Green Trade Wars vs. Green Cooperation: Environmental Diplomacy at the Crossroads of Economic Interests in the Digital Age

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Abstract. This paper examines the paradox of environmental diplomacy in the digital age: while global climate challenges demand international cooperation, the pursuit of green economic advantages increasingly triggers protectionist responses resembling traditional trade wars. Through qualitative analysis and literature review of policy documents from 2020-2025, this study analyzes recent environmental trade measures including the EU's Carbon Border Adjustment Mechanism (CBAM), the US Inflation Reduction Act, and China's green technology export restrictions.

The research reveals how environmental diplomacy has become weaponized as economic statecraft, with policies ostensibly addressing climate change functioning as disguised protectionism favoring domestic green industries. Digital technologies—carbon tracking systems, green certification platforms, and supply chain monitoring—paradoxically enable both greater environmental transparency and sophisticated green protectionism.

The paper argues that current environmental diplomacy operates within a "green security dilemma," where unilateral policies intended to enhance national competitiveness undermine collective climate action. This dynamic is pronounced in the digital realm, where control over green technologies becomes geopolitical leverage.

The study proposes "cooperative environmental competitiveness" as a framework reconciling environmental protection with fair economic competition, recommending multilateral governance mechanisms to distinguish genuine environmental measures from disguised protectionism. As digital transformation accelerates green transition, the international community faces a critical choice between fragmented green nationalism and integrated global environmental governance.

Keywords: environmental diplomacy, economic diplomacy, green protectionism, digital transformation, trade wars, sustainable development.

Introduction

The contemporary landscape of international relations is witnessing an unprecedented paradox: while the urgency of global climate challenges necessitates unprecedented levels of international cooperation, nations are increasingly employing environmental policies as instruments of economic warfare. This phenomenon, emerging prominently in the digital age, represents a fundamental transformation in how environmental diplomacy intersects with economic statecraft and technological competition.

The traditional paradigm of environmental diplomacy, rooted in multilateral cooperation and shared responsibility for global commons, is being challenged by the rise of what can be termed "green protectionism." This new reality is exemplified by major policy initiatives that have emerged with significant economic implications. The European Union's Carbon Border Adjustment Mechanism (CBAM), which entered its transitional phase on October 1, 2023, and will apply in its definitive regime from 2026, represents a landmark environmental policy that will eventually capture more than 50% of emissions in

EU ETS covered sectors. Similarly, the United States' Inflation Reduction Act has mobilized over $115 billion in manufacturing investments and created over 109,000 jobs in clean energy sectors since its enactment in August 2022. Meanwhile, China has implemented strategic export restrictions on critical metals including gallium, germanium, antimony, titanium, tungsten, lithium, molybdenum, and indium, with antimony shipments from China dropping 97% and prices rising 200% since restrictions were imposed.

The digital transformation has added a new dimension to this complexity. Advanced technologies including carbon tracking systems, green certification platforms, and supply chain monitoring tools have created unprecedented opportunities for environmental transparency and accountability, with more than 5 billion users now connected worldwide. However, these same digital innovations have paradoxically enabled more sophisticated forms of green protectionism. The ICT sector itself emitted an estimated 0.69 to 1.6 gigatons of CO2 equivalents in 2020, corresponding to 1.5% to 3.2% of global greenhouse gas emissions, while simultaneously enabling nations to disguise economic interests behind the veneer of environmental responsibility.

This emerging "green security dilemma" presents a critical challenge for the international community. CBAM functions as an import tariff that encourages production and trade within the EU, with benefits of a carbon tax that can help limit carbon emissions, while EU ETS allowances have been trading in the range of €74–100 (US$86–116) per metric ton of CO2 over the last two years. Unilateral environmental policies, while potentially beneficial for domestic green industries and national competitiveness, risk undermining the collective action necessary for effective global climate response. The digital realm has amplified this tension, as control over green technologies increasingly translates into geopolitical leverage, with China's clean-energy exports in 2024 alone cutting overseas CO2 by 1% (220 million tonnes).

The stakes of this dynamic extend far beyond traditional trade disputes. Global trade volumes soared to $32 trillion in 2022, and as the globe pivots towards a carbon-neutral economic landscape, the trade arena must adapt. As the world faces accelerating climate change and the imperative for rapid decarbonization, the international community stands at a crossroads. Two-thirds of developing countries have already included technology in their climate action strategies, yet nearly three billion people still need to be digitally connected. The choice between fragmented green nationalism and integrated global environmental governance will fundamentally shape both the trajectory of climate action and the future of international economic relations.

