

International Law and Dispute Resolution in the Context of Renewable Energy Development: A Review of the Case of Downstreaming of Nickel Ores by Indonesia

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Abstract

This paper delves into the intricate dynamics of international law and dispute resolution within the context of renewable energy development, focusing on Indonesia's downstreaming of nickel ores. As renewable energy initiatives gain prominence globally, the demand for essential minerals like nickel increases, prompting nations like Indonesia to explore downstreaming processes. However, this transition presents complex legal challenges, including international trade agreements, environmental regulations, and indigenous rights. Through a comprehensive review of relevant literature and case studies, this study analyzes Indonesia's approach to nickel ore downstreaming and its implications for international law and dispute resolution mechanisms. Additionally, it examines the role of international organizations, such as the World Trade Organization (WTO) and the United Nations Commission on International Trade Law (UNCITRAL), in resolving disputes arising from



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renewable energy projects. By synthesizing legal frameworks, environmental concerns, and socio-economic factors, this paper offers insights into navigating the legal complexities of renewable energy development, with a focus on Indonesia's nickel industry. Ultimately, the findings contribute to the discourse on sustainable resource management and the role of international law in facilitating equitable and environmentally responsible energy transitions.

KEYWORDS *WTO, Dispute, UNCITRAL, Nickel Ores, Renewable Energy Development*

Introduction

The transition towards renewable energy sources has emerged as a pivotal strategy in mitigating climate change and promoting sustainable development worldwide.¹ As nations endeavor to reduce their reliance on fossil fuels and embrace cleaner energy alternatives, the demand for essential minerals and metals essential for renewable energy technologies has surged. Nickel, in particular, has garnered significant attention due to its indispensable role in lithium-ion batteries, which power electric vehicles and store renewable energy.²

Indonesia, endowed with vast reserves of nickel, has sought to capitalize on this burgeoning demand by pursuing downstream initiatives to process raw nickel ore into higher-value products, such as battery-grade nickel chemicals. This strategic shift not only promises to enhance Indonesia's position in the global nickel market but also aligns

¹ Stolten, Detlef, and Viktor Scherer, eds. *Transition to renewable energy systems*. John Wiley & Sons, 2013; Neacsu, Adrian, et al. "The transition to renewable energy—a sustainability issue?." *Energy Transition: Economic, Social and Environmental Dimensions*. Singapore: Springer Nature Singapore, 2022. 29-72.

² Soelistijo, Ukar Wijaya. "Prospect of potential nickel added value development in Indonesia." *Earth Science. Science Publishing Group, USA* 2.6 (2013): 129-138.

with its aspirations for economic diversification and sustainable development.³

However, the downstreaming of nickel ores in Indonesia presents complex legal, environmental, and socio-economic challenges that necessitate careful examination. In the realm of international law, the downstreaming process intersects with various legal frameworks governing trade, investment, environmental protection, and indigenous rights. Moreover, disputes arising from renewable energy projects, including nickel ore downstreaming, require effective dispute resolution mechanisms to address conflicting interests and ensure equitable outcomes.⁴

In the further context, since the last few decades, the development of renewable energy has become a major focus for many countries around the world. Growing technologies and awareness of the environmental impact of fossil fuel use have driven efforts to shift to cleaner, more sustainable energy sources. Indonesia, as a country with abundant natural potential, is no exception to this global trend. However, the move to renewable energy also presents a number of challenges, including international legal disputes relating to the exploitation of natural resources for renewable energy purposes.⁵

³ Idris, M. Faris. "Pembangunan Melalui Sektor Pertambangan di Indonesia: Sebuah Tinjauan Etis." *Jurnal Uniyap* 3.11 (2013): 141932; Sugandi, Iqra, Oekan S. Abdoellah, and Budhi Gunawan. "Analysis of The Sustainable Development Policies of Local Communities in Indonesia." *TRANSFORMASI: Jurnal Manajemen Pemerintahan* (2022): 101-118; Hadi, Sudharto Prawata. "Sustainable development in Indonesia: current problems and future challenges." *3rd International Conference on Indonesian Social & Political Enquiries (ICISPE 2018)*. Atlantis Press, 2019.

⁴ Agrawal, Sumali, et al. "Impacts of Extractive Industry and Infrastructure on Forests." *Climate and Land Use Alliance, Indonesia* (2018); Nasir, Munawir. "Analysis of economic development based on environment resources in the mining sector." *The Journal of Asian Finance, Economics and Business* 7.6 (2020): 133-143; Mooiman, Michael B., Kathryn C. Sole, and Nicholas Dinham. "The precious metals industry: Global challenges, responses, and prospects." *Metal sustainability: Global challenges, consequences, and prospects* (2016): 361-396.

⁵ Owusu, Phebe Asantewaa, and Samuel Asumadu-Sarkodie. "A review of renewable energy sources, sustainability issues and climate change mitigation." *Cogent Engineering* 3.1 (2016): 1167990.

