Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Trade Remedies and Environmental Protection Amid the US-China Trade Dispute

Subhan Ali
University of the Punjab
Email: subhanali2599@gmail.com

Ayesha Sadiq
University of International Business and Economics
Email: ayshasadiq89@gmail.com

ABSTRACT

Environmental protection initiatives as well as international economic relations have been significantly impacted by the US-China trade conflict, which has been characterized by the heavy use of tariffs and trade remedies. This study looks at how trade remedies implemented during the conflict affected carbon emissions, the use of clean technology, and the enforcement of regulations. The paper emphasizes both favorable and unfavorable results by referencing empirical facts, environmental economics, and international trade legislation. Tariffs caused carbon leakage by moving high-emission output to nations with laxer environmental standards, even if they also offered some incentives for home sectors to increase energy efficiency and promote green innovation. Decarbonization efforts were further slowed by the interruption of supply lines for renewable energy. Integrating sustainability aims into trade defense efforts is made more difficult by the World Trade Organization's (WTO) legal framework, which permits environmental exceptions in trade measures but provides little clarity surrounding trade remedies. The report suggests eco-conditional trade probes, increased stakeholder involvement, and WTO reforms to align trade and environmental goals. It also proposes a paradigm shift in trade remedy policy to transparently and scientifically include environmental criteria. To reduce carbon leakage within the limitations of trade legislation, the growing application of border carbon adjustments is examined as a potential but intricate instrument. Finally, by providing policy insights pertinent to governments, international organizations, and industry stakeholders navigating the intertwined challenges of economic growth, this research adds to the growing conversation about how international trade instruments can promote rather than undermine climate goals.

Keywords: Environmental Protection, WTO, US-China Trade dispute, Carbon Leakage, GATT,

Introduction

The trade war between the United States and China, which started in 2018, was a major shift in international economic ties. The dispute, which was started by the US

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

under the Trump administration, focused on China's claimed unfair trade practices, such as forced technology transfers, state subsidies, and intellectual property theft. China retaliated with tariffs after the United States placed broad taxes on Chinese goods. Goods valued at about $550 billion were impacted by 2020 (Bown, 2020). Amidst the economic ramifications, the trade war's influence on environmental governance is a significant although little-studied aspect. Environmental effects, ranging from a reduction in regulations to an increase in emissions, started to emerge when both countries modified their industrial policies and trading patterns.

The purpose of trade remedies like anti-dumping duties, countervailing measures, and safeguards is to shield home industry from unfair competition from overseas (I. Ahmad et al., 2024). However, by influencing industrial location, manufacturing techniques, and investment in cleaner technology, these tools can have an indirect impact on environmental outcomes (Horn & Mavroidis, 2011) ; (Haider, Mathlouthi, et al., 2024). For instance, if production moves to nations with lower environmental standards, tariffs on environmentally sensitive products like steel and aluminum, which were specifically targeted during the US-China disagreement, may cause carbon leakage (Fajgelbaum et al., 2020). Consequently, even though trade remedies are essentially economic instruments, they have significant environmental effects that are needed for further research (Hui et al., 2025). Beyond carbon leakage, the trade war has other environmental effects. Due to laxer pollution regulations and less effective industrial technologies in those nations, the reorganization of global supply chains, especially the shifting of production from China to third countries like Vietnam, India, and Malaysia, may result in an increase in global emissions (Cherniwchan, 2017). In addition, the trade war delayed investments in renewable technology industries like solar panels, which were impacted by several rounds of tariffs, and disrupted international clean energy cooperation (Kim & Urpelainen, 2020) ; (Mathlouthi et al., 2025). These events demonstrate the unforeseen environmental consequences of strong trade remedies, particularly when they are applied between the US and China, two of the world's largest emitters.

Research Objectives and Research Questions

The impact of trade remedies used during the US-China trade conflict on environmental protection initiatives is examined in this research. It looks at the legal instruments and WTO procedures that mediate these intersections and investigates whether trade defense measures weakened or unintentionally aided environmental goals. The study's main questions are:

What impact have trade remedies had on the US-China trade war's environmental results?

Is it possible to balance environmental sustainability and economic defense tactics within the limitations of current international trade law?

What policy adjustments can better align trade remedies with global climate goals?

This paper contributes to a growing body of research that attempts to link international trade law and environmental governance, particularly where protectionism and geopolitical competition are involved (Bartels, 2012).

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Theoretical Framework and Literature Review

Understanding Trade Remedies in International Trade Law

Under the framework of the World Trade Organization (WTO), trade remedies are legal tools designed to shield home sectors from unfair trade practices or unexpected import spikes. These remedies include countervailing duties (the WTO Agreement on Subsidies and Countervailing Measures), anti-dumping measures (Article VI of GATT 1994 and the WTO Anti-Dumping Agreement), and safeguard measures (Article XIX of GATT 1994 and the WTO Safeguards Agreement). When foreign producers get subsidies that distort competition or when imported items are sold for less than their normal value (dumping), these tools enable nations to take corrective action (Hoekman & Kostecki, 2009). Theoretically, trade remedies seek to preserve national economic interests and guarantee fair competition while upholding free trade ideals. But these tools frequently touch on non-trade concerns including environmental preservation, public health, and labor rights (Matsushita et al., 2015). There can be serious environmental repercussions when nations use trade remedies in ecologically delicate industries like steel, energy, chemicals, or agriculture. This is because it may discourage green innovation or cause production to move to nations with less stringent environmental regulations (I. Ahmad et al., 2025).

