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Islamic ethics in carbon pricing: a qualitative comparative policy analysis of Indonesia, the United Kingdom, and the European Union

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This study examines the ethical implications of integrating Islamic economic principles into carbon pricing governance, highlighting how faith-consistent climate finance may contribute to public legitimacy, distributive equity, and policy learning in Muslim-majority contexts such as Indonesia. By foregrounding justice (*‘adl*), stewardship (*khilāfah*), and public welfare (*maṣlahah*), the findings suggest that carbon pricing frameworks can move beyond technical efficiency to incorporate ethical considerations and social accountability that may support long-term sustainability governance. Using a qualitative comparative approach, the study examines carbon pricing policies in Indonesia, the United Kingdom (UK), and the European Union (EU) through regulatory document analysis and expert focus group discussions (FGDs). Indonesia’s Carbon Economic Value (CEV) framework shows partial alignment with Islamic ethical principles, particularly in its emphasis on national ownership and the potential for ethical reinvestment of carbon revenues. In contrast, the UK and EU Emissions Trading Schemes demonstrate stronger institutional maturity and market stability, while also raising distributive concerns regarding equity for vulnerable groups and developing countries. The originality of this study lies in proposing an Islamic ethical evaluation framework for carbon pricing that bridges normative religious values with environmental governance. This research contributes to sustainability studies and Islamic economics by extending the *maqāṣid al-sharī‘ah* into comparative policy evaluation and offering a culturally relevant normative perspective for value-based climate governance.

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Introduction

Addressing climate change has become one of the most urgent challenges of the 21st century, reflected in global agendas such as the Paris Agreement and the United Nations Sustainable Development Goals (SDGs)—particularly SDG 13 on Climate Action. At the global level, carbon pricing has emerged as a central instrument for reducing greenhouse gas (GHG) emissions. According to the World Bank's State and Trends of Carbon Pricing 2024, approximately 24% of global GHG emissions are now covered by carbon pricing instruments, generating more than USD 100 billion in revenues in 2024, a figure that rose further in 2025 (The World Bank 2024, 2025). These revenues are increasingly being channeled toward public budgets, climate adaptation programs, and just transition initiatives. Such developments highlight not only the rapid expansion of carbon pricing globally but also the growing expectation that these mechanisms must balance efficiency with equity and legitimacy to ensure broad public acceptance. Similar concerns are echoed in sustainability governance literature, which stresses that formal frameworks such as ESG and SDGs must be embedded with ethical integration to achieve legitimacy (Jan et al. 2023).

Recent developments in Indonesia's carbon pricing efforts align with these global trends. For example, Indonesia launched its *Nilai Ekonomi Karbon* (Economic Value of Carbon) Trading Scheme in early 2023, targeting 99 coal-fired power plants of 25 MW or greater. By 2024, this coverage expanded to 146 plants, with emission intensity targets defined via PTBAE and optional auctioning of allowances (International Carbon Action Partnership 2024). In January 2025, Indonesia also commenced international carbon trading through the IDXCcarbon platform, involving five power plants and 1.78 million CO₂e credits, supported by strengthened monitoring, reporting, and verification (MRV) systems (S&P Global 2025). These milestones reflect Indonesia's growing commitment to low-carbon transition, while also highlighting challenges in governance, transparency, and equitable distribution of benefits.

Indonesia has institutionalized its carbon pricing policy through Presidential Regulation No. 98 of 2021, which outlines the carbon economic value (CEV) as a central mechanism to support the country's Nationally Determined Contribution (NDC) targets (Regulation of The President of The Republic of Indonesia Number 98 of 2021 on The Implementation of Carbon Pricing to Achieve The NDC Target and Control Over GHG Emissions in The National Development 2021). This regulation demonstrates Indonesia's firm commitment to sustainable development and low-carbon economic transformation. Indonesia's efforts in climate finance are further supported by earlier frameworks, including Law No. 32 of 2009 on Environmental Protection and Management, and Presidential Regulation No. 61 of 2011 concerning the National Action Plan for GHG Emission Reduction. The Financial Services Authority (FSA) has institutionalized sustainable finance through the Sustainable Finance Roadmap Phase I (2015–2019) and Phase II (2021–2025), aiming to integrate environmental, social, and governance (ESG) principles into the financial ecosystem (Kementerian Lingkungan Hidup dan Kehutanan 2023).

Indonesia targets a 29% reduction in emissions by 2030, with the potential to reach 41% through international collaboration. Key sectors include Forestry and Other Land Uses (FOLU), energy, agriculture, waste, and Industrial Processes and Product Use (IPPU) (Republic of Indonesia 2022). As a developing country with the world's largest Muslim population, Indonesia faces a unique challenge in ensuring that climate policies are both technically effective and ethically grounded. Research on Islamic corporate governance shows that embedding *Shari'ah*-based

values into institutions strengthens accountability, resilience, and legitimacy in achieving sustainability outcomes—insights that are directly relevant for climate governance (Jan et al. 2023; Jan, Lai, Shah, et al. 2023).

This study compares three jurisdictions: Indonesia, the United Kingdom (UK), and the European Union (EU). Indonesia is selected as the largest Muslim-majority country with an emerging carbon pricing policy, offering a rich context for evaluating ethical alignment with Islamic principles. The UK and EU are included as mature carbon pricing regimes frequently cited as global benchmarks. While they are not Muslim-majority, their inclusion allows for normative comparison across contrasting legal, political, and ethical contexts—highlighting both the universal relevance and contextual limitations of Islamic ethical perspectives in climate governance. Other Muslim-majority countries were not included due to the lack of sufficiently institutionalized carbon pricing mechanisms at the time of data collection. Islamic ethical principles are thus employed not as prescriptive mandates for non-Muslim contexts, but as a normative framework to evaluate equity, justice, and stewardship across diverse governance models.

