUR INTERNATIONALE POLITIK UND SICHERHEIT (May 19, 2022).

[121] Daniel Hoenig, *The Climate Club: Creating a More Effective Arena for Climate Mitigation*, CLIMATE LEADERSHIP COUNCIL (Nov. 30, 2022), https://clcouncil.org/blog/the-climate-club-creating-a-more-effective-arena-for-climate-mitigation/ ("climate mitigation efforts within the . . . political structures of G7 countries require significant political buy-in").

[122] Nordhaus, *supra* note 24 at 1341 (clubs create strategic situations requiring countries to act in their self-interest and undertake high levels of emissions reductions due to the incentives set in place).

[123] *Id.* at 1366.

[124] *Carbon Trading: How does it work?*, BBC NEWS (Sept. 25, 2015), https://www.bbc.com/news/science-environment-34356604.

[125] *Id.*

A. The Road Not Taken: Slow Efforts for Green Recovery

Estimates have revealed that the increase in global fossil emissions in 2022 was driven by an increase in emissions by countries on both smaller and larger scales.[126] This may be the result of slow efforts towards reaching the path of green recovery.[127] In light of this, it is likely these trends will continue downward unless major GHG emitters come on board to build an action plan. Such a plan requires putting more accountability on the G20 governance structure requiring greater transparency between countries. Despite their differing styles of governance, climate change mitigation efforts require cooperation between countries. They must come together to formulate a mega-climate club trade agreement or a climate club. This requires trade policies that can be integrated into the action plan, providing finance and climate-related support to other countries.[128]

The premise of a climate club is countries engaging in trade together, sharing the club's features, rules, and services to acquire mutual benefits, and providing future developments for all members.[129] The action between these members will implement the intended nationally determined contributions (INDCs)[130] as outlined in the UNFCC framework. This would allow countries within the club to self-differentiate their responsibilities towards addressing climate change.[131] The potential benefit of entering into a climate club agreement includes creating an integrated approach where countries can pursue higher standards for mitigating climate change.

A climate club arrangement must include targets for club members to implement specific GHG emission reduction commitments or targets for sectoral carbon intensities. This relies on the activities conducted by the club and the joint decisions and arrangements adopted by the parties that would motivate other countries to adopt similar strategies to join or pursue mechanisms on a similar basis with other interested countries. It also relies on

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[126] Canadell*, supra* note 114.

[127] Simon Evans & Josh Gabbatiss, *Coronavirus: Tracking How the World's 'Green Recovery' Plans Aim to Cut Emissions*, CARBON BRIEF (June 16, 2020), https://www.carbonbrief.org/coronavirus-tracking-how-the-worlds-green-recovery-plans-aim-to-cut-emissions/.

[128] *Integrate Trade Into Climate Strategies, DG Okonjo-Iweala Says at Africa Adaptation Summit*, WTO (Sept. 5, 2022), https://www.wto.org/english/news_e/news22_e/dgno_05sep22_e.htm.

[129] *See generally* Rafael Leal-Arcas et al., *The World Trade Organization and Carbon Market Clubs*, 52 GEO. J. INT'L L. 895 (2021).

[130] INDCs are the primary means for governments to communicate internationally the steps they will take to address climate change in their own countries. INDCs reflect each country's ambition for reducing emissions, taking into account its domestic circumstances and capabilities.

[131] *What is an INDC?*, WORLD RES. INST., https://www.wri.org/indc-definition#:~:text=INDCs%20are%20the%20primary%20means,its%20domestic%20circumstances%20and%20capabilities (last updated Apr. 15, 2021).

the club members being environmental equivalents.[132] In the context of a trade route, the domino theory by Richard Baldwin states that nations that sign a free trade agreement (FTA) are induced to sign new agreements that they did not negotiate because of the trade-diversion effects of the signed ones, creating political and economic forces on excluded nations.[133] FTAs are regarded as "contagious"[134] and can be used as a model for climate clubs. Their creation might incentivize more nations to join it.

A growing concern, however, remains for lower-income countries. This can be disadvantageous for them if they are unable to meet the standards defined by the club. Increasing market access arrangements and providing financial assistance and technology transfer through liberal approaches can address trade concern in several countries. The use of market-based instruments has been considered a cost-effective way to achieve emissions reduction. By imposing a tax or climate club fee on emissions, such instruments can force countries to re-think the cost of their emissions within the climate club market.[135] Economic incentives can drive emission reductions.[136] Economists suggest that if the costs and benefits of abatement were known and fixed in advance, carbon taxing and emission trading would even out.[137] This would expedite and economize the development of emission reduction strategies by innovators, companies, and institutions. Such an approach is particularly relevant when the costs of abatement is uncertain.[138]

1. Creating a Roadway for the Climate Club and Trade

Under a multilateral framework, broadening the scope of general exceptions under GATT Article XX could be effective in allowing countries to pursue climate and environmental policies that allow them to significantly expand their investments in clean-energy trade. It is likely that technological cooperation may further these goals. While club members may initially be

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[132] Giulia Leonelli, *After Elmau: Input to the Policy Debate on Climate Clubs*, SSRN ELEC. J. (Sept. 9, 2022), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4187834.
[133] Dany Jaimovich & Richard Baldwin, *Contagious FTAs: New Evidence on the Domino Theory of Regionalism*, CTR. FOR ECON. POL'Y RSCH. (Sept. 2, 2010), https://cepr.org/voxeu/columns/contagious-ftas-new-evidence-domino-theory-regionalism.
[134] Richard Baldwin & Dany Jaimovich, *Are Free Trade Agreements Contagious?* (Nat'l Bureau of Econ. Rsch., Working Paper No. 16084, 2010).
[135] Nathaniel Keohane et al., *Toward a Club of Carbon Markets*, 144 CLIMATIC CHANGE 81, 83 (2017) (this incentivizes polluters to reduce emissions, spurring better, cheaper, and faster innovations).
[136] *Id.*
[137] *Id.*
[138] Nathaniel Keohane, *Cap and Trade, Rehabilitated: Using Tradable Permits to Control U.S. Greenhouse Gases*, 3 REV. ENV'T. ECON. & POL'Y. 42, 43 (2009); Richard Newell & William Pizer, *Regulating Stock Externalities Under Uncertainty*, 45 J. ENV'T. ECON. & MGMT. 416, 416 (2003).

required to comply with specific GHG emissions limits, this may be relaxed after indirect emissions goals are met. This process includes identifying GHG emission reduction by examining different combinations of GHG emission-reducing technologies used by different production sectors.[139]

This can result in the creation of product standards compatible with environmental and WTO standards, allowing nations within the club to meet clean energy trade requirements and incentivize non-members to invest in green technologies. Countries that may be good at producing sustainable products that use renewable energy resources need to be considered. For instance, anti-dumping and countervailing duties should not be applied to non-members if their products comply with the club's emission rates, incentivizing other non-members to join decarbonization efforts.

Another approach is to enter alliances that mutually reduce tariffs on certain goods. For instance, the EU-US green steel and aluminum alliance was formulated during COP26, where the EU and U.S. agreed to mutually reduce tariffs on steel and aluminum.[140] This agreement allowed them to retain imports from other countries that fail to meet the standards for low-carbon production. This is a sector-focused approach (steel-aluminum trade) and is a step towards achieving a climate club. Such alliances can provide countries in a club, or countries that have negotiated similar agreements, access to financial resources and schemes that can foster opportunities for developing nations. Countries that have strong access to technology can also play a significant role in deploying and exporting these technologies.

Companies or industries that have a low-carbon infrastructure can prioritize investment through financial schemes and support from their domestic ministries of environment and foreign affairs. By looking at the average carbon sectoral intensity of each club member, policies can be enacted to achieve the average intensity. Such initiatives prove that the WTO can serve as a forum for deliberation on climate measures with trade impacts.[141] Additionally, two joint statements[142] have laid out the blueprint for the

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[139] Leonelli, *supra* note 132.

[140] *Steel and Aluminum U.S.-EU Joint Statement*, U.S. DEP'T COM. (Oct. 31, 2021), https://www.commerce.gov/news/fact-sheets/2021/10/steel-and-aluminum-us-eu-joint-statement; *see also Joint US-EU Statement on Trade in Steel and Aluminum*, THE WHITE HOUSE (Oct. 31, 2021), https://www.whitehouse.gov/briefing-room/statements-releases/2021/10/31/joint-us-eu-statement-on-trade-in-steel-and-aluminum/.

[141] WTO, Ministerial Statement on Trade and Environmental Sustainability of 14 December 2021, WTO Doc. WT/MIN(21)/6/Rev.2 (2021), https://docs.wto.org/dol2fe/Pages/SS/directdoc.aspx?filename=q:/WT/MIN21/6R2.pdf&Open=True.

[142] US-JAPAN JOINT STATEMENT (Feb. 7, 2022), https://www.commerce.gov/sites/default/files/2022-02/US-Japan-Joint-Statement.pdf (section 2 of the US-Japan and US-UK Joint Statements follow such an approach. Both statements provide that the states "will confer on entering into discussions on global steel

creation of climate club arrangements between countries with similar economies.[143] These blueprints focus on members enacting domestic policies to support low carbon intensity across production sectors, refrain from non-market practices that can contribute to carbon-intensive production, and allow government investments in decarbonization efforts.[144] Non-participants that do not meet these standards will have their market access restricted. Such initiatives need to be negotiated in good faith between all WTO members, taking the conditions that work in different countries into account in order to weigh members' performance.[145]

2. Interaction Between Climate Clubs and Domestic Economies: Trade Routes

Imposing carbon duties is an enforcement mechanism that member nations can expect mutual benefits from. This can look like a carbon tax on imported goods, offsetting the cost of emissions for foreign and domestic producers in the club market. However, because each country has a duty to maintain transparency and accountability when providing knowledge about carbon taxes and emissions generated by foreign production, this practice is difficult to achieve. This is a result of a difference in production levels and the usage of technologies and measurements used to establish the foreign emission rate. However, this voices a strong economic argument for considering the implementation of domestic carbon policies for exporting nations. Foreign countries may also apply carbon levies, which can create most-favored nation (MFN) issues.[146] However, under the WTO framework, we mitigate these issues under GATT Article XX as one of the exceptions for climate change protection.[147]

Issues with international climate models should be considered while building a climate club. One issue is the use of carbon tariffs, which may directly or indirectly tax carbon emissions. Using bans rather than tariffs might be a better approach for members pursuing green strategies domestically through carbon taxes. This would allow them to make industrial

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and aluminium arrangements to address both global non-market excess capacity as well as the carbon-intensity of the steel and aluminium industries"); *see also* STEEL AND ALUMINIUM, US-UK JOINT STATEMENT (Mar. 22, 2022), https://www.commerce.gov/sites/default/files/2022-03/UK232-Joint-Statement.pdf.

[143] Leonelli, *supra* note 132.

[144] *Id.*

[145] *See* Appellate Body Report, *United States – Import Prohibition on Certain Shrimp and Shrimp Product*, ¶ 166, WTO Doc. WT/DS58/AB/R (adopted on Oct. 12, 1998); Appellate Body Report, *United States – Import Prohibition on Certain Shrimp and Shrimp Products – Recourse to Article 21.5 of the DSU by Malaysia*, ¶¶ 123-124, WT/DS58/AB/RW (adopted on Oct. 22, 2001).

[146] Aaron Cosbey, *Border Carbon Adjustment* 1, 3-4 (2008), available at https://www.iisd.org/system/files/publications/cph_trade_climate_border_carbon.pdf.

[147] LEAL-ARCAS, *supra* note 31.

and other CO2 emissions costly. Another issue is defining climate-motivated trade policies which requires adhering to WTO balancing requirements.[148] In their scholarly evaluation, Jeremy Carl and David Fedor discuss how cap-and-trade is advantageous because revenues are more likely to be spent on renewable energy initiatives.[149] The largest GHG emitters need to enact a carbon tax through a carbon pricing model with reinvestment of revenues into renewable energy sources. Another approach is a uniform percentage tariff, which is designed to increase participation and hold non-participants accountable for the emissions of GHG embedded in traded goods and elsewhere.[150] Such a tariff can be amended by international climate treaties, imposing uniform tariffs on countries not part of a club and prohibiting retaliation against countries invoking this mechanism.[151]

B. Can We Link Climate Clubs to Markets?

Market-based tools can be incorporated to make countries commit to their efforts.[152] However, we know that this may lead to diversification within the climate clubs.[153] There are several ways to connect climate clubs and trade markets to provide economic benefits. The first way is by implementing knowledge sharing, coordination efforts, and technology transfer between member countries.[154] Economic growth and environmental sustainability can be achieved once standards and incentives to lower carbon are met and partnerships between the private and public sectors are formed for research and development.[155] Using this approach will allow member countries to increase trade in climate goods and services, reducing pollutants and energy use that increases carbon emission.

These initiatives allow several ministries to work together on an absolute or relative scale to facilitate green investments and technologies.[156] This would mean that countries that are major emitters would create a direct link

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[148] Ulrike Will, *The Extra-Jurisdictional Effects of Environmental Measures in the WTO Law Balancing Process*, 50 J. WORLD TRADE 611, 616 (2016).
[149] Jeremy Carl & David Fedor, *Tracking Global Carbon Revenues: A Survey of Carbon Taxes Versus Cap-and-trade in the Real World*, 96 ENERGY POL'Y 50, 51 (2016).
[150] Nordhaus, *supra* note 24, at 1348.
[151] Nordhaus, supra note 24, at 1348-49.
[152] *Market-Based Strategies*, CTR. FOR CLIMATE & ENERGY SOLS., https://www.c2es.org/content/market-based-strategies/ (last visited Oct. 9, 2023).
[153] *Id.*
[154] Heleen de Coninck et al., *International Technology-oriented Agreements to Address Climate Change*, 36 ENERGY POL'Y 335, 342 (2008).
[155] Heleen de Coninck et al., *International Technology-oriented Agreements to Address Climate Change*, 36 ENERGY POL'Y 335, 342 (2008).

[156] Tomoo Machiba, *Eco-innovation for Enabling Resource Efficiency and Green Growth: Development of an Analytical Framework and Preliminary Analysis of Industry and Policy Practices*, 7 INT'L. ECON. & ECON. POL'Y 357, 357 (2011).

between their trading systems. One such example is the link between the EU's Emissions Trading System (EU ETS), California, and Quebec.[157] Regulated carbon emitters between the members will have the benefit of participating in the Quebec and California markets and acquiring and selling emission allowances.[158] It is likely that, as time goes by, market players will create their own links in formulating strategies for investors across several markets. They would also define the emissions that can flow freely between the linked systems. Several developments around carbon trading have emerged, such as the launch of the African Carbon Markets Initiative, which has been formulated to increase the continent's participation in voluntary carbon markets.[159] Brazil, the Democratic Republic of Congo, and Indonesia have also joined together to form a rainforest protection alliance to monetize and protect these carbon sinks.[160]

These links require jurisdictions to amend their cap-and-trade regulations to recognize the allowances produced by other foreign jurisdictions.[161] Climate club members will need to first find out what common programs implemented by the proposed signatories exist. They will also be required to determine if links to the markets will affect a jurisdiction's ability to enforce the units domestically and whether laws to enforce the cap-and-trade program exist.

Such linkages, if implemented, create a road for a market club and facilitate a collective approach to carbon pricing of goods and services in a new green trading system. Assessing emission unit value and a global look to reduce risks will be useful in formulating a climate club trading system and linking regional systems with one another. Such a framework allows collaboration and a reduction in the overall economic cost of systems and linkages, as well as reducing entry costs for new trading systems. If such climate market club systems are deployed and standardized, it is likely that stakeholders across the globe will move closer to a trading system that can be

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[157] Erik Haites, *Experience with Linking Greenhouse Gas Emissions Trading Systems*, 5 WIREs ENERGY & ENV'T 246, 246 (2016).
[158] Ronaldas Vaiciulis & Shaun Fluker, *Linking the California and Québec Emissions Trading Schemes*, ABLAWG.CA (Dec. 3, 2013), https://ablawg.ca/wp-content/uploads/2013/12/Blog_RV_SF_California_Quebec_December-2013.pdf.
[159] *Africa Carbon Markets Initiative Launched to Dramatically Expand Africa's Participation in Voluntary Carbon Market*, CLIMATE CHAMPIONS (Nov. 8, 2022), https://climatechampions.unfccc.int/africa-carbon-markets-initiative/.
[160] Max Berak & Manuela Andreoni, *Brazil, Indonesia, and Congo Sign Rainforest Protection Pact*, N.Y. TIMES (Nov. 14, 2022).
[161] Bjart Holtsmark & Martin L. Weitzman, *On the Effects of Linking Cap-and-Trade Systems for CO 2 Emissions*, 75 ENVTL. & RES. ECONS. 615, 616-630 (2020).

more effective than the United Nations Framework Convention on Climate Change's (UNFCCC) Kyoto Mechanisms.[162]

The G7 "is intended to compensate for the lack of enforcement mechanisms in the Paris Agreement."[163] This indicates that sanctions can be imposed for non-compliance with measures:

> [W]e note with concern that currently neither global climate ambition nor implementation are sufficient to achieve the goals of the Paris Agreement by reducing greenhouse gas emissions. We aim to establish a Climate Club to support the effective implementation of the Paris Agreement by accelerating climate action and increasing ambition . . . .[164]

The end goal is to make climate obligations enforceable. This requires finding a balance between industrial transformations through decarbonization acceleration and market expansion for green industrial products. This will only be practical if there is a reform to how laws and actions regarding climate change continue to work as GHG emissions increase. The structure of a climate club creates a unified regime for assessing carbon pricing and procuring benefits from each other, as well as providing trade advantages by significantly linking markets.

