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Energy Transition and Its Implications for the Structure of the National Economy

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ABSTRACT

Energy transition has emerged as a central global agenda in response to climate change, decarbonization commitments, and sustainable development objectives. In fossil fuel–dependent economies, energy transition entails not only technological change but also profound structural transformations within the national economy. This study employs a qualitative descriptive–analytical approach grounded in political economy and public policy analysis to examine the implications of energy transition for national economic structures. Drawing on policy documents, academic literature, and institutional reports, the study analyzes how energy transition reshapes sectoral composition, labor markets, value distribution, and governance dynamics. The findings indicate that energy transition alters existing economic hierarchies, redistributes power among actors, and creates both opportunities for sustainable growth and risks of socio-economic disruption. The study argues that effective energy transition requires policy frameworks that integrate economic restructuring, social justice, and institutional coordination. It concludes that energy transition should be treated as a comprehensive structural economic policy to ensure equitable and sustainable national development.
Keywords: *energy transition; national economy; political economy; public policy; sustainable development*

INTRODUCTION

The global acceleration of energy transition has positioned energy systems at the core of contemporary debates on climate change, decarbonization, and sustainable development. Rising global temperatures, increasing frequency of extreme climate events, and mounting international pressure to reduce greenhouse gas emissions have pushed countries to reconsider their dependence on fossil fuels. Energy transition, therefore, has become a strategic agenda not only for environmental protection but also for long-term economic transformation. In this context, the shift toward renewable and low-carbon energy sources is increasingly understood as a structural process that reshapes production systems, investment patterns, and governance arrangements at the national level (Adelekan et al., 2024; Yang et al., 2024).

For resource-rich developing countries such as Indonesia, energy transition presents a complex and often contradictory challenge. Indonesia's national economy has long been anchored in extractive industries and fossil energy, particularly coal, oil, and gas, which contribute significantly to export revenues, employment, and state income. At the same time, Indonesia has committed to international climate agreements and national emission reduction targets, which require a gradual but decisive shift toward renewable energy sources. This dual commitment generates structural tensions between

maintaining economic stability and pursuing environmental sustainability, making energy transition a politically sensitive and economically consequential process (Bashir et al., 2022; Sandys, 2025).

Energy transition is not merely a technical substitution of energy sources but a transformation that carries profound implications for the structure of the national economy. Changes in the energy mix affect sectoral composition, industrial value chains, labor demand, and regional development patterns. Fossil fuel–dependent regions face the risk of economic decline and job displacement, while renewable energy sectors offer new opportunities that often require different skills, infrastructure, and institutional support. Without deliberate policy intervention, these shifts may exacerbate existing inequalities and create new forms of socio-economic vulnerability (Bang et al., 2022; Mirzania et al., 2023).

Despite these implications, much of the existing literature on energy transition remains dominated by technological, environmental, and engineering perspectives. Studies frequently emphasize emission reduction pathways, renewable energy deployment, and energy efficiency improvements, while paying limited attention to the political economy of transition. As a result, the structural economic consequences of energy transition, particularly in developing economies, remain underexplored. There is a notable lack of analyses that examine how energy transition reconfigures national economic structures, redistributes economic power, and reshapes relationships between the state, market actors, and society (McEvoy, 2022; Hanto et al., 2022).

This gap is especially relevant in the Indonesian context, where energy policy is closely intertwined with national development planning, fiscal sustainability, and regional economic disparities. Energy transition policies inevitably involve competing interests among incumbent fossil fuel industries, emerging renewable energy actors, government institutions, and affected communities. These dynamics influence not only the pace of transition but also the distribution of its costs and benefits. Understanding energy transition as an economic–political process is therefore essential for assessing its broader implications for national economic restructuring (Akıner, 2025; Nora et al., 2022).