In particular, the downstream of nickel ore in Indonesia is the focus of attention, raising questions about the balance between renewable energy development and international obligations related to the environment. As one of the largest nickel producing countries in the world, Indonesia has a great responsibility to ensure that the exploitation of its nickel ore not only supports economic growth, but also pays attention to aspects of sustainability and environmental protection.⁶

Within the framework of international law, states have an obligation to abide by the treaties and conventions they have signed. These agreements cover various aspects, including trade and environmental protection, which become relevant in the context of renewable energy development. For example, Indonesia as a member of the World Trade Organization (WTO) must abide by international trade rules, while also considering its responsibilities to the global environment. In the face of this dilemma, especially regarding the case of nickel ore downstream, it is important to conduct an in-depth analysis of the aspects of international law involved. Questions arise: Are Indonesia's actions in accordance with the international agreements they have joined? How can international dispute resolution mechanisms be applied in this context? And, last but not least, how is the development of renewable energy in Indonesia affected by the resolution of this dispute?⁷

One key to answering these questions is to look at a variety of reference sources that describe the relevant foundations of international law. In this framework, the role of international organizations such as the WTO, the United Nations Framework Convention on Climate Change (UNFCCC), and the United Nations Convention on the Law of the Sea

⁶ Saepudin, Asep, et al. "Indonesia Green Mining Industry." *European Journal of Development Studies* 2.5 (2022): 22-31.

⁷ Mitrania, Reygina Yenny, Manotar Tampubolon, and Edward ML Panjaitan. "The dispute between Indonesia and the European union concerning the export ban on nickel ore under the international trade law." *ICLHR 2021: Proceedings from the 1st International Conference on Law and Human Rights, ICLHR 2021, 14-15 April 2021, Jakarta, Indonesia*. European Alliance for Innovation, 2021; Krustiyati, J. M., et al. "Analyzing the lawsuit of the European Union over nickel ore export regulation in Indonesia." *Croatian International Relations Review* 28.89 (2022): 120-135.

(UNCLOS) becomes very important. Analysis and interpretation of these agreements will provide a better understanding of the legal context surrounding the exploitation of nickel ore for renewable energy in Indonesia. A number of studies and publications have contributed to our understanding of the relationship between international law and renewable energy development. According to research by Jones (2018), renewable energy policies at the national level can conflict with international obligations in the context of trade and the environment⁸.

This analysis can provide preliminary insights into possible misalignments between Indonesia's actions in the case of nickel ore downstream and related international legal norms. In addition, annual reports from the WTO and UNFCCC can provide an overview of changing trends and dynamics in trade and environmental protection at the global level, which are directly related to Indonesia's efforts in developing renewable energy. Meanwhile, quotes from international law experts such as Sands & McGee (2019) can provide a broader legal framework on state obligations in the environmental context and their impact on economic development⁹. An understanding of the legal principles underlying trade and the environment from the point of view of experts like Sands will provide deep insight into whether Indonesia's actions can be justified in the context of existing international legal norms.¹⁰

In this article, we will explore the dimensions of international law related to the downstream of nickel ore by Indonesia in the context of renewable energy development. By exploring various sources of references and citations, we can detail relevant international agreements, understand the dispute resolution mechanisms that may be involved, and evaluate their impact on renewable energy development in Indonesia. As such, this

⁸ Leal-Arcas, Rafael, and Andrew Filis. "Renewable energy disputes in the World Trade Organization." *Oil, Gas and Energy Law Journal* 13.3 (2015): 1-51.

⁹ Sand, Peter H., and Jeffrey McGee. "Lessons learnt from two decades of international environmental agreements: law." *International Environmental Agreements: Politics, Law and Economics* 22.2 (2022): 263-278.

¹⁰ See also Rajamani, Lavanya. "The changing fortunes of differential treatment in the evolution of international environmental law." *International Affairs* 88.3 (2012): 605-623.

article seeks to provide a comprehensive understanding of the complex relationship between international law and Indonesia's efforts to advance renewable energy through the exploitation of its nickel ores.

This paper endeavors to explore the intricate nexus between international law, dispute resolution, and renewable energy development, with a specific focus on Indonesia's downstreaming of nickel ores. By reviewing relevant case studies, legal frameworks, and empirical data, this study aims to elucidate the legal complexities and challenges inherent in Indonesia's pursuit of nickel ore downstreaming within the broader context of renewable energy development.

Through a comprehensive analysis, this paper seeks to achieve the following objectives:

1. Examine the legal frameworks governing Indonesia's downstreaming of nickel ores, including international treaties, domestic legislation, and regulatory mechanisms.
2. Evaluate the implications of Indonesia's downstreaming initiatives for international trade, investment, environmental protection, and indigenous rights.
3. Assess the effectiveness of existing dispute resolution mechanisms in addressing conflicts and disputes arising from renewable energy projects, with a focus on the case of nickel ore downstreaming in Indonesia.
4. Identify opportunities and challenges for enhancing legal frameworks and dispute resolution mechanisms to facilitate sustainable renewable energy development in Indonesia and beyond.

By shedding light on these critical issues, this study aims to contribute to the ongoing discourse on renewable energy development, international law, and sustainable resource management. Ultimately, it seeks to inform policymakers, industry stakeholders, and researchers about the complexities and opportunities associated with Indonesia's nickel ore downstreaming and its implications for global renewable energy transitions.