IV. CONTINUING THE INTERACTIONS FOR A CLIMATE CLUB

We must look beyond the statement that climate clubs can serve as a tool to mitigate climate change and instead develop a dialogue about international trade rules. We need to consider how countries and the ambitious goal of climate clubs can be achieved through multilateral frameworks like the Paris Agreement on Climate Change and the UNFCCC[165] or regional trade agreements (RTAs).[166] The ability lies in achieving a solution for determining a balanced equilibrium between existing climate arrangements, regional trade agreements, and new and forthcoming climate club modalities.[167]

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[162] Thomas L. Brewer, *Carbon Market Clubs and the New Paris Regime,* WORLD BANK, at 13 (July 2016), https://thedocs.worldbank.org/en/doc/323531476453676433-0020022016/original/1700505CarbonMarketClubsWeb.pdf.
[163] Droege & Feist, *supra* note 120, at 2.
[164] Elmau, *G7 Statement on Climate Club*, GOV'T. CANADA (June 28, 2022), https://www.international.gc.ca/news-nouvelles/2022/2022-06-28-g7-climate-club-climat.aspx?lang=eng; *see also G7 Statement on Climate Club*, G7 GERMANY (June 28, 2022), https://www.g7germany.de/resource/blob/974430/2057926/2a7cd9f10213a481924492942dd660a1/2022-06-28-g7-climate-club-data.pdf?download=1.
[165] United Nations Framework Convention on Climate Change, May 9, 1992, S. Treaty Doc. No. 102-38, 1771 U.N.T.S. 107 [hereinafter UNFCCC].
[166] Matthew C. Porterfield, *Climate Clubs: Key Design & WTO Compliance Issues*, Climate Advisers 1, 13 (Apr. 2022).
[167] Brewer, *supra* note 162.

Nordhaus constructed the climate club approach to rely on a top-down structure that develops through different ambitious standards and continues to grow to reach levels of abatement on an international scale.[168] Through this, one can argue that countries that have the resources and institutional capacity to make strong climate commitments would more likely form a club and procure trade or investment benefits as decided within members. The problem is balancing the current climate regimes, which allow trade penalties as forms of economic impetus to join the club.[169]

As argued previously, countries may form climate clubs to pursue their economic interests, allowing them to form their emission trading allowances to reduce the risk of emission leakage by private firms.[170] This in turn maintains trade competitiveness between trading partners.[171] From a trade competitiveness perspective, industrial production intended to move via trade flows to jurisdictions outside the regulatory reach. One such jurisdiction that employs the leakage mitigation approach is California, where emitters are required to purchase cap-and-trade allowances to cover their emissions rate.[172]

The economic effect of this on output levels, in addition to the free allocation of permits, induces an emission tax and a production incentive.[173] Incentivizing emissions abatement and mitigating leakage requires the employment of subsidy levels reflecting the GHG emissions in external jurisdictions,[174] which can be avoided if production activities remain confined in the same jurisdiction. This approach can be applied in the club aspect while applying transparency across sectors and between member states.

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[168] Nordhaus, *supra* note 24, at 1344.

[169] Georgia Piggot et al., *Addressing fossil fuel production under the UNFCCC: Paris and beyond* (Stockholm Env't Inst., Working Paper No. 09, 2017).

[170] Emissions leakage refers to any change in emissions from sources not covered by the GHG policy or program that is caused by the GHG emissions policy or program. Leakage is a potential issue under any state climate change policy that increases the operating costs of regulated entities, not just cap-and-trade. Also, it is worth noting that leakage occurs if there is excess capacity at in-state facilities that are exempt from the GHG regulations.

[171] Meredith Fowlie & Danny Cullenward, *Report on Emissions Leakage and Resource Shuffling*, INDEP. EMISSIONS MKTG. ADVISORY COMM. 1-14 (2018), https://calepa.ca.gov/wp-content/uploads/sites/6/2018/09/6e.IEMAC_Meeting_Materials_92118__Fowlie_and_Cullenward_Report_on_Emissions_Leakage.pdf.

[172] Meredith L. Fowlie et al., *Measuring Leakage Risk* 1, 6 (2016), chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://ww2.arb.ca.gov/sites/default/files/cap-and-trade/meetings/20160518/ucb-intl-leakage.pdf.

[173] This includes emissions tax (via the market-based value for allowances), which provides incentives for reducing emissions and production incentives to help with the level of carbon playing field with unregulated state-to state producers.

[174] Janet Peace & Jason Ye, *Market Mechanisms: Options for Climate Policy*, CTR. FOR CLIMATE & ENERGY SOLS. (April, 2020), https://www.c2es.org/wp-content/uploads/2020/04/market-mechanisms-options-climate-policy.pdf.

It is also likely that countries can follow the path of trade liberalization by becoming cost-effective in the process of reducing GHG emissions. This includes harmonizing regulatory standards and facilitating the transmission of technological information needed for technology transfers and to avoid emission leakages.[175] Establishing exceptions in the WTO system, as stated previously, is a viable approach that can allow interested parties to gain preferential arrangements within the climate clubs through the WTO. Several scholars have also identified that ambition and resources are related to each other for the growth of the climate club.[176]

A. Concerns Surrounding the Establishment of a Climate Club Amid Energy-Security Crises

In an October 2022 report, the IEA said, "[w]ith unrelenting inflationary pressures and interest rate hikes taking their toll, higher oil prices may prove the tipping point for a global economy already on the brink of recession."[177] Countries that continue to be dependent on oil and gas will need to find alternatives,[178] such as installing green operations and investing in renewables.[179]

With looming uncertainty between the public and private sectors about adopting models to mitigate climate change, Mark Carney, former Governor of the Bank of England, delivered an address that pointed to the penetrating asymmetry existing between society's knowledge of climate change and the inability of leaders to create models that incentivize change.[180] Institutions are not equipping themselves, both on the local and global levels, to tackle the

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[175] RAFAEL LEAL-ARCAS, CLIMATE CHANGE AND INTERNATIONAL TRADE 363 (2013).
[176] Robert O. Keohane, *The Global Politics of Climate Change: Challenge for Political Science*, 48 PS: POL. SCI. & POL. 19, 19 (2015); Lutz Weischer et al., *Climate Clubs: Can Small Groups of Countries Make a Big Difference in Addressing Cimate Change?*, 21 REV. EUR. CMTY. & INT'L. ENV'T. L. 177, 177 (2012).
[177] Roberto Bocca & Stefan Ellerbeck, *Electricity Use Drops in Europe: What You Need to Know about the Global Energy Crisis this Week*, WORLD ECON. F. (Oct. 17, 2022), https://www.weforum.org/agenda/2022/10/global-energy-sector-latest-news-17-october/; Noah Browning, *OPEC+ Oil Supply Cuts Could Tip World Into Recession, IEA Says*, REUTERS (Oct. 13, 2022), https://www.reuters.com/business/energy/opec-oil-supply-cuts-could-tip-world-into-recession-iea-says-2022-10-13/#:~:text=LONDON%2C%20Oct%2013%20(Reuters),Energy%20Agency%20said%20on%20Thursday.
[178] Clifford Krauss, *Why Some Countries Find It Hard to Move Away From Fossil Fuels*, N.Y. Times (May 15, 2023).
[179] Ian Palmer, *How Oil and Gas Is Being Affected By Climate Change – Response To A Presentation In Mid-America*, FORBES (Apr. 25, 2022), https://www.forbes.com/sites/ianpalmer/2022/04/25/how-oil-and-gas-is-being-affected-by-climate-change--response-to-a-presentation-in-mid-america/?sh=462a889b1cb9.
[180] Roger Harrabin, *Bank of England Chief Mark Carney Issues Climate Change Warning*, BBC NEWS (Dec. 30, 2019), https://www.bbc.com/news/business-50868717.

challenges that are being posed by the accumulation of harmful gases. For instance, Germany has demonstrated significant efforts with its domestic *Energiewende* project, which focuses on transitioning to renewable energy and energy efficient gains.[181] This model can be a blueprint for other countries to develop similar plans that include innovative decarbonization policies for a renewed Global Energy Transition Dialogue.[182] These initiatives can attract other advocates and ministries to adopt similar initiatives. Germany's State Secretary Stephan Steinlein of the Federal Foreign Office stated that *Energiewende* is a global project at its core and further stressed it being able to serve as "the world's laboratory . . . . Whatever succeeds here will inspire hope and courage; whatever fails might not even be attempted elsewhere."[183] Projects to mitigate climate change require efforts domestically and internationally; this requires integrated leadership to foster support with partners from emerging markets.

The G7 leaders have decided to "endorse the goals of an open and cooperative international Climate Club, and will work with partners towards establishing it by the end of 2022."[184] In their statement, they decided to establish a climate club around three pillars: "advancing ambitious and transparent climate change mitigation policies . . . . towards climate neutrality; transforming industries jointly to accelerate decarbonization; and boosting international ambition through partnerships and cooperation to encourage and facilitate climate action…. and promote just energy transition."[185] The G7 has highlighted the impacts to the energy markets and security that have occurred as a result of the Russian war of aggression.[186]

As prices accelerate and fluctuate through market conditions, they block the emergence of a coalition of the climate club working on energy transition.

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[181] Karoline Steinbacher & Sybille Röhrkasten, *An Outlook on Germany's International Energy Transition Policy in the Years to Come: Solid Foundations and New Challenges*, 49 ENERGY RSCH. & SOC. SCI. 204, 204 (2019).

[182] David Livingston, *The G7 Climate Mandate and the Tragedy of Horizons*, CARNEGIE ENDOWMENT 1, 1-2 (2021), https://carnegieendowment.ozrg/files/11_15_Livingston_G7_v1_event_summary.pdf.

[183] Sören Amelang, *Energy Transition Shapes Foreign Policy in Germany and Beyond*, CLEAN ENERGY WIRE (July 8, 2015), https://www.cleanenergywire.org/dossiers/energiewende-and-its-implications-international-security.

[184] *G7 Agrees to Establish "Climate Club" Amid Energy Security Concerns*, INT'L INST. FOR SUSTAINABLE DEV. (June 29, 2022), https://sdg.iisd.org/news/g7-agrees-to-establish-climate-club-amid-energy-security-concerns/.

[185] Elmau, *supra* note 164; *see also* G7 GERMANY *supra* note 164; Klass Lenaerts & Simone Tagliapietra, *A Transatlantic Energy and Climate Pact Is Now More Necessary Than Ever*, 57 INTERECONOMICS 247, 247 (2022).

[186] Daniel Balsalobre-Lorente et al., *Russia-Ukraine Conflict Sentiments and Energy Market Returns in G7 Countries: Discovering the Unexplored Dynamics*, 125 ENERGY ECONS. 1, 2 (2023).

Market instabilities disrupt the inequalities between developing and developed countries and negatively impact the economically low- and middle-income countries.[187] Partnerships like the Just Energy Transition Partnerships aim to support coal-dependent emerging economies as they make an energy transition.[188] These agreements hope to incentivize similar transitions between lower-middle and high-income countries.[189] For example, Egypt is working to secure $500 million from the United States, Germany, and the EU to finance its transition to clean energy.[190] President Biden has also announced a plan to mobilize $2 billion in private investments for solar energy development in Angola.[191] Similarly, the G7 Partnership for Global Infrastructure and Investment (PGII) can likely act as a private equity model to be noted on public exchanges to establish climate clubs.[192]

The purpose of a climate club, in our view, is to help facilitate access to financing for green energy and investments. This will allow the market to be revitalized through low-carbon and renewable-dependent derivatives, shifting the world economy based on low-carbon and renewable sources to include zero-emission thermal power generation plants and renewable hydrogen for sector emissions abatement. Establishing a climate club amid an energy crisis requires recognizing that coal power generation and fuel usage are causes of

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[187] Era Dabla-Norris et al., *Causes and Consequences of Income Inequality: A Global Perspective*, IMF (June 2015), https://www.imf.org/external/pubs/ft/sdn/2015/sdn1513.pdf.

[188] Katherine Kramer, *Just Energy Transition Partnerships: An Opportunity to Leapfrog from Coal to Clean Energy*, INT'L INST. FOR SUSTAINABLE DEV. (Dec. 7, 2022).

[189] Christopher Cassidy et al., *Just Energy Transition Partnerships: Will COP27 Deliver for Emerging Economies?*, ATLANTIC COUNCIL (Nov. 4, 2022), https://www.atlanticcouncil.org/blogs/energysource/just-energy-transition-partnerships-will-cop27-deliver-for-emerging-economies/.

[190] Zainab Usman, *As Financial Pledges Trickle In, Did COP27 Meet Its Goal of Implementation?,* CARNEGIE ENDOWMENT FOR INT'L. PEACE (Nov. 21, 2022), https://carnegieendowment.org/2022/11/21/as-financial-pledges-trickle-in-did-cop27-meet-its-goal-of-implementation-pub-88452.

[191] *Remarks by President Biden at Launch of the Partnership for Global Infrastructure and Investment*, Whitehouse.gov (June 26, 2022), https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/06/26/remarks-by-president-biden-at-launch-of-the-partnership-for-global-infrastructure-and-investment/.

[192] Alex Michaelowa, *A Vision for International Climate Finance After 2025, in* HANDBOOK OF INTERNATIONAL CLIMATE FINANCE 476 (2022); Christopher Cassidy et al., *Just Energy Transition Partnerships: Will COP27 Deliver for Emerging Economies?*, ATLANTIC COUNCIL (Nov. 4, 2022), https://www.atlanticcouncil.org/blogs/energysource/just-energy-transition-partnerships-will-cop27-deliver-for-emerging-economies/; Daniel Benaim et al., *US-Gulf Relations*, 29 MIDDLE EAST POL'Y. 3, 3 (2022).

global temperature increases and need to be phased out.[193] Ensuring reliable and affordable low-carbon energy will contribute to energy security.

The Intergovernmental Panel on Climate Change's (IPCC) report of 2021 has declared a code red for global warming.[194] The report identifies the literature climate clubs are built on and highlights that the club structures are reasonably stable, internally and externally.[195] Therefore, climate clubs need to reinforce an immediate, transformational shift away from the present sources that contribute to the rise in GHG, namely fossil fuels.[196] This also indicates that nations will be forcibly required to develop economies not reliant on fossil fuel if the red code remains activated. The U.S. National Intelligence Council has identified least twenty petrostates which continue to remain reliant on fossil-fuel extraction for over half of their export revenues.[197] It is unlikely that these states will adopt global decarbonization efforts, particularly because there are no incentives for these countries to join a club. The obligations they must meet do not outweigh the economic benefits of fossil-fuel extraction. Therefore, it is clear that climate security and energy security need to be addressed together.[198]

Climate clubs convene major players to help manage markets like gas. These markets are widely considered as vital instruments to allocate scarce supplies. Without coordination between buyers and sellers, free-riding may become an issue.[199] An arrangement between exporters—the United States, European Union, and Qatar—and importers—China, Japan, South Korea,

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[193] *Fossil Fuels and Climate Change: The Facts*, CLIENT EARTH (Feb. 18, 2022), https://www.clientearth.org/latest/latest-updates/stories/fossil-fuels-and-climate-change-the-facts/#:~:text=What%20is%20the%20link%20between,temperature%20has%20increased%20by%201C.

[194] *See IPCC Report: 'Code red' for Human Driven Global Heating, Warns UN Chief*, UN NEWS (Aug. 9, 2021), https://news.un.org/en/story/2021/08/1097362. Code red is a term that has been used by the UN Secretary General referring to the precarious climate situation and irreversible trends. *See also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2021: THE PHYSICAL SCIENCE BASIS (Valerie Masson Delmotte et al., 2021), https://www.ipcc.ch/report/ar6/wg1/.

[195] Paroussos et al., *supra* note 100, at 545.

[196] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2022: MITIGATION OF CLIMATE CHANGE (Priyadarshi R. Shukla et al., 2022), https://www.ipcc.ch/report/ar6/wg3/.

[197] NATIONAL INTELLIGENCE COUNCIL, CLIMATE CHANGE AND INTERNATIONAL RESPONSES INCREASING CHALLENGES TO U.S. NATIONAL SECURITY THROUGH 2040 1, 7 (2021), https://www.dni.gov/files/ODNI/documents/assessments/NIE_Climate_Change_and_National_Security.pdf

[198] Mark Nevitt, *Climate Security, Energy Security, and the Russia-Ukraine War*, JUST SEC. (May 11, 2022), https://www.justsecurity.org/81440/climate-security-energy-security-and-the-russia-ukraine-war/.

[199] Richard L. Stroup, *Free Riders and Collective Action Revisited*, 4 INDEP. REV. 485, 500 (2000).

India, and South Africa—creates a considerable forum. Although imperfect in nature, this arrangement acts as a supplement to the markets and not a replacement. It is likely that countries in the climate club would only decide to invest if the club's policies remain consistent with their climate ambitions. Another initiative is that if a climate club includes countries from Europe and Asia, an arrangement would allow liquefied natural gas (LNG) projects to be signed as simultaneous contracts between European and Asian customers, delivering energy security for Europe for a decade and then decarbonization in Asia over the next.

B. Trade and Climate Change: More Dialogue Needed

We make the case that environmental agreements are less effective than trade agreements because they are not enforceable. This raises the issue on whether trade agreements with strong environmental chapters might be a more effective way to mitigate climate change.

1. An Overview

Establishing a club requires supporting clean energy exports, where countries will accelerate their own energy transition by deploying renewable power sources. Clubs can offer early market access to clean energy exports like electro-fuels. Developed countries can be allies to other countries that may be interested in joining the club but may not be incentivized enough to do so. These countries can help secure necessary supply chains and new technologies for tapping the potential for supply. Such strategies can be positive and mutually beneficial exchanges between allies and trading partners such as the USA, Europe, and China.

It is likely that global supplies and green trade will increase if the manufacturing of clean energy technologies is promoted.[200] For example, in the USA, the proposed 48C tax credit is meant to incentivize investment in manufacturing facilities for renewable technologies, energy storage, low-carbon fuels, and efficiency products, specifically for the development of clean energy technologies.[201] This includes advancing energy projects through industrial facilities and recycling production, and using energy conservation

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[200] *The World is Entering a New Age of Clean Technology Manufacturing, and Countries' Industrial Strategies Will be Key to Success*, INT'L ENERGY AGENCY (Jan. 12, 2023), https://www.iea.org/news/the-world-is-entering-a-new-age-of-clean-technology-manufacturing-and-countries-industrial-strategies-will-be-key-to-success.

