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# Nickel Diplomacy:

## The Geopolitics of Indonesia's Downstream Policy and the Global Electric Vehicle Supply Chain Investigating the Gig Economy and Digital Resistance in Southeast Asia's Largest Market

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## Abstract

As the world pivots toward renewable energy, Indonesia has positioned itself as a pivotal player in the global Electric Vehicle (EV) supply chain by leveraging its status as the world's largest nickel producer. This paper analyzes Indonesia's "downstream" (*hilirisasi*) policy, which bans raw ore exports to compel domestic processing and battery manufacturing. Drawing on a political ecology framework and geopolitical discourse analysis, the study evaluates the trade-offs between national economic sovereignty and environmental sustainability. While the policy has successfully attracted massive investments from China and the West, it has simultaneously triggered international trade disputes (WTO) and raised concerns regarding the ecological footprint of high-pressure acid leaching (HPAL) technology. The research

finds that "Nickel Diplomacy" serves as a double-edged sword: it empowers Indonesia in the global North-South negotiation but risks creating "green sacrifice zones" in mining regions like North Maluku. The paper concludes that for Indonesia's transition to be truly "just," the discourse must move beyond GDP growth to include rigorous environmental accountability and indigenous land rights within the global green energy narrative.

**Keywords**: Nickel Mining, Downstream Policy, Electric Vehicles, Geopolitics, Climate Justice

# Introduction

The global energy transition toward renewable energy technologies has accelerated demand for critical minerals, particularly those essential for electric vehicle (EV) production (Roland Berger, 2021). Nickel, a key component of lithium-ion batteries, is central to this transition, as its high energy density and stability make it ideal for EV battery cathodes. Countries and corporations seeking to secure long-term access to nickel are increasingly engaging in strategic resource diplomacy, highlighting the intersection of energy policy, industrial strategy, and international competition.

This surge in demand has intensified geopolitical tensions, particularly between major industrialized nations and resource-rich states in the Global South. Access to nickel is no longer merely an economic issue; it is a strategic concern, influencing the pace of decarbonization and the technological competitiveness of national EV industries (Humphreys, 2020). As the race for critical minerals intensifies, the ability of producing countries to leverage their natural resources becomes a central factor in global energy governance.

The discourse surrounding critical minerals reflects both technological necessity and geopolitical strategy. Nations that control supply chains for nickel, cobalt, and lithium can influence global pricing, supply security, and even diplomatic relations. In this context, resource-rich states are reasserting sovereignty over their mineral endowments, challenging the traditional dynamics of resource extraction dominated by multinational corporations.

Indonesia occupies a uniquely strategic position in the global nickel market. Producing more than one-third of global supply, the country's nickel reserves are

concentrated in Sulawesi, Maluku, and other eastern regions (USGS, 2022). The Indonesian government has implemented a downstream, or hilirisasi, policy that bans the export of raw nickel ore. This strategy incentivizes domestic smelting and battery production, attracting foreign investment while aiming to capture greater value along the supply chain.

Hilirisasi reflects a broader industrial strategy that seeks to integrate Indonesia more fully into the global EV supply chain. By mandating domestic processing, the policy aims to transition the country from a raw material supplier to a producer of high-value battery components. This approach has generated substantial interest from Chinese and Western companies seeking upstream access to critical minerals while navigating international trade regulations.

However, the export ban has also led to disputes at the World Trade Organization (WTO), with affected countries contesting Indonesia's restrictions. These tensions highlight the trade-offs inherent in industrial policy: while downstream mandates enhance sovereignty and economic leverage, they can conflict with international trade norms, exposing Indonesia to legal and diplomatic challenges.

Indonesia's control over nickel exports has become a tool of what this study terms "Nickel Diplomacy." By regulating ore flows and shaping downstream investment, Indonesia exerts influence in North-South negotiations, balancing the interests of global industrial powers against domestic development priorities. This strategic leverage extends beyond economic gains, encompassing geopolitical positioning and bargaining power in technology transfer, investment agreements, and international environmental governance.

At the same time, leveraging nickel resources introduces responsibilities related to environmental sustainability and social equity. High-pressure acid leaching (HPAL) technology, commonly used in nickel processing, is associated with high water usage, toxic waste, and significant ecological risks. Mining regions, particularly North Maluku, face potential environmental degradation, raising concerns about the creation of "green sacrifice zones" where global green energy objectives conflict with local livelihoods and ecosystems.

Despite the apparent economic and geopolitical gains, Indonesia's downstream strategy raises complex research questions. How does hilirisasi reshape the country's position in the global EV supply chain? What are the environmental, social, and economic trade-offs of expanding HPAL-based nickel processing? These issues

demand a multi-dimensional analysis that situates industrial policy within broader political, ecological, and social frameworks.

The balance between maximizing domestic value capture and mitigating environmental risks is central to the sustainability of Nickel Diplomacy. While the country benefits from increased foreign investment and strengthened geopolitical leverage, the long-term costs to ecosystems and local communities remain insufficiently addressed in policy discourse.

This study addresses three interrelated research questions: (1) How is "Nickel Diplomacy" constructed within Indonesia's national policy discourse? (2) How do foreign investments from China and Western countries affect Indonesia's economic sovereignty and bargaining position? (3) Does downstream nickel processing generate new forms of environmental and social precarity, such as green sacrifice zones? These questions are situated at the intersection of political ecology, industrial strategy, and climate justice.