Islamic ethical principles such as justice (*'adl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*) are not confined to Muslim societies but are understood in Islamic scholarship as universal values (*maqāṣid al-sharī'ah*) that aim to ensure human welfare and environmental balance across contexts (Auda 2008; Kamali 2008). This universality makes them relevant as evaluative lenses not only in Muslim-majority settings like Indonesia but also in secular jurisdictions such as the UK and EU, where equity, transparency, and stewardship are central to sustainability debates. The UK and EU provide mature and technically advanced carbon pricing experiences that can serve as comparative benchmarks for Indonesia. While institutional and cultural differences remain, lessons from these jurisdictions—such as the integration of equity safeguards and robust governance mechanisms—are potentially transferable, provided they are adapted to Indonesia's socio-political and religious context (Meckling and Allan 2020; The World Bank 2024).

However, existing studies rarely evaluate carbon pricing mechanisms through an explicitly Islamic ethical lens, especially in Muslim-majority contexts. While a growing literature examines the ethics of carbon pricing more generally (Magnetti et al. 2025; Sunanda et al. 2025), systematic applications of Islamic principles—justice (*'adl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*)—to policy design remain scarce, with only limited contributions in recent Islamic economics and environmental governance scholarship (Ali et al. 2025; Askandar and Putro 2025; Tumiran 2024). Most existing carbon pricing frameworks emphasize technical efficiency and cost-effectiveness, while distributive justice and ethical legitimacy typically require complementary design choices (e.g., revenue recycling, targeted compensation) to avoid regressive impacts—concerns highlighted across recent policy and analytical reviews (Ergon et al. 2025; Merkle and Dolphin 2024).

This study asks whether current carbon pricing systems in Indonesia, the UK, and the EU align with Islamic principles of *'adl*, *khilāfah*, and *maṣlaḥah*. By addressing this question, the research fills an important gap in both sustainability governance and Islamic economic discourse. It contributes a context-sensitive normative evaluation that enhances the policy relevance and ethical grounding of carbon pricing in diverse socio-religious settings. Ultimately, this study aims to propose a framework that integrates ethical values into climate governance, offering a balanced model that promotes both environmental sustainability and social justice. In doing so, it builds upon insights from

Islamic corporate governance literature (Jan et al. 2021; Jan, Lai et al. 2023; Jan et al. 2023), extending their application from banking and financial institutions into the domain of environmental policy and climate finance.

Despite increasing global adoption, current carbon pricing policies—particularly in Muslim-majority contexts like Indonesia—exhibit several normative limitations. In Indonesia, the early stages of implementing Presidential Regulation No. 98/2021 and the launch of the Indonesia Carbon Exchange (IDXCarbon) in 2023 have revealed practical and ethical challenges. Recent reports and studies highlight unclear benefit-sharing mechanisms, limited stakeholder participation, and evolving oversight and governance arrangements (Dewanto 2025; Indonesia Stock Exchange 2023; PwC Indonesia 2024). Other analyses further emphasize questions of fairness in credit allocation and transparency of institutional actors (Ali et al. 2025; Askandar and Putro 2025). These concerns illustrate that while Indonesia's carbon pricing framework demonstrates regulatory progress, its legitimacy depends on addressing distributive equity and public accountability. This study, therefore, offers a normative ethical evaluation to help close these governance gaps, employing Islamic principles of justice (*‘adl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*)—as a culturally resonant framework in Muslim-majority settings. In doing so, this research extends two streams of literature: it complements global analyses of the distributive justice of carbon pricing (The World Bank 2024) and contributes to the emerging field of Islamic environmental ethics by applying its principles directly within a comparative policy framework.

Literature review

Carbon pricing mechanisms and global perspectives. Carbon pricing is a policy instrument that assigns a monetary value to carbon emissions to incentivize efforts to reduce GHG emissions. This mechanism is implemented through market-based strategies such as emissions trading and carbon taxes, which aim to encourage investment in low-carbon technologies (Best et al. 2020; Green 2021; Hepburn et al. 2020; Leroutier 2022; Mintz-Woo et al. 2021). The primary objective is to create a price signal that fosters the development and adoption of low- or zero-emission technologies, thus internalizing the external costs associated with emissions (Le and Azhgaliyeva 2023).

Carbon pricing mechanisms, such as carbon taxes and the emissions trading system (ETS), are designed to link the cost of emissions to their sources, holding emitters accountable for their environmental impact. Studies indicate that these mechanisms can significantly influence investment decisions and the adoption of renewable energy technologies (Lilliestam et al. 2021). However, these mechanisms are not without challenges. Concerns have been raised about carbon pricing being used for greenwashing, where companies participate in emissions trading schemes for reputational benefit without meaningful reductions (Trinks et al. 2022). Furthermore, loopholes in the design of carbon markets may allow firms to purchase credits without reducing actual emissions, and unregulated trading can lead to market speculation and manipulation, undermining the system's environmental integrity (Alotaibi et al. 2022).

The effectiveness of carbon pricing remains mixed. Some studies report modest annual emissions reductions of 0–2% (Green 2021), while others document significant sector-specific effects—such as a 20–26% annual decline in the UK's electricity sector due to the Carbon Price Support policy (Leroutier 2022). Nevertheless, long-term success depends on complementary policies that address structural transformation, investment in

clean technology, and mitigation of distributional impacts (Hepburn et al. 2020; Muth 2023).

International experiences provide important comparative insights. The EU ETS and the UK's Carbon Price Support scheme are widely studied models that offer lessons on regulatory architecture, market behavior, and policy sequencing (Venmans et al. 2020). The carbon market model, where carbon credits representing emissions reductions are traded, has been reinforced through multilateral agreements such as the Kyoto Protocol and the Paris Agreement. This model allows for cost-effective emissions reductions by enabling over-compliant firms to sell excess allowances to those falling short (Liu et al. 2024). In Asia, evidence from China, Japan, and South Korea suggests that carbon pricing can reduce both absolute emissions and carbon intensity in firms (Le and Azhgaliyeva 2023).