[201] *Fact Sheet: 48C Manufacturing Tax Credits*, ENERGY.GOV, https://www.energy.gov/sites/prod/files/FACT%20SHEET%20--%2048C%20MANUFACTURING%20TAX%20CREDITS.pdf (last visited Nov. 18, 2023) (to foster investment and job creation in clean energy manufacturing, the American Recovery and Reinvestment Act of 2009 established a tax credit for investments in manufacturing facilities for clean energy technologies).

technologies.[202] In a club, this approach can be adopted through different jurisdictions, allowing for the creation of jobs and reduction of greenhouse gases. Countries with a global reach will manufacture components in clean and green technology, qualifying for a 30% tax credit.[203] This is a benefit countries get for avoiding emission leakage and allowing ministries to engage with the private sector to determine which projects qualify for the credit system.[204] This also allows for investments in the region and stimulates economic growth.[205] This means that the resource endowments and markets of members within the club need to benefit the member industries to meet the demand for energy security and decarbonization efforts between those countries.

The IEA found that the costs associated with transitioning to a low-carbon energy system will be lower than those associated with a system based on expanding fossil fuels.[206] Countries that can obtain benefits will include direct energy benefits from technology-based investments that efficiently allocate energy sources and renewables.[207] The report points to the "benefit of initiating" as the economic benefit of a climate club.[208] If the cost of emissions reduction is not matched, trade sanctions will be imposed on the rest of the world. The report also mentions the "cost of leaving" as the economic cost to a region if the country leaves the global climate club. In such a case, the country in question will likely be sanctioned by all remaining countries.[209]

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[202] *Id.*

[203] David Burton et al., *Inflation Reduction Act of 2022 – New Tax Credits for Manufacturers of Clean Energy Equipment*, NORTON ROSE FULBRIGHT (Aug. 11, 2022), https://www.projectfinance.law/tax-equity-news/2022/august/inflation-reduction-act-of-2022-new-tax-credits-for-manufacturers-of-clean-energy-equipment/.

[204] *Id.*

[205] *Id.*; *see also* EY Americas, *Tax Credit for Green, Renewable Energy Included in Legislation*, EY (Dec. 14, 2021), https://www.ey.com/en_us/energy-resources/tax-credit-for-green--renewable-energy-included-in-legislation.

[206] *Projected Costs of Generating Electricity 2020*, INT'L ENERGY AGENCY (Dec. 2020), https://www.iea.org/reports/projected-costs-of-generating-electricity-2020 (last visited Oct. 9, 2023).

[207] Diana Ürge-Vorsatz et al., *Measuring the Co-benefits of Climate Change Mitigation*, 39 ANNUAL REV. ENV'T & RES. 549, 574 (2014).

[208] Nicholas Stern & Hans Peter Lankes, *Collaborating and Delivering on Climate Action Through a Climate Club: An Independent Report to the G7*, LONDON SCH. OF ECONS. & POL. SCI. (Oct., 2022), https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2022/10/Collaborating-and-delivering-on-climate-action-through-a-Climate-Club.pdf.

[209] Achmin Hagen & Jan Schneider, *Small Climate Clubs Should Not Use Trade Sanctions*, 92 ENERGY RSCH. & SOC. SCI. 102777 (2022).

2. Benefits Must Outweigh Obligations for Members of the Club

International legitimacy also has a concept of "bringing in," which means that "groups of countries who are willing to undertake particular commitments or actions agree to have those negotiated, recognized, and monitored within the UNFCCC."[210] Climate clubs will need to be linked to the UNFCC process through multilateral efforts which address ways the global character is recognized and the consequences of climate change are addressed.[211] Several scholars have focused on the legitimation of the climate clubs and have compared the establishment of the Paris Agreement to its rules contained in paragraphs 2, 3, and 7 of Article 6, which could satisfy the demands of international legitimacy for climate clubs.[212]

Mutual recognition for climate clubs also means that members need not adopt identical regulations. For instance, the following is not a club approach but an approach on a global climate scale that shows cooperation between countries. At the sub-national level, California and Quebec have linked their markets to an unprecedented degree and are developing separate offset protocols.[213] This means that mutual consensus on regulatory design features was established and parameters that were adaptable to individual jurisdictions were adopted.[214] Similarly, clubs can also agree on a "list" of regulatory design features or parameters that will be essential for membership based on an agreed set of principles.[215] Carbon units will be traded among jurisdictions where mitigation efforts will also provide benefits such as lower abatement costs, price stability, and market liquidity. This would also mean access to larger markets and stronger demands on the carbon markets.

Jurisdictions with smaller economies and less experience have the potential for capacity building and technical expertise development for designing and implementing environmental markets. This will incentivize countries that do not have the infrastructure to meet club membership requirements to develop appropriate plans before joining the club. Monitoring

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[210] Lutz Weischer et al., *Climate Clubs: Can Small Groups of Countries Make a Big Difference in Addressing Climate Change?*, 21 REV. EUR. CMTY. & INT'L. ENV'T. L. 177, 191 (2012).

[211] Richard B. Stewart et al., *Building Blocks for Global Climate Protection*, 32 STAN. ENVT'L. L. J. 341, 341 (2013); Richard Stewart et al., *A New Strategy for Global Climate Protection*, 120 CLIMATIC CHANGE 1, 1 (2013).

[212] *See generally* Robyn Eckersley, *Moving Forward in the Climate Negotiations: Multilateralism or Minilateralism?,* 12 GLOBAL ENV'T. POL. 24, 24 (2012); Robert Falkner, *A Minilateral Solution for Global Climate Change? On Bargaining Efficiency, Club Benefits and International Legitimacy*, 14 PERSPS. ON POL. 87, 87 (2016).

[213] *Program Linkage*, CAL. AIR RES. BD., https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/program-linkage (last visited Oct. 9, 2023).

[214] *Id.*

[215] Nathaniel Keohane et al., *Toward a Club of Carbon Markets*, 144 CLIMATIC CHANGE 81, 81 (2017).

the public and private sectors' efforts to decarbonize and create investment strategies must be supported by national governments. Clubs can offer members the opportunity to develop their own domestic policies, which will foster market integrity efforts.

Enhanced access to investment capital club membership can allow member nations to attract more low-carbon investment returns for emission reduction as part of the cap-and-trade program. Members can decide to provide institutional capacities for low-carbon investments and allow political leaders to strengthen climate action through export-import banks that allow private firms to access capital in other jurisdictions and prevent carbon leakages. In order to build a climate club, there needs to be enhanced recognition between members on the global front. This would allow members to strengthen and forge strategic and diplomatic alliances. To establish a club, principles should be developed around the interaction between regional partners will allow credible economic transactions and negotiations and will facilitate the creation of markets, incentivizing other countries to join clubs.

The Montreal Protocol[216] exemplifies how only members of the agreement are able to trade and adopt incentives. Non-members need to adopt adequate measures in order to enter the protocol. This is a policy climate clubs should consider as it would significantly strengthen market force and help monitor decarbonization efforts.[217] Public-good resources that can be shared between members make clubs successful. Members of a climate club that transition to a low-carbon energy system also unleash technologically innovative development by lowering the costs of renewable, storage, and grid management technologies. Member industries will likely result in knowledge spill-overs, and reports have said that "knowledge spill-overs from clean technology innovation are especially high."[218]

Incentives are useful when they benefit member countries and motivate other countries to join. An approach that can be considered is a uniform tariff on all imports from non-club countries into the club.[219] A climate club structure indicates the importance of cooperation between countries, from

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[216] Montreal Protocol on Substances that Deplete the Ozone Layer, Sept. 16, 1987, 26 I.L.M. 1541 [hereinafter Montreal Protocol].

[217] Antoine Dechezleprêtre et al., *Knowledge Spillovers from Clean and Dirty Technologies*, (LSE Working Paper No. 135, 2014), https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2013/10/Working-Paper-135-Dechezlepretre-et-al_updateOct2017.pdf.

[218] Grantham Research Institute on Climate Change and the Environment, *International Climate Cooperation is Critical, But Not for the Reasons You Might Think*, LONDON SCH. ECONS. (July 16, 2015), https://www.lse.ac.uk/granthaminstitute/news/international-climate-cooperation-is-critical-but-not-for-the-reasons-you-might-think/.

[219] William Nordhaus, *Dynamic Climate Clubs: On the Effectiveness of Incentives in Global Climate Agreements*, PROC. NAT'L ACAD. SCI. (Nov. 5, 2021), https://www.pnas.org/doi/10.1073/pnas.2109988118.

state to non-state actors to democracies, autocracies, and theocracies, as a means of evolving the global climate on the basis of economic and trade rationale. This will help combine costs, benefits, challenges, and opportunities. Regulatory arrangements can be made to determine collective ambition and commitments that can be beneficial to both domestic policy and climate club negotiations.[220]

C. Functioning of the Club

There are motives, incentives, and obligations that must be met to set up a climate club. This means that clearly established rules are required. For instance, climate treaties such as the Gothenburg Protocol have included emission limits on pollutants.[221] Another significant treaty is the Convention on Long-Range Trans-boundary Air Pollution (LRTAP),[222] which requires countries to report emission levels and uses technology to assess how those emissions travel in the air and what ecosystems they encounter or impact.[223] Such treaties can act as stepping stones to widen the focus from carbon prices to emissions and gases. This can also be applied to climate clubs through bargaining countries' emission limits methodology.[224] Concrete measures may be adopted within the club, setting an international target carbon price to allow countries to use carbon tax mechanisms to achieve the price.[225]

Members of the club will be able to increase the emission reduction and use trade sanctions as a means of imposing import tariffs to punish non-

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[220] Fergus Green, *"This Time is Different": The Prospects for an Effective Climate Agreement in Paris 2015*, GRANTHAM RSCH. INST. ON CLIMATE CHANGE & THE ENV'T (Oct. 30, 2014), https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2014/10/This-Time-is-Different.pdf.

[221] Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-Level Ozone, Nov. 30, 1999, T.I.A.S. No. 13073, 2319 U.N.T.S. 80 (stating that the objective is to mobilize the efforts of the Parties to control pollution through agriculture sources in wider nitrogen cycles in means to have an integrated approach for obtaining multiple co-benefits to nitrogen management).

[222] Convention on Long-Range Transboundary Air Pollution, Mar. 16, 1983, 1302 U.N.T.S. 217; For more information, *see* UNITED STATES DEPARTMENT OF STATE, CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION https://www.state.gov/key-topics-office-of-environmental-quality-and-transboundary-issues/convention-on-long-range-transboundary-air-pollution/ (describing the LRTAP's history internationally and in the United States).

[223] Sabrina Shankman, *The Most Important Climate Treaty You've Never Heard Of*, INSIDE CLIMATE NEWS (Apr. 11, 2018), https://insideclimatenews.org/news/11042018/climate-treaty-gothenburg-protocol-air-pollution-regulations-global-warming-science-black-carbon-lrtap/.

[224] Gernot Wagner & Martin L. Weitzman, *Climate Shock: Why Environmental Action Is So Hard*, Foreign Affairs (Apr. 27, 2015), https://www.foreignaffairs.com/world/climate-shock

[225] *Id.*

member countries that have not approved to take climate action that they are trading with. There is an economic rationale for trading. Trade effect, where one country wins and another loses, creates incentives for countries to join the club and raise their emission reduction rate to avoid sanctions or tariff impositions as a means of positive reinforcement strategies.[226] As mentioned earlier, the club structure can function to retain incentives by penalizing non-participants, indicating a means to make sure countries that wish to participate abide by agreements. Without penalties, it is likely that this model will prove ineffective.[227]

Academic literature has analyzed the effectiveness and downsides of climate clubs in multilateral arrangements.[228] The results show that having a club with strong abatement policies and trade sanctions on non-participants and participants who do not adhere to the obligations provide greater benefits for members. The combined result provides incentives for countries to join in.[229]

1. Perspectives of Market Players

The complexity of trade and the emergence of markets have demonstrated the need to establish new systems and linkages between the two. Trading systems are becoming populated by new market players who are creating their own passages independent of their domestic governments as means of incentivizing investors to enter the arena. This, however, depends on the jurisdictions and the political will of the legislation to allow for trade to be moved freely or be governed by different quotas and exchange rates. This becomes a complex situation when aspects of climate change and emissions come into the picture. The concentration of firms in a given market and the extent of government regulations for developing standards for carbon pricing for different market players may have an effect on the trade exposure.

With the inception of climate clubs, the key aspect of the interlinking between market players and climate policy will be to explore how much exposure a given industry, sector, or firm has on world markets and how much emissions they induce. If countries collectively, through climate clubs, introduce a price for global greenhouse gas emissions on potential market players, then the competition mechanism of the emissions trading system (ETS) may likely change for sectors that have been carbon constrained and those that have not. This means that energy-intensive firms and industries will

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[226] Geoffrey Heal & Howard Kunreuther, *Tipping Climate Negotiations* (Nat'l. Bureau of Econ. Rsch., Working Paper No. 16954, 2011).
[227] David Roberts, *The Paris Climate Agreement is at Risk of Falling Apart in the 2020s*, VOX (Nov. 5, 2019), https://www.vox.com/energy-and-environment/2019/11/5/20947289/paris-climate-agreement-2020s-breakdown-trump.
[228] Leal-Arcas, *supra* note 129.
[229] *Id.*

prefer to relocate to countries that have a considerably less-stringent climate policy.[230]

2. The Carbon-Leakage Problem

International market shares of exports and imports, specifically from the private sector, may be enhanced through non-carbon-constrained producers who may want to be associated with a climate club. This would create incentives for members to source intensive inputs from unconstrained regions vulnerable to carbon leakage, especially as seen in metal laden industries like aluminum or steel. The IPCC report of 2007 defines climate leakage as an increase in "CO2 emissions outside the countries taking domestic mitigation action divided by the reduction in the emissions of these countries."[231] With certain developed countries intending to negotiate climate clubs, the question of the relocation of firms in their countries to developing countries arises.

In a 2017 Carbon Disclosure Project (CDP) report, findings have suggested that market actors are not confident that carbon price signals from governments can be achieved in the short term.[232] National governments can combat climate change by implementing effective policies that impose a financial burden on carbon pollution. This can be achieved through regulations, emissions trading systems (ETS), or taxation, resulting in reduced carbon emissions and a significant step towards mitigating the impacts of climate change. However, gaps exist within different price levels, which may not be enough to incentivize low-carbon investments.[233] This brings us to the need to promote fair and unbiased competition among market players on a global-scale, resulting in more stringent regulatory reductions. A subsequent decline in industrial activity and emissions rate in developed countries may cause a stark increase in the emissions rate and the relocation of industries in developing countries where those stringent regulations do not exist. Several scholars have noted that lax environmental standards of developing nations lead them to later adopt protectionist policies for their sectors, hampering international trade.[234]

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[230] Julia Reinaud, *Trade, Competitiveness and Carbon Leakage: Challenges and Opportunities* (Energy, Env't and Dev. Programme Working Paper 9/01, 2009).
[231] *Carbon Leakage*, IPCC FOURTH ASSESSMENT REPORT: CLIMATE CHANGE 2007 (2007), https://archive.ipcc.ch/publications_and_data/ar4/wg3/en/ch11s11-7-2.html.
[232] CARBON DISCLOSURE PROJECT, CARBON PRICING CORRIDORS (2017), https://cdn.cdp.net/cdp-production/cms/reports/documents/000/002/112/original/Carbon-Pricing-Corridors-the-market-view.pdf?1495638527.
[233] Smita B. Brunnermeier & Arik Levinson, *Examining the Evidence on Environmental Regulations and Industry Location*, 13 J. ENV'T & DEV. 6, 6 (2004).
[234] Nora Wissner & Martin Cames *Briefing on the Proposal to Integrate Maritime Transport in the EU ETS Study for the Air Pollution and Climate Secretariat (AirClim) and the Life ETX Consortium*, OEKO-INSTITUT (Oct. 6, 2020),

Analyzing carbon leakage on a national level usually involves an aggregate of sectors that emit GHG, potentially contributing to the economy, and the costs involved in mitigating climate change. If a climate club were to consist of developed and developing members, it would be difficult to map out the carbon leakage from activities by different market players. A potential tool to use is a carbon leakage list comprised of potential club members that would be deemed at high risk of shifting activities in response to regulations by the EU Commission.[235] In addition, pricing carbon emissions through energy taxes and energy-efficiency trading schemes may not negate the economic impact of a given price for countries that remain heavily dependent on the same.[236]

The relationship between countries that are dependent on each other for trade makes it difficult to lower energy prices, resulting in a disproportional equilibrium for nations that have a high consumption rate of energy and higher emissions.[237] In addition, there is a lack of data, indicating that several companies continue to hesitate about making complete disclosures for transparency and accountability. For instance, in 2021 the CDP invited a number of companies located in India to discuss their emissions.[238] Few came forward and the ones that did have a long road ahead to make progress in lowering emissions.[239]

The big idea is to allow industries in countries within the climate club to catch up on the decarbonization timeline and use this to motivate the growth of the club into a larger establishment through domestic legislation or tariffs as a means to influence investments for countries and market players. In contrast, the Porter hypothesis previously suggested that environmental regulation can lead to drastic improvements in competitiveness and decrease

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https://www.oeko.de/fileadmin/oekodoc/Oeko-Institut_2022_ETS-shipping-briefing_paper.pdf.

[235] Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, 2003 O.J. (L 275/32).

[236] Simon Black et al., *More Countries Are Pricing Carbon, But Emissions Are Still Too Cheap*, IMF BLOG (July 21, 2022), https://www.imf.org/en/Blogs/Articles/2022/07/21/blog-more-countries-are-pricing-carbon-but-emissions-are-still-too-cheap.

[237] H. Ron Chan et al., *Energy Prices and International Trade Incorporating Input-Output Linkages* (World Bank Grp. Pol'y Rsch., Working Paper No. 8076).

[238] CDP INDIA DISCLOSURE REPORT 2021, DISCLOSURE: IMPERATIVE FOR A SUSTAINABLE INDIA 1, 12 (2021), https://www.cdp.net/en/reports/downloads/6164#:~:text=disclosures%20to%20CDP&text=In%202021%2C%2088%20Indian%20companies,compared%20to%20the%20year%202020.

[239] *Id.* at 2.

the global emission rate.[240] This would be useful if low-carbon technologies allowed themselves to become the most cost-effective production method for firms in regions that have adopted stringent climate action policies. This would help them gain an international share resulting in decreased leakage.[241] This approach emphasizes that in order to establish a climate club, there needs to be consensus between national-led policies focusing on the industrial and private sectors and civil society, mostly under the umbrella framework of a global-led approach. Therefore, harmonization and stringent climate strategies require agreements on carbon pricing and the coordination of national policies between the members of a potential climate club. The coordinated policies can act in accordance with the trading partners to assess the market rules for trade and net-zero emission. This requires market-based instruments and technology policies that can help the club members meet the global climate targets.

