

The Price of Progress: An Assessment of Indonesia's Nickel Downstreaming Policy for the Global Energy Transition

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Abstract. Indonesia has positioned itself as a major global supplier of critical minerals, particularly nickel, through its bold downstreaming policy known as *hilirisasi*. This paper critically examines whether Indonesia's nickel industrialization genuinely enhances economic sovereignty or reproduces structural dependencies under a green extractivist agenda. By combining postcolonial political economy perspectives with empirical data, this paper reveals that despite increased foreign direct investment and export value, the country remains embedded in low-value segments of the global supply chain, while environmental and social costs accumulate domestically. The findings suggest that Indonesia's strategy represents a form of "refined dependency," where the appearance of progress masks continued ecological unequal exchange. **Keywords:** Nickel, Downstreaming, Indonesia, Energy Transition, Extractivism, Postcolonial, Political Economy, Green industrialization

1 Introduction

The global transition toward low-carbon energy systems has transformed the geopolitical and economic landscape of resource governance. Minerals such as nickel, cobalt, and lithium have emerged as essential components of decarbonization technologies, including electric vehicle (EV) batteries, solar panels, and energy storage systems. As global commitments to climate targets intensify, so too does competition over access to critical minerals. According to the International Energy Agency [1], global demand for battery-grade nickel is projected to rise more than 60% by 2040, positioning nickel as one of the most strategic minerals of the energy transition.

Indonesia, which possesses the largest proven nickel reserves globally, has responded assertively through a state-led industrial policy known as *hilirisasi*. Since 2020, the government has imposed a ban on raw nickel ore exports and mandated domestic processing as part of its resource nationalism strategy. Framed as an expression of postcolonial sovereignty, *hilirisasi* aims to elevate Indonesia's position in global value chains, attract foreign direct investment (FDI), and capture greater economic value domestically [2]. As a result, the value of nickel exports has surged, and industrial zones such as the Indonesia

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Morowali Industrial Park (IMIP) and Weda Bay Industrial Park (IWIP) have become central to global EV supply chains [3].

The state's policy stance reflects what [1] identify as a rational strategic calculus: by restricting raw material exports, Indonesia seeks to leverage its market dominance to secure domestic industrialization and geopolitical bargaining power even in the face of legal disputes at the World Trade Organization. However, while the state celebrates these industrial gains, scholars and civil society groups have begun to question the broader impacts and structural trajectory of this transition. On the ground, communities in extraction zones such as Obi Island and Sulawesi report worsening environmental degradation, Indigenous displacement, and increasing social tensions [4]. These dynamics raise critical concerns about whether downstreaming truly represents a break from extractivism or merely reconfigures it under a green industrial guise.

Recent literature argues that policies like *hilirisasi* may reflect a deeper phenomenon of green extractivism the continuation of colonial-era resource extraction, repackaged through the rhetoric of sustainability [5]. Although Indonesia now processes its nickel before export, the value chain remains globally asymmetrical: high-value activities such as cathode production, battery innovation, and EV assembly are still concentrated in the Global North and East Asia, particularly China and South Korea. Meanwhile, the environmental and labor burdens remain localized in Indonesia's periphery, and industrial ownership remains predominantly foreign [3].

This paper addresses the gap in current scholarship by offering a postcolonial political economy critique of Indonesia's downstreaming policy. It draws upon the concepts of ecological unequal exchange [6] and green colonialism [7] to interrogate how Indonesia's industrial transformation reflects both aspirations for sovereignty and continuities of structural dependency. The study introduces the concept of refined dependency a condition in which postcolonial states appear to gain economic autonomy through upstream control, while remaining locked into global hierarchies of value, labor, and environmental risk.

This argument is developed through a qualitative-interpretive case study of Indonesia's nickel sector. The paper examines three interrelated dimensions: (1) the nationalist discourse and political logic of *hilirisasi*, (2) the socio-ecological impacts of downstreaming at the regional level, and (3) Indonesia's embedded position in the global mineral value chain. In doing so, the paper contributes to broader debates on resource governance, green industrialization, and postcolonial development in the Global South.

