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Corporate Compliance with Net-Zero Target and Environmental Regulations: Lessons from South Korea for Indonesia

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Abstract. This study examines corporate compliance with net-zero emissions targets and environmental regulations in Indonesia and South Korea, with the aim of exploring lessons Indonesia can apply from South Korea's experience. The study uses a comparative, descriptive qualitative approach, with data collected through a review of legal documents, government regulations, corporate reports, scientific journals, and international publications. The analysis focuses on comparing Indonesia's voluntary compliance system, which still relies on fiscal incentives and non-sanction evaluations, with South Korea's mandatory compliance system through the Framework Law on Carbon Neutrality and Green Growth and the Korea Emissions Trading Scheme (K-ETS). The results show that South Korea's success in encouraging corporate compliance with net-zero is supported by a binding legal framework, integrated ESG reporting, and digital emissions monitoring. Meanwhile, Indonesia is still in the policy commitment stage. The study recommends strengthening the net-zero legal framework, integrating ESG-based reporting systems.

Keywords: Corporate Compliance, Environmental Regulation, Net-Zero Emissions, Carbon Neutrality.

Abstrak. *Studi ini mengkaji kepatuhan korporasi terhadap target emisi nol bersih dan regulasi lingkungan di Indonesia dan Korea Selatan, dengan tujuan mengeksplorasi pembelajaran yang dapat diterapkan Indonesia dari pengalaman Korea Selatan. Studi ini menggunakan pendekatan kualitatif deskriptif komparatif, dengan data dikumpulkan melalui studi dokumen hukum, regulasi pemerintah, laporan korporasi, jurnal ilmiah, dan publikasi internasional. Analisis berfokus pada perbandingan sistem kepatuhan sukarela Indonesia, yang masih bergantung pada insentif fiskal dan evaluasi non-sanksi, dengan sistem kepatuhan wajib Korea Selatan melalui Undang-Undang Kerangka Kerja tentang Netralitas Karbon dan Pertumbuhan Hijau serta Skema Perdagangan Emisi Korea (K-ETS). Hasil penelitian menunjukkan bahwa keberhasilan Korea Selatan dalam mendorong kepatuhan korporasi terhadap nol bersih didukung oleh dasar hukum yang mengikat, pelaporan ESG terintegrasi, dan pemantauan emisi digital. Sementara itu, Indonesia masih dalam tahap komitmen kebijakan. Studi ini merekomendasikan penguatan kerangka hukum nol bersih, integrasi sistem pelaporan berbasis ESG.*

Kata kunci: *Kepatuhan Perusahaan, Regulasi Lingkungan, Emisi Nol Bersih, Netralitas Karbon.*

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1. Introduction

The issue of climate change has become an urgent global priority, demanding shared responsibility from various actors, including the corporate sector as the largest emitter.[1] According to the Intergovernmental Panel on Climate Change (IPCC) report, Global Greenhouse Gas (GHG) emissions must reach net-zero by mid-century to limit global warming below 1.5°C, as mandated by the 2015 Paris Agreement.[2] Developing and developed countries alike face this challenge, with corporations playing a key role in mitigating emissions through compliance with environmental regulations and contributing to Net-Zero Emissions (NZE) targets.[3] In this context, governments have a strategic role to ensure corporations comply with environmental regulations and contribute to NZE targets through robust legal frameworks, fiscal incentives, and enforcement mechanisms.[4]

Indonesia, as a developing country with significant GHG emissions from the energy and forestry sectors, has set a NZE target of 2060 or sooner, as stated in Presidential Regulation Number 98 of 2021 concerning the Implementation of Carbon Economic Value[5] and Law Number 32 of 2009 concerning Environmental

[1] Ioannis Dafnomilis et al., "Achieving net-zero emissions targets: An analysis of long-term scenarios using an integrated assessment model," *Annals of the New York Academy of Sciences* 1522, no. 1 (2023): 99. See also, Daniel Esty, and Nathan de Arriba-Sellier, "Zeroing in on Net-Zero: Matching Hard Law to Soft Law in Corporate Climate Pledges," *University of Colorado Law Review* 94, no. 3 (2023): 645; Thomas Hale et al., "Assessing the rapidly-emerging landscape of net zero targets," *Climate Policy* 22, no. 1 (2022): 21.

[2] Heleen L. Van Soest et al., "Net-zero emission targets for major emitting countries consistent with the Paris Agreement," *Nature communications* 12, no. 1 (2021): 2140. See also, Ms Florence Jaumotte et al., *Mitigating climate change: Growth-friendly policies to achieve net zero emissions by 2050,* (Washington: International Monetary Fund, 2021), 23.

[3] Zola Berger-Schmitz et al., "What explains firms' net zero adoption, strategy and response," *Business Strategy and the Environment* 32, no. 8 (2023): 5588. See also, Anita Foerster, and Michael Spencer, "Corporate net zero pledges: a triumph of private climate regulation or more greenwash," *Griffith Law Review* 32, no. 1 (2023): 121; Alperen A. Gözlügöl, and Wolf-Georg Ringe, "Private companies: the missing link on the path to net zero," *Journal of Corporate Law Studies* 22, no. 2 (2022): 892.

[4] Hail Jung et al., "Carbon emission regulation, green boards, and corporate environmental responsibility," *Sustainability* 13, no. 8 (2021): 4466. See also, Hyunah Lee, and Jaehong Lee, "Industry competition, corporate governance, and voluntary disclosure of greenhouse gas emissions information: evidence from South Korea," *International Journal of Environmental Research and Public Health* 19, no. 23 (2022): 16272; Jae-Hyup Lee, and Jisuk Woo, "Green new deal policy of South Korea: Policy innovation for a sustainability transition," *Sustainability* 12, no. 23 (2020): 10194.

[5] Ministry of Finance, "Presidential Regulation Number 98 of 2021 concerning the Implementation of Carbon Economic Values to Achieve Nationally Determined Contribution

Protection and Management (*Perlindungan dan Pengelolaan Lingkungan Hidup*/PPLH).[6] This target aligns with Indonesia's enhanced Nationally Determined Contributions (NDCs), which target emission reductions of up to 43.2% with international support by 2030.[7] However, corporate compliance in Indonesia still relies on fiscal incentives and voluntary mechanisms, such as a carbon tax whose implementation is delayed until 2025 and a newly developed carbon trading scheme.[8] This contrasts with South Korea, which is targeting carbon neutrality by 2050 through the Framework Act on Carbon Neutrality and Green Growth,[9] which strengthens corporate obligations in carbon emissions reporting, mitigation, and adaptation.[10] In South Korea, compliance is mandatory with a system of administrative sanctions and emission disclosure obligations through the Korea Emission Trading Scheme (K-ETS).[11]

Targets and Control Greenhouse Gas Emissions in National Development*," Ministry of Finance,* October 29, 2021. Retrieved in July 23, 2025 https://jdih.kemenkeu.go.id/dok/4595a8a6-1434-4005-27aa-08d9ad8bea9c. See also, Presidential Regulation of the Republic of Indonesia, "Presidential Regulation of the Republic of Indonesia no. 98 of 2021 concerning the Implementation of Carbon Economic Values for the Achievement of Nationally Determined Contribution Targets and Control of Greenhouse Gas Emissions in National Development." *Database Peraturan*, 29 Oktober 2021. Retrieved in July 24, 2025 from https://peraturan.bpk.go.id/Details/187122/perpres-no-98-tahun-2021

[6] President of the Republic of Indonesia, "Law of the Republic of Indonesia no. 32 of 2009 concerning Environmental Protection and Management," *Database Peraturan*, 03 Oktober 2009. Retrieved in July 24, 2025 from https://jdih.esdm.go.id/common/dokumen-external/UU%2032%20Tahun%202009%20%28PPLH%29.pdf.

[7] Emy Handayani, and Vallen Maharani, "Harmonizing Indonesia's Regulatory Framework on Energy Transition to Balance Green Goals and Economic Growth," In *IOP Conference Series: Earth and Environmental Science* 1537, no. 1, (2025): 12003. See also, Budy P. Resosudarmo et al., "Prospects of energy transition in Indonesia," *Bulletin of Indonesian Economic Studies* 59, no. 2 (2023): 152.

[8] Siti Rahma Novikasari, and Siti Ruhama Mardhatillah, "The Challenges of Carbon Tax Adoption in Indonesia: The Legal System Perspective," In *Prosiding Seminar Nasional Hukum Perdata* (Yogyakarta: Universitas Islam Indonesia, 2020), 45. See also, Yati Nurhayati et al., "Carbon Pricing Policy to Support Net Zero Emission: A Comparative Study of Indonesia, Finland and Sweden," *Environmental Policy and Law* 54, no. 1 (2024): 55.

