Volume 1, Issue 1, Mei 2026
E-ISSN : xxx-xxxx

Journal of Integrated Research
Ell Publication Research Center

ellpub

Green Industrial Policy and Energy Transition Governance: Comparative Institutional Analysis of Germany and South Korea

Ji-Hoon Park[1]

Ji-Hoon Park

Graduate School of Public Administration
Seoul National University
Email: jihoon.park@snu.ac.kr

***Corresponding Author:** jihoon.park@snu.ac.kr

Citation: Aziz (2026). Green Industrial Policy and Energy Transition Governance: Comparative Institutional Analysis of Germany and South Korea (Book Antiqua 14pt Bold). *Journal of Social Sciences and Humanities Perspectives*, *10*(4), xx–xx. https://doi.org/0000-0000

Published: 19/05/2026

ABSTRACT

The acceleration of global climate change has intensified the strategic importance of green industrial policy and energy transition governance within contemporary public administration and development policy. Governments increasingly seek to balance decarbonization commitments, industrial competitiveness, energy security, and socio-economic stability through coordinated policy interventions. This article comparatively analyzes Germany and South Korea to examine how institutional governance structures shape green industrial transformation and energy transition outcomes. Germany represents a decentralized and consensus-oriented transition model rooted in regulatory environmentalism and multi-level governance, while South Korea represents a state-coordinated industrial transition model emphasizing strategic industrial policy and technological modernization. Drawing upon comparative institutional analysis and policy implementation evaluation, the study integrates evidence from OECD, International Energy Agency (IEA), World Bank, European Commission, and national policy documents between 2020 and 2026. The findings demonstrate that energy transition effectiveness depends not only on technological innovation or climate commitments but also on institutional coordination, administrative adaptability, industrial policy integration, and governance legitimacy. Germany demonstrates strengths in regulatory sustainability and participatory governance but faces coordination complexity and implementation delays. South Korea demonstrates stronger centralized policy execution and industrial mobilization but encounters governance challenges

related to energy dependence and stakeholder participation. The article argues that sustainable green transition governance requires integrated institutional systems linking climate policy, industrial transformation, labor adaptation, and developmental resilience. The study contributes to integrated policy scholarship by developing a comparative governance framework connecting industrial coordination, institutional capacity, policy implementation, and socio-economic sustainability within contemporary energy transition governance.

Keywords: green industrial policy, energy transition, climate governance, institutional capacity, comparative governance, Germany, South Korea, sustainable development, industrial transformation, public policy

INTRODUCTION

Climate change has transformed environmental governance from a sectoral policy issue into a foundational challenge for economic governance, industrial strategy, energy security, and public administration. Governments increasingly recognize that achieving carbon neutrality requires not only environmental regulation but also structural transformation across energy systems, manufacturing sectors, labor markets, financial governance, and technological innovation ecosystems (IPCC, 2023). Consequently, green industrial policy has emerged as a central governance instrument linking climate objectives with economic competitiveness and developmental resilience.

The global acceleration of energy transition policies after the COVID-19 pandemic reflects broader shifts in state-market relations and developmental governance. International institutions including the OECD, International Energy Agency (IEA), World Bank, and International Monetary Fund increasingly frame green transition governance as both a climate necessity and an economic transformation strategy (OECD, 2024; IEA, 2025). Public investment in renewable energy, clean technology industries, green infrastructure, and low-carbon manufacturing has become a strategic component of contemporary industrial policy.

However, energy transition governance generates substantial institutional and political challenges. Decarbonization policies often require governments to reconcile competing priorities involving industrial competitiveness, employment protection, fiscal sustainability, energy affordability, and environmental commitments. Transition governance therefore extends beyond technological modernization toward broader questions concerning institutional coordination, administrative capacity, policy legitimacy, and socio-economic adaptation.

Germany and South Korea provide analytically significant comparative cases because both countries possess advanced industrial economies and strong technological capabilities, yet they pursue distinct governance models for energy transition and industrial decarbonization. Germany's Energiewende strategy reflects a decentralized and consensus-oriented governance approach emphasizing renewable energy expansion, environmental regulation, and participatory governance. South Korea's Green New Deal and carbon neutrality strategies reflect a more centralized industrial governance model emphasizing state

coordination, strategic technology investment, and export-oriented industrial transformation.