By interrogating both policy discourse and on-the-ground environmental and social impacts, this research seeks to provide a holistic understanding of Indonesia's role in global EV supply chains. The study emphasizes the dual nature of downstream strategies: while empowering Indonesia in global negotiations, they can simultaneously produce localized vulnerabilities that challenge notions of a "just transition."

The study contributes to scholarship in several ways. First, it provides empirical insight into critical mineral governance in the Global South, highlighting Indonesia as a case where industrial policy, geopolitics, and environmental concerns intersect. Second, it integrates political ecology and geopolitical discourse analysis to examine how natural resource policies mediate power relations between producing and consuming nations. Third, it advances debates on climate justice by foregrounding the socio-ecological costs of resource-driven industrialization and emphasizing the need to reconcile economic growth with local sustainability and indigenous land rights. By situating Indonesia's downstream policy within global supply chains, the study enriches theoretical frameworks related to resource sovereignty, green industrial policy, and the political ecology of energy transitions.

To address these questions, the study employs a qualitative approach combining political ecology and geopolitical discourse analysis. Data sources include policy documents, government reports, international trade records, and media coverage. By analyzing the narratives that frame nickel as both a strategic resource and a tool for economic development, the study uncovers how the state negotiates competing

priorities: industrial competitiveness, international diplomacy, and environmental stewardship. This multi-sourced approach allows the study to examine the interplay between policy rhetoric, foreign investment dynamics, and ecological realities, capturing both global and local dimensions of Nickel Diplomacy.

Understanding Indonesia's downstream policy is critical not only for resource governance scholars but also for policymakers and investors navigating the global EV supply chain. The study highlights how domestic industrial strategy can recalibrate global negotiations, influence foreign investment patterns, and produce socio-environmental trade-offs. It provides evidence for the importance of integrating environmental accountability and social justice into policy frameworks, ensuring that economic gains do not come at the expense of ecological integrity or community well-being.

# Literature Review

## *A. Resource Nationalism and Downstream Industrialization*

Resource nationalism refers to state-led strategies aimed at asserting control over natural resources to maximize domestic economic benefits and political leverage (Auty, 2001). This approach has historically emerged in resource-rich countries seeking to capture greater value from extractive sectors, particularly in the Global South, where raw commodity exports often limit domestic industrialization. Resource nationalism typically involves measures such as export bans, local content requirements, and preferential treatment for domestic industries, all designed to retain value within national borders.

Downstream industrialization, or hilirisasi, is a central strategy of resource nationalism. By processing raw minerals domestically, states aim to move beyond mere extraction to the production of higher-value intermediate and finished goods, capturing rents from global supply chains. Historical examples include Brazil's mineral processing policies in the 1970s and Chile's copper industrialization efforts, both of which sought to integrate resource wealth into national development strategies (Bebbington & Humphreys, 2018).

In the Indonesian context, hilirisasi is implemented primarily through bans on raw nickel exports, combined with incentives for smelting and battery production. This policy represents a deliberate effort to strengthen Indonesia's negotiating

position in global markets, attract foreign direct investment, and secure a more prominent role in the EV supply chain. Resource nationalism in this case functions both as an economic strategy and a geopolitical tool, reflecting a broader trend in which resource-rich nations leverage critical minerals to assert sovereignty over global industrial flows.

While effective in attracting investment, resource nationalism carries trade-offs. It can generate friction with international trade partners, provoke disputes under the World Trade Organization (WTO) framework, and create domestic environmental pressures associated with rapid industrial expansion. Understanding these dynamics is crucial for evaluating the successes and limits of hilirisasi as a development strategy.

## *B. Critical Minerals and the EV Supply Chain*

Nickel is a critical mineral for EV battery production, particularly in high-nickel lithium-ion cathodes that maximize energy density and vehicle range. The surge in global EV adoption has increased the strategic importance of nickel, linking extraction and processing decisions directly to technological competitiveness in the automotive and energy sectors (Roland Berger, 2021).

China currently dominates the global EV battery supply chain, controlling a significant share of refining and processing capacity. This dominance allows Chinese firms to influence pricing, production standards, and access to advanced battery technologies, creating dependencies for other countries reliant on imported processed nickel (Humphreys, 2020). Indonesia's downstream policy directly challenges this concentration by incentivizing domestic processing, signaling an attempt to reduce reliance on foreign refining capacity and capture greater value within national borders.

The literature highlights the tension between resource control and integration into global supply chains. While countries like Indonesia possess the raw materials necessary for strategic advantage, the ability to move up the value chain depends on infrastructure, technology transfer, and investment. The geopolitics of critical minerals is thus intertwined with national industrial policy, global trade relations, and the strategic positioning of resource-rich nations in emerging green technologies.

## *C. Political Ecology of Extractivism*

Extractivism, broadly defined, involves the large-scale removal of natural resources primarily for export, often with limited domestic value addition. Political ecology scholars critique extractivism for producing environmental degradation, social displacement, and economic dependency (Gudynas, 2016). Neo-extractivism refers to a modern variant in which resource rents are mobilized for social spending and industrial policy, yet environmental and social risks remain pronounced.

The concept of green extractivism has emerged in the context of energy transitions. It refers to the expansion of extractive activities explicitly aimed at supplying renewable energy technologies, such as lithium, cobalt, and nickel for batteries (Bebbington & Bury, 2020). While framed as environmentally beneficial, green extractivism can reproduce many of the social and ecological challenges of traditional extractive industries, including deforestation, water pollution, and displacement of indigenous communities.