V. CONCLUSION

Solving climate change is not just an economic and political issue. It involves aspects of trade that require us to consider the limitations of multilateral efforts. Present-day arguments require capacity developments for implementing effective climate actions with policies that include small coalitions of powerful nations that can work towards lowering the emissions rate on a global policy level.[242] Cooperative efforts between member countries of a club need to include non-discriminatory and compliant procedures with the WTO principles for the establishment of a climate-club consensus. Gains procured from strong mitigation measures can outweigh the tariff losses, indicating the importance of balancing the obligations and benefits of a climate club. Establishing a climate club relative to international treaties in adherence to trade routes acts as an effective proposal for decarbonization efforts on a global and regional level.

Let us now turn to the exploration of the concept of a climate club linked to the international trade regime in order to propose a strategy for its implementation within the G20 framework.

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[240] Stefan Ambec et al., *The Porter Hypothesis at 20: Can Environmental Regulation Enhance Innovation and Competitiveness?* (Resources for the Future, Discussion Paper No. 11-01, 2013).
[241] Brewer, *supra* note 162.
[242] OECD, *Institutional Capacity and Climate Actions*, OECD Doc. COM/ENV/EPOC/IEA/SLT 1, 20 (Nov. 2003) (prepared by Stéphane Willems & Kevin Baumert), available at http://www.iea.org/work/2004/cop10/aixg/institutional_capacity.pdf.

2. CLIMATE CLUBS AND INTERNATIONAL TRADE: A PROPOSAL FOR THE G20 AND SAUDI ARABIA[243]

I. INTRODUCTION

Climate change is one of the most pressing issues the world faces today. It poses significant risk to the environment,[244] human health,[245] food security,[246] and economic development.[247] According to the Intergovernmental Panel on Climate Change (IPCC), global warming is likely to reach 1.5°C above pre-industrial levels unless drastic actions are taken to reduce greenhouse gas emissions.[248]

One of the main drivers of climate change is the global trade system, which accounts for about a quarter of global carbon dioxide emissions.[249] Trade liberalization has enabled the expansion of production and consumption across borders, but it has also contributed to the increase of carbon-intensive goods and services.[250] Moreover, trade rules and agreements often create obstacles for countries to implement effective climate policies, such as carbon taxes, subsidies, or standards.[251]

Therefore, it is imperative to address climate change through international trade, creating incentives for countries to cooperate on reducing emissions and promoting low-carbon technologies. One possible way to achieve this is by forming a climate club linked to the international trade regime. A climate club

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[243] This section was written by Nizar AlMilli, Mishael AlSaif, Faisal AlHelal, Ahmed Albalbisi, and Fawaz AlQahtani.

[244] Recommendation: *Causes and Effects of Climate Change*, U.N., https://www.un.org/en/climatechange/science/causes-effects-climate-change (last visited Oct. 10, 2023).

[245] Recommendation: *Climate Change and Health*, WHO (Oct. 30, 2021), https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health.

[246] *What You Need to Know About Food Security and Climate Change*, THE WORLD BANK (Oct. 17, 2022), https://www.worldbank.org/en/news/feature/2022/10/17/what-you-need-to-know-about-food-security-and-climate-change.

[247] Laurence Chandy, *Economic Development in an Era of Climate Change*, CARNEGIE ENDOWMENT FOR INT'L PEACE (Jan. 4, 2023), https://carnegieendowment.org/2023/01/04/economic-development-in-era-of-climate-change-pub-88690#:~:text=Recent%20research%2C%20focusing%20specifically%20on,crime%2C%20unrest%2C%20and%20conflict.

[248] *Global Warming of 1.5°C*, IPCC (2018), https://www.ipcc.ch/sr15/.

[249] Glen P. Peters et al., *Growth in Emission Transfers via International Trade From 1990 to 2008*, 108 PROC. NAT'L ACAD. SCI. 8903, 8903 (May 24, 2011).

[250] *See generally* Rafael Leal-Arcas et al., *The Contribution of Free Trade Agreements and Bilateral Investment Treaties to a Sustainable Future*, 23 Zeitschrift für Europarechtliche Studien—ZeuS 3 (2019).

[251] CARBON PRICING LEADERSHIP COALITION, REPORT ON THE HIGH-LEVEL COMMISSION ON CARBON PRICES 1 (Joseph E. Stiglitz et al., 2017).

is a group of countries that agree to coordinate their climate policies and actions and impose sanctions or penalties on non-members who do not comply with their standards.[252] By linking the climate club to the trade regime, countries can leverage their market power and influence to induce other countries to join the club and adopt more ambitious climate measures. What follows is an analysis of how trade and climate change can work better together. We focus on the European Union and the Gulf Cooperation Council, specifically on Saudi Arabia.

II. BACKGROUND AND CONTEXT

A. The Role of the G20 in Global Climate Change Mitigation

The G20 was established in 1999 as a forum for dialogue and cooperation between major economies on issues related to global economic stability and growth.[253] Since then, the G20 has expanded its agenda to include various topics of global significance, such as development, financial regulation, energy, health, and climate change.[254]

The G20 has recognized the urgency and importance of addressing climate change as a key challenge for sustainable development and human well-being.[255] The G20 has endorsed the Paris Agreement on Climate Change, which aims to limit the global temperature rise to well below 2°C above pre-industrial levels, and pursue efforts to limit it to 1.5°C.[256] The G20 has also committed to implement their nationally determined contributions (NDCs) under the Paris Agreement, which outline their voluntary targets and actions to reduce emissions and adapt to climate impacts.[257]

However, the G20's efforts to tackle climate change have been insufficient and inconsistent.[258] According to the 2020 Climate Transparency Report, the G20 countries are not on track to meet their NDCs, let alone the Paris Agreement goals.[259] The report estimates that the G20's current policies

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[252] Nordhaus, supra note 24.
[253] *About G20*, G20, https://www.g20.org/en/about-g20/ (last visited Oct. 10, 2023).
[254] *Id.*
[255] *Id.*
[256] Oliver Milman, *G20 Leaders' Statement on Climate Change Highlights Right with the US*, THE GUARDIAN (July 8, 2017), https://www.theguardian.com/world/2017/jul/08/g20-climate-change-leaders-statement-paris-agreement.
[257] Ivana Kottasova, *Not a Single G20 Country is in Line with the Paris Agreement on Climate, Analysis Shows*, CNN (Sept. 16, 2021), https://www.cnn.com/2021/09/15/world/climate-pledges-insufficient-cat-intl/index.html.
[258] *Id.*
[259] *Climate Transparency Report: Comparing G20 Climate Action and Responses to the COVID-19 Crisis* at 52, CLIMATE TRANSPARENCY (2020), https://www.climate-transparency.org/g20-climate-performance/the-climate-transparency-report-2020#:~:text=The%20Climate%20Transparency%20Report%20identifies,Paris%20goals

will lead to a global temperature rise of 2.7°C by 2100, which would have devastating consequences for people and nature.[260] Moreover, the report finds that the G20's recovery plans from the COVID-19 pandemic have largely ignored the opportunity to invest in green recovery measures, such as renewable energy, energy efficiency, or low-carbon transport.[261] Instead, the G20 countries have allocated more funds to support fossil fuels than clean energy.[262]

Therefore, there is an urgent need for the G20 to enhance its ambition and action on climate change. It must align its policies and investments with the Paris Agreement objectives. One way to do this is by forming a climate club linked to the international trade regime, which can create incentives for cooperation and compliance among countries.

B. Overview of Mission Innovation and its Objectives

Mission Innovation (MI)[263] is a global initiative launched by 20 countries at COP21 in Paris in 2015, with the aim of accelerating clean energy innovation. MI members have committed to double their public investment in clean-energy research and development (R&D) over five years and collaborate on innovation challenges in areas such as smart grids, off-grid access, carbon capture, sustainable biofuels, clean hydrogen, and cooling.[264]

The objectives of MI are:

- To increase public investment in clean energy R&D by at least $30 billion per year by 2021;
- To stimulate private sector investment in clean energy innovation by creating market opportunities;
- To foster international collaboration on innovation challenges that address common goals;
- To enhance public awareness and engagement on clean energy innovation; and
- To support capacity building and technology transfer among countries.[265]

MI operates through three main mechanisms:

%20and%20the%20SDGs.%E2%80%9D&text=%E2%80%9CClimate%20crisis%20is%20already%20here,or%20there%20is%20no%20future.

[260] *Id.* at 22.

[261] *Id.* at 15.

[262] Ajit Niranjan, *G20 Poured More Than $1tn into Fossil Fuel Subsidies Despite COP26 Pledges – Report*, THE GUARDIAN (Aug. 23, 2023), https://www.theguardian.com/environment/2023/aug/23/g20-poured-more-than-1tn-on-fossil-fuel-subsidies-despite-cop26-pledges-report.

[263] MISSION INNOVATION, http://mission-innovation.net/ (last visited Oct. 10, 2023).

[264] *Id.*

[265] *Id.*

- Innovation Challenges: These are collaborative projects that focus on specific technology areas or sectors that have high potential for reducing emissions or increasing access to clean energy. There are currently eight active innovation challenges led by different MI members;
- MI Champions: These are individuals who have made significant contributions or achievements in advancing clean energy innovation in their countries or regions. They act as ambassadors for MI and inspire others to join or support MI activities; and
- MI Solutions: These are online platforms that showcase innovative solutions or best practices from MI members or partners that can help accelerate clean energy transitions.[266]

MI holds annual ministerial meetings where members report on their progress and announce new initiatives or partnerships.[267] The sixth MI ministerial meeting was held virtually in June 2021.[268] The meeting focused on three themes: public-private collaboration, green hydrogen, and Mission Innovation 2.0.[269] Mission Innovation 2.0 is a new phase of MI that was launched at the meeting with an updated vision and mission statement:

Vision: A prosperous world powered by affordable clean energy solutions available everywhere.

Mission: To accelerate clean energy transitions through innovation by mobilizing public-private action and investment at scale.[270]

Mission Innovation 2.0 also introduced three new elements:

- Missions: These are ambitious goals that aim to deliver impact at scale by addressing system-level challenges or opportunities related to clean energy transitions. There are currently four missions proposed by MI members: green hydrogen; shipping; carbon dioxide removal; and resilient power systems;
- Platforms: These are mechanisms that enable cross-cutting collaboration among MI members and stakeholders on common enablers or barriers for clean energy innovation. There are currently three platforms proposed by MI members: innovation ecosystems; public-private partnerships; and regulatory sandboxes; and
- Members' Framework: This is a set of principles and guidelines that define MI members' commitments and expectations regarding their participation and contribution in MI activities. [271]

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[266] *Id.*
[267] Mission Innovation, *Outcomes Report* (2021), http://mission-innovation.net/wp-content/uploads/2021/09/mi6_report-5.pdf.
[268] *Id.*
[269] *Id.* at 12.
[270] *Id.*
[271] *Id.*

Mission Innovation 2.0 aims to align with other global initiatives and processes related to clean energy innovation and transitions, such as the Clean Energy Ministerial, the UN High-level Dialogue on Energy, the COP26, and the UN Decade of Action on Sustainable Development Goals.[272]

C. Saudi Arabia's Involvement in Mission Innovation and Breakthrough Energy

Saudi Arabia is one of the founding members of Mission Innovation and has been actively involved in its activities and initiatives.[273] Saudi Arabia has committed to increase its public investment in clean-energy R&D by 150% by 2021, from $72 million in 2016 to $180 million in 2021.[274] Saudi Arabia has participated in several innovation challenges, such as smart grids,[275] carbon capture,[276] sustainable biofuels,[277] and clean hydrogen.[278] Saudi Arabia has also hosted and co-hosted various MI events and workshops, such as the MI-4 ministerial meeting in 2019, the MI regional workshop on innovation ecosystems in 2018, and the MI regional workshop on carbon capture in 2017.[279]

In addition to its involvement in MI, Saudi Arabia has also joined Breakthrough Energy,[280] a global initiative launched by Bill Gates and other philanthropists and investors to support clean energy innovation and entrepreneurship. Breakthrough Energy aims to bridge the gap between public R&D and private sector deployment of clean energy solutions by providing funding, expertise, and market access to promising innovators and entrepreneurs.[281] Breakthrough Energy operates through four main mechanisms:

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[272] *Id.*
[273] *See Five Year Anniversary,* MISSION INNOVATION (Nov. 30, 2020), http://mission-innovation.net/wp-content/uploads/2020/11/000.-MI-Anniversary-Special-Edition-Newsletter.pdf (summary of Mission Innovation's activities).
[274] *Id.*
[275] Kuo-Chi Chang et al., *Barriers and Challenges to Smart Grid Technology Development in the Kingdom of Saudi Arabia (KSA)*, 1377 INT'L CONF. ON A.I. & COMPUT. VISION 193, 193 (May 29, 2021).
[276] Rawan Radwan, *How Saudi Arabia Could Become a Leader in Carbon Capture on the Road to Net-zero Emissions*, ARAB NEWS (Mar. 1, 2021), https://www.arabnews.com/node/2260031/saudi-arabia.
[277] Andrew Welfle & Ali Alawadhi, *Bioenergy Opportunities, Barriers and Challenges in the Arabian Peninsula – Resource Modelling, Surveys & Interviews*, 150 BIOMASS & BIOENERGY 106083 (July 2021).
[278] Qusay Hassan et al., *Energy Futures and Green Hydrogen Production: Is Saudi Arabia Trend?*, 18 RESULTS IN ENG'G 101165 (June 2023).
[279] *Supra* note 267.
[280] BREAKTHROUGH ENERGY, https://breakthroughenergy.org/ (last visited Oct. 10, 2023).
[281] *Breakthrough Energy Champions Coalitions to Accelerate the Clean Energy Transition in Europe*, BREAKTHROUGH ENERGY (Nov. 10, 2022),

- Breakthrough Energy Ventures: This is a $1 billion fund that invests in early-stage companies that have the potential to deliver significant reductions in greenhouse gas emissions across various sectors, such as electricity,[282] transportation, agriculture, and manufacturing;[283]
- Breakthrough Energy Catalyst:[284] This is a program that mobilizes public and private capital to scale up the deployment of clean energy technologies that face high costs or risks, such as green hydrogen, direct air capture, long-duration energy storage, and sustainable aviation fuels;
- Breakthrough Energy Fellows: This is a network of experts and leaders who provide mentorship, guidance, and connections to clean energy innovators and entrepreneurs;[285]
- Breakthrough Energy Solutions: This is a platform that connects innovators and entrepreneurs with customers and partners who can help them test and demonstrate their solutions in real-world settings.[286]

Saudi Arabia joined Breakthrough Energy in 2020 as part of its G20 presidential agenda.[287] Saudi Arabia has committed to invest $2 billion in Breakthrough Energy Ventures over five years, making it the largest investor in the fund. Saudi Arabia has also pledged to support Breakthrough Energy Catalyst by providing co-funding and hosting demonstration projects for clean energy technologies.[288] Moreover, Saudi Arabia has expressed its interest in

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https://breakthroughenergy.org/news/breakthrough-energy-champions-coalitions-to-accelerate-the-clean-energy-transition-in-europe/.

[282] *See* RAFAEL LEAL-ARCAS ET AL., ELECTRICITY DECENTRALIZATION IN THE EUROPEAN UNION: TOWARDS ZERO CARBON AND ENERGY TRANSITION (ELSEVIER, 2nd ed. 2023) (on the specific case of electricity).

[283] *Breakthrough Energy Ventures*, BREAKTHROUGH ENERGY, https://breakthroughenergy.org/our-work/breakthrough-energy-ventures/ (last visited Oct. 10, 2023).

[284] *Breakthrough Energy Catalyst*, BREAKTHROUGH ENERGY, https://breakthroughenergy.org/our-work/catalyst/ (last visited Oct. 10, 2023).

[285] *Breakthrough Energy Fellows*, BREAKTHROUGH ENERGY, https://breakthroughenergy.org/our-work/fellows/ (last visited Oct. 10, 2023).

[286] *See generally State of the Transition 2023: Accelerating the Clean Industrial Revolution*, BREAKTHROUGH ENERGY, https://transition.breakthroughenergy.org/ (last visited Oct. 10, 2023)

[287] Joumana Saad & Nadeshda Zareen, *Saudi Arabia Joins Global Drive to Double Clean Energy Investment*, ARGAAM (Jan. 12, 2015), https://www.argaam.com/en/article/articledetail/id/398450.

[288] See Lilliestam, Johan, et al., *The Effect of Carbon Pricing on Technological Change for Full Energy Decarbonization: A Review of Empirical ex-post Evidence*, 11 WILEY INTERDISC. REVS.: CLIMATE CHANGE (2020), https://doi.org/10.1002/wcc.681.

collaborating with Breakthrough Energy on innovation challenges related to green hydrogen and carbon dioxide removal.[289]

By joining MI and Breakthrough Energy, Saudi Arabia has demonstrated its leadership and commitment to advancing clean energy innovation at the global level. Saudi Arabia has also positioned itself as a key partner for other countries who share its vision and goals for a low-carbon future.

D. The Importance of South-South Collaboration

South-South collaboration is a term that refers to the exchange of resources, knowledge, technology, or experience among developing countries or regions in the Global South.[290] South-South collaboration can take various forms, such as bilateral or multilateral agreements, regional or interregional cooperation, networks or platforms, or public-private partnerships.[291]

South-South collaboration, we posit, can play an important role in addressing climate change and promoting clean energy transitions for several reasons:

- South-South collaboration can foster mutual learning and capacity building among countries that face similar challenges or opportunities related to climate change and energy access. For example, countries that have abundant renewable energy resources can share their best practices and lessons learned on how to harness them effectively and efficiently;
- South-South collaboration can facilitate technology transfer and innovation diffusion among countries that have complementary needs and capabilities in clean energy development. For example, countries that have advanced technologies or innovations can offer them to other countries at affordable prices or with favorable terms;
- South-South collaboration can enhance market access and trade opportunities among countries that have compatible policies and standards for clean energy products or services. For example, countries that have implemented carbon taxes or subsidies can create preferential trade arrangements or agreements with other countries that have done the same;

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[289] Bart Boesmans, *Innovation Shapes the Future of Clean Energy*, ARAB NEWS (Nov. 21, 2023), https://www.arabnews.com/node/2412801.