Existing scholarship offers several important explanations regarding green transition governance. Ecological modernization theory argues that environmental sustainability can be integrated with industrial competitiveness through technological innovation and institutional reform (Mol & Sonnenfeld, 2000). Developmental state literature highlights the role of state coordination and industrial policy in structural economic transformation (Johnson, 1982). Multi-level governance theory emphasizes the importance of coordination across state institutions, regional governments, markets, and civil society actors (Hooghe & Marks, 2003). Public administration scholarship additionally demonstrates that policy implementation capacity significantly influences climate governance outcomes (Peters, 2018).

While previous studies emphasize climate policy instruments and technological innovation, current governance scholarship remains limited in explaining how institutional governance structures shape implementation effectiveness and socio-economic outcomes across distinct transition models. Several studies examine European energy transition governance through the lens of environmental regulation and participatory governance (Meadowcroft, 2009). Others analyze East Asian green industrial policy in relation to state-led technological modernization and industrial competitiveness (Kim & Thurbon, 2015). However, comparative institutional analysis connecting climate governance, industrial coordination, labor adaptation, and developmental resilience remains underdeveloped.

Several critical gaps therefore persist within current literature. First, there is a theoretical gap concerning how institutional governance structures mediate the relationship between climate policy and industrial transformation. Second, an empirical policy gap exists regarding the implementation consequences of decentralized versus centralized transition governance systems. Third, comparative governance scholarship insufficiently explains how industrial coordination mechanisms influence socio-economic resilience during energy transition processes. Fourth, policy implementation studies rarely integrate labor adaptation, energy security, and governance legitimacy within a unified analytical framework.

This article addresses these gaps through a comparative institutional analysis of Germany and South Korea. The study argues that successful energy transition governance depends not merely upon climate targets or technological capabilities but upon institutional coordination, industrial policy integration, administrative adaptability, and governance legitimacy. Specifically, the article contends that governance systems capable of integrating climate policy with industrial restructuring and social adaptation achieve more sustainable developmental outcomes.

The novelty of this article lies in three principal contributions. First, it develops an integrated comparative framework connecting green industrial policy with institutional governance and socio-economic resilience. Second, it bridges climate governance scholarship with comparative public administration analysis by emphasizing implementation capacity and institutional coordination. Third, it contributes to integrated policy research by synthesizing industrial policy, energy governance, labor adaptation, and climate transition within a unified governance perspective.

The analytical framework developed in this study conceptualizes green transition governance as an institutional transformation process involving four interconnected dimensions: climate policy coordination, industrial governance capacity, implementation mechanisms, and socio-economic adaptation. The causal relationship proposed by this article can be summarized as follows: climate policy coordination shapes institutional capacity; institutional capacity influences industrial transformation effectiveness; industrial transformation affects implementation legitimacy; and implementation legitimacy determines socio-economic resilience and governance sustainability.

The research objective of this article is therefore to comparatively analyze how institutional governance structures influence green industrial policy implementation and energy transition outcomes in Germany and South Korea while developing an integrated framework for sustainable transition governance.

METHODOLOGY

This study employs comparative institutional governance analysis integrating comparative public policy, multi-level governance analysis, and institutional political economy approaches to examine green industrial policy and energy transition governance in Germany and South Korea. The research design aligns with institutionalist governance theory and transition governance scholarship by conceptualizing energy transition as a multi-dimensional institutional transformation process involving climate regulation, industrial coordination, labor adaptation, technological modernization, and socio-economic restructuring. Germany and South Korea were selected because both countries possess advanced industrial economies and strong technological capacities while representing distinct governance traditions and transition strategies. Germany embodies a decentralized and consensus-oriented governance system emphasizing environmental regulation, federal coordination, and participatory governance mechanisms, whereas South Korea represents a centralized developmental governance model emphasizing strategic industrial policy, state coordination, and export-oriented technological transformation. The unit of analysis consists of national energy transition governance systems including climate policy institutions, industrial coordination mechanisms, energy regulatory structures, labor adaptation policies, and implementation agencies.