Environmental Protection in International Trade Theory

The effects of trade liberalization on the environment have long been discussed in scholarly works. The "pollution haven hypothesis," which holds that businesses may move to areas with laxer environmental laws to reduce production costs, is one significant theoretical worry (Copeland & Taylor, 2004). This perspective holds that trade liberalization, particularly in developing nations, may result in a "race to the bottom" in environmental standards. This is especially important in trade conflicts because companies are encouraged to restructure their supply chains to less controlled markets by tariffs or other remedies. However, the Porter Hypothesis contends that by compelling businesses to embrace greener technologies and more effective procedures, stringent environmental laws can foster innovation and boost competitiveness (Porter & van der Linde, 1995). However, in the context of trade disputes, these benefits might be lessened if trade remedies or tariff walls limit access to international renewable energy markets or deter cooperative R&D initiatives. When examining the US-China trade issue, both theoretical vantage points are pertinent. On the one hand, in line with the pollution haven theory, punitive tariffs shifted production to nations like Vietnam and India (Cherniwchan, 2017). Contrary to the Porter Hypothesis' predictions, trade limitations, however, impeded the adoption of low-carbon technology and delayed technological collaboration in some industries, such as green energy.

WTO Jurisprudence on Trade and Environment

Article XX of the WTO's General Agreement on Tariffs and Trade (GATT) permits exceptions to trade regulations for actions judged necessary to safeguard the health or life of people, animals, or plants (subsection b) or for actions related to the conservation of finite natural resources (subsection g). The application of Article XX

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

to trade remedies is still controversial, even though it offers a legal foundation for environmental protection within trade regimes. The WTO Appellate Body recognized the validity of environmental goals in cases like US–Shrimp and EC–Asbestos but stressed that these measures must be implemented in a way that is both reasonable and non-discriminatory (WTO, 1998; WTO, 2001). These instances show that although environmental exceptions are allowed by law, they shouldn't be exploited as a covert way to impede global trade. As a result, under existing WTO jurisprudence, including environmental concerns into trade remedies (such as applying carbon footprint criteria in anti-dumping investigations) continues to be legally difficult. Furthermore, there are currently no legally enforceable standards to align trade remedies with environmental goals, despite the WTO's Committee on Trade and Environment (CTE) encouraging discussion on the subject. Although this legal ambiguity gives nations the freedom to pursue trade policies connected to climate change, it also raises the possibility of uneven implementation or the escalation of disputes.

Empirical Literature on Trade Remedies and Environmental Impact

There are currently few empirical studies on the relationship between trade remedies and environmental effects, but new research is illuminating this important topic. Fajgelbaum et al. (2020), for example, discovered that trade protectionism during the US-China conflict caused a large reallocation of industry toward less regulated locations, which most certainly contributed to increased emissions worldwide. Similarly, Bown and Hillman (2019) described how the US-China solar panel tariff war slowed climate progress by raising costs for consumers of renewable energy and interfering with the adoption of clean energy. Other academics highlight the idea of "green protectionism," which is the practice of using environmental arguments to cover up economic motivations for trade restrictions (Ederington & Minier, 2003) ; (I. Ahmad et al., 2023). Although environmental goals are valid, they can be strategically abused when invoked in trade remedy contexts, especially in politically delicate industries like heavy industry, agriculture, and fossil fuels. This section of research emphasizes the necessity of more transparent institutional frameworks to guarantee that trade remedies are ecologically sound and not abused (Afzal et al., 2025a). Creating trade defense strategies that are both climate-sensitive and WTO-compliant is the difficult part.

Research Gap and Theoretical Contribution

Few studies have explicitly examined the function of trade remedies during well-known conflicts like the US-China trade war and its environmental ramifications, despite the expanding conversation on trade and the environment. Instead of treating trade and environmental governance as linked mechanisms, most current research views them as distinct policy realms (Haider, Ahmad, et al., 2024). To close that gap, this article places trade remedies within a sustainability framework and suggests that trade defense tools be evaluated not just for their economic fairness but also for their environmental effects (L. Ahmad et al., 2025) ; (Ghani et al., 2025).

Case Study: US–China Trade Measures and Their Environmental Impacts

Overview of Trade Remedies Imposed During the US–China Dispute

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Global value chains and bilateral trade flows were drastically changed by the US-China trade war, which entailed the use of trade remedies and retaliatory tariffs never before seen. Citing unfair trade practices, forced technology transfers, and intellectual property infringement, the United States levied tariffs on about $370 billion worth of Chinese imports between 2018 and 2020 under Section 301 of the Trade Act of 1974 (Bown, 2020) ; (Sadiq & Haider, 2024). These actions had comparable trade-restrictive impacts even though they were not structured as conventional anti-dumping or countervailing levies under WTO regulations. In response, China imposed duties on almost $110 billion worth of American exports, focusing on delicate industries including chemicals, auto parts, and agriculture (Cui & Li, 2021). Alongside these more comprehensive tariff actions, the U.S. Department of Commerce persisted in applying countervailing and anti-dumping taxes on Chinese goods in industries such as chemical intermediates, steel, aluminum, and solar panels. Notably, since 2012, when the United States accused Chinese manufacturers of receiving unlawful subsidies and dumping lower-priced goods on the international market, Chinese solar panel exports have already been subject to trade remedies (Bown & Hillman, 2019). During the trade war, these trade remedies became more intense, going beyond economic defense and having a significant impact on both countries' environmental policies.