[290] Recommendation: *What is 'South-South Cooperation' and Why Does It Matter*, U.N. (Mar. 20, 2019), https://www.un.org/development/desa/en/news/intergovernmental-coordination/south-south-cooperation-2019.html.

[291] *International Day for South-South Cooperation, 12 September*, U.N., https://www.un.org/en/observances/south-south-cooperation-day#:~:text=South%2DSouth%20cooperation%20is%20done,regional%2C%20intraregional%20or%20interregional%20basis (last visited Oct. 10, 2023).

- South-South collaboration can strengthen political solidarity and collective action among countries that have common interests or aspirations for climate change mitigation and adaptation. For example, countries that are vulnerable to climate impacts or have high mitigation potential can form coalitions or alliances to advocate for their rights and responsibilities in global climate negotiations.

Therefore, South-South collaboration can complement and supplement North-South cooperation,[292] which refers to the assistance or support provided by developed countries or regions in the Global North to developing countries or regions in the Global South.[293] While North-South cooperation is still essential and valuable, South-South collaboration can offer more flexibility, diversity, and ownership for developing countries to pursue their own pathways and solutions for clean energy transitions.[294]

III. CLIMATE CLUB AND INTERNATIONAL TRADE REGIME

A. Definition and Objectives of a Climate Club

A climate club is a concept proposed by Nobel laureate economist William Nordhaus in 2015 as a way to overcome the free-rider problem that plagues global climate cooperation.[295] The free-rider problem refers to the situation where countries have an incentive to enjoy the benefits of collective action on climate change without contributing to the costs or efforts.[296] This leads to a suboptimal outcome where countries underinvest in emission reduction and adaptation measures, resulting in higher global warming and damages.[297]

A climate club is defined as a group of countries that agree to coordinate their climate policies and actions and impose sanctions or penalties on non-members who do not comply with their standards.[298] The sanctions or penalties can take various forms, such as tariffs, quotas, bans, or fines.[299] The main objective of a climate club is to create incentives for countries to join

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[292] *Unlocking the Potential of South-South Cooperation: Policy Recommendations from the Task Team on South-South Cooperation*, Task Team on South-South Cooperation 00 (July 2011), https://www.oecd.org/dac/effectiveness/TT-SSC%20Policy%20Recommendations.pdf [hereinafter *South-South Potential*].
[293] *What is 'South-South cooperation' and Why Does It Matter?*, U.N. (Mar. 20, 2019), https://www.un.org/development/desa/en/news/intergovernmental-coordination/south-south-cooperation-2019.html.
[294] *South-South Potential*, *supra* note 292, at 7.
[295] Nordhaus, supra note 24, at 1341.
[296] *Id.* at 1339.
[297] *Id.* at 1339-1340.
[298] *Id.* at 1341.
[299] *Id.*

the club and adopt more ambitious climate measures, by making the benefits of membership outweigh the costs of non-membership.[300]

According to Nordhaus, a climate club can be designed based on four parameters:[301]

- The emission target: This is the level of emission reduction that the club members agree to achieve collectively or individually;
- The carbon price: This is the price that the club members agree to impose on their carbon emissions, either through a tax or a cap-and-trade system;
- The membership fee: This is the amount that the club members agree to pay to join the club or remain in the club;
- The trade penalty: This is the rate of tariff that the club members agree to impose on the imports from non-members who do not meet the club's emission target or carbon price.

Nordhaus suggests that an optimal climate club would have an emission target of 50% below 2015 levels by 2050, a carbon price of $50 per ton of carbon dioxide, a membership fee of zero, and a trade penalty of 4%.[302] He argues that such a club would attract a large number of countries to join and achieve a high level of global emission reduction.[303]

However, some scholars have criticized or modified Nordhaus's proposal based on various considerations, such as political feasibility, legal compatibility, distributional equity, or environmental effectiveness. For example, some scholars have argued that a trade penalty may not be compatible with the rules and principles of the World Trade Organization (WTO), which regulates international trade and prohibits discrimination among its members.[304] Others have suggested that a trade penalty may not be effective in inducing countries to join the club or comply with its standards, especially if they have low trade dependence or strong political resistance. Moreover, some scholars have pointed out that a trade penalty may have negative impacts on global welfare, trade flows, or development prospects, especially for poor or vulnerable countries.[305]

Therefore, some scholars have proposed alternative forms of sanctions or penalties, such as quotas, bans, fines, subsidies, standards, or labels. Some scholars have also proposed different ways of setting or adjusting the emission target, carbon price, membership fee, or trade penalty based on various criteria

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[300] *Id.*
[301] *Id.* at 1340.
[302] *Id*. at 1361.
[303] *Id.*
[304] *See* LEAL-ARCAS, *supra* note 31.
[305] Özgür Özdamar & Evgeniia Shahin, Consequences of Economic Sanctions: The State of the Art and Paths Forward, 23 INT'L STUD. R. 1646, 1646 (June 22, 2021).

or mechanisms, such as equity principles, dynamic incentives, bargaining power, or voting rules.

A. Potential Benefits of Linking Climate Club to the International Trade Regime

The international trade regime refers to a set of rules and institutions that govern international trade and economic relations among countries.[306] The main institution of the international trade regime is the WTO, which was established in 1995 as a successor to the General Agreement on Tariffs and Trade (GATT).[307] The WTO has 164 members and covers about 98% of global trade[308]. Three of the WTO's main functions are:

- to provide a forum for negotiation and consultation on trade issues and agreements;
- to administer and enforce trade rules and agreements through dispute settlement and monitoring mechanisms; and
- to cooperate with other international organizations and stakeholders on trade-related matters.[309]

The international trade regime has an important role in addressing climate change, as it can influence the production, consumption, and exchange of goods and services that affect or are affected by greenhouse gas emissions and climate impacts.[310] However, the international trade regime also faces several challenges and tensions in dealing with climate change, such as:

- The lack of coherence and coordination between trade rules and agreements as well as climate policies and agreements;
- The potential conflicts or disputes between countries over trade measures related to climate change, such as border carbon adjustments, environmental subsidies, or technical standards; and
- The distributional impacts and equity implications of trade liberalization and climate action on different countries, regions, or sectors.

Therefore, linking a climate club to the international trade regime can offer some potential benefits, such as:

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[306] Simon Lester, *The Role of the International Trade Regime in Global Governance*, 16 UCLA J. INT'L L. & FOREIGN AFFS. 209, 209 (2021).
[307] *WTO in Brief*, WTO, https://www.wto.org/english/thewto_e/whatis_e/inbrief_e/inbr_e.htm#:~:text=The%20World%20Trade%20Organization%20came,of%20the%20Second%20World%20War (last visited Oct. 10, 2023).
[308] *Id.*
[309] *Id.*
[310] *Trade and Climate Change*, WTO, https://www.wto.org/english/tratop_e/envir_e/climate_intro_e.htm (last visited Oct. 10, 2023).

- Creating synergies and complementarities between trade policies and climate policies, by aligning incentives and objectives;
- Enhancing legitimacy and credibility of climate action, by leveraging existing institutions and mechanisms;
- Expanding market access and opportunities for clean energy products and services, by reducing tariffs, barriers, or distortions;
- Fostering innovation and technology transfer in clean energy development, by facilitating cooperation and exchange among countries and stakeholders; and
- Promoting development and poverty reduction in developing countries, by providing support and assistance for their green transition.

However, linking a climate club to the international trade regime also entails some potential risks, such as:

- Provoking backlash or resistance from non-members or other stakeholders, by imposing sanctions or penalties;
- Undermining multilateralism or cooperation on global issues, by creating fragmentation or polarization;
- Compromising environmental effectiveness or integrity, by allowing loopholes or exceptions; and
- Exacerbating inequalities or injustices among countries, regions, or sectors, by creating winners or losers.

Therefore, linking a climate club to the international trade regime requires careful design, negotiation, and implementation, to balance the benefits and risks, and ensure the compatibility, feasibility, equity, and effectiveness of such an arrangement.

B. The Role of Innovation and Technology Transfer in Climate Change Mitigation

Innovation and technology transfer are essential for achieving climate change mitigation goals, as they can enable countries to reduce their emissions and increase their resilience to climate impacts. Innovation refers to the process of creating, developing, and applying new or improved products, processes, or services that can address existing or emerging problems or needs. Technology transfer refers to the process of transferring or exchanging knowledge, skills, equipment, or materials related to a specific technology among different actors or locations. Innovation and technology transfer can contribute to climate change mitigation in various ways, such as:

- Developing and deploying low-carbon technologies that can reduce the carbon intensity or footprint of various sectors, such as renewable energy, energy efficiency, carbon capture and storage, electric vehicles, or smart grids;

- Improving and adapting existing technologies that can enhance the performance or reliability of low-carbon solutions, such as batteries, inverters, sensors, or controllers;
- Creating and disseminating new business models or practices that can facilitate the adoption or diffusion of low-carbon technologies, such as leasing, franchising, crowdfunding, or peer-to-peer platforms; and
- Generating and sharing new knowledge or information that can support decision-making or policy-making on low-carbon transitions, such as data, analytics, indicators, or scenarios.

However, innovation and technology transfer also face several barriers and challenges in the context of climate change, such as:

- The lack of adequate or stable funding or financing for R&D or deployment of low-carbon technologies, especially in developing countries;
- The lack of appropriate or effective policies or regulations that can create a conducive environment or incentives for innovation and technology transfer, such as carbon pricing, subsidies, or standards;
- The lack of sufficient or relevant human capital or skills that can enable the development, use, or maintenance of low-carbon technologies, especially in developing countries;
- The lack of access or availability of low-carbon technologies, especially for remote, rural, or poor areas;
- The lack of trust or cooperation among different actors or stakeholders involved in innovation and technology transfer, such as governments, researchers, entrepreneurs, investors, or consumers; and
- The lack of protection or enforcement of intellectual property rights (IPRs) that can encourage innovation and technology transfer, or the lack of flexibility or balance of IPRs that can ensure affordability and accessibility of low-carbon technologies.[311]

Therefore, innovation and technology transfer require support and facilitation from various actors and institutions at different levels, such as:

- Governments: They can provide funding, policy, regulation, or infrastructure for innovation and technology transfer;
- International organizations: They can provide coordination, guidance, standards, or assistance for innovation and technology transfer;
- Research institutions: They can provide knowledge, expertise, training, or collaboration for innovation and technology transfer;

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[311] Minpeng Chen et al., *Climate Technology Transfer in BRI Era: Needs, Priorities, and Barriers from Receivers' Perspective*, 6 ECOSYSTEM HEALTH AND SUSTAINABILITY 1, 1 (2020).

- Private sector: They can provide investment, innovation, entrepreneurship, or market access for innovation and technology transfer; and
- Civil society: They can provide awareness, advocacy, participation, or feedback for innovation and technology transfer.

IV. POLICY, REGULATORY, AND LEGAL CHANGES

A. Analysis of Existing Policies, Regulations, and Agreements Related to Climate Change

There are various policies, regulations, and agreements that exist at national, regional, and international levels that are related to climate change and its interaction with trade and innovation. Some of these are:

- The Paris Agreement: This is the main international agreement on climate change, which was adopted in 2015 and entered into force in 2016. The Paris Agreement aims to limit the global temperature rise to well below 2°C above pre-industrial levels, and pursue efforts to limit it to 1.5°C. The Paris Agreement requires countries to submit their NDCs every five years, which outline their voluntary targets and actions to reduce emissions and adapt to climate impacts. The Paris Agreement also establishes a global stocktake every five years, which assesses the collective progress and ambition of countries. The Paris Agreement also provides a framework for cooperation on various aspects of climate action, such as finance, technology, capacity building, transparency, and adaptation;[312]
- The WTO: This is the main institution of the international trade regime, which regulates international trade and economic relations among countries.[313] The WTO has several agreements and rules that are relevant for climate change,[314] such as the Agreement on Subsidies and Countervailing Measures (ASCM), which disciplines the use of subsidies that affect trade;[315] the Agreement on Technical Barriers to Trade (TBT), which sets standards for technical regulations and conformity assessment procedures that affect

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[312] *The Paris Agreement*, U.N., https://www.un.org/en/climatechange/paris-agreement (last visited Oct. 10, 2023).
[313] *What is the WTO?*, WTO, https://www.wto.org/english/thewto_e/whatis_e/whatis_e.htm (last visited Oct. 10, 2023).
[314] *Overview*, WTO, https://www.wto.org/english/thewto_e/whatis_e/wto_dg_stat_e.htm (last visited Oct. 10, 2023).
[315] *Agreement on Subsidies and Countervailing Measures ("SCM Agreement")*, WTO, https://www.wto.org/english/tratop_e/scm_e/subs_e.htm (last visited Oct. 10, 2023) [hereinafter ASCM].

trade;[316] the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), which protects and enforces IPRs that affect trade;[317] and the General Agreement on Trade in Services (GATS), which covers trade in services that affect or are affected by climate change;[318]

- The UNFCCC Technology Mechanism: This is a mechanism established under the UN Framework Convention on Climate Change (UNFCCC), which is the parent treaty of the Paris Agreement. The Technology Mechanism aims to facilitate technology development and transfer for climate action among countries. The Technology Mechanism consists of two components: the Technology Executive Committee (TEC), which provides policy guidance and recommendations; and the Climate Technology Centre and Network (CTCN), which provides technical assistance and networking opportunities;[319]
- The Clean Energy Ministerial (CEM): This is a high-level global forum that brings together energy ministers and other stakeholders from 28 countries and the European Commission to promote clean energy policies and technologies. The CEM has several initiatives and campaigns that focus on specific areas or sectors of clean energy development, such as electric vehicles, energy efficiency, renewable energy, or hydrogen;[320] and
- The Regional Comprehensive Economic Partnership (RCEP): This is a mega-regional trade agreement that was signed in 2020 by 15 countries in Asia-Pacific, including China, Japan, South Korea, Australia, New Zealand, and 10 ASEAN members. The RCEP covers about 30% of global GDP and trade, and aims to create a free trade area among its members. The RCEP has some provisions that are relevant for climate change, such as cooperation on environmental

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[316] *Technical Barriers to Trade*, WTO, https://www.wto.org/english/tratop_e/tbt_e/tbt_e.htm (last visited Oct. 10, 2023).
[317] *TRIPS – Trade-Related Aspects of Intellectual Property Rights*, WTO, https://www.wto.org/english/tratop_e/trips_e/trips_e.htm (last visited Oct. 10, 2023).
[318] General Agreement of Tariffs and Trade: Multilateral Trade Negotiations Final Act Embodying the Results of the Uruguay Round of Trade Negotiations, Annex 1B, General Agreement on Trade in Services, 33 I.L.M. 1125, 1168 (1994), available at http:// www.wto.org/english/docs e/legal e/final e.htm [hereinafter GATT].
[319] *Technology Mechanism*, UNFCCC, https://unfccc.int/ttclear/support/technology-mechanism.html (last visited Oct. 10, 2023).
[320] *Who We Are*, Clean Energy Ministerial, https://www.cleanenergyministerial.org/who-we-are/ (last visited Oct. 10, 2023).

issues, promotion of green growth, protection of IPRs, or facilitation of e-commerce.[321]

B. Identifying Necessary Changes to Policies, Regulations, and Laws

We argue that, in order to create and implement a climate club linked to the international trade regime, some changes may be necessary to existing policies, regulations, and laws at different levels. Some of these changes are:

- At the national level: Countries may need to revise or introduce new policies or regulations that can support their participation in the climate club, such as carbon pricing, emission standards, subsidies, or labels. Countries may also need to adjust their trade policies or regulations to comply with the club's standards or sanctions, such as tariffs, quotas, bans, or fines. Countries may also need to reform their legal systems to ensure the enforcement or dispute resolution of the club's rules or agreements;
- At the regional level: Regional organizations or groups may need to harmonize or coordinate their policies or regulations to align with the climate club's objectives or requirements, such as emission targets, carbon prices, membership fees, or trade penalties. Regional organizations or groups may also need to negotiate or amend their existing trade agreements to incorporate or accommodate the club's standards or sanctions; and
- At the international level: International organizations or institutions may need to modify or update their rules or agreements to enable or facilitate the formation or operation of the climate club, such as allowing exceptions or waivers for environmental purposes, recognizing carbon taxes or border adjustments as legitimate trade measures, or providing support or assistance for innovation and technology transfer.

C. Exploration of Incentives to Promote Innovation and Technology Transfer

Innovation and technology transfer are essential for achieving climate change mitigation goals, but several barriers and challenges exist. It is important to explore and provide incentives to promote innovation and technology transfer among countries, especially developing countries.

Some possible incentives are:

- Financial incentives: These include grants, loans, guarantees, tax credits, or prizes that can support R&D, deployment, or diffusion of low-carbon technologies;

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[321] Kate Whiting, *An Expert Explains: What is RCEP, the World's Biggest Trade Deal?* (May 18, 2023), https://www.weforum.org/agenda/2021/05/rcep-world-biggest-trade-deal/.

- Regulatory incentives: These include standards, certifications, labels, or mandates that can create demand or market access for low-carbon technologies;
- Institutional incentives: These include platforms, networks, partnerships, or alliances that can facilitate cooperation or exchange on innovation and technology transfer;
- Informational incentives: These include data, analytics, indicators, or scenarios that can inform decision-making or policy-making on innovation and technology transfer; and
- Behavioral incentives: These include nudges, framing, feedback, or social norms that can influence attitudes or actions on innovation and technology transfer.

D. Addressing Barriers and Obstacles to Effective Climate Club Implementation

Creating and implementing a climate club linked to the international trade regime is not an easy or straightforward task. It involves many complexities, uncertainties, and risks. Therefore, it is crucial to address the barriers and obstacles that may hinder the effectiveness of such an arrangement.