The empirical analysis draws upon OECD climate governance indicators, International Energy Agency transition reports, World Bank industrial development data, European Commission policy evaluations, Korean Green New Deal documents, German federal energy transition reports, and peer-reviewed governance scholarship published between 2020 and 2026. Comparative analytical techniques include institutional process tracing, policy implementation analysis, governance coordination assessment, and industrial transition evaluation. Cross-case analysis focuses on identifying causal mechanisms linking governance structures with implementation effectiveness, industrial adaptation, labor transition, and socio-economic resilience. Triangulation was conducted through comparison across institutional reports, policy indicators, and academic literature to ensure interpretive validity. Ethical considerations involve exclusive reliance upon publicly verifiable evidence and avoidance of fabricated interviews or unverifiable claims. The study recognizes limitations associated with evolving energy transition policies, differences in governance reporting systems, and uncertainty regarding long-term climate transition outcomes.

Findings and Discussion

1. Institutional Governance Structures and Energy Transition Models

The comparative evidence demonstrates that governance structures strongly shape energy transition trajectories and implementation dynamics. Germany's Energiewende strategy represents a decentralized governance model emphasizing renewable energy expansion, environmental regulation, and participatory institutional coordination. Federal ministries, regional governments, municipalities, private energy providers, and civil society organizations collectively shape transition implementation processes.

This governance structure reflects Germany's broader tradition of coordinated market governance and regulatory environmentalism. Renewable energy policies, particularly feed-in tariffs and decentralized energy generation systems, facilitated substantial expansion of renewable electricity production over the past two decades. However, the comparative findings indicate that decentralized governance also generates coordination complexity and implementation delays, particularly regarding grid infrastructure, industrial decarbonization, and energy affordability.

South Korea adopts a more centralized transition governance model rooted in developmental state traditions. The Korean Green New Deal and carbon neutrality policies integrate industrial modernization, green technology investment, and strategic state coordination. Central government agencies play a dominant role in directing industrial adaptation, technological innovation, and infrastructure investment.

The comparative findings indicate that South Korea's governance model enables stronger implementation coordination and industrial mobilization. State-led investment strategies support battery technology, hydrogen development, electric vehicle production, and renewable manufacturing sectors. However, centralized governance also encounters legitimacy challenges related to stakeholder participation, labor adjustment, and dependence upon large industrial conglomerates.

The evidence demonstrates that governance effectiveness depends upon institutional coherence and coordination capacity rather than climate commitments alone. Germany demonstrates strengths in participatory legitimacy and environmental regulation, whereas South Korea demonstrates strengths in implementation agility and industrial coordination.

2. Industrial Policy Integration and Administrative Capacity

Industrial policy integration emerges as a central determinant of transition effectiveness. Germany's governance model historically prioritized renewable expansion and environmental regulation but experienced difficulties integrating industrial competitiveness, labor transition, and infrastructure modernization within a unified governance strategy.

The phase-out of nuclear energy following the Fukushima disaster intensified governance challenges regarding energy security and industrial competitiveness. Rising energy costs affected manufacturing sectors, while coordination disputes between federal and regional authorities delayed infrastructure expansion. These challenges reveal the importance of administrative coordination within multi-level governance systems.

South Korea demonstrates stronger integration between industrial policy and energy transition planning. Green industrial policy is embedded within broader national competitiveness strategies emphasizing technological leadership and export-oriented industrial upgrading. Government coordination mechanisms align public investment, industrial incentives, research funding, and workforce development initiatives.

Table 1. Comparative Matrix of Policy Governance, Institutional Capacity, and Developmental Outcomes