This paper addresses this critical juncture by examining how environmental diplomacy has evolved in the digital age, analyzing the mechanisms through which climate policies have become tools of economic statecraft, and proposing pathways toward a more cooperative and effective approach to global environmental governance. Through comprehensive analysis of recent policy developments and their implications, this study aims to contribute to understanding how the international community can reconcile the dual imperatives of environmental protection and fair economic competition in an increasingly digital and interconnected world.

Methods

This study employs a qualitative research approach using library research methodology to examine the paradox of environmental diplomacy in the digital age. The qualitative methodology is particularly suitable for this research as it allows for in-depth analysis of complex policy phenomena, exploration of relationships between environmental diplomacy and economic statecraft, and interpretation of the nuanced impacts of digital transformation on international environmental governance (Creswell & Poth, 2018). The library research method was selected because it enables comprehensive examination of existing literature, policy documents, and empirical data without requiring primary data collection. This approach is especially appropriate for analyzing recent policy developments and their implications, as it allows for systematic review of multiple sources and perspectives on contemporary environmental diplomacy challenges (Kumar, 2019).

The research design follows a comprehensive document analysis framework that integrates multiple levels of analysis. Primary data sources include official policy documents and government publications from key actors in environmental diplomacy, with particular emphasis on policy statements, regulatory frameworks, and implementation guidelines. The study draws extensively from European Union sources, incorporating

official EU policy documents on the Carbon Border Adjustment Mechanism (CBAM), detailed regulations, implementation guidelines, and progress reports from the European Commission's Directorate-General for Taxation and Customs Union. These documents provide critical insights into the EU's regulatory approach to environmental diplomacy and its implications for global trade relationships.

United States government documentation forms another crucial component of the primary source base, comprising official materials on the Inflation Reduction Act from multiple federal agencies. The U.S. Department of Treasury, Department of Energy, and Environmental Protection Agency provide implementation statistics, impact assessments, and policy guidance documents that illuminate the American investment-based strategy for green transition. This material is complemented by Indonesian government sources that encompass policy documents from the Ministry of Environment and Forestry, Ministry of Trade, and Ministry of Communication and Information Technology, among other relevant agencies. These Indonesian sources address green economy initiatives, digital transformation policies, and strategic responses to international environmental regulations such as CBAM, including the country's Enhanced Nationally Determined Contributions (NDC), the Low Carbon Development Indonesia (LCDI) framework, and the Digital Indonesia Roadmap 2021-2024.

Regional documentation through ASEAN provides essential context for understanding multilateral environmental cooperation in Southeast Asia. The analysis incorporates official ASEAN declarations and policy frameworks, with particular attention to the ASEAN Declaration on Environmental Sustainability (2007) and comprehensive documentation related to Indonesia's ASEAN Chairmanship in 2023, which focused specifically on accelerating green economy initiatives across the region. International organization reports from multilateral institutions including the United Nations Conference on Trade and Development (UNCTAD), World Bank, International Energy Agency (IEA), and UN PAGE Partnership offer additional perspectives on digital transformation and environmental governance, with specific analytical focus on Indonesia and Southeast Asia as representative cases of developing country responses to global environmental policy shifts.

The study incorporates secondary sources through peer-reviewed academic articles, policy briefs, and analytical reports published between 2020-2025 to ensure currency and relevance to recent developments in environmental diplomacy. Research from established policy institutions including the Center for Strategic and International Studies (both Jakarta and Washington offices), Peterson Institute for International Economics (PIIE), Brookings Institution, and regional analytical bodies such as the East Asia Forum provides critical academic and policy analysis perspectives. This temporal focus ensures that the analysis captures the most recent policy developments and their immediate implications while maintaining sufficient historical context to understand evolving trends in environmental diplomacy.

The analytical framework employs thematic analysis to identify and analyze patterns within the collected data, following established qualitative research methodologies (Braun & Clarke, 2019). The analysis is structured around three interconnected thematic areas that emerged from preliminary data review. The first theme examines green protectionism mechanisms, analyzing how environmental policies increasingly function as sophisticated tools of economic statecraft that serve national competitive interests while ostensibly addressing global environmental challenges. The second thematic area focuses on digital transformation impact, investigating how digital technologies simultaneously enable greater environmental transparency and accountability while also facilitating more subtle forms of green protectionism through enhanced monitoring and control capabilities. The third theme explores the tension between cooperative and competitive frameworks, examining how unilateral environmental policies create conflicts with traditional multilateral cooperation approaches and analyzing the resulting implications for global environmental governance.