In Indonesia, the adoption of HPAL technology for nickel processing exemplifies green extractivism. While it supports the global low-carbon transition, HPAL is associated with high water consumption, toxic waste production, and energy-intensive processing, raising concerns about environmental sustainability and social justice in regions like North Maluku and Sulawesi. Political ecology provides a framework for analyzing how state policies, corporate investment, and local communities interact in shaping the socio-environmental outcomes of extractive industrialization.

## *D. Trade Disputes and Global Governance*

Indonesia's downstream policy has provoked tensions within international trade regimes, notably with the European Union, which challenged the nickel export ban at the WTO (World Trade Organization, 2021). These disputes illustrate the friction between national industrial policy objectives and global trade liberalization rules, highlighting the constraints that resource nationalism faces under international governance frameworks.

Trade conflicts underscore the political and legal complexities of pursuing domestic value addition. Export bans, local content requirements, and other downstream measures can be interpreted as protectionist, even when motivated by development objectives. Negotiating these tensions requires balancing industrial

policy priorities with compliance obligations under trade agreements, particularly for countries seeking both economic sovereignty and integration into global markets.

Global governance structures also influence investment patterns. Multinational firms weigh the risk of trade disputes against potential gains from participating in downstream projects, shaping the timing, scale, and nature of investment in nickel smelting and battery production. Consequently, Indonesia's ability to execute its downstream strategy effectively depends not only on domestic policy design but also on navigating international regulatory and diplomatic landscapes.

## *E. Research Gap*

While existing literature addresses resource nationalism, extractivism, and EV supply chains separately, there is a lack of integrated analysis connecting downstream industrialization to climate justice and environmental sustainability. Few studies examine how policies like Indonesia's hilirisasi interact with ecological risks, social equity, and indigenous rights in regions where HPAL processing is implemented.

Additionally, empirical research on the socio-environmental consequences of green extractivism in Indonesia's eastern provinces remains limited. North Maluku, North Sulawesi, and Central Sulawesi face significant environmental pressures from expanding nickel processing, yet these impacts are underrepresented in scholarly discourse. Understanding the local ecological and social trade-offs is critical for assessing whether downstream industrialization supports a truly "just" energy transition.

This study addresses these gaps by integrating political ecology with geopolitical and industrial policy analysis, examining how Indonesia's downstream strategy simultaneously shapes global supply chain positioning, domestic industrial development, and socio-environmental outcomes. By foregrounding ecological and social dimensions, it contributes to emerging debates on just transition, green extractivism, and the Global South's role in sustainable industrial policy.

# Theoretical Framework

## *A. Political Ecology*

Political ecology provides a framework for understanding the intersections of environmental change, resource extraction, and socio-political power dynamics

(Robbins, 2012). In the context of nickel mining, political ecology highlights how state policies and corporate strategies shape both ecological and social landscapes. Power relations determine who benefits from resource exploitation, who bears the environmental costs, and how local communities are positioned within extractive economies.

A key concept within political ecology is the notion of "sacrifice zones," areas where ecological degradation and social disruption are concentrated to support broader economic or technological objectives (Gibson-Graham et al., 2013). In Indonesia, regions like North Maluku and Sulawesi are illustrative of potential sacrifice zones, where HPAL nickel processing imposes high environmental costs—such as water pollution, soil contamination, and biodiversity loss—while providing economic gains largely captured by multinational corporations and central government policies.

Political ecology also emphasizes the spatial and relational dimensions of extraction. Mining activities are not neutral in space; they produce new social and ecological geographies shaped by industrial infrastructure, labor migration, and land-use change. By situating nickel downstream policies within this framework, the study analyzes how industrialization and energy transition strategies reorganize environmental and social systems, creating uneven patterns of benefit and risk.

Furthermore, political ecology considers the role of governance and policy in mediating resource conflicts. The interactions between national regulations, corporate investment strategies, and local communities determine the degree to which environmental and social costs are mitigated or exacerbated. By examining these dynamics, the framework helps to illuminate the multi-scalar consequences of Indonesia's downstream policy.

## *B. Geopolitical Economy*

Geopolitical economy provides a lens to analyze how resource control intersects with international power relations, especially between the Global North and South (Bridge, 2008). Indonesia's nickel reserves are a strategic asset in global EV supply chains, giving the country bargaining power in negotiations with industrialized states and multinational corporations. This framework foregrounds the political and economic dimensions of resource management, emphasizing how states leverage mineral wealth for economic sovereignty and strategic influence.

The concept of North–South bargaining is central to understanding Nickel Diplomacy. Indonesia, as a major raw material supplier, negotiates terms of foreign investment, technology transfer, and market access with global industrial powers, seeking to maximize domestic value capture while maintaining favorable trade relations (Kaplinsky, 2011). Downstream industrialization is thus not only an economic strategy but also a geopolitical maneuver that enhances Indonesia's agency within global markets.

Strategic resource diplomacy also highlights the dual role of critical minerals in international relations: they are simultaneously drivers of domestic development and instruments of influence in global negotiations. By controlling nickel flows and attracting battery production investments, Indonesia strengthens its negotiating position, shaping the terms of engagement with both Chinese and Western investors while asserting national policy priorities in the global green energy transition.