Environmentally Sensitive Sectors Affected by Tariffs and Remedies

Environmental policy is closely related to many industries (Zhang & Haider, 2025). The industries that have been most severely impacted by the trade war These consist of:

Steel and aluminum are two of the industries that contribute the most to carbon emissions due to their high energy consumption. Citing national security concerns under Section 232, the United States levied 25% and 10% tariffs on imports of steel and aluminum, respectively. In response, China retaliated and shifted some manufacturing to markets in Southeast Asia (Kleimann & Guinan, 2020).

Solar Energy Technology: Rising tariffs had a particularly negative impact on the solar sector. Tariffs imposed by the United States on Chinese solar panels and modules increased domestic prices, which slowed the rate of installation and uptake. Simultaneously, Chinese companies moved their manufacturing to nations with laxer environmental regulations (Kim & Urpelainen, 2020).

Chemical and Petrochemical Products: The development of clean technology, electric vehicles, and renewable energy infrastructure was impacted by tariffs on intermediate commodities used in green manufacturing, such as rare earth elements, batteries, and electronic components. The targeting of these industries demonstrates the intricate relationship between the trade war and the worldwide shift to low-carbon industries. Policies intended to protect home markets frequently have unfavorable effects on the adoption of clean technology and climate innovation.

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Shifts in Production and Environmental Externalities

The regional shift in industrial production brought about by attempts to get around tariffs was one of the most obvious environmental effects of the US-China trade dispute. For instance, to evade U.S. duties and preserve access to Western markets, several Chinese firms set up new operations in Vietnam, Malaysia, Thailand, and Indonesia (Fajgelbaum et al., 2020). These nations frequently lack the ability to regulate the environment like the US or China, which increases waste, pollution, and the depletion of natural resources.

According to the "pollution haven hypothesis," this behavior moved emissions rather than decreased them. Industries that avoid strict rules in their home markets may take advantage of lax enforcement in host nations, harming the environment overall, claims Cherniwchan (2017).

Environmental Policy Responses in the US and China

Both nations' domestic environmental policymaking was impacted by the trade war as well. To make up for limited solar imports, the United States' reliance on domestic fossil fuels grew as a result of supply chain interruptions and higher import prices (Borenstein & Bushnell, 2019). While federal policy wavered between deregulation and protectionism, state-level policies in the United States persisted in promoting renewable energy. In China, domestic industrial reform, including efforts to tighten environmental regulation and consolidate overcapacity in heavy sectors, took place at the same time as the trade war. However, businesses were less inclined to invest in cleaner technology because of the decline in export competitiveness in important green sectors (Lo, 2020). To preserve economic stability in the face of trade tensions, Chinese leaders relaxed some environmental inspections and prioritized "dual circulation" policies, which put more of an emphasis on local markets. These changes demonstrate how trade remedies can change state regulatory practices in ways that have an indirect impact on climate commitments and environmental performance.

Global Implications and Legal Tensions

The US-China dispute also revealed the WTO legal framework's shortcomings in addressing trade remedies' environmental spillovers. The tariffs circumvented the conventional WTO routes because the majority were unilateral and justified on U.S. domestic law (Section 301). As a result, China filed disputes that have not been addressed because the Appellate Body is paralyzed (Zhou & Fang, 2021). Enforcing environmental norms and coordinating climate-aligned trade policies are made more challenging by this breakdown in multilateral trade governance. Furthermore, the WTO does not yet have a thorough system in place to evaluate or control how trade remedies affect the environment. Although Article XX permits environmental exceptions to general trade regulations, it has not been consistently or proactively interpreted to apply to trade remedies (Haider, 2025). This institutional gap points to the need for changes that would enable nations to incorporate environmental standards, including energy intensity or lifecycle emissions, into trade remedy investigations without going against their WTO commitments.

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Environmental Impacts and Analytical Assessment

Positive Environmental Outcomes of Trade Remedies

Even though trade remedies in the US-China conflict mostly raised worries about emissions relocation and environmental deterioration, some beneficial environmental effects were observed. The encouragement of cleaner production techniques in domestic businesses was one noteworthy outcome (HUI et al., 2015). For example, while being shielded by tariffs, American steel producers were under more pressure to boost energy efficiency to compete with imports that were more expensive (Kleimann & Guinan, 2020). This supports the Porter Hypothesis, which holds that market or regulatory forces can encourage environmental advancements and technical innovation (Porter & van der Linde, 1995). Furthermore, it can be argued that the tariffs on solar panels encouraged the growth of domestic solar manufacturing capacity in the United States, which could lead to long-term environmental advantages by reducing transportation emissions and localizing the supply chain (Borenstein & Bushnell, 2019). Some observers contend that increased domestic output could foster innovation and resilience in the renewable energy sector, perhaps speeding up future decarbonization efforts, even though the immediate result was an increase in solar costs. Additionally, the economic strains of the trade war served as some of the impetus for China's domestic industrial reforms, which sought to reduce pollution and overcapacity in heavy sectors. Trade friction can indirectly speed up environmental regulation when paired with domestic policy concerns, as evidenced by these measures, which included closing inefficient steel plants and bolstering environmental inspections (Lo, 2020).