Islamic economics and environmental ethics. The integration of Islamic economic principles into environmental governance offers a normative framework rooted in justice (*‘adl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*). Islamic economics emphasizes the protection of life (*hifzh al-nafs*), environment (*hifzh al-biah*), and wealth (*hifzh al-mal*), all of which align with sustainable development principles. Carbon pricing, in this context, can be interpreted as a form of *sadd al-dhari‘ah*—a preventive measure to reduce environmental harm—and as a policy aligned with the objectives of Islamic law (*maqāṣid al-sharī‘ah*), particularly when structured to ensure intergenerational equity and avoid exploitation (Fauzia and Riyadi 2018).

Islamic scholars have developed approaches to evaluate financial and policy instruments based on ethical performance derived from the *maqāṣid* framework. Alhammadi et al. (2022) propose a *maqāṣid*-based ethical index to assess institutional performance in Indonesia, offering a replicable model for evaluating environmental policies. Alotaibi et al. (2022) further highlight the tension between religious ethics and market logic in Islamic financial institutions—an issue equally relevant to carbon trading systems, where market efficiency may conflict with distributive justice.

From a jurisprudential (*fiqh*) standpoint, different Islamic schools of thought (*madhāhib*) have historically approached issues of trade, ownership, and environmental stewardship with varying emphases. The Hanafi school is known for its reliance on juridical preference (*istihsan*) to promote public interest, supporting innovative instruments like carbon trading, provided contracts remain transparent and avoid major uncertainty (*gharar*) (Kamali 2008). The Maliki school places strong weight on unrestricted public interest (*maṣlaḥah mursalah*), offering justification for adopting modern environmental mechanisms when they demonstrably benefit society (Kamali 2008). The Shafi'i school requires clear specification of contractual objects and outcomes, demanding robust verification of carbon credits to avoid *gharar* or speculative misuse (Kamali 2003). Meanwhile, the Hanbali school allows flexibility through the principle of necessity (*darurah*), which can justify carbon trading in the face of urgent climate threats (Auda 2008).

Contemporary Islamic economics scholars extend these jurisprudential traditions to environmental governance. Dusuki and Abdullah (2007) emphasize that ethical safeguards are essential to prevent commodification from undermining distributive justice, while Chapra (2000) and Auda (2008) argue that *maqāṣid*-based reasoning ensures that new financial tools advance holistic human welfare. This pluralism in *fiqh* interpretation underscores that while carbon pricing can be accommodated within Islamic law, its mechanisms must be carefully

designed to reflect diverse jurisprudential perspectives, thereby ensuring both compliance and legitimacy.

Despite the theoretical alignment, empirical studies examining carbon pricing within Islamic ethical frameworks are scarce. This study contributes by applying Islamic economics not only descriptively but evaluatively, measuring how policies in Indonesia, the UK, and the EU align with principles of justice (*‘adl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*). The literature on Islamic environmental ethics remains nascent, requiring further development and integration with global policy debates (Alhammadi et al. 2022; Alotaibi et al. 2022). This gap is particularly significant in policy environments where ethical legitimacy influences public acceptance. By addressing this, the study seeks to offer an ethical framework that enhances both fairness and accountability in carbon pricing.

Conceptual framework for Islamic evaluation of carbon pricing. To guide the ethical assessment of carbon pricing policies in Indonesia, the United Kingdom, and the European Union, this study proposes a conceptual framework rooted in Islamic economic principles. The framework draws on the *maqāṣid al-sharī‘ah* and consists of three core dimensions:

Justice (‘Adl). This dimension evaluates whether carbon pricing ensures fair distribution of costs and benefits, particularly protecting low-income and vulnerable groups. Policies should avoid regressive impacts and promote equity in access to environmental resources, in line with Qur’anic principles of fairness (Qur’an 5:8; 16:90).

Stewardship (Khilāfah). As trustees (*khulafā’*) of the Earth, humans are obliged to manage natural resources responsibly (Qur’an 6:165). This principle assesses whether carbon pricing encourages sustainable behavior, reduces emissions, and aligns with long-term environmental responsibility.

Public welfare (Maṣlaḥah). Rooted in the prevention of harm (*darar*) and the promotion of societal benefit, this dimension examines whether carbon pricing contributes to health, environmental quality, and economic resilience. It also considers how revenue is used—whether to reinforce social and ecological outcomes or not.

This evaluative framework is constructed specifically for this study, drawing on classical Islamic ethical scholarship—such as al-Ghazālī’s articulation of the five essential *maqāṣid* (*dīn*, *nafs*, *‘aql*, *nasl*, *māl*) in *al-Mustasfā*, and al-Shāṭibī’s elaboration of *maṣlaḥah* and the hierarchy of human needs in *al-Muwāfaqāt*—as well as contemporary Islamic economics literature (e.g., Alhammadi et al. 2022; Alotaibi et al. 2022; Asutay, 2007; Chapra, 2000). The three selected principles—justice (*‘adl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*)—are explicitly mapped from the core *maqāṣid* objectives: *‘adl* reflects the preservation of dignity, equity, and rights (*nafs*, *‘ird*); *khilāfah* corresponds to responsible management of wealth and environment (*māl*, *bī‘ah*); and *maṣlaḥah* encompasses holistic benefits including religion, intellect, life, lineage, and wealth (*dīn*, *‘aql*, *nafs*, *nasl*, *māl*). This mapping ensures that the ethical lens used in this study is both theologically grounded and methodologically transparent.