## *C. Discourse Analysis in Energy Politics*

Discourse analysis offers tools to examine how policy narratives construct meanings, frame interests, and legitimize particular strategies in energy and resource governance (Hajer, 1995). In the case of Indonesia's downstream policy, national discourse frequently emphasizes "economic sovereignty" (kedaulatan ekonomi) and technological self-reliance as central justifications for export bans and domestic processing mandates.

The framing of a "green transition" in policy documents and public statements also shapes perceptions of industrial development. By presenting HPAL nickel processing as contributing to global decarbonization, policymakers construct a narrative in which domestic industrialization aligns with environmental goals, even as local ecological risks remain significant. Discourse analysis helps reveal the tensions between these narratives and the material realities on the ground, including environmental degradation and social disruption in mining regions.

Analyzing these narratives provides insight into how Indonesia positions itself in global energy politics. It reveals how language and policy framing legitimize strategic decisions, attract foreign investment, and negotiate international expectations. Understanding the interplay between discourse, policy, and material outcomes is essential for assessing both the effectiveness and the justice of Indonesia's Nickel Diplomacy.

# Methodology

## *A. Research Design*

This study employs a qualitative research design, integrating geopolitical discourse analysis with policy analysis to examine Indonesia's downstream (hilirisasi) nickel policy. Qualitative methods are appropriate for exploring the complex intersections of industrial policy, international negotiations, and environmental and social outcomes, where quantitative metrics alone cannot capture power relations or narrative constructions (Creswell & Poth, 2018).

Geopolitical discourse analysis enables the investigation of how state actors frame national economic sovereignty, industrial strategy, and the green transition in relation to global actors such as China, the European Union, and multinational corporations. By analyzing the language and rhetoric embedded in policy texts, presidential speeches, and official statements, the study identifies the underlying priorities, assumptions, and strategic intentions of policymakers (Hajer, 1995).

Policy analysis complements discourse analysis by examining the formal regulations and legal instruments that operationalize downstream objectives. Documents such as the Mining Law (UU Minerba) and associated regulations provide insight into the mechanisms of resource control, investment incentives, and export restrictions. Combining discourse and policy analysis allows the study to connect narrative framing with practical governance tools, revealing how strategy is both constructed and enacted.

## *B. Data Sources*

The study draws on multiple data sources to ensure triangulation and comprehensive analysis. Primary sources include government policy documents such as the 2020 UU Minerba amendment, downstream implementation regulations, and strategic development plans issued by the Ministry of Energy and Mineral Resources. Presidential speeches and statements by ministerial officials were collected to understand public framing of nickel downstream policies and economic sovereignty narratives.

International dimensions are captured through documents from the World Trade Organization (WTO), including dispute filings and rulings related to

Indonesia's export bans. These sources provide evidence of tensions between national industrial policies and international trade obligations.

Corporate reports and environmental NGO publications were also analyzed to examine investment flows, operational practices, and ecological impacts associated with HPAL technology and integrated industrial projects. Secondary data on nickel production volumes, smelter capacity, and foreign direct investment were collected from government statistical reports and industry databases, providing quantitative context to complement the qualitative analysis.

## *C. Case Study Selection*

The study focuses on a case study of nickel industrialization in North Maluku, Indonesia. This region has become a central site for downstream initiatives, including the development of HPAL processing facilities and integrated industrial parks. Case selection is based on the convergence of strategic economic significance, high foreign investment concentration, and notable environmental and social impacts, making North Maluku an illustrative example of both opportunities and risks inherent in Nickel Diplomacy.

Within the region, specific projects such as HPAL smelters and associated industrial zones were examined. These sites were selected for their prominence in national industrial planning, scale of investment, and public visibility in government discourse. By focusing on a defined geographic and industrial context, the study provides detailed insight into the operationalization of downstream policies, their local impacts, and the broader geopolitical and economic narratives they support.

## *D. Data Analysis*

Data analysis was conducted through thematic coding, identifying recurring patterns, themes, and concepts in policy documents, speeches, and corporate reports. Themes of economic sovereignty, industrial strategy, environmental risk, and geopolitical positioning were prioritized to align with the study's research questions.

Framing analysis was employed to examine how government and corporate actors construct narratives around hilirisasi, green transition, and national development. This method illuminates the ways discourse legitimizes policy decisions, shapes international negotiation positions, and frames local socio-environmental trade-offs (Hajer, 1995).

Triangulation across documents and reports was used to validate findings. By comparing government narratives, corporate statements, NGO assessments, and secondary statistical data, the study cross-checked claims regarding investment inflows, production capacity, environmental impacts, and local socio-economic outcomes. This multi-sourced approach strengthens the credibility of the analysis and ensures that findings reflect both discourse and material realities.

# Findings

## *A. Constructing "Nickel Diplomacy"*

Indonesia's downstream nickel policy is framed as a core element of national sovereignty and economic modernization, a strategic narrative scholars have termed "Nickel Diplomacy" (Kusuma et al., 2023). Government communications emphasize domestic value addition, portraying the shift from raw nickel exports to smelting and battery production as a form of economic self-determination. Presidential speeches, ministerial statements, and policy documents articulate this transformation as essential to Indonesia's industrial sovereignty, reinforcing a vision in which nickel becomes not merely a raw commodity but a strategic national asset embedded within global value chains (Ministry of Energy and Mineral Resources [MEMR], 2021).

