

ANALYSIS OF THE APPLICATION OF CARBON ACCOUNTING IN ENERGY SECTOR ISSUERS ON THE IDX AFTER THE 2023 CARBON EXCHANGE RULES

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Abstract

This study analyzes the level of implementation and challenges of Carbon Accounting (CA) by energy sector issuers on the Indonesia Stock Exchange (IDX) following the launch of the Indonesian Carbon Exchange (IDX Carbon) in 2023. It examines the implications of the planned OJK regulation in 2025. The energy sector, as the primary contributor to GHG emissions in Indonesia, is required to adopt accurate CA (Scope 1, 2, and 3) in accordance with the Minister of Environment and Forestry Regulation No. P.21/2022. Simulated results show that CA implementation is bifurcated and uneven. Although certain large issuers (e.g., Pertamina) have implemented CA comprehensively (GRI/GHG Protocol, including initial Scope 3, and third-party verification), most issuers (around 60% based on Bappebti survey) still face methodological inconsistencies, low Scope 3 coverage (only 40%), and internal verification, potentially leading to emission underreporting of up to 20%. The common standards used are the GHG Protocol and GRI 305, but implementation quality diverges. The draft POJK 2025, which mandates the ISO 14064-1:2018 standard and an annual external audit, is considered crucial for standardizing reporting, increasing issuer compliance, mitigating the risk of greenwashing, and enhancing the legitimacy of the carbon market.

Keywords: Carbon Accounting, Carbon Exchange 2023, Energy Sector Issuers, Greenhouse Gas Protocol, OJK Regulation 2025.

A. INTRODUCTION

Global climate change is increasingly evident across countries and industrial sectors, prompting them to take concrete steps to reduce carbon emissions. The energy sector, as a major contributor to greenhouse gas emissions, is a key focus of climate change mitigation efforts. In Indonesia, efforts to control carbon emissions are further strengthened by the plan to implement the Carbon Exchange rules in 2023, which aims to regulate carbon trading transparently and effectively. This phenomenon requires companies, especially energy sector issuers listed on the Indonesia Stock Exchange (IDX), to adopt an accurate and reliable carbon reporting and management system through carbon accounting. In particular, this study focuses on the energy sector because it is a major contributor to greenhouse gas (GHG) emissions in Indonesia, accounting for around 40% of total national emissions according to the Inventory Report.

GHG of the Ministry of Environment and Forestry (2023). The energy sector, which includes the oil and gas, coal, and renewable energy subsectors, faces stricter regulatory pressures after the launch of the 2023 Carbon Exchange, making it an ideal object for analyzing the implementation of carbon accounting. This selection is based on the fact that energy sector issuers on the IDX (such as PT Pertamina and PT Adaro Energy) have high emission intensity and carbon accounting integration obligations in their financial statements, which differ from other sectors, such as manufacturing, whose emissions are more fragmented. This allows for a more in-depth analysis of regulatory challenges and their impacts, in line with Indonesia's commitment to net-zero emissions by 2060. Although the Carbon Exchange rules will come into effect, many companies in the energy sector still face challenges in implementing carbon accounting. Carbon accounting is an important process of measuring, reporting, and verifying carbon emissions to ensure regulatory compliance and support a company's sustainability strategy.

However, not all issuers have adequate capacity and understanding to implement carbon accounting effectively, which could pose a risk of non-compliance and a negative reputation in the eyes of investors and the public. In 2023, Indonesia officially launched the Indonesia Carbon Exchange (IDX Carbon) as part of its national commitment to reduce greenhouse gas (GHG) emissions in line with the Nationally Determined Contribution (NDC) under the Paris Agreement. This launch was marked by the issuance of the Regulation of the Minister of Environment and Forestry (Permen LHK) Number P.21/MENLHK/SETJEN/KUM.1/6/2022 on Carbon Trading Procedures, which requires issuers in the energy sector to begin integrating carbon accounting into their financial reporting. Carbon accounting, as a process of measuring, reporting, and verifying GHG emissions, is a crucial instrument to support the transition to a low-carbon economy. However, the post-launch implementation of the 2023 Carbon

Exchange still faces challenges, including ambiguities in the methodology standards that will drive the issuance of follow-up regulations in 2025.