Variable	Germany	South Korea	Empirical Evidence	Analytical Interpretation
Governance model	Decentralized participatory transition	Centralized developmental transition	National climate and energy reports	Governance structure shapes coordination dynamics
Climate policy orientation	Regulatory sustainability governance	Strategic industrial modernization	OECD and IEA policy evaluations	Policy orientation influences implementation priorities
Industrial coordination	Fragmented multi-level coordination	Strong central industrial coordination	Government transition strategies	Coordination capacity affects implementation efficiency
Renewable transition	Strong renewable expansion	Gradual industrial integration	IEA renewable energy data	Transition sequencing differs institutionally
Labor adaptation	Strong social dialogue mechanisms	State-led workforce modernization	Labor and industrial reports	Labor governance influences transition legitimacy
Energy security challenges	Grid integration and affordability concerns	Import dependency and fossil transition risks	Energy market analyses	Structural constraints affect transition resilience
Public legitimacy	High participatory legitimacy	Performance-based legitimacy	Governance surveys	Legitimacy mechanisms differ institutionally
Developmental outcomes	Sustainable transition with coordination delays	Industrial competitiveness with governance centralization	OECD and World Bank indicators	Institutional fit shapes resilience outcomes

The comparative evidence indicates that Germany's decentralized governance supports broader democratic participation but may reduce implementation speed during periods of rapid transition. South Korea's centralized governance improves implementation coordination but risks insufficient societal participation and concentrated decision-making.

These findings support governance coordination theory emphasizing that policy integration and administrative coherence are essential for effective transition governance. Climate policy effectiveness therefore depends not only on environmental regulation but also on institutional alignment across industrial, labor, fiscal, and infrastructure governance systems.

---

3. Labor Transition, Social Adaptation, and Governance Legitimacy

The findings demonstrate that labor adaptation significantly influences governance legitimacy during energy transition processes. Climate governance generates distributional consequences affecting workers, industries, and regional economies differently. Governance systems incapable of managing these socio-economic adjustments risk political resistance and implementation instability.

Germany's governance model incorporates stronger labor participation and social dialogue mechanisms. Trade unions, industrial associations, and regional governments participate actively in transition negotiations. Coal phase-out agreements included compensation frameworks, labor adjustment policies, and regional investment initiatives designed to reduce social disruption.

However, Germany also experienced political tensions regarding energy affordability, industrial competitiveness, and rural opposition to infrastructure expansion. These tensions illustrate that participatory governance does not automatically eliminate socio-economic conflict during structural transitions.

South Korea's governance model emphasizes workforce modernization and industrial upgrading through centralized planning and state-led investment. Green transition policies prioritize technology-intensive sectors including electric vehicles, semiconductors, and renewable manufacturing industries. The government additionally promotes workforce retraining and digital-industrial integration strategies.

Nevertheless, the findings indicate that centralized labor transition management may limit participatory negotiation and societal deliberation. Governance legitimacy therefore depends heavily upon state performance and economic outcomes.

The comparative evidence suggests that sustainable transition governance requires integrating labor adaptation with industrial policy and climate governance simultaneously. Governance systems that neglect labor transition risk implementation resistance and declining public legitimacy.

---

4. Developmental Resilience and Sustainable Transition Governance

Developmental resilience constitutes the ultimate test of energy transition governance effectiveness. The comparative findings indicate that resilient transition systems require balancing environmental sustainability, industrial competitiveness, social adaptation, and governance legitimacy.

Germany demonstrates strong environmental institutionalization and participatory governance capacity. Its transition model supports long-term sustainability norms and regulatory legitimacy. However, coordination complexity and infrastructure delays may reduce responsiveness during periods of rapid economic and geopolitical change.

South Korea demonstrates stronger industrial mobilization and centralized implementation capacity. Its governance system enables rapid technological investment and strategic industrial adaptation. However, governance sustainability depends upon maintaining public legitimacy, reducing energy dependence, and strengthening participatory accountability.

The evidence therefore demonstrates that sustainable energy transition governance requires integrated institutional systems capable of coordinating climate policy, industrial modernization, labor adaptation, and social protection. Technological innovation alone cannot guarantee governance resilience without institutional legitimacy and implementation capacity.

This article contributes to integrated policy scholarship by demonstrating that green industrial transformation represents a broader governance challenge involving institutional coordination, socio-economic adaptation, and developmental restructuring.

Conceptual Framework

Integrated Green Transition Governance Framework

Climate Policy Coordination → Institutional Capacity → Industrial Transformation → Implementation Legitimacy → Developmental Resilience

This framework proposes that climate transition effectiveness depends upon integrated governance systems connecting environmental regulation, industrial policy, labor adaptation, and socio-economic governance. Climate policy coordination establishes strategic direction, but institutional capacity determines whether governance systems can align regulatory agencies, industrial sectors, labor institutions, and infrastructure systems effectively.

