

The Sustainability Shift: Indonesia's Industrial Landscape in Five Key Sectors

Opportunities and Risks

*Why energy security, industrial competitiveness, and climate resilience
are reshaping Indonesia's sustainability transition*

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List of Abbreviations

AI	Artificial Intelligence	IKN	Nusantara Capital City
APIs	Active Pharmaceutical Ingredients	IMIP	Indonesia Morowali Industrial Park
ARPU	Average Revenue Per User	INA-CBGs	Indonesian Case Base Groups
AWS	Amazon Web Services	IoT	Internet of Things
B2B	Business-to-Business	IRMA,	Initiative For Responsible Mining Assurance
BF-BOF	Blast Furnace-Basic Oxygen Furnace	ISE	International Standard of Excellence
BPK	Supreme Audit Agency	ISPO	Indonesian Sustainable Palm Oil
CAGR	Compound Annual Growth Rate	IWIP	Indonesia Weda Bay Industrial Park
CATL	Contemporary Amperex Technology Co. Limited	KAPJ	Government's Coordinated Benefits
CBAM	Carbon Border Adjustment Mechanism	LFP	Lithium Iron Phosphate
CEPA	Comprehensive Economic Partnership Agreement	LME	London Metal Exchange
CRC	Cold-Rolled Coils	LPG	Liquefied Petroleum Gas
DMO	Domestic Market Obligation	MBG	Free Nutritious Meal
DPO	Domestic Price Obligation	MHP	Mixed Hydroxide Precipitate
DRI	Direct Reduced Iron	MSMEs	Micro, Small, and Medium Enterprises
DRI-EAF	Direct Reduced Iron-Electric Arc Furnace	MSP	Mixed Sulphide Precipitate
EAF	Electric Arc Furnaces	NCDs	Non-Communicable Diseases
EPD	Environmental Product Declarations	NDC	Enhanced Nationally Determined Contribution
ERI	Energy, Renewables and Infrastructure	NDPE	No Deforestation, No Peat, and No Exploitation
ESG	Environmental, Social, and Governance	NMC	Nickel Manganese Cobalt
ETM	Energy Transition Mechanism	NRE	New And Renewable Energy
EU	European Union	OJK	Financial Services Authority
EUCPR	EU Construction Products Regulation	OTT	Over-the-Top
EUCSDDD	EU Corporate Sustainability Due Diligence Directive	PDG	Princeton Digital Group
EUCSRD	EU Corporate Sustainability Reporting Directive	PS	Parent Stock
EUDR	EU Deforestation Regulation	PT SMI	PT Sarana Multi Infrastruktur
EV	Electric Vehicle	PUE	Power Usage Effectiveness
FMC	Fixed-Mobile Convergence	R&D	Research and Development
FORNAS	National Formulary	RECs	Renewable Energy Certificates
GDP	Gross Domestic Product	RKEF	Rotary Kiln Electric Furnace
GGP	Grand Grand Parent	RPJMN	National Medium-Term Development Plan
GHG	Greenhouse Gas	RSPO	Roundtable On Sustainable Palm Oil
GISTM	Global Industry Standard on Tailings Management Audit	RUKN	National Electricity General Plan
GMP	Good Manufacturing Practice	RUPTL	PLN's Electricity Supply Business Plan
GPS	Grand Parent Stock	SLL	Sustainability-Linked Loan
GREM	Geothermal Resource Risk Mitigation	SNI	Indonesian National Standards
HBI	Hot Briquetted Iron	SRUK	Carbon Unit Registry System
HGBT	Specified Natural Gas Price	THI	Indonesia Green Taxonomy
HGU	Right To Cultivate	TKBI	Indonesia Sustainable Finance Taxonomy
HPAL	High Pressure Acid Leaching	TKDN	Domestic Component Level
HRC	Hot-Rolled Coils	TMT	Technology, Media and Telecommunications
HTA	Health Technology Assessment	TSP	Triple Superphosphate
IBC	Indonesia Battery Corporation	US	United States
ICMM	International Council on Mining and Metals	WTO	World Trade Organization

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Introduction

The Global Sustainability Transition is Entering a New Phase

The global sustainability transition has undergone a marked transformation since gaining momentum following the adoption of the Paris Agreement at COP21 in 2015. Over the past decade, governments, corporations, and financial institutions have increasingly incorporated environmental, social, and governance (ESG) considerations into policy frameworks, investment decisions, and business strategies. However, the sustainability transition is now entering a more fragmented and pragmatic phase.

Regional divergence has become increasingly pronounced. Europe and parts of Asia continue to pursue ambitious decarbonization strategies and sustainable finance initiatives. Meanwhile, the United States and several emerging economies have recalibrated their approaches, placing greater emphasis on economic competitiveness, energy affordability, and industrial policy. Elevated transition costs and shifting political priorities have prompted policymakers to reassess the pace and sequencing of sustainability initiatives.

Escalating geopolitical tensions are putting Indonesia's economic resilience to the test

This recalibration has been further reinforced by persistent geopolitical tensions, particularly in the Middle East. Disruptions to global energy supply chains, especially concerns surrounding potential disruptions to the Strait of Hormuz, have renewed volatility in global energy markets. Oil prices temporarily exceeded USD 100 per barrel before moderating as immediate supply concerns eased. Nevertheless, these episodes underscore the continuing vulnerability of the global economy to geopolitical shocks.

Beyond higher energy prices, disruptions to shipping routes have increased logistics costs and exposed vulnerabilities in global supply chains. Petrochemicals, plastics, and downstream manufacturing industries have become increasingly susceptible to energy-related disruptions, demonstrating how geopolitical risks can rapidly spill over into broader economic activity.

As a result, sustainability is increasingly being embedded within broader frameworks of economic resilience, energy security, and strategic competitiveness rather than being pursued as a standalone environmental objective.



Indonesia's Structural Economic Challenge

The country's anticipated demographic dividend has yet to be fully realized

While the recovery from the COVID-19 pandemic disrupted labor market dynamics during a critical period of demographic transition, the quality of growth remains uneven.



Economic expansion has increasingly been driven by capital-intensive and natural resource-based sectors, particularly mining and mineral processing. While these sectors have generated significant export revenues, their contribution to broad-based employment creation remains limited and highly dependent on commodity price cycles.



Indonesia continues to experience signs of premature deindustrialization. Manufacturing's contribution to Gross Domestic Product (GDP) has remained **below 20% since 2018** and declined further to 18.5 % in the second quarter of 2026. This structural shift has important implications for job creation and productivity growth.



The labor market reflects these structural pressures. Since February 2020, Indonesia's labor force has expanded by approximately 12.3%, while informal employment has grown by 18.5%. Consequently, the share of formal employment declined from 43.5% in February 2020 to 40.58% in February 2026.

These developments suggest that sustaining long-term growth will require a stronger emphasis on productivity, industrial upgrading, and economic resilience.

Climate Change Is Becoming an Economic Risk

At the same time, physical climate risks are becoming increasingly material to Indonesia's economy. The country has experienced rising frequency and severity of floods, landslides, droughts, and extreme weather events.

In late 2025, severe flooding and landslides across Aceh, North Sumatra, and West Sumatra forced approximately one million people to evacuate. Beyond their humanitarian impacts, climate-related disasters generated significant economic costs.



**Sumatra flood
estimated loss:**

9.3 million

Worker affected

IDR 332 trillion

Economic loss¹

Climate change is also affecting agricultural productivity. The emergence of El Nino conditions in 2026 is expected to exacerbate food security pressures. Forecasts indicate a 98% probability that El Nino conditions will persist into early 2027, extending the dry season and reducing agricultural output.

These developments demonstrate that climate change is no longer solely an environmental issue. It is increasingly becoming an economic and fiscal challenge.



2.5 - 3%

lower rice production projection ²

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From ESG Compliance to Economic Resilience

Despite growing global skepticism toward sustainability frameworks, sustainability considerations remain structurally relevant for Indonesia. Physical climate risks continue to intensify, while transition risks associated with international trade, investment, and supply chains are becoming increasingly important.

Indonesia has taken several important steps to institutionalize sustainable finance and sustainable practices. The Financial Services Authority (OJK) mandated sustainability reporting for listed companies beginning in 2020 and introduced Indonesia Sustainable Finance Taxonomy (TKBI) in 2024.

However, implementation remains uneven.

In many cases, sustainability adoption has been driven primarily by compliance requirements and reputational considerations rather than strategic business transformation.

As a result, sustainability in Indonesia is likely to evolve toward a more pragmatic framework that emphasizes resilience, competitiveness, and long-term economic security. Rather than replacing climate objectives, this approach incorporates climate considerations into broader development strategies.

Sectoral Implications: Where Sustainability Matters Most

This white paper delves into five key sectors: Energy, Renewables and Infrastructure (ERI); Metals and Mining; Technology, Media and Telecommunications (TMT); Food and Agribusiness; and Healthcare and Pharmaceuticals. These five sectors have been selected because of their strategic importance to Indonesia's economic transformation and their exposure to sustainability-related opportunities and risks.



Energy, Renewables & Infrastructure

Energy security and electrification



Food & Agribusiness

Food security and climate resilience



Metals & Mining

Critical minerals and industrial policy



Healthcare & Pharmaceuticals

Supply chain resilience and demographics



Technology, Media, and Telecommunication

AI, data centers, and energy demand

Foreign direct investment and international market integration will continue to accelerate sustainability adoption across these sectors. Multinational corporations are extending sustainability standards across their supply chains. At the same time, investors increasingly reward resilient and future-ready businesses. As a result, sustainability is becoming a key determinant of market access and competitive advantage. Although priorities differ across industries, the overall direction is clear: companies that embed sustainability into their core business strategies will be better positioned to seize new opportunities and compete in Indonesia's next phase of economic transformation

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Business Implications and Strategic Priorities

The transition is creating a new generation of business opportunities across Indonesia's economy. As sustainability becomes increasingly linked to energy security, industrial competitiveness, and economic resilience, companies should move beyond viewing sustainability primarily as a compliance or reporting requirement. Instead, sustainability should be embedded into long-term business strategy, investment planning, and value creation by strengthening climate resilience, enhancing operational adaptability, and preparing businesses for an increasingly climate-affected operating environment.

Across the five sectors examined in this report, several strategic priorities consistently emerge.



First, companies should position themselves within higher value-added segments of the value chain. Whether through downstream manufacturing, battery materials, digital services, pharmaceutical localization, or value-added agribusiness, future competitiveness will increasingly depend on capturing greater value rather than expanding production alone.



Second, businesses should strengthen resilience by investing in the enabling infrastructure that will support Indonesia's next phase of growth. Electrification, renewable energy, digital infrastructure, resilient supply chains, and advanced manufacturing capabilities are becoming strategic assets that improve productivity while reducing exposure to geopolitical, climate, and market disruptions.



Third, sustainability should be integrated into commercial decision-making. Lower-carbon production, traceable supply chains, resource efficiency, and responsible governance are increasingly becoming prerequisites for accessing premium export markets, international capital, and global manufacturing networks. Companies that move early are likely to benefit from stronger customer relationships, broader financing options, and more durable competitive advantages.



Fourth, the financial institutions to move beyond traditional green finance by developing financing solutions for climate-resilient infrastructure, business adaptation, and resilient supply chains. As sustainability expectations evolve, banks that strengthen climate risk assessment while expanding adaptation and resilience financing will be better positioned to manage portfolio risks, capture new financing opportunities, and support long-term economic resilience.



Finally, businesses should recognize that Indonesia's structural transformation extends beyond individual industries. The greatest opportunities will emerge from integrated ecosystems that connect financing energy, manufacturing, digital infrastructure, healthcare, and food systems. Companies capable of building partnerships across these ecosystems will be better positioned to capture new sources of growth while supporting Indonesia's long-term economic resilience and sustainable industrial development.



"The most important strategic decisions facing businesses today are no longer about responding to change, but about positioning for it. Companies that can anticipate structural shifts, allocate capital effectively, and invest ahead of demand are more likely to emerge as industry leaders in the years ahead."

Anthonius Sehonamin (Seho)

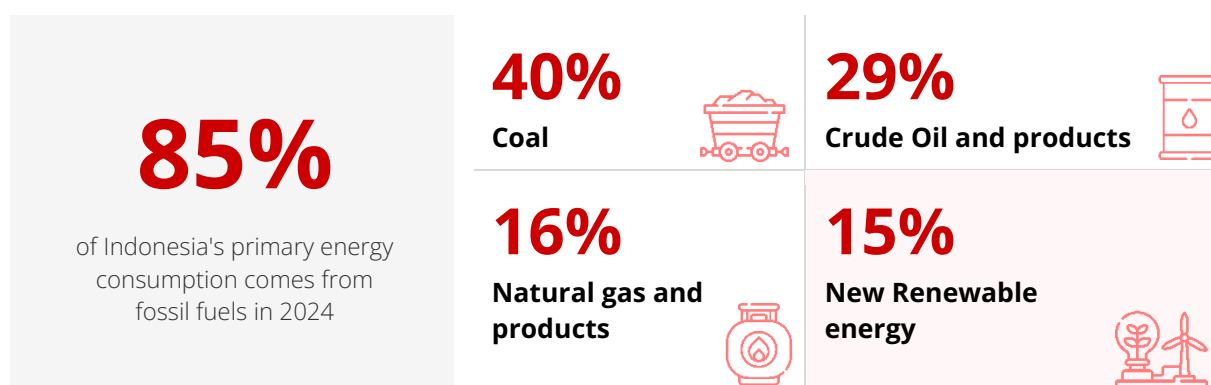
Head of Institutional Banking Group DBS Indonesia

Energy Security and Electrification: The Next Chapter of Indonesia's Energy Transition

Energy Security: The New Driver of Indonesia's Energy Transition

Indonesia's energy transition is increasingly being shaped not only by climate considerations but also by concerns over energy security, fiscal sustainability, and economic resilience.

Despite possessing abundant energy resources, Indonesia remains highly dependent on imported fuels, particularly crude oil, refined petroleum products, and liquefied petroleum gas (LPG). This dependence exposes the economy to fluctuations in international energy prices, exchange rate volatility, and geopolitical disruptions.³



Source: Ministry of Energy and Mineral Resources (2025)

Coal remains the largest energy source, followed by crude oil and petroleum products and natural gas, while new and renewable energy (NRE) contributes only 15%. This energy structure reflects the country's continued dependence on fossil fuels to meet growing energy demand, despite abundant renewable energy resources and ambitious decarbonization targets. The relatively modest share of renewables underscores the scale of investment, policy reform, and infrastructure development required to accelerate Indonesia's energy transition and strengthen long-term energy security.⁴

This fossil fuel-dependent energy structure has important implications for Indonesia's energy security, particularly given the country's growing reliance on imported petroleum products.



Despite being a net exporter of coal and several other energy commodities, Indonesia has been a net importer of oil for more than two decades. Crude oil production fell from more than 1.5 million barrels per day in the mid-1990s to approximately 580 thousand barrels per day in 2025, while domestic oil consumption continued to increase to around 1.8 million barrels per day.⁵



Indonesia also remains heavily dependent on imported LPG, which accounts for about 80% of domestic consumption. The success of the kerosene-to-LPG conversion program has substantially increased household LPG consumption, while domestic LPG production has failed to keep pace with demand growth. As a result, imported LPG currently accounts for most of the domestic consumption.⁶



Recent geopolitical tension has further reinforced concerns over Indonesia's energy security. The escalation of tensions in the Middle East and concerns over potential disruptions to shipping routes through the Strait of Hormuz highlighted Indonesia's vulnerability to external energy shocks.⁷ Such developments underscore the importance of reducing dependence on imported fossil fuels and strengthening domestic energy resilience.

This dependence on imported energy creates significant fiscal burdens. In recent years, government expenditure on fuel and electricity subsidies and compensation has remained elevated, reflecting efforts to protect consumers from fluctuations in global energy prices. In 2026, the government allocated IDR 381 trillion for energy subsidies and compensation, covering fuel, electricity, and certain LPG products, up from IDR 335 trillion in 2025.⁸ As of May 2026, the government had spent IDR 203.7 trillion on energy subsidies and compensation, driven by rising global oil prices and continued support for domestic energy prices, thereby maintaining significant pressure on the state budget.⁹

To reduce dependence on imported petroleum products, the government has increasingly relied on domestic biofuel programs. Following the implementation of B35 and B40 biodiesel mandates, Indonesia plans to increase the blending ratio to B50. The biodiesel program has contributed to reducing diesel imports while simultaneously strengthening domestic demand for crude palm oil and supporting the government's downstream industrialization agenda.¹⁰

However, biodiesel blending also presents several challenges. Industry stakeholders, particularly in transportation and mining, have raised concerns regarding higher maintenance costs and operational performance associated with higher biodiesel blends. Although government testing indicates that B50 remains technically feasible, questions remain regarding its long-term economic and operational impacts.¹¹

Against this backdrop, electrification has increasingly emerged as the government's long-term strategy for enhancing energy security. Unlike fuel substitution programs, electrification offers a structural pathway to reduce fossil fuel imports while enabling greater utilization of domestic energy resources, particularly renewable energy. A more diversified and modern electricity system can also improve resilience against growing physical climate risks—such as extreme weather and disruptions to fuel supply chains—by reducing reliance on imported energy and expanding domestic generation capacity. Electrification also supports broader industrial development objectives, including electric vehicles (EV), industrial downstream, digital infrastructure, and artificial intelligence (AI), making it a key foundation for Indonesia's long-term economic competitiveness and climate resilience.

Key Takeaways

- Indonesia's energy transition is increasingly driven by energy security concerns rather than climate commitments alone.
- Declining domestic oil production and high LPG imports have created growing fiscal vulnerabilities.
- Electrification has emerged as a strategic response to strengthen energy security, support industrialization, and reduce import dependence.

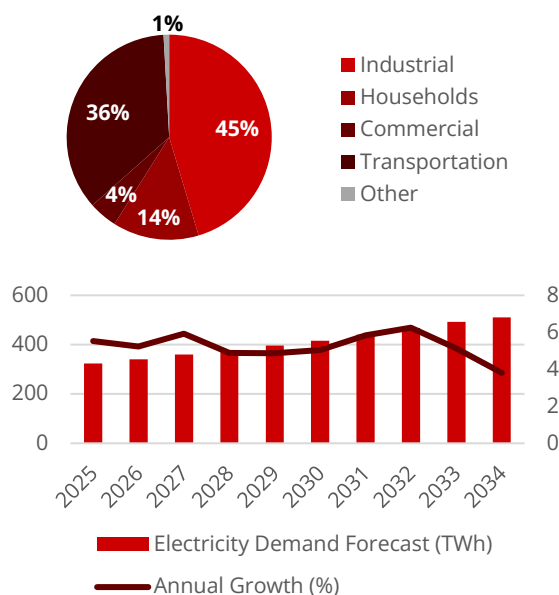


Electrification and the Emergence of New Electricity Demand

Indonesia's energy transition is increasingly becoming an electrification agenda. Unlike previous decades, when electricity demand growth was primarily driven by household consumption and conventional industrial activities, future demand growth will increasingly originate from emerging sectors such as transportation, industrial downstream, digital infrastructure, and household electrification. As a result, electricity is expected to become the primary energy carrier supporting Indonesia's long-term economic transformation.¹²

According to the National Electricity General Plan (RUKN) 2025–2060, Indonesia's electricity consumption is projected to increase significantly over the coming decades. Total electricity consumption is projected to increase from around **300 TWh** in 2024 to more than **1,800 TWh** by 2060.¹³ The trend in electricity demand reflects not only economic growth, but also structural changes in Indonesia's economy and energy system.

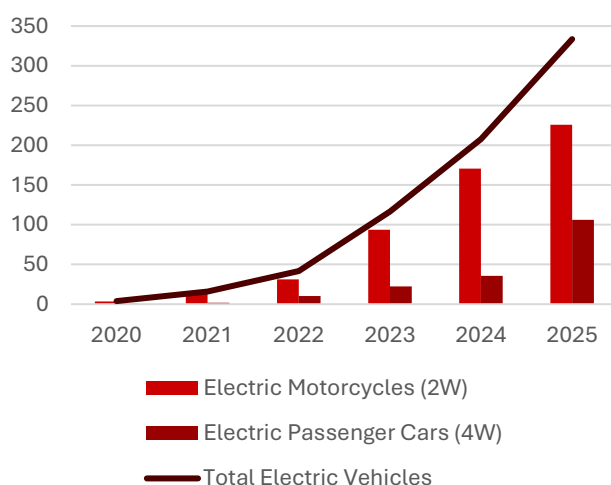
Indonesia's Electricity Demand Projection, 2024–2034



Transportation Electrification

Reducing dependence on imported oil remains one of the government's principal motivations for accelerating electric vehicle (EV) adoption. Indonesia has introduced various fiscal incentives, local content requirements, and industrial policies to support the development of domestic EV and battery industries.¹⁴ **As a result, the total EV population increase from 3,894 (2020) to 333,561 (2025).¹⁵**

Electric Vehicle Population in Indonesia, 2020–2025 (in thousand)



Source: Ministry of Transportation (2025); Ministry of Industry (2025)

As of early 2026, Indonesia's EV ecosystem had expanded considerably, supported by growing investments in battery manufacturing, charging infrastructure, and vehicle assembly. According to government projections, EV adoption is expected to accelerate substantially over the next decade, increasing electricity demand while reducing reliance on petroleum imports.¹⁶

The electrification of transportation also supports Indonesia's nickel downstream strategy. As one of the world's largest producers of nickel, Indonesia seeks to leverage its mineral resources to establish an integrated electric vehicle supply chain, ranging from mining and refining to battery production and EV manufacturing.



Industrial Electrification and Downstream Processing

Industrial development is expected to become the largest contributor to future electricity demand growth. Indonesia's downstream policies, particularly in the nickel sector, have stimulated rapid growth in electricity-intensive processing industries, such as smelter and mineral processing facilities.

This expansion has led to substantial increases in electricity demand, much of which is currently supplied through captive coal-fired power plants. By 2025, Indonesia's captive coal power capacity had reached approximately 31 GW, reflecting the growing importance of electricity in supporting industrial competitiveness.¹⁷

However, the rapid growth of captive power also presents a major challenge. While it has enabled industrial expansion, it has also increased reliance on coal, making it more difficult for Indonesia to decarbonize its power sector.

Estimated Electricity Demand of Selected Downstream Industries

Industry	Estimated Power Requirement
Nickel smelter	100–500 MW
Aluminum smelter	300–700 MW
Copper smelter	150–400 MW
EV battery manufacturing	50–200 MW

Source: Ministry of Industry; company reports



Digital Infrastructure and AI

The rapid expansion of Indonesia's digital infrastructure is creating another major source of electricity demand, reinforcing the importance of expanding power generation and transmission infrastructure. Indonesia remains the largest digital economy in Southeast Asia, around one-third of the digital economy of the six largest Southeast Asian economies.¹⁸ At the same time, the emergence of AI is accelerating demand for digital infrastructure, particularly data centers. AI-enabled computing requires substantially greater computing capacity and electricity consumption than traditional cloud computing applications. Consequently, both hyperscaler and domestic operators have significantly expanded investments in data center infrastructure in Indonesia.¹⁹



Household Electrification and LPG Substitution

The household sector represents another important source of future electricity demand growth.

Indonesia currently imports approximately 80% of its LPG consumption, creating a substantial fiscal burden through the government's subsidy program.

Consequently, policymakers have increasingly explored household electrification strategies, including induction cooking technologies, as a means of reducing LPG imports and improving energy security. Minister of Energy and Mineral Resources subsequently proposed a budget allocation of IDR 815.56 billion in the 2027 draft state budget for the electric stove program, targeting low-wattage units below 900 kVA suitable for rural and low-income households.²⁰

Although large-scale implementation remains challenging, electrification of household energy consumption has the potential to generate significant long-term reductions in fossil fuel imports. More broadly, household electrification illustrates how energy transition policies are increasingly being framed through the lens of energy security rather than climate policy alone.



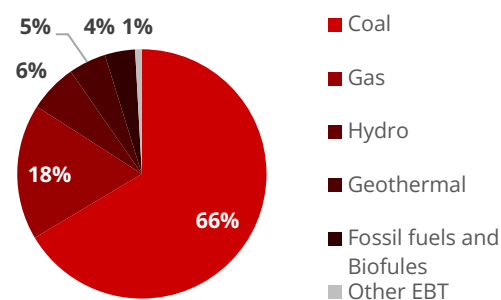
Can Indonesia's Power System Meet Future Demand?

The rapid growth of electricity demand raises a critical question: can Indonesia's power system provide sufficient, affordable, and reliable electricity to support the country's long-term economic transformation?

While Indonesia possesses abundant energy resources and substantial renewable energy potential, the electricity sector continues to face structural challenges related to generation mix, transmission infrastructure, investment mobilization, and institutional capacity.²¹

Indonesia's electricity system has historically been built around fossil fuels, particularly coal. Over the past decade, Indonesia's installed power generation capacity has continued to increase, reaching 107.51 GW in 2025. Despite this growth, coal remains the dominant source of electricity, accounting for around 66% of total generation, followed by natural gas and renewable energy.²² The dominance of coal has historically been supported by Indonesia's abundant domestic coal resources, relatively low generation costs, and energy security considerations.

Indonesia's Electricity Generation Mix, 2025



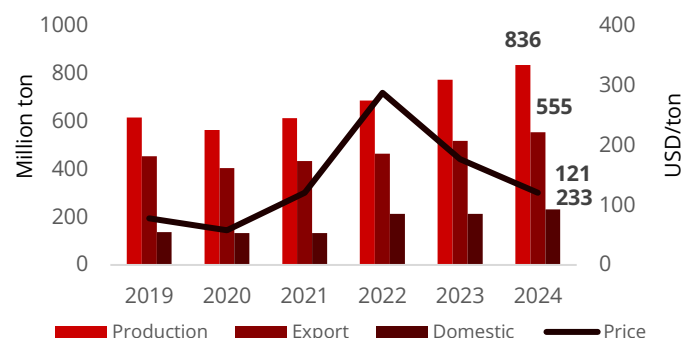
Source: Ministry of Energy and Mineral Resources (2025)

This model has successfully supported industrialization and expanded electricity access over the past several decades. However, the increasing electrification of the economy and growing international pressure to reduce emissions have created new challenges for the country's electricity sector.

Coal, the Backbone and the Barrier

Indonesia is currently one of the world's largest coal producers and exporters, with production exceeding 800 million tons annually, with 233 million tons consumed domestically in 2024. Domestic coal supplies to PLN, capped at USD70/ton under the domestic market obligation (DMO) – well below the 2024 benchmark price of USD121/ton – have supported relatively low electricity generation costs and reduced dependence on imported fuels.²³

Indonesia's Coal Supply and Domestic Market Dynamics (2016–2024)



Source: Ministry of Energy and Mineral Resources (2025)

However, coal also represents one of the principal challenges facing Indonesia's energy transition. The continued expansion of captive coal power plants to support industrial downstream activities, particularly in the nickel sector, risks increasing the carbon intensity of Indonesia's industrial development strategy.

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At the same time, the expansion of captive coal generation mostly to power industrial estates such as those in Central and Southeast Sulawesi as well as North Maluku raises concerns regarding access to international financing, and future export market requirements. As major economies strengthen carbon border adjustment measures and sustainability standards, the carbon intensity of industrial production may become an increasingly important determinant of long-term competitiveness.