[9] Republic of Korea, "Framework Act on Carbon Neutrality and Green Growth for Coping with Climate Crisis*" Ministry of Environment.* September 24, 2021. Retrieved in July 12, 2025 from https://elaw.klri.re.kr/eng_mobile/viewer.do?hseq=59958&key=39&type=part.

[10] Jung et al., "Carbon emission regulation," 4467. See also, Lee, and Lee, "Industry competition, corporate governance," 16279; Lee, and Woo, "Green new deal policy," 10195.

[11] InfluenceMap, "Corporate influence on the Korea Emissions Trading Scheme: An InfluenceMap briefing," *InfluenceMap,* May, 2025. Retrieved in July 21, 2025 from https://influencemap.org/report/Korea_ETS_and_Corporate_Influence. See also, Republic of Korea, "Act on the Allocation and Trading of Greenhouse-Gas Emission Permits*," Republic of Korea,* May 14, 2012. Retrieved in July 21, 2025 from https://elaw.klri.re.kr/eng_mobile/viewer.do?hseq=24561&key=&type=new; International Carbon Action Partnership, "Korea Emissions Trading System (K-ETS) – General Information,"

Beyond domestic differences, both countries have developed an international cooperation framework for carbon emission reduction. Indonesia and South Korea affirmed their cooperation through Article 6 of the Paris Agreement, which allows for the International Transfer of Mitigation Outcomes (ITMO) to support emission reduction projects.[12] This bilateral cooperation includes collaboration between companies in both countries on low-carbon projects, supported by subsidies from the South Korean Ministry of Trade, Industry, and Energy (MOTIE), similar to the Joint Crediting Mechanism (JCM) between Indonesia and Japan since 2013. This situation demonstrates that corporate compliance depends not only on national regulations but also on international commitments that influence corporate governance and accountability towards NZE targets.

Over the past decade, the literature on the transition to Net Zero Emissions (NZE) has grown rapidly, encompassing economic, technological, and environmental governance aspects across various countries. However, amidst these numerous studies, a significant research gap exists in the context of comparing the legal frameworks and corporate compliance mechanisms between Indonesia and South Korea. This issue is increasingly important given the two countries' differing levels of ambition and regulatory approaches to carbon neutrality targets, as well as legal structures that reflect contrasting institutional capacities and compliance cultures.

Most research on the energy transition in Indonesia still focuses on technical and economic aspects, such as renewable energy development, carbon tax mechanisms, and fiscal policies supporting decarbonization.[13] These studies

International Carbon Action Partnership, 8 September 2025. Retrieved in July 22, from 2025 https://icapcarbonaction.com/system/files/ets_pdfs/icap-etsmap-factsheet-47.pdf.

[12] Coordinating Ministry for Economic Affairs of the Republic of Indonesia, "Implementing Article 6 of the Paris Agreement, Indonesia and South Korea agree to cooperate in reducing carbon emissions [Press release No. HM.4.6/203/SET.M.EKON.3/06/2024]," *Coordinating Ministry for Economic Affairs of the Republic of Indonesia*, Juny 6, 2024. Retrieved in July 23, 2025 from https://www.ekon.go.id/publikasi/detail/5813/tanda-tangani-perjanjian-bersejarah-indonesia-dan-13-negara-mitra-sukses-mendorong-ekonomi-bersih-dan-adil.

[13] Harun Ardiansyah et al., "Bridging the Gap between Policy and Net-Zero Realization in Indonesia: An Outlook of Available Approaches," In *Journal of Physics: Conference Series* 2828, no. 1, (IOP Publishing, 2024), 12003. See also, Kamia Handayani et al., "Moving beyond the NDCs: ASEAN pathways to a net-zero emissions power sector in 2050," *Applied Energy* 311, no. 23 (2022): 1185; Satria Putra Kanugrahan et al., "Techno-economic analysis of Indonesia power generation expansion to achieve economic sustainability and net zero carbon 2050." *Sustainability* 14, no. 15 (2022): 9038; Yudiawan Fajar Kusuma et al., "Navigating challenges on the path to net zero emissions: a comprehensive review of wind turbine technology for implementation in Indonesia," *Results in Engineering* 22, no. 7 (2024): 1020; Nadhilah Reyseliani et al., "Power sector decarbonisation in developing and coal-producing countries: A case study of Indonesia," *Journal of Cleaner Production* 454, no. 8 (2024): 142202; David Firnando Silalahi et al., "100% renewable

highlight the importance of green investment and the role of the private sector in accelerating the transition, but they lack discussion of how legal frameworks can ensure substantive, rather than merely declarative, compliance. On the other hand, the Indonesian legal system still relies on voluntary mechanisms and incentive-based approaches, rather than on strict legal obligations with clear oversight and sanctions.

In contrast, South Korea has built a stronger and more integrated regulatory system through the Framework Act on Carbon Neutrality and Green Growth for Coping with the Climate Crisis, as well as the Korea Emission Trading Scheme (K-ETS), which serves as a regional example of implementing mandatory compliance for high-emission industrial sectors.[14] Research in Korea generally emphasizes evaluating the effectiveness of national policies and corporate oversight mechanisms,[15] but rarely examines their relevance for developing countries like Indonesia. Yet, cross-border learning is key to building a compliance system that is not only adaptive to the economic context but also strengthens legal legitimacy and public accountability.[16] Furthermore, literature discussing bilateral cooperation within the context of Article 6 of the Paris Agreement indicates that the potential for technology transfer and carbon credit mechanisms between Indonesia and South Korea remains underutilized.[17] Existing research focuses more on the technical aspects of technology transfer, without examining the legal and governance dimensions of cross-border corporate accountability.[18] In fact, in the context of NZE implementation, success is determined not only by technological capacity but also by the extent to which legal norms and oversight mechanisms can

electricity in Indonesia," *Energies* 17, no. 1 (2023): 5; Yudha Irmansyah Siregar, "Pathways towards net-zero emissions in Indonesia's energy sector," *Energy* 308 (2024): 133015.

[14] Suhyun Cho et al., "Is South Korea's 2050 Carbon-Neutral scenario sufficient for meeting greenhouse gas emissions reduction goal," *Energy for Sustainable Development* 80, no. 11 (2024): 1014. See also, Jung et al., "Carbon emission regulation," 4469; Lee, and Woo, "Green new deal policy," 10196.

[15] Jihyung Joo et al., "Contested net-zero target setting in a transitioning country: The case of South Korea," *Futures* 147, no. 8 (2023): 1031. See also, Lee, and Lee, "Industry competition, corporate governance," 16274; Hanju Lee et al., "Decarbonization pathways for Korea's industrial sector towards its 2050 carbon neutrality goal," *Journal of Cleaner Production* 476 (2024): 143749.

[16] Soohong Eum, "Conversion of the green mission for transformation-oriented industrial innovation: Green Growth and 2050 Carbon Neutrality in South Korea," In *Transformative Mission-Oriented Innovation Policies* (New York: Edward Elgar Publishing, 2025), 182. See also, Changgi Min, and Heejin Kim, "A Practical Framework for Developing Net-Zero Electricity Mix Scenarios: A Case Study of South Korea," *Energies* 17, no. 4 (2024): 926.

[17] Coordinating Ministry for Economic Affairs of the Republic of Indonesia, "Implementing Article 6," *Coordinating Ministry for Economic Affairs of the Republic of Indonesia,* June 6, 2024.

[18] Mailinda Yuniza et al., "Revisiting just energy transition in Indonesia energy transition policy," *The Journal of World Energy Law & Business* 17, no. 2 (2024): 120.

ensure substantive compliance with the principles of climate justice and just transition.[19]

This research gap is becoming increasingly relevant given the growing global pressure for developing countries to adopt transition models that are not only economically efficient but also socially just and legally responsible. In the Indonesian context, the need to strengthen the legal framework and corporate oversight mechanisms to achieve NZE is particularly pressing, particularly given the high dependence on fossil fuels and weak environmental law enforcement.[20]

Therefore, this study seeks to fill this gap through a comparative legal analysis between Indonesia and South Korea. The primary focus is on how the corporate compliance legal framework, sanction mechanisms, and oversight model can be implemented or adapted to strengthen energy transition governance in Indonesia. Through an analysis of environmental regulations and corporate compliance systems, this article assesses the potential for adopting the South Korean legal model to enhance accountability towards NZE targets. This approach enriches the discourse on just and effective energy transition policies in developing Asian countries.[21]

The objective of this research is to analyze and compare the effectiveness of the corporate compliance legal frameworks between Indonesia and South Korea in supporting the achievement of net-zero emissions targets. Based on this, the research questions are formulated as follows:

1. What is the legal framework governing corporate compliance with net-zero targets in Indonesia and South Korea?
2. What are the mechanisms for monitoring and enforcing corporate environmental regulatory violations in both countries?
3. What lessons can Indonesia learn from South Korea's experience in encouraging corporate compliance with net-zero targets?