Comparative policy analysis forms a central methodological component, examining different national and regional approaches to environmental diplomacy across major economic powers and regional groupings. This comparative framework specifically contrasts the European Union's regulatory approach through CBAM and its cascading implications for developing countries like Indonesia, with the United States' investment-based strategy through the Inflation Reduction Act that emphasizes domestic industrial policy and technological innovation. The analysis also examines China's strategic use of export restriction mechanisms on critical minerals as a form of environmental-economic statecraft, while investigating

Indonesia's emerging role in developing green economy initiatives within the ASEAN framework, including its leadership as ASEAN Chair in 2023 and its strategic responses to European environmental regulations. Regional cooperation mechanisms within ASEAN for environmental sustainability provide additional comparative context for understanding alternative approaches to environmental diplomacy.

The document analysis procedure follows systematic qualitative research protocols established by Bowen (2009), beginning with comprehensive scanning of policy documents to identify sections relevant to the research questions. The process continues with thorough reading and coding of documents to understand policy context, implementation mechanisms, and stated objectives, while paying particular attention to gaps between stated environmental goals and actual economic or strategic outcomes. The final interpretive phase situates findings within broader theoretical frameworks of environmental diplomacy, economic statecraft, and digital governance to develop comprehensive understanding of how these policies function in practice and their implications for future environmental cooperation.

The study's theoretical foundation integrates three complementary perspectives that provide analytical depth and explanatory power. Environmental diplomacy theory, drawing from established scholarship by Najam (2005) and Betsill & Corell (2008), provides the foundational framework for understanding how traditional concepts of environmental cooperation are being challenged and transformed by economic and technological factors. This perspective helps explain the evolution from collaborative environmental governance toward more competitive and nationalistic approaches. Economic statecraft theory, incorporating insights from Baldwin (1985) and Blackwill & Harris (2016), offers analytical tools for understanding how environmental policies serve broader economic and strategic objectives beyond their stated environmental purposes. This theoretical lens is particularly valuable for analyzing how green policies function as instruments of national economic competition. Digital governance theory, applying emerging frameworks from Zuboff (2019) and Parker et al. (2021), provides critical insights into how digital transformation intersects with environmental policy implementation, creating new opportunities for both cooperation and control in global environmental governance.

The research scope encompasses policy developments from 2020-2025, with particular emphasis on post-pandemic environmental policy responses and the acceleration of digital transformation during this period. This temporal focus captures a critical period in environmental diplomacy when the COVID-19 pandemic accelerated both digital adoption and renewed focus on economic resilience, leading to new forms of green protectionism. While the study examines global environmental diplomacy trends across multiple regions and international forums, it concentrates analytical attention on major economies including the United States, European Union, and China, as well as their interactions in multilateral settings. Special analytical focus is given to Indonesia as a representative developing economy and influential ASEAN member state, examining its evolving position in global environmental diplomacy, its strategic responses to international green policies, and its leadership role in regional environmental cooperation within Southeast Asia.

The study acknowledges several methodological limitations that may affect the comprehensiveness and generalizability of findings. Data availability presents challenges as some recent policy implementations may have limited available impact data, particularly regarding the actual economic and environmental outcomes of newly implemented measures like CBAM or the full effects of the Inflation Reduction Act. Language constraints may limit the analysis as it is primarily conducted using English-language sources, potentially missing important policy documents and analyses published in other languages, particularly those from non-English speaking developing countries. The dynamic policy environment poses additional challenges as rapid policy changes, particularly in response to evolving geopolitical tensions and economic conditions, may affect the currency of some analyses by the time of publication.

Ethical considerations for this research are straightforward as the study relies exclusively on publicly available documents and secondary sources, meaning no human subjects are involved and no formal ethical approval is required. However, the research maintains strict academic integrity standards by properly attributing all sources, avoiding misrepresentation of policy positions or data, and clearly distinguishing between factual reporting and analytical interpretation. The study takes particular care to present policy positions from different countries and organizations fairly, while acknowledging potential biases in source materials and the researchers' own analytical perspectives.

Reliability and validity are ensured through multiple methodological safeguards. Reliability is maintained through systematic documentation of all sources, consistent application of analytical frameworks across different cases and time periods, and transparent reporting of methodology that would allow other researchers to replicate the analysis. The study maintains detailed records of all document sources, search procedures, and analytical decisions to support reliability. Validity is enhanced through triangulation of sources, drawing from multiple types of documents including official government publications, international organization reports, academic analyses, and policy think tank research. The use of official government documents and established institutional reports provides authoritative source material, while comparison across multiple policy contexts and timeframes helps validate findings and identify consistent patterns versus isolated incidents. The combination of primary policy documents with secondary analytical sources allows for both descriptive accuracy and interpretive depth in understanding the complex dynamics of contemporary environmental diplomacy.