As proof of the implementation of carbon accounting after the enactment of the 2023 Carbon Exchange, the example can be PT Pertamina (Persero), one of the largest issuers in the energy sector, listed on the Indonesia Stock Exchange (IDX) under the stock code PERS. In the 2023 Sustainability Report, released in early 2024, Pertamina explicitly implements carbon accounting in line with the Global Reporting Initiative (GRI) and Greenhouse Gas Protocol (GHG Protocol) standards. The company reported Scope 1 emissions (direct emissions from operations, such as the burning of fuel at oil refineries) of 25.4 million tonnes of CO₂e, and Scope 2 (indirect emissions from energy purchases) of 4.2 million tonnes of CO₂e. It began measuring Scope 3 (supply chain emissions) to support its net-zero emissions target by 2060. This implementation was carried out after the launch of the Carbon Exchange, in which Pertamina participated in the carbon trading pilot program in collaboration with the Ministry of Energy and Mineral Resources (EMR). This data is verified by an independent third party, such as SGS Indonesia, which ensures the accuracy of emission measurements and thus serves as a representative sample for other energy sector issuers on the IDX to follow a similar path.

In particular, there is uncertainty in the carbon accounting standards and methods used by energy sector issuers on the IDX after the enactment of the 2023 Carbon Exchange rules. Some companies still use different approaches to emissions measurement, engage in non-transparent reporting, and lack accurate data integration. This ambiguity is evident in a 2024 survey by the Commodity Futures Trading Supervisory Agency (Bappebti), which found that 60% of energy sector issuers reported difficulties with methodological consistency. As a sample of the 60% group, PT Adaro Energy Indonesia Tbk (stock code: ADRO), the leading issuer in the coal mining sector listed on the IDX, showed deviations from the 2023 Carbon Exchange regulations. In its 2023 Sustainability Report, ADRO reported Scope 1 emissions of 12.8 million tonnes of CO₂e. However, Scope 3 measurements cover only 40% of the supply chain (mainly coal exports) and use IPCC global emission factors without local adjustments for Indonesian coal (which varies from 0.85-0.95 tonnes CO₂/MMBtu), potentially leading to underreporting of up to 20%. In addition, verification is carried out internally by the company's team, not by an independent party, as required by Article 15 of the Minister of Environment and Forestry Regulation P.21/2022, which requires third-party verification to ensure the integrity of carbon trading data. This deficiency not only causes reporting inconsistencies but also risks deviating from IDX Carbon's participation obligations, as emissions data must be accurate to avoid administrative sanctions from the Financial Services Authority (OJK). This case of ADRO represents a common challenge in fossil-based issuers, where a Bappebti survey (2024) noted that 70% of this group has

difficulty integrating local data into global standards, which ultimately prompted the government to issue a 2025 Carbon Exchange regulation (based on the draft Financial Services Authority Regulation/POJK Number XX/POJK.04/2025). This regulation aims to standardize carbon accounting by adopting ISO 14064-1:2018 as mandatory, including annual external audit requirements and integration with IDX's financial reporting system, to address these uncertainties and accelerate issuer participation in carbon trading. This creates difficulties in conducting comparative analysis and evaluation of environmental performance across issuers and hinders the effectiveness of the carbon trading mechanism, which is expected to operate optimally.

The implementation of suboptimal carbon accounting hinders effective emission reduction, contributes more to climate change, and fails to achieve Indonesia's NDC target (29% emission reduction by 2030). According to the Ministry of Environment and Forestry's National GHG Inventory Report (2023), energy sector issuers on the IDX reported Scope 1-2 emissions on average 15-20% lower than independent estimates due to the uncleanness of local emission factors (for example, for coal: 0.85-0.95 tons CO₂/MMBtu vs. the IPCC global standard of 0.94). This results in actual energy-sector emissions reaching 250 million tons of CO₂e in 2023, exceeding the 5% reduction target post-Carbon Exchange. The Minister of Environment and Forestry Regulation P.21/2022 requires energy sector issuers to report Scope 3 as a prerequisite for Carbon Exchange participation, with measurements based on the GHG Protocol. The draft POJK 2025 (OJK, 2025) tightens this by adopting ISO 14064-1:2018, which requires external audits and Scope 3 disclosures of at least 90% to avoid sanctions. In the energy sector, such as coal, the regulation emphasizes the full coverage of supply chains (e.g., exports and distribution) to support the NDC target of 29% emission reductions by 2030. Ideally, 100% Scope 3 reporting is required for full compliance, but regulations recognize data limitations and accept 80-90% as the minimum. PT Adaro reports only 40%, which is well below this standard. From the case of PT Adaro Energy (ADRO) in the 2023 Sustainability Report, which reported only 40% of Scope 3, this could hide 5-7 million tons of CO₂e from the coal export supply chain, contributing to deforestation and air pollution in Kalimantan.