Negative Environmental Consequences and Carbon Leakage

Notwithstanding these benefits, the trade remedies and tariffs were mostly responsible for several unfavorable environmental consequences, the most significant of which were pollutant displacement and carbon leakage. Many manufacturers moved their operations to third countries like Vietnam, Malaysia, and Indonesia, which have less strict environmental rules and enforcement capabilities, because of the imposition of tariffs on Chinese goods (Fajgelbaum et al., 2020). Instead of lowering global emissions, this production shift caused them to be shifted, which may have increased pollution in areas with weak environmental regulation (Cherniwchan, 2017). According to empirical evaluations of emissions data, any decreases in emissions that were made in the United States or China were offset by rising emissions in these third countries from carbon-intensive industries like steel and aluminum (Wei et al., 2021). Trade barriers also generated supply chain disruptions, which resulted in inefficiencies like duplicate production facilities and higher transportation emissions. The disruption of the worldwide supply chain for renewable energy was another unfavorable effect. Tariffs on solar panels and associated parts raised prices and decreased the rate at which solar capacity was installed both domestically and internationally, which delayed the adoption of clean energy (Kim & Urpelainen, 2020). These consequences show that short-term economic protectionism and long-term climate goals must be traded off.

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Analysis on The Regulatory Rollbacks and Enforcement Challenges

Environmental regulatory environments were also impacted by the wider political and economic issues surrounding the trade dispute. The Trump administration's deregulatory policies, which included the removal of environmental protections like power plant and car emissions regulations, coincided with the trade war in the United States (Kahn & Kotchen, 2020). These regulatory rollbacks took place in an environment of economic nationalism and protectionism that made environmental enforcement less important, even though they were not directly brought on by trade remedies. Even though China's environmental regulations have generally gotten stronger over the last ten years, the trade war's economic pressures caused some enforcement areas to temporarily loosen in order to stabilize employment and industry (Lo, 2020). Such regulatory leniencies run the risk of compromising long-term environmental objectives and give conflicting messages to foreign and domestic investors about China's sustainability commitment. The difficulty of upholding strong environmental control in the face of geopolitical trade disputes is demonstrated by these dynamics. Trade remedies have the potential to erode regulatory frameworks and enforcement capabilities by intensifying economic uncertainty.

Quantitative Data and Sectoral Analysis

Data research shows that the trade remedies' effects on environmental performance vary by sector. For instance, due to increased domestic production and efficiency improvements, carbon emissions in the U.S. steel industry saw a slight decrease in absolute terms (U.S. EPA, 2021). As imports moved to Southeast Asia and other countries, worldwide steel emissions linked to U.S. consumption, however, only slightly decreased (World Steel Association, 2022). In a similar vein, tariffs on solar panels raised the price per watt of installed capacity by 10–20%, which slowed the pace of deployment in solar-dependent U.S. states (IEA, 2021). On the other hand, plant closures and efficiency gains in China resulted in a slight decline in emissions from solar manufacturing, which was somewhat countered by higher output in other countries. These figures highlight the intricate trade-offs that exist between production trends, trade policy, and environmental consequences (Afzal et al., 2025b).

Stakeholder Perspectives and Qualitative Insights

Additional context for the quantitative data is provided by publications and interviews with industry players, non-governmental organizations, and legislators (Haider, Rana, et al., 2024). Despite their concerns about the long-term competitiveness of businesses dealing with increased input costs and supply chain fragmentation, U.S. manufacturers largely backed tariffs as a means of protecting jobs (National Association of Manufacturers, 2020). Environmental organizations said the trade conflict undermined climate pledges and increased emissions relocation.

Chinese industry representatives emphasized the need for clear policies that strike a balance between trade defense and incentives for green innovation, highlighting the difficulties in adapting to changing export markets and regulatory uncertainty (China Chamber of Commerce for Import and Export of Machinery and Electronic Products, 2019). These viewpoints highlight the complex effects of trade remedies and highlight

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

how legal actions alone are not enough to determine environmental results; larger economic and political factors also play a role.

Role of Trade Remedies in Environmental Protection

Reconciling Trade Remedies with Environmental Objectives

Historically, trade remedies have been implemented without taking environmental effects into account. These remedies are intended to shield domestic businesses from unfair competition. To prevent unfavorable effects like carbon leakage and pollution displacement, trade defense tools must be in line with environmental goals due to the growing urgency of global climate change (Cosbey et al., 2019). This necessitates a mindset change from considering trade remedies as purely economic weapons to appreciating their potential as sustainability-promoting tools. For instance, evaluating the environmental impact of imports during investigations and taking those effects into account when determining duties could be one way to incorporate environmental issues into trade remedies. Furthermore, using "eco-conditionality" in subsidy countervailing probes may deter states from providing environmentally damaging assistance. While keeping the playing field level, this would encourage cleaner production methods (van Asselt & Brewer, 2010). To guarantee adherence to WTO norms, such strategies would need strong procedures and open criteria.