How does the international trade mechanism affect Indonesia's nickel ore downstream policy?

In the 21st century, the world has faced serious challenges in addressing climate change and energy sustainability. Countries around the world are increasingly aware of the importance of switching to renewable energy sources to reduce dependence on fossil fuels and their negative impact on the environment. Indonesia, as a country with abundant natural potential, is actively involved in global efforts to develop renewable energy. One of the natural resources that is the focus of attention in the context of renewable energy is nickel ore. Indonesia, as one of the world's largest nickel producers, has great potential to use nickel ore as an integral part of its renewable energy portfolio. However, these efforts to downstream nickel ore not only create opportunities, but also pose challenges, especially in terms of international obligations and environmental impact.¹¹

The case of downstream nickel ore by Indonesia is a major highlight, given the complexity of the relationship between renewable energy development, international trade obligations, and environmental responsibility. As a party to various international agreements such as the World Trade Organization (WTO) and the United Nations Framework Convention on Climate Change (UNFCCC), Indonesia is faced with the need to be in line with international provisions related to trade and environmental protection. It is important to understand that national policies related to renewable energy can have a significant impact on the dynamics of international trade and environmental sustainability. Therefore, in-depth research on the relationship between international law and renewable energy development in Indonesia, particularly through the

¹¹ See Rahayu, Sekar Wiji, and Fajar Sugianto. "Implikasi Kebijakan Dan Diskriminasi Pelarangan Ekspor Dan Impor Minyak Kelapa Sawit Dan Bijih Nikel Terhadap Perekonomian Indonesia." *DiH: Jurnal Ilmu Hukum* 16.2 (2020): 373034; Barizi, Muhammad Hirza, and Reza Triarda. "Rantai Pasokan Global Dan Nasionalisme Sumber Daya Alam: Kajian Terkait Hilirisasi Nikel di Indonesia." *Indonesian Journal of International Relations* 7.2 (2023): 312-338.

case of downstream nickel ore, becomes relevant in the face of the complexity of these issues.¹²

Questions arise: How does the international trade mechanism affect Indonesia's nickel ore downstream policy? Are these actions in line with global environmental obligations recognized by Indonesia through international treaties? How can dispute resolution efforts be applied to bridge the gap between national interests and international norms? This study aims to detail the background of Indonesia's nickel ore downstream case, focusing on the international legal framework surrounding the country's efforts in developing renewable energy. By analysing relevant international treaties, we can explore the legal aspects that guide and govern the relationship between renewable energy development and international responsibility.¹³

Through a deep understanding of this background, we can provide a solid foundation to explore the challenges and opportunities faced by Indonesia in integrating nickel ore into its renewable energy strategy. Thus, this article not only provides a comprehensive overview of the relationship between international law and renewable energy development in Indonesia but also demonstrates the relevance of the nickel ore downstream case as a case study that can provide valuable insights in a broader global context

¹² Patra, Elma Eddy, et al. "Corporation's Liability on Illegal Dumping's Impact on Climate Change according to the UNFCCC and its Implementation in Indonesia." *JASSP* 2.1 (2022): 57-64.

¹³ Tijaja, Julia, and Mohammad Faisal. "Industrial policy in Indonesia: A global value chain perspective." *Asian Development Bank Economics Working Paper Series* 411 (2014); Warburton, Eve. "Nationalism, developmentalism and politics in Indonesia's mining sector." *Indonesia in the New World: Globalisation, Nationalism and Sovereignty* (2018): 90-108; Ing, Lili Yan, Mari Elka Pangestu, and Olivier Cadot. "Indonesia's trade policies in the new world trade." *The Indonesian Economy*. Routledge, 2017. 57-88.

The Context of Renewable Energy and Downstream Nickel Ore in Indonesia

Renewable energy has become a major focus for many countries in the world in response to climate change and energy sustainability.¹⁴ Indonesia, as a country with abundant natural wealth, is in a strategic position to explore the potential of renewable energy to meet national energy needs while minimizing environmental impact. One initiative that attracts attention in this context is the downstream effort of nickel ore as an integral part of the renewable energy development strategy in Indonesia.¹⁵

Nickel seeds, as an abundant natural resource in Indonesia, are the focus of efforts to diversify the country's energy portfolio.¹⁶ Downstreaming, or processing nickel ore into value-added products, is considered a strategic step to increase economic added value, create jobs, and support the growth of the renewable energy sector. In this context, nickel ore is not only seen as a conventional mining resource but also as a critical component to support energy sustainability.¹⁷

In recent years, Indonesia has experienced a significant increase in renewable energy development. Solar, wind and bioenergy projects have become an integral part of the government's vision to achieve renewable energy targets and reduce greenhouse gas emissions. In this context, nickel ore can serve as the main feedstock for renewable energy batteries, given its important role in energy storage technology. However, behind its positive potential, downstream nickel ore also poses a number of

¹⁴ Dincer, Ibrahim. "Renewable energy and sustainable development: a crucial review." *Renewable and sustainable energy reviews* 4.2 (2000): 157-175.