Based on these considerations, this study positions energy transition within a political economy framework to analyze its implications for the structure of the national economy. The research addresses three key questions: how energy transition influences sectoral and structural economic change; which actors and interests shape the transition process; and what policy challenges arise in managing a just and inclusive transition. By focusing on these issues, the study seeks to contribute to a more comprehensive understanding of energy transition as a structural economic phenomenon rather than a narrowly defined environmental or technological agenda.

METHODS

This study adopts a qualitative descriptive–analytical research design with a political economy and public policy approach. A qualitative method is employed because the research aims to interpret policy processes, structural economic changes, and power relations associated with energy transition rather than to quantify causal relationships. Qualitative analysis enables a deeper examination of how energy transition policies are

formulated, contested, and implemented within the broader context of national economic structures (Sugiyono, 2019).

The study relies on secondary data sources, including national energy and development policy documents, academic literature on energy transition, political economy, and public policy, as well as reports published by national and international institutions concerned with energy, climate, and economic development. Data were collected through systematic library research and document analysis, with sources selected based on their relevance, analytical depth, and credibility. This approach allows the study to capture both theoretical perspectives and policy realities surrounding energy transition (Sugiyono, 2019).

Data analysis was conducted in three stages. First, descriptive analysis was used to map the existing structure of the national economy and the main features of energy transition policies. Second, political economy analysis was applied to examine the roles, interests, and power relations among key actors, including the state, fossil energy industries, renewable energy sectors, and affected communities. Third, policy analysis was undertaken to assess the implications of energy transition for economic restructuring, labor markets, and distributional outcomes. The validity of the analysis was ensured through logical consistency, cross-referencing of sources, and coherence between research objectives, methods, and analytical findings (Sugiyono, 2019).

RESULTS AND DISCUSSION

Energy Transition within the Framework of National Political Economy

Energy transition should be understood as a political–economic process that restructures power relations, production systems, and institutional arrangements rather than as a purely technological shift. In the national context, energy systems are deeply embedded in economic interests, fiscal structures, and political coalitions that have evolved over decades. Fossil fuel–based energy regimes are supported by established infrastructures, regulatory frameworks, and vested interests that benefit from the status quo. Consequently, energy transition inevitably challenges existing economic hierarchies and redistributes power among actors, making it a contested and negotiated process rather than a linear policy pathway (McEvoy, 2022; Hanto et al., 2022).

The state plays a central role in shaping the trajectory of energy transition through regulation, fiscal policy, and strategic planning. In fossil fuel–dependent economies, the state often faces a dual role: on one hand, it is expected to lead decarbonization efforts and fulfill international climate commitments; on the other hand, it remains fiscally and politically reliant on revenues generated from extractive energy sectors. This structural contradiction constrains policy choices and creates ambivalence in the implementation of transition strategies. Energy transition policies are therefore frequently characterized by gradualism, selective incentives, and compromises designed to minimize short-term economic disruption (Bang et al., 2022; Akıner, 2025).

From a political economy perspective, incumbent fossil fuel actors possess significant structural and instrumental power. Their influence extends beyond market dominance to include lobbying capacity, employment provision, and contributions to regional economic stability. These actors often frame energy transition as a threat to economic growth, employment, and national competitiveness, thereby shaping public discourse and policy priorities. In contrast, renewable energy sectors, while growing,

typically lack comparable political leverage, particularly in developing economies where institutional support and financial access remain limited (Mirzania et al., 2023)

Energy transition thus becomes an arena of competing interests between incumbency and innovation. The pace and direction of transition are influenced by how effectively the state mediates these conflicts and aligns energy policy with broader development objectives. Where energy transition is treated as an isolated environmental agenda, it risks marginalization within national economic planning. Conversely, when embedded within an economic restructuring strategy, energy transition can serve as a catalyst for industrial diversification, technological upgrading, and long-term resilience (Sandys, 2025).