Some possible barriers are:

- Political barriers: These include lack of political will, leadership, or consensus among countries to join or comply with the climate club; resistance or opposition from non-members or other stakeholders to the club's standards or sanctions; conflicts or disputes among members or non-members over trade measures related to climate change;
- Economic barriers: These include lack of adequate or stable funding or financing for innovation and technology transfer; negative impacts or costs of trade sanctions on global welfare, trade flows, or development prospects; distributional effects or equity implications of trade liberalization and climate action on different countries, regions, or sectors;
- Technical barriers: These include lack of sufficient or relevant human capital or skills for innovation and technology transfer; lack of access or availability of low-carbon technologies, especially for remote, rural, or poor areas; lack of protection or enforcement of IPRs for innovation; lack of flexibility or balance of IPRs for technology transfer; and
- Legal barriers: These include lack of coherence or coordination between trade rules and agreements and climate policies and agreements; lack of compatibility or compliance of trade sanctions with WTO rules and principles; lack of enforcement or dispute resolution mechanisms for the club's rules or agreements.

V. CASE STUDIES AND LESSONS LEARNED

A. Examination of Previous Attempts at Climate Club Formation and their Outcomes

There have been several attempts and proposals to form climate clubs or similar initiatives in the past with varying degrees of success. Some examples are:

- The Kyoto Protocol: This was the first international agreement on climate change, which was adopted in 1997 and entered into force in 2005.[322] The Kyoto Protocol set binding emission targets for developed countries and flexible mechanisms for developing countries to participate in emission reduction or trading.[323] The Kyoto Protocol can be seen as a form of climate club that did not impose sanctions or penalties for noncompliance.[324] However, the Kyoto Protocol faced several challenges and limitations, such as low participation and ambition of countries, lack of enforcement and compliance of countries, and negative impacts on trade and development of countries;[325]
- The Asia-Pacific Partnership on Clean Development and Climate (APP): This was a voluntary initiative launched in 2006 by six countries: Australia, China, India, Japan, South Korea, and the United States.[326] The APP aimed to promote cooperation on clean energy development and technology transfer among its members, by creating public-private partnerships and sectoral task forces.[327] The APP can be seen as a form of climate club, as it offered benefits or incentives to its members such as access to new markets and technologies. However, the APP also faced several challenges and limitations, such as lack of funding and resources, lack of transparency and accountability, lack of environmental effectiveness

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[322] *What is the Kyoto Protocol*, UNFCCC, https://unfccc.int/kyoto_protocol (last visited Oct. 10, 2023).
[323] *Id.*
[324] Nordhaus, *supra* note 24, at 1362.
[325] Francesco Bassetti, *Success or Failure? The Kyoto Protocol's Troubled Legacy*, CLIMATE FORESIGHT (Dec. 8, 2022), https://www.climateforesight.eu/articles/success-or-failure-the-kyoto-protocols-troubled-legacy/#:~:text=The%20Kyoto%20Protocol%20had%20failed,mitigation%20as%20a%20costly%20punishmen.
[326] *Asia-Pacific Partnership for Clean Development and Climate*, INT'L ENERGY AGENCY, https://www.iea.org/policies/4319-asia-pacific-partnership-for-clean-development-and-climate (last updated Aug. 24, 2021).
[327] *Id.*

or impact, and lack of coherence or coordination with other global initiatives;[328]

- The Carbon Pricing Leadership Coalition (CPLC): This is a global initiative launched in 2015 by the World Bank and other partners to advance carbon pricing policies and practices among countries and stakeholders.[329] The CPLC aims to create a network or community of leaders and practitioners who support and implement carbon pricing in various forms, such as taxes, cap-and-trade systems, or fees. The CPLC can be seen as a form of climate club, as it provides benefits or incentives to its members, such as knowledge sharing, capacity building, advocacy, or recognition. However, the CPLC also faces some challenges and limitations, such as a lack of binding commitments or obligations, lack of harmonization or alignment of carbon prices, lack of protection or compensation for vulnerable groups, and lack of political support or acceptance.[330]

B. Identification of Successful Strategies and Factors Contributing to Failure

Based on the examination of previous attempts or proposals to form climate clubs or similar initiatives, some successful strategies and factors contributing to failure can be identified, such as:

- Successful strategies include:
  - building on existing platforms or institutions that have legitimacy and credibility among countries and stakeholders, such as the UNFCCC, the WTO, or the G20;
  - aligning with other global initiatives or processes that have common goals or interests related to climate change and trade, such as the Paris Agreement, the Clean Energy Ministerial, or the RCEP;
  - providing clear and measurable objectives and indicators that can demonstrate the impact or effectiveness of the climate club;
  - offering flexible and diverse options or mechanisms that can accommodate different needs or preferences of countries, such as emission targets, carbon prices, membership fees, or trade penalties; and
  - engaging with various actors or stakeholders that can support or influence the formation or implementation of the climate club,

[328] *Asia-Pacific Partnership for Clean Development and Climate*, INT'L ENERGY AGENCY, https://www.iea.org/policies/4319-asia-pacific-partnership-for-clean-development-and-climate (last updated Aug. 24, 2021).
[329] *Who We Are*, CARBON PRICING LEADERSHIP COAL., https://www.carbonpricingleadership.org/who-we-are (last visited Oct. 10, 2023).
[330] *Id.*

such as governments, international organizations, research institutions, private sector, civil society.

- Factors contributing to failure include:
  - ignoring or neglecting the rules or principles of the international trade regime that regulate trade measures related to climate change, such as non-discrimination, transparency, proportionality, or justification;
  - understanding or overlooking the political or economic resistance or opposition from non-members or other stakeholders to the club's standards or sanctions, such as national sovereignty, energy security, competitiveness, or development;
  - overestimating or overreaching the ambition or action of countries to join or comply with the climate club, such as emission targets, carbon prices, membership fees, or trade penalties;
  - failing to provide adequate or stable funding or financing for innovation and technology transfer, especially for developing countries; and
  - failing to ensure equity or justice among countries, regions, or sectors in terms of benefits or costs of trade liberalization and climate action.

C. Insights from the Gulf Cooperation Council-European Union Trade Relationship

The trade relationship between the Gulf Cooperation Council (GCC) and European Union (EU) is an example of a regional trade relationship that has some relevance for climate change and its interaction with trade and innovation. The GCC-EU trade relationship can provide some insights for creating and implementing a climate club linked to the international trade regime.

The GCC-EU trade relationship was established in 1988 through a Cooperation Agreement that covers various areas of cooperation, such as trade, investment, energy, environment, science, technology, education, culture, or security.[331] The GCC-EU trade relationship is characterized by high volume and value of trade flows, especially in energy products.[332] The EU is the GCC's largest trading partner, accounting for about 15% of its total

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[331] *Regional Cooperation and Economic Relations with other Countries and Groupings*, SECRETARIAT GEN. GULF COOP. COUNCIL, https://www.gcc-sg.org/en-us/CooperationAndAchievements/Achievements/RegionalCooperationandEconomicRelationswithotherCountriesandGroupings/Pages/NegotiationswiththeEU.aspx#:~:text=The%20Supreme%20Council%20mandated%20the,into%20force%20in%20January%201990 (last visited Oct. 10, 2023).

[332] *Id.*

trade in 2019.[333] The GCC is the EU's fifth largest trading partner, accounting for about 4% of its total trade in 2019.

The GCC-EU trade relationship has some positive aspects that can support climate action among both parties, such as:

- The existence of a formal and comprehensive framework for cooperation on various issues related to climate change and energy, such as renewable energy, energy efficiency, carbon capture and storage, hydrogen, or nuclear energy;
- The presence of mutual interests and benefits in diversifying their energy sources and markets, and reducing their dependence on fossil fuels;
- The availability of resources and capabilities for innovation and technology transfer in clean energy development, such as funds, research centers, universities, or companies; and
- The potential for creating new opportunities or synergies for trade and investment in clean energy products or services, such as solar panels, wind turbines, batteries, or smart grids.

However, the GCC-EU trade relationship also has some negative aspects that can hinder climate action among both parties, such as:

- The lack of progress or conclusion of a free trade agreement (FTA) that could enhance trade liberalization and cooperation among both parties;
- The presence of conflicts or disputes over trade measures related to climate change, such as EU's carbon border adjustment mechanism (CBAM), which could impose tariffs on imports from countries that do not have comparable carbon prices;
- The divergence of policies or regulations related to climate change and energy, such as emission targets, carbon prices, subsidies, or standards;
- The resistance or reluctance of some sectors or stakeholders to adopt or support low-carbon transitions, such as oil producers, exporters, or consumers.

VI. RECOMMENDATIONS AND CONCLUSION

A. Proposed Strategies for Creating an Effective Climate Club within the G20 Framework

Based on the analysis and discussion in the previous sections, some possible strategies for creating an effective climate club linked to the international trade regime within the G20 framework are:

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[333] *Gulf Region*, EUR. COMM'N, https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/countries-and-regions/gulf-region_en (last visited Oct. 10, 2023).

- Building on the existing platforms and institutions of the G20 and its related initiatives, such as MI, Breakthrough Energy, or CEM, to leverage their legitimacy, credibility, and resources for climate action;
- Aligning with the objectives and commitments of the Paris Agreement and its related processes, such as NDCs, global stocktake, or enhanced transparency framework in order to ensure coherence and consistency with the global climate regime;
- Providing clear and measurable objectives and indicators for the climate club, such as emission targets, carbon prices, membership fees, or trade penalties, that can reflect the different circumstances and capabilities of countries;
- Offering flexible and diverse options or mechanisms for countries to join or comply with the climate club, such as emission trading systems, carbon tax credits, technology transfer agreements, or green recovery plans;
- Engaging with various actors or stakeholders that can support or influence the formation or implementation of the climate club, such as governments, international organizations, research institutions, private sector, civil society, or media; and
- Addressing the barriers and obstacles that may hinder the effectiveness of the climate club, such as political resistance or opposition, economic impacts or costs, technical challenges or gaps, legal conflicts or disputes.

B. Importance of Innovation and Technology in Achieving Climate Change Mitigation Goals

Innovation and technology are essential for achieving climate change mitigation goals, as they can enable countries to reduce their emissions and increase their resilience to climate impacts. Innovation and technology can also create new opportunities and benefits for countries in terms of economic growth, trade, investment, employment, or development. However, innovation and technology also face several barriers and challenges in the context of climate change, such as lack of funding, policy, skills, access, cooperation, or protection. Therefore, it is important to provide incentives and support for innovation and technology transfer among countries, especially developing countries.

Some possible incentives and support are:

- Financial incentives: These include grants, loans, guarantees, tax credits, or prizes that can support R&D, deployment, or diffusion of low-carbon technologies;

- Regulatory incentives: These include standards, certifications, labels, or mandates that can create demand or market access for low-carbon technologies;
- Institutional incentives: These include platforms, networks, partnerships, or alliances that can facilitate cooperation or exchange on innovation and technology transfer;
- Informational incentives: These include data, analytics, indicators, or scenarios that can inform decision-making or policy-making on innovation and technology transfer; and
- Behavioral incentives: These include nudges, framing, feedback, or social norms that can influence attitudes or actions on innovation and technology transfer.

C. The Potential Role of Saudi Arabia in Promoting South-South Collaboration on this Issue

Saudi Arabia has the potential to promote South-South collaboration on this issue, as it has demonstrated its leadership and commitment to advancing clean energy innovation at the global level. Saudi Arabia has also positioned itself as a key partner for other countries who share its vision and goals for a low-carbon future.

Some possible ways for Saudi Arabia to promote South-South collaboration on this issue are:

- Sharing its best practices and lessons learned on diversifying its economy and reducing its dependence on oil revenues, as well as on developing and deploying low-carbon technologies such as renewable energy, carbon capture and storage, hydrogen, or nuclear energy;
- Offering its resources and capabilities for innovation and technology transfer to other developing countries who need or seek them, such as funds, research centers, universities, or companies;
- Creating or joining regional or interregional initiatives or platforms that focus on specific areas or sectors of clean energy development and cooperation, such as solar energy, wind energy, biofuels, or smart grids; and
- Supporting or assisting other developing countries who face challenges or difficulties in joining or complying with the climate club, such as providing financial aid, technical assistance, capacity building, or policy advice.

D. Final Thoughts on the Future of Climate Clubs and International Trade

Climate change is one of the most pressing challenges facing the world today.[334] It poses significant risks to the environment, human health, food security, and economic development.[335] One of the main drivers of climate change is the global trade system, which accounts for about a quarter of global carbon dioxide emissions.[336]

Therefore, it is imperative to address climate change through international trade, by creating incentives for countries to cooperate on reducing emissions and promoting low-carbon technologies.

One possible way to achieve this is by forming a climate club linked to the international trade regime. By linking the climate club to the trade regime, countries can leverage their market power and influence to induce other countries to join the club and adopt more ambitious climate measures.

This section has explored the concept and objectives of a climate club linked to the international trade regime. It has proposed a strategy for its implementation within the G20 framework. This section has also examined the relevance of this proposal to Saudi Arabia, a member of the G20 and a participant in Mission Innovation and Breakthrough Energy. Additionally, this section has discussed the importance of South-South collaboration on this issue, highlighting the potential role of Saudi Arabia in promoting it.

This section concluded that creating and implementing a climate club linked to the international trade regime is not an easy or straightforward task. It involves many complexities, uncertainties, and risks. It requires careful design, negotiation, and implementation, to balance the benefits and risks, and ensure the compatibility, feasibility, equity, and effectiveness of such an arrangement.

This section has also suggested that innovation and technology are essential for achieving climate change mitigation goals, but they also face several barriers and challenges. Therefore, it requires support and facilitation from various actors and institutions at different levels.

This section has intended to contribute to the academic literature and policy debate on this topic and to provide some insights and recommendations for future research and action.

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[334] *Climate Change 'Biggest Threat Modern Humans Have Ever Faced', World-Renowned Naturalist Tells Security Council, Calls for Greater Global Cooperation*, UN (Feb. 23, 2021), https://press.un.org/en/2021/sc14445.doc.htm.

[335] *Id.*

[336] Trade and Climate Change Information Brief No. 1, WTO (2021), https://www.wto.org/english/news_e/news21_e/clim_03nov21-4_e.pdf.

3. THE SAUDI GREEN INITIATIVE[337]

I. INTRODUCTION

The Saudi Green Initiative (SGI),[338] launched by Saudi Arabia's Crown Prince and Prime Minister Mohammed bin Salman in March of 2021, is a comprehensive plan to combat climate change and promote sustainable development. The initiative aims to reduce carbon emissions, increase the use of renewable energy, and protect natural resources in the Kingdom.[339] While the initiative has been praised for its ambitious goals,[340] it has also faced criticism and skepticism from various quarters.[341]

The premise of this section is to address whether sustainability and economic growth are mutually exclusive in Saudi Arabia. It is easy to say, "yes, they are." This section will examine the goals and impact of the Saudi Green Initiative, explore tourism in Saudi Arabia and its environmental impact, and address some of the criticism put forward, all the while challenging the notion that sustainability and economic growth in the Kingdom of Saudi Arabia cannot exist harmoniously.

II. TARGETS OF THE SAUDI GREEN INITIATIVE

The Saudi Green Initiative is a national commitment made by the Kingdom of Saudi Arabia to implement several green projects that revolve around three targets:[342]

A. Emissions reduction;
B. Afforestation;
C. Land and sea protection.

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[337] This section was written by Sireen Hassan Sandokji.
[338] *SGI: Steering Saudi Arabia Towards a Green Future*, SAUDI & MIDDLE EAST GREEN INITIATIVES, https://www.greeninitiatives.gov.sa/about-sgi/ (last visited Oct. 10, 2023).
[339] *Id*.
[340] Rashid Hassan, *UN Official Applauds Saudi Green Initiative Aimed at Addressing Climate Change Effects*, ARAB NEWS (May 24, 2022), https://www.arabnews.com/node/2088861/saudi-arabia.
[341] Robert Kennedy, *'Dangerous and Delusional': Critics Denounce Saudi Climate Plan*, AL JAZEERA (Oct. 26, 2021), https://www.aljazeera.com/news/2021/10/26/green-or-greenwashing-saudi-arabias-climate-change-pledges.
[342] *Id*.

A. Reducing Emission

One of the primary goals of the Saudi Green Initiative is to reduce carbon dioxide emissions.[343] Saudi Arabia is one of the world's largest oil producers and exporters[344] and as such, it is a significant contributor to global carbon emissions.[345] The initiative aims to reduce the country's carbon footprint by planting 10 billion trees in Saudi Arabia and restoring 40 million hectares of degraded land.[346] This massive reforestation effort will not only sequester carbon from the atmosphere but also help combat desertification and soil erosion.[347] This makes Saudi Arabia one of the largest reforestation projects in the world.[348]

B. Greening Saudi Arabia

Another key goal of the Saudi Green Initiative is to increase the use of renewable energy.[349] Currently, Saudi Arabia relies heavily on fossil fuels for electricity production.[350] However, the initiative aims to increase the country's renewable energy capacity to 50% by 2030.[351] This will be achieved by investing in solar and wind power projects as by well as developing new technologies such as carbon capture and green hydrogen.[352]

C. Protecting Land and Sea

In addition to reducing carbon emissions and increasing renewable energy use, the Saudi Green Initiative also aims to protect natural resources in the

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[343] *SGI Target: Reduce Carbon Emissions by 278 MTPA by 2030*, SAUDI & MIDDLE EAST GREEN INITIATIVES, https://www.greeninitiatives.gov.sa/about-sgi/sgi-targets/reducing-emissions/reduce-carbon-emissions/ (last visitied Oct. 10, 2023).
[344] *What Countries are the Top Producers and Consumers of Oil?*, ENERGY INFO. ADMIN., https://www.eia.gov/tools/faqs/faq.php?id=709&t=6 (last updated Sept. 22, 2023).
[345] Hannah Ritchie, *Who has Contributed Most to Global CO2 Emissions?*, OUR WORLD IN DATA (Oct. 1, 2019), https://ourworldindata.org/contributed-most-global-co2.
[346] *SGI Target: Plant 10 Billion Trees Across Saudi Arabia*, SAUDI & MIDDLE EAST GREEN INITIATIVES, https://www.greeninitiatives.gov.sa/about-sgi/sgi-targets/greening-saudi/plant-10-billion-trees/ (last visited Oct. 10, 2023) [hereinafter *SGI Plant Target*].
[347] *Id.*
[348] *Green Riyadh Project*, ROYAL COMMISSION FOR RIYADH CITY, https://www.rcrc.gov.sa/en/projects/green-riyadh-project (last visited Oct. 10, 2023).
[349] *Saudi Green Initiative*, INT'L ENERGY AGENCY, https://www.iea.org/policies/13391-saudi-green-initiative (last visited Oct. 10, 2023).
[350] *Saudi Arabia*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/international/analysis/country/SAU (last updated Dec. 2, 2021).
[351] *SGI Plant Target*, *supra* note 346.
[352] *SGI Target: Reduce Carbon Emissions by 278 MTPA by 2030*, SAUDI & MIDDLE EAST GREEN INITIATIVES, https://www.greeninitiatives.gov.sa/about-sgi/sgi-targets/reducing-emissions/reduce-carbon-emissions/ (last visited Oct. 10, 2023).