The selection of these three principles was not arbitrary, but grounded in their direct applicability to core ethical concerns in climate policy—namely, distributive justice, intergenerational responsibility, and societal well-being. While the classical *maqāṣid al-sharī‘ah* includes five essential objectives (*dīn*, *nafs*, *‘aql*, *nasl*, and *māl*), the chosen dimensions serve as operational

proxies that integrate these objectives in policy-relevant terms. For instance, *maṣlaḥah* encompasses public interest holistically, including the preservation of faith, intellect, and lineage, while *khilāfah* reflects stewardship over wealth and the environment. This framing allows the model to remain both theologically grounded and practically usable in empirical climate governance contexts.

Policies will be assessed as either fully aligned, partially aligned, or misaligned with these principles. This framework supports a structured comparison across regions and provides culturally relevant ethical insights for climate governance in Muslim-majority contexts like Indonesia. While this study synthesizes three key *maqāṣid*-derived principles—justice (*‘adl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*)—it is recognized that Islamic jurisprudential schools (*madhāhib*) may interpret their application differently. For example, a Maliki-oriented approach may prioritize *maṣlaḥah* as sufficient justification for policy innovation, whereas a Shafī‘i perspective would require stricter contractual safeguards. By acknowledging these variations, the framework remains both theologically grounded and adaptable to practical contexts, reinforcing its relevance for evaluating modern policy instruments such as carbon pricing (Auda 2008; Chapra 2000; Dusuki and Abdullah 2007).

Methodology

Research design. This study employs a qualitative comparative policy analysis approach to evaluate carbon pricing and carbon trading mechanisms in Indonesia, the UK, and the EU. A qualitative approach is appropriate for exploring complex regulatory and ethical phenomena, especially where contextual, institutional, and normative frameworks influence policy design and implementation (Aspers and Corte 2019). This method enables a rich, interpretive understanding of how policies function and how they align with Islamic ethical principles. The research design is grounded in interpretivist epistemology, combining documentary analysis and stakeholder engagement through expert focus group discussions (FGDs). This multi-source strategy enhances triangulation and contextual validity.

Data collection. Data was collected through two complementary strategies: content analysis of official policy documents and primary qualitative inquiry through expert FGDs. An overview of the research data inventory, data categorization, and triangulation strategy applied in this study is provided in Supplementary File 1.

Document analysis. Policy texts and official documents from Indonesia, the UK, and the EU were selected based on their relevance to national carbon pricing regulations, institutional frameworks, and implementation guidelines. These included Indonesia’s Presidential Regulation No. 98/2021 and related guidance from the FSA, the UK’s Carbon Price Support scheme and UK ETS documentation, as well as the EU ETS directives and implementation frameworks. The document selection followed a purposive strategy grounded in policy relevance rather than systematic database searches, making the use of PRISMA inappropriate for this study’s qualitative scope. Nonetheless, the process was guided by predefined thematic relevance criteria to ensure consistency across jurisdictions. The documents were analyzed to extract content related to justice (*‘adl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*), with attention to themes such as distributive fairness, institutional responsibility, benefit-sharing, and transparency. The full list of policy documents and regulatory sources included in the comparative analysis is provided in Supplementary File 2.

FGDs. To enrich the analysis with practitioner perspectives, four FGDs were conducted between November and December 2023, involving a total of twelve participants. Participants were selected through purposive sampling based on their institutional roles, expertise, and geographic representation, with representation from Indonesia's FSA, the UK-based Global Sustainable Futures network, SUCOFINDO (an Indonesian verification body), and academic experts on environmental law and carbon markets from the EU. Detailed anonymized participant metadata, including institutional background and areas of expertise, are provided in Supplementary File 3. Each discussion lasted between 60 and 90 min and was conducted via secure online platforms.

A semi-structured discussion guide was used, centering around key questions such as: the perceived strengths and limitations of current carbon pricing regulations in their jurisdictions; assessments of fairness in carbon credit allocation; integration of ethical or religious values in policy design; and perceptions of justice and accountability in implementation. The FGDs protocol and question guide are provided in Supplementary File 4, with a mapping between questions and ethical indicators available in Supplementary File 8. The FGDs were designed to elicit expert reflections corresponding to the ethical indicators used in the analytical framework. During the analysis stage, responses were coded according to predefined categories derived from the principles of justice (*'adl*), stewardship (*khilāfah*), and public welfare (*maṣlahah*), enabling a structured interpretation of policy governance and distributive implications of carbon pricing mechanisms.

Prior to participation, all participants were informed of the study objectives and provided both verbal and written consent. Ethical approval was obtained from the Universitas Islam Bandung Ethics Committee (ref. 180/B.04/LPPM/XII/2023). The use of semi-structured FGDs for eliciting expert perspectives follows established practice in qualitative housing and policy research (Li et al. 2022), ensuring depth, flexibility, and thematic coherence across stakeholder groups.

Data analysis. Thematic analysis was applied to all data sources using a hybrid strategy that combined inductive open coding with deductive categories derived from the Islamic ethical framework established in the literature. Coding was conducted manually using structured coding sheets to retain conceptual depth and interpretive flexibility. While qualitative software tools such as NVivo were considered, manual coding was deemed more suitable for capturing the nuanced dimensions of Islamic ethical values and maintaining researcher reflexivity.

A detailed description of the qualitative data analysis procedure and triangulation process is provided in Supplementary File 6.

To ensure inter-coder reliability, two researchers independently coded a subset of transcripts and policy texts. Discrepancies were addressed through iterative discussion, and consensus was reached through alignment on core ethical constructs. The major codes were organized to reflect the evaluative framework: justice (*'adl*), stewardship (*khilāfah*), and public welfare (*maṣlahah*), operationalized through indicators such as equity, transparency, accountability, and public value. The qualitative coding framework, including operational indicators for justice (*'adl*), stewardship (*khilāfah*), and public welfare (*maṣlahah*), is detailed in Supplementary File 5.