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[19] Andrés Fuentes Hutfilter et al., "Rural transitions to net zero GHG emissions in Korea," *OECD Regional Development Papers* 2, no. 3 (2023): 24. See also, Akihisa Mori et al., "Policy Struggles Toward Net Zero CO2 Emissions in Indonesia: A Political Economic Perspective," In *The Climate–Energy–Land Nexus in Indonesia* (Routledge: Routledge, 2023), 43; Alexander Zahar, and Laely Nurhidayah, "Legal constraints on policymaking for the reduction of greenhouse gas emissions from agriculture in Indonesia," *Climate Law* 13, no. 2 (2023): 121.

[20] Iqbal, and Hilmi Rayhannafi, "Legal politics toward natural energy: Natural gas utilization in Indonesia," *Journal of Sustainable Development and Regulatory Issues (JSDERI)* 1, no. 1 (2023): 26. See also, Nurhayati et al., "Carbon Pricing Policy," 56; Sinta Wahyu Purnama Sari, and Widya Krulinasari, "Carbon Trading According to International Law and Its Implementation in Indonesia," *Fiat Justisia: Jurnal Ilmu Hukum* 9, no. 2 (2015): 553.

[21] Ardiansyah et al., "Bridging the Gap," 12005. See also, Handayani et al., "Moving beyond the NDCs," 1188; Hutfilter et al., "Rural transitions to net zero," 24; Zahar, and Nurhidayah, "Legal constraints on policymaking," 123.

2. Research Methods

This study uses a comparative descriptive qualitative approach to analyze corporate compliance with net-zero targets and environmental regulations in Indonesia and South Korea. Primary data were collected through a study of legal and policy documents, including laws, presidential regulations, regulations related to ESG disclosure, and corporate oversight documents such as Corporate Performance Rating Assessment Program (*Program Penilaian Peringkat Kinerja Perusahaan*/PROPER) in Indonesia and K-ETS and KECO policies in South Korea. Secondary data were also obtained from scientific journal articles, international reports, policy briefs, and official government publications relevant to the energy transition, carbon taxes, and corporate emissions disclosure. Data analysis was conducted through a comparative study comparing the legal frameworks, oversight mechanisms, and corporate compliance practices in both countries. This approach allows for the identification of differences between voluntary and mandatory compliance, as well as an evaluation of the effectiveness of legal instruments and enforcement mechanisms. The results of the analysis were then synthesized to provide policy recommendations for Indonesia, particularly in strengthening the legal basis for net-zero, integrating ESG reporting, and digitizing emissions monitoring.

3. Results and Discussion

3.1. Legal Framework for Corporate Compliance with Net-Zero Targets

In Indonesia, the primary regulations governing corporate compliance with net-zero targets consist of several legal instruments. First, Law Number 32 of 2009 concerning Environmental Protection and Management (*Perlindungan dan Pengelolaan Lingkungan Hidup*/PPLH), which requires every business activity to have an Environmental Impact Analysis and comply with environmental quality standards.[22] This instrument serves as the foundation for ensuring corporations account for the emissions impacts of their operations, although it still relies on an administrative approach rather than specific emission targets.[23]

[22] President of the Republic of Indonesia, "Law of the Republic," *Database Peraturan*, 03 Oktober 2009.

[23] Riswandha Imawan, and Rehulina Rehulina, "Legal Aspects of Indonesia's Obligation to Use Renewable Energy," *Jambe Law Journal* 5, no. 2 (2022): 232. See also, I. Gusti Ayu Putri Kartika et al., "Quo Vadis Energy Legal Policy towards Equitable and Sustainable Development in Indonesia," *Law Reform* 21, no. 2 (2025): 274.

Second, Presidential Regulation Number 98 of 2021 introduces the Carbon Economic Value (ECV) mechanism, including carbon trading and a carbon tax.[24] This mechanism aims to encourage corporations to reduce emissions through economic incentives, but its implementation still faces challenges, such as the delay in the carbon tax until 2025.[25]

Third, Law Number 40 of 2007 concerning Limited Liability Companies, specifically Article 74, mandates the implementation of Corporate Social Responsibility (CSR) for companies operating in the natural resources sector. This CSR encompasses environmental responsibilities, but is often voluntary and poorly integrated with NZE targets, leading to regulatory asymmetry.[26]

However, the various legal instruments issued in Indonesia are not fully aligned to support the achievement of the Net-Zero Emissions (NZE) target. Existing regulations still tend to be oriented towards administrative compliance, such as reporting and licensing, without ensuring substantive compliance with real emission reductions at the corporate level.[27] Furthermore, the carbon tax scheme stipulated in Law Number 7 of 2021 concerning the Harmonization of Tax Regulations is still implemented on a limited basis, with limited sector coverage.[28]

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[24] Ministry of Finance, "Presidential Regulation Number 98 of 2021*," Ministry of Finance,* October 29, 2021. See also, Presidential Regulation of the Republic of Indonesia, "Presidential Regulation of Republic," *Database Peraturan*, 29 Oktober 2021.

[25] Novikasari, and Mardhatillah, "The Challenges of Carbon," 46. See also, Komang Adi Kurniawan Saputra et al., "Potential Carbon Tax in Indonesia: A Literature Review." *International Journal of Environmental, Sustainability, and Social Science* 4, no. 6 (2023): 1671; Wahri, M. Sunanda et al., "Advancing the Carbon Pricing Framework in Indonesia: A Systematic Review of Policies, Challenges, and Global Lessons," *Results in Engineering* (2025): 10715; Wahri, M. Sunanda et al., "Carbon tax and trading mechanisms for emission reduction in the Indonesian power sector," *Cleaner Engineering and Technology* (2025): 1014.

[26] Dinda Keumala et al., "Indonesia's Sustainable Green Economy Policy in the Energy Sector: Challenges and Expectations," *Jurnal Media Hukum* 32, no. 1 (2025): 12. See also, Ardiansyah et al., "Bridging the Gap," 12007; Alfian Massagony et al., "Political economy of energy policy in Indonesia towards net zero emissions by 2060," *Energy for Sustainable Development* 88 (2025): 1017; Handayani, and Maharani, "Harmonizing Indonesia's Regulatory," 12005.

[27] Muhamad Haikal Mujamil et al., "The Urgency of the Newest Renewable Energy Law in International Law Perspective," *Tirtayasa Journal of International Law* 2, no. 2 (2023): 183. See also, Mori et al., "Policy Struggles Toward Net," 43; Nurhayati et al., "Carbon Pricing Policy," 57; Hannisa Oktora Putri, and Riauli Susilawaty Hutapea, "Analysis of implementation of carbon tax policy in efforts to address climate change issues with studies in Australia, Japan, Colombia, and Indonesia," *Indonesian Journal of Economics and Management* 4, no. 2 (2024): 306; Rakotoarisoa Maminiaina Heritiana Sedera, "The implementing a carbon tax as a means of increasing investment value in Indonesia," *Journal of Sustainable Development and Regulatory Issues (JSDERI)* 1, no. 2 (2023): 42.

[28] Directorate General of Taxes, "Indonesia's Carbon Tax Implementation," *Ministry of Finance of the Republic of Indonesia,* October 24, 2023. Retrieved in July 5, 2025 from https://www.financeministersforclimate.org/sites/cape/files/inline-files/2.1%20Hestu%20Yoga_Revisi_Update_Indonesia%27s%20Carbon%20Tax.pdf. See also,

The implementation of the carbon tax, originally planned for 2022, has been delayed due to the unpreparedness of the industrial sector and the need for harmonization of environmental and fiscal regulations.[29] This situation has created inconsistencies in the implementation of energy transition policies, as dependence on coal remains very high. Several studies emphasize the need for legal harmonization and policy consistency to ensure Indonesia's actions align with its Nationally Determined Contribution (NDC) commitments and the 2060 NZE target.[30] Indonesia's legal framework has also integrated international elements through the ratification of the Paris Agreement and the renewal of its Enhanced Nationally Determined Contribution (ENDC) commitment, which targets a 31.89% emission reduction through domestic efforts and up to 43.20% with international support.[31] However, corporate compliance with this target still relies on voluntary incentives, such as the Just Energy Transition Partnership (JETP) scheme, which faces socio-economic challenges due to the lack of comprehensive guidelines for early retirement of coal-fired power plants.[32]

Another obstacle arises from the lack of cross-ministerial coordination, particularly between the Ministry of Finance and the Ministry of Environment and Forestry, in determining the basis and implementation mechanisms for the carbon

Salsabila Yasmin Qanita, and Diani Sadiawati, "Carbon Tax Regulation in Indonesia: A Comparative Review with Singapore," *Awang Long Law Review* 7, no. 2 (2025): 342; Muhammad Shohihul Wahyu Muzakki, "*Pajak* karbon, solusi pendanaan APBN yang berkelanjutan*?* Direktorat Jenderal Pajak," *Direktorat Jnederal Pajak*, Januari 8, 2025. Retrieved in July 09, 2025 from https://www.pajak.go.id/index.php/id/artikel/pajak-karbon-solusi-pendanaan-apbn-yang-berkelanjutan.