Advantages and Challenges of Coal Dependence

Advantages	Challenges
Energy security	High carbon intensity
Affordable electricity	Reduced renewable competitiveness
Domestic resource availability	Increasing ESG pressure
Supports industrial growth	Potential future stranded assets

The Renewable Opportunity Is Large but Barely Tapped

Despite continued dependence on fossil fuels, Indonesia possesses some of the world's largest renewable energy resources. **Total renewable energy potential is estimated at approximately 3,687 GW**, with solar energy becomes country's largest renewable energy resource.²⁴

Among renewable technologies, solar energy is increasingly emerging as the most scalable option due to declining costs, relatively short development timelines, and broad geographic availability. Meanwhile, geothermal and hydropower remain strategically important because of their ability to provide reliable baseload electricity and their substantial contribution to Indonesia's installed renewable energy capacity. Geothermal energy particularly has attracted significant investment, supported by government incentives such as the Geothermal Resource Risk Mitigation (GREM) facility managed by PT Sarana Multi Infrastruktur (PT SMI), which helps reduce exploration risks and improve project bankability.

However, despite this substantial resource potential, renewable energy deployment remains limited. Persistent challenges—including permitting, financing, land acquisition, and transmission infrastructure—continue to hold back progress.²⁵

Indonesia's Renewable Energy Potential and Installed Capacity (GW)

Technology	Potential	Installed Capacity
Solar	3,294	1.5
Hydro	95	7.6
Geothermal	24	2.7
Wind	155	0.2
Bioenergy	57	3.1

Source: Ministry of Energy and Mineral Resources (2025)²⁶

Installed renewable generation capacity remains below 15.1 GW, or less than 0.5% of the potentials



The Promise of the 100GW Solar Program

Recognizing the strategic importance of renewable energy, the government has increasingly emphasized solar energy as the foundation of Indonesia's future electricity system. Despite possessing one of the world's largest solar energy resources, the country has developed only a small fraction of its potential. This gap highlights the disconnect between Indonesia's renewable energy ambitions and their implementation.

Total solar potential

3,294 GW

Installed solar capacity remains at only

1.5 GW

President Prabowo Subianto's 100 GW solar program capacity have shifted the discussion from renewable energy deployment toward broader questions of energy demand and economic transformation. The significance of the 100 GW solar program extends beyond electricity generation alone.

Large-scale solar deployment could reduce fossil fuel imports, stimulate domestic manufacturing industries, create employment opportunities, and support the development of battery storage and transmission infrastructure.²⁷

The 100 GW initiative also implies a fundamental transformation of Indonesia's electricity system. Unlike previous electricity expansion programs centered on fossil fuels, large-scale solar deployment requires substantial investment in transmission networks, battery energy storage systems, smart grids, and demand management technologies.



Transmission Bottlenecks

Transmission infrastructure remains one of the principal constraints to Indonesia's energy transition. Renewable energy resources are often located far from major demand centers, creating substantial challenges for grid integration.

The expansion of renewable energy will require substantial investment in transmission infrastructure, including inter-island transmission networks, smart grids, and electricity storage systems. Without these investments, Indonesia's abundant renewable energy resources may remain inaccessible to major demand centers.²⁸ The planned expansion of solar energy in eastern Indonesia, hydropower in Kalimantan, and geothermal resources in various regions will require major capital deployment in transmission infrastructure and grid modernization.

According to government estimates, Indonesia will need 47,700 kilometers of additional transmission lines and 10GW in storage systems to support future electricity demand growth until 2034.²⁹

Consequently, Indonesia's energy transition challenge is no longer simply about adding generation capacity. Rather, it requires the simultaneous expansion of generation, transmission, storage, and digital infrastructure. The country's ability to mobilize investment and implement institutional reforms at scale will therefore determine whether Indonesia can successfully transition from a fossil fuel-based electricity system toward a more secure, competitive, and sustainable.



Financing the Transition: A Bankability Problem, Not Just a Capital Problem

The scale of Indonesia's future electricity demand implies a correspondingly large investment requirement. According to PLN's Electricity Supply Business Plan (RUPTL), **Indonesia will require IDR 2,967.4 trillion (USD 169 billion) in investment** over the coming decades to finance new generation capacity, transmission networks, battery storage systems, and supporting infrastructure.³⁰

Additional committed capital will also be required to support the government's proposed 100 GW solar program and broader electrification agenda.³¹

Despite Indonesia's substantial renewable energy resources, actual investment levels remain relatively modest compared with regional peers. Renewable energy deployed capital has historically fluctuated between USD 1 billion and USD 2 billion annually, substantially below the level required to achieve the country's long-term energy targets.³²

Ultimately, Indonesia's energy transition increasingly depends not only on technological readiness, but also on the country's ability to transform investment opportunities into bankable projects. The challenge is not solely a matter of capital availability. Rather, it reflects structural issues related to project bankability, regulatory certainty, market design, and institutional coordination. Consequently, the transition from fossil fuels to electrification therefore represents not merely an energy challenge, but a broader challenge of economic governance and institutional transformation.

The Bankability Challenge

Project bankability remains one of the most frequently cited obstacles to renewable energy investment in Indonesia. Developers have historically faced challenges related to tariff determination, power purchase agreement (PPA) structures, foreign exchange risk, and project allocation mechanisms.³³ While for investors, bankability depends on several factors, including predictable revenue streams, contractual certainty, regulatory stability, and adequate risk allocation.

Among the project bankability aspects, electricity tariffs remain one of the most important constraints affecting renewable energy investment. Historically, Indonesia's electricity pricing framework has prioritized affordability and fiscal stability, often limiting the commercial viability of renewable energy projects. In particular, the availability of low-cost domestic coal through the DMO and domestic price obligation (DPO) mechanisms has reduced the competitiveness of renewable energy technologies. While these policies have contributed to energy security and affordable electricity prices, they have also created unintended disincentives for renewable energy investment.

Contractual risks continue to represent a major concern for investors. Renewable energy projects typically require long investment horizons and substantial upfront capital expenditures. Consequently, investors place considerable emphasis on the stability and predictability of power purchase agreements, tariff mechanisms, and regulatory frameworks.³⁴

Although recent regulatory reforms, including MEMR Regulation No. 5/2025, seek to improve the bankability of renewable energy projects, uncertainty remains regarding how these provisions will be implemented in practice and whether they will sufficiently address long-standing investor concerns. These challenges do not necessarily



imply that Indonesia is an unattractive market. Rather, they suggest that the allocation of risks between government, utilities, and private investors requires further refinement.

Key Risks Affecting Renewable Energy Project Bankability



Tariff Ceiling Mechanism

Key Issues

Renewable tariffs are capped relative to PLN's generation cost and remain fixed throughout the PPA period without indexation.

Impact on Bankability

Limits project returns and creates long-term revenue uncertainty due to inflation and currency risks.



Risk Allocation Asymmetry

Key Issues

Developers bear significant exposure to force majeure events, curtailment risks, and regulatory changes.

Impact on Bankability

Increases project risk premiums and raises financing costs.



Limited Lender Protections

Key Issues

Lender step-in rights and security enforcement mechanisms remain weaker than international project finance standards.

Impact on Bankability

Restricts access to commercial financing and increases the cost of debt.



Lengthy PPA Negotiations

Key Issues

PPAs are negotiated on a case-by-case basis without standardized contracts, resulting in prolonged negotiations.

Impact on Bankability

Delays project execution, increases transaction costs, and reduces investment attractiveness.



No Standardized Curtailment Compensation

Key Issues

Compensation mechanisms for renewable energy curtailment remain limited and uncertain.

Impact on Bankability

Creates revenue uncertainty and complicates financial modeling and risk assessment.



Weak Government Guarantee Coverage

Key Issues

Government guarantees cover only selected infrastructure risks and exclude broader commercial and payment risks.

Impact on Bankability

Provides limited risk mitigation and reduces the attractiveness of projects to commercial lenders.

From Capital Scarcity to Market Reform

Global financial markets increasingly allocate capital toward infrastructure, renewable energy, and sustainable investments. Instead, the critical issue is whether Indonesia can create sufficiently bankable projects and predictable regulatory frameworks to attract long-term deployed capital.

Recent initiatives, including the Energy Transition Mechanism (ETM), blended finance facilities, green financing instruments, and PT SMI role as the ETM Country Platform Manager, demonstrate growing efforts to mobilize both commercial and concessional capital for Indonesia's energy transition.³⁵ Through the ETM Country Platform, PT SMI coordinates blended finance from multilateral development banks, commercial lenders, climate funds, institutional investors, and philanthropic organizations to support the early retirement of coal-fired power plants and the expansion of renewable energy. However, the effectiveness of these initiatives will ultimately depend on the government's ability to address underlying structural constraints in the electricity sector.

The Sustainability Shift



Strategic Opportunities and Industry Priorities

Indonesia's energy transition is increasingly becoming an economic development strategy rather than solely an environmental agenda. As energy security rises on the national policy agenda, reducing dependence on imported oil and LPG has become a strategic priority. In this context, electrification provides a pathway to strengthen energy security while supporting the industry demand.

Rising electricity demand increases the urgency of expanding domestic renewable energy capacity to ensure that future growth is both reliable, affordable and resilient. Climate adaptation has become an equally important consideration, as more frequent extreme weather events increase the vulnerability of electricity infrastructure and fuel supply chains. Building a power system capable of supporting these industries will require not only additional generation capacity but also stronger transmission networks, energy storage, and greater system flexibility to withstand climate-related disruptions. Electrification reflects broader changes in Indonesia's economic priorities, as electricity demand is increasingly driven by emerging industries such as EV, downstream mineral processing, AI, and digital infrastructure.

As a result, Indonesia's growing electricity demand represents not only an energy challenge but also a major industrial opportunity. The next phase of the energy transition will therefore depend not only on how much renewable energy the country can deploy, but also on how effectively it can leverage electrification to drive long-term economic growth, industrial competitiveness, and national resilience to future climate risks.³¹ Several sectors are particularly well positioned to benefit from this transformation.

Strategic Investment Opportunities in Indonesia's Energy Transition

Investment Area	Key Opportunity	Main Investment Drivers
 Utility-scale solar	Generation expansion	100 GW solar target
 Geothermal	Baseload renewable power	Energy security
 Battery energy storage	Grid flexibility	Renewable integration
 Transmission networks	Grid expansion	Electrification
 Green data centers	AI and digital economy	Electricity demand
 EV charging infrastructure	Transport electrification	Oil substitution
 Industrial electrification	Downstream industry	Economic transformation

Source: Tenggara Strategics analysis.



Among these sectors, utility-scale solar, including the proposed 100 GW solar program, and transmission infrastructure are likely to experience the strongest growth due to the government's increasing emphasis on energy security and electrification. Similarly, green data centers and battery storage systems are expected to emerge as important investment themes as AI and renewable energy deployment accelerate.

Realizing these opportunities will require simultaneous progress in generation expansion, transmission development, industrial policy, financing mechanisms, and institutional reform. Ultimately, Indonesia's success will depend on its ability to develop bankable projects, mobilize long-term investment, and build an electricity system that is not only low carbon, but also secure, resilient, and capable of supporting sustainable economic growth.

"The real opportunity is no longer renewable energy itself, but the industries, infrastructure, and ecosystems that will be built around rising electricity demand. Companies that view electrification as a growth enabler rather than a sustainability initiative are likely to be better positioned for the next decade."

Kevin Tanuwidjaja

Executive Director Institutional Banking Group Bank DBS Indonesia

For businesses, the implication is not simply how to access energy, but how to position themselves within the electrification ecosystem that is emerging across manufacturing, transportation, digital infrastructure, and industrial development. Strategic planning increasingly requires companies to evaluate future energy requirements, investment readiness, and long-term competitiveness as electricity becomes a central enabler of growth. Organizations that move early to align their business models with these developments are likely to benefit from expanding investment and infrastructure opportunities.

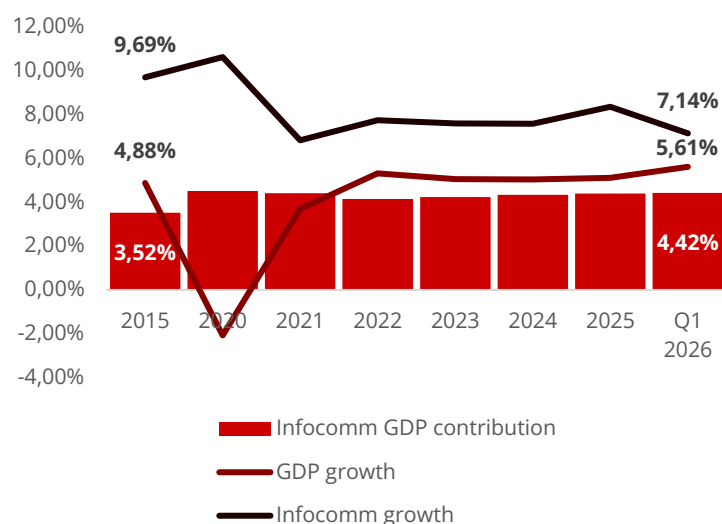
From Telco to TechCo: Reinventing Growth in Indonesia's Digital Infrastructure

Digital infrastructure remains essential, but connectivity is no longer where value is created

Despite moderating growth, telecommunications remain a critical enabler of Indonesia's digital economy.

The TMT industry has emerged as one of the most transformative sectors of Indonesia's economy.³⁶ Among its segments, telecommunications remain a mature industry that has consistently contributed to national income for many years and recorded growth rates exceeding overall economic growth. However, the ability of telecommunications operators to generate additional profits from traditional connectivity services is becoming increasingly constrained. This trend is reflected in the gradual slowdown in the growth of Indonesia's information and communication sector, from around **9% in 2015** to **7% in the first quarter of 2026**.³⁷

Information and Communication GDP Growth, 2015–2026 (%)



Source: Indonesia Central Bureau of Statistics (2026).



Telecommunication access remains uneven across regions

Internet penetration has continued to increase, rising from 77% in 2022 to 81.72% in 2026. Despite this progress, significant gaps in digital access and inclusion persist. This disparity raises concerns over missed economic opportunities, as access to information and digital infrastructure increasingly determines participation in economic and social development.



Telco industry has faced persistent pressure from declining profitability

This trend is reflected in lower profit margins and stagnant average revenue per user (ARPU), despite continued growth in data consumption. This condition has prompted operators to realign their corporate strategies, focusing on efficiency and cost optimization.³⁸



Reinventing the Telecom Business Model

Globally, telecommunications operators have struggled to capture a proportional share of the value created by digital transformation. While consumers and businesses continue to consume more data, much of the economic value generated by digital activities has increasingly been captured by over-the-top (OTT) providers, hyperscaler, digital platforms, and cloud service providers rather than by connectivity operators themselves.

In Indonesia, the telecommunications industry continues to benefit from strong structural demand drivers, but the mobile data consumption rapid growth is not translated into higher ARPU. Mobile internet penetration remains relatively high, digital services continue to expand, and businesses are increasingly adopting cloud and digital technologies. These trends have not translated into proportional improvements in profitability due to the dominance of prepaid services has contributed to high customer churn. On top of that, telecommunication companies have to spend substantial investments in network expansion and spectrum acquisition.³⁹ These pressures have prompted operators to realign their corporate strategies, with greater emphasis on operational efficiency and cost optimization.

Consequently, telecommunications operators are increasingly confronted with a strategic dilemma. Continuing to compete solely on network quality and pricing risks further commoditization, while moving into higher-value digital services requires substantial investments, organizational transformation, and new capabilities.⁴⁰ This has encouraged operators to pursue strategies ranging from industry consolidation and infrastructure sharing to asset-light models and fixed-mobile convergence, while gradually expanding into higher-value digital services. At the same time, network modernization, accompanied with green solution also provides opportunity to promote cost efficiency, sustainability and lower carbon emission.⁴¹

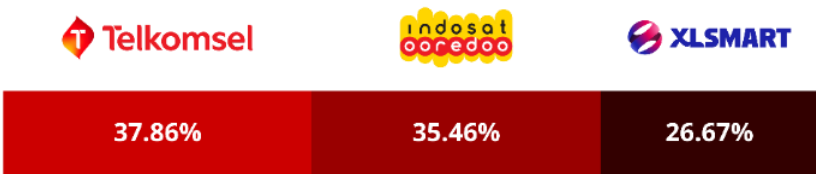
Consolidation and the Search for Scale

One of the industry's principal responses to declining profitability has been consolidation. Greater scale enables operators to improve spectrum efficiency, reduce duplicated investments, strengthen bargaining power, and improve operational efficiency.

Indonesia's telecommunications sector has experienced significant consolidation over the past decade. The merger of XL Axiata and Smartfren to establish XLSMART in 2025 represents the latest and perhaps most significant example of this trend.⁴² The transaction reflects growing industry recognition that scale has become increasingly important in a mature market characterized by slowing revenue growth and rising capital requirements.

Consolidation also allows operators to optimize network investments and reduce competitive pressures in an increasingly saturated market. International experience suggests that markets with fewer but stronger operators often achieve higher profitability, better network quality, and more sustainable investment outcomes.

Distribution of Mobile Operator Usage



Source: APJII (2026)



Pursued FMC Strategies

By combining mobile connectivity, fixed broadband, content services, and enterprise solutions within integrated ecosystems, operators seek to improve customer convenience while enabling cross-selling opportunities, integrated customer management, more competitive pricing and customer churn reduction. The model has also proven effective in mature markets.⁴³



Europe
around 40%



China
75%



United States
10-15%

Major Indonesian operators, including Telkom Indonesia, Indosat, and XLSMART, have all expanded their fixed broadband businesses as part of broader convergence strategies.⁴⁴ The objective is no longer simply to provide connectivity but to establish integrated digital ecosystems capable of serving both households and enterprises across multiple service categories.

The Shift Toward Asset-Light Business Models

Telecommunications companies sought competitive advantage through ownership of extensive physical infrastructure, including telecommunications towers, fiber networks, and data centers. However, the capital-intensive nature of these assets increasingly constrains financial performance and limits strategic business decision.



As a result, telecommunication companies have adopted asset light strategy by divesting infrastructure assets

such as towers and fiber networks, into dedicated entities through infrastructure carve-outs and business entity spin-offs to specialized infrastructure companies while retaining access through long-term service agreements. Telecommunications tower divestments represent the most prominent example of this approach.⁴⁵

The shift toward asset-light business models provides telecommunications operators with greater financial flexibility and enables them to redirect capital toward higher-growth opportunities, including enterprise services, cloud computing, cybersecurity, and AI applications, while also easing the burden of their asset-heavy legacy infrastructure. However, this transition also requires operators to redefine their sources of competitive advantage. Competitive differentiation increasingly depends not on asset ownership alone but on the ability to integrate services, develop ecosystems, and maintain strong customer relationships.

The infrastructure sharing to increase network coverage

Most regions continue to rely on 4G networks to accommodate rising data demand, while densely populated urban areas are prioritizing 5G rollout to support higher-speed connectivity and advanced digital applications.⁴⁶ However, the expansion of 5G networks has been constrained by limited

The Sustainability Shift



spectrum availability, as the government's planned spectrum auction has been repeatedly delayed, slowing broader commercialization.⁴⁷



Globally, Infrastructure sharing has become increasingly common.

By sharing network assets, operators can reduce operation and capital expenditure requirements while improving network coverage and operational efficiency.⁴⁸

In the case of Europe, network sharing arrangements have reduced expenses

10-25%
operating expenses

15-40%
capital expenditure⁴⁹

Given Indonesia's archipelagic geography, uneven population distribution, and the high cost of network deployment, infrastructure sharing could become a critical mechanism to accelerate digital inclusion while improving investment efficiency. Although Indonesia has yet to establish a formal regulatory framework for network sharing, rising investment requirements and persistent connectivity gaps suggest that such arrangements are likely to become increasingly relevant in the future.

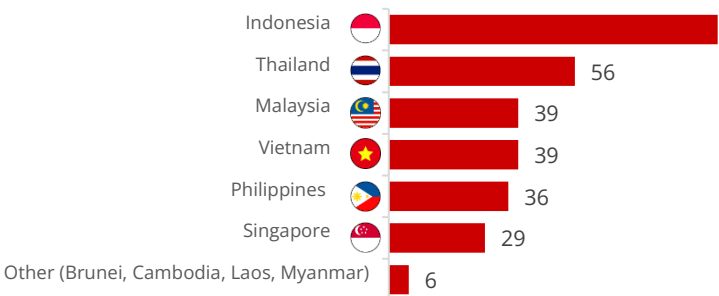
Unlocking New Value Streams in a Maturing Connectivity Market



Digital services have emerged as the primary drivers of value creation in the digital economy

E-commerce, ride-hailing, digital banking, digital payments, and online platforms have become deeply embedded in daily economic activities, generating substantial growth opportunities across the broader digital ecosystem. This strong digital adoption has enabled **Indonesia to maintain the largest digital economy in Southeast Asia over the past decade, with gross merchandise value (GMV) reaching USD 99 billion in 2025**, equivalent to approximately 33% of the total GMV of the six largest Southeast Asian economies (SEA-6).⁵⁰

Digital Economy Size in Southeast Asia (in billion USD)



Source: Bain & Company, Google, and Temasek (2025)



**Capturing Value
Beyond
Connectivity**

Recognizing the shift in the connectivity service toward digital ecosystem, telecommunications operators globally have expanded aggressively into business-to-business (B2B) digital services. The shift toward enterprise services also reflects broader changes in business demand. As digital technologies become increasingly integrated into business operations, companies require not only connectivity but also digital service. Telecommunications operators are therefore seeking to reposition themselves from providers of connectivity to providers of integrated digital ecosystems.

In Indonesia, major operators such as Telkom Indonesia, Indosat, Biznet, and XLSMART have increased investments in enterprise connectivity, managed services, cloud computing, cybersecurity, AI and Internet of Things (IoT) solutions.

This transition is driven by several structural advantages. Compared with retail customers, enterprise customers typically generate higher margins, exhibit lower churn rates, and require more integrated and customized solutions. Moreover, enterprise services create opportunities for long-term contractual relationships that extend beyond basic connectivity provision.



**The rapid
development of
AI**

AI is transforming business models by enabling greater automation, improving operational efficiency, and reducing costs across industries. As AI applications become increasingly integrated into everyday activities, public awareness and adoption have risen significantly.

Beyond its direct applications, AI is acting as a catalyst for the broader digital ecosystem. Growing AI adoption is expected to accelerate demand for complementary digital services. This trend is already visible on the supply side. Indonesia has emerged not only as a consumer but also increasingly as a producer of AI-enabled digital services, with growing revenues from AI-featured applications growing.⁵¹

Rapid adoption among both consumers and enterprises

79%

of users have become familiar with AI through various channels and applications

127%

growth yoy on **Revenue generated by AI-enabled applications**⁵²



Data Centers: The New Center of Digital Value Creation

While telecommunications networks remain the backbone of digital expansion, much of the value created in the digital economy has increasingly been captured by digital platform companies and hyperscaler rather than by connectivity providers.

In response, telecommunications operators are seeking to move up the value chain by offering integrated digital solutions instead of standalone connectivity services. Many operators have expanded their portfolios into B2B technology services. However, this transformation requires a fundamental shift from the traditional connectivity business model toward a platform and service oriented business model.

Moreover, competition with hyperscaler often leaves telecommunications operators facing thinner margins and weaker bargaining positions.⁵³ As a result, operators increasingly need to identify areas where their existing infrastructure assets, enterprise relationships, and local market knowledge can generate sustainable competitive advantages.

Why Data Centers Have Become Strategic Assets

Both traditional telecommunications operators and global hyperscaler are aggressively expanding their data center investments. For telecommunications operators, data centers offer a strategic opportunity to capture a larger share of digital value creation while reducing dependence on increasingly commoditized connectivity services.

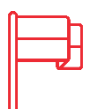


Data center business closely aligns with telecommunications operators' existing capabilities, allowing them to leverage their network infrastructure, operational expertise, and enterprise customer relationships.



The rapid adoption of AI is further accelerating this opportunity.

AI applications require substantially greater computing power, storage capacity, and network performance than conventional digital services, increasing demand for AI-ready data center infrastructure.⁵⁴



Indonesia hosts Southeast Asia's largest digital economy, while internet penetration and enterprise digitalization continue to expand rapidly. Telecommunications operators, including Telkom Indonesia, Indosat, Biznet, and XLSMART, have also leveraged their existing infrastructure assets and enterprise relationships to expand into data center services.⁵⁵



Greater Jakarta possesses mature telecommunications infrastructure, extensive fiber and subsea cable connectivity, and proximity to major enterprise customers, supporting low-latency and high-reliability operations. Similarly, Nongsa Digital Park in Batam offers strong connectivity and strategic proximity to Singapore-based enterprises seeking alternative expansion locations.⁵⁶

Building Green Data Centers in Indonesia

The rapid expansion of AI has significantly increased demand for Graphics Processing Units (GPUs), resulting in greater power density and substantially higher electricity consumption. Because data centers require uninterrupted electricity supply at large scale, energy sourcing has become a strategic issue. In response, hyperscaler increasingly require facilities to operate using renewable energy, giving rise to the concept of green data centers.⁵⁷



Data center expansion brings growing energy and water challenges



The challenge is substantial. AI-focused data centers can consume electricity equivalent to approximately **100,000 households, while a 1-GW facility may require power comparable to that consumed by around 800,000 households in the United States.**⁵⁸

2x

increase in data center electricity consumption by 2026, from the current 1–2% share of global electricity consumption, driven largely by AI and cryptocurrency mining.⁵⁹

4.16

million liters of water per day

for cooling is consumed for a 100-MW data center⁶⁰

Growing rack densities are increasing the need for advanced cooling systems. Liquid cooling has emerged as a preferred solution because it improves cooling efficiency while reducing energy consumption. However, it also increases reliance on reliable water supplies, making water availability an important consideration for data center operations.

This challenge is particularly relevant in tropical countries such as Indonesia, Singapore, and Malaysia, where high ambient temperatures require cooling systems to operate almost continuously. Water demand is even more pronounced in major data center clusters such as Greater Jakarta and Batam, where many facilities are located in areas already facing water stress.⁶¹

Physical climate risks are becoming an increasingly important business consideration for the data center industry. Rising temperatures, more frequent heatwaves, prolonged droughts, and increasing water scarcity can reduce cooling efficiency, raise operating costs, and intensify competition for limited water resources. As these risks increase, reliable access to electricity and water will become critical to maintaining operational resilience and long-term business continuity.

Against this backdrop, sustainability is increasingly becoming a business imperative rather than solely an environmental objective, accelerating the transition toward green data centers that integrate energy-efficient cooling, renewable electricity, and sustainable water management. This transition creates significant investment opportunities across the green data center ecosystem, including renewable energy supply, advanced cooling systems, power infrastructure, and supporting digital infrastructure. For Indonesia, green data centers could simultaneously strengthen operational resilience, capture growing AI-driven digital investment, and stimulate greater demand for renewable energy.

Challenge in building green data centers

High Costs and Lengthy Permitting Slow Investment

Compared with regional competitors such as Singapore and Malaysia, data center operators continue to face relatively high costs associated with **land acquisition, electricity supply, permitting processes, and infrastructure development.** Data centers simultaneously classified as industrial facilities, digital service providers, and critical infrastructure. Consequently, oversight is spread across 8 to 9 ministries and agencies. This multi-layered governance structure creates overlapping compliance requirements and lengthens approval timelines.²⁵ In addition, shortages

The Sustainability Shift

Indonesia's Industry Landscape in Five Key Sectors
Opportunities and Risks



of advanced semiconductor chips and specialized AI computing equipment continue to constrain capacity expansion globally.