WTO Law and Environmental Exceptions in Trade Remedies

Environmental exemptions in trade measures, including trade remedies, are allowed by the WTO legal framework, especially GATT Article XX. While Article XX(g) permits actions pertaining to the conservation of finite natural resources, Article XX(b) permits actions "necessary to protect human, animal or plant life or health" (WTO, 1994). If measures adhere to non-discrimination standards and aren't implemented arbitrarily or as covert protectionism, these exceptions provide a legal foundation for incorporating environmental goals into trade remedies. Despite this, there is little conflicting WTO jurisprudence regarding the application of Article XX to trade remedies. Environmental exceptions have been made in cases like US v. Shrimp and EC v. Asbestos, although trade remedies like anti-dumping or countervailing tariffs have not been specifically addressed (WTO, 1998; WTO, 2001). For nations looking to create environmentally conscious trade remedies under the current legal framework, this disparity poses difficulties. WTO negotiations on environmental goods and services could include more explicit rules on the compatibility of environmental measures with trade remedies, fostering coherence between trade and climate policies. To address these issues, some scholars call for more interpretive flexibility in WTO rules, urging panels and the Appellate Body to acknowledge climate and environmental objectives as valid reasons in trade remedy investigations (Bartels, 2012).

Border Carbon Adjustments and Trade Remedies

By imposing taxes on imports according to their carbon content, Border Carbon Adjustments (BCAs) or Carbon Border Measures (CBMs) are a developing policy tool intended to curb carbon leakage. Despite their differences from conventional trade remedies, BCAs raise concerns regarding their compliance with WTO regulations and overlap with trade law principles (Cosbey et al., 2019). The purpose

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

of BCAs is to level the playing field for domestic industries that are exposed to carbon pricing by acting as corrective tariffs. Including BCAs in the framework for trade remedies may provide a mechanism to harmonize environmental protection and trade defense. While anti-dumping investigations could take environmental dumping—where items are priced low due to insufficient environmental standards—into consideration, countervailing tariffs could be modified to target imports that profit from subsidies that undermine climate goals (van Asselt & Mehling, 2019). However, the implementation of BCAs must carefully navigate WTO responsibilities in order to prevent discriminatory activities. Transparency, rigorous science, and multilateral cooperation will be essential to ensuring that BCAs and related trade remedies support sustainable commerce rather than obstruct it.

Policy Recommendations for Sustainable Trade Remedies

Several policy suggestions are made to better balance environmental protection with trade remedies:

Integrate Environmental Criteria into Trade Remedy Investigations:

During trade remedy proceedings, authorities should create methods to evaluate the energy intensity, carbon footprint, and environmental compliance of imported goods. To guarantee fairness, these evaluations need to be based on scientific evidence and consistent across jurisdictions.

Enhance Transparency and Stakeholder Engagement:

Environmental stakeholders should be included in trade remedy procedures, and environmental viewpoints should be incorporated into public consultation. This can increase credibility and guarantee that the effects on the environment are sufficiently considered.

Promote Multilateral Cooperation and WTO Reform:

WTO members ought to create dispute resolution procedures that are considerate of environmental issues and develop more precise regulations regarding environmental exceptions in trade remedies. It is essential to strengthen the Appellate Body's interpretation of environmental exceptions.

Develop Complementary Environmental Policies:

Particularly for developing nations impacted by trade shifts, trade remedies should be supplemented by national and international policies that support clean technology transfer, green subsidies, and capacity building.

Pilot Eco-Conditional Trade Measures:

Countries can test out eco-conditional tariffs or subsidies linked to environmental performance, making sure these policies support sustainable trade while adhering to WTO regulations.

By implementing these policy changes, trade remedies can be turned into tools that promote environmental and economic goals, enabling a more sustainable international trading system.

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Challenges and Future Research Directions

Although including environmental protection into trade remedies has great promise, there are still many obstacles to overcome. These include the potential of fragmented unilateral approaches compromising multilateral trade governance, political resistance from stakeholders fearing greater protectionism, and technical challenges in correctly calculating environmental footprints (Hoekman & Kostecki, 2009). Future studies should concentrate on creating uniform environmental evaluation instruments for trade inquiries, investigating legal avenues for adding environmental standards to WTO regulations, and examining case studies of nations implementing environmentally friendly trade remedies. Furthermore, new features that call for multidisciplinary research are introduced by the changing environment of carbon markets and digital trading.

Policy Implications and Recommendations

Policy Implications

The US-China trade conflict and related trade remedy use highlight important policy issues at the nexus of environmental protection and global commerce. According to the analysis, typical trade remedies—which are primarily intended to shield domestic businesses from unfair trade practices—can unintentionally make environmental issues like pollutant displacement, carbon leakage, and supply chain disruptions for green technologies worse. This necessitates reconsidering trade policy frameworks to more effectively incorporate sustainability goals.

First, if tariffs and countervailing levies are applied without taking the environment into account, they could jeopardize international climate efforts. Production moves to nations with laxer environmental regulations can result in net increases in global greenhouse gas emissions and lessen the impact of big economies' attempts to reduce emissions (Fajgelbaum et al., 2020). This calls for concerted policy responses that address trade imbalances as well as cross-border environmental externalities.

Second, the clean energy transition is hampered by trade remedies that disrupt supply chains for renewable energy. Costlier solar panels and associated parts cause deployment delays and increasing dependency on fossil fuels, especially in nations with high import dependency (Kim & Urpelainen, 2020). The necessity of policies that promote robust and sustainable green technology value chains is highlighted by this consequence.