Importantly, energy transition also operates across multiple scales of governance. National policies interact with global energy markets, international climate finance, and geopolitical considerations, while local communities experience transition impacts most directly through employment shifts and changes in regional development. This multilevel nature reinforces the need to conceptualize energy transition as a political–economic transformation that reshapes the national economy both structurally and spatially (Herranz-Surrallés, 2024).

Implications of Energy Transition for the Structure of the National Economy

Energy transition has far-reaching implications for the structure of the national economy, particularly in terms of sectoral composition, labor markets, and value distribution. A shift away from fossil fuels alters the relative importance of economic sectors, gradually reducing the dominance of extractive industries while increasing the relevance of renewable energy, manufacturing, and service-based activities linked to clean technologies. This transformation affects not only energy production but also upstream and downstream industries, including transportation, construction, and industrial manufacturing (Treut et al., 2021).

One of the most immediate structural impacts of energy transition is the reconfiguration of value chains. Fossil fuel value chains are typically capital-intensive and geographically concentrated, generating high rents for specific regions and actors. In contrast, renewable energy value chains tend to be more decentralized and labor-intensive, creating opportunities for broader participation but often producing lower short-term fiscal returns. This shift has significant implications for national revenue structures and regional economic balance, particularly in countries where fossil fuel exports constitute a major source of state income (Rabbi et al., 2022).

Labor market dynamics represent another critical dimension of structural change. Energy transition reshapes employment patterns by reducing labor demand in fossil fuel sectors while increasing demand for new skills in renewable energy, digital energy systems, and energy efficiency services. However, this transformation is rarely smooth. Workers in fossil fuel industries often face skills mismatches and geographic immobility, making them vulnerable to job displacement. Without proactive labor market policies, energy transition may exacerbate unemployment and social inequality, particularly in regions heavily dependent on extractive industries (Bang et al., 2022).

Beyond sectoral and labor effects, energy transition influences the distribution of economic value and welfare. Regions that successfully attract renewable energy

investment may experience economic revitalization, while fossil fuel–dependent regions risk economic decline and stranded assets. These uneven outcomes underscore the importance of integrating energy transition into broader economic and regional development strategies rather than treating it as a sector-specific policy issue (Mirzania et al., 2023).

The table below summarizes the key structural economic implications of energy transition across major dimensions of the national economy.

Table 1. Structural Economic Implications of Energy Transition

Economic Dimension	Fossil Fuel–Based Structure	Energy Transition–Oriented Structure	Key Implications
Sectoral Composition	Dominance of extractive and carbon-intensive sectors	Expansion of renewable energy and clean technology sectors	Industrial diversification and reduced carbon dependency
Value Chains	Centralized, rent-based value creation	Decentralized and technology-driven value creation	Redistribution of economic benefits across regions
Labor Market	Stable employment in fossil fuel industries	Growing demand for green skills and services	Risk of job displacement and skills mismatch
Fiscal Structure	High dependence on fossil energy revenues	More diversified but uncertain revenue sources	Need for fiscal adaptation and new revenue models
Regional Economy	Concentration of economic activity in resource-rich areas	Potential diffusion of investment to new regions	Risk of regional inequality without policy intervention

The structural shifts outlined above demonstrate that energy transition fundamentally reconfigures the national economy. These changes create both opportunities for sustainable growth and risks of socio-economic disruption. The extent to which energy transition contributes to inclusive and balanced development depends on the capacity of public policy to manage sectoral transformation, labor adjustment, and regional disparities in a coordinated manner (Arias et al., 2023).

Public Policy Challenges in Managing a Just and Inclusive Energy Transition

Managing energy transition as a structural economic transformation presents complex public policy challenges, particularly in balancing economic stability, environmental objectives, and social justice. Energy transition policies often operate within competing policy priorities, where short-term economic growth, fiscal stability, and energy security intersect with long-term decarbonization goals. This tension is especially pronounced in fossil fuel–dependent economies, where abrupt policy shifts risk undermining macroeconomic stability and political legitimacy (Bakhsh et al., 2024; Yang et al., 2024).

