Aligning Energy Transition, Carbon Markets, and Sustainable Investment Pathways for Inclusive Green Transition Management in Indonesia

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Abstract

Indonesia's green transition represents a structural transformation challenge shaped by resource dependence, governance fragmentation, and distributive political economy constraints. As the world's largest producer of palm oil and a major coal exporter, Indonesia's development model remains deeply embedded in carbon- and land-intensive sectors. At the same time, the country has committed to ambitious climate mitigation targets through its updated Nationally Determined Contribution (NDC), renewable energy expansion strategies, domestic carbon market development, and blended finance initiatives such as the Just Energy Transition Partnership (JETP). This coexistence of climate ambition and extractive dependence generates a central governance dilemma: how to decarbonise without destabilising fiscal revenues, regional employment, and economic growth. This paper examines how Indonesia can align energy transition governance, carbon market integrity, and sustainable investment pathways to enable an inclusive and investable green transition in resource-dependent regions. Drawing on qualitative institutional analysis and political economy theory, the study identifies four structural constraints: inter-ministerial fragmentation, subnational implementation asymmetries, fiscal reliance on extractive revenues, and elevated green investment risk perceptions. These factors collectively weaken policy credibility and slow capital reallocation toward low-carbon sectors. The paper argues that Indonesia's transition must be governed as an investment-led structural transformation rather than a prohibition-driven environmental reform. It advances an institutional alignment framework integrating coordinated governance authority, transparent green investment regulation, credible carbon market oversight, and inclusive substitution strategies such as agroforestry, bioeconomy upgrading, and regional diversification. The findings demonstrate that institutional coherence is a prerequisite for reconciling climate ambition with economic stability and social inclusion in emerging economies.

Keywords: : Green Transition; Energy Policy; Carbon Markets; Sustainable Finance; Institutional Alignment; Political Economy; Indonesia; Just Transition; Climate Governance; Resource Dependence

1. Introduction and Research Context

The accelerating impacts of climate change, biodiversity loss, and widening socio-economic inequality have reconfigured the foundations of global economic governance. The green transition is no longer framed as an environmental compliance agenda; it has evolved into a structural transformation project reshaping capital allocation, industrial policy, fiscal architecture, and long-term development trajectories (UNEP, 2011). For resource-rich emerging economies, this transformation generates a central governance dilemma: how to decarbonise without destabilising growth models historically anchored in carbon- and land-intensive sectors.

Indonesia embodies this structural tension. Over the past decades, its development trajectory has been deeply shaped by natural resource-based industries, particularly palm oil plantations and coal extraction. Palm oil underpins export revenues, rural employment, and regional economic development, while coal remains dominant in domestic electricity generation and foreign exchange earnings. Yet these sectors are also associated with deforestation, peatland degradation, greenhouse gas emissions, and persistent land tenure conflicts, disproportionately affecting indigenous communities (Austin et al., 2017; Carlson et al., 2018). As global markets internalise climate risk through ESG screening, sustainability standards, and climate-related trade measures, Indonesia's growth model faces mounting transition pressures.

At the same time, Indonesia has articulated increasingly ambitious climate commitments. Through its updated Nationally Determined Contribution (NDC), renewable energy targets, forest and peatland moratoriums, domestic carbon pricing instruments, and participation in blended finance initiatives such as the Just Energy Transition Partnership (JETP), the government has signalled alignment with global decarbonisation pathways. However, ambition has advanced more rapidly than institutional alignment. Capital continues to favour incumbent resource-intensive sectors characterised by policy familiarity and predictable returns, while renewable energy and nature-based investment pipelines confront regulatory fragmentation, coordination asymmetries, and elevated risk perceptions.

This paper argues that Indonesia's green transition challenge is not one of policy absence but of institutional misalignment. Decarbonisation must therefore be analysed as a governance and capital allocation problem operating across three interdependent domains:

1. energy transition governance, particularly the reform of coal-dependent electricity systems and renewable deployment frameworks;
2. carbon market institutional integrity, including credible monitoring, reporting, verification (MRV), and equitable benefit-sharing mechanisms; and
3. sustainable investment and substitution pathways, encompassing agroforestry integration, bioeconomy upgrading, and regional economic diversification.

Rather than advocating abrupt elimination of resource-based sectors, the study advances a managed substitution perspective grounded in fiscal realism and inclusive economic restructuring. Effective transition management requires coordinated inter-ministerial authority, predictable investment frameworks, and risk-sharing mechanisms capable of mobilising green capital while preserving socio-economic stability.

By situating Indonesia's trajectory within its political economy, characterised by fiscal dependence on extractive revenues, decentralised governance structures, and distributive conflict, the paper contributes to green finance and development policy debates. It develops an institutional alignment framework linking energy governance, carbon pricing, and sustainable capital allocation in resource-dependent emerging economies. In doing so, the study extends green transition scholarship beyond mitigation targets and technological deployment toward the governance architecture necessary to render decarbonisation investable, inclusive, and politically durable.

2. Research Question and Objectives

This study addresses the following central research question on How can Indonesia align its public policy and regulatory frameworks across energy transition governance, carbon market

development, and sustainable investment pathways to enable an inclusive and investable green transition in resource-dependent regions?

This question reframes the green transition not merely as a mitigation challenge, but as an institutional alignment and capital reallocation problem. It emphasises the interaction between policy coherence, regulatory design, fiscal incentives, and investment governance in shaping structural transformation while maintaining economic stability and social inclusion.

To address this question, the study pursues four interrelated objectives:

1. To examine Indonesia's regulatory and institutional architecture shaping green investment incentives, with particular attention to the interaction between energy policy, environmental regulation, and fiscal frameworks.
2. To evaluate the political economy constraints embedded within existing energy, environmental, and financial regulations, and assess how these influence business behaviour, capital allocation decisions, and perceptions of transition risk.
3. To identify viable sustainable substitution pathways across land use, industrial value chains, and regional economies that reconcile environmental objectives with inclusive growth and long-term resilience.
4. To develop an integrated governance and financing framework capable of supporting a just, credible, and investment-grade green transition, including strengthened inter-ministerial coordination, carbon market integrity mechanisms, and blended finance instruments.