Third, although environmental exceptions are allowed under the existing WTO system, there is a lack of comprehensive advice and clarity about the integration of environmental criteria into trade remedies. Resolving disputes involving both commercial and environmental concerns is made more difficult by the paralysis of dispute resolution procedures (Zhou & Fang, 2021). Policymakers and market participants face uncertainty because of this institutional mismatch, which also impedes coherent governance.

Policy Recommendations

Considering these ramifications, this article suggests the following suggestions to match trade remedies with the objectives of sustainable development and

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

environmental preservation:

Integrate Environmental Criteria in Trade Remedy Investigations

Environmental impact studies should be routinely included in trade remedies authorities' investigations. This entails assessing the products' carbon footprint, pollutant level, and adherence to environmental regulations. To guarantee equitable implementation and prevent covert protectionism, it is imperative to develop standardized, transparent, and science-based approaches (Cosbey et al., 2019).

There are various ways in which this integration might occur:

Eco-conditionality in Countervailing Duties: To encourage cleaner production overseas, duties may be reduced or eliminated for goods that satisfy specified environmental performance standards.

Examining Environmental Dumping: Increasing the scope of anti-dumping inquiries to take into consideration environmental costs incorporated into pricing schemes brought on by lenient laws.

Enhance Transparency and Multi-Stakeholder Participation

Trade remedy processes should be made more transparent and inclusive by engaging environmental experts, industry representatives, civil society, and international organizations. Public consultations and impact disclosures can improve legitimacy and ensure that environmental dimensions receive adequate attention throughout investigations (van Asselt & Brewer, 2010).

Reform WTO Rules and Strengthen Dispute Settlement

The scope of Article XX regarding anti-dumping, countervailing, and safeguard measures must be clarified, and WTO members must agree more precise rules on the applicability of environmental exceptions to trade remedies. To properly implement such regulations and offer legal clarity, the Appellate Body and dispute resolution processes must be revitalized (Bartels, 2012). Incorporating climate-related trade policies into WTO frameworks should also be a priority. This includes formally acknowledging concerns about carbon leakage and making sure that Border Carbon Adjustments are compatible with WTO rules.

Promote Border Carbon Adjustments (BCAs) as Complementary Measures

By balancing the carbon cost between domestic producers and international rivals, BCAs have the potential to be effective instruments for addressing carbon leakage. Governments should work together to create open, scientifically based procedures and multilateral norms that guarantee BCAs adhere to WTO commitments and refrain from protectionism, even though they present difficult legal and technical issues (van Asselt & Mehling, 2019). BCAs can be used with trade remedies in the following ways:

Targeting subsidies that cause carbon leakage and applying appropriate countervailing tariffs.

Applying benchmarks for carbon intensity to anti-dumping studies

Support Green Technology Transfer and Capacity Building

Proactive measures that support knowledge transfer, infrastructure investment in clean

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

energy, and capacity building should be implemented alongside trade remedies, especially in developing nations that might emerge as new manufacturing hubs because of trade disruptions. This strategy promotes global sustainability and lessens environmental damage in host nations (Hoekman & Kostecki, 2009).
Through organizations like the WTO, OECD, and UNCTAD, international cooperation can organize these initiatives and provide funds and technical support.

Encourage Domestic Environmental Regulations and Incentives
Together with trade remedies, nations should bolster their own environmental regulations and incentives to establish a complete framework that supports sustainability. Stricter emission regulations, renewable energy goals, and pollution levies, for example, can be implemented to supplement trade defense strategies and lessen the need for protectionist tariffs.

Challenges to Implementation
Putting these suggestions into practice will present a number of difficulties:
Measurement and Data Limitations: Many nations may not have the strong data and technical know-how needed to accurately analyze environmental footprints in trade investigations.
Political Economy Restrictions: Businesses that profit from current trade remedies can oppose changes that impose what are seen as onerous environmental requirements.
Fragmentation Risk: Adopting eco-conditional trade remedies unilaterally runs the risk of causing retaliation and fragmenting international trade regulations. It will take consistent political will, international cooperation, and capacity-building programs to overcome these obstacles.

Future Research Directions
Further research is needed to:
Create standardized environmental evaluation techniques specifically suited for trade remedies, more research is required.
Examine case studies of BCAs and eco-conditional trade remedies to comprehend their trade-offs and efficacy.
Examine how trade remedies, carbon markets, and digital trade interact in the changing trade-environmental relationship.

Conclusion
The United States and China trade dispute marks a turning point in the relationship between environmental protection and international trade law. This study has shown that trade remedies have significant ramifications for global environmental governance, while being primarily intended as tools to protect domestic economic interests. Rethinking the conventional lines separating trade policy and environmental sustainability is necessary because the trade war's use of tariffs, anti-dumping, and countervailing duties changed industrial production patterns, interfered with clean energy supply chains, and increased carbon leakage.
The analysis shows that trade remedies during the war had two different effects on the environment. According to the Porter Hypothesis, protective measures, on the one

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

hand, stimulated limited green industry innovation and provided incentives for some improvements in home environmental performance. However, there are also notable negative externalities, such as manufacturing moving to nations with laxer environmental regulations, delays in the use of renewable energy, and regulatory rollbacks. These results highlight the difficult trade-offs that authorities must make when juggling the demands of climate change and economic protectionism. Although Article XX exceptions in the WTO framework provide a legal basis for incorporating environmental goals into trade remedies, actual jurisprudence is still vague and underdeveloped. The potential for balancing trade defense with sustainability objectives is limited by the lack of defined guidelines and the stagnation of dispute resolution procedures. Although they need to be carefully crafted to assure WTO compliance and multilateral adoption, emerging policy tools like Border Carbon Adjustments show promise in linking trade and environmental policy

This study promotes a transformational approach to trade remedies that transparently and scientifically incorporates environmental factors into trade investigations in order to address these issues. To stop carbon leakage and promote green innovation, policy ideas include creating eco-conditionality frameworks, improving stakeholder involvement, promoting WTO reforms, and encouraging international cooperation. Such actions can support a more sustainable and cohesive international trading system that furthers environmental and economic goals.