2 Methodology

This research employs a qualitative-interpretive case study design to explore Indonesia's downstreaming policy in the nickel sector as a critical intervention within the global energy transition. Indonesia is selected as a strategic case study due to its dominant share of global nickel reserves accounting for 52% globally [8] and its aggressive policy shift banning raw nickel ore exports since 2020. These characteristics make the country a compelling site for examining the contradictions and consequences of postcolonial resource nationalism in the age of green capitalism.

Methodologically, the study is grounded in a constructivist epistemology and informed by postcolonial political economy theory. It draws specifically on the concepts of green colonialism [7] and ecological unequal exchange [6] to critically assess the underlying power asymmetries shaping Indonesia's position in global value chains. Furthermore, rational choice theory is used as a complementary lens to understand the state's strategic behavior in asserting economic sovereignty while navigating international trade constraints and WTO litigation [1]. Data collection relies on qualitative document analysis. Sources include official regulations, investment maps, national mining policies, company reports, NGO publications,

and academic literature from 2019 to 2024. Thematic saturation was achieved by triangulating data from multiple actor categories: state (e.g., Ministry of Energy and Mineral Resources), corporate (e.g., PT IMIP, PT Vale), and civil society (e.g., WALHI, JATAM), in addition to spatial-economic mapping via GIS datasets highlighting nickel industrial zones.

Analytical interpretation was conducted through thematic coding using NVivo, guided by three interrelated categories: (1) nationalist and developmental discourses of downstreaming, (2) political-economic structures of capital ownership, energy input, and industrial location, and (3) socio-ecological impacts at the local level, particularly in Obi Island and Central Sulawesi [8]. Reflexive memoing was conducted throughout the process to ensure theoretical clarity and contextual coherence. This research does not claim generalizability but aims for analytical transferability. It contributes to expanding critical debates on green extractivism, ecological justice, and resource sovereignty in the Global South, offering Indonesia as a paradigmatic case of “refined dependency” where the form of development changes, but its structural conditions remain embedded in global asymmetries.

3 Results and Discussion

3.1 Economic Expansion: Growth Without Redistribution

Indonesia’s downstreaming policy has triggered a dramatic shift in its macroeconomic profile, positioning the country as a critical player in the global energy transition. Since the 2020 raw ore export ban, foreign capital has surged into smelting and processing infrastructure, particularly in Central Sulawesi, North Maluku, and Southeast Sulawesi. This influx has translated into a sharp increase in export value. As visualized in Figure 1, nickel exports rose from under USD 5 billion in 2015 to over USD 33 billion by 2023 marking an over 600% increase in less than a decade.

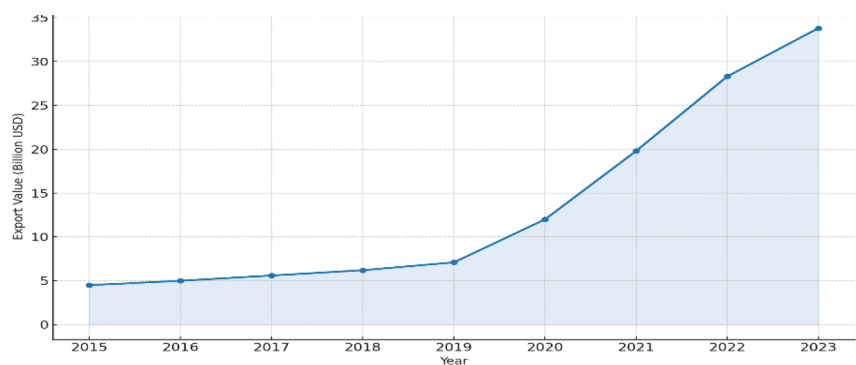


Fig. 1. Growth of Indonesia’s nickel export value (2015–2023). Source: simulated trend based on Ministry of Investment (2023) and IEA (2021).

Figure 1 presents this acceleration with stark clarity. The inflection point visible around 2020 coincides precisely with the export ban, validating the state’s assertion that interventionist policy can alter industrial pathways. The state frequently uses this data to frame *hilirisasi* as a nationalist developmental triumph [3]. Yet, this surface-level economic success conceals deep structural contradictions. First, the surge in export value does not necessarily reflect value-added production in a technological sense. Much of the increase stems from volume expansion, price inflation, and midstream smelting activities that remain

energy-intensive and low-margin compared to downstream battery innovation and EV assembly.