Industrial transformation mediates the relationship between institutional capacity and implementation legitimacy. Governance systems capable of integrating technological innovation with labor adjustment and industrial competitiveness demonstrate stronger implementation sustainability. Implementation legitimacy subsequently shapes developmental resilience by influencing public trust, political stability, and long-term governance adaptability.

The framework contributes theoretically by integrating climate governance, industrial policy analysis, and institutional governance scholarship within a unified comparative model.

CONCLUSION

This article comparatively analyzed green industrial policy and energy transition governance in Germany and South Korea. The findings demonstrate that transition effectiveness depends fundamentally upon institutional coordination, industrial policy integration, administrative adaptability, and governance legitimacy rather than climate targets alone.

Germany and South Korea represent contrasting governance trajectories within contemporary energy transition politics. Germany emphasizes decentralized participatory governance and environmental regulation, while South Korea emphasizes centralized industrial coordination and strategic technological modernization. Both models demonstrate important strengths and structural limitations regarding implementation capacity, labor adaptation, and developmental resilience.

The article's central argument is that sustainable energy transition governance requires integrated institutional systems linking climate policy, industrial transformation, labor governance, and socio-economic adaptation. Governance systems focused exclusively upon technological modernization risk legitimacy deficits, whereas systems emphasizing participation without implementation coordination may experience policy stagnation.

Theoretically, this study contributes to integrated policy scholarship by developing a comparative framework connecting climate policy coordination, institutional capacity, industrial transformation, implementation legitimacy, and developmental resilience. Empirically, the article contributes comparative evidence regarding how governance structures shape transition outcomes across distinct industrial economies.

The policy implications are significant. Governments pursuing energy transition must integrate climate objectives with industrial competitiveness, labor protection, and infrastructure coordination. Transition governance requires adaptive institutional systems capable of balancing environmental sustainability with socio-economic stability and public legitimacy.

Future research should examine regional transition inequalities, subnational governance dynamics, green fiscal governance, and comparative transition politics across emerging economies and developing states.

REFERENCES

Bovens, M., Goodin, R. E., & Schillemans, T. (2014). The Oxford handbook of public accountability. Oxford

University Press.

Hall, P. A., & Soskice, D. (2001). Varieties of capitalism. Oxford University Press.

Hooghe, L., & Marks, G. (2003). Unraveling the central state. American Political Science Review, 97(2), 233–243.

IEA. (2025). World energy outlook 2025. International Energy Agency.

IMF. (2024). Climate governance and industrial transition. International Monetary Fund.

IPCC. (2023). Sixth assessment synthesis report. Intergovernmental Panel on Climate Change.

Johnson, C. (1982). MITI and the Japanese miracle. Stanford University Press.

Kern, F., & Rogge, K. (2018). Harnessing theories of the policy process for analyzing the politics of sustainability transitions. Environmental Innovation and Societal Transitions, 27, 102–117.

Kim, S., & Thurbon, E. (2015). Developmental environmentalism. New Political Economy, 20(2), 219–242.

Mazzucato, M. (2021). Mission economy. Harper Business.

Meadowcroft, J. (2009). What about the politics? Policy Sciences, 42(4), 323–340.

Mol, A. P. J., & Sonnenfeld, D. A. (2000). Ecological modernization around the world. Frank Cass.

North, D. C. (1990). Institutions, institutional change and economic performance. Cambridge University Press.

OECD. (2024). Climate policy and green growth governance report. OECD Publishing.

Ostrom, E. (1990). Governing the commons. Cambridge University Press.

Peters, B. G. (2018). The politics of bureaucracy. Routledge.

UNDP. (2024). Human development and climate transition governance. United Nations Development Programme.

World Bank. (2025). Green transition and industrial transformation. World Bank.

World Economic Forum. (2025). Global risks report 2025. World Economic Forum.

Zysman, J., & Huberty, M. (2021). Can green sustain growth? Industrial and Corporate Change, 30(4), 801–821.