Collectively, these objectives reposition Indonesia's green transition as a systemic governance challenge rather than a sectoral environmental reform. By integrating regulatory coherence, capital mobilisation, and distributive feasibility, the study contributes to emerging scholarship on institutional alignment in resource-dependent emerging economies navigating structural decarbonisation.

3. Literature Review and Theoretical Framework

This study develops a Green Transition Alignment Model to analyse how institutional coordination, regulatory design, and capital allocation interact in resource-dependent emerging economies. The model conceptualises green transition management as the alignment of three interdependent pillars:

1. Energy Transition Governance
2. Carbon Market Institutional Integrity
3. Sustainable Investment and Substitution Pathways

Rather than treating climate mitigation as a sectoral environmental issue, the model frames green transition as a systemic governance challenge requiring coherence across policy domains that traditionally operate in silos.

Pillar 1: Energy Transition Governance

Energy transition governance refers to the regulatory, fiscal, and institutional architecture guiding the shift from fossil fuel dependence toward renewable and low-carbon energy systems. This includes renewable energy targets, power purchase agreement (PPA) frameworks, subsidy reform, coal phase-down strategies, and blended finance mechanisms.

Within green economy theory, sustainability is understood not merely as environmental protection but as a development paradigm promoting resource efficiency, resilience, and social equity (UNEP, 2011). Public policy plays a catalytic role in correcting market failures, internalising environmental externalities, and shaping long-term investment signals. In resource-dependent economies, energy transition governance must balance decarbonisation objectives with energy security, affordability, and fiscal stability.

Pillar 2: Carbon Market Institutional Integrity

Carbon markets represent a market-based instrument designed to internalise the social cost of emissions. Climate finance literature emphasises that effective carbon pricing requires regulatory certainty, credible monitoring, reporting, and verification (MRV) systems, and transparent benefit-sharing arrangements to crowd in private capital.

Carbon market institutional integrity refers not only to technical design but to governance credibility. Without robust MRV systems, prevention of double counting, and predictable legal frameworks, carbon markets risk undermining investor confidence and environmental legitimacy. In emerging economies, institutional trust is a precondition for carbon finance scalability.

Pillar 3: Sustainable Investment and Substitution Pathways

Green transitions are fundamentally about redirecting capital flows toward low-carbon and nature-positive activities. Climate finance scholarship underscores the importance of regulatory stability, long-term policy signals, and risk-sharing mechanisms to mobilise private investment in emerging markets.

In this paper, sustainable substitution is conceptualised along two complementary dimensions:

1. Land-use and production substitution, including agroforestry, mixed cropping, peatland restoration, and bio-based alternatives that reduce ecological pressure while sustaining rural incomes;
2. Economic and value-chain substitution, shifting from volume-driven commodity exports toward diversified, higher-value, and lower-impact economic activities supported by green finance, circular economy innovation, and renewable energy deployment.

Substitution does not imply abrupt elimination of existing sectors. Rather, it represents gradual structural transformation designed to reduce systemic dependence while preserving socio-economic stability.

3.2 Governance Fragmentation and Alignment Failure

The Green Transition Alignment Model posits that effective transition management depends on coherence across these three pillars. However, in resource-dependent economies such as Indonesia, governance fragmentation frequently disrupts alignment.

Regulatory governance literature highlights a shift from command-and-control approaches toward hybrid models combining legal mandates, market-based instruments, voluntary standards, and corporate accountability mechanisms. In Indonesia, forest moratoriums, sustainability certification schemes (ISPO and RSPO), renewable energy incentives, and carbon pricing initiatives reflect this hybrid architecture. Yet hybrid governance does not automatically guarantee coherence.

Fragmentation manifests in several ways:

1. Sectoral silos, where energy, forestry, and finance ministries pursue partially conflicting objectives;
2. Policy asymmetry, where fossil-fuel incentives coexist with renewable ambitions;

3. Temporal inconsistency, where short-term fiscal priorities undermine long-term climate commitments;
4. Subnational divergence, where decentralised authorities implement policies unevenly.

Political economic perspectives further explain why fragmentation persists.

Resource-dependent sectors often enjoy institutional protection due to their macroeconomic importance, employment effects, and fiscal contributions. Ownership structures, state–business relationships, and distributive coalitions constrain regulatory ambition. Abrupt disruption risks economic instability and political resistance. Consequently, managed transition strategies become more viable than prohibition-based approaches.

Misalignment across the three pillars produces structural contradictions:

1. Energy transition policies may be ambitious, but investment frameworks remain uncertain.
2. Carbon markets may exist, but without credible institutional integrity they fail to attract capital.
3. Sustainable substitution pathways may be identified, yet fiscal incentives continue to favour incumbent sectors.

The model therefore emphasises alignment as the central analytical lens. Alignment requires:

1. Institutional coordination across ministries;
2. Consistent fiscal and regulatory incentives;
3. Credible and transparent carbon governance;
4. Investment-grade policy certainty;
5. Inclusion mechanisms that mitigate distributive conflict.

3.3 Theoretical Contribution

By integrating green economy theory, climate finance scholarship, regulatory governance, and political economy analysis, this framework moves beyond sector-specific environmental reform. It conceptualises green transition as an institutional coordination problem embedded within resource-dependent political economies.

The Green Transition Alignment Model thus contributes to the literature in three ways:

1. It reframes decarbonisation as a capital allocation and governance coherence challenge rather than solely a mitigation target issue;
2. It integrates substitution theory into energy and carbon market governance debates;
3. It provides an analytical tool for assessing transition feasibility in emerging economies facing structural dependence on extractive and land-intensive sectors.

4. Methodology

4.1 Research Design

This study uses a qualitative institutional analysis to examine how governance structures, regulatory frameworks, and investment mechanisms shape Indonesia's green transition. The research is policy-oriented and focuses on institutional coherence, political economy dynamics, and capital allocation patterns rather than quantitative modeling of emissions or financial flows.

A qualitative approach is appropriate because green transition management in resource-dependent economies is primarily a governance coordination problem. It involves understanding regulatory mandates, fiscal incentives, inter-ministerial relations, and political constraints. These dimensions cannot be fully captured through econometric or simulation-based methods alone. The objective is to assess whether existing institutions support or hinder alignment across energy transition policies, carbon markets, and sustainable investment pathways.