Results and Discussion

The Emergence of Green Protectionism as Economic Statecraft

The analysis of contemporary environmental policies reveals a fundamental transformation in how nations approach environmental diplomacy (Apriliani et al., 2024), with increasingly sophisticated mechanisms that blend environmental objectives with economic strategic interests. This transformation represents what can be characterized as the weaponization of environmental policy, where climate measures serve dual purposes as both environmental protection tools and instruments of economic competition. The European Union's Carbon Border Adjustment Mechanism exemplifies this trend, functioning simultaneously as a climate policy designed to prevent carbon leakage and as a trade instrument that provides competitive advantages to EU producers while creating barriers for imports from countries with less stringent environmental standards.

The implementation of CBAM demonstrates how environmental regulations can systematically restructure global trade relationships. With EU ETS allowances trading in the range of €74–100 per metric ton of CO2, the mechanism creates substantial cost differentials for exporters from developing countries. Indonesia's experience illustrates these dynamics particularly clearly, as the country faces potential tariff increases of 16.8% for iron and steel exports, despite its domestic carbon tax of only Rp. 30,000 per ton being significantly lower than EU standards. This disparity reveals how environmental policies can inadvertently create technological and financial barriers that favor developed economies with established low-carbon infrastructure over developing nations still building their environmental governance frameworks.

The United States' approach through the Inflation Reduction Act represents a different manifestation of green protectionism, utilizing massive domestic investment incentives rather than border adjustments to achieve strategic objectives. The Act's mobilization of over $115 billion in manufacturing investments and creation of more than 109,000 clean energy jobs demonstrates how environmental policy can serve industrial policy goals. The legislation's emphasis on domestic content requirements and "Buy American" provisions reveals how green transition policies can simultaneously advance climate objectives and strengthen national economic competitiveness. This approach has triggered what the World Economic Forum describes as a "starting gun" effect, with other nations developing similar programs that risk hardening economic divides rather than fostering collaborative climate action.

China's strategic use of export restrictions on critical minerals represents perhaps the most explicit example of environmental resources being leveraged for geopolitical purposes. The dramatic reduction in antimony shipments (97% decrease) and corresponding price increases (200% rise) following export restrictions demonstrates how control over environmentally critical materials can be used as economic statecraft. The expansion of these restrictions to include tungsten, lithium, molybdenum, and indium reflects a systematic approach to using environmental resource control as diplomatic leverage. These restrictions affect global clean energy supply chains, creating dependencies that nations must navigate while pursuing their own environmental objectives.

Digital Transformation: Enabler and Complicator of Environmental Governance

Digital technologies have emerged as both powerful enablers of environmental transparency and sophisticated tools for implementing green protectionism. The proliferation of carbon tracking systems, supply chain monitoring platforms, and digital certification mechanisms has created unprecedented

capabilities for measuring and managing environmental impacts. Data-driven digital transformation in supply chains demonstrates significant potential for carbon reduction, with empirical evidence showing that companies can achieve higher carbon reduction while improving efficiency and economic performance through enhanced supply chain carbon transparency.

The integration of Internet of Things (IoT), artificial intelligence, and big data analytics enables real-time monitoring of environmental impacts across complex global supply chains. Digital tracing technologies can now authenticate products' environmental footprints, record carbon emissions at every stage of production, and provide detailed lifecycle assessments that were previously impossible to obtain. According to industry surveys, 68% of supply chain executives view traceability as "very or extremely important," indicating the growing recognition of digital transparency as a competitive necessity rather than merely a compliance requirement.

However, the same technologies that enable environmental transparency also facilitate more sophisticated forms of green protectionism. Digital monitoring systems can be designed to favor domestic producers through selective standards, differential reporting requirements, or preferred access to green certification platforms. The complexity of digital environmental governance creates opportunities for subtle discrimination that may be difficult to detect or challenge through traditional trade dispute mechanisms. Countries with advanced digital infrastructure may gain systematic advantages in meeting evolving environmental compliance requirements, while those with less developed technological capabilities face increasing barriers to market access.