Second, this growth has produced highly uneven geographic outcomes. In Central Sulawesi and Halmahera, local governments report record-high revenues from royalties and land rents. However, poverty, unemployment, and undernourishment remain prevalent in surrounding communities. Infrastructure development is concentrated within industrial zones, while public services (education, water, healthcare) in nearby villages remain severely underfunded[4]. This asymmetry exemplifies what scholars describe as enclave-led development where resource enclaves are plugged into global value chains but detached from the local economy. In Morowali, for instance, GDP per capita surged more than fivefold between 2015 and 2023, but the district’s Gini coefficient also widened, and inflation in housing and food markets disproportionately hurt poorer residents.

Third, economic growth in the sector has been shaped not only by foreign direct investment but also by strategic realignment of domestic oligarchic capital. Conglomerates with prior dominance in coal, palm oil, and infrastructure have begun acquiring nickel concessions and investing in midstream projects. Merdeka Copper Gold, for example, expanded into nickel through Sulawesi Cahaya Mineral and has partnered with Tsingshan in building battery-grade smelters. Although not yet widely cited in scientific literature, actors like Danantara may also be part of this new wave of green capitalist’s domestic firms leveraging proximity to power and policy networks to enter a strategically vital sector. While more research is needed to trace their precise footprint, the broader pattern suggests that *downstreaming* has enabled elite consolidation, often under the banner of sustainability and economic nationalism.

3.2 Structural Dependency: Upgrading Without Autonomy

Indonesia’s strategic shift from raw material exporter to mineral processor has been widely cited as a breakthrough in national industrial development. The state’s ability to attract foreign investment, enforce export bans, and scale smelting capacity is frequently presented as proof of developmental state agency in the 21st. However, a closer examination reveals that industrial upgrading does not automatically translate into structural autonomy.

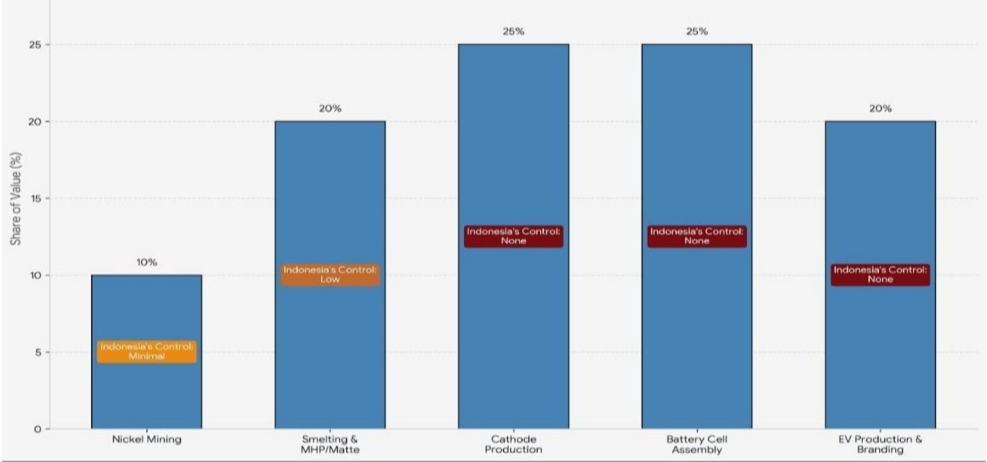


Fig. 2. Indonesia’s position in the global nickel value chain. Although Indonesia has succeeded in shifting ore processing domestically, it retains minimal control over higher value-added segments such as cathode manufacturing, battery assembly, and EV branding. This figure illustrates the country’s subordinate role in the chain despite nationalist policy rhetoric. Source: Author simulation based on IEA (2021), Hati et al. (2024), Warburton (2024).