Limited option to procure renewable electricity

Indonesia possesses considerable renewable energy potential, estimated at approximately 3,686 GW. However, only around 15.63 GW had been installed as of early 2026.⁶² The continued dominance of coal-fired power generation limits renewable energy integration into the electricity system. Moreover, unlike Singapore, Malaysia, and Vietnam, Indonesia has yet to effectively implement grid joint-utilization mechanisms, preventing private renewable energy developers from utilizing PLN's transmission network.⁶³

As a result, green data center operators face limited options for directly procuring renewable electricity. Many therefore rely on alternative mechanisms, including captive renewable energy generation and Renewable Energy Certificates (RECs), to meet sustainability commitments. While captive generation provides greater control over energy sourcing, it requires substantial land availability and high upfront investment. Since many data centers are located in Greater Jakarta and Batam, where land availability is constrained, RECs have emerged as the most practical solution. Consequently, demand for RECs continues to exceed available supply.⁶⁴

Several leading operators, including Digital Edge Indonesia, Telkom Indonesia, and Princeton Digital Group (PDG), have already adopted REC schemes. More importantly, demand from hyperscaler has begun to stimulate additional renewable energy investment. For example, PLN has established partnerships with AWS and Microsoft, linking renewable energy procurement to the development of approximately 410 MW of additional solar generation capacity.⁶⁵

Upfront cost to invest on efficient cooling system

As tropical country with an average temperature of 27° C, the traditional air-cooling systems, may require substantial power, pushing the Power Usage Effectiveness (PUE) upward. In addition, increasing rack density and AI workloads have made conventional air cooling increasingly inadequate. Consequently, operators are increasingly adopting hybrid cooling technologies that combine air, evaporative, and direct liquid cooling systems.

The higher cost of liquid cooling systems is primarily driven by specialized components and more complex installation requirements. The lack of standardized designs across vendors further increases installation and maintenance complexity. The integration of the cooling system into the server also makes the component replacement and upgrade becomes more challenging. Although modern liquid cooling systems are designed with multiple safety features, leaks remain an operational risk, as even minor failures can damage sensitive electronic equipment.⁶⁶

Despite its higher upfront cost and technological complexity, liquid cooling offers significant long-term benefits by improving energy efficiency, reducing operating costs, and supporting future sustainability standards. Leading operators in Indonesia—including Digital Edge Indonesia, Telkom Indonesia, and Princeton Digital—have already implemented liquid cooling solutions. Given the significant pipeline of hyperscale and AI-ready facilities, adoption of advanced cooling technologies is expected to accelerate further.



Competing and Partnering with Hyperscaler

Despite the opportunities created by cloud computing and AI, telecommunications operators face significant challenges in competing with global hyperscaler such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud.⁶⁷ Hyperscaler benefit from substantial economies of scale, advanced technological capabilities, and access to large pools of capital.⁶⁸ Consequently, telecommunications operators often struggle to compete directly in cloud infrastructure and digital platform markets.

Rather than competing head-to-head, many operators have increasingly adopted partnership-based strategies. Telecommunications companies possess several competitive advantages that hyperscaler often lack, including extensive local infrastructure, regulatory familiarity, enterprise customer relationships, and nationwide connectivity networks.

These complementary capabilities create opportunities for collaboration rather than direct competition. Increasingly, telecommunications operators are evolving into digital ecosystem orchestrators that integrate connectivity, cloud computing, cybersecurity, AI applications, enterprise services, and digital infrastructure into comprehensive business solutions.

The investment and the financing opportunity

The transition toward a sustainable digital economy supports both climate change mitigation and adaptation while advancing broader decarbonization and sustainability objectives. Achieving this transformation requires multiple elements to work in parallel. Green data centers depend on energy-efficient cooling technologies, reliable access to renewable electricity, and a skilled workforce capable of designing, operating, and maintaining advanced digital infrastructure. These requirements result in significantly higher upfront investment than conventional data centers, making access to green financing a critical enabler of technology adoption and long-term sustainability.⁶⁹

At the same time, sustainability presents a significant opportunity to attract foreign investment. Across many emerging economies, the adoption of green infrastructure is often constrained by financing gaps and the additional upfront costs associated with low-carbon technologies. However, global investors and technology companies are increasingly seeking opportunities to finance and develop green digital infrastructure. To capitalize on this momentum, Indonesia must strengthen its investment climate through clear regulations, supportive financing frameworks, and a predictable business environment. Financial institutions also have an opportunity to play a larger role by mobilizing capital for green digital infrastructure and accelerating the country's digital transformation.⁷⁰

Recent financing transactions demonstrate growing investor confidence in Indonesia's green data center market. DBS Bank arranged green financing for Digital Edge's AI-ready data center campus in the GIC Industrial Estate, Bekasi. The first phase of the 500 MW CGK Campus secured a USD 665 million (approximately Rp100 trillion) syndicated green loan, with DBS acting as Mandated Lead Arranger and Green Facility Coordinator. The project targets an annualized PUE of 1.25, LEED certification, recycled water systems, and renewable electricity integration through collaboration with PLN.⁷¹

DBS also arranged an IDR 1.7 trillion club loan for PDG to develop the 22 MW JC2 AI-ready data center campus in Cibitung. The project became Indonesia's first hyperscale data center to utilize biomass as a renewable energy source and the first to achieve Green Mark Platinum certification.⁷² Building on this success, PDG has continued expanding its footprint through the 120 MW JC3 campus, supported by a USD 400 million syndicated loan in which DBS served as one of the underwriters.⁷³

These transactions demonstrate that sustainable digital infrastructure is increasingly viewed as an investable asset class rather than a niche sustainability initiative. Although green data centers require higher upfront capital



expenditure, access to dedicated green financing is improving as investors recognize the sector's long-term growth potential. The expansion of green financing also supports the implementation of TKBI, strengthening the country's pathway toward its net-zero emissions target.

Looking ahead, Indonesia's digital transformation will increasingly depend on its ability to integrate sustainability into digital infrastructure development. Rising electricity demand, growing expectations from global investors, and the increasing importance of low-carbon operations mean that sustainability is becoming a competitive advantage rather than simply a compliance requirement. By developing a digital ecosystem supported by renewable energy, efficient technologies, and sustainable finance, Indonesia can strengthen its position as a leading destination for green data center investment in Southeast Asia while supporting long-term economic growth, energy security, and climate objectives.

Strategic Opportunities and Industry Priorities

The transformation of Indonesia's telecommunications sector reflects a broader structural shift in the digital economy. As traditional connectivity services become increasingly commoditized, future value creation will depend less on providing network access and more on owning, integrating, and orchestrating the digital infrastructure ecosystem. The transition from Telco to TechCo therefore represents not merely a diversification strategy, but a fundamental redefinition of how value is created and captured in the digital economy.⁷⁴



Strategic Priorities for Telecommunications Operators

For telecommunications operators, the primary strategic challenge is to move beyond connectivity and establish positions within higher-value segments of the digital ecosystem. Future growth opportunities increasingly lie in enterprise services, cloud computing, cybersecurity, AI applications, and digital infrastructure.



Partnership-based approaches are likely to prove more sustainable and profitable than direct competition with global technology companies. Rather than competing directly with hyperscaler, telecommunications operators could leverage their relationships, and operational expertise.⁷⁵



At the same time, operators continue pursuing asset-light strategies and infrastructure-sharing arrangements to improve capital efficiency. The capital released through asset monetization can then be redirected toward higher-growth opportunities, particularly data centers and enterprise digital services.



Strategic Priorities for Data Center and Digital Infrastructure Investors

Data centers have emerged as one of the most attractive investment opportunities within Indonesia's digital economy. Strong growth in cloud computing, enterprise digitalization, and AI is expected to sustain demand for data center capacity over the coming decade.⁷⁶

For investors, however, competitive advantage will increasingly depend not only on the availability of land and connectivity infrastructure, but also on access to reliable and sustainable electricity supply. The growing importance of ESG considerations means that future competitiveness will increasingly depend on operators' ability to secure renewable energy supply, improve energy efficiency, and demonstrate credible decarbonization strategies.



For data center developers and hyperscaler, **access to renewable energy and robust transmission infrastructure will be key determinants of investment decisions**, significantly influencing Indonesia's ability to compete with regional hubs such as Singapore and Malaysia. Procuring renewable energy can be in form of partnership with renewable energy developer. Partnership with PLN can help to accommodate large scale renewable energy supply.

The upfront capital expenditure to adopt advance cooling system also accommodates the sustainability target. Although it incurs higher cost, the direct liquid cooling and immersion cooling can reduce the water consumption, hence lower the operational cost and improve the water resilience. Using alternative water source, such as reclaimed water and desalinated water, can help to reduce the usage of fresh water as a vital resource for the community.⁷⁷ Renewable energy integration, advanced cooling technologies, and AI-ready facilities are therefore likely to become the defining characteristics of next-generation data centers.



ESG Priorities: Towards a Sustainable Digital Economy

The future competitiveness of Indonesia's digital economy will increasingly depend on its ability to reconcile digital expansion with climate resilience and sustainable infrastructure.⁷⁸ The next phase of digital development cannot simply replicate previous growth models at a larger scale. Instead, digital infrastructure must be planned, financed, and operated to withstand growing physical climate risks—including rising temperatures, water stress, and increasingly volatile weather patterns—while maintaining cost efficiency, operational reliability, and long-term sustainability.

This challenge also presents significant investment opportunities. Growing demand for resilient and low-carbon data centers are expected to stimulate investment across renewable energy generation, battery energy storage systems, transmission infrastructure, sustainable finance, advanced cooling technologies, and water-efficient solutions. As climate risks become a more important consideration in investment decisions, digital transformation and the energy transition should increasingly be viewed as complementary strategies for strengthening both economic competitiveness and infrastructure resilience.

Ultimately, the transition from Telco to TechCo reflects a broader transformation of Indonesia's digital economy. Future value creation will increasingly accrue not to companies that merely provide connectivity, but to those capable of building, financing, and orchestrating resilient digital infrastructure ecosystems. Operators that successfully integrate climate adaptation, resource efficiency, and low-carbon operations into their digital infrastructure will be better positioned to attract investment, maintain business continuity, and support Indonesia's next phase of sustainable economic growth.

"AI is often discussed as a technology trend, but the bigger investment story is the infrastructure required to support it. Over time, value is likely to accrue not only to application developers, but also to the businesses enabling data, computing power, connectivity, and digital ecosystems."

Nathalia Y Ratulangi

Executive Director Institutional Banking Group Bank DBS Indonesia

As demand for cloud services, AI workloads, cybersecurity, and digital infrastructure continues to expand, companies may need to rethink where value will be created in the next phase of digital growth. Businesses that focus on ecosystem positioning, infrastructure readiness, and long-term scalability are likely to capture greater opportunities than those relying solely on traditional connectivity or technology models.

Towards Better Health: Supply Chain Resilience, Healthcare Access, and Human Capital in Healthcare Market

Global Trends and Where Indonesia Stands

The global pharmaceutical market reached approximately USD 1.6 trillion in 2023 and is projected to grow to USD 2.4 trillion by 2029.⁷⁹

Beyond market expansion, however, healthcare systems are increasingly being shaped by broader sustainability considerations. Around the world, governments, healthcare providers, and pharmaceutical companies are placing greater emphasis on resilient supply chains, equitable access to healthcare, and long-term healthcare outcomes. At the same time, environmental issues—including carbon emissions, waste management, and sustainable manufacturing—are becoming increasingly important for companies integrated into global pharmaceutical supply chains.

These global trends are driven primarily by the growing burden of chronic non-communicable diseases (NCDs).

Cardiovascular disease, diabetes, cancer, and chronic respiratory illnesses now account for approximately 74% of all deaths worldwide.⁸⁰ Unlike acute illnesses, these diseases require continuous treatment, long-term medicine supply, specialist care, and sustained healthcare financing. Consequently, medicines for immunology, oncology, diabetes, and obesity have become the fastest-growing therapeutic categories globally.

Indonesia shares many of these structural healthcare challenges but differs in one important respect. Unlike export-oriented pharmaceutical manufacturing hubs, Indonesia's pharmaceutical industry remains overwhelmingly focused on serving the domestic market. Indonesia imports majority of its active pharmaceutical ingredients (APIs), while most domestic manufacturers operate in downstream formulation rather than upstream API production.⁸¹ At the same time, **BPJS Kesehatan now covers nearly the entire Indonesia's population, making access, affordability, and supply security the dominant policy priorities for both government and industry.**⁸²

As a result, ESG has not yet become the principal commercial driver of Indonesia's pharmaceutical and healthcare industries. Unlike manufacturers supplying Europe or North America, most Indonesian healthcare companies face limited market pressure to improve carbon performance or meet international sustainability reporting standards because they primarily serve domestic demand. Instead, the industry's immediate priorities remain ensuring reliable medicine supply, expanding healthcare access, strengthening domestic manufacturing, and addressing shortages of specialist physicians. These priorities are fundamentally social and governance issues, although they are not always framed explicitly as ESG.

Nevertheless, global sustainability trends are gradually becoming more relevant. Multinational pharmaceutical companies operating in Indonesia are increasingly expected to comply with global sustainability standards established by their parent companies, while pharmaceutical firms participating in international supply chains face growing requests for emissions reporting and sustainable procurement practices.



At the same time, Indonesia's sustainable finance framework is beginning to create opportunities to finance healthcare infrastructure, cold-chain logistics, and pharmaceutical manufacturing through sustainability-linked financing. These developments suggest that although sustainability is not yet the primary driver of Indonesia's healthcare market, its influence is likely to increase over time, particularly among internationally integrated companies.

The rising prevalence of hypertension, diabetes, and respiratory illnesses demonstrates that Indonesia is experiencing the same epidemiological transition observed globally, reinforcing the need for a healthcare system that is more resilient, accessible, and financially sustainable.

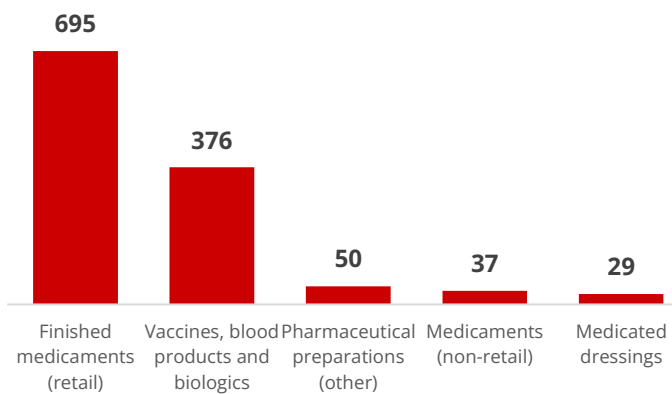
Global Trends and Indonesia Manifestation in BPJS Utilization Data (2019 to 2024)

Global Trend	Indonesia Manifestation	Indonesia Headline
NCD burden rising globally (74% of deaths)	Chronic conditions dominating clinical encounters	Hypertension: 6.0% of monthly cases and remain stable. Diabetes: growing from 4.5% to projected 5.6% by mid-2026
Diabetes and obesity medicines fastest growing	Expanding insulin and metformin demand	Diabetes in all 72 months of observation; 578,000 cumulative cases and has significant upward trajectory
Respiratory burden amplified post-COVID	Acute respiratory infections dominate by volume	Acute URI: 1.17M cases, 8.9% monthly average but on February surges reaching 13.4%

The Resilience Front:
From Import Dependence to Secure, Cleaner Supply

Of the three fronts shaping Indonesia's healthcare transition, supply-chain resilience is likely to have the most immediate commercial implications. It sits at the intersection of governance and environmental priorities within the ESG agenda. The same concentrated, carbon-intensive pharmaceutical manufacturing base that makes Indonesia's supply chain vulnerable is also attracting increasing scrutiny from global buyers and regulators over its emissions performance. Supply-chain resilience is where sustainability and commercial competitiveness first converge in Indonesia's healthcare industry, and where investments made over the next two years are likely to generate the strongest long-term returns.

Indonesia Pharmaceutical Imports by Product Category in Million USD (HS Chapter 30, 2024)



Source: Harvard Growth Lab Atlas of Economic Complexity, HS92 country-product-year panel (2026), processed.



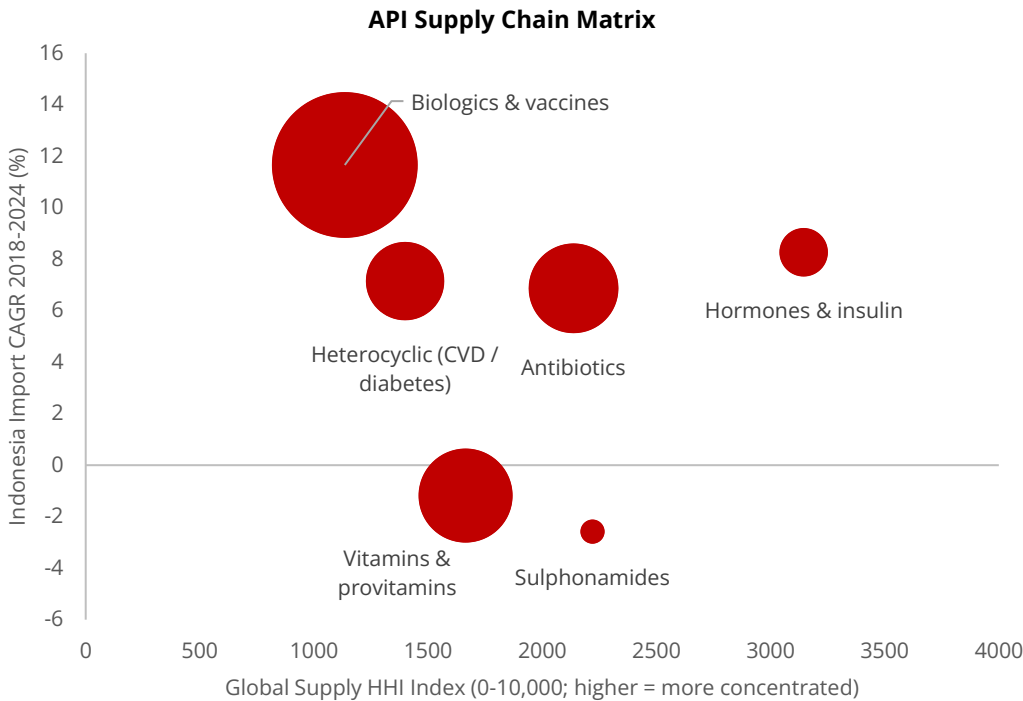
API Import Concentration and Supply Risk by Therapeutic Category (2024)

Category	2024 Imports	Change vs 2023	Key Source Countries	Concentration Risk
Antibiotics (incl. amoxicillin)	USD 142M	+1.7%	China 42% India 11%	High: 53% from China and India combined
Vitamins and provitamins	USD 156M	+32.3%	China 35% USA 11%	Moderate-high
Heterocyclic APIs (metformin, amlodipine)	USD 108M	+20.8%	Ireland 30% China 15%	Moderate
Hormones including insulin	USD 41M	-9.3%	Ireland 50% USA 24%	Very high: few global producers
Vaccines, biologics, oncology	USD 376M	+13.6%	USA 17% Switzerland 17%	Moderate

Source: Harvard Growth Lab Atlas of Economic Complexity, HS92 panel, processed (2026). Concentration risk based on Herfindahl-Hirschman Index (HHI) of global export market shares.

A market built on borrowed supply

Indonesia imports roughly 90% of its APIs.⁸³ More important than the headline figure is the composition of those imports. Dependence is greatest in precisely the therapeutic categories associated with the country's growing burden of chronic diseases. In other words, the medicines expected to drive future healthcare demand are also those most vulnerable to external supply disruptions.



Source: Harvard Growth Lab Atlas of Economic Complexity, HS92 panel (2026), processed.
Note: Bubble size is the total import value in 2024.



Antibiotics, cardiovascular and diabetes APIs, hormones and insulin, and biologics combine two characteristics that make them strategically important:

Rapidly growing domestic demand

driven by demographic change and the increasing prevalence of chronic diseases.

Highly concentrated global production

much of it centered in China and India.⁸⁴

The key issue is not the overall import share but the asymmetry of supply risk. A prolonged disruption affecting a single major source country can interrupt access to life-saving medicines, while domestic manufacturers cannot rapidly replace lost imports. That asymmetry was manageable when global supply chains operated with relatively few disruptions. Today, however, it is being tested simultaneously by geopolitical tensions and environmental pressures.

Two forces are turning a known weakness into a live risk



Geopolitical risk affecting supply chain

The United States enacted the BIOSECURE Act in December 2024,⁸⁵ restricting dealings with selected Chinese biotechnology firms, while the European Union's Critical Medicines Act⁸⁶ is encouraging buyers to diversify toward EU-qualified suppliers and strategic stockpiles. As major pharmaceutical markets redraw their supplier networks, competition for non-Chinese API capacity is intensifying, leaving smaller importing countries such as Indonesia increasingly exposed to tighter supply availability and higher procurement costs.



Supply-chain resilience has evolved from a procurement issue into a broader ESG consideration

Extreme weather events affecting manufacturing hubs in China and India have already disrupted API production. Within Indonesia, climate-related risks to cold-chain logistics and coastal port infrastructure increasingly threaten medicines that cannot tolerate supply interruptions, including insulin and biologics. At the same time, European pharmaceutical companies are beginning to request Scope 3 emissions data from suppliers under the EU Corporate Sustainability Reporting Directive (EU-CSR Directive). For Indonesian firms participating in global pharmaceutical supply chains, a carbon-intensive and geographically concentrated supplier base is gradually becoming both a commercial and operational liability.

Opportunity for Pharmaceutical Supply Chain Localization

The strategic question facing industry leaders is no longer whether to localize production, but which therapeutic categories should be localized first and over what timeframe. The answer depends as much on commercial viability as on policy support. Given technological and commercial constraints, pharmaceutical localization should be pursued through a phased approach, prioritizing therapeutic categories with strong domestic demand, mature manufacturing processes, and realistic pathways to international quality standards. Among the type of products, the cardiovascular APIs is the most viable option. While the oncology products are the most complicated as it requires advance technology and ecosystem.



Localization Viability by Therapeutic Category

Category	Near-Term Viability	Main Barriers	Realistic Horizon
Cardiovascular APIs (metformin, amlodipine, statins)	High	Capital investment, BPOM/GMP certification	1 to 3 years
OTC and acute agents (paracetamol, antacids)	Very high	Minimal — partially local already	Consolidation phase
Insulin and biosimilar biologics	Medium	Technology transfer, scale economics	3 to 6 years
Oncology biologics	Low in near term	Technology intensity, limited domestic demand at scale	6 or more years, or partnership

Challenges in Localizing the Supply Chain



Meeting international quality and reliability standards remains a key barrier

Multinational pharmaceutical companies continue to emphasize the importance of consistent quality, compliance with international Good Manufacturing Practice (GMP) standards, and reliable long-term supply. However, Indonesia's pharmaceutical manufacturing capabilities have yet to extend to complex molecules requiring advanced technologies and specialized expertise. The government's planned restriction on medical-grade salt imports illustrates the challenge, as only two domestic producers currently have the capability to supply the market.



Limited innovation ecosystem constrains API development

Indonesia continues to face gaps in pharmaceutical R&D, clinical trial capacity, and technology transfer, limiting its ability to develop innovative APIs. As a result, the most commercially viable localization opportunities remain concentrated in established generic medicines rather than novel therapies.

Companies investing today are therefore preparing not for today's disruption, but for the future shocks arising from geopolitical tensions, physical climate risks, and global supply chain disruptions. Long-term success depends on sequencing investments according to technological readiness, market potential, and policy support, rather than attempting comprehensive import substitution. Supplier diversification—from qualification through GMP audits to initial procurement—typically requires 12 to 18 months. Building a domestic GMP-certified manufacturing facility takes even longer. As climate-related disruptions, extreme weather events, and logistics bottlenecks become more frequent, firms that move early in commercially viable therapeutic categories will gain not only greater operational resilience, but also meaningful procurement and pricing advantages over competitors that remain dependent on a single concentrated source.



The investment and the financing question

Building supply-chain resilience requires significant long-term investment. Developing GMP-certified API manufacturing capacity demands substantial upfront capital, while supplier diversification requires companies to maintain larger inventory buffers to protect against supply disruptions. These investments improve resilience but also increase financing requirements well before additional revenue is generated. Industry participants indicate that disruptions to Chinese or Indian supply lasting more than two to three months would significantly increase procurement costs, particularly for formulation-focused manufacturers with limited pricing flexibility.⁸⁷ Inventory buffers provide important protection, but they remain a financing cost carried on corporate balance sheets.

This is where the financing structure matters more than the slogan of localization. Three implications follow for how the capital gets raised.



API localization is best suited to long-term financing with repayment schedules aligned to certification timelines, rather than conventional working-capital facilities, because revenue begins only after BPOM approval and GMP certification are secured.



Second, Indonesia's TKDN procurement policy also functions as a financing instrument. By increasing confidence in government and BPJS-related demand, TKDN improves project bankability and lowers the cost of capital for domestic manufacturers. Lenders are generally more willing to finance predictable demand than uncertain commercial opportunities.



Investments in cold-chain infrastructure, warehouse modernization, and GMP upgrades already qualify under TKBI, creating opportunities to utilize sustainability-linked financing that remain largely underexplored within the healthcare sector.

For investors, the focus is increasingly shifting from cost efficiency to supply security. As supply concentration becomes more widely recognized as a commercial risk, companies able to demonstrate credible supplier diversification and localization strategies are likely to benefit from lower financing costs and stronger investor confidence. Supply-chain resilience represents one of the clearest examples of sustainability performance translating directly into competitive advantage and cost of capital within Indonesia's healthcare sector.

The Access Front: From Universal Coverage to a Working Copayment Market

If resilience is the governance front of Indonesia's healthcare transition, access is its social heart. It is also the front where the sustainability agenda and the commercial case most closely align. Universal health coverage remains Indonesia's greatest social achievement in healthcare while simultaneously shaping what can be prescribed, reimbursed, and financed. The defining development over the next two years will not be the continued expansion of BPJS itself, but the emergence of the market that sits just beyond it.

One payer defines the market

BPJS Kesehatan covered approximately 98.6% of Indonesia's population in 2025 and finances an estimated 60% of the pharmaceutical market by volume.^{88, 89}



For manufacturers, distributors, hospitals, and insurers, BPJS is not simply one payer among many—it is the dominant mechanism through which healthcare demand is expressed and financed.

That dominance creates both opportunity and constraint. BPJS reimburses medicines through the National Formulary (FORNAS), yet industry estimates suggest **only around 2% of globally available innovative medicines are currently included**.⁹⁰ Consequently, medicines outside FORNAS effectively serve only patients paying out of pocket or covered by supplementary insurance. Indonesia's achievement of near-universal healthcare coverage therefore also defines the current commercial limits of the innovative medicines market.

The margin squeeze the C-suite already feels

Hospitals are reimbursed under the Indonesian Case Base Groups (INA-CBGs) payment system, which provides a fixed payment based on diagnosis rather than actual treatment cost.⁹¹ Some procedures generate healthy margins, while others are consistently loss-making. A kidney stone procedure, for example, may reimburse IDR 6–9 million against treatment costs of around IDR 4–5 million, whereas dengue admissions often reimburse only IDR 1.6–2.1 million despite similar costs. Hospital management therefore relies on careful case-mix management, using profitable services to offset those that operate at a loss.