Integration of data from multiple sources was achieved through triangulation. Insights from document analysis were cross-validated with themes emerging from FGDs, allowing for richer contextualization and robust interpretive synthesis. The document analysis followed an iterative process inspired by Bowen (2009), focusing on repeated reading, theme saturation, and

relevance to the study's ethical evaluation goals. This procedure aligns with recent applications of municipal policy document analysis in comparative studies (David et al. 2024), reinforcing the methodological rigor in extracting normative insights from regulatory texts. Final findings were organized around the three guiding principles to assess how each jurisdiction's carbon pricing system aligns or diverges from the normative values embedded in Islamic economic ethics.

Results

Carbon pricing implementation in Indonesia. Indonesia has institutionalized its carbon pricing policy through Presidential Regulation No. 98 of 2021 (Regulation of The President of The Republic of Indonesia Number 98 of 2021 on The Implementation of Carbon Pricing to Achieve The NDC Target and Control Over GHG Emissions in The National Development 2021), which establishes the framework of CEV to support the country's NDC targets. The regulation legally mandates four core instruments—carbon trading, result-based payments, carbon levies (taxes), and other mechanisms based on technological development—to drive mitigation and adaptation across key sectors: energy, industry, waste, agriculture, and FOLU. The regulation also defines a six-stage implementation process: baseline setting, target determination, action planning, execution, monitoring, and reporting, all integrated through the national platform known as SRN-PPI.

The carbon trading mechanism consists of a dual structure combining cap-and-trade and carbon offset schemes. Entities subject to emissions caps receive quotas called *Persetujuan Teknis Batas Atas Emisi Pelaku Usaha* (PTBAE-PU), while voluntary participants can generate and trade *Sertifikat Pengurangan Emisi Gas Rumah Kaca* (SPE-GRK) through verified emission reduction projects. These units are traded on the IDX Carbon Exchange under the supervision of the FSA. MRV protocols are embedded in the system, including the deployment of continuous emissions monitoring systems (CEMS), which have been implemented in several industrial facilities.

In addition to market-based instruments, the RBP scheme offers financial incentives for verified emission reductions by national and subnational entities. These contributions are counted directly toward Indonesia's NDC achievement. The regulatory framework also includes a carbon tax mechanism enacted through the Harmonization of Tax Regulations Law (UU HPP), which imposes a levy of Rp 30 per kilogram of CO₂ equivalent on emissions from fossil fuel use.

These instruments collectively form the legal and administrative foundation of Indonesia's carbon pricing initiative. The institutional elements and implementation mechanisms described here serve as the basis for further ethical, regulatory, and operational assessment, which will be elaborated in the following discussion section.

Carbon pricing implementation in the UK and EU. The European Union has operationalized its climate ambition through the European Green Deal, adopted in 2019, which sets a binding target to achieve climate neutrality by 2050 and reduce GHG emissions by at least 55% by 2030 relative to 1990 levels. As part of this strategy, the EU ETS, established in 2005, serves as the primary carbon pricing mechanism. It functions under a cap-and-trade structure, where the total cap declines annually—currently at 2.2%, increasing to 4.3% from 2024 under the revised EU Climate Law. The EU ETS is further reinforced by the market stability reserve (MSR), which serves as a buffer to absorb surplus allowances and stabilize market prices—an institutional mechanism that contributes to the system's overall effectiveness (Bayer and Aklin, 2020).

To address carbon leakage and ensure fair competition, the EU has also initiated the carbon border adjustment mechanism (CBAM), which applies equivalent carbon costs to imports in sectors such as cement, aluminum, steel, and fertilizers. Kortum and Weisbach (2016) describe CBAM as a bold step in extraterritorial environmental regulation, highlighting the EU's ambition to globalize carbon standards.

Following Brexit, the United Kingdom launched its own UK ETS in January 2021. The system retains structural similarities to the EU ETS but includes specific features such as the Cost Containment Mechanism (CCM), designed to intervene in cases of price spikes. In addition to the UK ETS, the UK continues to apply a Carbon Price Support (CPS), an additional levy on fossil-fuel-generated electricity. However, a recent study by the Institute for Energy Economics and Financial Analysis (IEEFA 2025) notes that relatively low UK carbon prices may have resulted in substantial revenue shortfalls, raising concerns over price calibration and fiscal efficiency.

Both the EU and UK have used their ETS frameworks to stimulate innovation in low-carbon technologies. Evidence shows that firms within the EU ETS filed significantly more green patents and invested in energy efficiency without adverse employment impacts (Calel and Dechezlepretre 2016; Martin et al. 2016).

From a regulatory perspective, the UK has implemented climate-related financial disclosure frameworks aligned with ISO 14064, the Task Force on Climate-Related Financial Disclosures (TCFD), and the forthcoming UK Sustainability Disclosure Standards (UK SDS). These developments were noted during FGDs with representatives from the Global Sustainable Future network in the UK.

While both systems share a cap-and-trade foundation, they diverge in design maturity—EU's approach features near-complete auctioning of allowances, whereas the UK continues to rely on free allocation for emissions-intensive sectors. Key operational differences between the EU and UK ETSs pertain to emissions cap structures, offset eligibility, allocation methods, and monitoring systems. These distinctions are outlined in the comparative summary provided in Table 1.

The comparative overview in Table 1 highlights important differences in scope, allocation, and monitoring across the EU ETS, UK ETS, and Indonesia's emerging system. For Indonesia, these differences are not only technical but also normative lessons. The EU's experience with comprehensive MRV systems and transparent registries demonstrates the importance of credibility, while the UK's use of targeted carbon price support shows how fiscal design can influence distributive outcomes. Transferring such practices to Indonesia requires careful adaptation: auction revenues, for example, could be directed toward poverty alleviation or green *waqf* projects, ensuring distributive justice (*'adl*) and public welfare (*maṣlaḥah*). Similarly, embedding stronger MRV frameworks would enhance stewardship (*khilāfah*) by ensuring that emission reductions are real and verifiable. Thus, while the UK and EU provide advanced templates of carbon market governance, their application in Indonesia must be culturally translated into Islamic economic ethics to secure legitimacy and public acceptance (Auda 2008; Meckling and Allan 2020; The World Bank 2024).