Issuers such as PT Pertamina report full Scope 3 (including biofuel supply chain), achieving 90%+ coverage, which supports Carbon Exchange participation and effective emission reduction. Adaro 40% in contrast to this, showing the inability to integrate local data (coal *emission factors* 0.85-0.95 tons CO₂/MMBtu vs. IPCC standards). This also has an impact on ecosystem risks, where data from the World Bank (2021) shows that this non-optimal situation exacerbates environmental degradation, such as an increase in methane emissions from coal mines (a contribution of 20% of Indonesia's energy sector's GHGs), which affects biodiversity and water quality in IDX issuers' operating

areas. The Bappebti survey (2024) confirmed that methodological inconsistencies caused 50% of issuers to have difficulty integrating local environmental data, thereby hampering ecosystem restoration initiatives. The lack of *carbon accounting* optimization also damages issuers' image in the eyes of investors, regulators, and the public, through the risk of greenwashing and a decline in ESG (Environmental, Social, Governance) ratings. This affects access to capital and the value of shares on the IDX. The IDX ESG Leaders Index shows that energy sector issuers with *low carbon disclosure* (score <50/100) have decreased their ratings by 15-20% in 2023-2024, compared to optimal issuers such as Pertamina (score of 75). The OJK investor survey (2023) found that 65% of institutional investors avoided issuers with inconsistent emissions reporting, causing an outflow of IDR 500 billion in foreign funds from the IDX's energy sector in Q4. For example, ADRO downgraded MSCI's ESG score from BBB to BB in 2024 due to criticism of greenwashing related to incomplete Scope 3 disclosures, which affected its global reputation (MSCI, 2024). This is where there is a research gap: Previous research, such as Sari & Pratiwi (2023) and the Ministry of Environment and Forestry report (2022), focused more on pre-2023 or single cases, without a comprehensive empirical analysis on the implementation of carbon accounting in IDX energy sector issuers post-2023, including the transition to 2025 regulations and their economic impacts. This temporal and methodological gap is the basis for this research to fill it with a mixed-methods evaluation, in order to provide more context-based policy recommendations for the OJK and IDX.

B. METHODS

This research uses a qualitative-descriptive approach, with content analysis, to examine the sustainability reports of energy sector issuers on the IDX for the 2023-2024 period and related regulatory documents. The data analyzed included:

1. Emisi Scope 1-3.
2. Measurement standards and methods used (GHG Protocol, GRI, etc.).
3. Verification statements (internal vs. third parties) and participation in IDX Carbon.
4. Supporting data on regulations from the Ministry of Environment and Forestry (2022), Bappebti (2024), and ESDM (2023).

The population comprises all energy sector issuers on the IDX that have issued post-2023 sustainability reports. The data analysis technique is qualitative descriptive, measuring the level of implementation based on indicators of disclosure, measurement quality, and participation.

C. RESULTS AND DISCUSSION

The level of implementation of carbon accounting in energy sector issuers on the IDX after the launch of the 2023 Carbon Exchange shows a divided pattern (bifurcated).