¹⁵ Ardiansyah, Fitriani, Neil Gunningham, and Peter Drahos. "An environmental perspective on energy development in Indonesia." *Energy and non-traditional security (NTS) in Asia* (2012): 89-117.

¹⁶ Shah, Zar, et al. "The economic value of natural resources and its implications for Pakistan's economic growth." *Commodities* 1.2 (2022): 65-97.

¹⁷ Yoesgiantoro, D., N. A. Sasongko, and B. S. Arifianto. "Defense study on Indonesian nickel processing." *IOP Conference Series: Earth and Environmental Science*. Vol. 1108. No. 1. IOP Publishing, 2022; Nathanael, Garcia Krisnando. "Industri batubara dari sisi ekonomi, politik, dan lingkungan." *Parapolitika: Journal of Politics and Democracy Studies* 2.1 (2021): 20-30.

challenges that cannot be ignored. The complexity of this issue includes considerations of international law, especially related to trade obligations and environmental protection. Thus, looking holistically at the context of renewable energy and nickel ore downstream in Indonesia is needed to understand the dynamics of interactions between natural resource development, downstream efforts, and international responsibility.

As the world's largest nickel producer, Indonesia has a great opportunity to demonstrate its leadership role in combining downstream policies with environmental commitments. In line with the global challenges faced by the international community, Indonesia needs to find the right balance between economic needs and environmental responsibility, providing a sustainable foundation for future renewable energy development.¹⁸ Therefore, an in-depth analysis of the context of renewable energy and downstream nickel ore in Indonesia is not only relevant for national sustainability but can also provide valuable insights for other countries facing similar dilemmas. This article will explore the complex dynamics between natural resources, renewable energy policy, and international responsibility, with a particular focus on the downstream case of nickel ore, to open up deep insights into the challenges and opportunities on the way to renewable energy in Indonesia.

Downstream Potential of Nickel Ore in the Context of Renewable Energy in Indonesia

The downstream potential of nickel ore in Indonesia is becoming increasingly significant in line with the need for sustainable renewable energy. Nickel ore is not only a mining commodity, but also a key

¹⁸ Muhammad, Sawedi, Suryanto Arifin, and Ridwan Syam. "The Controversy of Mine License Extending and Their Impact on Environmental Sustainability in Indonesia." *THE 17TH ASIA PACIFIC SOCIOLOGICAL ASSOCIATION (APSA) CONFERENCE*. 2022; Naryono, Endang. *Nickel Mine Exploitation In Indonesia, Between A Blessing And A Disaster Of Environmental Damage*. No. y58qe. Center for Open Science, 2023; Syahnur, Sofyan, and Yossi Diantimala. "'Surviving and growing up with illegal status': The Analysis of Socio-Economic Household, Potential Conflict, the Environmental Damage, and Vulnerability of Local Community to Disaster." *Journal of Sustainable Mining* 20.3 (2021): 157-177.

component in the battery industry, especially in the development of electric vehicles and energy storage. In this context, downstream nickel ore not only serves to increase economic added value but also supports the transformation towards a cleaner and more sustainable society.¹⁹

1. Electric Vehicles and Energy Storage

- **Electric Vehicle (EV) Batteries:** Nickel ore is becoming an important ingredient in electric vehicle batteries, which is increasingly becoming a major trend in sustainable transportation. By downstreaming nickel ore, Indonesia can position itself as a strategic feedstock provider in the global EV industry.
- **Energy Storage:** In renewable energy schemes, energy storage through batteries is a major challenge. Downstream nickel ore can support the development of efficient and sustainable energy storage solutions.

2. Economic Value Added Increases

- **Product Diversification:** Downstream allows Indonesia to create value-added products from nickel ore, such as ready-to-use batteries, instead of just selling raw beans. This move not only increases income but also creates jobs in industries with high added value.
- **Downstream Industry Development:** By building processing facilities and downstream factories, Indonesia can create an industrial ecosystem that supports innovation and technology development in the renewable energy sector.

3. Support for Renewable Energy Goals

- **Reducing Dependence on Fossil Fuels:** By integrating nickel ore in renewable energy development, Indonesia can reduce dependence on fossil fuels and achieve lower carbon emission targets.

¹⁹ Pandyaswargo, Andante Hadi, et al. "The emerging electric vehicle and battery industry in Indonesia: Actions around the nickel ore export ban and a SWOT analysis." *Batteries* 7.4 (2021): 80; Soelistijo, Ukar Wijaya. "Prospect of potential nickel added value development in Indonesia." *Earth Science. Science Publishing Group, USA* 2.6 (2013): 129-138.

- Driving Technological Innovation: Downstream nickel ore can be a catalyst to drive innovation in renewable energy technology, especially in the development of more efficient and environmentally friendly batteries.
4. Challenges in Downstreaming Nickel Ore
- Environmental Obligations and Ecological Balance: Downstream processes must pay attention to environmental impacts, including considerations related to improving nickel ore extraction and processing. Ecological balance and sustainability must be a priority in the development of the downstream industry.
 - Global Market Uncertainty: Fluctuations in global commodity prices, especially in the battery industry, can create challenges in ensuring the sustainability and competitiveness of the downstream industry in the international market.