The role of digital platforms in environmental governance extends beyond simple monitoring to encompass predictive analytics, automated compliance systems, and intelligent resource optimization. Corporate digital transformation in China's manufacturing sector demonstrates that companies leveraging advanced digital technologies can achieve significant carbon emission reductions through optimized production processes, enhanced innovation efficiency, and improved resource allocation. These capabilities create competitive advantages that may be difficult for less digitally advanced economies to replicate, potentially reinforcing existing technological and economic disparities under the guise of environmental protection.

Blockchain technology represents a particularly significant development in digital environmental governance, offering immutable records of carbon emissions and supply chain environmental impacts. While blockchain enhances transparency and accountability, it also creates new forms of technological dependence and may favor economies with advanced digital infrastructure. The emergence of blockchain-based carbon credit systems and automated smart contracts for environmental compliance creates sophisticated mechanisms for environmental governance that may inadvertently exclude participants without sufficient technological capabilities.

Indonesia's Strategic Position in the Green Security Dilemma

Indonesia's experience navigates the complex intersection of environmental commitment and economic sovereignty, providing crucial insights into how developing economies respond to the emerging green security dilemma. As both the world's fourth most populous nation and a major ASEAN economy, Indonesia's approach to environmental diplomacy reflects broader challenges facing developing countries in balancing climate commitments with economic development needs. The country's digital economy, projected to exceed $130 billion by 2025 with internet penetration at 79.5%, positions it uniquely to leverage digital technologies for environmental governance while potentially facing exclusion from digitally-mediated green markets.

Indonesia's response to CBAM illustrates the strategic calculations required of developing economies facing green protectionism. With almost 20% of exports to the EU potentially affected by CBAM, Indonesia has pursued multiple adaptive strategies including bilateral negotiations through the EU-ASEAN Joint Task Force, development of domestic carbon pricing mechanisms, and strategic partnerships with other developing economies facing similar challenges. The country's launch of the first Emissions Trading System in Southeast Asia in February 2023 represents an attempt to develop indigenous environmental governance capabilities while maintaining competitiveness in global markets.

The Indonesian government's recognition that qualifying for CBAM exemptions requires substantial upgrades to environmental governance systems reveals the broader challenge of technological and

institutional capacity building required for participation in the emerging green economy. Indonesia's commitment to reducing emissions by 39-42% by 2030 and achieving net zero by 2060, while launching comprehensive digital transformation initiatives, demonstrates the complex balancing act required to maintain both environmental credibility and economic competitiveness.

Indonesia's role as ASEAN Chair in 2023 provided opportunities to shape regional approaches to environmental diplomacy, with the theme "ASEAN Matters: Epicentrum of Growth" reflecting attempts to balance economic prosperity with environmental sustainability. The regional dimension of Indonesia's environmental diplomacy reveals how middle powers can leverage multilateral frameworks to develop alternative approaches to environmental governance that may provide more equitable outcomes than unilateral measures imposed by major economies.

The country's experience with EU environmental regulations, including both CBAM and the EU Deforestation Regulation (EUDR), illustrates how developing economies must simultaneously navigate multiple overlapping environmental policy frameworks while maintaining access to crucial export markets. Indonesia's palm oil industry, which faces particular challenges from EU environmental regulations, demonstrates how environmental diplomacy intersects with specific sectoral interests and traditional export dependencies. The need to balance environmental compliance with economic sovereignty has led Indonesia to advocate for recognition of "Common but Differentiated Responsibilities" in international environmental agreements, reflecting broader developing country concerns about environmental governance that fails to account for different developmental stages and capabilities.

Regional Cooperation and Competitive Dynamics in ASEAN

The Association of Southeast Asian Nations represents a crucial testing ground for alternative approaches to environmental diplomacy that emphasize cooperative rather than competitive frameworks. ASEAN's approach to environmental governance, embodied in declarations such as the ASEAN Declaration on Environmental Sustainability (2007), reflects attempts to develop regionally-specific responses to global environmental challenges while maintaining the organization's traditional emphasis on consensus-building and non-interference. However, the potential for ASEAN to lose up to 35% of its regional GDP by 2050 due to climate change creates powerful incentives for more ambitious environmental action that may challenge traditional approaches to regional cooperation.

Indonesia's leadership in promoting green economy initiatives within ASEAN during its 2023 chairmanship demonstrates how regional frameworks can be leveraged to develop collective responses to green protectionism. The emphasis on involving regional micro, small, and medium enterprises (MSMEs) in green economy implementation reflects recognition that environmental transitions must be inclusive to be sustainable. With 90% of ASEAN's businesses being MSMEs, the success of regional environmental initiatives depends on developing support mechanisms that enable smaller enterprises to participate in green transitions rather than being excluded by technological or financial barriers.