That balancing act became more difficult in 2025 when BPJS limited reimbursement to a single specialist consultation within a three-day treatment period, regardless of how many specialists a patient actually consults. A patient with diabetes, hypertension, and chronic kidney disease may require three specialists, yet the hospital receives reimbursement for only one consultation. The policy reduces revenue precisely as chronic diseases increasingly require multidisciplinary care. Financial sustainability therefore depends not simply on increasing patient volume, but on actively managing service mix and reimbursement exposure.

Hospitals are already responding by reassessing admission policies, refining referral pathways, and expanding private-pay and corporate-insurance services to offset pressure on BPJS-funded care.⁹² These decisions increasingly influence pharmaceutical procurement, specialist recruitment, and investment in medical technology. The INA-CBG reimbursement system has therefore become not only a hospital management issue, but a demand-side consideration affecting the entire healthcare value chain.

The importance of effective reimbursement system also affects the pharmaceutical companies as they need to strengthen the Indonesian evidence base required for reimbursement. **Health Technology Assessment (HTA)** increasingly relies on local real-world evidence alongside clinical trials. Hospital operators need disciplined case-mix management while expanding private-pay and corporate-insurance revenue streams. Private insurers, meanwhile, should prepare for a supplementary insurance market that has yet to fully emerge but is approaching commercial viability.

The opportunity, and the financing lens:

The government's coordinated benefits (KAPJ) framework

KAPJ would allow BPJS to provide baseline coverage while private insurers finance treatment above BPJS limits, including non-FORNAS medicines and higher-tier healthcare services. The commercial implications are significant. Private insurers would gain access to a substantial new market, pharmaceutical companies would obtain a reimbursement pathway for innovative medicines currently excluded from FORNAS, and hospitals could provide higher-value services without absorbing the full financial impact of INA-CBG reimbursement constraints. The most valuable asset a company on this front can hold, ahead of the policy, is evidence and readiness. Both are far less costly to build today than to acquire later under intensifying competition.



The KAPJ unlock is the creation of a new insurable market.

Once claims data flows, private insurers can underwrite supplementary products, which converts today's unfunded demand for innovative medicines into funded and bankable demand. For pharmaceutical companies, the investment in FORNAS evidence and Indonesian real-world evidence made today is effectively an option on that market opening. It is capital committed ahead of a policy gate, the companies holding completed evidence packages when the gate opens will capture the copayment market before slower competitors can respond.

For hospitals, the INA-CBG squeeze is as much a creditworthiness issue as it is a clinical one. Institutions that offset BPJS reimbursement pressures through disciplined case-mix management and a growing private-pay patient base present a stronger financial profile to lenders and investors, placing them in a better position to finance the specialist recruitment and infrastructure investments that the next stage of healthcare development will require.

Private insurers, premium hospitals, and innovative pharmaceutical companies positioned ahead of this policy shift stand to benefit first, while companies that demonstrate preparedness are also likely to enjoy improved access to capital. The eventual sharing of BPJS claims data represents a potential re-rating catalyst for investor

The remaining barrier is highly specific—and therefore potentially solvable. BPJS has not yet provided private insurers with access to claims data, preventing insurers from accurately pricing supplementary insurance products.⁹³ Resolving this single issue would represent the key milestone in opening Indonesia's copayment market and marks the point at which the financing perspective becomes most relevant.

The Human Capital Front: From Specialist Scarcity to Accessible Care

The third front is where Indonesia's healthcare transition is most visibly social. Access to advanced care is determined less by whether effective treatments exist than by whether specialist physicians are available to diagnose and manage patients. Human capital has therefore become the binding constraint on the sector's long-term growth, while also serving as one of the clearest measures of healthcare system performance. The specialist gap will be the single largest determinant of how quickly Indonesia's healthcare market expands over the coming decade, making this the front where social and commercial returns are most closely aligned.

A market gated by scarcity

Indonesia had 46,533 registered specialist medical doctors as of 2026, serving a population of approximately 284 million.⁹⁴



**Ratio of specialist
per 1000 population**

Indonesia

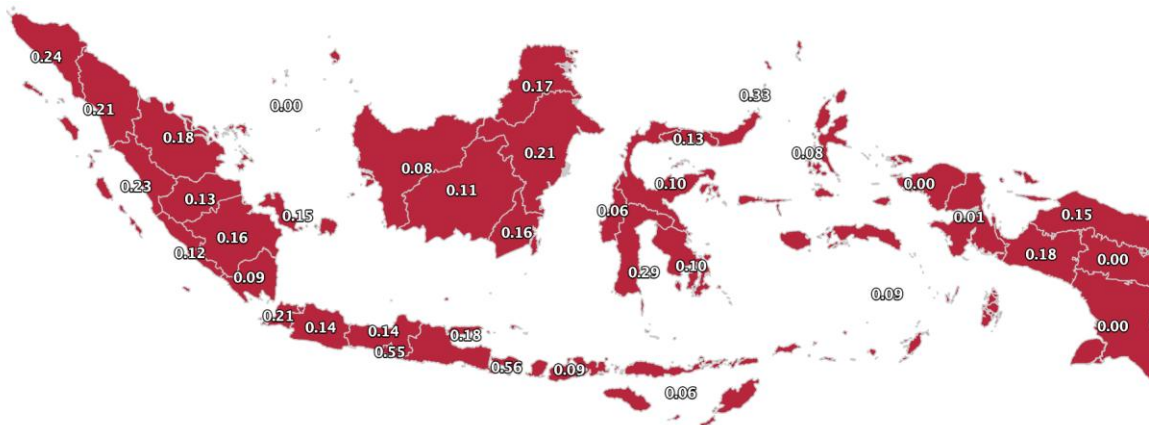
0.16

OECD countries

1.5-3



Ratio of Specialists per 1,000 Population by Province



Source: Ministry of Health (2026), processed.

The concentration is geographic. Provinces with established medical schools and tertiary hospitals record the highest ratios, **while provinces in eastern Indonesia, Kalimantan, and parts of Sumatra fall as low as 0.03 specialists per 1,000**. The consequence is that many Indonesians living with chronic NCDs are treated by general practitioners, not because specialist care does not exist, but because it is out of reach. The challenge is therefore one of both distribution and overall capacity.

Why scarcity is a commercial constraint, not only a social one

Specialists sit at the center of this market for two reasons.



First, they diagnose and manage conditions that general practitioners cannot adequately treat, improving diagnostic accuracy, treatment outcomes, and quality of life rather than simply increasing healthcare utilization.



Second, they are the principal prescribers of innovative, patented, and high-value therapies. Cardiologists drive demand for advanced cardiovascular medicines, oncologists for cancer therapies and biologics, and endocrinologists for modern diabetes treatments.

International experience consistently shows that markets with greater specialist density achieve higher uptake of innovative medicines because specialists possess both the clinical expertise and diagnostic infrastructure needed to identify appropriate patients. A substantial share of the potential market for innovative therapies is therefore not being lost to competitors or constrained by price — it is simply not being reached. The limitation lies not in patient demand, but in the availability of specialist diagnosis and care pathways that enable appropriate treatment.

Building Specialist Capacity to Unlock Healthcare Growth

The Ministry of Health's hospital-based specialist development program is the principal policy engine on this front. Hospitals participating in the program commit to training and retaining specialist physicians, supported by government-funded residency placements and incentive schemes designed to encourage specialists to practice in underserved regions. For industry participants, this program should be viewed not simply as a healthcare initiative, but as a leading indicator of future market expansion.

For manufacturers of innovative medicines, the addressable market expands broadly in line with specialist capacity, making specialist deployment by province a more useful planning indicator than national population alone. For hospital operators, the key decision is which specialist service lines to build and where. For medical device and equipment suppliers, every additional specialist service line generates demand for diagnostic imaging, laboratory services, surgical equipment, and treatment infrastructure.



The investment required

Investment is already underway. One leading private hospital network has identified cardiology catheterization laboratories, oncology centers, urology services, and neurology infrastructure as among its highest capital expenditure priorities for 2026. These investments are intended not only to improve clinical outcomes but also to attract specialist physicians, whose presence in turn drives demand for higher-value healthcare services, medicines, and medical devices.⁹⁵

The constraint on that model is volume. A catheterization laboratory needs a substantial and predictable flow of cardiology patients to earn an acceptable return. Expansion into secondary cities and underserved regions therefore depends less on ambition than on realistic patient-volume forecasting and disciplined market selection. This is the point at which the social case and the commercial case can pull apart, because the provinces that need specialists most are the provinces where volume is hardest to underwrite.

Financing Indonesia's Specialist Healthcare Expansion

The central challenge is financing rather than strategy. Investments in specialist service lines are long-term, capital intensive, and highly dependent on patient volume.

A lender financing a catheterization laboratory in a secondary city is effectively underwriting a demand forecast rather than an established revenue stream. It is therefore unsurprising that many of these investments are financed conservatively or postponed altogether. Three implications follow.

Government-funded residency placements and retention incentives make specialist supply more predictable

The Ministry of Health program improves bankability in the same way TKDN does on the resilience front. Predictable specialist supply is what converts a volume forecast into something a lender can underwrite. Companies should be explicit with their banks about how program participation de-risks their projections, because that argument is rarely made and it is a strong one.

Sustainability-linked financing has its clearest and least-used application in Indonesian healthcare

On the resilience front the eligible assets are physical. Here the performance is social and, crucially, measurable. Specialists placed and retained in underserved provinces, patients served outside Java, and service lines opened in regions with ratios below the national average are exactly the kind of targets a sustainability-linked structure is built to price. Human capital front is where Indonesia's social-led sustainability transition becomes financeable, because access is measurable and improvement in it can be written directly into the terms of a facility.



Specialist density should be viewed by investors as a leading indicator of future healthcare demand

Provinces with growing specialist capacity are also likely to become the next markets for innovative therapies, advanced diagnostics, and higher-value healthcare services. Companies expanding ahead of this trend are investing before those markets are fully priced. The associated risk is ultimately one of patient volume, which is why the most credible operators are those able to demonstrate disciplined forecasting rather than simply ambitious expansion plans.

Strategic Opportunities and Industry Priorities

The Opportunity Landscape

The three structural challenges discussed in this paper — API supply-chain dependence, BPJS financing constraints, and shortages of specialist physicians — together with the growing need to strengthen healthcare resilience against physical climate risks and future public health emergencies, create distinct commercial opportunities for industry participants over the next one to two years. Rather than representing isolated sectoral issues, these challenges are likely to reshape investment priorities across Indonesia's healthcare ecosystem, driving demand for more resilient pharmaceutical supply chains, healthcare infrastructure, and innovative healthcare delivery models.

Summary of Strategic Opportunities by Segment

	Opportunity			
	 API localization for cardiovascular and OTC molecules	 KAPJ copayment implementation	 Specialist-driven market expansion	 Hospital infrastructure expansion
Relevant Players	Generic manufacturers, domestic formulation producers	Innovative medicine manufacturers, private insurers, premium hospitals	Innovative medicine companies, medical device manufacturers	Medical device distributors, equipment manufacturers
Key Trigger	TKDN policy, import restrictions	BPJS-private insurer data integration	Specialist development program, hospital investments	Expansion of cardiology, oncology, neurology, and urology services
Strategic Response	GMP investments, BPOM certification	FORNAS submissions, Indonesian evidence generation	Physician engagement, hospital partnerships	Supply agreements with hospital networks

The Sustainability Shift



Strategic Priorities for Pharmaceutical Manufacturers

For manufacturers of innovative medicines, the highest near-term priority is strengthening the evidence base required for inclusion in the FORNAS. HTA increasingly relies on Indonesian real-world evidence alongside international clinical trial data. Companies that begin generating local effectiveness and outcomes data today will be better positioned to respond quickly as the KAPJ framework becomes operational.

For generic and domestic pharmaceutical manufacturers, the government's localization agenda identifies cardiovascular APIs and over-the-counter products as the most commercially attractive near-term opportunities. Companies seeking to capitalize on these opportunities should begin investment decisions early, recognizing that GMP certification typically requires one to three years.



Large and predictable domestic demand



Mature production technologies



GMP certification that can realistically be achieved within one to three years.⁹⁶

Strategic Priorities for Healthcare Providers

Hospital operators should view the Ministry of Health's specialist development program not merely as a workforce initiative, but as a long-term growth strategy. Hospitals that invest early in specialist service lines are likely to attract specialist physicians, patient referrals, and higher-value clinical services before competing providers establish similar capabilities.

Across the industry, hospital management teams consistently identify cardiology, oncology, neurology, and urology as the four specialist disciplines offering the greatest long-term growth potential. At the same time, hospitals can no longer regard BPJS reimbursement constraints as passive limitations. Institutions that actively manage patient mix, referral pathways, and service portfolios while maintaining quality of care will be better positioned to sustain financial performance under the INA-CBG reimbursement system.

Strategic Priorities for Supply Chain Players

Pharmaceutical distributors and procurement organizations should begin diversifying supply chains beyond China and India. Establishing alternative supplier relationships requires significant lead times, including supplier qualification, GMP audits, regulatory approvals, and initial procurement cycles, often extending 12 to 18 months. Companies that begin diversification early will be better positioned to manage future geopolitical disruptions, physical climate risks and supply-chain shocks.



ESG Priorities: The Social Dimension Comes First

In Indonesia's pharmaceutical and healthcare industries, the most material ESG considerations remain social rather than environmental. The sector's immediate priorities are improving access, equity, affordability, and quality of healthcare services. Companies that contribute to expanding access to effective medicines through FORNAS, support specialist training in underserved regions, or are directly addressing the ESG priorities most relevant to the Indonesian market.

At the same time, climate resilience is becoming an increasingly important consideration as more frequent extreme weather events and physical climate risks place additional pressure on healthcare systems, disrupt the delivery of medical services, and increase demand for resilient healthcare infrastructure and supply chains.

Environmental sustainability remains important but currently has its greatest commercial impact on companies participating in international pharmaceutical supply chains. Pharmaceutical has been the most carbon-intensive sector in the healthcare and pharmaceutical companies, due to the feedstock derived from petrochemical and the logistic.⁹⁷ For example, European pharmaceutical companies increasingly request scope 3 emissions data from suppliers to comply with the EUCSRD.⁹⁸ For companies focused primarily on Indonesia's domestic market, however, environmental reporting remains an emerging rather than immediate commercial requirement.

Indonesia's healthcare sector has yet to fully utilize the country's sustainable finance framework. Investments in cold-chain logistics, medical waste management, hospital energy efficiency, and GMP modernization already satisfy eligibility requirements under TKBI.⁹⁹ Nevertheless, sustainability-linked financing remains significantly underutilized. As healthcare sector demand continues to rise and modernize, these financing instruments are likely to become increasingly important in supporting resilient, accessible, and sustainable healthcare infrastructure.

"The most compelling opportunities in healthcare may not come from treating more patients, but from building a more resilient healthcare ecosystem. Supply-chain security, specialist availability, and long-term accessibility are increasingly becoming business fundamentals rather than healthcare policy issues."

Nathalia Y Ratulangi,

Executive Director Institutional Banking Group Bank DBS Indonesia

Healthcare organizations may need to look beyond immediate demand and evaluate how resilience can be embedded across supply chains, infrastructure, talent, and service delivery models. Businesses that invest early in areas such as localization, specialist capacity, and healthcare accessibility are likely to be better positioned as demographic trends and healthcare demand continue to evolve over the long term.



Towards Sustainable Food Security: The Next Agribusiness Frontier in Indonesia

Food Security and Sustainability as Strategic Priorities

Indonesia's food, agribusiness, and animal husbandry sectors are entering a period of structural transformation driven by both domestic priorities and international market developments.

Domestically, the government has elevated food security and food self-sufficiency to the center of its economic and development agenda.

Through initiatives aimed at increasing agricultural productivity, strengthening domestic food supply chains, expanding downstream processing activities, and **implementing strategic programs such as the Free Nutritious Meal (Makan Bergizi Gratis or MBG) program**, Indonesia seeks to reduce vulnerabilities to external supply shocks while ensuring food affordability and availability for its growing population.

Responding to Evolving Global Sustainability Standards

Indonesian agribusinesses increasingly operate in a global environment characterized by rising sustainability expectations and regulatory requirements. Major export markets and international stakeholders are introducing policies to address climate change, deforestation, biodiversity loss, and supply chain transparency. These include regulations such as the **EU Deforestation Regulation (EUDR), the EU Corporate Sustainability Due Diligence Directive (EUCSDDD), sustainability disclosure frameworks, certification schemes, and traceability requirements** affecting agricultural and food products. Consequently, producers and exporters face growing pressure to demonstrate responsible sourcing, strengthen traceability systems, and improve environmental and social performance throughout their value chains.

At the same time, Indonesia has principal policy foundations for food security strategy in the National Medium-Term Development Plan (RPJMN) 2025–2029, which positions agriculture as a central pillar of Indonesia's inclusive and sustainable economic transformation. The heightened emphasis on food security also reflects increasing concerns over climate-related production risks, particularly the repeated occurrence of El Niño events that have coincided with key harvest periods in recent years, disrupting agricultural output and reinforcing the need for a more resilient food system. Current climate forecasts further underscore these concerns. Dry season conditions are forecast to be drier than usual, particularly during the period from June 2026 to January 2027, highlighting the continued need to strengthen agricultural resilience and safeguard domestic food production.¹⁰⁰

While food self-sufficiency and sustainability objectives are often perceived as competing priorities, Indonesia cannot afford to pursue one at the expense of the other. Indonesia remains committed to its Enhanced Nationally Determined Contribution (NDC) and long-term net-zero ambitions, while maintaining access to international markets increasingly requires compliance with evolving sustainability standards. For export-oriented sectors such



as palm oil, fisheries, coffee, and cocoa, sustainability has become an important determinant of market access, investment attractiveness, and long-term competitiveness.

Beyond short-term production disruptions, physical climate risks are becoming a structural business consideration for Indonesia's agrifood sector. Rising temperatures, the prolonged El Niño, floods, and the increasing frequency of extreme weather events are affecting crop yields, livestock productivity, water availability, and the stability of agricultural supply chains. These risks not only threaten domestic food security but also increase operational uncertainty, production costs, and investment risks across the value chain. As a result, climate resilience is emerging as a strategic priority alongside sustainability.

Against this backdrop, stakeholders across Indonesia's agrifood sector must operate within an increasingly complex environment in which food security, economic growth, climate resilience and sustainability objectives must be pursued simultaneously. Companies are investing in traceability systems, certification schemes, circular economy practices, resource efficiency improvements, waste-to-energy solutions, and sustainable supply chain management. Meanwhile, policymakers face the challenge of ensuring that sustainability measures support rather than undermine broader objectives related to agricultural productivity, food affordability, and rural development.

The EUDR represents one of the most important regulatory developments affecting Indonesia's palm oil industry. Although the regulation introduces extensive due diligence requirements, its implications for Indonesia can largely be understood through three interconnected challenges: **supply chain segregation, data governance, and varying levels of industry preparedness.**

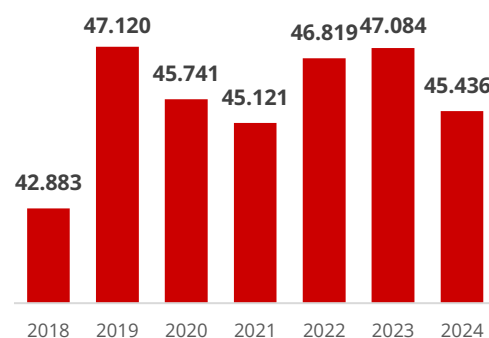
The Global Palm Oil Leader

Indonesia is the world's largest producer and exporter of palm oil, with the industry contributing approximately 3.5% of GDP. With 56.6 million tons of crude palm oil and palm kernel oil produced in 2025

Indonesia accounts for approximately 60% of global production and more than half of global exports, underscoring its central role in global supply and trade flows.¹⁰¹ The production volume growth remains stable with 1% compound annual growth rate (CAGR) between 2018 and 2024.¹⁰²

Given its dominant market position, Indonesia's palm oil industry is highly exposed to changes in international demand, consumer preferences, and regulatory developments. However, the export of palm oil has stagnated, while prices have become increasingly volatile, with a more pronounced downward trend. In recent years, multinational corporations, importing countries, and consumers have increasingly emphasized sustainability, traceability, and regulatory compliance, resulting in a structural transformation of the global palm oil trade. Consequently, Indonesian producers have been required to adapt to evolving standards as sustainability compliance becomes an increasingly important determinant of market access and competitiveness.

**Indonesia's Palm Oil Production Volume
2018–2024 (in Tons)**



Source: Statistics Indonesia (2025)

The Sustainability Shift

Indonesia's Industry Landscape in Five Key Sectors
Opportunities and Risks



This shift has important implications for the industry's sustainability agenda. Discussions of sustainable palm oil in Indonesia are often framed primarily as being driven by the influence of international buyers and foreign regulations. However, as domestic demand assumes a larger role in driving industry growth, this perspective increasingly overlooks the growing importance of internal sustainability considerations. Sustainability challenges within Indonesia are no longer shaped exclusively by international market requirements, but also by domestic policies such as the Indonesian Sustainable Palm Oil (ISPO) certification, local governance, and community expectations that are becoming equally important in determining the industry's future trajectory.



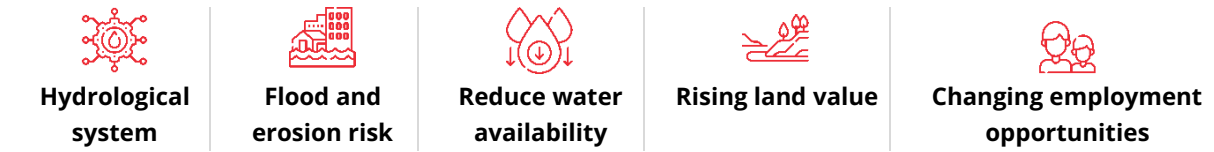
Source: Statistics Indonesia (2026) ¹⁰³

Discussions of sustainable palm oil in Indonesia have traditionally focused on external pressures, particularly evolving requirements from international buyers and foreign regulations. While these remain important, such a perspective increasingly overlooks the growing influence of domestic drivers. As domestic demand expands, sustainability challenges are increasingly shaped not only by international market requirements but also by Indonesia's own ESG priorities, including ISPO implementation, local governance, and community expectations.



The Shifting Drivers of Palm Oil Sustainability

Large-scale palm oil production has long generated tensions with local communities. Although the industry has delivered substantial economic benefits nationally, plantation expansion can create localized environmental and socioeconomic impacts that directly affect surrounding populations. Consequently, the sustainability of Indonesia's palm oil industry has become increasingly intertwined with its ability to maintain a social license to operate. Many of these concerns arise from the environmental consequences of large-scale land conversion into plantation development.



These environmental and social pressures have elevated sustainability from an export requirement to a domestic governance issue, as unresolved community grievances increasingly pose regulatory and operational risks through local government oversight of land rights and plantation permits, including right to cultivate (Hak Guna Usaha or HGU) concessions.



Many major Indonesian palm oil producers have adopted sustainability commitments that extend beyond mandatory regulations to response to both international expectations and domestic pressures.

The most prominent framework is the voluntary **No Deforestation, No Peat, and No Exploitation (NDPE) commitment**, which has become the industry standard among major producers, traders, and consumer goods companies.



**Prevent
deforestation**



**Prohibit peatland
conversion**



**Eliminate exploitation of workers, local
communities, indigenous population**

The widespread adoption of NDPE also reflects growing recognition that the environmental footprint of palm oil production is concentrated primarily during the plantation expansion phase rather than during mature operations. A substantial proportion of emissions associated with palm oil production results from land-use change, particularly deforestation and peatland drainage, which release carbon accumulated over long periods. By contrast, operational emissions from established plantations are comparatively limited and largely arise from agricultural inputs, processing activities, and energy consumption.

Policy drivers: the B50 initiative

Indonesia has also accelerated the implementation of the B50 biodiesel mandate to strengthen domestic demand for palm oil while supporting energy security and reducing reliance on imported fossil fuels. The policy was initially advanced in response to weakening global biodiesel demand, requiring Indonesia to absorb a larger share of palm oil-based biodiesel that had **previously been intended for export markets.**

Its implementation has been gradual, from B5 to B40, as higher blending mandates required parallel investments in refining capacity, fuel distribution infrastructure, engine compatibility, and quality assurance systems before nationwide adoption became feasible.

The long-term sustainability potential of palm oil production

Moreover, oil palm is a perennial crop with a productive lifespan of approximately 25 years and possesses significant carbon sequestration capacity throughout its growth cycle. Although this sequestration does not offset emissions from unsustainable land conversion, it highlights an important distinction: **the principal sustainability challenge facing Indonesia's palm oil industry is not the continued operation of existing plantations, but how future production growth is achieved.**

This distinction has profound implications for the industry's future development. If deforestation and peatland conversion constitute the primary sources of environmental risk, then future growth can no longer rely on extensification strategies based on opening new land. Instead, Indonesia's palm oil industry must increasingly shift toward intensification strategies that maximize productivity within existing plantation areas. Long-term sustainability will depend less on how much additional land can be cultivated and more on how efficiently existing land can be utilized.

In practice, much of Indonesia's private palm oil industry has already embraced this transition.

Major producers have largely ceased large-scale plantation expansion and increasingly focus on improving yields and productivity within existing estates to satisfy both international market requirements such as the EUDR and domestic sustainability expectations. By contrast, concerns over continued land conversion have become increasingly associated with state-led initiatives, particularly food estate projects that primarily target domestic markets and operate under central government mandates.

The Sustainability Shift

Indonesia's Industry Landscape in Five Key Sectors
Opportunities and Risks



Navigating Sustainability Regulations in the Palm Oil Industry



EUDR compliance requires segregated supply chains, whereby palm oil destined for European markets must remain physically and administratively separated from non-compliant products.

This requires robust traceability systems capable of identifying the origin of fresh fruit bunches and maintaining chain-of-custody records throughout the production and export process. For Indonesia's fragmented industry structure, which includes large plantation companies, traders, processors, and independent smallholders, maintaining segregation presents a significant logistical challenge and will require substantial investment in traceability systems.



Compliance requires detailed geolocation data and supporting documentation demonstrating that commodities are not associated with post-cutoff deforestation.

These requirements have generated tensions with Indonesia's emphasis on data sovereignty and have created practical challenges for independent smallholders, many of whom remain reluctant or unable to provide geolocation and ownership information due to privacy concerns, land tenure uncertainty, and commercial considerations.



The ISPO standard has been already in place, but it is not broadly recognized internationally.

Despite having its own sustainability certification mechanism, ISPO is only recognized as domestic certification framework and inequivalent mechanism for meeting EU DR requirements. As a result, exporters targeting premium international markets continue to rely primarily on internationally recognized sustainability certifications, while ISPO remains more relevant for domestic market applications.

Despite these challenges, preparedness varies considerably across industry participants. Most major Indonesian producers have already adopted NDPE commitments and participate in the Roundtable on Sustainable Palm Oil (RSPO). Although RSPO is a voluntary certification scheme, its standards substantially overlap with EUDR requirements concerning deforestation, traceability, and responsible sourcing. Consequently, many RSPO-certified producers have been relatively well positioned to comply with EUDR requirements, with the primary adjustments relating to enhanced due diligence and documentation rather than fundamental changes in plantation practices.