Insights from the FGDs further contextualize these institutional differences by highlighting stakeholder perceptions regarding governance credibility, distributive fairness, and the social legitimacy of carbon pricing mechanisms. Participants emphasized that the effectiveness of carbon markets depends not only on regulatory design but also on the perceived transparency of monitoring systems, fairness in allowance allocation, and the visible social benefits generated by carbon revenues. To preserve

participant confidentiality and improve thematic clarity, the excerpts presented in Table 2 are anonymized, synthesized representations derived from the FGDs rather than verbatim quotations. These synthesized excerpts reflect the dominant themes identified during the qualitative analysis and are intended to illustrate the ethical and governance issues discussed by participants. Selected illustrative excerpts from these discussions are presented in Table 2, which provides qualitative evidence supporting the thematic patterns identified in the analytical framework.

Discussion

Comparative ethical analysis using Islamic principles. The institutional architecture of carbon pricing mechanisms—whether through trading, taxation, or result-based finance—serves not merely as a technical framework but also reflects underlying values regarding fairness, accountability, and the distribution of environmental responsibilities. These dimensions are critical in an Islamic ethical context, which prioritizes principles such as justice (*'adl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*). Islamic economics itself is rooted in a moral and legal framework that seeks to align human behavior with divine guidance. Unlike conventional models that often prioritize profit maximization, Islamic economics upholds values such as divine origin (*rabbāniyyah*), balance (*tawāzun*), and unity of ownership (*tawḥīd*), emphasizing that all resources ultimately belong to God and must be managed responsibly by humans as stewards (Qur'an 11:61).

From this perspective, carbon pricing instruments are not rejected per se, but their legitimacy depends on whether they serve collective well-being while avoiding harm (*ḍarar*). The objective is to ensure that environmental regulation supports the *maqāṣid al-sharī'ah*—the higher goals of Islamic law—which include the protection of faith (*dīn*), life (*nafs*), intellect (*'aql*), wealth (*māl*), and posterity or ecological balance (*nasl*). These values provide a concrete normative lens through which the fairness, transparency, and accountability of carbon pricing systems can be evaluated.

Each component outlined in Table 1 holds ethical implications when evaluated through Islamic principles. For instance, the presence and enforcement of robust MRV systems reflect the Islamic values of trust (*amānah*) and transparency (*shafāfiyyah*), which are essential in upholding institutional credibility and avoiding uncertainty (*gharar*) in transactions. Cap-setting mechanisms and emission allocation formulas embody principles of distributive justice (*'adl*), particularly when they include safeguards for less-resourced actors or regions. The treatment of voluntary offsets and result-based payments relates to public welfare (*maṣlaḥah*), as these instruments offer flexible pathways for broad stakeholder participation in climate mitigation. Transparent third-party verification, centralized reporting platforms, and public access to carbon market data further strengthen stewardship (*khilāfah*) by ensuring accountability and traceability. Therefore, the structural distinctions highlighted in Table 1 are not merely operational—they provide a normative basis for assessing each system's alignment with Islamic ethical values.

Despite being a relatively young framework, Indonesia's carbon pricing initiative demonstrates a notable policy ambition. The hybrid model—combining market-based mechanisms with fiscal instruments—offers institutional flexibility to accommodate sectoral differences in capacity and readiness (Prihatiningtyas et al. 2023). However, findings from FGDs and stakeholder reviews point to persistent concerns regarding institutional coordination, the uneven quality of MRV implementation, and the lack of public engagement. These concerns raise ethical

Table 1 Comparative overview of carbon pricing frameworks in the EU, UK, and Indonesia.

Aspect	EU ETS	UK ETS	Indonesia ETS
Industry cap term	Annual declining cap: ~2.2% from 2021, increases to 4.3% from 2024	Annual reduction target aligned with UK Net Zero by 2050	Sectoral PTBAE caps set by MEMR (Ministerial Decree No. 16/2022)
Country cap term	EU-wide, sector-specific cap based on ETS Directive	UK-specific cap ~5% below EU ETS trajectory (starting 2021)	National-level PTBAE-PU across five sectors (energy, waste, IPPU, agriculture, FOLU)
Mechanism	Cap-and-trade with auctioning, free allocation for leakage sectors	Cap-and-trade with auctioning and transitional free allocation	Cap-and-trade via CEV mechanism with hybrid options
Emission calculation method	Activity-based, facility-level monitoring via ETS monitoring plans	UK Government conversion factors and ETS monitoring plans	Default methods, facility-specific data, or continuous measurement (CEMS)
Free allocation basis	Benchmarks and historical emissions (ex-post adjustment allowed)	Based on historical emissions and carbon leakage risk benchmarks	Derived from historical emissions and average sector intensity
Free allowance basis	Same as allocation, capped annually and adjusted by MSR	Sectoral allowance set by the government, with a review process	Calculated using technical quota formulas and baseline targets
Carbon market/OTC	EU-wide ETS market, access to international offsets limited post-2020	UK ETS market: international offset use is currently restricted	Currently voluntary, moving to mandatory national ETS by 2025
Emission monitoring method	Default + specific sector methods (CEMS required for some sectors)	Default + CEMS + activity-based reporting	Default methods dominate; CEMS are used in large coal, fertilizer, and cement sectors
Reported scopes	Scope 1 mandatory, Scope 2 optional, Scope 3 limited (via CSRD)	Scope 1 mandatory; Scope 2-3 being phased via CSRD-style rules	Scope 1 mandatory; Scope 2 and 3 increasingly reported under SRN-PPI
Reporting standards	GHG Protocol, ISO 14064, IPCC Guidelines, ESRS	GHG Protocol, PAS 2060, ISO 14064, TCFD, ESRS (planned)	GHG National Standard (SNI), ISO 14064, SRN-PPI, IPCC, TCFD (voluntary)
Third-party verification	Mandatory for ETS installations and carbon offsetting entities	Required for neutrality claims and disclosures under SECR/TCFD	Required for carbon neutrality recognition, verified under MOEF
Reporting platforms	EU ETS Registry, CDP, ESRS	UK ETS Registry, CDP, TCFD-aligned reports	SRN-PPI (national registry), CDP (limited), UK ETS Registry (for exporters)
CEMS infrastructure	Common in large industrial plants and power sectors	Integrated in large emitters (power and industry)	Still limited; expansion planned in Phase 2 with international donors
Carbon market access	Full access to the EU ETS and limited offsets (subject to MSR)	Partial access with certified UK offset schemes (expansion expected)	Initial access to voluntary carbon markets, ETS national pilot in progress
Transparency level	High—audit trails, public registries, independent compliance checks	High—linked to corporate financial disclosure and ESG audits	Medium—MRV enforcement improving, institutional coordination needed
Key challenges	Adapting to the Fit-for-55 package, Scope 3 tracking, maritime inclusion	Climate risk governance, adjusting carbon leakage rules	Technical readiness, MRV gaps, sector readiness, investor education