[29] Dyah Maya Nihayah et al., "CO2 emissions in Indonesia: the role of urbanization and economic activities towards net zero carbon," *Economies* 10, no. 4 (2022): 74. See also, Sari, and Krulinasari, "Carbon Trading According," 555; Erwin Syahruddin et al., "Carbon Trading as a New Paradigm for Indonesia's Polluter Pays Principle," *Journal of Law and Legal Reform* 5, no. 1 (2024): 32.

[30] Nurhidayah et al., "Indonesia's Just Energy Transition: The Societal Implications of Policy and Legislation on Renewable Energy," *Climate Law* 14, no. 1 (2024): 41. See also, Handayani et al., "Moving beyond the NDCs," 1189; Kanugrahan et al., "Techno-economic analysis," 9038; Resosudarmo et al., "Prospects of energy," 154; Nadhilah Reyseliani et al., "Power sector decarbonisation in developing and coal-producing countries: A case study of Indonesia," *Journal of Cleaner Production* 454, no. 8 (2024): 142204; Siregar, "Pathways towards net-zero," 133016; Ariana Soemanto et al., "The role of oil fuels on the energy transition toward net zero emissions in indonesia: a policy review," (2023): 2078; Zahar, and Nurhidayah, "Legal constraints on policymaking," 125.

[31] Coordinating Ministry for Economic Affairs of the Republic of Indonesia, "Implementing Article 6," *Coordinating Ministry for Economic Affairs of the Republic of Indonesia,* June 6, 2024. See also, Dafnomilis et al., "Achieving net-zero emissions targets," 100; Van Soest et al., "Net-zero emission targets," 2140.

[32] Handayani, and Maharani, "Harmonizing Indonesia's Regulatory," 12007. See also, Yuniza et al., "Revisiting just energy transition," 120.

tax.[33] Furthermore, the ongoing legislative process for the New and Renewable Energy Bill (RUU EBT) demonstrates political and bureaucratic obstacles that are slowing energy diversification.[34] This situation illustrates that despite Indonesia's strong international commitments, domestic coordination and regulatory challenges remain major obstacles to achieving substantive compliance with the net-zero emissions target.

In contrast, South Korea has a more integrated legal system. Through the Framework Act on Carbon Neutrality and Green Growth, the government set a legal target for carbon neutrality by 2050.[35] This law commits corporations to actively participate in decarbonization, supported by strategies such as the Green New Deal that emphasize green industrial innovation.[36] Corporations are required to (1) compile and report a Greenhouse Gas Inventory,[37] which includes Scope 1, 2, and 3 emissions, ensuring transparency and accountability;[38] (2) comply with the Korea Emission Trading Scheme (K-ETS) based on the Act on the Allocation and Trading of Greenhouse Gas Emission Permits (2012),[39] as a cap-and-trade scheme with free allocations gradually reduced to encourage emission reductions;[40] (3) Implementing Environmental, Social, and Governance (ESG) disclosure

[33] Indria Wahyuni et al., "The Road to Net-Zero Emission in Indonesia: Legal Loopholes in National Carbon Tax Scheme," *Media Iuris* 6, no. 3 (2023): 46. See also, Novikasari, and Mardhatillah, "The Challenges of Carbon," 47.

Ardiansyah et al., "Bridging the Gap," 12008; Mujamil et al., "The Urgency of the Newest," 184.

[35] B. E. T. T. Y. Wang, and M. E. E. R. A. Gopal, "Climate action brief South Korea," *Asia Society Policy Institute* 8, no. 3 (2023): 89. See also, Republic of Korea, "Framework Act on Carbon,"; Eum, "Conversion of the green," 184; Lee, and Woo, "Green new deal policy," 10197.

[36] Yun Lee et al., "Realizing 2050 Net-zero in South Korea: From adaptive reduction to proactive response," *Futures* 154 (2023): 103267. See also, Lee, and Woo, "Green new deal policy," 10198.

[37] Ifigeneia Paliampelou, "Net zero targets and governance: A literature review (2009-2021)," *Handbook on Corporate Governance and Corporate Social Responsibility* 5, no. 3 (2024): 52. See also, Lee, and Lee, "Industry competition, corporate governance," 16278; Jung et al., "Carbon emission regulation," 4480.

[38] Esty, and de Arriba-Sellier, "Zeroing in on Net-Zero," 645. See also, Gözlügöl, and Ringe, "Private companies: the missing," 892.

[39] Republic of Korea, "Act on the Allocation," *Republic of Korea,* May 14, 2012. See also, International Carbon Action Partnership, "Korea Emissions Trading," *International Carbon Action Partnership,* 8 September 2025; InfluenceMap, "Corporate influence on the Korea," *InfluenceMap,* May, 2025.

[40] Hyung-Sub Kim et al., "Future projection of CO2 absorption and N2O emissions of the south korean forests under climate change scenarios: toward net-zero CO2 emissions by 2050 and beyond," *Forests* 13, no. 7 (2022): 1078. See also, InfluenceMap, "Corporate influence on the Korea," *InfluenceMap,* May, 2025; Jung et al., "Carbon emission regulation," 4482.

obligations as regulated by the Financial Services Commission (FSC).[41] This ESG disclosure is mandatory for listed companies, supporting green investment and mitigating the risk of greenwashing.

South Korea's legal system emphasizes corporate compliance through legal obligations accompanied by strict administrative sanctions, such as fines for failure to report or exceeding government-set emissions quotas.[42] This mechanism has been shown to be more effective than the voluntary approach still dominant in Indonesia. In practice, the implementation of the Korea Emission Trading Scheme (K-ETS) has significantly reduced emissions in carbon-intensive sectors such as steel and cement, although the influence of large corporations like POSCO has sometimes undermined policy ambition.[43] In addition to law enforcement, South Korea is integrating its emissions system with its Green Growth policy to strengthen the industry's transition to decarbonization. The government provides Research and Development (R&D) support, fiscal incentives, and clean energy subsidy programs that encourage low-carbon innovation across various industrial sectors.[44] These policies not only facilitate the adoption of clean technologies and increased energy efficiency but also establish a clear incentive structure for businesses to comply with emissions reduction targets. The integration of law enforcement and green economy policies creates a synergy that strengthens the

[41] Yulchon LLC, "Environmental, Social & Governance Law – Korea 2025," *International Comparative Legal Guides*, 2025. Retrieved in July 23, 2025 from https://iclg.com/practice-areas/environmental-social-and-governance-law/korea. See also, Lee, and Lee, "Industry competition, corporate governance," 16280.

[42] Ki-Bok Chang et al., "The Economic Impacts of Implementing Net Zero Policies in Korea: A Combined Top-Down and Bottom-Up Approach," *Climate Change Economics* 16, no. 01 (2025): 244. See also, Cho et al., "Is South Korea's 2050 Carbon," 101449; Ziyu Duan, and Seiyong Kim, "Characteristics and variations in Korea through the lens of net-zero carbon transformation in cities," *Sustainability* 15, no. 18 (2023): 13747; Hutfilter et al., "Rural transitions to net zero," 25; Joo et al., "Contested net-zero," 103116; Kim et al., "Future projection of CO2," 1078; Jaewan Kim et al., "Assessment of the enhanced nationally determined contributions of the Republic of Korea and the strategies for the 2050 net-zero target," *Asia-Pacific Sustainable Development Journal* 30, no. 1 (2023): 52; Lee et al., "Decarbonization pathways for Korea's," 143750; Min, and Kim, "A Practical Framework," 927; Jaeryoung Song, and Cheolhu Kim, "A Study on Strategies of Public R&D to Achieve National Carbon Neutrality: Focusing on the Implications of the Republic of Korea," *Asian Journal of Innovation & Policy* 11, no. 1 (2022): 41; Yeongjun Yeo et al., "2050 net-zero scenarios and well-to-wheel greenhouse gas emissions assessment of South Korea's road sector," *Journal of Cleaner Production* 492 (2025): 144809.

[43] InfluenceMap, "Corporate influence on the Korea," *InfluenceMap,* May, 2025.