Poultry as a Pillar of Indonesia's Food Economy

Indonesia's poultry industry occupies a uniquely strategic position within the national economy due to its dual role as both a critical food security sector and a major source of economic activity.

In 2024, the industry generated production valued at approximately IDR 36.8 trillion, equivalent to 1.32% of Indonesia's GDP.¹⁰⁴

Poultry products remain among the most affordable and accessible sources of animal protein for Indonesian households, making the sector highly consequential for nutritional outcomes, food security, and social welfare. At the same time, the industry's extensive value chain supports millions of livelihoods across breeding, feed production, farming, processing, and distribution activities.



The strategic importance of the poultry sector has become even more pronounced under President Prabowo Subianto’s administration, whose policy agenda emphasizes food security and the implementation of MBG program. These initiatives are expected to substantially increase demand for poultry products, particularly chicken meat and eggs, both of which represent cost-effective and scalable sources of animal protein. Consequently, the poultry industry has emerged as a key beneficiary of broader government efforts to strengthen national food security and improve nutritional outcomes.



Policy-Driven Expansion of Poultry Supply

One indication of this policy direction is the government’s decision to increase import quotas for Grand Grand Parent (GGP) breeding stock, which represents the highest level of the poultry breeding pyramid. GGP chickens produce Grand Parent Stock (GPS), which subsequently produce Parent Stock (PS) before ultimately supplying broiler and layer chickens for commercial production. As a result, adjustments to GGP quotas constitute long-term signals regarding future poultry demand rather than short-term interventions to increase supply.

The expansion of GGP quotas reflects the government’s expectation that national demand for poultry products will increase significantly as food security initiatives and the MBG program continue to expand. Because each additional unit of GGP stock ultimately generates multiple generations of commercial poultry, relatively small adjustments at the top of the breeding pyramid can translate into substantial increases in future production capacity. Consequently, Indonesia’s poultry industry is entering a new investment cycle supported by strong policy commitments and relatively predictable long-term demand growth.

This development creates opportunities throughout the poultry value chain. Unlike previous growth cycles driven primarily by population growth and rising incomes, current demand projections are increasingly reinforced by government programs, providing investors with a relatively high degree of demand visibility.

Poultry value chain



Breeding operation



Feed production



Farm infrastructure



Processing facilities



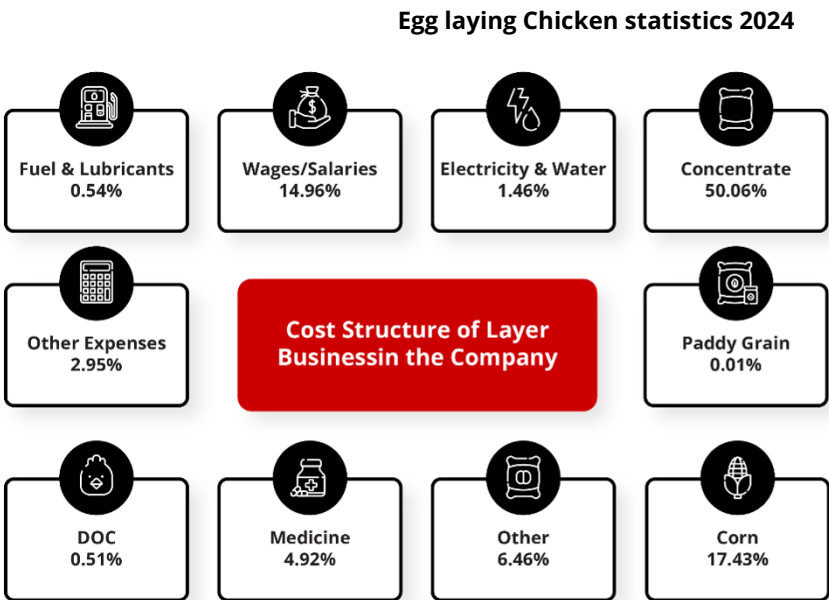
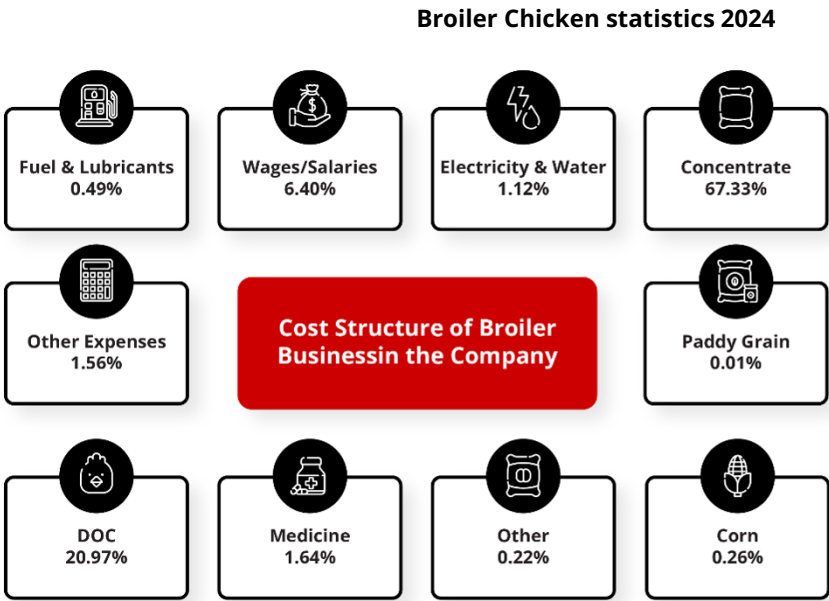
Cold chain logistics



Animal health service



Agricultural technologies



Source: Statistics Indonesia (2025)

The complexity of building long-term competitiveness in the Poultry Industry

Indonesia's poultry industry remains predominantly oriented toward the domestic market, creating a business environment in which competitiveness is driven primarily by production costs, operational efficiency, and regulatory compliance. Unlike export-oriented sectors that must satisfy increasingly stringent international sustainability and traceability requirements, Indonesian poultry producers face relatively limited commercial incentives to adopt sustainability practices beyond those that generate direct operational or financial benefits.



Indonesia's poultry industry faces a structural competitiveness challenge despite being one of the world's largest poultry producers



Indonesian poultry products have limited presence in international markets because production costs remain relatively higher compared with major exporters such as Brazil, the United States, and Thailand. Feed accounts for the majority of production expenses, while dependence on imported feed ingredients, particularly soybean meal, together with animal health inputs, reduces international competitiveness.



Waste management remains one of the most important barriers to wider ESG implementation. Industry interviews suggest that poultry waste management practices vary considerably among producers. Rather than adopting systematic approaches emphasizing traceability, environmental safeguards, and circular economy principles, many operators continue to rely on pragmatic approaches aimed primarily at minimizing immediate operational disturbances, including odor control and the informal sale of poultry waste as compost material.



For many producers, sustainability-related investments are still limited. Investments are prioritized toward initiatives that reduce costs, improve productivity, or strengthen supply reliability. While sustainability-related investment generally pursued only when they provide clear operational or commercial returns or are required by customers, investors, or corporate policies. International sustainability and traceability requirements exert comparatively limited influence because the industry remains largely insulated from export market pressures.

Consequently, the industry has historically relied on domestic demand rather than export markets for growth. This orientation has been reinforced by Indonesia's relatively protective trade policies. The most notable example was Indonesia's dispute with Brazil at the World Trade Organization (WTO), where Brazil successfully challenged Indonesia's restrictions on poultry imports. Although Indonesia subsequently modified aspects of its import regime, the domestic poultry market has remained largely insulated from international competition.

Much of the existing ESG momentum within Indonesia's poultry industry has originated from foreign-owned or foreign-affiliated companies that have transferred sustainability practices from their overseas operations. These firms often implement global sustainability frameworks, traceability systems, and operational standards in their Indonesian facilities. However, this process of knowledge transfer remains limited and has not yet resulted in broad industry-wide adoption.

The Potential of Premium Poultry Products

Historically, premium and sustainability-oriented products in Indonesia have been introduced primarily by foreign companies transferring established practices from overseas markets. However, recent developments in Indonesia's poultry industry suggest that domestic demand for premium products may be beginning to emerge organically.

This emerging demand underscores a broader principle: the long-term development of sustainability practices ultimately depends on the existence of market demand, including changing consumer preferences, purchasing behavior, and broader societal expectations.

One example is the premium egg producer International Standard of Excellence (ISE) Foods, which has gradually transformed its business model from one focused primarily on procurement to a more vertically integrated operation. By increasing control over production processes, quality standards, and supply chain management, the company has established a stronger foundation for premiumization, traceability, and sustainability strategies.



ISE has experienced steady growth in sales, suggesting that demand for premium and sustainably produced products is gradually emerging within the Indonesian market. Although this market segment remains relatively small, its growth may signal an important shift in consumer preferences. Rather than sustainability remaining solely an externally imposed requirement, domestic consumers may increasingly become active participants in driving higher production standards.

If consumer preferences continue to evolve beyond price considerations toward quality, traceability, animal welfare, and production standards, sustainability principles may gradually become commercially viable within Indonesia's domestic poultry market. Such developments could create a self-reinforcing cycle in which consumer demand, private sector innovation, and public policy mutually reinforce the adoption of sustainability practices.

Strengthening Food Security Through Fertilizer

Fertilizer occupies a uniquely strategic position within Indonesia's agricultural sector as a critical input for crop productivity and national food security. The government has long recognized this importance through the implementation of fertilizer subsidy programs designed to maintain affordability for farmers and support agricultural production.

Two government policies are particularly important in shaping Indonesia's fertilizer industry.



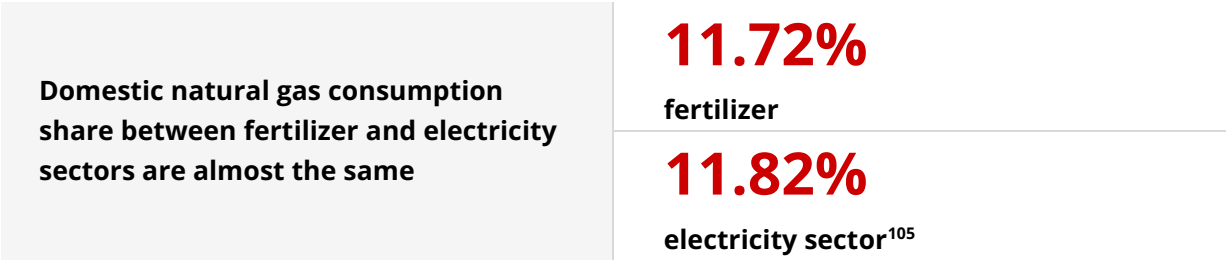
Subsidized fertilizer program

The total fertilizer subsidy allocation reached 9.55 million tons in 2025.



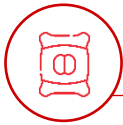
Specified Natural Gas Price (HGBT) policy

The HGBT policy provides regulated natural gas prices to selected industries, including fertilizer producers. This policy is especially important because natural gas serves as the principal feedstock for nitrogen-based fertilizers such as urea.



The HGBT policy applies broadly to domestic fertilizer manufacturers rather than exclusively to subsidized fertilizer production. This cost advantage has enabled Indonesian fertilizer producers to remain internationally competitive and maintain export markets. Nevertheless, exports remain secondary to domestic food security objectives, with the government generally limiting fertilizer exports to less than 15% of total production, although specific quotas vary according to domestic supply conditions and agricultural policy priorities.

This export exposure creates an important channel through which ESG principles can diffuse into Indonesia's fertilizer industry. While domestic demand remains the sector's primary focus, maintaining access to international markets increasingly requires compliance with evolving sustainability standards and environmental performance expectations.



Organic Fertilizer as an Emerging Alternative

Indonesia's fertilizer industry is also experiencing structural changes that create new opportunities for sustainability-oriented products. In recent years, the production costs of conventional fertilizers, particularly NPK fertilizers, have increased due to rising prices of key inputs. Nitrogen fertilizers remain highly dependent on natural gas, while phosphate fertilizers rely heavily on imported raw materials that have experienced substantial price volatility due to geopolitical tensions, supply constraints, and growing global demand.

The World Bank fertilizer price index increased by 15% during the first half of 2025, while phosphate fertilizers recorded some of the largest increases, including a 43% increase in triple superphosphate (TSP) prices.¹⁰⁶

Against this backdrop, organic fertilizers have increasingly emerged as commercially viable alternatives rather than merely environmentally preferable products. Improvements in production efficiency, increased availability of agricultural biomass and organic waste, and growing economies of scale have reduced the cost of commercially produced organic fertilizers, while conventional fertilizer prices have continued to rise.

As a result, the historical price gap between organic and conventional fertilizers has narrowed considerably. For example, Petroganik 15% C-Organik and Phonska Plus 15-15-15 are currently sold at approximately IDR 20,000 per kilogram in retail packaging, demonstrating that commercially produced organic fertilizers have begun approaching price parity with non-subsidized NPK fertilizers.

This convergence creates an important opportunity for ESG adoption within Indonesia's fertilizer industry. As conventional fertilizer prices continue to increase while organic fertilizer production becomes more cost-competitive, sustainability and commercial competitiveness are becoming increasingly aligned. Consequently, the transition toward organic and bio-based fertilizers is being driven not only by environmental considerations but also by changing market fundamentals.

Strategic Priorities and Opportunities

Indonesia's food, agribusiness, and animal husbandry sectors are entering a period of structural transformation that presents significant opportunities for investors and industry participants. As climate change intensifies, physical risks are becoming increasingly material to agricultural productivity, livestock performance, and supply chain stability. Across all three sectors, several strategic priorities emerge. **First**, businesses should prioritize productivity improvements rather than relying on production expansion alone. **Second**, investments in traceability, operational transparency, and supply chain management will become increasingly important for maintaining market access and attracting capital. **Third**, sustainability should be viewed not merely as a compliance requirement but as a strategic instrument for enhancing competitiveness, strengthening climate resilience, and improving long-term profitability.

Strategic Priorities for Palm Oil Companies

The future growth model is shifting from land expansion toward productivity enhancement. With major producers already adopting NDPE commitments and facing increasing regulatory scrutiny, opportunities are emerging in plantation replanting, productivity improvement, digital traceability systems, smallholder integration, and sustainable land management. Companies capable of improving operational efficiency while complying with evolving sustainability standards, such as RSPO, are likely to gain competitive advantages.



Strategic Priorities for Poultry Companies

The government's food security agenda and the expansion of the MBG program are expected to generate sustained long-term demand growth. The expansion of GGP that Indonesia is entering a new investment cycle in poultry production. Opportunities exist throughout the value chain, including breeding operations, feed manufacturing, farm infrastructure, processing facilities, cold chain logistics, animal health services, and agricultural technologies. At the same time, the rising demand of premium products suggests that demand for quality, traceability, and sustainability may gradually strengthen.

Strategic Priorities for Fertilizer Companies

Despite the dominance of subsidized fertilizers, the organic fertilizer poses opportunities since the raw material of inorganic fertilizer is volatile. Companies are investing in innovative production technologies, agricultural waste utilization, and circular economy solutions may benefit from both stable cost and sustainability-related advantages.

Ultimately, Indonesia's food security agenda, combined with evolving sustainability expectations, is creating a new agribusiness growth model centered on productivity, resilience, and value creation. Companies capable of aligning these objectives successfully are likely to emerge as the principal beneficiaries of Indonesia's next phase of agribusiness development.

"The future winners in agribusiness may not necessarily be the largest producers, but those capable of delivering productivity, traceability, and resilience at the same time. Increasingly, market access and competitiveness will depend on all three."

Ello Hanson

Executive Director Institutional Banking Group Bank DBS Indonesia

As food security becomes a strategic priority and sustainability expectations continue to evolve, agribusinesses may need to balance production growth with supply-chain resilience and operational transparency. Companies that strengthen productivity while investing in traceability, ecosystem partnerships, and long-term competitiveness are likely to be better positioned to capture future market opportunities both domestically and internationally.

From Production Leader to Sustainability: The Next Chapter in Indonesia's Metals and Mining Industry

The metals and mining industry lie at the center of the global energy transition. As countries accelerate investment in renewable energy, EV, electricity networks, and energy storage, demand for steel, nickel, copper, aluminum, and other critical minerals continue to grow. Steel remains indispensable for wind turbines, transmission towers, and transport infrastructure, while nickel has become a strategic input for batteries supporting electrification and energy storage. As a result, the energy transition is expected to increase global demand for metals over the coming decades.

Paradoxically, the industry enabling decarbonization is also one of the world's largest sources of greenhouse gas (GHG) emissions.

11%

~ 5.9 GtCO₂e

GHG emission from the metals and mining sector¹⁰⁷

55%

of metal and mining production comes from the steel production

80%

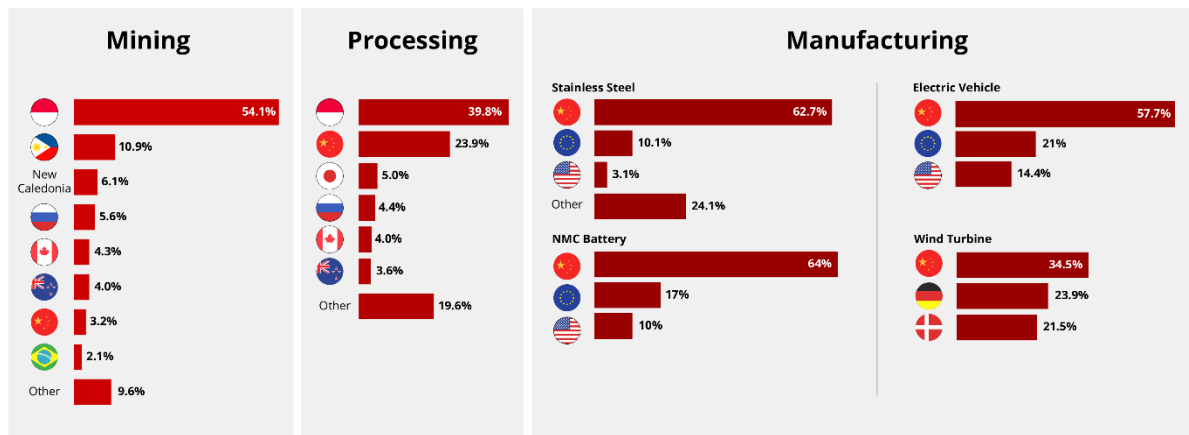
of global mining and metal GHG emissions originate in Asia,¹⁰⁸

Alongside steel industry that becomes the highest emission contributor in metal and mining industry, nickel has emerged as one of the fastest-growing sources of metal and mining emissions. In the meantime, Indonesia has emerged as one of the world's most important suppliers of critical minerals. Since the implementation of the nickel ore export ban in 2020, the country has transformed itself into the world's largest nickel refining hub, accounting for more than half of global refined nickel production and attracting billions of dollars in downstream investment, predominantly from Chinese companies.¹⁰⁹

Yet Indonesia's downstream strategy has so far been driven primarily by stainless steel production, which still accounts for approximately 84% of global nickel demand, while batteries represent only around 16%.¹¹⁰ Although Indonesia has successfully established itself as a global processing center, much of its downstream industry remains integrated into China's industrial supply chains, while higher value-added manufacturing activities continue to develop gradually.



Global distribution of nickel production capacity across supply chains



Source: Bappenas (2025)

The next challenge is no longer expanding production capacity but strengthening sustainable competitiveness. These challenges demonstrate that competitiveness today extends beyond production scale to encompass broader ESG performance.



Indonesia's nickel ores require significantly more energy-intensive processing than sulfide ores mined elsewhere



Many processing facilities continue to rely on captive coal-fired power plants because renewable energy remains difficult to access in major industrial clusters, especially in Eastern part of Indonesia because of inadequate transmission infrastructure.



Environmental protection, occupational safety, community engagement, and supply chain transparency are becoming increasingly important considerations for investors and downstream manufacturers.

This transition is being reinforced by changing market requirements. The EU has introduced a series of regulations—including the Carbon Border Adjustment Mechanism (CBAM), the Battery Regulation and Battery Passport, and the Construction Products Regulation—that increasingly require producers to demonstrate lower-carbon production, responsible sourcing, and supply chain traceability.¹¹¹ The expected implementation of the EU–Indonesia Comprehensive Economic Partnership Agreement (CEPA) from 2027 also presents opportunities to expand exports of Indonesian metal and mining products.

However, capturing these opportunities will depend not only on Indonesia's mineral resources, but also on producers' ability to meet increasingly stringent sustainability standards while strengthening operational resilience to growing physical climate risks. Rising temperatures, extreme rainfall, floods, water scarcity, and disruptions to transport and energy infrastructure are becoming increasingly important considerations for mining operations, processing facilities, and export supply chains, reinforcing the need for climate adaptation alongside decarbonization.

Ultimately, the basis of competition in the global metals and mining industry is shifting. Resource abundance and production scale remain important, but they are no longer sufficient to secure long-term market leadership. Companies that combine efficient production with cleaner energy, responsible mining practices, transparent supply chains, and strong ESG performance will be better positioned to access premium markets, attract international capital, and strengthen long-term competitiveness. As climate risks become more material to industry players, integrating climate adaptation and resilience into business strategy will increasingly become a source of competitive advantage rather than simply a risk management exercise.



Decarbonizing Indonesia's Nickel Industry

Indonesia has emerged as the world's largest nickel producer, transforming itself from a raw material exporter into the center of the global nickel processing industry. Indonesia's strategic importance extends well beyond its resource endowment

55 million tons

nickel reserves ¹¹²

60%

of global production in 2024, equals to 2.18 million metric tons nickel production in 2024 ¹¹³

USD

15.55 billion

Chinese investment on basic metal processing industry (2020-Q2 2025) ¹¹⁴

Nickel is a critical mineral that underpins both traditional and future industries. As countries accelerate electrification and renewable energy deployment, demand for battery minerals is expected to continue rising over the long term, placing Indonesia at the center of future critical mineral supply chains.



Stainless steel



EV batteries



Battery energy storage systems (BESS)

In 2023, global nickel demand for low-carbon technologies reached approximately 477,000 tons. Around 63% came from EV batteries and battery energy storage systems, followed by wind power (9.6%) and other low-carbon power technologies—including nuclear, hydropower, geothermal, and concentrated solar power—which accounted for 24.9%. The nickel demand is expected to increase alongside the continued expansion of clean energy infrastructure.¹¹⁵

Indonesia's production leadership, however, has also created a new challenge

The rapid expansion of nickel processing has significantly increased the industry's environmental footprint.

Nickel production accounted for around 22% of national emissions from Indonesia's energy and industrial sectors in 2023, while mining and refining activities have generated growing environmental and social pressures in major production areas, particularly Central Sulawesi, Southeast Sulawesi, and North Maluku.¹¹⁶ As international buyers place greater emphasis on carbon intensity, responsible sourcing, and ESG performance, production volume alone is no longer sufficient to sustain long-term competitiveness.



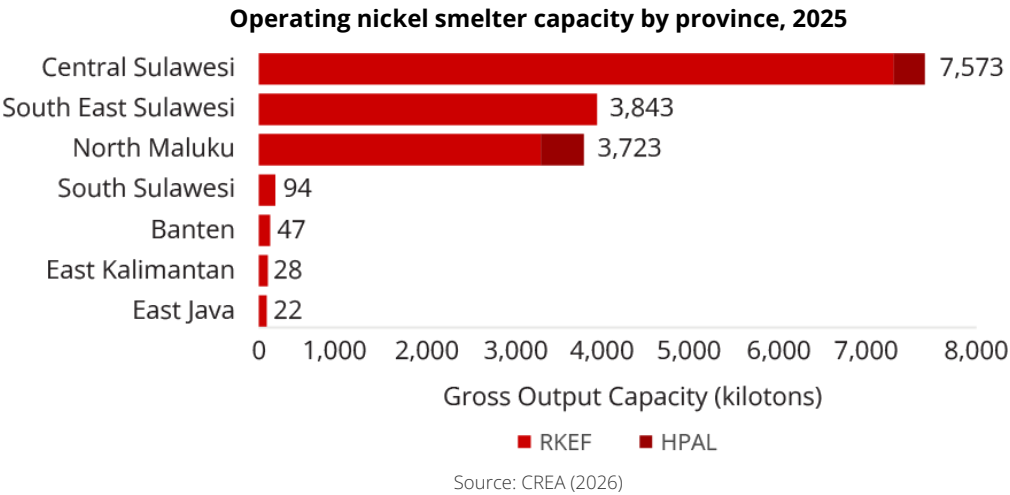
A major source of Indonesia's relatively high emissions lies in the structure of its nickel production process

- 

Indonesia's laterite nickel ores require significantly more energy-intensive processing than the sulfide ores mined in many competing countries. As a result, nickel smelting consumed approximately 100 billion kilowatt-hours of electricity in 2023—equivalent to nearly 80% of Indonesia's total household electricity consumption.
- 

Around 80% of domestic processing capacity relies on the Rotary Kiln Electric Furnace (RKEF) process, or commonly called nickel smelting process, which produces ferronickel and nickel pig iron primarily for stainless steel manufacturing. Although High Pressure Acid Leaching (HPAL) or leaching capacity has expanded to produce battery-grade materials, nickel smelting remains the backbone of Indonesia's downstream industry, meaning stainless steel—not batteries—continues to drive most nickel demand and investment.
- 

More than 60% of this refining capacity is controlled by Chinese investors, compared with only around 13% by Indonesian companies.¹¹⁷



- 

The industry's carbon intensity is further amplified by its dependence on captive coal-fired power plants. Approximately 97% of the electricity consumed by nickel processing facilities is generated from dedicated coal-fired plants, largely because most industrial parks are located in remote areas with limited access to the national grid.¹¹⁸

Consequently, nickel smelting process accounted for almost all emissions (97.9%) generated by nickel sector. Although leaching operations generally consume less energy through waste heat recovery systems, they still represent only a relatively small share of total production.¹¹⁹

Failure to Decarbonize Could Erode Indonesia's Market Access

This carbon-intensive production model is becoming increasingly difficult to sustain. Sustainability is rapidly evolving from a compliance obligation into a source of competitive advantage. International markets are introducing stricter sustainability requirements through mechanisms such as environmental product declarations, digital product passports, and low-carbon procurement policies adopted by the European Union and the United Kingdom.



USD
166 million

(~7.47%) Indonesia's nickel matte export to EU (used for battery material) ¹²⁰

These changes are particularly important for Indonesia because the EU remains an important destination for battery-grade nickel products. Consequently, compliance with emerging sustainability standards increasingly important. At the same time, China is strengthening mandatory environmental disclosure requirements under its 15th Five-Year Plan (2026–2030).¹²¹ Together, these developments indicate that stronger sustainability performance will become increasingly important for maintaining market access across both Western and Asian markets.

The market is also beginning to reward lower-carbon production

The London Metal Exchange (LME) has introduced a dedicated low-carbon metals category, with low-carbon nickel already trading at a premium. As of January 2026, low-carbon nickel was priced at USD 18,800–19,300 per ton, compared with USD 17,900–18,300 per ton for conventionally produced nickel.¹²² These developments suggest that future competitiveness will increasingly depend not only on production scale but also on carbon performance.