4.2 Data Sources

The study draws on multiple sources to ensure analytical depth and triangulation. These include:

1. National regulatory and policy documents, such as renewable energy regulations, carbon pricing frameworks, forestry and land-use policies, green bond frameworks, and Indonesia's Nationally Determined Contribution (NDC).
2. Government publications, including ministry strategic plans, fiscal policy statements, and national development planning documents.
3. Multilateral and international organisation reports from institutions such as the World Bank, Asian Development Bank, OECD, and UNEP.
4. Industry and sectoral reports related to renewable energy, palm oil sustainability, and carbon market development.

Using diverse sources allows cross-verification between policy intent, institutional design, and implementation challenges.

4.3 Analytical Strategy

The analysis combines three components:

1. First, a regulatory review assesses coherence and misalignment across environmental, energy, fiscal, and investment policies. Particular attention is given to how mandates across ministries interact and whether they reinforce or undermine transition objectives.
2. Second, a comparative regional lens situated Indonesia within broader Southeast Asian and Asia-Pacific trends. Comparisons with countries such as Vietnam and Malaysia are used for contextual benchmarking rather than full empirical comparison.
3. Third, a case-based synthesis examines selected examples of renewable energy projects, agroforestry initiatives, and blended finance mechanisms to illustrate alignment challenges in practice.

4.4 Limitations

This study does not conduct quantitative emissions modeling or firm-level financial analysis. It relies primarily on publicly available documents rather than extensive primary interviews. The comparative dimension is illustrative rather than exhaustive.

By clearly defining its scope, the study positions itself as a theoretically informed, policy-relevant institutional analysis of green transition governance.

5. Key Findings and Empirical Analysis

5.1 Energy Transition Governance: Institutional Ambition and Structural Lock-In

Indonesia's energy transition illustrates a core paradox confronting resource-dependent emerging economies: the coexistence of formal decarbonisation ambition and entrenched fossil fuel dependence. On the one hand, Indonesia has articulated renewable energy targets, committed to its Nationally Determined Contribution (NDC), participated in the Just Energy Transition Partnership (JETP), and issued green sovereign bonds—moves that align it with global climate governance norms (Government of Indonesia, 2021; World Bank, 2022). On the other hand, coal continues to dominate electricity generation and contribute significantly to export revenues and provincial fiscal income.

This duality reflects not policy contradiction but structural tension. Transition ambition operates within a political economy shaped by fossil-based development, institutional path dependency, and fiscal reliance on extractive sectors. The pace and character of reform are therefore mediated by institutional incentives rather than technological feasibility alone.

5.1.1 Regulatory Architecture and Market Signals

Indonesia's energy transition governance operates through a hybrid regulatory architecture combining state planning mandates, fiscal incentives, coordination through state-owned enterprises, and emerging market-based instruments. This hybridity reflects broader global shifts from purely command-and-control environmental regulation toward mixed governance models integrating public authority and market mechanisms (Jordan et al., 2015; Meckling et al., 2015).

Renewable energy deployment is guided by national planning frameworks that set target shares for renewable generation, while fiscal incentives and procurement mechanisms are designed to encourage private sector participation. Simultaneously, Indonesia has begun developing carbon pricing instruments within the power sector, signaling a move toward internalizing environmental externalities through market-based tools.

However, the credibility of these instruments depends heavily on regulatory stability. Renewable energy policies have undergone periodic tariff adjustments and regulatory recalibrations. While such revisions may respond to fiscal or market realities, they introduce uncertainty into long-term investment planning. Climate finance scholarship underscores that capital mobilization in emerging markets requires predictable regulatory environments, credible commitment mechanisms, and risk-sharing arrangements (Campiglio, 2016; OECD, 2021).

Investors in renewable infrastructure face long asset lifespans and high upfront capital costs. Where tariff frameworks are revised or procurement rules shift unpredictably, perceived regulatory risk increases, raising the cost of capital. In such contexts, fossil-based investments,

despite long-term transition risk, may appear more stable in the short term due to established institutional familiarity.

This dynamic produces what may be termed policy dualism. While green sovereign bonds and renewable targets signal transition ambition, coal's domestic market obligation (DMO) framework and continued export revenues reinforce incumbent sector confidence. By guaranteeing domestic coal demand at regulated prices, the DMO system reduces exposure of coal producers to market volatility and strengthens fossil-based lock-in.

The coexistence of renewable promotion and fossil stabilization sends mixed signals to capital markets. Transition credibility depends not only on announcing renewable targets but on aligning fiscal and regulatory incentives across the energy system.

5.1.2 Coal Dependence and Distributive Politics

Coal's dominance in Indonesia's electricity mix is not merely a function of resource abundance; it reflects structural political economy conditions. Coal production supports employment clusters, provincial fiscal revenues, and networks of political influence. Distributive conflict theory suggests that climate reform encounters resistance not because actors misunderstand climate risks, but because reform reallocates rents and employment opportunities (Aklin & Mildenberger, 2020; Stokes, 2020).

Coal-producing provinces derive significant royalties and revenue-sharing transfers from extractive activity. Local budgets finance infrastructure and public services through these revenues. Abrupt coal phase-out would generate concentrated economic losses in specific regions, while climate benefits are diffused nationally and globally. This asymmetry aligns with path dependency theory, which posits that institutional trajectories become self-reinforcing through feedback mechanisms (Pierson, 1994).

Political leaders embedded in coal-dependent regions rationally prioritize short-term fiscal stability over uncertain long-term transition benefits. Thus, resistance to rapid coal phase-down is not purely ideological but rooted in distributive rationality. Reform trajectories are consequently moderated to preserve economic continuity.

Managed transition frameworks such as JETP seek to mitigate distributive imbalance by mobilizing concessional finance to support early retirement of coal assets and renewable expansion. By absorbing part of the financial burden, blended finance mechanisms attempt to reduce resistance from incumbent sectors. However, external financing alone cannot substitute for domestic fiscal realignment. Long-term structural alignment requires reconfiguration of revenue-sharing systems and investment in alternative regional industries.

In this context, energy transition governance becomes inseparable from fiscal federalism and regional development policy. Without credible alternative economic pathways for coal-dependent provinces, transition acceleration will remain politically constrained.