[44] Daigee Shaw et al., "East Asia climate club: Pathway toward 2050 net-zero," *Climate Change Economics* 14, no. 04 (2023): 234. See also, Bui Duc, and Wang, "Strategic Pathways to Net Zero," 198; Eum, "Conversion of the green," 185; Kim et al., "Assessment of the enhanced," 53; Lee et al., "Realizing 2050 Net," 103266; Wen-Tien Tsai, and Chi-Hung Tsai, "Analysis of changes in greenhouse gas emissions and technological approaches for achieving carbon neutrality by 2050 in Taiwan," *Environmental Science and Pollution Research* 31, no. 29 (2024): 41552.

effectiveness of the Emissions Trading Scheme (ETS), ensuring that corporate compliance is not only formal but also substantive. This approach supports South Korea's Nationally Determined Contribution (NDC) target of a 40% emissions reduction by 2030, while simultaneously encouraging innovation and sustainable industrial transformation. Thus, the fundamental difference between Indonesia and South Korea lies in the legal status of the net-zero emissions (NZE) target, which in South Korea is binding and has a strong legal basis, while in Indonesia it is still limited to a policy commitment without binding legal consequences.[45] South Korea affirmed its decarbonization commitment through the Framework Act on Carbon Neutrality and Green Growth for Coping with the Climate Crisis, a comprehensive law that provides legal legitimacy for the 2050 NZE target. This law stipulates the obligations of the state, local governments, and the corporate sector to gradually reduce emissions in accordance with the National Action Plan and establishes enforcement mechanisms in the form of administrative sanctions for those who violate reporting requirements or exceed established emission limits.

Furthermore, South Korea's legal framework integrates the NZE into the national legal system through derivative regulations such as Presidential Decrees and Enforcement Rules, which clarify institutional responsibilities, cross-ministerial coordination mechanisms, and transparency obligations for business entities under the Emission Trading Scheme (ETS). This legal structure reinforces the principle of legal accountability by placing climate policy within the formal legal hierarchy, rather than simply as a policy initiative. This arrangement makes any violation of targets or reporting obligations legally punishable, demonstrating that South Korea's energy transition rests on a strong and measurable foundation of the rule of law.

[45] Logeswaran Govindarajan et al., "Solar energy policies in southeast Asia towards low carbon emission: A review," *Heliyon* 9, no. 3 (2023): 43. See also, L. Delta Merner et al., "Comparative analysis of legal mechanisms to net-zero: lessons from Germany, the United States, Brazil, and China," *Carbon Management* 15, no. 1 (2024): 2288; Wahyuni et al., "The Road to Net-Zero," 47; Susan L. Karamanian, "International investment agreements, human rights, and the path to net-zero: What role for corporate codes?," *Business and Human Rights Journal* 10, no. 1 (2025): 102; Keumala et al., "Indonesia's Sustainable Green," 14; Lee et al., "Realizing 2050 Net," 103269; Dina Silvia Puteri, "Making Indonesia Sustainable: Shaping the Law to Reduce Digital Carbon Footprint," *Indonesian Journal of Advocacy and Legal Services* 6, no. 1 (2024): 76; Aulia Sabila Syarifa Qalbie, and Rahmaniah, "The opportunity to achieve net zero emissions in indonesia through the implementation of a green economy to address climate change," *Global South Review* 5, no. 1 (2023): 85; Kalim U. Shah et al., "Is there a case for a coal moratorium in Indonesia? Power sector optimization modeling of low-carbon strategies," *Renewable and Sustainable Energy Transition* 5 (2024): 1074; Manan Shah et al., "A roadmap to 2050 for Nepal and Singapore with comparative energy market study for net-zero greenhouse gas emissions," *Sustainable Energy Technologies and Assessments* 71 (2024): 1034; Sulman Shahzad et al., "Charting the UK's path to net zero emissions by 2050: Challenges, strategies, and future directions." *IET Smart Grid* 7, no. 6 (2024): 720; Silalahi et al., "100% renewable electricity," 5.

In contrast, in Indonesia, the 2060 NZE target is still regulated through policy documents such as the Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR) and the Enhanced Nationally Determined Contribution (ENDC), which are declarative and not legally binding. Although several regulations, such as Law Number 32 of 2009 concerning Environmental Protection and Management and Presidential Regulation Number 98 of 2021 concerning the Economic Value of Carbon, provide a normative basis for implementing mitigation actions, neither specifically regulates the legal obligations towards NZE, including corporate legal responsibility for reporting emissions or sanction mechanisms for violations.

In the absence of a primary law establishing NZE as a national legal obligation, Indonesia still relies on administrative approaches and cross-sectoral coordination. The existing legal framework tends to be fragmented, spread across various sectoral policies without adequate legal harmonization. This makes Indonesia's NZE target more like a political or administrative commitment than a substantive legal obligation. Thus, the fundamental difference between the two countries lies not only in the implementation power, but also in the legal character of the climate policy itself where South Korea has placed NZE in the national legal system which is binding, while Indonesia still places it at the level of public policy which is non-legislative and declarative.

3.2. Supervision and Law Enforcement Mechanisms

Corporate compliance monitoring in Indonesia is carried out by the Ministry of Environment and Forestry through the Corporate Performance Rating Assessment Program (*Program Penilaian Peringkat Kinerja Perusahaan*/PROPER), which assesses the extent to which companies comply with environmental regulations and sustainable practices, including waste management, energy efficiency, and greenhouse gas emission reduction.[46] The system uses a color-coded rating ranging from gold to black, with high-ranking companies receiving administrative incentives, while low-ranking companies are required to make improvements. However, PROPER is evaluative in nature and relies largely on

[46] Ministry of Environment and Forestry, "Corporate Performance Assessment Program in Environmental Management (PROPER),". *Jakarta: Ministry of Environment and Forestry*. Retrieved in July 21, 2025 from https://ppkl.menlhk.go.id/website/filebox/200/161207084852PROGRAM%20PENILAIAN%20KINERJA%20PERUSAHAAN%20DALAM%20PENGELOLAAN%20LINGKUNGAN%20HIDUP%20%28PROPER%29.pdf. See also, Kartika et al., "Quo Vadis Energy," 277; Handayani, and Maharani, "Harmonizing Indonesia's Regulatory," 12008; Keumala et al., "Indonesia's Sustainable Green," 16; Massagony et al., "Political economy of energy," 1018.

company self-assessment, making it vulnerable to manipulation and lacking binding legal sanctions.[47]

Studies show that PROPER has not been fully integrated with the 2060 NZE target because its focus is more on adaptation than emission mitigation, so its effectiveness in reducing emissions from the coal-dominated energy sector is relatively low.[48] Several studies highlight the inconsistency of the national legal framework with international commitments, weak cross-ministerial coordination, limited funding, and the influence of political actors prioritizing conventional energy.[49]

To strengthen law enforcement, PROPER relies on a color-based evaluation mechanism that monitors corporate performance in waste management, energy efficiency, and GHG emission reduction. Companies with high ratings receive administrative privileges, while those with low ratings are required to participate in a performance improvement program overseen by the Ministry of Environment and Forestry.[50] While lacking criminal sanctions, the program operates on the principle of public accountability, with ratings and audit results publicly published, exerting reputational pressure on companies.[51] The Ministry of Environment and Forestry also conducts field inspections and verification of reporting data to ensure compliance between company reports and actual conditions, establishing a continuous compliance monitoring mechanism. This system emphasizes a combination of administrative evaluation, public transparency, and field audits as an institutionally binding law enforcement instrument, although it differs from formal sanction mechanisms such as fines or administrative penalties.

Law enforcement in Indonesia still faces challenges such as inter-agency coordination, weak oversight capacity, and minimal integration between emissions

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[47] Imawan, and Rehulina, "Legal Aspects of Indonesia's," 234. See also, Mujamil et al., "The Urgency of the Newest," 186; Nurhidayah et al., "Indonesia's Just Energy Transition," 42; Mori et al., "Policy Struggles Toward Net," 45; Nihayah et al., "CO2 emissions in Indonesia," 75.

[48] Handayani et al., "Moving beyond the NDCs," 1190. See also, Kanugrahan et al., "Techno-economic analysis," 9039; Resosudarmo et al., "Prospects of energy," 156; Reyseliani et al., "Power sector decarbonisation," 142207; Siregar, "Pathways towards net-zero," 133019; Soemanto et al., "The role of oil fuels," 2079; Albertus Sentot Sudarwanto, "Examining legal tools in encouraging the achievement of net zero emission: A way forward for Indonesia," In *IOP Conference Series: Earth and Environmental Science* 1438, no. 1, (IOP Publishing, 2025), 2018.; Zahar, and Nurhidayah, "Legal constraints on policymaking," 127.

[49] Kartika et al., "Quo Vadis Energy," 278. See also, Handayani, and Maharani, "Harmonizing Indonesia's Regulatory," 12009; Keumala et al., "Indonesia's Sustainable Green," 17; Massagony et al., "Political economy of energy," 1019; Imawan, and Rehulina, "Legal Aspects of Indonesia's," 235; Mujamil et al., "The Urgency of the Newest," 187.