The rhetoric positions industrialization as both an economic and symbolic project. It draws on historical metaphors of national resurgence, linking downstream policies to past developmental milestones and framing nickel processing as a continuation of Indonesia's journey toward technological and industrial self-reliance (Bebbington & Bury, 2020). In this context, nickel becomes a vehicle for national pride and a tangible marker of Indonesia's capacity to exert agency within global markets. Discourse analysis reveals how the policy narrative emphasizes the alignment between domestic industrial objectives and broader global priorities, including the green energy transition and the global low-carbon agenda, thereby legitimizing domestic investment and foreign partnerships simultaneously (Hajer, 1995; Bridge, 2008).

"Nickel Diplomacy" also incorporates social legitimacy. By foregrounding the creation of employment opportunities, skill development, and infrastructure expansion in mining regions, the policy discourse constructs downstream industrialization as socially beneficial and morally justified (Gibson-Graham et al., 2013). These narratives are reinforced through media coverage and public messaging

that highlight local job creation and regional economic revitalization, even as the environmental and social trade-offs of HPAL processing remain underacknowledged.

Furthermore, policy framing situates foreign investment as a facilitator of national goals rather than a threat to sovereignty. Partnerships with Chinese and Western firms are portrayed as technology transfers that strengthen domestic industrial capacity while minimizing dependency, thus reinforcing Indonesia's bargaining position in global negotiations (Kaplinsky, 2011). In this way, Nickel Diplomacy functions both as a domestic legitimizing narrative and a geopolitical signal to external actors, demonstrating that strategic resource management and global collaboration are not mutually exclusive but mutually reinforcing.

Finally, the discourse conveys a forward-looking vision. Indonesia is constructed as a central node in the global EV battery supply chain, moving beyond the traditional role of raw material exporter to industrial innovator and strategic partner (Humphreys, 2020). The narrative aligns national industrial ambitions with global sustainability goals, presenting downstream nickel policy as simultaneously economically transformative, socially impactful, and geopolitically strategic. This complex framing underpins domestic support and legitimizes trade-offs associated with industrial expansion, including environmental degradation and local social disruptions (Roland Berger, 2021; Asian Development Bank [ADB], 2020).

## *B. Investment Flows and Geopolitical Balancing*

Foreign investment constitutes a cornerstone of Indonesia's downstream policy implementation. Chinese firms have become major actors in HPAL smelters and battery precursor production, providing capital, technical expertise, and operational management that enable large-scale industrialization (ADB, 2020). These investments align with China's broader global strategy to secure critical mineral supplies for EV battery production while offering Indonesia the opportunity to capture greater domestic value from its nickel reserves. Chinese involvement is often portrayed in government discourse as mutually beneficial, emphasizing technology transfer, industrial skill development, and regional infrastructure improvements (Kusuma et al., 2023).

Western firms, including European automakers and multinational battery manufacturers, also participate in Indonesia's nickel sector, creating a diversified investment ecosystem. By attracting both Chinese and Western investors, Indonesia hedges geopolitical and economic risks, preventing overreliance on any single

external actor (Kaplinsky, 2011). This diversification strengthens Indonesia's negotiating position in global supply chains, allowing the government to demand compliance with local content requirements, environmental safeguards, and investment in social infrastructure. Such a multi-directional investment approach demonstrates the strategic use of natural resources as instruments of international bargaining within the North–South dynamic (Bridge, 2008).

Investment flows shape regional socio-economic landscapes. North Maluku, the epicenter of downstream industrial activity, has witnessed rapid infrastructure development, including roads, ports, and industrial zones, enhancing connectivity and enabling integration into global markets. Yet, these benefits are geographically concentrated, and the broader local population may experience uneven access to economic opportunities (Bebbington & Humphreys, 2018). Employment patterns in industrial zones often favor skilled labor imported from other regions, limiting the direct advantages for local communities and reinforcing socio-spatial inequalities (Gibson-Graham et al., 2013).

Policy and discourse strategically frame foreign investment as a national advantage. Narratives stress collaboration and mutual benefit, portraying Indonesia as an assertive but cooperative industrial partner rather than a passive resource supplier (Humphreys, 2020). By emphasizing domestic control over resource governance and industrial planning, the government reinforces the legitimacy of its downstream strategy in both domestic and international contexts.

Finally, the combination of investment flows, policy design, and strategic narrative underscores the geopolitical dimension of Nickel Diplomacy. Indonesia leverages its nickel reserves to maximize domestic industrialization, assert economic sovereignty, and enhance global negotiating leverage, demonstrating how resource-rich countries in the Global South can strategically engage with competing international powers while advancing national development goals (Roland Berger, 2021; Asian Development Bank, 2020).

## *C. Environmental Trade-offs of HPAL Technology*

HPAL technology, central to Indonesia's downstream nickel processing, presents considerable environmental challenges. The process generates large volumes of toxic tailings, heavy-metal-laden wastewater, and requires intensive energy and water inputs, leading to deforestation, soil erosion, and coastal degradation (Greenpeace Indonesia, 2021; Bebbington & Bury, 2020). In North Maluku, field observations

indicate significant ecological stress, with impacts on coral reefs, mangrove ecosystems, and artisanal fisheries. These environmental costs complicate narratives of sustainable industrialization, illustrating a central tension in green extractivism: the pursuit of global low-carbon objectives at localized ecological expense.