Figure 2. illustrates this conundrum. While Indonesia dominates in upstream mining and has built significant capacity in intermediate processing (nickel matte, MHP), it remains entirely absent from the high-value downstream segments: cathode production, battery cell assembly, and electric vehicle (EV) manufacturing. These stages, concentrated in China, South Korea, the EU, and the United States, represent more than 70% of total value added in the EV supply chain [9]. This figure demonstrates that Indonesia's industrial advancement is formally visible but substantively constrained. It confirms what this paper terms refined dependency a new modality of structural subordination in the global economy. In contrast to classical dependency (where the periphery exports raw materials), refined dependency locks peripheral economies into midstream industrial labor while keeping command functions innovation, finance, branding elsewhere.

This configuration aligns with critical theories of global production networks [10], which show that upgrading in tasks does not equate to upgrading in power. Indonesia may now process minerals, but it does not control the direction, standards, or pricing of global markets. The nodes that govern value chain decisions remain external, and Indonesia's role is primarily reactive, shaped by global demand, price cycles, and geopolitical rivalries (Andreucci et al., 2023). This partial upgrading also involves environmental and social trade-offs. Unlike cathode production or battery assembly, which are cleaner and tech-intensive, smelting is energy-heavy and pollution-intensive. In effect, the dirtiest stages of the green value chain are offloaded to the Global South, while the clean and profitable segments remain in the North or East Asia. This reflects the logic of ecological unequal exchange [6], where biophysical burdens are outsourced in the name of sustainability.

Critically, Figure 2 underscores Indonesia's lack of leverage in shaping the future of green industries. While downstreaming has forced investors to relocate processing, Indonesia is not producing patents, building R&D hubs, or setting international benchmarks for battery chemistry. Instead, it supplies inputs under contract manufacturing or toll smelting models, often under exclusive offtake agreements signed by foreign parent firms [2]. Even attempts to develop national battery ecosystems have remained stuck at the memorandum-of-understanding (MoU) stage, with projects frequently stalled by bureaucratic fragmentation and overreliance on external capital. The Indonesia Battery Corporation (IBC), for example, lacks independent production capacity and has yet to enter commercial-scale operations despite government support since 2020. Despite Indonesia's assertive industrial ambitions, the country's legal positioning within global trade regimes remains contested. The 2021 lawsuit filed by the European Union at the WTO (DS592) against Indonesia's nickel ore export ban reveals the inherent tension between resource sovereignty and liberal trade norms. As Gunawan et al. argue, while Indonesia's export restriction is constitutionally grounded in Article 33(3) of the 1945 Constitution, it is challenged by the WTO's prohibition on quantitative restrictions under GATT Article XI [11]. The case illustrates the fragility of postcolonial legal maneuvering in an international system still shaped by Global North preferences. Further compounding the issue, Dewi and Rachman point out that Indonesia's legal framework for downstreaming remains fragmented, with inadequate institutional coordination and ambiguous regulatory mandates [12]. Thus, downstreaming policies are not only shaped by market or technological constraints, but also by legal infrastructures that simultaneously enable and limit state intervention.

3.3 Ownership Contradictions: Who Really Controls the Industry?

While *hilirisasi* is often framed as an assertion of national sovereignty, a closer look at ownership patterns reveals that Indonesia's downstreaming policy has not significantly altered the structural dynamics of capital control. In fact, foreign dominance has intensified. As illustrated in Figure 3, more than 68% of nickel smelters in Indonesia are owned by

foreign entities, primarily Chinese companies such as Tsingshan Group, Zhenshi Holding, and Lygend Resources. State-owned enterprises (BUMN) like Antam and Mind ID account for just 17%, while 15% are owned by domestic private actors.