[50] Imawan, and Rehulina, "Legal Aspects of Indonesia's," 236. See also, Mujamil et al., "The Urgency of the Newest," 189; Nurhidayah et al., "Indonesia's Just Energy Transition, 44.

[51] Berger-Schmitz et al., "What explains firms," 5589. See also, Esty, and de Arriba-Sellier, "Zeroing in on Net-Zero," 646.

data and corporate financial reporting.[52] For example, the Environmental Management and Management Law (UU PPLH) allows for administrative and criminal sanctions for Environmental Impact Analysis violations, but enforcement rarely reaches the courts because emission evidence is difficult to verify without a digital monitoring system.[53] In 2025, the government launched the Environmental Management Agency to strengthen enforcement, including coordination of forest fires and emission mitigation. However, challenges remain, such as the conflict between economic development and environmental protection.[54] Furthermore, Constitutional Court ruling Number 119/PUU-XXIII/2025 expanded protections for environmental activists, challenging deregulation that undermines environmental rights. These challenges are exacerbated by the lack of public participation in decision-making, which hinders a just energy transition.[55]

In South Korea, oversight and enforcement of corporate compliance are carried out through the Korea Environment Corporation (KECO) in collaboration with the Ministry of Environment (MOE).[56] This system emphasizes the legal obligation for companies to report greenhouse gas emissions annually, with failure to report subject to administrative fines or minor criminal sanctions.[57] Furthermore, Environmental, Social, and Governance (ESG) standards are integrated into the legal framework, so companies that fail to meet ESG disclosure obligations can be penalized by capital market authorities.[58]

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[52] Wahyuni et al., "The Road to Net-Zero," 49. See also, Novikasari, and Mardhatillah, "The Challenges of Carbon," 48; Nurhayati et al., "Carbon Pricing Policy," 58; Putri, and Hutapea, "Analysis of implementation," 308; Saputra et al., "Potential Carbon Tax," 1672; Sari, and Krulinasari, "Carbon Trading According," 556; Sedera, "The implementing a carbon tax," 44; Sunanda et al., "Advancing the Carbon Pricing," 10719; Sunanda et al., "Carbon tax and trading," 1015; Syahruddin et al., "Carbon Trading As A New," 33.

[53] Kartika et al., "Quo Vadis Energy," 279. See also, Mujamil et al., "The Urgency of the Newest," 189; Qalbie, and Rahmaniah, "The opportunity to achieve," 85.

[54] Iqbal, and Rayhannafi, "Legal politics toward natural," 27. See also, Puteri, "Making Indonesia Sustainable," 77.

[55] Yuniza et al., "Revisiting just energy transition," 122.

[56] Korea Environment Corporation, "Support for Greenhouse Gas Emission Trading Policy," 2023 *Korea Environment Corporation*. Retrieved in July 20, 2025 from https://www.keco.or.kr/en/lay1/S295T321C332/contents.do. See also, Chang et al., "The Economic Impacts," 2440015; Cho et al., "Is South Korea's 2050 Carbon," 101451; Duan, and Kim, "Characteristics and variations," 13746.

[57] Republic of Korea, "Act on the Allocation," *Republic of Korea,* May 14, 2012. See also, InfluenceMap, "Corporate influence on the Korea," *InfluenceMap,* May, 2025; International Carbon Action Partnership, "Korea Emissions Trading," *International Carbon Action Partnership,* 8 September 2025.

[58] Yulchon LLC, "Environmental, Social & Governance Law – Korea 2025,". See also, Lee, and Lee, "Industry competition, corporate governance," 16281; Paliampelou, "Net zero targets," 54.

Since 2025, ESG disclosure has become mandatory for KOSPI-listed companies, with enforcement mechanisms including fines of up to 100 million won and restrictions on market access.[59] KECO and the MOE verify reporting data through field inspections and internal audits, ensuring consistency between company reports and actual operating conditions.

In South Korea, the Emission Trading Scheme (ETS), known as K-ETS, links environmental compliance with market mechanisms, whereby companies exceeding their emissions quotas are required to purchase additional carbon credits, creating a clear and significant financial obligation.[60] The K-ETS is supported by a binding legal framework through the Framework Act on Carbon Neutrality and Green Growth 2019, which stipulates administrative penalties of up to 500 million won and minor criminal penalties for companies that fail to report emissions in a timely manner.[61]

Emissions reporting is mandatory annually, and KECO, in collaboration with the Ministry of Energy and Mineral Resources (MOE), manages this process through the National GHG Inventory System (NGHIS), including independent audits and field verification to ensure data accuracy. This system enables real-time emissions monitoring, emphasizing corporate transparency and accountability, with mandatory Scope 1, 2, and 3 reporting for KOSPI-listed companies starting in 2025. Non-compliance with ESG standards can trigger capital market penalties, including fines and market access restrictions.[62]

The K-ETS targets the decarbonization of heavy industry sectors, such as steel and chemicals, through reductions in free allocations in Phase 4 (2026–2030), encouraging companies to shift to low-carbon practices.[63] South Korea's Green New Deal strengthens the K-ETS through investments in renewable energy and green technologies, supporting the target of a 40% emission reduction by 2030 from 2018 levels.[64] Government R&D in carbon-neutral technologies is also a crucial instrument for supporting industrial innovation.[65]

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[59] Lee et al., "Realizing 2050 Net," 103268.

[60] Kim et al., "Assessment of the enhanced," 54. See also, Lee et al., "Decarbonization pathways for Korea's," 143752; Min, and Kim, "A Practical Framework," 928; Song, and Kim, "A Study on Strategies," 43; Tsai, and Tsai, "Analysis of changes in greenhouse," 41554.

[61] Kim et al., "Assessment of the enhanced," 55. See also, Lee et al., "Realizing 2050 Net," 103269.

[62] Yeo et al., "2050 net-zero scenarios," 144810. See also, Lee, and Lee, "Industry competition, corporate governance," 16283.

[63] Kim et al., "Future projection of CO2," 1075. See also, Lee et al., "Decarbonization pathways for Korea's," 143755.

[64] Lee, and Woo, "Green new deal policy," 10199. See also, Cho et al., "Is South Korea's 2050 Carbon," 101453.

[65] Song, and Kim, "A Study on Strategies," 44. See also, Tsai, and Tsai, "Analysis of changes in greenhouse," 41555.

Analysis by InfluenceMap[66] shows that several large South Korean companies play a significant role in influencing the implementation of the K-ETS, emphasizing the need for transparency and independent oversight. Industry lobbies such as POSCO have weakened the emission cap, but Phase 4 (2026-2030) is planned to be stricter with a reduction in free allocations.[67] South Korea's success also lies in the integration of digital technology in its National GHG Inventory System (NGHIS)-based monitoring system, which allows for real-time auditing and verification of emissions data.[68] The NGHIS supports independent verification, with penalties for false data reaching up to 5 years in prison or a fine of 500 million won.[69] This suggests that challenges from industry lobbies, such as POSCO, could potentially undermine the K-ETS's ambitions, demanding stronger independent oversight.[70]

South Korea's approach combines mandatory emissions reporting, data verification, field audits, financial penalties, and market surveillance, establishing a binding legal framework and effective enforcement mechanisms.[71] The K-ETS and ESG standards ensure KOSPI-listed companies report Scope 1, 2, and 3 transparently, with sanctions for violations including fines and market access restrictions.[72] This model affirms corporate legal responsibility for decarbonization. This has not yet been realized in Indonesia, which still relies on manual reporting and sampling oversight.[73] In 2025, Indonesia faces coordination challenges, such as deregulation challenged by civil society over weakening environmental protections, and the need for reforms for stronger enforcement.[74] Comparisons show that Korea is more proactive with binding sanctions and technology, while Indonesia needs harmonization for effectiveness.

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[66] InfluenceMap, "Corporate influence on the Korea," *InfluenceMap,* May, 2025.

[67] Yoonsoo Kim et al., "Same policy, different dreams: explaining the variation in local net-zero policy stringency in South Korea," *Climate Policy* 7, no. 3 (2025): 14. See also, Jung et al., "Carbon emission regulation," 4484.

[68] International Carbon Action Partnership, "Korea Emissions Trading," *International Carbon Action Partnership,* 8 September 2025. See also, Duan, and Kim, "Characteristics and variations," 13747; Kim et al., "Assessment of the enhanced," 64; Min, and Kim, "A Practical Framework," 929;

[69] Cho et al., "Is South Korea's 2050 Carbon," 101451. See also, Eum, "Conversion of the green," 186; Lee et al., "Realizing 2050 Net," 103269.

[70] InfluenceMap, "Corporate influence on the Korea," *InfluenceMap,* May, 2025.