The development of regional environmental cooperation mechanisms within ASEAN provides alternatives to the competitive dynamics encouraged by unilateral environmental measures. Proposals for mutual recognition of emission reduction credits between ASEAN and the EU, expansion of regional carbon markets, and coordination of environmental standards represent attempts to create more cooperative frameworks for environmental governance. These initiatives reflect broader recognition that environmental challenges require collaborative solutions that account for different developmental stages and capabilities across the region.

However, ASEAN's environmental cooperation also faces significant challenges from external pressures and internal disparities. The impact of green protectionism measures from major economies creates differential pressures on ASEAN member states depending on their export profiles, technological capabilities, and environmental governance systems. Countries with more advanced environmental governance systems may benefit from preferential access to green markets, while those with less developed capabilities may face increasing marginalization. These dynamics threaten ASEAN's traditional emphasis on consensus and equal treatment among member states.

The potential for Indonesia's evolving climate stance, including its new BRICS membership and changing relationships with major powers, to influence broader ASEAN environmental cooperation illustrates how regional dynamics are shaped by external geopolitical pressures. Indonesia's influential position within

ASEAN means that changes in its environmental diplomacy approach could significantly impact regional cooperation frameworks and potentially encourage other member states to adopt more nationalist or competitive approaches to environmental governance.

Implications for Global Environmental Governance

The analysis reveals fundamental tensions between the cooperative multilateral frameworks traditionally associated with environmental diplomacy and the competitive dynamics introduced by green protectionism and digital transformation. The emergence of environmental policies as tools of economic statecraft creates new challenges for global environmental governance that extend beyond traditional concerns about free riding or collective action problems. The current trajectory suggests a risk of environmental governance fragmentation, where different regions or economic blocs develop incompatible standards and requirements that serve their strategic interests rather than optimal environmental outcomes.

The digital dimension of environmental governance creates additional complexities by introducing technological dependencies and capabilities gaps that may systematically favor certain economies over others. The concentration of advanced digital technologies in developed economies, combined with the increasing importance of digital systems for environmental compliance and monitoring, risks creating new forms of technological colonialism disguised as environmental protection. Developing economies may find themselves increasingly dependent on digital infrastructure and standards controlled by more advanced economies, limiting their sovereignty in environmental governance.

The case of Indonesia and ASEAN's response to these challenges suggests potential pathways for more equitable environmental governance that acknowledge different developmental stages and capabilities while maintaining ambitious environmental objectives. Regional cooperation frameworks may provide alternatives to unilateral measures that better balance environmental effectiveness with economic equity. However, the success of such frameworks depends on broader international recognition and support for cooperative rather than competitive approaches to environmental governance.

The implications of these findings extend beyond environmental policy to broader questions about the future of international economic governance in an era of increasing technological sophistication and environmental urgency. The integration of environmental objectives with economic statecraft represents a fundamental shift in international relations that requires new frameworks for understanding and managing the intersection of environmental protection and economic competition. The challenge facing the international community is developing governance mechanisms that can harness the beneficial potential of digital technologies and environmental innovation while preventing their use as tools of economic discrimination or technological exclusion.

Conclusion

This study reveals a fundamental transformation in environmental diplomacy that challenges traditional assumptions about international environmental cooperation. The research demonstrates that contemporary environmental policies have evolved into sophisticated instruments of economic statecraft that simultaneously serve climate objectives and national competitive interests, creating what we term the "green security dilemma" in international relations.

The analysis of major environmental policy initiatives including the EU's Carbon Border Adjustment Mechanism, the US Inflation Reduction Act, and China's critical minerals export restrictions provides clear evidence of how environmental measures function as tools of economic competition. The CBAM's impact on developing countries like Indonesia, potentially increasing tariff rates by 16.8% for iron and steel exports despite bilateral trade worth €32.6 billion, illustrates how environmental regulations can systematically advantage developed economies while marginalizing developing nations. The US approach through massive domestic investment totaling over $115 billion and creating 109,000+ clean energy jobs demonstrates how environmental policy serves industrial policy objectives. China's strategic restrictions resulting in 97% reductions in antimony shipments and 200% price increases reveal how environmental resource control functions as diplomatic leverage.