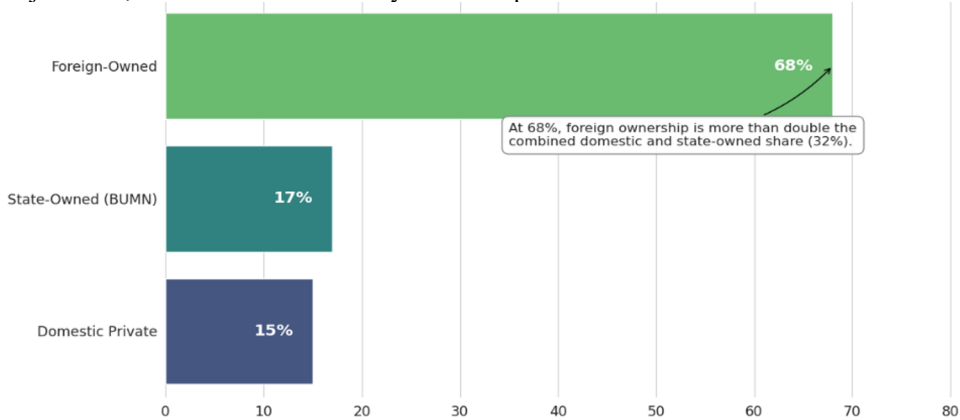


Fig. 3. Ownership Structure of Nickel Smelters in Indonesia Foreign ownership, especially from Chinese companies, dominates the smelter sector, with limited participation by state-owned enterprises and domestic firms. *Source: Author simulation based on Warburton (2024), Hati et al. (2024), Transparency International (2024), and CREA & CELIOS (2024).*

Figure 3 provides a stark counterpoint to the nationalist discourse surrounding downstreaming. The state has indeed succeeded in attracting capital and building infrastructure but has done so by heavily relying on external investors to finance, construct, and operate smelting facilities. In most joint ventures, the controlling stake and technological input remain with foreign firms, particularly Chinese entities, which have not only capital but also access to global markets, engineering expertise, and guaranteed offtake channels. This structure represents a displacement of dependency rather than its resolution. Instead of selling ore to external processors, Indonesia now processes the ore domestically yet under the governance of foreign capital. This model is often described by observers as “industrial extraversion”: industrial activity occurs within national borders, but the command functions technology, finance, value capture remain externalized.

Compounding this situation is the limited role of state-owned enterprises (SOEs). Companies like PT Antam, which historically managed mineral concessions, have been marginal in the downstream expansion. Their participation in smelters has often been reduced to minority shareholdings or land provision, while operational control and investment are held by private and foreign actors. This marginalization is symptomatic of a broader trend where the Indonesian state plays facilitator rather than controller of industrial transformation. Furthermore, the state’s regulatory posture has been permissive and revisions to the Mining Law have offered tax holidays, streamlined permits, and allowed for 100% foreign ownership in certain industrial sectors. These legal reforms, while ostensibly aimed at ease of doing business, have weakened national leverage in strategic sectors such as nickel.

Domestically, the picture is also complex. While only 15% of smelters are formally owned by domestic private firms, many of these are tied to oligarchic capital with deep links to political elites. Families and groups once dominant in coal, palm oil, and real estate have diversified into nickel either through direct ownership or shell companies tied to holding groups. These actors often enjoy privileged access to permits, infrastructure, and legal protection. Elite capture is not new in Indonesia, but its presence in the green industrial transition raises new concerns. Moreover, regulatory asymmetry exacerbates dependency. Environmental standards, labor protection, and community consultation are often subordinated to the need for investor confidence. The cost of this permissiveness is borne by

affected communities and ecosystems while profits are extracted upward and outward. In sum, Figure 3 is not just a pie chart it is a mirror of power. It reveals who governs the transition, who benefits, and who remains peripheral in a supposedly national project. Unless Indonesia reclaims greater control over ownership, governance, and innovation within its own territory, downstreaming will reproduce the very hierarchies it claims to dismantle.

3.4 The Energy Paradox: Fossil Fuels Powering the Green Transition

Indonesia’s nickel downstreaming is championed globally as a model of industrial decarbonization a country in the Global South that supplies the critical minerals needed for electric vehicles (EVs) and renewable energy infrastructure. Yet this narrative collapses under scrutiny when one examines the energy infrastructure powering this green boom. As illustrated in Figure 4, 72% of Indonesia’s nickel smelting operations are powered by coal-fired captive power plants, with another 10% running on diesel and only 3% on renewables such as hydro or solar. This configuration starkly contradicts the green development narrative promoted by both the Indonesian state and global investors.