By understanding the potential and challenges in the context of downstream nickel ore for renewable energy in Indonesia, this article will continue by exploring the aspects of international law involved and how these dynamics can affect renewable energy development as well as Indonesia's responsibilities in an increasingly integrated global scenario.

International Trade Obligations: World Trade Organization (WTO) Perspectives

International trade, as the main driver of economic growth, is becoming a complex arena for countries around the world. As an integral part of the global trade order, Indonesia, as a leading nickel producer, must understand and face a number of international trade obligations, especially in the context of downstream nickel ore for renewable energy development. In this context, the World Trade Organization (WTO) perspective becomes the main basis for discussing the dynamics and challenges that may be faced by Indonesia.

A. WTO Principles in the Context of Downstream Nickel Ore

Indonesia, as a developing country, can take advantage of the principle of Special and Differential Treatment introduced by the WTO. This principle recognizes different levels of economic development and grants special rights to developing countries. The extent to which downstream steps of nickel ore in Indonesia take into account this principle will be the main highlight. Meanwhile, the principle of non-discrimination, which includes Most-Favored Nation and National Treatment, demands equal treatment of all WTO members. Therefore, the analysis will focus on the extent to which nickel ore downstream measures conform to this principle, and whether they may present a challenge of discrimination.²⁰

B. Impact of Downstream Measures on International Trade

Changes in the structure of international trade can be triggered by downstream steps of Indonesian nickel ore. Increasing the added value of nickel products through downstream can have an impact on export and import patterns, affecting the global nickel market. In addition, fluctuations in global commodity prices, particularly in the battery industry, can create uncertainty in international trade. Therefore, the analysis of the export and import impact of downstream nickel ore products, together with strategies that Indonesia can adopt to overcome global market uncertainty, will be the focus of this study.²¹

C. Trade Disputes That May Arise

Downstream steps of nickel ore can give rise to international trade disputes. Some countries may see these measures as a form of

²⁰ See Dewi, Yetty, and Mikaila Jessy Azzahra. "Re-examining Indonesia's Nickel Export Ban: Does it Violate the Prohibition to Quantitative Restriction?." *Padjadjaran Journal of International Law* 6.2 (2022): 180-200.

²¹ Widiatedja, I. Gusti Ngurah Parikesit. "Indonesia's Export Ban on Nickel Ore: Does It Violate the World Trade Organization (WTO) Rules?." *Journal of World Trade* 55.4 (2021).

protectionism, violating WTO principles. The extent to which nickel ore downstream policy can be assessed as a form of protectionism and the potential for legal action from third parties is an important consideration. An analysis of the conformity of these measures with WTO rules and commitments, including the General Agreement on Tariffs and Trade (GATT) and the General Agreement on Trade in Services (GATS), is also an integral part of the study.²²

In the context of renewable energy, international trade obligations play a central role, and the World Trade Organization (WTO) perspective has a significant impact on global trade dynamics. The WTO, as the international body regulating interstate trade, provides a legal and normative framework for understanding and resolving trade disputes, including those related to renewable energy.

1. WTO and Its Linkage to Renewable Energy

The WTO mandates basic principles of trade, such as equal treatment, non-discrimination, and transparency. In the context of renewable energy, policies that support the development and trade of renewable energy technologies can be affected by WTO rules. In addition, proper understanding and implementation of WTO agreements can play a key role in facilitating trade in renewable energy equipment and components.

2. Principle of Non-Discrimination

The principle of non-discrimination, consisting of Most-Favored Nation and national treatment, is the foundation of international trade held by the WTO. In the context of renewable energy, this means that every WTO member country must give equal treatment to renewable energy goods and services from all its

²² See Siahaan, Doan Mauli Tua, Ibrahim Sagio, and Evi Purwanti. "Restriction of Indonesian Nickel Ore Export Based on the Perspective of Quantitative Restriction Principle in General Agreement on Tariffs and Trade." *Jurnal Penelitian Hukum De Jure* 21 (2021): 409-418; Mitrana, Reygina Yenny, Manotar Tampubolon, and Edward ML Panjaitan. "The dispute between Indonesia and the European union concerning the export ban on nickel ore under the international trade law." *ICLHR 2021: Proceedings from the 1st International Conference on Law and Human Rights, ICLHR 2021, 14-15 April 2021, Jakarta, Indonesia*. European Alliance for Innovation, 2021.

trading partners, without distinguishing between domestic and imported products.

3. Transparency and Openness

The WTO emphasizes transparency in trade policy. In the context of renewable energy, this creates demands to provide clear and accessible information on energy policies, tariffs, and trade-related regulations. Thus, this transparency can promote trade in renewable energy technologies and products.

4. Special Protection

The WTO recognizes a special protection principle that allows countries to adopt certain environmental policies or renewable energy policies provided that they are not considered unfair trade barriers. Therefore, member states have room to implement renewable energy policies without violating WTO rules, especially if those policies are implemented to achieve environmental or sustainability goals.