5.1.3 Institutional Fragmentation

Energy transition governance in Indonesia intersects across multiple institutional domains, including the Ministry of Energy and Mineral Resources (MEMR), the Ministry of Finance (MoF), environmental authorities, and state-owned utilities. This multi-actor architecture increases the complexity of policy coordination.

Tariff setting, procurement processes, carbon pricing design, and fiscal subsidy allocation involve overlapping mandates. Where coordination mechanisms are informal or ad hoc, inconsistencies emerge. Multi-level governance literature emphasizes that policy coherence is critical for accelerating low-carbon transitions (Bulkeley & Betsill, 2005; Kern & Howlett, 2009). Fragmented authority structures increase transaction costs and undermine investor confidence.

In Indonesia's case, institutional coordination remains reactive rather than embedded within a unified transition authority. While cross-ministerial committees exist, their capacity to harmonize fiscal incentives, regulatory timelines, and industrial policy objectives is limited. The absence of a centralized energy transition coordination body capable of integrating carbon pricing, renewable targets, and fiscal instruments weakens alignment across governance pillars.

Institutional fragmentation also affects subsidy reform. Fossil fuel subsidies and renewable incentives are often managed within separate fiscal frameworks. Without synchronized adjustment, renewable promotion may be offset by continued fossil stabilization.

This fragmentation reinforces incrementalism. Reform proceeds in discrete policy segments rather than through systemic transformation. While incremental change reduces political shock, it may also slow the pace required to meet climate commitments.

Synthesis: Institutional Ambition within Structural Constraint

The analysis of Indonesia's energy transition governance reveals that institutional ambition exists within structural lock-in. Renewable targets, carbon pricing instruments, and green bond issuance reflect alignment with global climate norms. However, fiscal dependence on coal revenues, distributive conflict dynamics, and fragmented governance architectures moderate reform trajectories.

Transition acceleration therefore requires not only policy declaration but institutional integration. Aligning fiscal incentives, tariff stability, carbon pricing credibility, and regional diversification strategies is essential for transforming ambition into investable certainty.

Indonesia's experience demonstrates that energy transition governance in resource-dependent economies is fundamentally a coordination and distributive challenge. Without addressing structural lock-in, market-based instruments and renewable targets risk operating within a fossil-dominated incentive system. By confronting these structural realities through managed substitution, fiscal reform, and institutional alignment, Indonesia can gradually shift from incremental reform toward systemic transformation.

Carbon Market Development: Integrity, Credibility, and Political Economy

Carbon pricing has emerged globally as a central instrument for internalizing environmental externalities and correcting market failures associated with greenhouse gas emissions (Stiglitz & Stern, 2017). In theory, carbon pricing aligns private incentives with social costs, enabling decentralized actors to incorporate emissions considerations into investment and production decisions. In practice, however, carbon markets are institutional constructs whose effectiveness depends on regulatory credibility, administrative capacity, and political feasibility.

Indonesia has introduced domestic carbon trading mechanisms, particularly within the power sector, and has articulated ambitions to expand carbon pricing instruments into forestry and land-use domains. These developments position Indonesia within the broader trend of emerging economies experimenting with market-based climate instruments. Yet the empirical evidence suggests that the effectiveness of these mechanisms depends less on formal adoption and more on institutional integrity and distributive design.

5.2.1 Market Design and Institutional Integrity

Effective carbon markets require robust monitoring, reporting, and verification (MRV) systems, transparent registries, credible baseline methodologies, and enforceable compliance obligations (Hepburn, 2007; Newell et al., 2014). Environmental integrity is foundational: without reliable emissions accounting and enforcement mechanisms, carbon markets risk becoming symbolic rather than transformative.

In Indonesia, the decentralised governance structure complicates unified carbon accounting across sectors and jurisdictions. Energy-sector emissions, forestry-based carbon

sequestration, and land-use change involve distinct administrative authorities and data systems. Fragmentation increases the risk of inconsistent baseline calculations and potential double counting, particularly when domestic carbon credits interface with international voluntary or compliance markets.

Institutional opacity further undermines credibility. Investors in carbon markets require predictable regulatory rules, clarity regarding offset eligibility, and transparent dispute resolution mechanisms. Climate finance literature consistently emphasizes that capital mobilization depends on credibility rather than mere instrument existence (Buchner et al., 2019). Where enforcement appears uncertain or MRV standards lack international recognition, carbon prices remain shallow and liquidity constrained.

Moreover, carbon market design intersects with Indonesia's broader fiscal architecture. Questions of revenue allocation, registry management, and regulatory oversight involve multiple ministries, including finance, energy, and environment authorities. Without coordinated governance structures, institutional competition may weaken coherence.

Carbon markets also require long-term policy stability. Frequent rule changes or uncertainty regarding linkage to international markets increase perceived regulatory risk. Investors may discount domestic carbon assets if they anticipate methodological revision or political interference.

Thus, carbon pricing in Indonesia must be understood not as a purely technical mechanism but as a governance-dependent instrument. Institutional integrity is not ancillary to market performance; it is the precondition for environmental credibility and financial scalability.

5.2.2 Carbon Pricing and Competitiveness

Carbon pricing redistributes economic costs across sectors and regions. Industries with high emissions intensity face increased production costs, while low-carbon sectors gain relative advantage. In export-oriented economies, such redistribution interacts with global competitiveness concerns.

Indonesia's export dependence on commodities—including coal, palm oil, and other resource-based products, heightens sensitivity to cost increases arising from carbon pricing. Meckling et al. (2015) note that governments often calibrate carbon pricing trajectories to minimize competitiveness losses for trade-exposed industries. Political economy theory predicts moderated reform in contexts where incumbent sectors retain institutional influence (Falkner, 2016).

In Indonesia, coal remains central not only to domestic electricity generation but also to export revenues and regional employment. A rapidly escalating carbon price could erode competitiveness of coal-fired generation relative to renewables but would simultaneously affect state-owned utilities and provincial fiscal revenues.

This creates a structural dilemma. On one hand, carbon pricing enhances allocative efficiency and signals long-term decarbonisation commitment. On the other, aggressive pricing without compensatory measures risks industrial backlash and fiscal instability.