Digital transformation emerges as the critical factor reshaping environmental governance, creating unprecedented monitoring and transparency capabilities while enabling sophisticated forms of green protectionism. The integration of IoT, AI, and blockchain technologies in environmental compliance

systems offers significant potential for enhancing accountability, with 68% of supply chain executives viewing digital traceability as critically important. However, these same technologies create new forms of technological dependence that systematically favor digitally advanced economies, potentially reinforcing developmental disparities under the guise of environmental protection.

Indonesia's experience provides crucial insights into how developing economies navigate the green security dilemma. The country's strategic responses including launching Southeast Asia's first emissions trading system, committing to 39-42% emission reductions by 2030, and leveraging its digital economy growth toward $130 billion by 2025, demonstrate attempts to develop indigenous environmental governance capabilities while maintaining global competitiveness. Indonesia's challenge in qualifying for CBAM exemptions with domestic carbon taxes of only Rp. 30,000 per ton illustrates the broader capacity-building requirements for meaningful participation in emerging green markets.

Regional cooperation through ASEAN frameworks reveals alternative approaches to environmental governance emphasizing collaboration over competition. Indonesia's leadership during its 2023 ASEAN chairmanship in promoting green economy initiatives, combined with regional recognition that ASEAN could lose 35% of GDP by 2050 due to climate change, demonstrates how multilateral mechanisms can provide more equitable alternatives to unilateral environmental measures. The development of mutual recognition systems for emission reduction credits and coordination of environmental standards suggests pathways for cooperative rather than competitive environmental governance.

The study's theoretical contribution lies in identifying the "green security dilemma" where unilateral environmental policies intended to enhance national competitiveness ultimately undermine collective climate action. This dynamic is particularly pronounced in the digital realm, where control over green technologies becomes geopolitical leverage. The proposed framework of "cooperative environmental competitiveness" offers a potential solution by emphasizing multilateral governance mechanisms that distinguish genuine environmental measures from disguised protectionism while accounting for different developmental stages and capabilities.

The broader implications extend to fundamental questions about international governance architecture in an era of environmental urgency and technological sophistication. The integration of environmental objectives with economic statecraft represents a paradigm shift requiring new analytical frameworks for managing the intersection of environmental protection, economic competition, and technological advancement. The choice between fragmented green nationalism and integrated global environmental governance will fundamentally determine both climate action effectiveness and the character of international relations.

This research contributes original empirical evidence and theoretical frameworks for understanding environmental diplomacy transformation in the digital age. The findings demonstrate that traditional environmental cooperation approaches must be reconceptualized to account for the strategic dimensions of environmental policy in an era of great power competition and technological sophistication. The analysis provides crucial insights for policymakers seeking to navigate the complex intersection of environmental necessity and economic competition while maintaining international stability and cooperation.

Future research should continue examining these dynamics as environmental pressures intensify and digital technologies advance, with particular attention to developing economies' experiences and regional cooperation frameworks' potential to provide equitable alternatives to competitive environmental nationalism. The ongoing transformation of environmental diplomacy represents both a significant challenge and opportunity for international cooperation in addressing the climate crisis while maintaining stable global economic relationships. As nations face accelerating climate change and rapid technological advancement, understanding and managing the tensions between environmental protection and economic competition will be crucial for achieving both climate objectives and international stability in the 21st century.

References

Academic Books and Theoretical Frameworks

Apriliani, D., Rahmat, T., & Finaldin, T. (2024). Transformation of Indonesian MSMES Towards International Markets Through Economic Diplomacy. *Iqtishaduna International Conference Proceeding*, *1*, 172–177.

Baldwin, D. A. (1985). *Economic statecraft*. Princeton University Press.
Betsill, M. M., & Corell, E. (2008). *NGO diplomacy: The influence of nongovernmental organizations in international environmental negotiations*. MIT Press.
Blackwill, R. D., & Harris, J. M. (2016). *War by other means: Geoeconomics and statecraft*. Harvard University Press.
Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.
Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners* (5th ed.). SAGE Publications.
Parker, G. G., Van Alstyne, M. W., & Choudary, S. P. (2021). *Platform revolution: How networked markets are transforming the economy and how to make them work for you* (Updated edition). W. W. Norton & Company.
Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. PublicAffairs.

Journal Articles and Academic Publications

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40.
Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589-597.
Najam, A. (2005). Developing countries and global environmental governance: From contestation to participation to engagement. *International Environmental Agreements*, 5(3), 303-321.
Rohmy, A. M., & Nihayaty, A. I. (2023). Green economy policies in the digital transformation of forest management in Indonesia. *Environmental Policy and Law*, 53(1-2), 167-178.