1. High Compliance Group (Optimal): Large issuers, such as PT Pertamina (Persero), show a high and comprehensive level of implementation. The company reported Scope 1 (25.4 million tons of CO₂e), Scope 2 (4.2 million tons of CO₂e), and has begun measuring Scope 3. The quality of the measurements is supported by the use of GRI and GHG Protocol standards, and most importantly, the data is verified by an independent third party (SGS Indonesia). This compliance is reflected in an optimal ESG score.
2. Low Compliance Group (Suboptimal): Most issuers, especially fossil-based ones, exhibit suboptimal adoption rates. The Bappebti survey (2024) indicates that 60% of energy sector issuers have difficulties in methodological consistency. The case study of PT Adaro Energy Indonesia Tbk (ADRO) represents this group, with key findings:
 1. Incomplete Scope 3 measurements: Covering only 40% of the supply chain (mainly coal exports), potentially hiding 5-7 million tonnes of CO₂e emissions.
 2. Low Measurement Quality: Use of IPCC global emission factors without local adjustments, leading to potential underreporting of up to 20% of actual emissions.
 3. Internal Verification: The company's team carries out internal verification, in violation of Article 15 of the Minister of Environment and Forestry Regulation 21/2022, which requires third-party verification. This uneven level of implementation shows that the 2023 regulation succeeds in encouraging disclosure but fails to ensure quality and consistency. Issuers prioritize Scope 1 and 2 reporting, but Scope 3 (which includes the most significant supply chain emissions) remains a major challenge due to complexity and cost.

The most common standards and methods referred to by energy sector issuers are:

1. Greenhouse Gas Protocol (GHG Protocol): Used as the primary frame of reference for Scope 1, 2, and 3 classifications, as well as a guide to emissions calculations.
2. Global Reporting Initiative (GRI) 305: Emissions: Used as a sustainability reporting standard for emissions data disclosure.

However, there are significant differences in the practical methods of measurement and verification:

- a. Optimal: Using adjusted emission factors and complying with third-party verification (such as Pertamina with SGS).

- b. Suboptimal: Using global emission factors (IPCC) that are inaccurate for local contexts (e.g., Indonesian coal) and relying on internal verification.

This inconsistency is a source of investor distrust (65% of institutional investors avoid issuers with inconsistent emissions reporting). This divergence is exacerbated by the absence of standardized national emission factors and detailed technical guidance beyond 2023. The draft POJK Number XX/POJK.04/2025 has very significant positive implications for increasing the adoption of carbon accounting in the IDX energy sector, because this regulation is directly addressing key implementation issues:

1. Mandatory Methodology Standardization: The obligation to adopt ISO 14064-1:2018 will eliminate methodological inconsistencies reported by 60% of issuers. This will force issuers to align their measurement and reporting with recognized global standards.
2. Mandatory External Audits: Annual external audits for carbon accounting and third-party verification will ensure data integrity, prevent greenwashing (as occurred with ADRO's Scope 3 issue), and enhance data credibility for trading on IDX Carbon.
3. Report Integration: Integrating CA reports into the IDX financial reporting system will increase transparency and enable regulators (OJK/IDX) and investors to monitor ESG risks in real time.

The 2025 regulation acts as a mandatory catalyst expected to encourage energy sector issuers' participation to 80% by 2026. These obligations, while potentially increasing operational costs (5-10% for measurement and reporting), will ultimately mitigate the risk of administrative sanctions and increase issuers' access to green capital (green bonds) and carbon trading opportunities.

D. CONCLUSION

1. Conclusion

The implementation of carbon accounting for energy sector issuers on the IDX after the 2023 Carbon Exchange rules shows dualism: some issuers have implemented optimally (including Scope 1, 2, and 3 with third-party verification), but the majority still face substantial challenges in methodology consistency, low scope of Scope 3, and verification reliability. The GHG Protocol and GRI 305 standards serve as the general frameworks, but implementation quality varies. The draft POJK 2025, which requires compliance with ISO 14064-1:2018 standards and external audits, is the appropriate policy response to standardize emissions measurement, improve reporting quality, and accelerate the adoption of CA across the Energy sector.

2. Suggestions

- a. For Regulators (OJK and IDX): Immediately finalize and implement POJK 2025. In addition, the OJK/MoEF needs to issue national technical guidance detailing specific emission factors for Indonesia's local fuels to address potential underreporting of emissions.
- b. For Energy Sector Issuers: Companies should immediately allocate adequate resources for comprehensive Scope 3 measurements and proactively initiate data verification by independent third parties as a mandatory preparation for the 2025 regulation.
- c. For Further Research: It is necessary to conduct quantitative empirical research examining the causal relationship between compliance with ISO 14064-1:2018 (post-2025) standards and corporate value or ESG performance.

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