Table 2 Illustrative quotes from FGD data.

Theme/analytical focus	Illustrative quote (anonymized)	Participant	Ethical code
Policy design maturity and institutional readiness	"Indonesia is still in the early stages of implementing carbon pricing. The government initially introduced a carbon tax targeting coal-fired power plants, but implementation has been delayed."	P1	KHF3
Fairness in allowance allocation	"Free allocation may protect certain industries, but it can also raise concerns about fairness if some sectors receive more favorable treatment than others."	P3	ADL1
MRV credibility and environmental integrity	"The EU ETS relies heavily on monitoring, reporting, and verification systems. Without MRV systems, the environmental integrity of the market would be difficult to guarantee."	P4	KHF2
Transparency and accountability in governance	"Companies and investors need confidence that emissions data are credible. Otherwise, carbon prices may not reflect real environmental outcomes."	P6	KHF3
Distributional effects on vulnerable groups	"If carbon costs are passed on to households, low-income groups may be disproportionately affected."	P8	ADL3
Protection of vulnerable groups	"Governments need mechanisms to protect vulnerable groups. Carbon revenues could be redistributed through social programs or subsidies."	P9	ADL2
Revenue use and public welfare	"Carbon revenues should be reinvested into climate mitigation and adaptation programs."	P11	MSL1
Long-term sustainability orientation	"Carbon pricing policies must contribute to broader SDGs."	P10	MSL2
Stakeholder participation and legitimacy	"Climate policies should involve governments, industry, civil society, and affected communities in decision-making processes."	P12	MSL3

The excerpts presented in Table 2 are anonymized, synthesized representations derived from the FGDs and do not represent verbatim participant quotations. The synthesized excerpts were developed to preserve confidentiality while reflecting the dominant themes identified during the qualitative analysis. Full anonymized synthesized discussion excerpts are provided in Supplementary File 7.

Table 3 Comparative alignment of carbon pricing systems with Islamic ethical principles.			
Islamic ethical principle	Indonesia	United Kingdom	European Union
Justice (‘ <i>adl</i>)	Partial alignment. Emerging attention to equity and national ownership, but limited redistributive mechanisms and uneven institutional readiness, remain challenges.	Moderate alignment. Transitional protections and regulatory safeguards exist, although concerns remain regarding household energy burdens and carbon leakage policies.	Relatively strong alignment in institutional safeguards and allocation transparency, though distributive concerns for vulnerable regions and developing countries persist.
Stewardship (‘ <i>khilāfah</i>)	Partial alignment. Regulatory commitment to emissions reduction exists, but MRV capacity and enforcement systems are still developing.	Strong alignment through established ETS governance, climate disclosure frameworks, and monitoring systems.	Strong alignment supported by mature MRV systems, emissions caps, MSR mechanisms, and long-term climate governance frameworks.
Public welfare (‘ <i>maṣlaḥah</i>)	Partial alignment. Carbon pricing demonstrates potential to support sustainable development, but revenue allocation mechanisms remain insufficiently transparent.	Moderate alignment through reinvestment mechanisms and support for low-carbon transition initiatives.	Stronger alignment through structured reinvestment into climate adaptation, innovation, and social transition programs.

questions about procedural justice and the integrity of environmental governance.

In Islamic thought, procedural justice (‘*adl*) is not limited to equitable outcomes, but includes the fairness and transparency of the mechanisms through which outcomes are generated. Long-term viability of Indonesia’s carbon pricing regime will therefore require public trust. As emphasized in both stakeholder interviews and comparative studies (e.g., Jenkins and Karplus 2016), perceptions of fairness, transparency, and predictability are essential to foster meaningful participation.

Comparatively, the EU and UK systems exhibit more mature MRV frameworks and institutional transparency. This difference is ethically significant. The Islamic principle of stewardship (‘*khilāfah*) requires institutional structures that uphold trust (‘*amānah*) and accountability (Qur’an 4:58). Empirical evidence from the EU ETS—showing emissions reductions without negative impacts on economic competitiveness—supports the idea that transparency and verification can deliver both environmental and economic gains (Bayer and Aklin 2020; Dechezleprêtre et al. 2023). These institutional attributes strengthen public trust and ethical legitimacy, which remain weak spots in Indonesia’s framework. While Indonesia’s SRN-PPI and CEMS deployments mark progress, gaps in enforcement and data availability weaken the credibility of carbon reductions and thereby compromise ethical compliance with the stewardship mandate.