Competitiveness concerns also intersect with emerging international climate policies, including carbon border adjustment mechanisms. Indonesian exporters may face implicit carbon pricing through trade channels even if domestic pricing remains modest. Thus, calibrated domestic carbon pricing may serve as a strategic hedge against external trade measures.

However, credibility requires gradual but predictable escalation trajectories. If carbon pricing remains politically constrained to low levels, its signaling function weakens. Investors in renewable infrastructure or low-carbon manufacturing rely on expectations of rising carbon costs to justify capital reallocation.

Balancing competitiveness and credibility therefore demands a phased approach: moderate initial pricing combined with clear long-term escalation pathways, sectoral differentiation mechanisms, and targeted industrial support for vulnerable sectors.

5.2.3 Benefit-Sharing and Inclusion

Carbon markets in land-use and forestry sectors intersect directly with rural livelihoods, indigenous land tenure systems, and smallholder agricultural practices. Without equitable benefit-sharing frameworks, carbon finance risks reinforcing existing inequalities and exacerbating social conflict (Markkanen & Anger-Kraavi, 2019).

Indonesia’s plantation landscapes and forest areas are characterized by overlapping tenure claims and diverse stakeholder interests. Carbon credit generation through restoration or avoided deforestation requires clarity regarding land rights and revenue allocation.

Institutional ambiguity regarding benefit-sharing can undermine environmental legitimacy. Communities participating in agroforestry or restoration initiatives require predictable compensation to offset opportunity costs. If carbon revenues are captured disproportionately by intermediaries or centralized authorities, local incentives to maintain conservation practices weaken.

Sustainable substitution therefore depends on institutional clarity regarding revenue distribution. Transparent mechanisms allocating carbon proceeds to local communities, provincial governments, and national authorities enhance both environmental durability and political acceptance.

Moreover, inclusion is not merely distributive but participatory. Community involvement in project design, monitoring, and governance reduces conflict and strengthens accountability. Carbon markets that ignore local social structures risk reputational damage and investor retreat.

In this respect, carbon pricing instruments must be embedded within broader social governance frameworks. Environmental integrity and social equity are mutually reinforcing conditions for market credibility.

5.3 Sustainable Investment and Substitution Pathways

Carbon pricing and energy transition policies reduce emissions within incumbent sectors, but long-term decarbonisation also requires structural economic diversification. Transition feasibility depends on developing viable substitution pathways capable of absorbing capital, labor, and fiscal revenues previously tied to extractive industries.

Sustainable substitution must therefore operate across land use, industrial value chains, and regional economic systems.

5.3.1 Land-Use Substitution and Agroforestry

Agroforestry and mixed cropping systems offer pathways to reduce deforestation pressure while maintaining rural income streams (Austin et al., 2017). By integrating tree cover with agricultural production, agroforestry enhances carbon sequestration, soil resilience, and biodiversity outcomes.

From a green industrial policy perspective, substitution represents structural transformation rather than marginal efficiency improvement (Rodrik, 2014). Rather than merely increasing yield per hectare within monoculture systems, agroforestry alters production models and risk profiles.

Carbon finance can complement agroforestry by monetizing ecosystem services. Payments for carbon sequestration, biodiversity conservation, or watershed protection provide additional revenue streams. However, liquidity constraints limit smallholder adoption. Transition from monoculture to diversified systems often involves upfront costs and delayed returns.

Blended finance mechanisms are therefore essential. Concessional capital, risk guarantees, and technical assistance reduce transitional income volatility. Public development banks and climate funds can absorb early-stage risks until agroforestry systems mature.

Tenure insecurity remains a structural barrier. Clear land rights are prerequisite for long-term carbon credit generation and investment confidence. Institutional reform addressing land registration and dispute resolution enhances scalability.

5.3.2 Bioeconomy Upgrading

Value-chain upgrading toward bio-based materials, sustainable chemicals, and circular production enhances domestic value capture while reducing pressure for land expansion. Industrial policy literature emphasizes the state's role in coordinating innovation ecosystems, supporting R&D, and shaping markets (Mazzucato, 2018).

Indonesia's downstream processing incentives in palm oil and minerals illustrate early steps toward upgrading. However, bioeconomy transformation requires more than processing mandates. It demands investment in research institutions, infrastructure, quality standards, and export market access.

Bio-based product innovation, such as bioplastics or sustainable packaging, can reposition Indonesia within global green value chains. Yet such upgrading is capital-intensive and technologically demanding. Strategic public–private partnerships and targeted industrial clusters can accelerate capability development.

Policy coherence between trade, research, and environmental domains is critical. Export incentives aligned with sustainability certification enhance competitiveness while reinforcing environmental objectives.

5.3.3 Regional Diversification

Resource-dependent provinces face volatility from global commodity cycles and transition risks from decarbonisation. Renewable energy deployment and ecosystem restoration services provide alternative revenue streams capable of stabilizing regional economies.

However, diversification requires fiscal incentive restructuring. Current intergovernmental revenue-sharing systems tied to extractive production create structural dependence. Without fiscal reform, provinces rationally prioritize resource extraction.

Performance-based fiscal transfers linked to renewable capacity expansion or restoration outcomes can realign incentives. World Bank (2022) analyses highlight the importance of fiscal federalism reform in supporting transition feasibility.

Regional diversification also benefits from industrial clustering. Renewable manufacturing facilities, maintenance services, and restoration enterprises create localized economic ecosystems. Coordinated infrastructure investment, transmission lines, logistics hubs, and research centers, enhances viability.

Importantly, diversification must be sequenced to avoid abrupt revenue collapse. Managed transition frameworks combining carbon revenue recycling, blended finance, and phased subsidy reform provide smoother adjustment trajectories.

Synthesis: From Emissions Reduction to Structural Transformation

Sections 5.2 and 5.3 collectively demonstrate that Indonesia's transition feasibility depends on institutional credibility and structural diversification. Carbon markets require integrity and equitable benefit-sharing to mobilize capital. Sustainable substitution pathways require fiscal reform, investment governance, and industrial coordination.

Transition is therefore not solely a matter of reducing emissions intensity within existing sectors but of reshaping economic structures. Institutional alignment across carbon pricing, land-use reform, fiscal federalism, and industrial policy determines whether green transition becomes incremental adaptation or systemic transformation.