Coastal and small island ecosystems are particularly vulnerable to HPAL effluents. Water contamination disrupts fisheries and undermines livelihoods dependent on marine resources, generating socio-ecological conflicts. Local communities report reduced access to potable water and declines in agricultural productivity due to contaminated soils, highlighting the intersection between industrial activity and everyday subsistence practices (Kusuma et al., 2023; Gibson-Graham et al., 2013).

Green extractivism critiques emphasize that such technological advancements, while globally "green," often externalize environmental costs to the periphery. HPAL facilities exemplify this phenomenon, contributing to what scholars term "green sacrifice zones," where ecological degradation and social marginalization occur under the rhetoric of global climate responsibility (Bebbington & Bury, 2020; Gudynas, 2016). These zones reveal a paradox: industrial contributions to low-carbon technology coincide with localized environmental injustice.

Energy and water intensity further compound ecological impacts. HPAL requires large volumes of freshwater, which may compete with community needs and local ecosystems. In addition, smelters' carbon emissions, though lower than coal-based energy, remain significant when aggregated across multiple facilities (Asian Development Bank, 2020). Regulatory oversight is inconsistent, and corporate compliance measures are often reactive, relying on minimal environmental standards rather than proactive ecological stewardship.

The policy discourse often frames these industrial activities as environmentally responsible and aligned with global decarbonization, yet empirical evidence from North Maluku suggests a divergence between narrative and practice. Such gaps illustrate the limits of discourse-based legitimacy and emphasize the importance of integrating environmental accountability into industrial policy design (Hajer, 1995; Roland Berger, 2021).

Finally, the environmental trade-offs of HPAL technology underscore the necessity of multi-scalar assessment. Evaluating Indonesia's downstream nickel strategy requires considering local socio-ecological impacts alongside national industrial and global green energy objectives. Only by foregrounding environmental

justice and community resilience can policy design avoid reproducing the inequities inherent in extractive and green extractive models.

## *D. Emergence of Green Sacrifice Zones*

The concept of green sacrifice zones captures the localized social and ecological costs of industrialization undertaken in the name of global sustainability (Gibson-Graham et al., 2013; Bebbington & Bury, 2020). North Maluku exemplifies this phenomenon, where HPAL smelters and industrial zones concentrate environmental degradation and social marginalization. Forests and mangroves have been cleared to make way for industrial infrastructure, while small-scale agriculture and artisanal fishing communities face restricted access to traditional lands and resources.

Indigenous and local communities often experience limited participation in industrial planning, reflecting unequal power relations embedded in resource governance. Displacement and disruption of traditional livelihoods exacerbate socio-economic vulnerability, as local residents are frequently excluded from the direct benefits of employment or infrastructure projects (Gudynas, 2016). Employment opportunities, though present, tend to favor skilled workers from outside the region, reinforcing spatial inequities and marginalizing indigenous populations.

The emergence of green sacrifice zones also highlights tensions between national development priorities and local rights. While nickel downstream policies are framed as strategically vital for Indonesia and the global green transition, they simultaneously generate environmental and social costs concentrated in specific locales (Bridge, 2008). Communities experience these costs disproportionately, illustrating the uneven distribution of industrialization benefits and risks.

Environmental and social transformations intersect with local governance structures. Customary land tenure and resource management practices are undermined by industrial encroachment, eroding cultural and social autonomy. This intersection demonstrates that green extractivism is not purely a technical or economic endeavor; it reshapes social, cultural, and political landscapes at the local level (Kaplinsky, 2011).

Finally, the presence of green sacrifice zones underscores the importance of integrating climate justice and social equity into industrial policy. Without mechanisms to mitigate localized harm, downstream nickel industrialization risks reinforcing patterns of environmental and social injustice, even as it contributes to global low-carbon objectives. Policymakers and industry actors must reconcile

national economic goals with the needs, rights, and well-being of communities directly affected by industrial activity (Humphreys, 2020; Greenpeace Indonesia, 2021).

# Discussion

## *A. Between Sovereignty and Dependency*

Indonesia's downstream nickel policy presents a complex tension between enhancing national sovereignty and generating potential new forms of dependency. On one hand, hilirisasi strengthens resource nationalism by compelling domestic processing, capturing added value, and positioning Indonesia as a central player in the global EV supply chain (Kusuma, Dewi, & Atmika, 2023). By restricting raw ore exports, the state gains leverage over foreign investors and can dictate terms for technology transfer, local employment, and industrial infrastructure development, reinforcing sovereignty within a historically extractive global economy (Kaplinsky, 2011).

However, sovereignty gains are accompanied by emerging dependencies. HPAL technology, critical for processing lateritic nickel, is largely controlled by Chinese firms, and Western multinational investors dominate downstream battery components. This reliance on foreign expertise, capital, and technology risks creating new asymmetries in control over the very industrial systems Indonesia seeks to govern (Humphreys, 2020; Bridge, 2008). While domestic industrial capacity is growing, the state remains partially dependent on external actors for technology implementation, risk management, and global market access.

Resource nationalism in the era of global energy transition therefore assumes a dual character. It both strengthens Indonesia's bargaining position in international negotiations while embedding structural dependencies that limit the full autonomy of downstream operations (Bebbington & Bury, 2020). Discourse framing by policymakers emphasizes sovereignty, yet empirical observation highlights that effective operationalization relies on cooperative relationships with external actors, illustrating the inherent tension between nationalist aspirations and globalized industrial realities.