5. Dispute Settlement

The WTO also provides an effective dispute settlement mechanism. If a country feels that the renewable energy trade policies of its trading partners violate WTO agreements, it can refer the dispute to the WTO Dispute Settlement Body. It creates a neutral forum that allows fair and transparent dispute resolution.

6. Challenges and Opportunities Ahead

Future challenges involve striking a balance between international trade obligations and national renewable energy policies. Countries need to understand and manage potential tensions between national regulations to support the renewable energy industry and international trade obligations enforced by the WTO.

Opportunities also arise to leverage the WTO framework as a means to facilitate trade and investment in the renewable energy sector. Strong partnerships between member countries, industry stakeholders, and trade organizations can help develop trade rules and standards that support the global growth of the renewable energy sector.²³

²³ Lewis, Joanna I. "The rise of renewable energy protectionism: emerging trade conflicts and implications for low carbon development." *Global Environmental*

With a deep understanding of WTO principles and how they can be integrated with renewable energy policies, countries can create a trade environment that supports renewable energy development without neglecting international obligations. As a result, the WTO framework can be a catalyst for renewable energy growth globally, creating a sustainable and inclusive energy system of the future

Harmonization Strategy: Unifying WTO Obligations and Renewable Energy Development

To achieve an optimal balance between international trade obligations and interests in renewable energy development, Indonesia must develop a harmonization strategy. The analysis will focus on how Indonesia can implement downstream measures for nickel ore without violating WTO rules and still advance the renewable energy development agenda. Furthermore, the importance of international cooperation in facing global trade challenges and the application of best practices from other countries will be an important part of this research.

Through this approach, this article aims to provide a comprehensive understanding of Indonesia's international trade obligations from a WTO perspective and how the country can address dispute challenges, mitigate economic impacts, and at the same time, advance the renewable energy development agenda effectively.

Global Environmental Obligations: United Nations Framework Convention on Climate Change (UNFCCC)

The importance of global environmental protection and climate change mitigation has been a major focus in the framework of the United Nations Framework Convention on Climate Change (UNFCCC). As a

Politics 14.4 (2014): 10-35; Selivanova, Yulia. *The WTO and energy: WTO rules and agreements of relevance to the energy sector*. Vol. 16. Geneva: International Centre for Trade and Sustainable Development, 2007.

country committed to this agreement, Indonesia has an obligation to understand and comply with the principles of the global environment set by the UNFCCC. This article will discuss Indonesia's global environmental obligations in the context of nickel ore downstream for renewable energy development, taking into account important aspects of the UNFCCC.

1. UNFCCC Objectives and Emissions Reduction Obligations

The UNFCCC aims primarily to reduce greenhouse gas emissions and achieve global environmental sustainability. Indonesia, as a signatory to and ratifying the UNFCCC, has a responsibility to contribute to this goal. In the context of downstream nickel ore, this article will assess the extent to which these measures are consistent with the emission reduction efforts launched by the UNFCCC.

2. Environmental Protection and Downstream Impact of Nickel Ore

The downstream steps of Indonesia's nickel ore must be tested within the framework of global environmental protection. Increased nickel ore extraction and downstream processes can have significant impacts on local and global ecosystems. This article will explore the possible environmental impacts of nickel ore downstream and how Indonesia's obligations under the UNFCCC can guide mitigation and adaptation measures.

3. Involvement in the UNFCCC Negotiation and Implementation Process

As an active participant in the United Nations Conference on Climate Change (COP), Indonesia has an important role in the negotiation process and implementation of the UNFCCC. How does Indonesia's participation in the COP reflect its commitment to the global environmental goals laid out in the UNFCCC? This analysis will cover how downstream nickel ore measures can be linked to Indonesia's national contribution in achieving UNFCCC targets.

4. UNFCCC Financial and Technological Mechanisms

The UNFCCC establishes financial and technology transfer mechanisms to assist developing countries in their efforts to address

climate change. Indonesia, through downstream measures of nickel ore, can seek financial and technical support from the UNFCCC. The analysis will evaluate the extent to which Indonesia utilizes this mechanism to strengthen nickel ore downstream policies and practices within the framework of sustainable development.

5. Alignment Assessment with Other UNFCCC Instruments

In addition to the UNFCCC, there are other instruments that support global environmental protection, such as the Kyoto Protocol and the Paris Agreement. How downstream measures of nickel ore can be in line with these instruments, and the extent to which Indonesia considers the balance between these different global environmental obligations, is the focus of research.

Through a deep understanding of Indonesia's global environmental obligations in the context of nickel ore downstream, this article aims to provide comprehensive insights into how the country can integrate downstream practices within the UNFCCC framework and support overall global environmental goals

International Dispute Settlement Mechanisms in the Context of Renewable Energy

In the complex dynamics of renewable energy development, the possibility of international disputes among countries and stakeholders can be a significant challenge. International Dispute Resolution Mechanisms are key instruments to prevent and resolve conflicts that may arise. In the context of renewable energy, where legal and policy uncertainty can lead to disputes, a deep understanding of dispute resolution mechanisms is crucial.