Indonesia's experience illustrates that credibility, inclusion, and diversification are interdependent pillars of durable transition governance. Without institutional integrity, carbon markets stagnate. Without diversification, fiscal lock-in persists. Without equitable benefit-sharing, political resistance intensifies.

Green transition management in resource-dependent emerging economies thus requires coordinated reform across environmental, fiscal, and industrial domains. Carbon pricing and substitution strategies must operate within a coherent political economy framework capable of reconciling climate ambition with development imperatives.

5.4 Subnational Governance and Implementation Gaps

Indonesia's decentralised governance structure plays a decisive role in shaping the feasibility and pace of green transition management. Since the post-Reformasi decentralisation reforms, provincial and district governments have been granted substantial authority over land-use licensing, local development planning, and certain aspects of resource management. While

decentralisation has strengthened democratic accountability and local autonomy, it has also introduced policy asymmetry across regions (Faguet, 2014). In the context of climate governance, this asymmetry translates into uneven implementation of national decarbonisation commitments and variable institutional capacity to operationalise green transition strategies.

The green transition in Indonesia is therefore not governed solely at the national level. Rather, it is mediated through a multi-layered governance system in which subnational actors possess both the authority and the incentives to shape outcomes. The empirical findings suggest that subnational governance constitutes one of the most significant structural constraints to coherent transition alignment.

5.4.1 Capacity Constraints

A primary implementation gap arises from uneven technical and administrative capacity across provinces and districts. Subnational authorities vary widely in their ability to design renewable energy integration plans, conduct carbon accounting, enforce environmental standards, and facilitate green investment.

Provinces with strong administrative infrastructure and prior exposure to international climate initiatives are better positioned to implement renewable projects or engage in carbon market mechanisms. By contrast, resource-dependent regions often lack specialised expertise in monitoring, reporting, and verification (MRV) systems, sustainable land-use planning, and investment facilitation procedures.

This capacity asymmetry produces differentiated transition speeds. Regions with higher institutional readiness can leverage national incentives effectively, while less-equipped provinces struggle to meet regulatory requirements or attract sustainable investment. As a result, decentralisation reinforces regional inequality in transition outcomes.

Capacity gaps also affect project bankability. Renewable energy developers require predictable permitting processes and technical coordination with local authorities. Where local governments lack experience with grid integration, environmental impact assessments, or public–private partnership frameworks, project delays and cost escalations increase. Such inefficiencies amplify perceived investment risk.

Moreover, limited capacity in carbon accounting undermines market credibility. If local authorities cannot accurately monitor emissions reductions or restoration outcomes, carbon pricing mechanisms lose environmental integrity. In this context, technical capacity becomes a foundational prerequisite for financial credibility.

Addressing these constraints requires sustained investment in subnational capacity-building. Technical training, digital monitoring systems, and intergovernmental knowledge-sharing platforms are critical to reducing implementation asymmetry. Without such support, national-level climate ambition will continue to encounter local-level bottlenecks.

5.4.2 Fiscal Dependence and Incentive Misalignment

Beyond administrative capacity, fiscal structures significantly shape subnational behaviour. Indonesia's intergovernmental revenue-sharing arrangements allocate royalties and transfers from extractive sectors, particularly coal and mining, to producing provinces. This fiscal dependence creates rational incentives for local governments to prioritise resource extraction over decarbonisation.

From a political economy perspective, subnational actors operate within short-term revenue constraints. Provincial budgets depend on extractive income streams that finance infrastructure, social programs, and administrative functions. Abrupt reduction in coal production or plantation expansion would generate immediate fiscal shortfalls without guaranteed compensatory transfers.

Consequently, provinces may perceive aggressive transition policies as threats to economic stability. This dynamic illustrates how climate reform is embedded within fiscal federalism structures. Without fiscal redesign, local governments are unlikely to champion decarbonisation voluntarily.

Revenue-sharing frameworks thus generate incentive misalignment between national climate objectives and provincial fiscal interests. Even when central authorities introduce renewable energy incentives or carbon pricing mechanisms, subnational actors may lack motivation to reorient development strategies.

Fiscal realignment is therefore essential to transition management. Potential mechanisms include:

1. Performance-based fiscal transfers linked to renewable deployment or restoration outcomes;
2. Carbon revenue recycling directed toward provincial transition funds;
3. Transitional compensation schemes for coal-dependent regions;
4. Diversification grants supporting green industrial clusters.

Such reforms would reconfigure fiscal incentives, making low-carbon development financially attractive rather than economically disruptive.

5.4.3 Political Resistance and Institutional Lock-In

Institutional lock-in further complicates subnational transition dynamics. Path dependency theory suggests that policy trajectories become entrenched through institutional feedback mechanisms and vested interests (Pierson, 1994). In resource-dependent provinces, economic structures, employment networks, and political coalitions are deeply intertwined with extractive industries.

Local elites including business actors, political leaders, and administrative officials often maintain close ties to resource sectors. These networks benefit from existing licensing systems, revenue flows, and procurement arrangements. Transition reform threatens established rents and power configurations.

Resistance to reform may therefore manifest as regulatory delay, selective enforcement, or political opposition to national mandates. Such resistance is not necessarily ideological but rooted in rational defense of local economic interests.

Institutional lock-in also shapes public perceptions. Communities reliant on coal mining or plantation employment may view transition policies as externally imposed constraints rather than locally beneficial reforms. Without credible alternative employment pathways, climate policy risks being framed as economic sacrifice.

Transition management must therefore extend beyond regulatory design toward political coalition building. Strategies include:

1. Inclusive stakeholder consultations;
2. Visible investment in alternative industries;
3. Social protection measures during sectoral adjustment;
4. Transparent communication linking transition to local economic opportunity.

Managed substitution, rather than prohibition, reduces resistance by preserving income continuity while gradually altering economic structures.

Synthesis: Multi-Level Governance as a Determinant of Transition Feasibility

The Indonesian case demonstrates that subnational governance constitutes a decisive arena for transition feasibility. Capacity asymmetry, fiscal dependence, and institutional lock-in collectively moderate reform trajectories. National ambition alone cannot overcome these structural conditions.

Effective green transition management therefore requires multi-level alignment. The central government must coordinate policy coherence, redesign fiscal incentives, and provide

technical support, while provincial authorities must internalise climate objectives within local development planning.