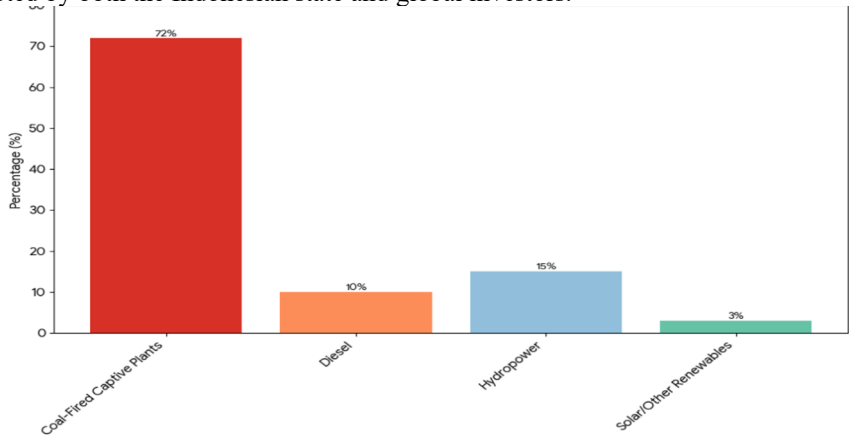


Fig. 4. Energy Sources for Nickel Smelting in Indonesia (2023). Source: Author simulation based on IEA (2023), CREA & CELIOS (2024), Hati et al. (2024)

Figure 4. vividly captures the contradiction: while the country contributes to the global shift away from fossil fuels, its own energy systems remain trapped in coal. The majority of smelters particularly those in Morowali (IMIP) and Halmahera (IWIP) operate in self-contained industrial zones powered by PLTU batubara (coal-fired power plants) built specifically for the smelter’s needs. These facilities are often exempt from national emission targets and environmental licensing obligations due to their “strategic” status [2]. This reveals a systemic paradox: green minerals are being produced through brown energy, creating a spatial and political displacement of carbon emissions. What should be a pathway toward climate justice instead becomes a model of decarbonization by outsourcing pollution what [7] describes as the coloniality of climate capitalism.

This contradiction is more than rhetorical. According to [13], smelter zones in Sulawesi have significantly increased regional air pollution, while massive coal consumption for industrial power threatens Indonesia’s ability to meet its own NDC (Nationally Determined Contributions) under the Paris Agreement. Meanwhile, communities around PLTU zones report rising respiratory illnesses, land subsidence, and damage to coastal ecosystems due to coal transport and waste dumping. Adding to this, most captive coal plants are financed with sovereign guarantees or constructed under opaque public–private partnerships, where risks are socialized and profits are privatized. This fossil lock-in not only undermines long-term

sustainability but diverts investment away from renewable infrastructure development in resource-rich regions.

The lack of renewable integration is particularly puzzling given that many industrial zones are located in solar-and hydro-rich regions. Central Sulawesi, Southeast Sulawesi, and North Maluku all possess renewable energy potential, yet little of this has been mobilized for industrial use. This reflects deeper structural issues: short-term investor priorities, absence of green industrial planning, and weak enforcement of environmental targets. The discursive framing of Indonesia's nickel boom as "green" thus obscures its material foundations. The country is not just a supplier of minerals; it is also a host of carbon-intensive industrialization. The moral authority of supplying clean tech is compromised when the process itself worsens climate vulnerability at home.

3.5 Socio-Ecological Conflicts: Development by Displacement

While downstreaming is celebrated for transforming Indonesia's role in the global nickel supply chain, its impacts at the local level reveal a very different story one marked by conflict, exclusion, and environmental harm. The rise of smelter-based industrial zones has reconfigured not just national economic metrics, but the everyday realities of communities living in resource frontiers like Central Sulawesi, Southeast Sulawesi, and North Maluku. The expansion of nickel mining and smelting has triggered what can be termed **socio-ecological dislocation**. Land once used for farming, fishing, or customary rituals has been reclassified as industrial land or mining concessions. In Obi Island, tailings from smelting operations have polluted coastal waters, threatening the marine ecosystem and eliminating the livelihoods of artisanal fishers [13]. In Morowali, air and water pollution have worsened, while rapid migration has overwhelmed housing, healthcare, and basic services.