[71] Kim et al., "Assessment of the enhanced," 56. See also, Lee et al., "Decarbonization pathways for Korea's," 143756; Min, and Kim, "A Practical Framework," 931.

[72] Yeo et al., "2050 net-zero scenarios," 144811. See also, Lee, and Lee, "Industry competition, corporate governance," 16284.

[73] Kim et al., "Same policy, different dreams," 15.

[74] Iqbal, and Rayhannafi, "Legal politics toward natural," 29. See also, Qalbie, and Rahmaniah, "The opportunity to achieve," 86.

3.3. Lessons for Indonesia: Towards Substantive Corporate Compliance

Indonesia, as one of the countries with the highest greenhouse gas emissions in ASEAN, faces significant challenges in achieving its 2060 Net-Zero Emissions (NZE) target, primarily due to the energy sector's reliance on coal and incompletely integrated environmental regulations.[75] Comparisons with South Korea, which has successfully implemented robust monitoring and enforcement systems through the Korea Emissions Trading Scheme (K-ETS) and the National GHG Inventory System (NGHIS), offer valuable lessons for strengthening corporate compliance in Indonesia toward a substantive energy transition.[76]

First, establish a clear, binding legal framework. Indonesia's 2060 net-zero emissions (NZE) target currently represents a political commitment through the Nationally Determined Contribution (NDC) and the Just Energy Transition Partnership (JETP), but lacks a binding legal framework with strict sanctions.[77] The lack of specific legislation hampers corporate compliance enforcement with emissions reductions, particularly in the coal-dependent energy sector.[78] South Korea provides a model through its Framework Act on Carbon Neutrality and Green Growth, which establishes carbon neutrality as a legal obligation, with administrative sanctions such as fines of up to 500 million won and imprisonment of up to 5 years for false emissions reporting.[79] This law mandates the reporting of Scope 1, 2, and 3 emissions, ensuring corporate accountability through independent audits and technology-based verification.[80]

Indonesia could emulate this approach by reforming Law Number 32/2009 concerning Environmental Protection and Management (*Perlindungan dan Pengelolaan Lingkungan Hidup*/PPLH) to include specific provisions on emission

[75] Nazwa Amalia et al., "Legal Analysis of Indonesian Regulation and Policy on Commitment to Achieving Net Zero Emission (NZE) in Renewable Energy Transition in Electricity Sector," *Andalas Law Journal* 9, no. 2 (2024): 35. See also, Handayani et al., "Moving beyond the NDCs," 11892; Resosudarmo et al., "Prospects of energy," 157.

[76] Kim et al., "Assessment of the enhanced," 57. See also, Lee et al., "Decarbonization pathways for Korea's," 143757; Min, and Kim, "A Practical Framework," 932; International Carbon Action Partnership, "Korea Emissions Trading," *International Carbon Action Partnership,* 8 September 2025.

[77] Amalia et al., "Legal Analysis of Indonesian," 35. See also, Handayani, and Maharani, "Harmonizing Indonesia's Regulatory," 12010; Keumala et al., "Indonesia's Sustainable Green," 17.

[78] Ardiansyah et al., "Bridging the Gap," 12009. See also, Resosudarmo et al., "Prospects of energy," 159; Reyseliani et al., "Power sector decarbonisation," 142208.

[79] Republic of Korea, "Framework Act on Carbon,". See also, Lee, and Woo, "Green new deal policy," 10201; Duan, and Kim, "Characteristics and variations," 13747; Kim et al., "Assessment of the enhanced," 59; Lee et al., "Realizing 2050 Net," 103270.

[80] Min, and Kim, "A Practical Framework," 933. See also, Cho et al., "Is South Korea's 2050 Carbon," 101456.

limits, financial sanctions, and criminal penalties for violators.[81] A study by Massagony[82] emphasized the need for specific climate change legislation to reduce fossil fuel subsidies and encourage investment in renewable energy sources such as solar and wind power. Regulatory harmonization, as recommended by Kartika et al.[83] is crucial to prevent contradictions between international commitments such as the Paris Agreement and national policies.[84] This approach aligns with the suggestion of Merner et al.[85] who highlighted the urgency of binding legislation in major emitting countries to support global targets. Furthermore, legal reforms should include guidelines for early retirement of coal-fired power plants,[86] taking into account socio-economic impacts.[87] Strengthening law enforcement also requires an independent body to oversee emissions targets,[88] as well as public engagement to ensure transparency.[89] This approach can address the weaknesses of the PROPER program, which is evaluative in nature without strong sanctions.[90] By adopting a binding legal framework, Indonesia can encourage substantive corporate compliance, support decarbonization, and accelerate the energy transition towards NZE 2060.

Second, Integration of ESG-Based Reporting and Incentive Systems. South Korea has successfully integrated emissions reporting and Environmental, Social, and Governance (ESG) standards into its capital market system, where companies that fail to comply with ESG disclosures face financial penalties or market access restrictions.[91] Starting in 2025, KOSPI-listed companies will be required to report ESG performance, which enhances reputation, attracts green investment, and

[81] Wahyuni et al., "The Road to Net-Zero," 49. See also, Sudarwanto, "Examining legal tools," 2018; Nurhidayah et al., "Indonesia's Just Energy Transition, 45.

[82] Massagony et al., "Political economy of energy," 1011.

[83] Kartika et al., "Quo Vadis Energy," 280.

[84] Mujamil et al., "The Urgency of the Newest," 189. See also, Qalbie, and Rahmaniah, "The opportunity to achieve," 89.

[85] Merner et al., "Comparative analysis of legal," 2289.

[86] Handayani, and Maharani, "Harmonizing Indonesia's Regulatory," 12011.

[87] Reyseliani et al., "Power sector decarbonisation," 1422. See also, Puteri, "Making Indonesia Sustainable," 79.

[88] Sudarwanto, "Examining legal tools," 2019.

[89] Nurhidayah et al., "Indonesia's Just Energy Transition, 47. See also, Yuniza et al., "Revisiting just energy transition," 123.

[90] Susanti Arsi Wibawani et al., "Environmental Regulation in Corporate Csr Practices in Indonesia: Environmental Regulation in Corporate Csr Practices in Indonesia." *PENA LAW: International Journal of Law* 2, no. 2 (2024): 34. See also, Mori et al., "Policy Struggles Toward Net," 46; Nihayah et al., "CO2 emissions in Indonesia," 77.

[91] Yulchon LLC, "Environmental, Social & Governance Law – Korea 2025,". See also, Lee, and Lee, "Industry competition, corporate governance," 16286; Berger-Schmitz et al., "What explains firms," 5591.

strengthens global competitiveness.[92] This system is supported by the Framework Act on Carbon Neutrality (2021), which integrates Scope 1, 2, and 3 emissions reporting with strict oversight by the Korea Environment Corporation (KECO) and the Ministry of Environment (MOE).[93] This approach ensures corporate accountability and encourages a low-carbon transition, particularly in heavy industrial sectors such as steel and chemicals.[94]

Indonesia can emulate this model by strengthening Financial Services Authority (OJK) regulations, such as POJK Number 51/2017 concerning Sustainable Finance, to require disclosure of emissions and ESG performance for public companies.[95] Studies by Hakovirta et al.[96] showed that companies adopting ESG practices benefit from green investments, particularly through collaboration with climate innovation startups, such as those developing renewable energy technologies. However, the main challenges in Indonesia are low corporate awareness and limited resources for ESG implementation, which require intensive education programs and cross-sector collaboration.[97] Incentive policies, such as tax breaks or access to green financing for companies that achieve low-emission targets can encourage substantive compliance.[98] This approach aligns with the findings of Hale et al.[99] who emphasize the importance of credible metrics and interim targets to prevent greenwashing in NZE commitments. Furthermore, integrating ESG into the capital market can increase transparency and investor confidence. Indonesia also needs to address institutional fragmentation, such as weak coordination between ministries, which hampers the implementation of sustainable policies.[100] By adopting the South Korean model, Indonesia can encourage companies not only to comply with formal regulations but also to contribute to decarbonization through green investment and technological innovation.

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[92] Esty, and de Arriba-Sellier, "Zeroing in on Net-Zero," 648. See also, Foerster, and Spencer, "Corporate net zero pledges," 124.

[93] Republic of Korea, "Framework Act on Carbon,". See also, Kim et al., "Assessment of the enhanced," 60; Lee et al., "Realizing 2050 Net," 103272.

[94] Yeo et al., "2050 net-zero scenarios," 144813. See also, Min, and Kim, "A Practical Framework," 934;

[95] Wibawani et al., "Environmental Regulation in Corporate," 34. See also, Puteri, "Making Indonesia Sustainable," 80; Saputra et al., "Potential Carbon Tax," 1674.