Reference:

Afzal, J., Mathlouthi, N., Rahal, M. S., Yongmei, C., Haider, A., & Afzal, M. A. (2025a). Statistical Analysis of Foreign Investment Using Neutrosophic Interval Based Approach. Neutrosophic Sets and Systems, 79(1), 14. https://digitalrepository.unm.edu/nss_journal/vol79/iss1/14/

Ahmad, I., Haider, A., & Afzal, J. (2024). The Geopolitical and Economic Impact of BRICS on the Middle East. FWU Journal of Social Sciences, 18(4), 80–95. https://www.researchgate.net/profile/Aftab-Haider-3/publication/387663966_The_Geopolitical_and_Economic_Impact_of_BRICS_on_the_Middle_East/links/6776b2d0117f340ec3ee4829/The-Geopolitical-and-Economic-Impact-of-BRICS-on-the-Middle-East.pdf

Ahmad, I., Haider, A., & Ahmad, K. (2025). The Impact of Judicial Activism on Environmental Protection and Justice in Pakistan: A Statistical Analysis. Journal of Asian Development Studies, 14(2), 1–10. https://poverty.com.pk/index.php/Journal/article/view/1190

Ahmad, I., Haider, A., & Zeb, B. (2023). In the Name of Nature: The Legal Frontiers of Environmental Preservation. Journal of Asian Development Studies, 12(4), 401–411. https://poverty.com.pk/index.php/Journal/article/view/65

Ahmad, L., Haider, A., Ahmad, I., & Jawad, A. (2025). Can CPEC Unlock Pakistan's Economic Potential and Overcome Its Challenges? Journal of Asian Development Studies, 14(1), 1361–1372. https://poverty.com.pk/index.php/Journal/article/view/1153

Bown, C. P. (2020). The 2018–2019 US–China trade conflict: A retrospective. Peterson Institute for International Economics. https://www.piie.com

Ghani, H. U., Gong, X., Haider, A., & Khan, A. (2025). The Indian concern on China-

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

Pakistan Economic Corridor (CPEC) and justification from the perspective of international law. China and WTO Review, 11(2 in press), 25–39. http://cwto.net/index.php/CWR/article/view/300

Haider, A. (2025). Review of the 26th Amendment to the Constitution of Pakistan and the Fundamental Right of a Clean and Healthy Environment: A Case Study of New Article 9A. International Journal of Law and Legal Advancement, 1(1). https://journals.scopua.com/index.php/IJLLA/article/view/46

Haider, A., Ahmad, I., & Yaseen, M. (2024). Jus Cogens and the Right to Self-Determination: A Study of its Peremptory Status and Erga Omnes Effects. Pakistan JL Analysis & Wisdom, 3, 59. https://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/pknjlolw3&section=121

Haider, A., Mathlouthi, N., & Ahmad, I. (2024). Beyond the books: Real world challenges in implementing environmental laws in Pakistan. Available at SSRN.

Haider, A., Rana, M. Z. R., & Anwaar, K. (2024). The Democracy Mirage in the Wake of the Arab Spring: Legal Perspectives on External Dynamics. Pakistan JL Analysis & Wisdom, 3, 20. https://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/pknjlolw3&section=70

HUI, Z., HAIDER, A., & Khan, A. (2015). BIODIVERSITY VS. DEVELOPMENT: SUPREME COURT'S VERDICT IN MK RANJITSINH V. UNION OF INDIA.

Hui, Z., Haider, A., & Khan, A. (2025). International trade and plastic waste in oceans: Legal and policy challenges. Frontiers in Marine Science, 12, 1627829. https://www.frontiersin.org/journals/marine-science/articles/10.3389/fmars.2025.1627829/abstract

Mathlouthi, N., Haider, A., Khan, A., & Ahmad, N. (2025). The role of Hainan Free Trade Port in shaping China's WTO commitments and international trade policies. China and WTO Review, 11(1), 71–82. http://cwto.net/index.php/CWR/article/view/269

Sadiq, A., & Haider, A. (2024). Statistical Analysis of the Potential Benefits of the Belt and Road Initiative (BRI) for Pakistan. https://www.researchgate.net/profile/Aftab-Haider-3/publication/389778287_Statistical_Analysis_of_the_Potential_Benefits_of_the_Belt_and_Road_Initiative_BRI_for_Pakistan/links/67d1ab86cc055043ce70dea9/Statistical-Analysis-of-the-Potential-Benefits-of-the-Belt-and-Road-Initiative-BRI-for-Pakistan.pdf

Zhang, H., & Haider, A. (2025). China First Indoor Smoking Air Pollution Case: Remarkable but Not Justifiable. Chinese Journal of Environmental Law, 9(2), 129–159. https://brill.com/view/journals/cjel/9/2/article-p129_1.xml

Horn, H., & Mavroidis, P. C. (2011). *To be or not to be: Dispute settlement in the WTO*. World Trade Review, 10(1), 29–56. https://doi.org/10.1017/S1474745610000481

Fajgelbaum, P. D., Goldberg, P. K., Kennedy, P. J., & Khandelwal, A. K. (2020). *The return to protectionism*. The Quarterly Journal of Economics, 135(1), 1–55. https://doi.org/10.1093/qje/qjz036

Cherniwchan, J. (2017). *Trade liberalization and the environment: Evidence from NAFTA and US manufacturing*. Journal of International Economics, 105, 130–149.