1. International Arbitration: Solutions Beyond Conventional Courts

International arbitration is a popular dispute resolution mechanism in the context of renewable energy. The parties involved may choose arbitration as an alternative to conventional courts, providing the necessary flexibility and sustainability. The analysis will cover the advantages and disadvantages of arbitration, as well as its relevance in resolving renewable energy disputes.

2. International Court of Justice (ICJ): Settlement of Interstate Disputes

The ICJ is an international tribunal that handles disputes between states. In the context of renewable energy, where projects often involve cross-border cooperation, the ICJ can be a forum for resolving disputes involving two or more countries. An understanding of the ICJ's processes and involvement in renewable energy dispute resolution will be the focus of analysis.

3. Negotiation and Diplomacy: Non-Adjudicative Settlement

A non-adjudicative approach through negotiation and diplomacy can be an option to resolve disputes without involving third parties. In the context of renewable energy, where cooperation between countries can be key, an understanding of how negotiations can play a crucial role in dispute resolution will be investigated.

4. International Mediation: Facilitation of Dispute Resolution

International mediation involves a neutral third party to help the parties reach an agreement. In renewable energy projects involving multiple interests, mediation can be an effective mechanism to address disagreements and facilitate solutions that are acceptable to all parties. This analysis will explore how mediation can be applied in the context of renewable energy.

5. Investment Mechanism: Protection of Foreign Investors

Renewable energy projects often involve foreign investors, and international investment protection mechanisms can be an important consideration. Treaty-based arbitration, through bilateral investment conventions or treaties, provides investors with legal protection and special dispute resolution pathways. The analysis will assess the sustainability and impact of this mechanism in the context of renewable energy.

6. Special Considerations in Renewable Energy Dispute Resolution

Dispute resolution in the context of renewable energy requires special consideration. From environmental sustainability to technical and regulatory aspects, this analysis will highlight how dispute resolution mechanisms can address the specific dynamics that arise in renewable energy projects.

By understanding and evaluating these various international dispute resolution mechanisms in the context of renewable energy, this article aims to provide a holistic view of how stakeholders can select and implement the most relevant and effective mechanisms in maintaining the sustainability of renewable energy projects at the international level.

Impact of Nickel Ore Downstream Case on Renewable Energy Development in Indonesia

The development of renewable energy in Indonesia faces serious challenges arising from the downstream case of nickel ore. Nickel seeds, as a key commodity in the manufacture of batteries for renewable energy, are taking center stage in Indonesia's efforts to increase added value domestically. However, the impact of this downstream policy has consequences that can affect the dynamics of renewable energy development in the country. One of the impacts that arises is the uncertainty of nickel ore supply for the battery industry. Downstream nickel ore means more production and processing is done domestically before being exported, which may cause the supply of nickel ore to the international market to be limited. Given that nickel ore is a key raw material in battery manufacturing, particularly for electric vehicles and energy storage, this uncertainty could hamper the growth of Indonesia's renewable energy industry.

With increasing competition in the renewable energy market, especially in terms of battery technology, increased production costs due to downstream policies can make Indonesian products less competitive. This can hurt Indonesia's renewable energy exporters and hamper the potential growth of exports of renewable energy-based products. On the other hand, there are positive impacts that can arise from the downstream of nickel ore if managed wisely. Measures to increase added value can create new industrial opportunities in the renewable energy sector. For example, the development of the domestic battery manufacturing industry can generate new jobs, encourage innovation, and increase Indonesia's energy independence. However, improper implementation can trigger uncertainty and risks for emerging renewable energy projects.

In this context, renewable energy developers and stakeholders need to collaborate with the government to find a balanced solution. It is important to consider the need to increase the added value of nickel ore in line with the sustainability and competitiveness of the renewable energy industry. The government can play a key role in formulating policies that support the integration of nickel ore downstream with the development of renewable energy. In addition, international cooperation can be key to overcoming negative impacts and maximizing the positive potential of downstream policies. Through partnerships with trading partner countries, Indonesia can ensure that its measures are in line with international standards and do not hinder the growth of the renewable energy industry globally. This could include the development of a fair and sustainable trade framework to support the exchange of resources needed for renewable energy development. It is also important to strengthen infrastructure and supporting policies to address supply challenges and facilitate the growth of the renewable energy sector. For example, investments in logistics infrastructure, improved production efficiency, and fiscal incentives for the renewable energy industry can help mitigate the negative impact of downstream policies and improve the competitiveness of the sector.

By combining these approaches, Indonesia can achieve a balance between nickel ore downstream policy and renewable energy development. A deep understanding of the positive and negative impacts is required, as well as a commitment to finding solutions that support the sustainable growth of the renewable energy sector. Only with collaboration between government, industry, and other stakeholders can Indonesia face these challenges wisely and ensure that renewable energy remains a key pillar in efforts to achieve sustainability goals.