Kingdom.[353] This includes preserving marine life, protecting wildlife habitats,[354] and reducing water consumption.[355] Efforts will be made to reduce plastic waste and improve waste management practices.[356] Moreover, Saudi Arabia has committed to protecting 30% of its terrestrial and marine habits by 2030.[357] All three targets are interlaced. Working on one target will consequently leave a positive effect on another target. Currently, there are 77 initiatives to help reach the three targets.[358]

In essence:

- To increase the use of renewable energy in the Kingdom, the government plans to invest in solar and wind power to reduce reliance on fossil fuels and promote clean energy. The goal is to generate 50% of the country's electricity from renewable sources by 2030.[359]
- Regarding transportation, the government will promote the use of electric vehicles and public transportation to reduce emissions from the transportation sector. This will include the development of charging infrastructure and the introduction of incentives for electric vehicle adoption.[360]
- The government will also promote energy efficiency as a whole by adopting energy-efficient building standards and encouraging the use of energy-efficient appliances and equipment. This will help reduce the energy demand and lower emissions from the building and industrial sectors.[361]

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[353] *SGI Target: Protecting 30% of Saudi Arabia's Land and Sea*, SAUDI & MIDDLE EAST GREEN INITIATIVES, https://www.greeninitiatives.gov.sa/about-sgi/sgi-targets/protecting-land-and-sea/protecting-saudi-arabia-s-land-and-sea/ (last visited Oct. 10, 2023).
[354] *Id.*
[355] Ruth Michaelson, *Oil Built Saudi Arabia – Will a Lack of Water Destroy It?*, THE GUARDIAN (Aug. 6, 2019), https://www.theguardian.com/cities/2019/aug/06/oil-built-saudi-arabia-will-a-lack-of-water-destroy-it.
[356] *Saudi Green Initiative Steps Up Its Drive Against Plastic Pollution*, Arab News (June 4, 2023), https://www.arabnews.com/node/2315691/business-economy.
[357] *SGI Target: Protecting 30% of Saudi Arabia's Land and Sea*, Saudi & Middle East Green Initiatives, https://www.greeninitiatives.gov.sa/about-sgi/sgi-targets/protecting-land-and-sea/protecting-saudi-arabia-s-land-and-sea/ (last visited Oct. 10, 2023).
[358] *SGI Initiatives*, SAUDI & MIDDLE EAST GREEN INITIATIVES, https://www.greeninitiatives.gov.sa/sgi-initiatives/ (last visited Oct. 10, 2023).
[359] *Id*.
[360] Jennifer Bell & Ayush Narayanan, *Electric Vehicle Demand Booms in Saudi Arabia Amid Move to Green Mobility*, ALARYABIYA NEWS (June 22, 2023), https://english.alarabiya.net/News/saudi-arabia/2023/06/21/Electric-vehicle-demand-booms-in-Saudi-Arabia-amid-move-to-green-mobility#:~:text=The%20Saudi%20government%20is%20actively,for%20the%20growing%20urban%20populatio.
[361] Yousef Alyousef & Adbulhadi Varnham, *Saudi Arabia's National Energy Efficiency Programme: Description, Achievements and Way Forward*, 5 INT'L J. LOW-CARBON TECHS. 291, 293-294 (2010).

- The government will invest in carbon capture and storage technologies to capture carbon emissions from industrial processes and store them underground. This will help reduce emissions from the industrial sector, which is a significant contributor to carbon emissions in the country.[362]
- With respect to reforestation and afforestation, the government has set a target of planting 10 billion trees in the country by 2030 to help absorb carbon dioxide from the atmosphere. This will include the establishment of new forests and protected areas and the promotion of sustainable land use practices.[363]

These initiatives and actions outlined by the Saudi Green Initiative show a dedication to lowering carbon emissions and advancing sustainability in Saudi Arabia. By putting these steps in place, the country may reduce its reliance on fossil fuels and make the transition to a more robust and sustainable future.

III. IMPACT OF THE SAUDI GREEN INITIATIVE

The impact of the Saudi Green Initiative is expected to be significant. The reforestation effort alone will sequester an estimated 278 million tons of carbon per year.[364] The increased use of renewable energy will reduce the country's reliance on fossil fuels and help diversify the economy.[365] The initiative is also expected to create new job opportunities in the renewable energy sector, which will, therefore, contribute to the economy.[366]

The initiative has also been praised for its potential to inspire other countries in the region and around the world to take similar steps towards sustainability.[367] As one of the world's largest oil producers, Saudi Arabia's commitment to reducing carbon emissions and promoting renewable energy sends a powerful message to the international community.

The initiative's positive global impact is significant. With this initiative, Saudi Arabia can serve as an example for other countries by investing in renewable energy sources and reducing their dependence on fossil fuels.[368] Furthermore, as a significant contributor to global carbon emissions, Saudi

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[362] *SGI Initiatives*, *supra* note 358.
[363] *Id*.
[364] Rawan Radwan, *How the Saudi Green Initiative Has Moved from Ambition to Action, Two Years On*, ARAB NEWS (Mar. 29, 2023), https://www.arabnews.com/node/2277406/saudi-arabia.
[365] *Id.*
[366] Nirmal Narayanan, *Job Creation in Saudi Arabia to Continue Beyond 2030*, ARAB NEWS (July 22, 2023), https://www.arabnews.com/node/2342351/business-economy.
[367] Samia Basheer Hanifi, *Saudi Arabia Can Show Oil-Rich Nations How to Tackle Global Warming, Says France's Climate Change Ambassador*, ARAB NEWS (Oct. 9, 2023), https://www.arabnews.com/node/2388106/business-economy.
[368] *Id.*

Arabia's initiative's goal to achieve net-zero emissions by 2060 can significantly help combat climate change.[369]

IV. TOURISM IN SAUDI ARABIA AND ITS IMPACT ON THE ENVIRONMENT

Tourism in Saudi Arabia is a growing industry that has been identified as a key component of the country's Vision 2030 plan.[370] The government of Saudi Arabia has been making significant investments in promoting tourism in the country, such as developing new tourist attractions, the relaxation of visa requirements, and the construction of new hotels and infrastructure.[371]

However, tourism in Saudi Arabia also has significant environmental impacts. The country is home to a number of fragile ecosystems, including coral reefs, wetlands, and desert landscapes,[372] which are vulnerable to damage from tourism-related activities such as construction, transportation, and waste disposal.[373] In addition, the extraction and processing of oil in Saudi Arabia have significant environmental impacts, including air and water pollution.[374]

To mitigate these environmental impacts, the government of Saudi Arabia has launched a number of initiatives to promote sustainable tourism practices.[375] These initiatives include the development of eco-tourism destinations, the promotion of responsible tourism practices, and the implementation of environmental regulations and standards for tourism

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[369] *Saudi Green Initiative*, VISION 2030, https://www.vision2030.gov.sa/en/projects/saudi-green-initiative/ (last visited Oct. 10, 2023).

[370] VISION 2030, https://vision2030.gov.sa/en (last visited Oct. 10, 2023).

[371] *Visa & Tourism*, GOV.SA, https://www.my.gov.sa/wps/portal/snp/aboutksa/tourism/!ut/p/z0/04_Sj9CPykssy0xPLMnMz0vMAfIjo8zijQx93d0NDYz8DczCLA0CQ4KCg1zMfL2CA4z0g1Pz9AuyHRUBqgX_Gw!!/ (last visited Oct. 20, 2023).

[372] *Protecting a Natural Kingdom*, NAT'L GEOGRAPHIC, https://www.nationalgeographic.com/protecting-a-natural-kingdom/#:~:text=And%20the%20often%2Dextreme%20climate,endemic%20species%20requires%20tremendous%20efforts (last visited Oct. 10, 2023).

[373] Tareq I. Alrawaf et al., *The Distribution of Ecotourism Activities and Potential Consequences for the Saudi Desert Ecosystem*, 213 J. ARID ENV'TS. 1, 1 (2023).

[374] Haider Mahmood et al., *Oil Sector and CO2 Emissions in Saudi Arabia: Asymmetry Analysis*, 6 PALGRAVE COMMC'NS. 1, 1 (2020).

[375] Reina Takla Nour El Shaeri, *Saudi Tourism Ministry Launches Global Solutions Hub to Monitor Sustainable Travel*, ARAB NEWS (Oct. 20, 2023), https://www.arabnews.com/node/2388776/business-economy.

activities.[376] However, it remains to be seen how effective these measures will be in mitigating the environmental impacts of tourism in Saudi Arabia.

V. SUSTAINABILITY AND ECONOMIC GROWTH

Sustainability and economic growth are closely related in Saudi Arabia because the country has been implementing various sustainable development initiatives to diversify its economy,[377] reduce its dependence on oil exports,[378] and promote environmental conservation.[379] These initiatives include investing in renewable energy, implementing water conservation measures, and promoting eco-tourism.[380] By promoting sustainable economic development, Saudi Arabia can balance economic growth with environmental protection and ensure long-term economic stability.

Saudi Arabia's economic goals include diversifying the economy away from oil dependency, developing non-oil sectors such as tourism and technology, attracting foreign investment, increasing employment opportunities for Saudis, and becoming a hub for trade and investment in the Middle East.[381] The country's Vision 2030 plan outlines these goals and aims to transform the country into a more diversified, dynamic, and prosperous economy.[382]

The Saudi Green Initiative can mitigate the impact of climate change by focusing on sustainable practices, such as increasing the use of renewable energy sources, reducing carbon emissions, and promoting conservation efforts. These actions can be aligned with the country's economic goals by promoting investment in renewable energy technologies, creating new job opportunities in green industries, and enhancing the country's global reputation as a leader in sustainable development.

Sustainability in Saudi Arabia contributes to the country's economic growth in several ways. First, sustainable practices promote resource efficiency, reducing costs for businesses and households and can lead to

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[376] *Ecotourism in Saudi on the Rise*, VISIT SAUDI, https://www.visitsaudi.com/en/do/lifestyle/ecotourism-in-saudi-arabia-on-the-rise (last visited Oct. 10, 2023).
[377] *Business & Economy*, VISION 2030, https://www.vision2030.gov.sa/en/progress/business-economy/ (last visited Oct. 10, 2023).
[378] *KAPSARC Investigations Ways to Diversify Non-oil Exports to Achieve Saudi Vision 2030*, RIYADH DAILY (Oct. 12, 2021), http://alriyadhdaily.com/article/56ab9d6cf6984bca9a5feb101f21dc0e.
[379] *Saudi Green Initiative*, *supra* note 369.
[380] *SGI Initiatives*, *supra* note 358.
[381] *A Thriving Economy*, VISION 2030, https://www.vision2030.gov.sa/en/vision-2030/overview/a-thriving-economy/ (last visited Oct. 10, 2023).
[382] *Id.*

increased productivity and profitability. Second, the country's focus on renewable energy and eco-tourism creates new economic opportunities and diversifies the economy beyond the oil sector. Third, sustainable practices can enhance the country's international reputation and attract foreign investment. Lastly, by promoting sustainable practices, Saudi Arabia can ensure the long-term sustainability of its natural resources and reduce the environmental impact of economic activities, which is essential for sustainable economic growth. Overall, sustainability initiatives in Saudi Arabia contribute to economic growth by promoting resource efficiency, diversifying the economy, attracting investment, and ensuring long-term sustainability.

VI. CRITICISM OF THE SAUDI GREEN INITIATIVE

Despite its ambitious goals, the Saudi Green Initiative has faced criticism and skepticism from various quarters. Some critics argue that the initiative is merely a publicity stunt, and that the Saudi government has no intention of following through on its commitments.[383]

While it is true that the Saudi government has a checkered history when it comes to environmental issues, there are several reasons to believe that the Saudi Green Initiative is a serious commitment. First, the initiative was launched by Crown Prince Mohammed bin Salman, who has been a driving force behind many of the Kingdom's recent reforms.[384] The Crown Prince has also been vocal about the need to address climate change and promote sustainability.[385]

Second, the Saudi government has already taken several concrete steps toward achieving the goals of the initiative. For example, in March of 2021, the government announced plans to build a $5 billion green hydrogen plant, which will be one of the largest in the world.[386] The plant is expected to

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[383] Mohammed Al-Surf, *Sustainability Beyond Borders: What We Can Learn from the Saudis' Approach to Combat Climate Chage through the Regional Climate Center*, LINKEDIN (Jan. 17, 2023), https://www.linkedin.com/pulse/sustainability-beyond-borders-what-we-can-learn-from-saudis-al-surf.

[384] Radwan, *How the Saudi Green Initiative Has Moved from Ambition to Action, Two Years On*, ARAB NEWS (Mar. 29, 2023), https://www.arabnews.com/node/2277406/saudi-arabia.

[385] Mohammed bin Salman, The Crown Prince and The Saudi Green Initiative, ARABIAWEATHER (Sept. 23, 2023), https://www.arabiaweather.com/en/content/mohammed-bin-salman-the-crown-prince-and-the-saudi-green-initiative#:~:text=It%20is%20noteworthy%20that%20Crown,efforts%20to%20address%20climate%20change.

[386] *Neom Green Hydrogen Company Completes Financial Close at a Total Investment Value of USD 8.4 Billion in the World's Largest Carbon-Free Green Hydrogen Plant*, NEOM (May 22, 2023), https://www.neom.com/en-us/newsroom/neom-green-hydrogen-investment.

produce 650 tons of green hydrogen per day, which will be used to power buses and trucks in the Kingdom.[387]

Third, the Saudi government has already invested heavily in renewable energy projects, including Sakaka, a 300-megawatt (MW) solar power plant,[388] and Dumat al-Jandal, a 400-megawatt (MW) wind farm[389]. The Saudi government has also launched a program to install solar panels on the roofs of homes and buildings, which is expected to generate 3.45 gigawatts (GW) of electricity by 2020 and 9.5 GW by 2023.[390]

Another criticism of the Saudi Green Initiative is that it does not go far enough.[391] Some environmentalists argue that the initiative should include more ambitious targets, such as a complete phase-out of fossil fuels.[392] While it is true that the initiative could be more ambitious, it is important to recognize that the Kingdom is taking significant steps towards sustainability. The fact that Saudi Arabia, one of the world's largest oil producers, is committed to reducing carbon emissions and investing in renewable energy is a significant achievement.

Furthermore, it is crucial to understand that moving away from fossil fuels will take time and cannot be accomplished overnight. The Saudi Green Initiative is a positive move and ought to be viewed as a component of a larger effort toward sustainability.

VII. CONCLUSION AND RECOMMENDATION

The Saudi Green Initiative is an ambitious plan to combat climate change and promote sustainable development in Saudi Arabia. The initiative's goals of reducing carbon emissions, increasing renewable energy use, and protecting natural resources are crucial steps toward a greener future. Despite the criticism and skepticism, there are many reasons to think that Saudi Arabia

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[387] *Neom Green Hydrogen Project*, ACWA POWER, https://acwapower.com/en/projects/neom-green-hydrogen-project/ (last visited Oct. 10, 2023).

[388] *Sakaka Solar Power Plant*, VISION 2030, https://www.vision2030.gov.sa/en/projects/sakaka/ (last visited Oct. 11, 2023).

[389] *Saudi Arabia's First Wind Farm Begins Electricity Production*, AL JAZEERA (Aug. 8, 2021), https://www.aljazeera.com/news/2021/8/8/saudi-arabias-first-wind-farm-begins-electricity-production.

[390] HECTOR G. LOPEZ-RUIS, ET AL., ASSESSING RESIDENTIAL SOLAR ROOFTOP POTENTIAL IN SAUDI ARABIA USING NIGHTTIME SATELLITE IMAGES: A STUDY FOR THE CITY OF RIYADH 4 (2019), available at https://www.kapsarc.org/wp-content/uploads/2020/04/KS-2019-DP67-Assessing-Residential-Solar-Rooftop-Potential-in-Saudi-Arabia-Using-Nighttime-Satellite-Images.pdf.

[391] Kelvin Chan, *Saudi Arabia has 'Green Vision' at COP27, Critics Unmoved*, AP NEWS (Nov. 13, 2022), https://apnews.com/article/science-africa-business-middle-east-12fd748874b5e3113fa3cd0afd023cc2.

[392] *Id*.

is committed to this initiative. The project has the potential to significantly improve the Kingdom and motivate nations worldwide to make strides in an analogous direction toward sustainability.

This initiative is a part of the Kingdom's goal to advance transitioning into a low-carbon economy and become a global leader in sustainable development. Additionally, it is a component of a larger multinational initiative to combat climate change and safeguard the planet's natural resources.

This analysis and reflection on the relationship between sustainability and economic growth shows that they are not mutually exclusive. The Kingdom has set a solid foundation for both sustainability and the economy to thrive. To address the environmental impacts of tourism in Saudi Arabia, the government can take the following measures:

Recommendation 1

Develop and enforce environmental regulations: The government can implement strict environmental regulations and standards for tourism activities, such as waste management, energy efficiency, and water conservation. These regulations can ensure that tourism activities are conducted in a sustainable and responsible manner.

Recommendation 2

Promote sustainable tourism practices: The government can encourage tourists to engage in sustainable practices, such as using public transportation, conserving water and energy, and minimizing waste generation. This can be achieved through public awareness campaigns and educational programs.

Recommendation 3

Collaborate with stakeholders: To create sustainable tourism practices and address environmental issues, the government can collaborate with other stakeholders like travel agencies, local communities, and environmental organizations.

Recommendation 4

Conduct environmental impact assessments: The government can conduct environmental impact assessments for tourism projects and activities to identify potential environmental impacts and develop measures to mitigate them.

These measures can help to promote sustainable tourism practices and minimize the environmental impacts of tourism in Saudi Arabia.