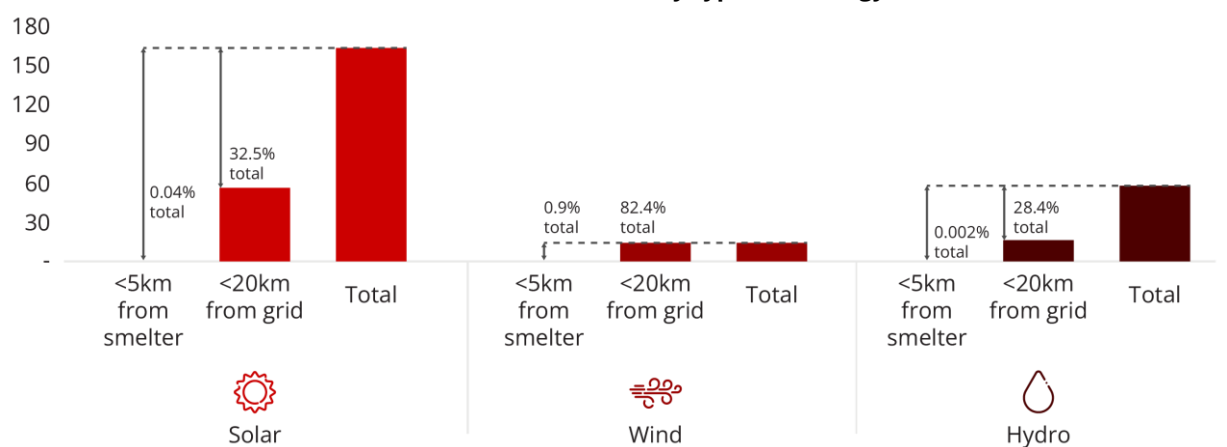


The Renewable Energy Pathway to Competitive Nickel Production

Indonesia possesses significant natural advantages to support this transition. The country's major nickel-producing regions also contain substantial renewable energy resources, particularly hydropower, solar, and wind, estimated at 3,686 GW in total. Government assessments indicate that much of this potential lies close to existing industrial clusters.

Within 20 kilometers of the transmission network in Central Sulawesi, Southeast Sulawesi, and North Maluku, around 34.4% of renewable energy potential is accessible, including 32.5% of solar, 82.4% of wind, and 28.4% of hydropower resources. However, inadequate transmission infrastructure and continued reliance on captive coal-fired generation have slowed renewable energy integration. Without stronger grid connectivity and clearer incentives for industrial low-carbon transformation, many processing facilities risk remaining locked into carbon-intensive production for decades.

Total annual potential of renewable energy in Central Sulawesi, South Sulawesi and North Maluku, by type and energy location



Source: Bappenas (2025)



The transition has already begun through investment in renewable energy by major producers to reduce dependence on captive coal generation and strengthen long-term competitiveness.

Vale Indonesia continues to expand hydropower generation at its Sorowako operations, with total installed capacity reaching 365 MW.¹²³ Harita Group is developing one of Indonesia's largest industrial solar projects on Obi Island, with an initial capacity of 40 MWp. Indonesia Morowali Industrial Park (IMIP) is constructing a 262 MWp solar facility supported by an 80 MWh battery energy storage system, while Indonesia Weda Bay Industrial Park (IWIP) plans to develop 2 GW of solar capacity alongside 500 MW of wind power.¹²⁴ These investments demonstrate that renewable energy is increasingly viewed not merely as an environmental commitment, but as a strategic asset capable of lowering operating costs, improving access to premium export markets, and strengthening resilience against future carbon regulations.

Looking ahead, Indonesia's competitive advantage will no longer be determined solely by the size of its nickel reserves or its processing capacity. As global supply chains become increasingly shaped by carbon intensity, traceability, and responsible sourcing, the next phase of Indonesia's nickel industry will depend on its ability to produce low-carbon, responsibly sourced nickel at scale. Indonesia's downstream strategy has successfully established the country as the world's leading nickel producer. The next challenge is to transform that production leadership into sustainable competitive advantage.

Moving Beyond Nickel: Building the Battery Value Chain

While stainless steel remains the largest source of nickel demand today, batteries represent the industry's most significant long-term growth opportunity. Building on its success in nickel downstream processing, Indonesia has expanded its ambitions beyond mining and refining by developing an integrated battery manufacturing ecosystem.

Despite becoming the world's leading nickel producer, Indonesia has yet to establish itself as a major player in higher value-added downstream manufacturing. Much of its semi-finished nickel output continues to be exported to China, Japan, and Europe for further processing. This presents a significant opportunity to capture greater value through battery materials, battery manufacturing, and other advanced industrial applications.



Indonesia has already made substantial progress. Over the past few years, the country has attracted significant investment across the battery value chain, including precursor and cathode materials, battery cells, battery packs, electric vehicle assembly, and battery recycling. This marks an important shift from exporting intermediate products toward capturing greater value-added manufacturing.



Domestic battery manufacturing capacity is also expanding. PT HLI Green Power—a joint venture between Hyundai Motor Group and LG Energy Solution—operates a 10 GWh battery cell facility in Karawang. Meanwhile, Indonesia Battery Corporation (IBC) and Contemporary Amperex Technology Co. Limited (CATL) are jointly developing a USD 6 billion integrated battery project covering nickel mining, HPAL processing, precursor and cathode production, battery cell manufacturing, and battery recycling.¹²⁵

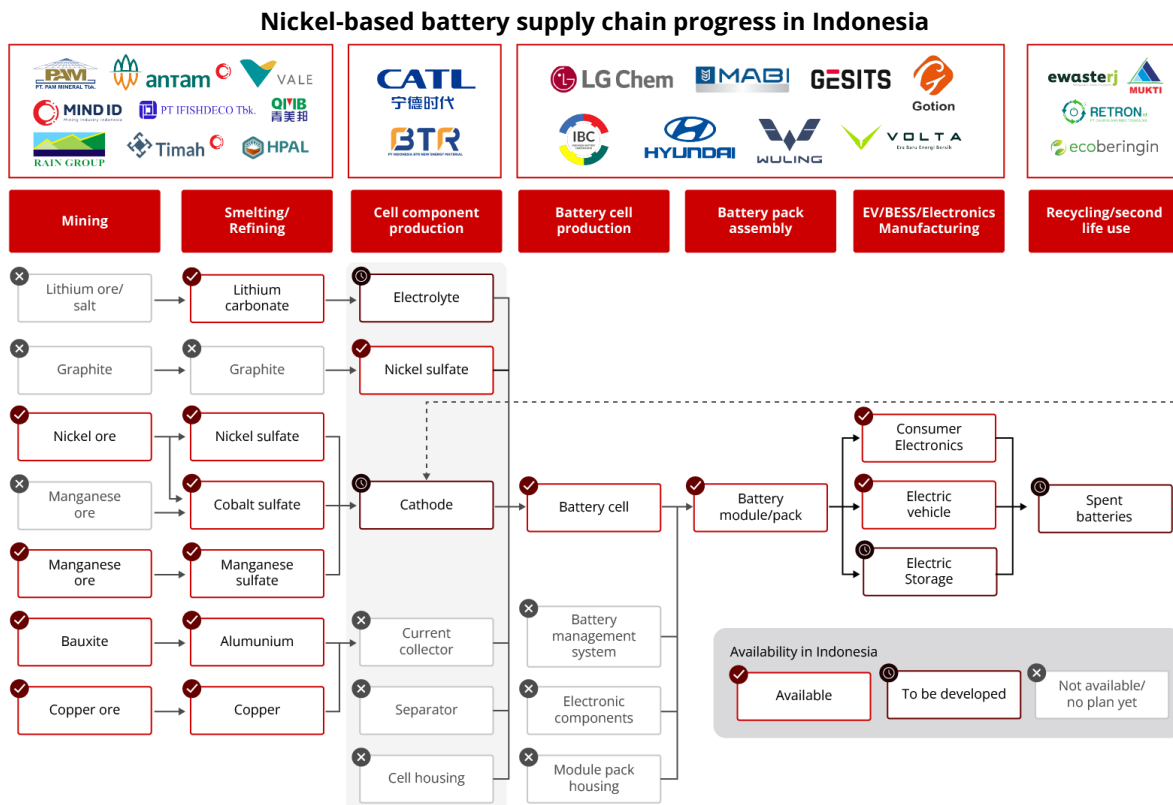


These investments help address critical gaps in Indonesia's battery supply chain, particularly in cathode materials and battery cell production, which generate stronger industrial spillovers than vehicle assembly alone. Unlike EV manufacturing, battery components serve multiple end markets—including EV and BESS—thereby expanding Indonesia's export opportunities as electrification grows rapidly.

The Sustainability Shift

Indonesia's Industry Landscape in Five Key Sectors

Opportunities and Risks



Challenges to Indonesia's Battery Industry Competitiveness

This shift presents both risks and opportunities for Indonesia. The country's downstream strategy was initially built on expectations of rapidly expanding demand for nickel-based batteries. The growing popularity of lithium iron phosphate (LFP) batteries may moderate future nickel demand. At the same time, the geopolitical uncertainty may disrupt the short-term performance. However, the long-term competitiveness will be determined not only by production capacity but also by sustainability

Significant emission generated in the upstream parts

Although EV are widely recognized as a low-carbon transport solution, a significant share of their lifecycle emissions is generated before the vehicle is ever driven. Battery production—particularly the mining, refining, and processing of critical minerals such as nickel, lithium, cobalt, and graphite—is highly energy intensive and accounts for a substantial portion of an EV's embedded carbon footprint. Consequently, the global sustainability agenda is increasingly shifting its focus from vehicle electrification alone to the environmental performance of the entire battery value chain.

In the near term, industry also faces heightened geopolitical uncertainty

The conflict in the Middle East has increased energy prices and disrupted global supply chains for several critical battery inputs. Higher electricity costs directly increase production expenses for energy-intensive processes such as synthetic graphite manufacturing and nickel refining.

More importantly for Indonesia, disruptions in sulphur supply have tightened global availability of sulfuric acid—a critical input for HPAL facilities producing mixed hydroxide precipitate (MHP) and mixed sulphide precipitate (MSP). Because Indonesia remains heavily dependent on sulfuric acid imports from China, tighter export controls and supply disruptions have already forced

The Sustainability Shift

Indonesia's Industry Landscape in Five Key Sectors

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production cuts at several battery-grade nickel facilities, contributing to higher nickel prices and increasing costs throughout the battery value chain.¹²⁶ In addition, disruptions in naphtha and aluminum markets have further increased costs for electrolytes, separators, binders, and battery pack manufacturing.

Technology trends are also reshaping the industry's competitive landscape

Nickel manganese cobalt (NMC) batteries remain the preferred choice for premium EV because of their high energy density. However, LFP batteries have rapidly gained market share due to their lower cost, improving performance, and longer operating life. LFP batteries are approximately 30% cheaper than NMC batteries and have become the dominant battery chemistry in China's mass-market EV segment.¹²⁷ They also account for around 90% of battery energy storage systems worldwide, where affordability and durability are generally more important than energy density.¹²⁸ As a result, future nickel demand from batteries may grow more slowly than previously anticipated, even as overall battery deployment continues to accelerate.

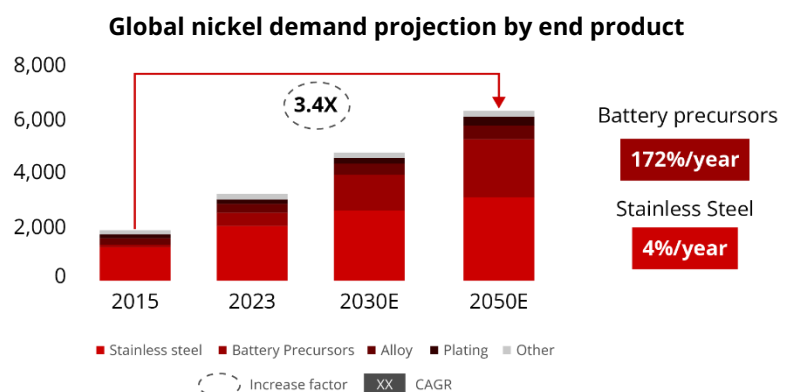
Stringent sustainability requirement

Expected to account for around one-fifth of global EV sales, the EU has complemented its 2035 phase-out of internal combustion engine vehicles with the **EU Battery Regulation (EUBR)**, creating the world's first comprehensive sustainability framework for batteries. Rather than regulating only the final product, the EUBR introduces due diligence requirements covering critical mineral sourcing and processing, mandatory carbon footprint reporting, minimum recycled-content thresholds, and the Battery Passport, which from 2027 will require digital traceability for EV and industrial batteries sold in the European market, representing approximately 21% of global EV sales.¹²⁹ These measures fundamentally reshape industry competition by making carbon intensity, traceability, recycled content, and responsible sourcing as important as cost and product performance.

Capturing Opportunities in the Evolving Battery Market

Rapid growing nickel demand for battery

By 2050, nickel demand for batteries is projected to increase at an average of 172% per year compared to the much lower growth of stainless steel. In particular, nickel demand from batteries is expected to grow rapidly, driven by the global energy transition and policies such as the EU's commitment to phase out new internal combustion engine vehicles by 2035.¹³⁰





Indonesia's investments in cathode materials and battery cell manufacturing.

These investments remain strategically important because these products serve both nickel-based batteries and the rapidly expanding renewable energy technologies. Expanding beyond EV manufacturing therefore provides greater resilience against changes in battery chemistry while enabling Indonesia to capture higher value across multiple battery applications.



Global battery demand is expected to continue expanding alongside the electrification of transport and the rapid deployment of renewable energy.

Battery energy storage systems, in particular, have emerged as one of the fastest-growing segments of the global battery market, creating sustained demand for battery cells regardless of vehicle sales cycles. This reinforces the strategic importance of Indonesia's investments in cathode materials and battery cell production, which can serve both electric mobility and energy storage markets.



Battery recycling represents another promising source of long-term growth.

Through the IBC-CATL partnership, Indonesia is developing its first large-scale battery recycling facility, which is expected to begin commercial operations before the end of the decade. Although the recycling industry remains at an early stage globally, it is expected to become increasingly important as battery volumes expand and circular economy regulations become more stringent.

Nickel-rich NMC batteries offer particularly attractive recycling economics value because they contain higher-value critical minerals. The estimated recovery value ranges from USD 10-28 per kilogram, substantially higher than the USD 1.4-10.4 per kilogram typically recovered from LFP batteries.¹³¹ Recovering nickel, cobalt, and lithium not only improves investment returns but also reduces dependence on primary mining while supporting compliance with emerging recycled-content requirements under regulations such as the EUBR.

Looking ahead, Indonesia's competitive advantage in the battery industry will depend not only on securing critical mineral supplies but also on moving further downstream into high-value manufacturing and circular economy activities.

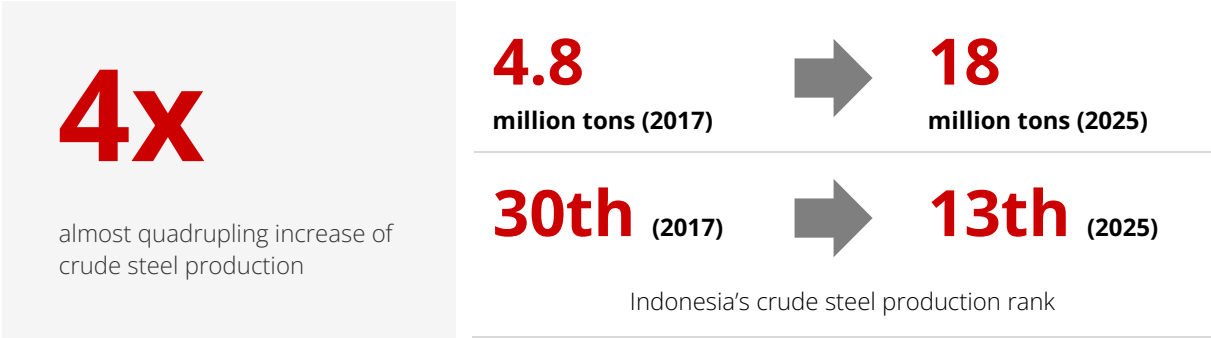
Investments in cathode materials, battery cells, and recycling position Indonesia to serve both the expanding electric vehicle market and the rapidly growing energy storage sector. As sustainability standards, battery technologies, and global supply chains continue to evolve, capturing value across the entire battery life cycle—rather than relying solely on resource extraction—will be essential to strengthening Indonesia's long-term competitiveness.

While nickel and batteries dominate discussions on Indonesia's critical minerals strategy, steel remains the country's largest industrial metal and an equally important pillar of industrial competitiveness. Together, the nickel and steel industries account for the majority of emissions from Indonesia's metals sector, making decarbonization central to maintaining long-term access to international markets. Like nickel, the steel industry is entering a new phase of competition—one in which success will depend not only on production costs but also on carbon intensity, product quality, and sustainable manufacturing practices.



Transforming Indonesia's Steel Industry

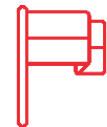
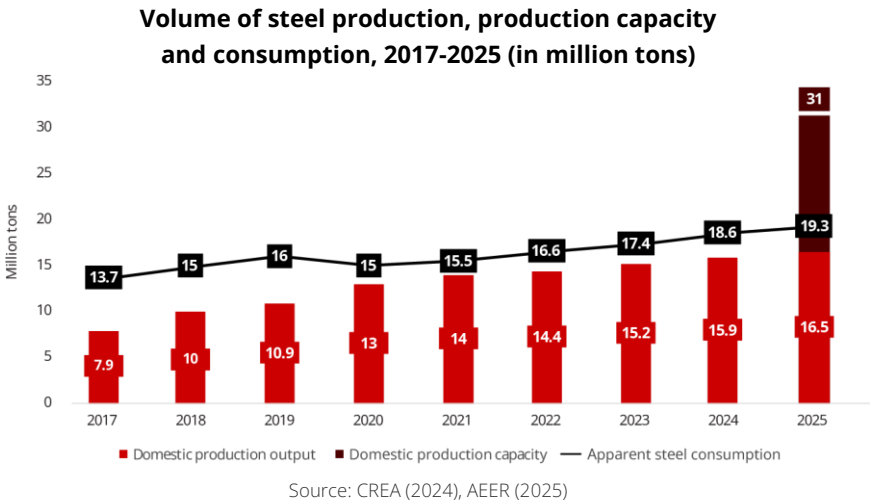
Steel remains the backbone of industrial development, supplying essential inputs for construction, infrastructure, manufacturing, automotive, machinery, and energy. Indonesia's steel industry has expanded rapidly over the past decade. Sustained economic growth of around five percent and large-scale infrastructure development—including roads, reservoirs, industrial estates, and the Nusantara Capital City (IKN)—have been the primary drivers of this expansion.¹³²



Despite this impressive growth, Indonesia's steel industry remains paradox, with the structural constraint



Domestic steel mills operate at only around 52.7%, of installed capacity, well below the industry's optimal utilization rate of approximately 80%.¹³³



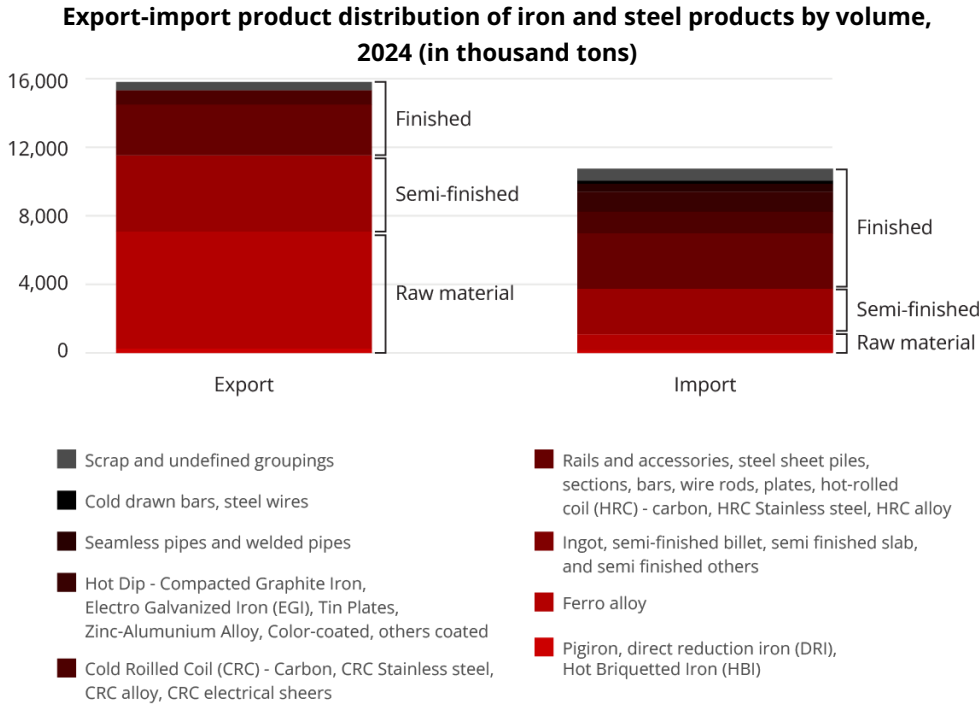
Indonesia records the lowest apparent finished-steel consumption in Southeast Asia, at approximately 60 kilograms per capita, far below Malaysia, Thailand, and Vietnam, where consumption approaches 200 kilograms per capita.¹³⁴

Rather than indicating a saturated market, these figures point to substantial untapped domestic demand as Indonesia continues to industrialize and urbanize. The challenge is not a lack of market opportunities but the industry's limited ability to capture them.



The country remains heavily dependent on imports of higher-value finished products, such as coated steel, seamless and welded pipes, and cold-drawn bars and wires.

At the same time, Indonesia continues to export relatively low-value intermediate products—including ferroalloys, ingots, billets, slabs, hot-rolled coils (HRC), and cold-rolled coils (CRC)—while importing downstream products with greater technological sophistication and higher profit margins. This imbalance limits domestic value creation and reduces the broader industrial multiplier effects expected from downstream manufacturing.



Source: CREA (2024), IISIA (2026)

Indonesia's Steel Market Remains Vulnerable in an Increasingly Policy-Driven Industry

Steel has also become one of the world's most policy-driven industries. Persistent global overcapacity—particularly from China—has shifted competition beyond production efficiency toward trade policy. China continues to export more than 100 million tons of steel annually, putting downward pressure on global prices and intensifying competition across international markets.¹³⁵

Many major steel-producing economies have strengthened trade protection measures



The United States doubled its Section 232 steel tariff from 25% to 50% in 2025 while expanding its coverage to more than 400 HS codes.



The EU has extended safeguard measures, proposed significant reductions in import quotas, and introduced additional tariffs of up to 50% to protect domestic producers.



Similar measures have been adopted across Canada, India, Brazil, Turkiye, Thailand, Malaysia, Vietnam, Japan, and South Korea.¹³⁶



Indonesia remains one of the region's more open steel markets

Although anti-dumping duties, safeguard measures, Indonesian National Standards (SNI), and Domestic Component Level (TKDN) requirements are already in place, enforcement remains inconsistent and regulatory loopholes continue to undermine their effectiveness.



Audit findings by Indonesia's Supreme Audit Agency (BPK) revealed that import approvals were issued without mandatory technical recommendations from the Ministry of Industry, resulting in more than 83 thousand tons of non-compliant steel imports between 2023 and the first half of 2024.¹³⁷



Import circumvention has further weakened existing safeguards. Some carbon steel products have been reclassified as alloy steel through the addition of trace amounts of boron or chromium to avoid higher import duties. In other cases, intermediate steel components have entered Indonesia as prefabricated building units, allowing importers to bypass both higher tariffs and mandatory SNI requirements. These regulatory weaknesses have exposed domestic producers to persistent price competition, particularly from imported Chinese steel.¹³⁸

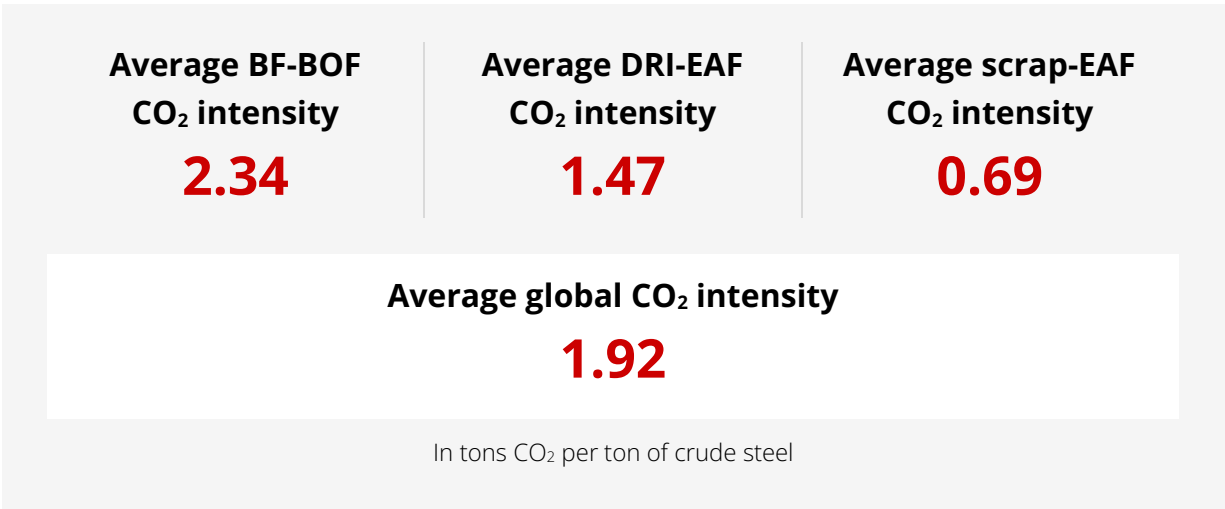
The consequences have become increasingly evident. Several major steel producers—including Krakatau Osaka Steel and Ispat Indo—have ceased operations over the past year, reflecting mounting financial pressure across the industry. Without stronger regulatory enforcement and more effective trade remedies, Indonesia risks further erosion of its domestic industrial base despite continued growth in national steel demand.¹³⁹

The carbon intensive technology still dominates

While Indonesia continues to address these immediate competitiveness challenges, the global steel industry is entering a new phase of competition driven by shifting toward low-carbon technology. Increasingly, steel producers are competing not only on production costs but also on carbon intensity.

80% of Indonesia's steel production use the conventional blast furnace-basic oxygen furnace (BF-BOF).¹⁴⁰

BF-BOF is the most carbon-intensive production process because it relies on coal both as a reducing agent and as the primary source of process heat.¹⁴¹ Electric Arc Furnaces (EAF), which primarily recycle scrap steel, can significantly reduce emissions, particularly when powered by renewable electricity. Direct Reduced Iron-Electric Arc Furnace (DRI-EAF) technology provides an intermediate pathway by replacing coal with natural gas or hydrogen while maintaining high-quality steel production.



Source: World Steel (2026)



Because most domestic steel production still relies on BF-BOF technology, the industry has an estimated emissions intensity of around 1.6 tons of CO₂ per ton of steel, placing Indonesia among the higher-carbon steel producers globally.¹⁴²

Regulatory Pressure Is Redefining Market Access

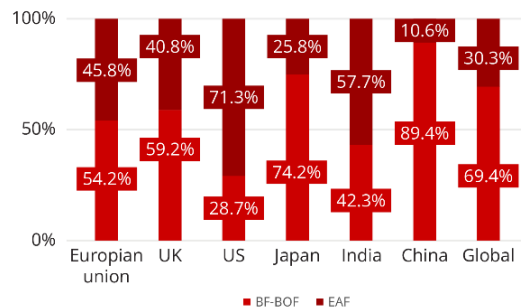
The EU CBAM, EU Construction Products Regulation (EUCPR), Digital Product Passport, and mandatory environmental disclosure requirements are redefining international competitiveness by requiring manufacturers to disclose carbon emissions, energy consumption, and environmental performance throughout the product life cycle. Similar carbon-related trade measures are expected to expand across other major markets over the coming decade.