[96] Marko Hakovirta et al., "Corporate net zero strategy Opportunities in start-up driven climate innovation," *Business strategy and the environment* 32, no. 6 (2023): 3142.

[97] Wibawani et al., "Environmental Regulation in Corporate," 36. See also, Yuniza et al., "Revisiting just energy transition," 125.

[98] Sedera, "The implementing a carbon tax," 46. See also, Sunanda et al., "Advancing the Carbon Pricing," 10721.

[99] Hale et al., "Assessing the rapidly," 23.

[100] Keumala et al., "Indonesia's Sustainable Green," 18. See also, Massagony et al., "Political economy of energy," 1020.

Third, improve monitoring capacity and digitize emissions data. South Korea's success in emissions monitoring relies on the National GHG Inventory System (NGHIS), which enables real-time auditing and verification of emissions data, enhancing corporate transparency and accountability.[101] The NGHIS facilitates early detection of violations, such as false emissions reporting, with swift sanctions such as fines of up to 500 million won or imprisonment of up to 5 years, supporting the Korea Emissions Trading Scheme (K-ETS).[102] This system contrasts with Indonesia's approach, which still relies on manual reporting and supervisory sampling through the Company Performance Rating Assessment Program (PROPER), which is vulnerable to manipulation due to its reliance on self-assessment.[103]

Indonesia needs to build a National Carbon Data Platform integrated with the licensing and financial reporting systems.[104] This platform can utilize digital technologies, such as blockchain, to accurately verify emissions, preventing data manipulation, which is a weakness of PROPER.[105] Digitalization can also support the implementation of Indonesia's carbon tax and Emissions Trading Scheme (ETS), which are hampered by institutional fragmentation, low carbon prices, and weak inter-agency coordination.[106] South Korea's experience shows that

[101] International Carbon Action Partnership, "Korea Emissions Trading," *International Carbon Action Partnership,* 8 September 2025. See also, Duan, and Kim, "Characteristics and variations," 13747; Min, and Kim, "A Practical Framework," 934.

[102] Kim et al., "Assessment of the enhanced," 61. See also, Lee et al., "Realizing 2050 Net," 103289; Cho et al., "Is South Korea's 2050 Carbon," 101459

[103] Wahyuni et al., "The Road to Net-Zero," 51. See also, Mori et al., "Policy Struggles Toward Net," 47; Nihayah et al., "CO2 emissions in Indonesia," 79; Wibawani et al., "Environmental Regulation in Corporate," 37.

[104] International Energy Agency, "An Energy Sector Roadmap to Net Zero Emissions in Indonesia: Executive summary," *International Energy Agency,* 2022. Retrieved in July 21, 2025 from https://www.iea.org/reports/an-energy-sector-roadmap-to-net-zero-emissions-in-indonesia/executive-summary. See also, World Bank, "Indonesia: Country climate and development report," *World Bank Group*, 2023. Retrieved in July 21, 2025 from https://documents1.worldbank.org/curated/en/099042823064027780/pdf/P177245 01e40e50940a6ae035cd74193a44.pdf; BloombergNEF, "Net-Zero Transition: Opportunities for Indonesia," *BloombergNEF,* 2022. Retrieved in July 12, 2025 from https://assets.bbhub.io/professional/sites/24/BNEF-Net-Zero-Transition-Opportunities-for-Indonesia_FINAL.pdf; Amalia et al., "Legal Analysis of Indonesian," 39; Handayani, and Maharani, "Harmonizing Indonesia's Regulatory," 12012; Keumala et al., "Indonesia's Sustainable Green," 19.

[105] Kanugrahan et al., "Techno-economic analysis," 9041. See also, Reyseliani et al., "Power sector decarbonisation," 142210; Song, and Kim, "A Study on Strategies," 45.

[106] Wahri, M. Sunanda et al., "Carbon tax and trading," 1016. See also, Syahruddin et al., "Carbon Trading as A New," 34; Putri, and Hutapea, "Analysis of implementation," 308; Puteri, "Making Indonesia Sustainable," 83.

investment in technologies such as blockchain improves monitoring efficiency and stakeholder trust.[107]

A study by Shah et al.[108] suggests that digitizing emissions data could support ASEAN regional collaboration, such as a carbon trading mechanism based on Article 6 of the Paris Agreement, to accelerate decarbonization.[109] However, challenges such as human resource capacity, technological funding, and resistance from industry actors must be overcome.[110] PROPER reforms with the integration of digital technology,[111] along with public engagement for transparency,[112] can strengthen oversight and support the achievement of the NZE 2060.

These measures can shift corporate compliance in Indonesia from an administrative formality to a substantive one, supporting the energy transition towards the NZE 2060. However, challenges such as coal dependence, weak inter-agency coordination, and resistance from industry actors must be addressed.[113] South Korea demonstrates that the combination of a strong legal framework, ESG integration, and digital technology can create an effective compliance ecosystem.[114] Indonesia can start by reforming PROPER to include legal sanctions, expanding the scope of ESG reporting through the Financial Services Authority (OJK), and establishing a national carbon data platform.[115] Furthermore, public engagement and transparency in policymaking will ensure a just and inclusive energy transition.[116] By adopting these lessons, Indonesia can accelerate the decarbonization of the energy and industrial sectors, in line with its global Paris Agreement commitments.

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[107] Kim et al., "Assessment of the enhanced," 62. See also, Song, and Kim, "A Study on Strategies," 47; Lee et al., "Decarbonization pathways for Korea's," 143759.

[108] Shah et al., "Is there a case for," 1076.

[109] Coordinating Ministry for Economic Affairs of the Republic of Indonesia, "Implementing Article 6," *Coordinating Ministry for Economic Affairs of the Republic of Indonesia,* June 6, 2024. See also, Dafnomilis et al., "Achieving net-zero emissions targets," 101. See also, Jaumotte et al., *Mitigating climate change*, 25.

[110] Keumala et al., "Indonesia's Sustainable Green," 21. See also, Resosudarmo et al., "Prospects of energy," 160; Massagony et al., "Political economy of energy," 1021.

[111] Sudarwanto, "Examining legal tools," 2020.

[112] Nurhidayah et al., "Indonesia's Just Energy Transition, 48.

[113] Massagony et al., "Political economy of energy," 1022. See also, Soemanto et al., "The role of oil fuels," 2080; Zahar, and Nurhidayah, "Legal constraints on policymaking," 126.

[114] Cho et al., "Is South Korea's 2050 Carbon," 101461. See also, Eum, "Conversion of the green," 187; Lee et al., "Decarbonization pathways for Korea's," 143760.

[115] Sudarwanto, "Examining legal tools," 2021. See also, Nurhayati et al., "Carbon Pricing Policy," 59.

[116] Nurhidayah et al., "Indonesia's Just Energy Transition, 46. See also, Yuniza et al., "Revisiting just energy transition," 127.

4. Conclusion

A comparison between Indonesia and South Korea confirms that the effectiveness of corporate compliance with net-zero targets depends heavily on a robust legal framework, an effective oversight system, and cross-sector policy integration. South Korea has successfully made carbon neutrality a legally binding obligation, with mandatory emissions reporting, independent audits, field verification, and administrative and criminal sanctions for violations. This mechanism is supported by carbon market integration through the Korea Emissions Trading Scheme (K-ETS) and mandatory ESG disclosure, which emphasizes transparency, accountability, and corporate legal responsibility in decarbonizing the heavy industry sector.

In contrast, Indonesia still relies on an administrative or voluntary legal framework, with enforcement through the Corporate Performance Rating Program (PROPER), which relies largely on self-assessment. This system provides incentives and ratings, but is vulnerable to manipulation, lacks strong legal sanctions, and is not fully integrated with the 2060 NZE target. Inter-ministerial coordination, oversight capacity, and integration of emissions data with financial reporting are still limited, resulting in corporate compliance tending to be an administrative formality rather than a substantive one.

To accelerate the energy transition, Indonesia needs to strengthen the legal framework for net-zero by establishing clear emission limits, financial and criminal sanctions, and guidelines for the early retirement of coal-fired power plants. Integrating an ESG reporting system into capital markets and sustainable finance regulations can enhance accountability, encourage green investment, and prevent greenwashing. Improving monitoring capacity and digitizing emissions data through an integrated national platform enables real-time verification, reduces manipulation, and supports carbon trading mechanisms. Public engagement and transparency in decision-making are key to ensuring a just and inclusive energy transition.

With legal reform, ESG integration, digitalization, and effective oversight, Indonesia can transform corporate compliance from an administrative formality into substantive action, accelerate the decarbonization of the energy and industrial sectors, and achieve the 2060 NZE target in a concrete and sustainable manner. This approach balances business interests with environmental responsibility, supports equitable green development, and puts Indonesia on a credible and measurable energy transition path.

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