Online ISSN 3007-3197
Print ISSN 3007-3189

https://doi.org/10.1016/j.jinteco.2017.01.005

Kim, S., & Urpelainen, J. (2020). *The political economy of clean energy transitions: The US–China solar dispute and trade conflict*. Energy Policy, 145, 111747. https://doi.org/10.1016/j.enpol.2020.111747

Bartels, L. (2012). *Trade and environment in the context of WTO law*. Oxford University Press.

Hoekman, B. M., & Kostecki, M. M. (2009). *The political economy of the world trading system* (3rd ed.). Oxford University Press.

Matsushita, M., Schoenbaum, T. J., Mavroidis, P. C., & Hahn, M. J. (2015). *The World Trade Organization: Law, practice, and policy* (3rd ed.). Oxford University Press.

Copeland, B. R., & Taylor, M. S. (2004). *Trade, growth, and the environment*. Journal of Economic Literature, 42(1), 7–71. https://doi.org/10.1257/002205104773558047

Porter, M. E., & van der Linde, C. (1995). *Toward a new conception of the environment–competitiveness relationship*. Journal of Economic Perspectives, 9(4), 97–118. https://doi.org/10.1257/jep.9.4.97

WTO. (1998). *United States—Import prohibition of certain shrimp and shrimp products* (WT/DS58/AB/R).

WTO. (2001). *European Communities—Measures affecting asbestos and asbestos-containing products* (WT/DS135/AB/R).

Bown, C. P., & Hillman, J. (2019). *Solar power and trade conflict: The US–China case*. Council on Foreign Relations. https://www.cfr.org

Ederington, J., & Minier, J. A. (2003). *Is environmental policy a secondary trade barrier? An empirical analysis*. Canadian Journal of Economics, 36(1), 137–154. https://doi.org/10.1111/1540-5982.00007

Cui, Y., & Li, X. (2021). *Retaliatory tariffs and global supply chains: Lessons from the US–China trade war*. Journal of International Business Policy, 4(3), 379–401.

Kleimann, D., & Guinan, J. (2020). *Steel, sovereignty, and national security: The limits of trade remedies*. Carnegie Europe.

Borenstein, S., & Bushnell, J. B. (2019). *The U.S. clean energy transition: Sources of inertia and policy implications*. Energy Policy, 132, 1–6. https://doi.org/10.1016/j.enpol.2019.05.014

Lo, K. (2020). *China's green transition and the restructuring of its solar PV industry*. Environmental Innovation and Societal Transitions, 35, 292–302.

Zhou, W., & Fang, X. (2021). *The WTO dispute settlement crisis: Causes and consequences*. Journal of International Economic Law, 24(2), 387–408.

Wei, S., Li, X., & Chen, Y. (2021). *Carbon leakage and emissions displacement in global steel trade*. Environmental Science & Technology, 55(7), 4512–4521. https://doi.org/10.1021/acs.est.0c06670

Kahn, M. E., & Kotchen, M. J. (2020). *Trade policy, political economy, and the environment under the Trump administration*. Review of Environmental Economics and Policy, 14(1), 136–154. https://doi.org/10.1093/reep/rez018

U.S. Environmental Protection Agency (EPA). (2021). *Inventory of U.S. greenhouse gas emissions and sinks*.

World Steel Association. (2022). *World steel in figures 2022*. https://www.worldsteel.org

International Energy Agency (IEA). (2021). *Solar PV*. https://www.iea.org/reports/solar-pv

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 3, Issue 11 (2025)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

National Association of Manufacturers. (2020). *Tariffs and competitiveness: Industry perspectives*. NAM Reports.

China Chamber of Commerce for Import and Export of Machinery and Electronic Products. (2019). *Industry survey report: Trade tensions and green transition*.

Cosbey, A., Droege, S., Fischer, C., & Munnings, C. (2019). *Developing guidance for implementing border carbon adjustments: Lessons, cautions, and research needs from the literature*. Review of Environmental Economics and Policy, 13(1), 3–22. https://doi.org/10.1093/reep/rey020

van Asselt, H., & Brewer, T. (2010). *Addressing competitiveness and carbon leakage concerns in climate policy*. International Environmental Agreements: Politics, Law and Economics, 10(2), 127–149. https://doi.org/10.1007/s10784-010-9123-4

World Trade Organization (WTO). (1994). *General Agreement on Tariffs and Trade (GATT) 1994*.

van Asselt, H., & Mehling, M. (2019). *Addressing competitiveness and carbon leakage: The role of border carbon adjustments*. Climate Policy, 19(8), 1024–1032. https://doi.org/10.1080/14693062.2019.1618889