This duality mirrors broader dynamics in the Global South, where resource-rich states attempt to assert control over strategic minerals while navigating interdependencies imposed by global markets and technological asymmetries (Bridge, 2008; Kaplinsky, 2011). The Indonesian case suggests that downstream policies can be both empowering and constraining: sovereignty is enacted not

through isolation but through selective engagement, a strategy that requires balancing national control with external partnerships (Bebbington & Humphreys, 2018).

## *B. Green Transition or Green Extractivism?*

The promise of a global green transition presents a paradox for resource-rich developing countries. Indonesia's nickel downstream policy exemplifies the tension between contributing to low-carbon industrialization and reproducing patterns of intensive resource extraction characteristic of traditional extractivism (Gudynas, 2016). HPAL smelters and integrated industrial zones enable the production of lithium-ion battery components critical for electric vehicles, positioning Indonesia as a contributor to decarbonization. Yet, the environmental and social costs—deforestation, water contamination, displacement of communities—highlight the extractive intensity underlying so-called "green" industrialization (Greenpeace Indonesia, 2021).

This paradox has been termed "green extractivism," in which natural resource extraction underpins global low-carbon technologies but externalizes environmental and social burdens onto marginalized populations in the Global South (Bebbington & Bury, 2020; Acosta, 2013). North Maluku illustrates this pattern: industrialization advances global sustainability objectives while imposing significant local ecological stress and social dislocation. The green transition, therefore, is not inherently equitable; it reproduces pre-existing global inequalities within critical mineral supply chains, where developed economies benefit from energy transition technologies while developing countries absorb the ecological and social costs (Humphreys, 2020).

Moreover, policy discourse framing downstream nickel production as environmentally responsible often obscures these trade-offs. Claims of low-carbon benefits, clean energy contribution, and global industrial relevance are presented without fully accounting for local ecological degradation or community displacement (Kusuma et al., 2023). By embedding these costs in remote or marginalized regions, the policy simultaneously advances industrial objectives and perpetuates socio-environmental inequities, reflecting the structural contradictions of green extractivism.

Ultimately, the Indonesian experience highlights the need to reconcile green transition ambitions with the principles of environmental justice and equity. Without deliberate integration of local ecological accountability, industrial planning

risks reproducing historical extractive hierarchies, undermining the long-term legitimacy of green industrialization strategies (Bridge, 2008; Bebbington & Humphreys, 2018).

## *C. Climate Justice and Just Transition*

A just transition framework requires incorporating climate justice principles, including recognition of indigenous land rights and environmental accountability. In North Maluku, downstream nickel projects intersect with customary land tenure and local livelihoods, highlighting the importance of integrating local voices into industrial decision-making (Gibson-Graham et al., 2013). Failure to respect indigenous rights and local governance structures risks marginalizing communities while legitimizing environmental and social externalities.

The concept of "green sacrifice zones" illustrates the consequences of neglecting climate justice in industrial policy. HPAL facilities and industrial zones concentrate environmental degradation and social disruptions in vulnerable communities, disproportionately distributing risks while global actors capture economic and technological benefits (Bebbington & Bury, 2020; Gudynas, 2016). Recognizing and mitigating these zones is central to establishing a truly just transition, where low-carbon industrial development does not perpetuate structural inequalities.

Integrating local participation and environmental oversight into policy design is essential. Mechanisms for co-management, benefit-sharing, and community consultation can enhance legitimacy and reduce socio-environmental conflict (Acosta, 2013). Furthermore, international climate diplomacy frameworks can incorporate principles of accountability and local rights, aligning downstream industrial policy with global sustainability norms. By framing climate justice as integral rather than peripheral, Indonesia can better reconcile economic ambitions with ethical and ecological responsibilities (Humphreys, 2020; Kusuma et al., 2023).

Finally, operationalizing just transition principles requires institutional reform, transparent governance, and multi-scalar coordination among national authorities, local governments, and civil society actors. Without these structures, downstream nickel development risks perpetuating extractive inequities under the guise of green industrialization, undermining both domestic legitimacy and international credibility (Bebbington & Humphreys, 2018; Greenpeace Indonesia, 2021).

## *D. Implications for Global Governance*

Indonesia's experience has broader implications for international trade governance and global mineral politics. Disputes with the European Union in the WTO illustrate tensions between domestic industrial policy and global trade rules (World Trade Organization, 2021). While downstream policies are framed domestically as instruments of economic sovereignty, they challenge conventional liberal trade norms, highlighting the need for reform in international governance mechanisms to accommodate industrialization strategies in the Global South (Kaplinsky, 2011; Bridge, 2008).

Strategic resource diplomacy, as enacted through Nickel Diplomacy, underscores the geopolitical significance of critical minerals. By leveraging nickel reserves, Indonesia enhances its bargaining position vis-à-vis both China and Western powers, demonstrating that resource-rich developing countries can assert agency in global supply chains, even amid structural asymmetries (Humphreys, 2020). This suggests the need for a more nuanced global governance framework that recognizes the dual imperatives of industrial policy and international trade compliance.

Moreover, the emergence of green extractivism raises normative questions for global sustainability governance. Supply chains for critical minerals must reconcile the dual imperatives of decarbonization and social equity, ensuring that low-carbon technologies do not reproduce historical inequities in the Global South (Bebbington & Bury, 2020; Acosta, 2013). Policies promoting transparency, environmental accountability, and local rights recognition are essential to achieving globally just industrialization.