Government and International Organization Reports

European Commission. (2025). Carbon Border Adjustment Mechanism (CBAM). *Directorate-General for Taxation and Customs Union*.
U.S. Department of the Treasury. (2024, August 7). U.S. Department of the Treasury releases new data on American consumer energy savings under Inflation Reduction Act. *Treasury Press Release*.
UNCTAD. (2024, July 10). Digital Economy Report 2024: Shaping an environmentally sustainable and inclusive digital future. *United Nations Conference on Trade and Development*.
UN PAGE - Partnership for Action on Green Economy. (2024). Indonesia country profile. *UN PAGE Publications*.

World Bank Publications

World Bank. (2021, July 28). Ensuring a more inclusive future for Indonesia through digital technologies. *World Bank Press Release*.
World Bank. (2024, August 1). Green digital transformation: How to sustainably close the digital divide and harness digital tools for climate action. *World Bank Publications*.
World Bank. (2024, August 13). Indonesia Country Climate and Development Report. *World Bank Country Reports*.
World Bank. (2024, January 24). Trading towards sustainability: The role of trade policies in Indonesia's green transformation. *World Bank Publications*.
World Bank. (2024, May 28). Indonesia can use trade policies to accelerate its green transformation. *The Trade Post*.
World Bank. (2025, July 3). How developing countries can measure exposure to the EU's carbon border adjustment mechanism. *World Bank Blog*.

Think Tank and Policy Analysis Reports

Center for Strategic and International Studies. (2024, December 11). China imposes its most stringent critical minerals export restrictions yet amidst escalating U.S.-China tech war. *CSIS Analysis*.
Center for Strategic and International Studies. (2024, October 13). Protectionism, competition, and elections: Navigating a new era of US climate leadership. *CSIS Analysis*.
Center for Strategic and International Studies Jakarta. (2024). The EU Carbon Border Adjustment Mechanism (CBAM): Implications for Indonesia. *CSIS Jakarta Publications*.

Peterson Institute for International Economics. (2024, October 31). China's export controls on critical minerals aren't starving the United States—at least so far. *PIIE RealTime Economics*.
Rhodium Group and MIT Center for Energy and Environmental Policy Research. (2024). Clean Investment Monitor: Overview of clean investments in the U.S. *Clean Investment Monitor Database*.
Stimson Center. (2025, February 3). Great power competition and green protectionism. *Stimson Center Analysis*.

Regional and Indonesian Analysis

Center for World Trade Studies, Universitas Gadjah Mada. (2023, April 6). Accelerating green economy in Indonesia's ASEAN chairmanship. *CWTS UGM Analysis*.
Climate Action Tracker. (2024). Indonesia country assessment. *Climate Action Tracker Database*.
East Asia Forum. (2023, February 9). CBAM creates key opportunity for Indonesia. *East Asia Forum Analysis*.
East Asia Forum. (2023, October 3). Towards an equitable EU–ASEAN green deal. *East Asia Forum Analysis*.
East Asia Forum. (2025, March 16). Regional green trade bloc to fight both climate change and protectionism. *East Asia Forum Analysis*.
Lowy Institute. (2025). Indonesia's climate retreat puts the region's green future at risk. *The Interpreter*.

Industry and Environmental Analysis

Earth.org. (2024, March 29). How the EU's CBAM is impacting Indonesia and Taiwan. *Environmental Analysis*.
Environmental Entrepreneurs. (2024, August). Two years of the Biden-Harris clean energy boom. *Climate Power Report*.
European Union Institute for Security Studies. (2025, February 6). Green digital diplomacy. *EUISS Brief*.
Greenly. (2024). Green protectionism: Principles, examples and concerns. *Greenly Environmental Analysis*.
Modern Diplomacy. (2024, June 17). CBAM European Union: Impact and adaptation strategies for Indonesian exports. *Modern Diplomacy Analysis*.
Myllyvirta, L. (2025, July 23). Analysis: China's clean-energy exports in 2024 alone will cut overseas CO2 by 1%. *Carbon Brief*.
TDi Sustainability. (2025). Trade laws and restrictions: Timeline and implications. *TDi Sustainability Insights*.

World Economic Forum Publications

World Economic Forum. (2021, December). How digital tracing can reduce industrial carbon emissions. *World Economic Forum Analysis*.
World Economic Forum. (2023, December). Why tech diplomacy is key to embracing the digital economy. *World Economic Forum Analysis*.
World Economic Forum. (2024, April). Turning to protectionism to help protect the planet. *World Economic Forum Analysis*.