One of the most significant policy challenges concerns the management of stranded assets. Investments in fossil fuel infrastructure, including power plants, mining facilities, and distribution networks, are typically designed for long operational lifespans. Accelerated decarbonization policies may render these assets economically unviable before their expected depreciation period, creating financial losses for both public and private actors. These losses can translate into fiscal pressures, banking sector vulnerabilities, and resistance from incumbent industries that seek to delay or dilute transition policies (Bang et al., 2022; Taylor et al., 2024).

Political resistance further complicates the policy landscape. Energy transition redistributes economic rents and power, weakening established coalitions while empowering emerging actors in renewable energy and clean technology sectors. Incumbent fossil fuel interests often mobilize political influence to frame transition policies as threats to employment, affordability, and national sovereignty. In response, governments may adopt incremental or ambiguous policy approaches that reduce political risk but slow the pace of structural transformation (Hanto et al., 2022; Mohammadi & Khabbazan, 2022).

Another critical challenge lies in ensuring social justice within the transition process. Energy transition policies that prioritize efficiency and emissions reduction without addressing distributional impacts risk exacerbating social inequality. Rising energy prices, employment displacement, and uneven regional development can disproportionately affect low-income households and resource-dependent regions. A just energy transition therefore requires complementary social policies, including retraining programs, regional development funds, and social protection mechanisms that mitigate adverse impacts and support affected communities (Bang et al., 2022; Vasstrøm et al., 2024).

Institutional capacity and policy coordination also play a decisive role in shaping transition outcomes. Energy transition intersects with industrial policy, labor policy, fiscal policy, and regional development planning. Fragmented governance structures and weak inter-ministerial coordination often result in policy incoherence, where energy transition objectives conflict with short-term economic or political considerations. Strengthening institutional integration and policy coherence is essential to ensure that energy transition functions as a comprehensive economic restructuring strategy rather than a narrowly defined environmental agenda (Sandys, 2025).

Finally, the design of inclusive and adaptive policy frameworks is crucial for managing uncertainty in energy transition pathways. Technological innovation, global energy market volatility, and geopolitical dynamics introduce significant uncertainty into transition planning. Flexible policy instruments, such as adaptive regulation, phased implementation, and stakeholder engagement mechanisms, can enhance policy resilience and legitimacy. By embedding justice, adaptability, and economic restructuring into policy design, governments can better manage the transformative implications of energy transition for the national economy (Arias et al., 2023; Fischer & Toffolo, 2024).

CONCLUSIONS

This study demonstrates that energy transition has profound structural implications for the national economy, extending beyond technological substitution toward a comprehensive political–economic transformation. The transition reshapes sectoral composition, labor markets, fiscal structures, and regional development

patterns, while simultaneously redistributing power among state institutions, market actors, and social groups. The findings confirm that the direction and pace of energy transition are not determined solely by technological readiness or environmental imperatives, but by political economy dynamics that mediate competing interests and policy priorities.

The analysis further reveals that energy transition policies, when treated as narrowly sectoral or environmental initiatives, risk generating economic disruption, social inequality, and political resistance. Managing stranded assets, employment displacement, and regional disparities requires integrating energy transition into broader economic restructuring and development strategies. A just and inclusive energy transition depends on policy coherence across energy, industrial, labor, and regional development domains, as well as the state's capacity to balance growth objectives, fiscal stability, and long-term sustainability.

From a policy perspective, energy transition should be designed as a structural economic policy rather than a standalone energy agenda. Policymakers are encouraged to adopt integrated and adaptive policy frameworks that align decarbonization goals with national development strategies, incorporate social protection and workforce transformation measures, and ensure equitable distribution of transition benefits. Future research is recommended to extend this qualitative political economy analysis through empirical sectoral and regional studies to assess the differentiated impacts of energy transition across economic structures and social groups.

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