In this context, decentralisation is neither inherently obstructive nor inherently enabling. Its impact depends on incentive structures and institutional support mechanisms. Where fiscal transfers reward extractive continuity, transition stalls. Where performance-based incentives encourage renewable diversification and restoration, decentralisation can accelerate reform.
Subnational governance gaps thus reveal a broader theoretical insight: green transition in resource-dependent emerging economies is fundamentally a coordination challenge across vertical governance levels. Institutional alignment must operate not only horizontally across ministries but vertically between national and local authorities.

Transition management, therefore, requires fiscal redesign and coalition-building strategies rather than purely regulatory mandates. Without addressing subnational incentive structures and path-dependent political economies, green transition policies risk remaining aspirational commitments rather than operational realities.

6. Economic, Managerial, and Business Implications

The empirical findings carry significant implications for economic policy, corporate governance, and strategic business adaptation in resource-dependent emerging economies. Indonesia's experience demonstrates that green transition management intersects not only with environmental reform but with distributive politics, capital allocation structures, and institutional design. Positioned within existing literature, the findings reinforce distributive conflict theory, demonstrate the necessity of a market-shaping state, and extend green finance scholarship by highlighting institutional alignment as a precondition for capital reallocation.

6.1 Economic Implications: Risk Reallocation and Structural Resilience

From a macroeconomic perspective, sustainable substitution reduces long-term systemic risk. Continued dependence on fossil fuels and land-intensive commodities exposes Indonesia to climate-related trade measures, tightening ESG standards, reputational pressures, and volatility in global demand. The findings suggest that green transition should be understood not merely as compliance cost, but as risk mitigation and structural resilience strategy. Diversifying energy systems, strengthening carbon governance, and upgrading value chains gradually reduce vulnerability to regulatory shocks and commodity cycles.

However, transition reform generates concentrated costs in coal-dependent provinces and plantation economies, while benefits are diffuse and long-term. This asymmetry supports

distributive conflict theory (Aklin & Mildenberger, 2020): climate reform is constrained by rent redistribution rather than technological feasibility. Without compensatory fiscal transfers, retraining programs, and inclusive investment mechanisms, transition risks exacerbating regional inequality. Sustainable substitution must therefore be embedded within just transition frameworks to preserve macroeconomic stability and political legitimacy.

6.2 Managerial Implications: Strategic Adaptation under Institutional Uncertainty

At the firm level, green transition requires a shift from short-term extraction-based profitability toward longer planning horizons that internalise environmental and regulatory risk. Regulatory fragmentation across energy, forestry, and finance domains increases compliance complexity. Managers must respond to evolving carbon pricing mechanisms, certification standards, and ESG disclosure expectations.

Export-oriented firms have demonstrated greater responsiveness due to exposure to international market pressures. However, smaller enterprises and smallholders face structural disadvantages, including high compliance costs and limited access to green finance. This underscores the importance of capacity-building, cooperative financing models, and blended finance instruments to reduce barriers to participation.

Supply chain transparency is becoming central to corporate strategy. Carbon markets and sustainability-linked finance increasingly require traceability and environmental performance metrics. Firms that proactively integrate renewable energy, circular production models, or bioeconomy upgrading into operations gain first-mover advantages in emerging green markets. Strategic adaptation therefore shifts from reactive compliance to proactive positioning.

6.3 Business Strategy: Competitiveness in a Carbon-Constrained Economy

Sustainability is evolving from a niche concern into a structural market requirement. Global capital increasingly prices climate risk into asset valuations, while buyers impose sustainability standards across supply chains. Firms dependent on carbon-intensive or deforestation-linked activities face long-term competitiveness risks. By contrast, engagement in agroforestry integration, renewable deployment, and bio-based innovation enables repositioning within expanding green value chains.

This dynamic reinforces the necessity of a market-shaping state (Mazzucato, 2018). Private actors cannot absorb transition risk alone in contexts marked by regulatory volatility and infrastructure gaps. Public policy must provide credible signals, de-risk early-stage investment,

and coordinate industrial upgrading. Blended finance, tariff stabilisation, and fiscal reform are central to enabling strategic business transformation.

6.4 Theoretical Positioning

The findings substantively support distributive conflict theory by showing that transition constraints arise from embedded rent structures and fiscal dependence. Managed substitution, rather than abrupt prohibition, is more politically feasible because it preserves economic continuity while reducing environmental externalities over time.

The analysis also demonstrates that carbon pricing and green finance instruments are insufficient without institutional coherence. The state's role extends beyond regulation to market creation, risk absorption, and coordination across sectors. Renewable targets without tariff stability, or carbon markets without credible enforcement, fail to mobilise capital at scale.

Finally, the study extends green finance literature by foregrounding institutional alignment as foundational to capital reallocation. Financial instruments operate effectively only within credible governance architectures. Where cross-ministerial coordination, subnational incentive compatibility, and regulatory predictability are weak, green finance remains fragmented and symbolic rather than transformative.

6.5 Synthesis

The economic, managerial, and business implications converge on a central conclusion: decarbonisation in resource-dependent emerging economies is fundamentally an institutional coordination and distributive governance challenge. Sustainable substitution enhances macroeconomic resilience, but political economy constraints moderate reform trajectories. Corporate competitiveness increasingly depends on early engagement with green value chains, supported by coherent state-led market shaping. Only through systemic alignment across energy, carbon, and investment domains can sustainability become economically viable, politically durable, and strategically advantageous.

7. Policy Implications and Recommendations

The empirical findings indicate that Indonesia's green transition challenge is not primarily one of policy absence, but of institutional alignment, incentive coherence, and distributive feasibility. Effective inclusive green transition management therefore requires coordinated reform across four interconnected domains: institutional reform, investment governance, fiscal realignment, and just transition mechanisms. Rather than framing sustainability as a constraint on growth, policymakers should position sustainable substitution as a strategic economic upgrade aligned with Indonesia's long-term competitiveness and resilience.

Institutional Reform

Institutional reform is foundational to transition alignment. Fragmentation across energy, environmental, agricultural, and investment domains weakens policy credibility and increases investor uncertainty. Renewable incentives may conflict with fossil fuel subsidies, carbon market rules may not align with land-use governance, and agricultural policies may encourage expansion rather than restoration. Stronger inter-ministerial coordination mechanisms with formal authority, ideally anchored at the executive level are necessary to harmonise renewable deployment, carbon pricing implementation, fiscal incentives, and land-use regulation.