4. SAUDI ARABIA'S PLAN FOR RENEWABLE ENERGY[393]

I. INTRODUCTION

As of 2021, studies show that Saudi Arabia has consumed 153.8 million metric tons of oil.[394] Renewable energy comes from natural sources that are replenished at a faster rate than they are utilized.[395] A few examples of renewable energy sources include wind and solar energy, hydroelectric power, and geothermal energy.[396] On the other hand, oil and gas are non-renewable energy resources that take hundreds of millions of years to form.[397] Saudi Arabia is infamously known for their reliance on oil and gas[398] as they are among the leading countries in oil production.[399] The increasing awareness of the effects of climate change, along with the rising demand for renewable energy, means that Saudi Arabia's reliance on gas and oil is becoming unsustainable in the long run. That is why the current Saudi government has plans to reduce Saudi Arabia's reliance on fossil fuels and increase the use of renewable energy, as part of its Vision 2030 sustainability plan. The aim of this section is to further explore the National Renewable Energy plan that is being implemented by the Saudi Government.

II. RELIANCE ON OIL AND GAS IN SAUDI ARABIA

When discussing the topic of energy consumption in the Kingdom of Saudi Arabia, it is important to note that this pot of seemingly never-ending gold, that has been relied on heavily by the Saudi economy, was first found in 1938.[400] This discovery would forever change every aspect of the country.

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[393] This section was written by Halah Alshaikh.

[394] *Oil Consumption in Saudi Arabia from 1990 to 2022*, STATISTA (Aug. 25, 2023), https://www.statista.com/statistics/264389/oil-consumption-in-saudi-arabia/#:~:text=Saudi%20Arabia%20consumed%20166%20million,Arabia%20hold%20huge%20hydrocarbon%20reserves.

[395] *What is Renewable Energy*, UN, https://www.un.org/en/climatechange/what-is-renewable-energy#:~:text=Renewable%20energy%20is%20energy%20derived,plentiful%20and%20all%20around%20us. (last visited Oct. 11, 2023).

[396] *Id*.

[397] *Id.*

[398] *Saudi Arabia's Oil Dependence: Challenges Ahead*, IT. INST. FOR INT'L POL. STUD. (Apr. 19, 2016), https://www.ispionline.it/en/publication/saudi-arabias-oil-dependence-challenges-ahead-14997.

[399] Anna Fleck, *The World's Biggest Oil Producers*, STATISTA (Dec. 6, 2022), https://www.statista.com/chart/16274/oil-productin-countries/.

[400] *Saudi Arabia Facts and Figures*, ORG. PETROLEUM EXPORTING COUNTRIES, https://www.opec.org/opec_web/en/about_us/169.htm#:~:text=Oil%20was%20first%20struck%20in,metres%20in%20the%20Dammam%20oilfield (last visited Oct. 11, 2023).

The oil and gas industry has played a major role in shaping Saudi Arabia's economic, political, and social landscape.[401]

For decades, the government has relied heavily on the export of oil, which brought significant revenue and growth to the nation, but also led to its economy's over-dependence on the commodity.[402] The oil price crash of 2014-2016 is an example of how the Saudi economy can be adversely affected by the economic cycles in the commodity market.[403] First, Saudi Arabia's heavy dependence on oil exports can leave its economy vulnerable to fluctuations in global oil prices.[404] The recent drop in oil prices in 2020, for example, had a significant impact on the Saudi economy due to its reliance on oil exports.[405] The production and consumption of fossil fuels, including oil and gas, contribute significantly to climate change.[406] The extraction of oil and gas harms the environment, damages local ecosystems, and contributes to greenhouse gas emissions.[407]

According to the World Bank, Saudi Arabia is one of the world's largest emitters of CO2, with about 60 million tons of CO2 emissions per year from burning oil and gas.[408] The over reliance on oil and gas resources has helped lead to the concentration of power in the hands of the state and limited the growth of non-energy-related sectors in the economy. The Saudi government has recognized the need to prioritize the diversification of the economy, reduce the dependence on oil and gas, and develop non-energy alternatives,

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[401] Osamah Alsayegh, *How Economic and Political Factors Drive the Oil Strategy of Gulf Arab States*, RICE U. BAKER INST. FOR PUB. POL'Y (Jan. 9, 2023), https://www.bakerinstitute.org/research/how-economic-and-political-factors-drive-oil-strategy-gulf-arab-states.

[402] Rachna Uppal, *Saudi Economy Edging Closer to Reducing Dependence on Oil, IMF Official Says*, REUTERS (May 3, 2023), https://www.reuters.com/world/middle-east/saudi-economy-edging-closer-reducing-dependence-oil-imf-official-2023-05-03/.

[403] Marc Stocker et al., *What Triggered the Oil Price Plunge of 2014-2016 and Why it Failed to Deliver an Economic Impetus in Eight Charts*, WORLD BANK BLOGS (Jan. 18, 2018), https://blogs.worldbank.org/developmenttalk/what-triggered-oil-price-plunge-2014-2016-and-why-it-failed-deliver-economic-impetus-eight-charts.

[404] *Saudi Arabia and the Oil Price Collapse*, MIDDLE EAST POL'Y COUNCIL, https://mepc.org/speeches/saudi-arabia-and-oil-price-collapse (last visited Oct. 11, 2023).

[405] Avie Schneider & Camila Domonoske, *Oil Prices, Stocks Plunge After Saudi Arabia Stuns World with Massive Discounts*, NPR (Mar. 8, 2020), https://www.npr.org/2020/03/08/813439501/saudi-arabia-stuns-world-with-massive-discount-in-oil-sold-to-asia-europe-and-u-.

[406] Savannah Bertrand, *Fact Sheet: Climate, Environmental, and Health Impacts of Fossil Fuels (2021)*, ENV'T & ENERGY STUDY INST. (Dec. 17, 2021), https://www.eesi.org/papers/view/fact-sheet-climate-environmental-and-health-impacts-of-fossil-fuels-2021.

[407] *Id.*

[408] *Fossil Fuel Energy Consumption (% of Total) – Saudi Arabia*, THE WORLD BANK, https://data.worldbank.org/indicator/EG.USE.COMM.FO.ZS?locations=SA (last visited Oct. 11, 2023).

such as tourism, manufacturing, and information and communication technology.[409] Economic diversification will increase the resilience of the economy to external shocks and provide new opportunities for employment and wealth creation for its people. However, transitioning away from a reliance on oil and gas is a daunting task that requires substantial investment and political will from the government. Saudi Arabia's reliance on gas and oil has both economic and environmental drawbacks.

III. NATIONAL RENEWABLE ENERGY PROGRAM AIMS

Vision 2030 is an ambitious plan launched by the Saudi government in 2016 to diversify the country's economy and lessen its reliance on oil revenue.[410] The plan aims to create a more prosperous and sustainable future for Saudi Arabia by promoting economic growth, social development, and sustainability.[411] The government plans to achieve these goals by implementing a series of programs, initiatives, and policies across different sectors.[412] The plan outlines three main themes: a vibrant society, a thriving economy, and an ambitious nation.[413] Under each of these themes, several goals are set, including promoting culture and entertainment,[414] increasing the participation of women in the workforce,[415] creating opportunities for youth,[416] increasing foreign investment,[417] developing the tourism sector,[418] and promoting entrepreneurship and innovation.[419] The aim of these goals is to build a more economically diversified and innovative society that is equipped to address the challenges of the future.[420] The National Transformation Program 2020 highlights Saudi's aspiration to turn away from

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[409] *A Diversified Investment Strategy Anchored Locally and Reaching Global Dimensions*, PIF, https://www.pif.gov.sa/en/Pages/OurInvestments.aspx?gad=1&gclid=CjwKCAiA04arBhAkEiwAuNOsIscoAqdLJS5YgDJ0bey-5dQiPsTY9y42EMVwa4EL26hsejr3vQABtxoCZ_0QAvD_BwE (last visited Oct. 10, 2023).

[410] *A Story of Transformation*, VISION 2030, https://www.vision2030.gov.sa/en/vision-2030/story-of-transformation/#:~:text=Saudi%20Arabia's%20Vision%202030%20is,growth%20in%20just%20five%20years (last visited Oct. 11, 2023).

[411] KINGDOM OF SAUDI ARABIA, VISION 2030 13 (2016).

[412] *Id.*

[413] *Id.*

[414] *Id.* at 22.

[415] *Id.* at 37.

[416] *Id.*

[417] *Id.*

[418] *Id.* at 44.

[419] *Id.* at 36.

[420] *Id.* at 42.

the overconsumption of oil and diversify its traditional economic income.[421]

In tune with the Saudi Green Initiative, the Saudi Kingdom launched the National Renewable Energy Program (NREP), sponsoring the "circular carbon economy" concept.[422] The concept is a thought-out plan to manage and reduce carbon emissions.[423] The goal of this project is to shift away from reliance on nonrenewable resources to renewable sources by the completion of Vision 2030.[424] The government hopes this program will educate Saudi youth on renewable energy and will create job opportunities for Saudi nationals in a new work field. Furthermore, the program seeks to attract foreign investments and enhance international collaboration. Finally, the main goal of the project is to reduce dependence on oil and gas. The different projects planned to help reach these goals mainly include four sectors:

1. Solar;
2. Wind;
3. Geothermal; and
4. Waste-to-energy.[425]

1. Solar

The sun is a renewable energy source and solar energy systems generate electricity with very little environmental impact.[426] Solar energy helps reduce the world's reliance on fossil fuels that are finite in quantity and harm the environment during their production and use. The National Renewable Energy Plan aims to develop 40 GW of solar capacity through a combination of utility-scale solar photovoltaic (PV) and concentrated solar power (CSP) projects.[427] Once installed, solar panels can produce electricity with zero fuel costs. This creates an opportunity for significant long-term cost savings in power bills. Unlike traditional power sources, solar energy does not create dangerous greenhouse gases, like carbon dioxide, that cause climate change and air pollution.

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[421] Vision 2030, *National Transformation Program* (2020), available at https://www.vision2030.gov.sa/en/vision-2030/vrp/national-transformation-program/.
[422] Thomas Everill, *Recent Developments for Renewable Energy in Saudi Arabia*, BORGEN PROJECT (Jan. 7, 2023), https://borgenproject.org/developments-for-renewable-energy-in-saudi-arabia/#:~:text=.
[423] *Id*.
[424] *Saudi National Renewable Energy Program (NREP)*, INT'L ENERGY AGENCY (Jan. 20, 2022), https://www.iea.org/policies/14658-saudi-national-renewable-energy-program-nrep#.
[425] *Supra* note 409.
[426] Theocharis Tsoutsous et al., *Environmental Impacts from the Solar Energy Technologies*, 33 ENERGY POL'Y 289, 289 (2005).
[427] *Market in Focus:* Solar Photovoltaics (PV*)*, SAUDI INDUS. DEV. FUND (Dec. 2022), https://sidf.gov.sa/en/MediaCenter/Industrial_reports/Solar Photovoltaics (PV).pdf.

2. Wind

The National Renewable Energy Program plans to develop a total of 16 GW of wind capacity by 2030.[428] The country has significant potential for onshore and offshore wind power, and the program is working on a number of projects to harness this potential.[429] Wind energy is a promising and rapidly evolving sector in Saudi Arabia's renewable energy program under Vision 2030.[430] With abundant wind resources, a significant investment, and several large-scale wind projects in the pipeline,[431] the country is on the path to meeting its ambitious renewable energy target.

3. Geothermal

Geothermal energy is a type of renewable energy that harnesses the heat energy stored beneath the Earth's surface. It is considered one of the cleanest, most reliable, and sustainable sources of energy, with the potential to provide continuous power for a long time with relatively low carbon emissions. The Red Sea Rift Valley region of Saudi Arabia has significant potential for geothermal energy due to its geological features, including tectonic activity associated with the Red Sea Rift.[432] The high temperature of the water in these geothermal areas provides potential for direct use in various applications, including space heating, agricultural, and industrial processes. Additionally, geothermal power plants can be constructed in the region to extract heat and convert it into electricity.

4. Waste-to-Energy

Waste-to-energy is a process that involves converting waste materials to produce electricity, heat, or fuel. This process involves burning waste in specially designed facilities, which capture and use the heat generated to produce electricity or steam. Saudi Arabia is currently exploring the potential of waste-to-energy as part of its National Renewable Energy Program. The country has launched several waste-to-energy projects that focus on converting the large amounts of waste produced in major cities into electricity. One example of a Waste-to-Energy project in Saudi Arabia is the Integrated

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[428] Andrew Roscoe, *Breaking: Saudi Arabia Sets New 58.7GW Renewable Energy Target for 2030*, MEED (Jan. 10, 2019), https://www.meed.com/saudi-arabia-renewable-energy-target.
[429] *Id.*
[430] *Top Five Onshore Wind Power Plants in Development in Saudi Arabia*, POWER TECH., https://www.power-technology.com/data-insights/top-5-onshore-wind-power-plants-in-development-in-saudi-arabia/ (last updated July, 19, 2023).
[431] *Id.*
[432] *Geothermal Energy in Saudi Arabia*, KING ABDULLAH UNIV. SCI. & TECH., https://ces.kaust.edu.sa/research/detail/geothermal-energy-page (last visited May 20, 2023).

Waste Management Project (IWMP), which aims to convert municipal solid waste into electricity. The IWMP is located in the Western Province of Saudi Arabia and is a collaboration between the Saudi Arabian Ministry of Environment, Water, and Agriculture, and private-sector partners.[433] The project involves building a waste-to-energy plant, which will use various technologies to convert municipal solid waste into electricity.[434]

IV. NATIONAL RENEWABLE ENERGY PROGRAM PROJECTS

The Kingdom of Saudi Arabia has already started implementing numerous plans for renewable energy to be set by 2030, such as:

1. King Salman Energy Park (SPARK):

Located in Al-Jouf in the north of the country, this is the largest solar project in the world. [435] The project includes several phases which aim to be the dominating energy sector in the region.[436]

2. Sakaka Solar Power Plant:

Located in the Al Jouf region, the Sakaka Solar Power Plant is a 300-megawatt photovoltaic solar project. It plays an important role in developing renewable energy and diversifying Saudi Arabia's power-generation mix.[437]

3. Dumat Al Jandal Wind Farm:[438]

This is the largest wind-energy project in the Middle East, also located in the Al Jouf region. The project includes 99 wind turbines and has a capacity of 400 megawatt. The project has been in progress for years and has the ability to power over 50,000 households.[439]

4. The Sudair Solar PV project:

The Sudair Solar PV project is a 1.51 GW photovoltaic (PV) solar farm planned to be constructed in the Riyadh province of Saudi Arabia. The project

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[433] *Country Commercial Guide: Saudi Arabia Waste Management*, Int'l Trade Admin. (July 6, 2022), https://www.trade.gov/country-commercial-guides/saudi-arabia-waste-management.

[434] *Country Commercial Guide: Saudi Arabia Waste Management*, INT'L TRADE ADMIN. (July 6, 2022), https://www.trade.gov/country-commercial-guides/saudi-arabia-waste-management..

[435] SPARK, https://www.spark.sa/ (last visited May 20, 2023).

[436] *King Salman Energy Park*, VISION 2030, https://www.vision2030.gov.sa/en/projects/king-salman-energy-park// (last visited Oct. 11, 2023)..

[437] *Sakaka Photovoltaic Solar Project*, POWER TECH. (Apr. 20, 2021), https://www.power-technology.com/projects/sakaka-photovoltaic-solar-project/.

[438] *Dumat Al Jandal Wind Farm*, NS ENERGY, https://www.nsenergybusiness.com/projects/dumat-al-jandal-wind-farm/ (last visited Oct. 12, 2023).

[439] Umesh Ellichipuram, *Dumat Al Jandal Wind Farm in Saudi Arabia Starts Production*, POWER TECH. (Aug. 9, 2021), https://www.power-technology.com/news/dumat-al-jandal-wind/.

is expected to break the records as the second-largest single-site solar facility in the world.[440]

In conclusion, Saudi Arabia's renewable-energy projects reflect a significant commitment toward its renewable energy targets, and they play a crucial role in attracting foreign investment, creating job opportunities, and diversifying the nation's energy mix.

V. POSSIBLE SETBACKS

While the renewable energy plans are promising, there are always setbacks and criticism that may be faced with any initiative. One of the biggest challenges in implementing renewable energy technologies is getting them to work effectively on a large scale.[441] This requires significant investment in research, development, and testing of new technologies and may require highly skilled labor.

Another risk is that integrating intermittent energy sources like wind and solar into the grid system could require significant upgrades to the existing network, which could be costly and time consuming.[442] Change is difficult in any society keen on their customs and traditions making the development of new regulations vulnerable to backlash. Finally, the main source of income for Saudi Arabia has been oil and gas since the start of their prime.[443] With the copious amounts of money invested in this plan, the risks that may be faced will cause a huge financial setback.

VI. CONCLUSION

Renewable energy is becoming an important focus for Saudi Arabia's future energy needs. The country is investing heavily in technologies such as solar, wind, and waste-to-energy, to help meet their clean energy targets and reduce their dependence on oil and gas exports. This shift towards renewable energy is part of the country's ambitious vision to transform their economy under Vision 2030.

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[440] *Sudair Solar Power Plant*, NS ENERGY, https://www.nsenergybusiness.com/projects/sudair-solar-power-plant/ (last visited Oct. 12, 2023).

[441] Paul Denholm et al., *The Challenges of Achieving a 100% Renewable Electricity System in the United States*, 5 JOULE 1331, 1331 (2021).

[442] Natala Kolkowska, *Grid Integration of Renewable Energy*, SUSTAINABLE REV. (June 9, 2023), https://sustainablereview.com/grid-integration-of-renewable-energy/#:~:text=Renewable%20energy%20integration%20necessitates%20upgrades,connect%20remote%20renewable%20energy%20sources.

[443] *Saudi Arabia*, FORBES, https://www.forbes.com/places/saudi-arabia/?sh=7881605b4e5c (last visited Oct. 12, 2023).

With the heavy reliance on oil and gas, the country has decided to take financial and environmental precautions to ensure a safe, well-connected, and stable community. There is no doubt that Saudi Arabians function in a system created by customs and traditions. For its ambitious plan to succeed, Saudi Arabia's renewable-energy project must be introduced slowly before completion. The vast change in regulations, oil prices, and new expectations for citizens to act mindfully and carry on in an eco-friendlier lifestyle requires time.