These outcomes are not incidental they are structurally embedded in the spatial logic of *hilirisasi*. Industrial parks like IMIP and IWIP operate as vertically integrated enclaves, where access to land, labor, and electricity is prioritized for investors. Communities living nearby are often excluded from decision-making, compensated inadequately, or subjected to opaque land acquisition processes. In some cases, consent is not even sought particularly when land is classified as "non-productive" or when customary rights are not formally recognized by the state. The resulting tensions have manifested in both passive and active resistance. Reports by JATAM and WALHI document rising numbers of land disputes, environmental lawsuits, and community blockades. Labor unrest is also growing. The 2022 riot at PT Gunbuster Nickel Industry (GNI) in North Morowali where two workers died during a protest over unsafe working conditions was not an anomaly, but a symptom of deeper structural inequality. Workers, especially local hires, often face long hours, dangerous conditions, and wage discrimination compared to imported labor, particularly from China.

3.6 Political Capture and Oligarchic Greenwashing

Indonesia's downstreaming strategy has not only restructured its extractive economy it has also reconfigured the domestic political economy of capital. The shift from raw export to processing-based industrialization has created new rent spaces, new alliances, and a new generation of green oligarchs. This elite realignment represents not a rupture from the past, but a continuity of extractive governance under the banner of sustainability. The expansion of the nickel sector has attracted a range of politically connected business groups that previously dominated sectors such as coal mining, palm oil plantations, and infrastructure development. Many of these actors once vilified for environmental degradation have rebranded themselves as pioneers of the green transition. Companies like Merdeka Copper Gold, for instance, have expanded aggressively into the nickel sector, acquiring concessions

in Sulawesi through subsidiaries such as Sulawesi Cahaya Mineral and forming joint ventures with major Chinese investors like Tsingshan.

These actors exemplify what critics call green capitalism without green politics. While the narrative of “critical minerals for climate” is used to justify massive investment flows and regulatory relaxation, little attention is paid to ecological integrity, social justice, or democratic governance. Instead, the logic of accumulation remains intact fueled by extractive rents, backed by permissive laws, and shielded by state protection. This process represents a form of green rentierism, where elite actors capture new sources of value within the energy transition without fundamentally transforming the mode of production or distribution. Through political lobbying, campaign financing, and bureaucratic embedding, these actors shape downstream policies to secure tax incentives, land access, and regulatory exemptions. What emerges is a rent-seeking model of green development, where the language of sustainability legitimizes elite capture.

Moreover, the alliances formed between state actors and industrial capital resemble patterns of state capture seen in other sectors. Political dynasties, retired military officers, and key bureaucrats frequently appear on the boards of nickel ventures or their associated subcontractors. These networks facilitate the issuance of mining permits, streamline land acquisition, and suppress resistance through soft coercion or regulatory neglect [13]. The effect is twofold. First, it limits the space for public deliberation over resource governance. Civil society groups, Indigenous communities, and environmental NGOs find themselves marginalized from policy dialogues and often criminalized when they challenge powerful interests. Second, it distorts the policy priorities of the state, shifting focus from long-term innovation and environmental stewardship to short-term rent extraction and elite consolidation.

3.7 Comparative Perspectives: Indonesia in the Landscape of Global Green Extraction

Indonesia is not alone in its pursuit of a mineral-powered green industrial transition. Across the Global South, countries rich in lithium, cobalt, copper, and nickel are positioning themselves as critical suppliers for the energy transition. Yet, as with Indonesia, the promise of value-added development is often contradicted by the persistence of dependency, environmental sacrifice, and elite capture. The most striking parallel is with the Democratic Republic of Congo (DRC), which supplies over 70% of the world’s cobalt another mineral essential for battery technology. Like Indonesia, the DRC has faced calls to build smelters and battery plants locally. Yet, despite its resource dominance, the country remains structurally locked into raw material export under Chinese-led consortia, with minimal value capture and widespread social harm, including child labor, displacement, and violence [14]. In the Philippines, a country with a long history of nickel extraction, export bans have been repeatedly implemented and reversed. While some processing has taken place, most production still feeds global supply chains as unprocessed ore. Local resistance especially from Indigenous groups has successfully challenged mining permits, highlighting the importance of grassroots environmental governance.