Future Challenges and Opportunities in Renewable Energy Development: Looking Ahead Wisely

The development of renewable energy is a key point in the change towards a more sustainable and low-carbon emission society. Despite significant progress, the future of renewable energy is faced with a number

of challenges and opportunities that require wise thinking and proactive action to achieve sustainable goals.

Future Challenges:

1. **Dependence on Limited Resources:** Although renewable resources such as solar and wind are abundant, some renewable energy technologies rely on certain raw materials. For example, solar panels require materials such as silicon, while batteries require metals such as lithium. Reliance on a limited supply of these materials can be a significant challenge.

Proof:

- The price of lithium, which is used in batteries, has experienced significant fluctuations in recent years due to increased demand.
- Silicon supply for solar panels could be disrupted by tensions in global supply chains.

2. **Energy Infrastructure and Storage:** Energy storage is key to overcoming supply instability from renewable energy sources that are not always predictable. Adequate infrastructure to store and distribute renewable energy is still under development and requires large investments.

Proof:

- The ability of batteries to store energy is limited and still requires increased efficiency.
- Challenges in integrating energy storage systems into existing power grids.

3. **Policy Uncertainty:** Changes in politics and government policies can have a major impact on the renewable energy industry. Policy uncertainty can make investors hesitant and hamper the sector's growth.

Proof:

- Changes in energy policy in several countries have had an impact on renewable energy projects.
- Changes in tax policies and incentives in some countries may reduce investment attractiveness.

Future Opportunities:

1. **Innovative Technologies:** The development of new technologies can open up new opportunities in renewable energy. Innovations in energy storage, solar panel efficiency, and power generation technology can overcome some of today's constraints.

Proof:

- Breakthroughs in state-of-the-art battery technology, such as graphite-based batteries, promise greater storage capacity and lower cost.
- The development of organic solar panels and hydrogen fuel cells shows potential to improve energy conversion efficiency.

2. **Improved Energy Efficiency:** Optimizing energy use and improving the efficiency of electrical infrastructure represents a significant opportunity. Energy efficiency programs and innovations in grid management can help reduce overall energy requirements.

Proof:

- Energy efficiency programs in the industrial sector have helped companies reduce their energy consumption.
- The use of smart technology and smart electric grids enables more efficient power management.

3. **Investment in R&D:** Investment in research and development (R&D) plays a key role in unlocking new opportunities. Governments, companies, and research institutions can collaborate to create innovative solutions.

Proof:

- Government programs and private companies that support research in the field of renewable energy have made significant progress.
- Focus on R&D to reduce costs and improve the efficiency of renewable energy technologies.

4. **International Collaboration:** Global challenges require global solutions. International collaboration can facilitate the exchange of knowledge, technology, and resources to accelerate the development of renewable energy.

Proof:

- Partnerships between countries in developing large-scale renewable energy projects, such as solar power projects in the Sahara desert involving several European and African countries.
- Exchange of technology and best practices through international conferences and forums.

In looking to the future of renewable energy, it is important to acknowledge the challenges and opportunities that exist. With wise action, technological innovation, and cooperation between countries, the renewable energy sector can be the backbone in meeting the world's energy needs in a sustainable manner and responding to the challenges of climate change. The importance of continuing to drive technological development is crucial in overcoming future challenges. The role of innovations such as the development of cheaper and more efficient perovskite-based solar cells, as well as the use of artificial intelligence to improve energy efficiency, can form the foundation for the growth of the renewable energy industry. Investments in collaborative research projects involving scientists, governments, and the private sector can accelerate the discovery of breakthrough solutions. In addition, strategic partnerships between the public and private sectors can open up new opportunities. The development of strong renewable energy infrastructure requires substantial investment, and partnerships can help support financial needs while sharing risk between governments and the private sector. For example, public-private partnership projects in solar and wind power generation have proven successful in several countries.

Through this approach, we can create a solid foundation for a sustainable, efficient and widely accessible renewable energy future. While addressing challenges, the opportunities presented by technological innovation and collaboration can open the door to energy systems that are environmentally friendly, economical, and can provide long-term benefits to the global community.

Conclusion

In conclusion, our examination underscores the intricate relationship between international trade obligations and renewable energy development, highlighting the crucial role of the World Trade Organization (WTO) in shaping these dynamics. Striking a harmonious balance between trade principles and renewable energy policies presents a significant challenge, necessitating open dialogue and collaboration among national and international stakeholders. As we confront the urgent imperatives of climate change and clean energy transitions, global cooperation becomes paramount. Facilitating equal access to technology and opportunities in renewable energy trade is essential for ensuring justice and equality, particularly for developing nations.

Looking ahead, it is imperative to innovate trade agreements to reflect current global challenges, incorporating renewable energy and sustainability concerns. Strengthening dispute resolution mechanisms and enhancing awareness of WTO principles among stakeholders are also vital steps in navigating the intersection of trade and renewable energy. As technology evolves and trade dynamics shift, the WTO must adapt to remain relevant and flexible, serving as a catalyst for fair and sustainable trade practices. Through proactive measures and collective commitment, we can forge a path towards a sustainable future where international trade and renewable energy development converge harmoniously, fostering a world characterized by sustainability and global justice.

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