Regulatory design should prioritise incentive-based approaches that reward gradual transition rather than abruptly penalising legacy sectors. Performance-linked renewable subsidies, carbon revenue-sharing arrangements, and transition-oriented tax incentives can reduce concentrated resistance in coal- and plantation-dependent regions. Institutional reform must also embed adaptive governance principles, enabling place-based experimentation—such as pilot renewable clusters or agroforestry zones while maintaining national policy coherence.

Investment Governance

Green transition ultimately depends on capital reallocation. Sustainable substitution pathways, including renewable energy, agroforestry integration, and bioeconomy upgrading, require substantial long-term investment. Clear, investable roadmaps linking climate targets to economic diversification strategies are essential to provide investors with regulatory visibility and confidence.

Regulatory transparency must be strengthened through streamlined permitting processes, standardised contractual frameworks, and transparent carbon registries. Blended finance mechanisms should be strategically expanded to de-risk early-stage projects, crowding in private

capital rather than replacing it. Public funds can absorb initial risk, particularly in rural and restoration-based initiatives.

Investment governance must also prioritise smallholders and SMEs, who often face liquidity constraints and compliance burdens. Targeted financial instruments, microfinance facilities, and technical assistance programs are necessary to prevent exclusion and ensure inclusive participation in green value chains.

Fiscal Realignment

Fiscal structures strongly influence transition feasibility. Revenue-sharing frameworks tied to extractive sectors create disincentives for rapid decarbonisation. Fiscal realignment should recalibrate intergovernmental transfers to reward renewable deployment, restoration activities, and sustainable land-use planning.

Carbon market revenues present an opportunity for transparent recycling toward infrastructure, workforce retraining, and regional diversification funds. Gradual fossil fuel subsidy reform, accompanied by targeted social protection measures, can correct distorted price signals without destabilising vulnerable communities. Fiscal reform should be framed as strategic capital reallocation toward future competitiveness rather than austerity.

Just Transition Mechanisms

Inclusive transition management requires explicit just transition measures to address distributive consequences. Workforce retraining programs aligned with renewable energy, restoration, and bioeconomy sectors can support labor mobility. Targeted support for smallholders and SMEs reduces barriers to sustainability compliance. Participatory governance processes enhance legitimacy and reduce political resistance.

Place-based transition funds, financed through carbon revenues or blended finance, can cushion concentrated economic losses in resource-dependent regions. By embedding social equity within broader institutional reform, Indonesia can align environmental ambition with political feasibility.

Together, these reforms reposition green transition from regulatory obligation to strategic economic transformation, anchoring climate ambition within a coherent, investable, and inclusive governance framework.

8. Conclusion

This study argues that green transition management in Indonesia cannot be reduced to environmental regulation, carbon pricing adoption, or formal compliance with international climate commitments. In resource-dependent contexts, sustainability is not merely an environmental objective but a structural economic transformation challenge. Effective transition requires alignment across energy transition governance, carbon market integrity, and sustainable investment pathways within a coherent institutional architecture shaped by political economic realities.

The empirical findings indicate that Indonesia's transition constraints stem less from policy absence than from governance fragmentation, fiscal dependence on extractive sectors, and distributive conflict. Energy transition policies coexist with fossil fuel incentives; carbon market mechanisms operate within partially integrated regulatory frameworks; and sustainable substitution initiatives remain unevenly scaled. This misalignment limits the reallocation of capital necessary for structural transformation and weakens investor confidence.

Theoretically, the analysis reinforces distributive conflict theory by demonstrating that climate reform in emerging economies is constrained primarily by rent redistribution dynamics rather than informational deficits or technological incapacity. Coal-dependent provinces, plantation-linked economic networks, and state-owned enterprises are embedded within incumbent structures that generate fiscal revenues and employment. Transition reform alters these flows, reshaping political coalitions and regional power balances. Abrupt prohibition-based approaches therefore risk concentrated resistance and institutional backlash. Managed transition strategies—anchored in substitution and diversification rather than elimination—are more politically feasible and economically stabilising.

The study further demonstrates the necessity of a market-shaping state. Carbon pricing and green finance instruments cannot operate effectively in isolation from institutional coherence. Regulatory ambition without credible enforcement, transparent governance, and long-term policy stability fails to mobilise private capital at scale. In Indonesia's case, fragmented mandates across energy, forestry, and finance domains weaken transition credibility. The state must therefore extend beyond rule-setting toward risk absorption, fiscal redesign, and coordination of industrial upgrading. Blended finance mechanisms, renewable tariff stabilisation, and reform of intergovernmental fiscal transfers are central components of transition feasibility rather than supplementary tools.

By introducing institutional alignment as a foundational precondition for capital reallocation, this study extends green finance scholarship beyond instrument design. While existing literature emphasizes green bonds, carbon credits, and climate funds, the Indonesian case illustrates that capital mobilisation depends equally on regulatory predictability, cross-ministerial coordination, and subnational incentive compatibility. Where institutional alignment fails, green finance remains under-scaled and symbolic rather than transformative.

From a policy perspective, inclusive green transition management requires systemic reform across four domains: institutional coordination, investment governance, fiscal realignment, and just transition mechanisms. Policy coherence across energy, environmental, agricultural, and financial domains is essential to send credible signals to investors and communities. Incentive-based regulation can moderate distributive resistance, while targeted financial and technical support for smallholders and SMEs prevents exclusion from emerging green value chains. Place-based experimentation enables adaptive governance while preserving national alignment.

Indonesia's experience offers broader lessons for emerging economies confronting similar tensions between resource dependence and decarbonisation pressure. Transition durability depends on aligning climate ambition with fiscal structures, institutional credibility, and distributive justice. Green transition is neither a binary choice between development and decarbonisation nor a purely technical exercise in emissions accounting. It is a negotiated process of institutional realignment, capital reallocation, and political coalition management. The central policy challenge is therefore not whether to pursue sustainability, but how to govern it coherently so that environmental ambition becomes a platform for inclusive and investable growth.

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