However, the country remains politically fragmented and structurally dependent on external investors [15]. Latin American lithium producers notably Argentina, Bolivia, and Chile have likewise struggled to build national control over their green resources. While Bolivia launched a state-led lithium industrialization program, it has faced setbacks due to technological gaps, limited capital, and geopolitical maneuvering from China, Germany, and the United States. In Argentina, lithium extraction is mostly led by private and foreign firms, with limited benefit to local economies and growing conflicts over water use in Indigenous territories. Across these cases, several common features emerge:

1. Export-oriented growth dominates: Green minerals are integrated into global markets with minimal domestic processing or technology transfer.
2. Elite alliances thrive: Political-business coalitions capture rents from new extraction, often under weak environmental and labor governance.
3. Communities bear the cost: Displacement, pollution, and social conflict are consistent patterns, often suppressed in the name of national progress.
4. Sustainability is selectively defined: Green credentials are used to attract finance and legitimacy while masking unsustainable practices on the ground.

Indonesia shares these features but also diverges in important ways. Its assertive use of policy tools (export bans, investment regulations, industrial parks) has allowed it to attract significant midstream processing infrastructure. Unlike the Philippines or DRC, Indonesia now hosts the world's largest nickel smelting capacity and plays a central role in China's battery supply chain. This gives the country potential leverage in renegotiating its position in global value chains. However, this leverage remains unrealized unless accompanied by reforms in ownership, energy policy, social governance, and technological capacity

4 Conclusion

Indonesia's downstreaming policy in the nickel sector has become a global reference point in the era of green industrialization. It is widely celebrated for increasing export value, attracting foreign investment, and asserting national control over strategic resources. Yet, as this paper has shown, beneath the macroeconomic success lies a series of contradictions that undermine the emancipatory potential of the green transition. First, while export revenues have surged, value capture remains limited to low and midstream segments. Indonesia has succeeded in relocating smelting infrastructure but remains structurally excluded from high-value activities such as cathode manufacturing, battery innovation, and EV assembly. This form of *refined dependency* reveals that upgrading production tasks does not necessarily mean upgrading power or autonomy.

Second, ownership structures remain skewed. Despite nationalist rhetoric, more than two-thirds of smelters are foreign-owned, dominated by Chinese capital. State-owned enterprises and domestic firms play marginal roles, often subordinated to joint ventures. What emerges is a model of industrial extraversion, where the process is nationalized but control remains external. Third, the energy infrastructure supporting downstreaming is rooted in fossil dependency. The majority of smelters are powered by coal-fired captive plants, intensifying Indonesia's carbon footprint even as it supplies minerals for global decarbonization. This exposes a profound contradiction at the heart of the energy transition: the Global South is being asked to green the planet while absorbing the environmental costs. Fourth, at the local level, *hilirisasi* has triggered social displacement, labor exploitation, and environmental degradation. Industrial zones function as enclaves, insulated from public scrutiny and democratic oversight. Militarized security, weak environmental enforcement, and suppressed dissent point to an authoritarian model of green development. Finally, the process has enabled elite consolidation, not public empowerment. Former coal and plantation oligarchs have rebranded as green investors, capturing rents through policy access, regulatory exemptions, and opaque partnerships. The language of sustainability has become a vehicle for greenwashing extractivism, rather than transforming it.

As recent legal assessments underscore, Indonesia's downstreaming success will depend not only on geopolitical positioning or economic strategy, but also on building robust legal and institutional frameworks capable of withstanding external challenges and coordinating domestic implementation. Comparative cases across the Global South from cobalt in the DRC to lithium in Argentina demonstrate that Indonesia's experience is not unique. What

distinguishes Indonesia is its assertive use of industrial policy. Yet even this leverage is undermined when governance structures reproduce old patterns of dependency and dispossession. The findings of this paper suggest that green transitions are not inherently just. Without redistributive institutions, democratic accountability, and ecological limits, downstreaming may simply replace one mode of extractivism with another less visible, but equally exploitative. The true test of Indonesia's industrial strategy lies not in export figures, but in whether it can build a green economy that is equitable, sovereign, and sustainable.

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