Globally, steelmakers are gradually shifting toward lower-carbon production technologies

Europe is leading this transition through the widespread replacement of BF-BOF with EAF and DRI-EAF facilities, while the United States already produces roughly three-quarters of its steel using EAF technology.

Meanwhile, the Middle East is positioning itself as a major supplier of Direct Reduced Iron (DRI) and Hot Briquetted Iron (HBI), leveraging abundant and relatively low-cost energy resources.¹⁴³

Share of furnace technology adoption, 2025



Source: World Steel (2026)

The transition toward cleaner steel production also faces significant structural constraints

Indonesia under tight competition with low-cost steel from China

The tightening rivalry drives Indonesia production expansion using conventional BF-BOF capacity to support industrial growth.

Limited Scrap Supply Constrains EAF Adoption

EAF require reliable supply of high-quality scrap steel, yet Indonesia's scrap collection and processing system remains fragmented and labor intensive. Collection still relies heavily on informal waste pickers, junkshops, brokers, and manual sorting, while advanced recycling technologies widely used in developed economies remain limited.¹⁴⁴ Furthermore, Indonesia's electricity system continues to depend heavily on coal-fired power generation, reducing the emissions advantage that EAF technology could otherwise provide.

Consequently, Indonesia is expected to adopt lower-carbon steelmaking technologies more slowly than many competing economies.



Indonesia is expected to add 22.2 mtpa of steelmaking capacity by 2047, but **only 5.4% (1.2 mtpa) is projected to utilize electric arc furnace (EAF) technology.**



This falls well behind India, where **10.7% (40.9 mtpa)** of the planned 382.1 mtpa capacity expansion will be EAF-based.¹⁴⁵



Turning Decarbonization into Competitive Advantage

Although the transition toward green steel requires substantial capital investment, it is increasingly becoming a prerequisite for maintaining market access rather than simply achieving environmental objectives. For Indonesian steel producers, these developments present both challenges and opportunities. Companies that continue relying on carbon-intensive production risk losing competitiveness in premium export markets, while those capable of reducing emissions will be better positioned to benefit from growing demand for certified low-carbon steel. Beyond preserving market access, the business shift may also create new value, as low-carbon steel is estimated to command premiums exceeding **USD 100 per metric ton**, while small volume of green steel plate has reportedly traded at premiums of **USD 300–500 per metric ton**.¹⁴⁶

Indonesia possesses significant long-term advantages to support this transition. With an estimated 3,686 GW of renewable energy potential, the country has considerable opportunities to power industrial operations with renewable electricity, expand battery energy storage systems, develop green hydrogen, and produce lower-carbon steel. Modernizing scrap recycling infrastructure and accelerating renewable energy deployment would further improve both emissions performance and production efficiency.

Looking ahead, demand for low-carbon steel is expected to extend beyond finished steel products. While green premiums today are largely concentrated in finished steel, market participants increasingly expect upstream products—including DRI and pig iron—to enter the low-emission premium market as manufacturers intensify efforts to reduce emissions across the entire steel value chain.¹⁴⁷ For Indonesia, this broadens the commercial opportunity beyond preserving market access, creating new prospects to move further downstream while supplying higher-value, lower-carbon products across multiple stages of production. The industry's long-term competitiveness will depend not only on production volume, but also on its ability to combine cost competitiveness, technological upgrading, and decarbonized production to meet the evolving demands of global steel markets.

Strategic Opportunities and Industry Priorities

Indonesia's metals and mining industries are entering a new phase of development. Over the past decade, the country's competitive advantage has been built primarily on abundant mineral resources, downstream processing policies, and rapid expansion of smelting capacity. Looking ahead, however, production scale alone will no longer be sufficient. Access to premium export markets, international financing, and global manufacturing supply chains will increasingly depend on the industry's ability to reduce carbon emissions, strengthen traceability, improve governance, and demonstrate credible sustainability performance.

At the same time, growing physical climate risks—including extreme rainfall, flooding, rising temperatures, water scarcity to power hydropower plant, and disruptions to energy and transport infrastructure—are becoming increasingly material to mining operations and processing facilities, reinforcing the need for more resilient assets and supply chains. Sustainability is therefore evolving from a compliance requirement into a broader strategy for enhancing operational resilience, managing climate risks, and strengthening long-term competitiveness.

Strategic Priorities for Nickel Upstream Players

For mining companies and smelter operators, low-carbon technology investment should be viewed as a commercial investment rather than solely an environmental obligation. As regulations such as the EU CBAM and Battery Passport become more widely implemented, sustainability performance will become an important source of competitive differentiation.



Improvement in traceability will become a key aspect to secure the future market.

In the meantime, the voluntary environmental performance audit for mining site conducted by third party bodies such as International Council on Mining and Metals (ICMM), Initiative for Responsible Mining Assurance (IRMA), Global Industry Standard on Tailings Management Audit (GISTM), to ensure the socio-environmental and governance negative impact can be avoided. This integration of the environmental standard can improve the market access as the major players in the downstream industry, such as Mercedes-Benz, Tesla, BMW, Ford.

The renewable energy utilization should be priority for the upstream players.

The recent geopolitical tension and policy uncertainty limits the supply of coal. This condition can induce operational risk for the nickel smelter. Meanwhile, the renewable energy potential such as solar and wind does not take long time to be established. Hydropower also can provide the baseload electricity for the operation. Consequently, renewable energy deployment should be accelerated to mitigate the uncertainty with the fossil-fuel supply and significantly reduce the environmental impact.

**Strategic
Priorities for
Battery
manufacturer**

The most immediate opportunity lies in accelerating the transition from resource extraction to higher-value downstream industries. While Indonesia has successfully expanded nickel processing capacity, greater value creation will increasingly come from battery component, battery cell and battery pack, recycling, specialty metals, and other advanced industrial applications.

Among those products, battery component production has wider potential.

The battery component production can be used other than EV, such as BESS, household electronics, e-scooter. Expanding component manufacturing therefore creates broader export opportunities and reduces dependence on EV demand amid the slowing down EV demand.

While mature markets in Europe, China, Japan, and South Korea are already investing heavily in recycling capacity, Indonesia's industry remains at an early stage. Developing domestic recycling capabilities would enable Indonesia to recover valuable critical minerals, reduce dependence on primary mining, comply with emerging circular economy regulations, and strengthen its position in the global battery supply chain.

Consequently, companies that move beyond commodity production toward integrated manufacturing ecosystems will be better positioned to capture higher margins while reducing their exposure to commodity price cycles.

**Strategic
Priorities for
Steel Producer**

Amid intense competition from low-cost imported steel, Indonesia's steel industry faces growing pressure to improve both cost competitiveness and product quality. At the same time, the global steel market is entering a new phase in which competitiveness is increasingly determined by carbon intensity. Steelmakers across Europe, North America, and the Middle East are accelerating the transition from conventional BF-BOF production to lower-carbon technologies such as EAF and DRI-EAF. Some pioneering producers are already replacing natural gas with green hydrogen in DRI processes and powering EAF facilities with renewable electricity to produce near-zero-emission steel.



Beyond investing in cleaner production technologies, steel manufacturers must also strengthen environmental compliance and product transparency.

Environmental Product Declarations (EPD), which provide standardized and independently verified information on a product's environmental impact throughout its life cycle, are becoming an essential requirement in the construction sector. Governed internationally by ISO 14025 and the EN 15804 standard in Europe, EPD support compliance with emerging regulations such as the EUCPR, and enable manufacturers to demonstrate the environmental performance of their products to buyers, investors, and regulators.

The future competitiveness of Indonesia's steel industry will depend not only on its ability to produce steel efficiently but also on its ability to produce it with sustainable standard. By combining low-carbon production technologies with internationally recognized environmental certifications and transparent product disclosures, Indonesian steel manufacturers can transform regulatory pressure into a source of competitive advantage, securing access to premium markets and strengthening their position in the global green manufacturing ecosystem.

Another strategic priority is strengthening domestic industrial ecosystems rather than developing individual projects in isolation. Indonesia's long-term competitiveness will depend on creating integrated value chains that connect mining, processing, renewable energy, manufacturing, logistics, R&D, and recycling. This ecosystem approach not only increases domestic value addition but also enhances supply-chain resilience and creates opportunities for technology transfer, innovation, and skilled employment.

The next stage of Indonesia's mining and metals transformation will also require a different financing model. Green smelters, renewable energy integration, battery manufacturing, recycling facilities, and low-carbon steel production require substantial long-term capital investment. Sustainability-linked loans, green bonds and export credit facilities are therefore likely to play an increasingly important role in supporting industrial expansion. Companies with credible decarbonization strategies, reliable sustainability reporting, and internationally recognized governance standards are expected to enjoy broader access to global capital and lower financing costs.

"Indonesia has already demonstrated its ability to build scale. The next challenge is creating value. Over the coming years, competitiveness will be determined less by resource ownership and more by a company's ability to participate in higher-value manufacturing ecosystems and meet evolving global requirements."

Kevin Tanuwidjaja

Executive Director Institutional Banking Group Bank DBS Indonesia

As global markets increasingly focus on traceability, carbon intensity, and value-added production, businesses will need to evaluate how they can strengthen their position beyond extraction and processing alone. Companies that invest in downstream integration, industrial upgrading, and ecosystem development are likely to be better positioned to capture long-term growth opportunities while maintaining relevance in increasingly competitive global supply chains.

Capital Meets Climate: Financing Indonesia's Industrial Transitions

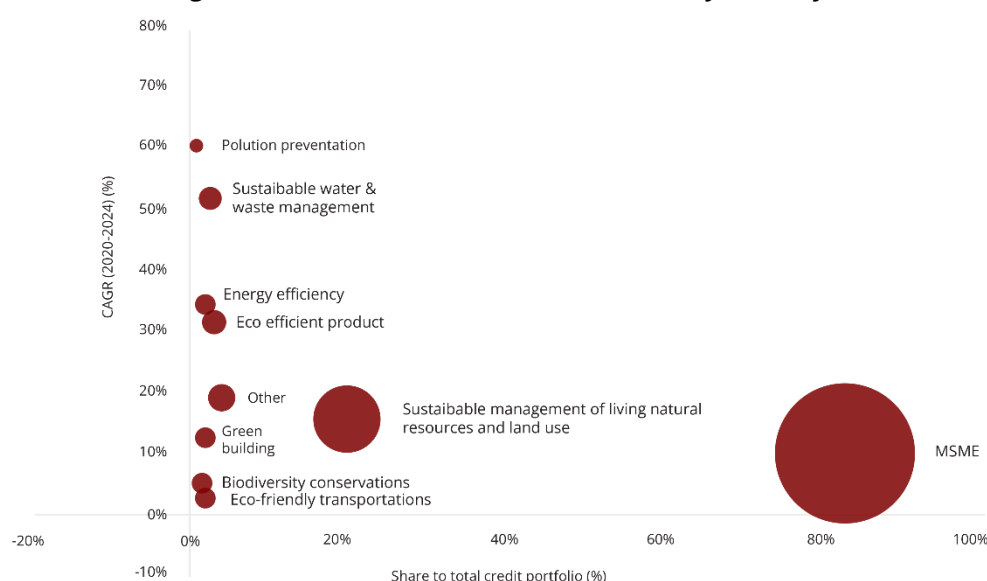
The sustainable financing will be a critical enabler of Indonesia's industrial transition. The opportunities discussed throughout this report — from expanding electricity infrastructure and renewable energy to battery manufacturing, low-carbon metals, green data centers, healthcare modernization, and sustainable agribusiness — will require unprecedented levels of long-term capital. As sustainability becomes increasingly linked to industrial competitiveness and economic resilience, financial institutions are playing a pivotal role in mobilizing capital to support business transformation rather than financing environmental projects alone.

In the meantime, the heightened physical climate risk becomes material financial consequence. Physical climate risks can translate into financial risks through borrower's repayment ability, the value of collateral pledged against loans, and the operational continuity of businesses especially those with dependencies. As a result, the financial regulator, including Bank Indonesia and Financial Service Authority are starting to incorporate the climate risk into their stress-testing framework to assess impact on systemic risk across the banking sector.

Against this backdrop, Indonesia has already established an important foundation for sustainable finance. The introduction of the Indonesia Green Taxonomy (THI) in 2017, followed by its evolution into TKBI, has strengthened the banking sector's ability to classify sustainable economic activities while providing greater regulatory clarity and consistency for implementation. TKBI promotes the standard interoperability by aligning the activity categories according to the ASEAN Taxonomy, to enhance the sustainable financing in Indonesia.¹⁴⁸

As a result, sustainable financing by Indonesia's banking sector grew at a CAGR of 24% between 2019 and 2024, reaching IDR 2,075 trillion (USD 114 billion), equivalent to 26.12% of the banking sector's total credit portfolio. This rapid expansion demonstrates that sustainable finance is becoming an increasingly important component of Indonesia's financial system rather than a niche financing segment.¹⁴⁹

Banking Sustainable Finance Portfolio and CAGR by Industry, 2024



Source: OJK (2025)

The Sustainability Shift

Indonesia's Industry Landscape in Five Key Sectors
Opportunities and Risks



Among the available financing instruments, sustainability-linked loan (SLL) has emerged as an important mechanism for supporting transition finance

Unlike green loans, which require proceeds to be allocated to eligible green projects, SLL link financing terms to borrowers' achievement of predefined sustainability performance targets while allowing proceeds to be used for either specific sustainability projects or general corporate purposes. This flexibility makes SLL particularly well suited to high-emitting sectors such as palm oil, cement, steel, mining, chemicals, manufacturing, transportation, and livestock.¹⁵⁰

Borrowers that achieve agreed sustainability performance targets may benefit from lower interest rates or more favorable financing terms, while failure to meet these targets can result in higher borrowing costs. In Indonesia, syndicated SLL facilities have supported companies across a wide range of industries, with sustainability performance indicators tailored to each sector's transition priorities. As corporate sustainability commitments continue to strengthen, demand for SLL is expected to accelerate, with emissions reduction remaining the most common sustainability performance target.

Sustainability-Linked Loans Supporting Indonesia's Industrial Transition Disbursed by DBS Bank

Industry	Key Performance Indicator	SLL Case
 Cement	Reduce Scope 1 CO ₂ emissions	Semen Indonesia Group: IDR 6.89 trillion (USD 367 million)
 Mining	Reduce carbon emission intensity and increase renewable energy use	Vale Indonesia: IDR 13.5 trillion (USD 750 million)
 Livestock	Maintain annual Somatic Cell Count and reduce GHG emissions	CJ Feed Care: IDR 350 billion (USD 22 million)
 Textile	Reducing Scope 1 & Scope 2 GHG emission intensity; reducing energy intensity; improving water use intensity.	Indo-Rama Synthetics: IDR 325 billion (USD 20 million)

Source: Various sources ¹⁵¹

Beyond SLL for large corporations, DBS Indonesia has also expanded sustainable financing solutions to strengthen micro, small, and medium enterprises (MSMEs) across strategic supply chains. One example is the IDR 336 billion (USD 20 million) sustainable pre-shipment facility provided to Sucden Coffee Indonesia, which improves access to working capital during the pre-export stage. The facility helps stabilize the cash flow of smallholder farmers and MSMEs within Sucden's supply chain, enabling them to maintain production, improve market access, and expand sales in both domestic and export markets.

In addition, DBS Indonesia has provided a blended finance facility to Adena Coffee, a social enterprise specializing in sustainable coffee production and management. This financing supports the adoption of sustainable farming practices while demonstrating how innovative financial solutions can strengthen supply chain resilience and promote inclusive, sustainable business growth.¹⁵²

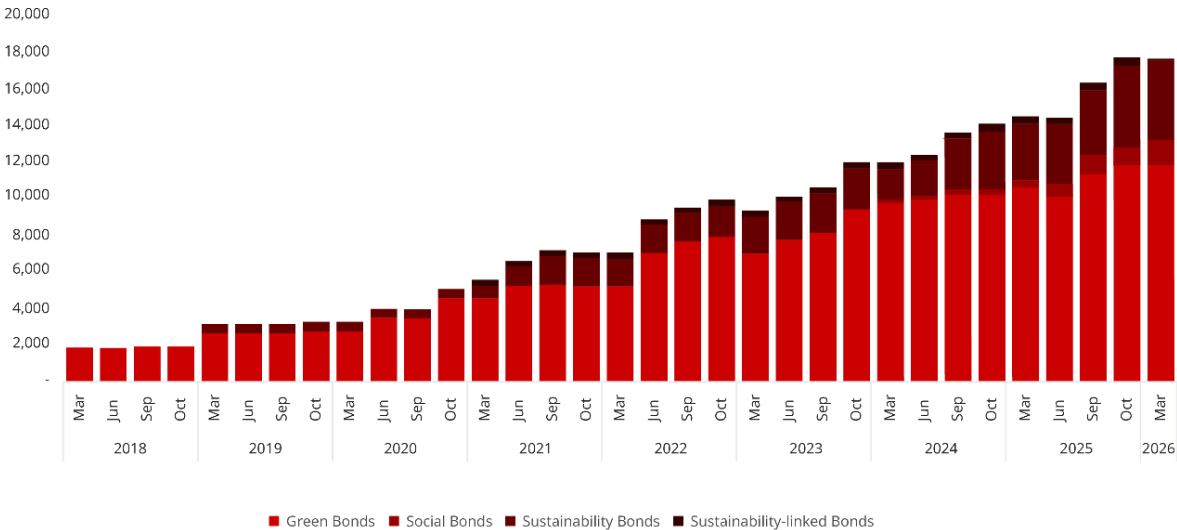
The sustainable bond market has also experienced significant growth

As governments, investors, and businesses increasingly recognize the long-term value of ESG integration, green bonds have become an important financing instrument for supporting low-carbon development. Indonesia now has one of Southeast Asia's largest green bond markets, accounting for nearly one-quarter of the region's outstanding green bond issuance.

The Sustainability Shift



Indonesia's Sustainable Bond Market, 2018–2024 (in million USD)



Source: Asian Bonds Online (2026)

Within the sustainable bond market, **green bonds account for the largest share, representing 67% of total issuance, with the majority issued by the government.** The proceeds are used to finance green projects, including renewable energy infrastructure, green buildings, sustainable infrastructure, and low-carbon transportation. Social bonds account for 25% of total issuance and are primarily used by companies, including banks, to finance or refinance projects that generate positive social outcomes, such as affordable housing, MSME financing, job creation, and basic infrastructure¹⁵³ DBS Indonesia plays a role to promote responsible business practice as the ESG coordinator of the social bonds issuance by Bank Rakyat Indonesia.¹⁵⁴

Carbon market as the alternative financing options for reducing carbon emissions

Market-based mechanisms are expected to play an increasingly important role in accelerating Indonesia's sustainability transition. Among these, the carbon market has emerged as one of the most promising instruments by creating financial incentives for emissions reduction and channeling private capital toward low-carbon investment. As carbon pricing becomes more widely adopted, the carbon market can support corporate decarbonization while improving the commercial viability of renewable energy, nature-based solutions, and other green projects.

Indonesia possesses one of the world's richest biodiversity assets, with nature-based carbon credit potential exceeding 1.5 gigatons of CO₂, representing around 15 percent of global nature-based mitigation potential. To harness this potential, Indonesia launched IDXCarbon in 2023 as a trading platform for both compliance carbon allowances under the cap-and-trade system and voluntary carbon credits.¹⁵⁵ Through the platform, companies can purchase carbon credits to offset emissions and support their commitments to decarbonization.

Although trading activity remains relatively modest, Indonesia's carbon market continues to mature. In June 2026, the government introduced the Carbon Unit Registry System (SRUK) to strengthen market governance by improving transparency, preventing double counting, and enhancing the credibility of carbon transactions. As governance and market confidence improve, the carbon market has the potential to attract greater capital inflows, channel private investment into low-carbon projects and become an increasingly important source of financing for Indonesia's green transition.¹⁵⁶



Beyond providing capital, financial institutions are increasingly becoming strategic partners in Indonesia's sustainability transition

As sustainability and ESG considerations become more deeply embedded in investment decisions and regulatory frameworks, banks are expanding their role beyond traditional lending by supporting clients in developing credible decarbonization roadmaps and transition strategies. Leveraging their extensive networks, financial institutions can also connect businesses with technology providers, industry experts, and strategic partners to accelerate the adoption of low-carbon solutions across value chains.

Looking ahead, the continued growth of sustainable finance will depend not only on the availability of green financial instruments but also on stronger collaboration among government, financial institutions, investors, and the private sector. By combining innovative financing solutions with technical expertise and strategic partnerships, financial institutions can serve as key catalysts in mobilizing private capital, accelerating the transition of hard-to-abate industries, and advancing Indonesia's pathway toward a more competitive, resilient, and low-carbon economy.



Endnote

- ¹ Krisna Gupta, Riandy Laksono, and Rizki N. Siregar, "Prabowonomics: Can Indonesia Really Grow at 8%?", *Bulletin of Indonesian Economic Studies*, Vol. 62, No. 1, 2026
- ² Hendriyo Widi, "Beras Dilanda Kenaikan Harga dan Ancaman Penurunan Produksi," *Kompas*, June 22, 2026, <https://www.kompas.id/artikel/beras-dilanda-kenaikan-harga-dan-ancaman-penurunan-produksi>.
- ³ International Energy Agency (IEA), *Southeast Asia Energy Outlook 2025*, 2025, <https://www.iea.org/reports/oil-2025>
- ⁴ Ministry of Energy and Mineral Resources (ESDM), *Handbook of Energy and Economic Statistics of Indonesia 2024*, 2025, <https://www.esdm.go.id/assets/media/content/content-handbook-of-energy-and-economic-statistics-of-indonesia-2024.pdf>
- ⁵ SKK Migas, *Indonesia Oil and Gas Statistics 2025*, 2025, <https://www.skkmigas.go.id/publication?tab=laporan%20tahunan>
- ⁶ Ministry of Energy and Mineral Resources, *Handbook of Energy and Economic Statistics of Indonesia 2024*, 2025, <https://www.esdm.go.id/assets/media/content/content-handbook-of-energy-and-economic-statistics-of-indonesia-2024.pdf>
- ⁷ International Energy Agency, *Oil Market Report*, 2025
- ⁸ Directorate General of Treasury Ministry of Finance, *Menjaga Denyut Energi Indonesia Melalui RAPBN 2026*, November 15, 2025, <https://djpb.kemenkeu.go.id/portal/id/berita/lainnya/opini/4553-menjaga-denyut-energi-indonesia-melalui-rapbn-2026.html>
- ⁹ Debrinata Rizky, Teuku M.V. Arief, "Belanja Subsidi dan Kompensasi Energi Melonjak 208,2 Persen", *Kompas.com*, June 8, 2026, <https://money.kompas.com/read/2026/06/08/111107126/belanja-subsidi-dan-kompensasi-energi-melonjak-2082-persen>
- ¹⁰ Ministry of Energy and Mineral Resources, "Uji Jalan B50 Sektor Otomotif Tunjukkan Hasil Aman", June 3 2026, <https://ebtke.esdm.go.id/artikel/berita/uji-jalan-b50-sektor-otomotif-tunjukkan-hasil-aman>
- ¹¹ Ministry of Energy and Mineral Resources, "Uji Jalan B50 Sektor Otomotif Tunjukkan Hasil Aman", June 3, 2026, <https://ebtke.esdm.go.id/artikel/berita/uji-jalan-b50-sektor-otomotif-tunjukkan-hasil-aman>
- ¹² Ministry of Energy and Mineral Resources (ESDM), *National Electricity General Plan (RUKN) 2025–2060*, 2025
- ¹³ Ministry of Energy and Mineral Resources (ESDM), *National Electricity General Plan (RUKN) 2025–2060*, 2025
- ¹⁴ Ministry of Industry, *Roadmap for Electric Vehicle Development in Indonesia*, 2025
- ¹⁵ Ministry of Industry, *Development of EV Industry*, 2026
- ¹⁶ Ministry of Transportation, *Electric Vehicle Statistics*, 2025; Ministry of Industry, *Indonesia Battery Ecosystem Development Report*, 2025
- ¹⁷ Centre for Research on Energy and Clean Air (CREA), *Indonesia's Captive Coal Expansion*, 2025; Global Energy Monitor, *Global Coal Plant Tracker*, 2025, <https://globalenergymonitor.org/article/press-releases/31-gw-of-captive-coal-puts-indonesias-economy-emissions-targets-at-high-risk/>
- ¹⁸ Google, Temasek, and Bain & Company, *e-Economy Southeast Asia 2025*, 2025, <https://www.temasek.com.sg/content/dam/temasek-corporate/news-and-views/resources/reports/e-economy-sea-2025-report.pdf>
- ¹⁹ Company publications and investor presentations of Amazon Web Services, Microsoft Azure, and Google Cloud, 2024–2025
- ²⁰ CNN Indonesia, "Bahlil usul Anggaran Kompor Listrik Rp815,5 M pada 2027", June 20, 2026, <https://www.cnnindonesia.com/ekonomi/20260616061332-85-1369577/bahlil-usul-anggaran-kompor-listrik-rp8155-m-pada-2027>.
- ²¹ Ministry of Energy and Mineral Resources (ESDM), *National Electricity General Plan (RUKN) 2025–2060*, 2025
- ²² Ministry of Energy and Mineral Resources, *Handbook of Energy and Economic Statistics of Indonesia 2024*, 2025, <https://www.esdm.go.id/assets/media/content/content-handbook-of-energy-and-economic-statistics-of-indonesia-2024.pdf>
- ²³ Ministry of Energy and Mineral Resources, *Keputusan Menteri Energi Dan Sumber Daya Mineral Republik Indonesia*, 2021, https://jdih.esdm.go.id/dokumen/download?id=Kepmen+ESDM+No.+139.K_HK.02-MEM.B-2021_new.pdf&utm_source=
- ²⁴ Ministry of Energy and Mineral Resources (ESDM), *Handbook of Energy and Economic Statistics of Indonesia 2024*, 2025, <https://www.esdm.go.id/assets/media/content/content-handbook-of-energy-and-economic-statistics-of-indonesia-2024.pdf>