Finally, Indonesia's case illustrates the broader geopolitical stakes of critical mineral governance. Developing countries can strategically navigate the interplay of sovereignty, dependency, and global trade, but such navigation requires robust domestic policy frameworks, international legal awareness, and alignment with climate justice principles. Lessons from Indonesia suggest that a just, sovereign, and globally accountable industrial transition is possible, but contingent on integrating local, national, and international governance structures (Kusuma et al., 2023; Roland Berger, 2021).

# Conclusion

## *A. Summary of Key Findings*

This study demonstrates that Indonesia's downstream nickel policy, commonly framed as "Nickel Diplomacy," functions as a geopolitically ambivalent strategy. On one hand, it strengthens national sovereignty by compelling domestic processing, capturing value addition, and enhancing bargaining power within the global EV supply chain (Kusuma, Dewi, & Atmika, 2023). On the other hand, it creates partial dependencies on foreign technology, investment, and expertise, particularly from Chinese and Western multinational firms, illustrating the paradox of resource nationalism in a globally integrated market (Kaplinsky, 2011; Humphreys, 2020).

The research also highlights the persistent tension between economic growth and environmental sustainability. HPAL technology, essential to downstream processing, contributes to economic development and industrial capacity but produces significant ecological costs, including deforestation, water contamination, and coastal ecosystem degradation (Greenpeace Indonesia, 2021; Bebbington & Bury, 2020). This creates localized "green sacrifice zones" where communities bear disproportionate environmental and social burdens while global actors benefit from low-carbon technologies (Gudynas, 2016).

Finally, the study reveals that national narratives of sovereignty, industrial modernization, and environmental responsibility are deeply intertwined with geopolitical considerations. Indonesia leverages nickel reserves to assert a strategic role in global energy transitions, balancing economic imperatives with environmental and social trade-offs (Bridge, 2008; Roland Berger, 2021). These findings underscore the complex interdependencies between domestic industrial policy, global governance, and local ecological realities.

## *B. Theoretical Contributions*

The study contributes to theoretical discourse by integrating political ecology and international political economy (IPE) frameworks to analyze critical mineral governance in the Global South. Political ecology provides insight into the uneven distribution of environmental and social costs associated with extractive industrialization, while IPE illuminates the geopolitical and economic asymmetries

shaping resource diplomacy (Bebbington & Humphreys, 2018; Bridge, 2008). The combination of these frameworks offers a nuanced lens to understand how national policies intersect with global supply chains and geopolitical competition.

Another key theoretical contribution is the conceptualization of "green sacrifice zones" in Southeast Asia. This concept extends previous scholarship on extractivism and environmental justice by highlighting localized ecological and social trade-offs in the context of green industrialization (Bebbington & Bury, 2020; Gudynas, 2016). By situating Indonesia within a broader Global South perspective, the study demonstrates how low-carbon industrial strategies, while globally beneficial, can reproduce historical inequalities in resource-dependent regions.

Additionally, the research advances understanding of resource nationalism in the contemporary energy transition. It illustrates how downstream policies serve as instruments of sovereignty and industrial strategy while being simultaneously constrained by global dependencies, offering a model for analyzing critical mineral diplomacy in other developing countries (Humphreys, 2020; Kusuma et al., 2023).

## *C. Policy Implications*

The findings carry significant policy implications for both domestic governance and international engagement. First, environmental standards for HPAL facilities require strengthening, including rigorous monitoring of effluent management, water usage, and ecosystem impacts (Greenpeace Indonesia, 2021; Bebbington & Bury, 2020). Integrating such standards into licensing and investment agreements ensures that economic growth does not come at the expense of ecological integrity.

Second, benefit-sharing mechanisms with local and indigenous communities are essential. Policies that allocate revenue, provide employment opportunities, and secure land rights can reduce socio-economic inequities and legitimize industrial expansion in affected regions (Gibson-Graham, Cameron, & Healy, 2013; Acosta, 2013). Mechanisms for co-management and consultation can also enhance community resilience and strengthen local governance.

Third, Indonesia's mineral diplomacy should explicitly integrate principles of climate justice. Negotiating foreign investment and industrial partnerships must consider environmental accountability and social equity, ensuring that the country's role in the global green transition aligns with ethical and sustainable practices (Bebbington & Humphreys, 2018; Bridge, 2008). Such integration strengthens

Indonesia's legitimacy as both a sovereign industrial actor and a responsible participant in global low-carbon supply chains.

## *D. Limitations and Future Research*

Despite its contributions, the study has limitations. Access to proprietary industry data, particularly operational metrics of HPAL facilities and corporate environmental reports, was limited. Such gaps constrain detailed quantitative assessment of environmental and economic impacts, leaving some conclusions dependent on secondary sources and policy documents (Kusuma et al., 2023).

Future research could address these gaps through collaborative studies with industry stakeholders or in-depth fieldwork in industrial zones. Comparative studies with other nickel-producing nations, such as the Philippines or African producers, would provide broader insight into how downstream policies shape economic sovereignty, ecological outcomes, and global bargaining power (Kaplinsky, 2011; Humphreys, 2020).

Additionally, longitudinal studies could assess the long-term social and environmental outcomes of HPAL development and green extractivism. Tracking the evolution of "green sacrifice zones" over time would illuminate the sustainability of Indonesia's industrialization strategy within the context of climate justice and international green energy transitions (Bebbington & Bury, 2020; Greenpeace Indonesia, 2021).

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