- ²⁵ International Renewable Energy Agency (IRENA), *Renewable Capacity Statistics 2025*, 2025, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2025/Jul/IRENA_DAT_RE_Statistics_2025.pdf
- ²⁶ Ministry of Energy and Mineral Resources, “Capaian Positif Tahun 2025, Negara Hadir Penuhi Kebutuhan Energi Masyarakat”, January 9 2026, <https://www.esdm.go.id/id/media-center/arsip-berita/capaian-positif-tahun-2025-negara-hadir-penuhi-kebutuhan-energi-masyarakat>
- ²⁷ Institute for Essential Services Reform (IESR), *The Solar Archipelago: Indonesia's 100 GW Leap to Energy Sovereignty*, 2025, <https://iesr.or.id/en/pustaka/the-solar-archipelago-indonesias-100-gw-leap-to-energy-sovereignty/>
- ²⁸ Ministry of Energy and Mineral Resources (ESDM), *National Electricity General Plan (RUKN) 2025–2060*, 2025
- ²⁹ PT PLN, *Electricity Supply Business Plan (RUPTL) 2025–2034*, 2025
- ³⁰ Ministry of Energy and Mineral Resources (ESDM), *National Electricity General Plan (RUKN) 2025–2060*, 2025.
- ³¹ Institute for Essential Services Reform (IESR), *The Solar Archipelago: Indonesia's 100 GW Leap to Energy Sovereignty*, 2025, <https://iesr.or.id/en/pustaka/the-solar-archipelago-indonesias-100-gw-leap-to-energy-sovereignty/>
- ³² International Renewable Energy Agency (IRENA), *Renewable Energy Finance Flows*, 2025, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2025/Nov/IRENA_CPI_FIN_Global_landscape_energy_transition_finance_2025.pdf
- ³³ Institute for Essential Services Reform (IESR), *The Solar Archipelago: Indonesia's 100 GW Leap to Energy Sovereignty*, 2025, <https://iesr.or.id/en/pustaka/the-solar-archipelago-indonesias-100-gw-leap-to-energy-sovereignty/>
- ³⁴ PwC Indonesia, *Power in Indonesia: Investment, Taxation and Regulatory Guide*, 2025, <https://www.pwc.com/id/en/pwc-publications/industries-publications/energy-utilities---mining-publications/power-guide-2025.html>
- ³⁵ PT Sarana Multi Infrastruktur (PT SMI), Energy Transition Mechanism (ETM) Country Platform, July 13 2026, <https://ftp.ptsmi.co.id/etm-indonesia>
- ³⁶ Indonesia Central Bureau of Statistics (BPS), Gross Domestic Product by Industry First Quarter 2026
- ³⁷ Ibid.
- ³⁸ McKinsey & Company, *The Critical Bets on the Future of Telco Value Creation*, February 26, 2026, <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-critical-bets-on-the-future-of-telco-value-creation>
- ³⁹ PwC Indonesia, *Indonesia Telecommunications Sector Overview and Market Update*, 2026.
- ⁴⁰ Oliver Wyman, *The Future of B2B Telco*, March 2024, <https://www.oliverwyman.com/our-expertise/insights/2024/mar/future-b2b-telco.html>
- ⁴¹ PwC Indonesia, *Indonesia Telecommunications Sector Overview and Market Update*, 2026.
- ⁴² S&P, “Asia-Pacific telcos consolidate to compete with market leaders”, May.25, 2023, <https://www.spglobal.com/market-intelligence/en/news-insights/research/asia-pacific-telcos-consolidate-to-compete-with-market-leaders>
- ⁴³ Kearney, “Are US consumers ready for fixed-mobile convergence?”, May 1, 2024, <https://www.kearney.com/industry/communications/article/are-us-consumers-ready-for-fixed-mobile-convergence>
- ⁴⁴ Ministry of Communication and Digital Affairs, “Mengenai Layanan Fixed Mobile Convergence FMC”, Feb.28, 2024, <https://djed.komdigi.go.id/news/mengenai-layanan-fixed-mobile-convergence-fmc>
- ⁴⁵ PWC, “Perspectives from the Global Telecom Outlook, 2025–2029”, March 5 2026, <https://www.pwc.com/id/en/pwc-publications/industries-publications/tmt/telecom-outlook-perspectives.html>
- ⁴⁶ PWC, *Indonesia telecommunications sector overview and market update*, 2026,
- ⁴⁷ Livia Kristianti, “Kemkomdigi telah klarifikasi dokumen lelang frekuensi 700MHz & 2.6 GHz”, *Antara*, June 25, 2026, <https://www.antaraneews.com/berita/5622891/kemkomdigi-telah-klarifikasi-dokumen-lelang-frekuensi-700mhz-26-ghz>
- ⁴⁸ McKinsey, “The future of telcos: Mapping the routes to renewed success”, December 18, 2024, <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-future-of-telcos-mapping-the-routes-to-renewed-success#/>
- ⁴⁹ McKinsey, “The future of telcos: Mapping the routes to renewed success”, December 18, 2024, <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-future-of-telcos-mapping-the-routes-to-renewed-success#/>
- ⁵⁰ Bain & Company, Google, and Temasek, *e-Conomy SEA 2025*, 2025.
- ⁵¹ Ibid.
- ⁵² Ibid.
- ⁵³ Deloitte, *2026 Global Telecommunications Industry Outlook*, 2026
- ⁵⁴ International Energy Agency, *Energy and AI*, 2025
- ⁵⁵ Company announcements and annual reports of PT Telkom Indonesia Tbk, PT Indosat Ooredoo Hutchison Tbk, PT XL Smart Telecom Sejahtera Tbk, and Biznet Networks, 2024–2025.
- ⁵⁶ CSIS Indonesia, Tenggara Strategics, Universitas Prasetya Mulya, UMBRA Strategic Legal Solutions, and the Indonesian Solar Energy Association (AESI), *Powering the Future: Advancing Green Data Centers in Indonesia*, 2026.
- ⁵⁷ International Energy Agency (IEA), *Energy and AI*, 2025.
- ⁵⁸ International Energy Agency (IEA), *Energy and AI*, 2025; JLL, *2025 Global Data Center Outlook*, 2025
- ⁵⁹ International Energy Agency, *Energy and AI*, 2025

The Sustainability Shift

Indonesia's Industry Landscape in Five Key Sectors
Opportunities and Risks



- ⁶⁰ DBS and Climate Bonds Initiatives, *Adaptation and Resilience: Exploring Investable Opportunities in APAC*, 2026
- ⁶¹ The Jakarta Post, "Indonesia's data center boom raises alarm over water use". April 7, 2026, <https://www.thejakartapost.com/business/2026/04/07/indonesias-data-center-boom-raises-alarm-over-water-use>
- ⁶² Ministry of Energy and Mineral Resources (ESDM), *Bauran EBT di Sektor Listrik Lampaui Target RUKN*, January 9, 2026, <https://www.esdm.go.id/id/media-center/arsip-berita/bauran-ebt-di-sektor-listrik-lampaui-target-rukun>
- ⁶³ Ministry of Energy and Mineral Resources Regulation No. 11 of 2021, Article 45(1).
- ⁶⁴ CSIS Indonesia, Tenggara Strategics, Universitas Prasetya Mulya, UMBRA Strategic Legal Solutions, and the Indonesian Solar Energy Association (AESI), *Powering the Future: Advancing Green Data Centers in Indonesia*, 2026.
- ⁶⁵ PLN, "PLN Teken Kesepakatan dengan Amazon untuk Proyek Tenaga Surya 210 MW di Indonesia", Nov.15, 2022, <https://web.pln.co.id/media/siaran-pers/2022/11/pln-teken-kesepakatan-dengan-amazon-untuk-proyek-tenaga-surya-210-mw-di-indonesia>; CNN Indonesia, "Microsoft Mau Gandeng PLN Bikin Tenaga Surya 200MW untuk Data Center", Feb.5, 2026, <https://www.cnnindonesia.com/teknologi/20260205145635-206-1324966/microsoft-mau-gandeng-pln-bikin-tenaga-surya-200mw-untuk-data-center>
- ⁶⁶ McKinsey, "Keeping cool in the data age", September 24, 2025, <https://www.mckinsey.com/capabilities/operations/our-insights/operations-blog/keeping-cool-in-the-data-age>
- ⁶⁷ Deloitte, 2026 *Global Telecommunications Industry Outlook*, 2026
- ⁶⁸ Ibid.
- ⁶⁹ World Bank, *Green data centers: towards a sustainable digital transformation, A practitioner's guide*, 2023
- ⁷⁰ World Bank, *Green data centers: towards a sustainable digital transformation, A practitioner's guide*, 2023
- ⁷¹ Digital Edge, "Digital Edge Amankan Pembiayaan Hijau Pusat Data Terbesar di Indonesia Senilai US\$665 Juta untuk Mendukung Pengembangan Kampus CGK 500MW", March 16, 2026, <https://id.digitaledgedc.com/id/berita-id/digital-edge-pembiayaan-hijau-us665-juta-kampus-data-center-cgk>
- ⁷² DBS, "Bank DBS Indonesia and Bank UOB Indonesia arrange IDR1.7T club green loan for Princeton Digital Group's data center campus", March 13, 2025, https://www.dbs.com/newsroom/Bank_DBS_Indonesia_and_Bank_UOB_Indonesia_arrange_IDR17T_club_green_loan_for_Princeton_Digital_Groups_data_center_campus
- ⁷³ Princeton Digital Group (PDG), "PDG Raising ~USD 856 Million Debt for its Hyperscale Data Center Expansion in Indonesia", May 7, 2026, <https://princetonpdg.com/newsroom/pdg-raising-usd-856-million-debt-for-its-hyperscale-data-center-expansion-in-indonesia/>
- ⁷⁴ McKinsey & Company, *The Critical Bets on the Future of Telco Value Creation*, February 26, 2026, <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-critical-bets-on-the-future-of-telco-value-creation> ; Oliver Wyman, *The Future of B2B Telco*, March 2024, <https://www.oliverwyman.com/our-expertise/insights/2024/mar/future-b2b-telco.html>
- ⁷⁵ Oliver Wyman, *The Future of B2B Telco*, March 2024, <https://www.oliverwyman.com/our-expertise/insights/2024/mar/future-b2b-telco.html>.
- ⁷⁶ Bain & Company, Google, and Temasek, *e-Economy SEA 2025*, 2025; International Energy Agency (IEA), *Energy and AI*, 2025.
- ⁷⁷ Equinix, "How Data Centers Can Use Alternative Water Sources", March 20, 2025, <https://blog.equinix.com/blog/2025/03/20/how-data-centers-can-use-alternative-water-sources/>
- ⁷⁸ International Energy Agency (IEA), *Energy and AI*, 2025; CSIS Indonesia, Tenggara Strategics, Universitas Prasetya Mulya, UMBRA Strategic Legal Solutions, and the Indonesian Solar Energy Association (AESI), *Powering the Future: Advancing Green Data Centers in Indonesia*, 2026.
- ⁷⁹ IQVIA Institute for Human Data Science, *The Global Use of Medicines 2025: Outlook to 2029*, August 2025.
- ⁸⁰ World Health Organization, *Noncommunicable Diseases*, <https://www.who.int/health-topics/noncommunicable-diseases>
- ⁸¹ Ministry of Health of Indonesia, *Roadmap Farmasi Indonesia 2020–2024*, 2017. <https://peraturan.bpk.go.id/Details/111983/permenkes-no-17-tahun-2017>.
- ⁸² BPJS Kesehatan. 2026. "Penghargaan Pemerintah Universal Health Coverage Tahun 2026." YouTube video. January 27, 2026. <https://www.youtube.com/watch?v=hZ9kj4yiBE4>.
- ⁸³ Ministry of Health of Indonesia (see n. 71).
- ⁸⁴ Harvard Growth Lab Atlas of Economic Complexity for commodity Antibiotics (HS 2941), Insulin (HS 293791), and Oxygen-function amino-compounds (HS 2922).
- ⁸⁵ BIOSECURE Act, Section 851 of the National Defense Authorization Act for Fiscal Year 2026, Pub. L. No. 119-60, signed December 18, 2025.
- ⁸⁶ European Commission. *Critical Medicines Act*. Proposal COM(2025) 102, March 11, 2025.
- ⁸⁷ Interview with senior management, multinational pharmaceutical subsidiary in Indonesia, June 2026. *Inventory buffer dynamics and sensitivity of procurement costs to sustained supply disruption*.
- ⁸⁸ BPJS Kesehatan (see n. 72).
- ⁸⁹ Interview with senior management (see n. 77). BPJS market share (~60% of the pharmaceutical market), FORNAS coverage gap (~2% of globally available innovative medicines), and KAPJ data-sharing barrier.

The Sustainability Shift



⁹⁰ Ibid.

⁹¹ Interview with a physician-executive at a leading private hospital network in Indonesia, June 2026. INA-CBGs tariff mechanics, case-mix management practices, the 2025 BPJS single-consultation-fee policy change, and hospital financial dynamics.

⁹² Ibid. Hospital responses to INA-CBGs tariff pressure, including admission and referral policies, payer mix, procurement, and specialist recruitment decisions.

⁹³ BPJS market share, FORNAS coverage gap, and KAPJ data-sharing barrier (see n. 79).

⁹⁴ Direktorat Jenderal Sumber Daya Manusia Kesehatan (Dirjen SDM) and Badan Pusat Statistik (BPS). *Peta Rasio Dokter Spesialis terhadap Populasi*. 2026. https://eplanning-ditjennakes.kemkes.go.id/indikator/user/rasio_populasi_sps (accessed June 29, 2026); Badan Pusat Statistik (BPS). *Indonesia Population Projection 2020–2050*. 2023.

⁹⁵ Interview with a physician-executive (see n. 81). Specialist service investment priorities, specialist partnership revenue-sharing models, and patient volume thresholds for service-line viability.

⁹⁶ Ministry of Health of Indonesia (see n. 71)

⁹⁷ Gillian Parker and Fiona A. Miller. “Tackling Pharmaceutical Pollution Along the Product Lifecycle: Roles and Responsibilities for Producers, Regulators and Prescribers,” *Pharmacy* 12, no. 6, (2024), doi: [10.3390/pharmacy12060173](https://doi.org/10.3390/pharmacy12060173)

⁹⁸ EU Corporate Sustainability Reporting Directive. Directive (EU) 2022/2464 of the European Parliament and of the Council, December 14, 2022.

⁹⁹ Otoritas Jasa Keuangan (OJK). POJK No. 51/POJK.03/2017 tentang Penerapan Keuangan Berkelanjutan, 2017; Taksonomi Hijau Indonesia, updated 2022.

¹⁰⁰ Ministry of Administrative and Bureaucratic Reform (KemenPAN-RB), “BMKG: El Nino 2026 Berpotensi Bertahan hingga Awal 2027”, June 10, 2026, <https://menpan.go.id/site/berita-terkini/berita-daerah/bmkg-el-nino-2026-berpotensi-bertahan-hingga-awal-2027>

¹⁰¹ Indonesia Investment, Palm Oil Summary 2025, <https://www.indonesia-investments.com/id/bisnis/komoditas/minyak-sawit/item166>

¹⁰² BPS, *Statistik Tanaman Perkebunan Tahunan Indonesia 2024 (Kelapa Sawit, Kopi, Kakao, Karet, Teh, dan Komoditas Perkebunan Unggulan)*, 2025

¹⁰³ BPS, *Ekspor Minyak Kelapa Sawit Menurut Negara Tujuan Utama, 2012-2024*, 2026

¹⁰⁴ BPS, *Poultry Establishment Statistics 2024*, 2025

¹⁰⁵ ESDM, *Handbook of Energy and Economic Statistics of Indonesia 2023*, 2024

¹⁰⁶ World Bank, “Fertilizer prices gain momentum amid strong demand and geopolitical tensions,” July 9, 2025 <https://blogs.worldbank.org/en/opendata/fertilizer-prices-gain-momentum-amid-strong-demand-and-geopoliti>

¹⁰⁷ ICMM, *Global Mining & Metals Greenhouse Gas Emissions Dataset*, 2026

¹⁰⁸ ICMM, *Global Mining & Metals Greenhouse Gas Emissions Dataset*, 2026

¹⁰⁹ Center for Advanced Defense Studies (C4ADS), *Refining Power*, 2025, <https://c4ads.org/commentary/refining-power/#Ownership>

¹¹⁰ Badan Perencanaan Pembangunan Nasional (Bappenas), *Decarbonization Roadmap of Indonesia's Nickel Industry*, 2025; Centre for Research on Energy and Clean Air (CREA), *Indonesia's nickel: Aimed at EVs, but still parked in stainless steel*, 2026

¹¹¹ Centre for Research on Energy and Clean Air (CREA), *Indonesia's nickel: Aimed at EVs, but still parked in stainless steel*, 2026

¹¹² Badan Perencanaan Pembangunan Nasional (Bappenas), *Decarbonization Roadmap of Indonesia's Nickel Industry*, 2025

¹¹³ S&P, “Indonesia – Mining by the numbers, 2024”, January 6, 2026, <https://www.spglobal.com/market-intelligence/en/news-insights/research/2026/01/indonesia-mining-by-the-numbers-2024>

¹¹⁴ Anastasya L. Yudi, “China's Investment in Indonesia Hits \$35.3 Billion”, *Tempo*, August 28, 2025, <https://en.tempo.co/read/2043827/chinas-investment-in-indonesia-hits-us35-3-billion>

¹¹⁵ Badan Perencanaan Pembangunan Nasional (Bappenas), *Decarbonization Roadmap of Indonesia's Nickel Industry*, 2025

¹¹⁶ World Resource Institute (WRI), “Nickel's Climate Cost and Indonesia's Push for Cleaner Production”, January 6, 2026, <https://www.wri.org/technical-perspectives/nickels-climate-cost-and-indonesias-push-cleaner-production>

¹¹⁷ Centre for Research on Energy and Clean Air (CREA), *Indonesia's nickel: Aimed at EVs, but still parked in stainless steel*, 2026

¹¹⁸ Badan Perencanaan Pembangunan Nasional (Bappenas), *Decarbonization Roadmap of Indonesia's Nickel Industry*, 2025,

¹¹⁹ Badan Perencanaan Pembangunan Nasional (Bappenas), *Decarbonization Roadmap of Indonesia's Nickel Industry*, 2025

¹²⁰ Harvard Growth Lab Atlas of Economic Complexity for commodity Nickel Matte (HS 92)

¹²¹ Centre for Research on Energy and Clean Air (CREA), *Indonesia's nickel: Aimed at EVs, but still parked in stainless steel*, 2026

¹²² Centre for Research on Energy and Clean Air (CREA), *Indonesia's nickel: Aimed at EVs, but still parked in stainless steel*, 2026

¹²³ World Resource Institute (WRI), “Nickel's Climate Cost and Indonesia's Push for Cleaner Production”, January 6, 2026, <https://www.wri.org/technical-perspectives/nickels-climate-cost-and-indonesias-push-cleaner-production>

¹²⁴ Centre for Research on Energy and Clean Air (CREA), *Indonesia's nickel: Aimed at EVs, but still parked in stainless steel*, 2026

¹²⁵ Centre for Research on Energy and Clean Air (CREA), *Indonesia's nickel: Aimed at EVs, but still parked in stainless steel*, 2026

The Sustainability Shift



- ¹²⁶ Fitch, "Sulphur Bottlenecks Tighten Nickel Market; Battery Impact Contained", June 14, 2026, <https://www.fitchratings.com/research/corporate-finance/sulphur-bottlenecks-tighten-nickel-market-battery-impact-contained-14-06-2026>
- ¹²⁷ International Energy Agency (IEA), *Global EV Outlook 2025*, 2025
- ¹²⁸ International Energy Agency (IEA), *Global Energy Review 2026*, 2026
- ¹²⁹ International Energy Agency (IEA), *Global EV Outlook*, 2026
- ¹³⁰ Badan Perencanaan Pembangunan Nasional (Bappenas), *Decarbonization Roadmap of Indonesia's Nickel Industry*, 2025,
- ¹³¹ Huajie Li et.al., "Economic evaluation and prediction on typical lithium-ion battery recycling processes: A multi-objective assessment", *Resources Conservation and Recycling*, Vol.220, 2025
- ¹³² Centre for Research on Energy and Clean Air (CREA), *Indonesia iron and steel's full potential hinges on low-carbon technologies*, 2024,
- ¹³³ Aksi Ekologi dan Emansipasi Rakyat, *Dekarbonisasi Industri Baja: Menghijaukan Industri Baja Indonesia, Membajakan Tekad Hijau Bersama*, 2025; Centre for Research on Energy and Clean Air (CREA), *Indonesia iron and steel's full potential hinges on low-carbon technologies*, 2024; Fery Firmansyah, "Modus-modus Impor Baja", *Tempo*, December 12, 2025 <https://www.tempo.co/ekonomi/modus-modus-impor-baja-2098192>
- ¹³⁴ Agora Industry and Agora Energiewende, *Decarbonising steel in Southeast Asia. Pathways, Opportunities and Enablers*, 2025
- ¹³⁵ Han R. Putra "Bagaimana Industri Baja Kian Lesu Tertekan Impor", *Tempo*, December 12, 2025, <https://www.tempo.co/ekonomi/banjir-impor-industri-baja-2098189>
- ¹³⁶ Aguido Adri, "Baja Nasional Terjepit Banjir Impor dan Lemahnya Proteksi", *Kompas*, November 10, 2025, <https://www.kompas.id/artikel/proteksi-masih-lemah-darurat-industri-baja>; Han R. Putra. "Bagaimana Industri Baja Kian Lesu Tertekan Impor", *Tempo*, December 12, 2025, <https://www.tempo.co/ekonomi/banjir-impor-industri-baja-2098189>
- ¹³⁷ Fery Firmansyah, "Modus-modus Impor Baja", *Tempo*, December 12, 2025 <https://www.tempo.co/ekonomi/modus-modus-impor-baja-2098192>
- ¹³⁸ Afiffah R. Nurdifa, "Terungkap 3 Modus Impor Baja Murah yang Hantam Industri Lokal", *Bisnis Indonesia*, December 17, 2025, <https://ekonomi.bisnis.com/read/20251217/257/1937567/terungkap-3-modus-impor-baja-murah-yang-hantam-industri-lokal>
- ¹³⁹ Afiffah R. Nurdifa, "Bos KRAS Curhat Gempuran Produk China Buat Pabrik Baja di RI Bertumbangan", *Bisnis Indonesia*, February 4, 2026, <https://ekonomi.bisnis.com/read/20260204/257/1950026>
- ¹⁴⁰ Hans N. Jong, "Indonesia's steel expansion risks a surge in greenhouse gas emissions", *Mongabay*, February 11, 2026, <https://news.mongabay.com/2026/02/indonesias-steel-expansion-risks-a-surge-in-greenhouse-gas-emissions/>
- ¹⁴¹ World Steel, *World Steel in Figures 2026*
- ¹⁴² Hans N. Jong, "Indonesia's steel expansion risks a surge in greenhouse gas emissions", *Mongabay*, February 11, 2026, <https://news.mongabay.com/2026/02/indonesias-steel-expansion-risks-a-surge-in-greenhouse-gas-emissions/>
- ¹⁴³ S&P, "Asia-Pacific Steel: Why Capacity Is Still (Somehow) Growing", June 17, 2026 <https://www.spglobal.com/ratings/en/regulatory/article/asia-pacific-steel-why-capacity-is-still-somehow-growing-s101691161>
- ¹⁴⁴ Hans N. Jong, "Indonesia's steel expansion risks a surge in greenhouse gas emissions", *Mongabay*, February 11, 2026, <https://news.mongabay.com/2026/02/indonesias-steel-expansion-risks-a-surge-in-greenhouse-gas-emissions/>; Irine Handika, Stephanie K. Susanto, Amanda M. Soestika, et.al., "Legal pathways for scrap-based green steel: Reforming ferrous metal governance in Indonesia for net-zero industrial policy", *Energy for Sustainable Development* 93, 2026, <https://doi.org/10.1016/j.esd.2026.102040>
- ¹⁴⁵ Grantham Research Institute, "Asia's steel expansion is creating carbon lock-in", June 30, 2026, <https://www.lse.ac.uk/granthaminstitute/news/asias-steel-expansion-is-creating-carbon-lock-in/>
- ¹⁴⁶ S&P, "Prices and policies: Forging the green steel market", January 6, 2025, <https://www.spglobal.com/energy/en/news-research/blog/metals/010625-prices-and-policies-forging-the-green-steel-market>
- ¹⁴⁷ Ibid.
- ¹⁴⁸ IEEFA, "Will the new Indonesian Taxonomy for Sustainable Finance really serve its national interest?", February 27, 2024, <https://ieefa.org/resources/will-new-indonesian-taxonomy-sustainable-finance-really-serve-its-national-interest>
- ¹⁴⁹ Otoritas Jasa Keuangan, *Banking Sustainability Maturity Report 2025*, 2026
- ¹⁵⁰ Climate Policy Initiative, *Climate-Aligned Investments and Policy Nexus in Indonesia Unlocking transition finance for achieving net-zero emissions*, 2025
- ¹⁵¹ Romys Binekasri, "Semen Indonesia Peroleh Pinjaman Hijau Rp 6 T, Buat Apa Nih?", *CNBC Indonesia*, December 21, 2022, <https://www.cnbcindonesia.com/market/20221221135436-17-398866/semn-indonesia-peroleh-pinjaman-hijau-rp-6-t-buat-apa-nih>; Vale, "Strengthening Its Sustainable Finance Strategy, PT Vale Secures US\$750 Million ESG-Linked Syndicated Loan Facility", April 23, 2026, <https://saladeimprensa.vale.com/w/strengthening-its-sustainable-finance-strategy-pt-vale-secures-us-750-million-esg-linked-syndicated-loan-facility>; DBS Bank, "PT CJ Feed Care Indonesia Raih Sustainability Linked Loan Senilai Rp350 Miliar dari Bank DBS Indonesia", October 23, 2024, https://www.dbs.com/newsroom/PT_CJ_Feed_Care_Indonesia_Raih_Sustainability_Linked_Loan_Senilai_Rp350_Miliar_dari_B

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Opportunities and Risks



[ank_DBS_Indonesia](#) ; DBS Bank. “Bank DBS Indonesia introduces first ever Sustainability-Linked Trade Finance Facility for PT. Indo-Rama Synthetics Tbk”, January 14, 2025, https://www.dbs.com/newsroom/Bank_DBS_Indonesia_introduces_first_ever_Sustainability_Linked_Trade_Finance_Facility_for_PT_Indo_Rama_Synthetics_Tbk

¹⁵² DBS Bank, “Bank DBS Indonesia Supports Sucden Coffee Indonesia with USD 20 Million Sustainable Pre-Shipment Facility to Boost Local MSME Coffee Farmers”, January 13, 2026, https://www.dbs.com/newsroom/Bank_DBS_Indonesia_Supports_Sucden_Coffee_Indonesia_with_USD_20_Million_Sustainable_Pre_Shipment_Facility_to_Boost_Local_MSME_Coffee_Farmers

¹⁵³ Asian Development Bank. “ADB Dukung Penerbitan Perdana Obligasi Dan Sukuk Sosial Oleh Indonesia”, January 8, 2024, <https://www.adb.org/id/news/adb-supports-indonesia-first-social-bond-and-sukuk-issuance>; Bloomberg Technoz, “BRI Terbitkan Obligasi Sosial Perdana Senilai Rp5 Triliun”, June 2025, <https://www.bloombergentechnoz.com/detail-news/74977/bri-terbitkan-obligasi-sosial-perdana-senilai-rp5-triliun/2>; Asian Bonds Online, Data Portal

¹⁵⁴ DBS Bank, “Chief Sustainability Officer DBS Bank Reveals 5 Trends Shaping the Direction of Sustainable Financing Today”, October 24, 2025, https://www.dbs.com/newsroom/Chief_Sustainability_Officer_DBS_Bank_Reveals_5_Trends_Shaping_the_Direction_of_Sustainable_Financing_Today

¹⁵⁵ McKinsey, “Indonesia’s green powerhouse promise: Ten bold moves”, April 22, 2024, <https://www.mckinsey.com/id/our-insights/indonesias-green-powerhouse-promise-ten-big-bets-that-could-pay-off>

¹⁵⁶ Nina Susilo, “Pemerintah Targetkan Perdagangan Karbon mulai Juni 2026”, *Kompas*, April, 16, 2026, <https://www.kompas.id/artikel/pemerintah-percepat-perdagangan-karbon-sruk-beroperasi-juni-2026>



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