Distributive justice (‘*adl*) is also reflected in how emissions quotas and fiscal burdens are allocated. In the EU and UK, transitional support is extended to emissions-intensive, trade-exposed sectors to ensure fairness during the early phases of market adjustment. Indonesia’s allocation model—while technically grounded in the PTBAE-PU system—lacks mechanisms to support small and micro-enterprises or to address regional inequalities. Meta-studies have shown that trust and perceived fairness are essential for policy acceptance (Carattini et al. 2018; van den Bergh et al. 2020), especially in contexts where fiscal transfers are involved. The absence of redistributive mechanisms in Indonesia’s design contradicts Islamic teachings on proportional burden-sharing and socio-economic equity (Qur’an 5:8).

Regarding public welfare (‘*maṣlaḥah*), the reinvestment of carbon revenues is ethically pivotal. The EU and UK earmark such revenues for green innovation, household energy assistance, and climate adaptation programs. Indonesia, however, has not yet established a transparent or purpose-driven carbon revenue management strategy. FGD participants highlighted that allocating these funds to programs such as rural electrification, support

for low-carbon MSMEs, and climate-resilient agriculture would align with the Islamic objective of collective welfare (‘*maṣlaḥah* ‘*āmmah*).

Aligning carbon pricing mechanisms with Islamic principles does not entail a rejection of market instruments, but calls for recalibrating their purposes, procedures, and impacts in accordance with the ethical imperatives of justice (‘*adl*), stewardship (‘*khilāfah*), and public welfare (‘*maṣlaḥah*). Within this framework, Indonesia—as the world’s most populous Muslim-majority country—holds a unique position to integrate Islamic economic values into the evolving design of its carbon governance system. Doing so may not only enhance the religious legitimacy of environmental regulation but also strengthen public confidence and the institutional robustness necessary for long-term policy effectiveness.

At the same time, Islamic ethical principles also provide a distinctive layer of legitimacy compared to conventional sustainability frameworks such as ESG and the SDGs. While ESG and SDGs are widely recognized as global governance standards, scholars have critiqued them for being overly technocratic and insufficiently responsive to cultural and religious contexts (Asutay 2025; Avdukic and Asutay 2025; Iqbal and Mirakhor 2017). By contrast, Islamic ethics—anchored in the ‘*maqāṣid al-sharī‘ah*—frames sustainability not only as an economic or environmental imperative but also as a moral obligation rooted in divine stewardship (‘*khilāfah*) and distributive justice (‘*adl*). This ethical framing strengthens procedural legitimacy in Muslim-majority contexts like Indonesia, where public acceptance often depends on both regulatory credibility and religious resonance (Asutay 2007; Dusuki and Abdullah 2007). In this sense, Islamic ethics complements ESG and SDG frameworks by embedding universal principles of fairness and accountability within a value system that resonates locally, thereby enhancing institutional trust and long-term policy effectiveness.

To provide a clearer comparative synthesis, Table 3 summarizes the relative alignment of Indonesia, the UK, and the EU carbon pricing systems with the three Islamic ethical principles employed in this study: justice (‘*adl*), stewardship (‘*khilāfah*), and public welfare (‘*maṣlaḥah*). The comparison does not imply absolute ethical compliance or non-compliance, but rather reflects the extent to which each system demonstrates institutional and policy characteristics that are consistent with the evaluative framework developed in this study.

Fiqh compliance of carbon credit trading. From the standpoint of Islamic commercial law (‘*fiqh mu‘āmalāt*), the permissibility of

trading carbon credits depends on whether such transactions fulfill the essential pillars (*arkān*) and conditions (*shurūṭ*) of valid contracts. Classical jurists, including Ibn Qudāmah in *al-Mughnī* and al-Kāsānī in *Badāʾiʿ al-Ṣanāʾiʿ*, emphasize that a legitimate trade must involve a lawful and existing commodity (*māl mutaqaawwim*), deliverability (*maqdūr ʿala taslimih*), absence of undue uncertainty (*gharar*) or speculation (*maysir*), and clear ownership and transferability (*milk al-tām*). These contractual principles aim to ensure justice, clarity, and ethical conduct in economic transactions.

Carbon credits, while intangible, represent certified GHG emission reductions—typically quantified as one metric ton of CO₂e. Though non-physical, they are not conceptually dissimilar from digital assets or usufruct rights (*manfaʿah*)—both of which are generally accepted in contemporary Islamic finance when grounded in verifiable benefit. Thus, carbon credits may be considered legitimate tradable assets if their issuance is transparently verified, their ownership clearly recorded, and their environmental value demonstrably real.

While the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI) has not issued a dedicated ruling on carbon markets, its existing standards on sales of intangible rights and contract transparency support conditional permissibility when linked to tangible outcomes. In Indonesia, the DSN-MUI has taken steps in this direction through Fatwa No. 111/DSN-MUI/IX/2017, which addresses sukuk for environmental projects and acknowledges that environmental assets may be traded under the classification of lawfully owned property (*mā malūk*) provided that the value is not speculative and that the end use serves public benefit (*maṣlaḥah*).

The implementation of carbon credit markets must thus ensure several *Shariʿah*-aligned features. Most critically, the integrity of verification mechanisms is paramount. As highlighted in FGDs with SUCOFINDO and Global Sustainable Futures UK, market credibility depends on robust MRV systems. Studies show that robust MRV systems significantly reduce emissions uncertainty and build market confidence (International Energy Agency 2020; United Nations Framework Convention on Climate Change 2014). Islam strongly emphasizes trust (*amānah*) and transparency (*shafāfiyyah*); unverifiable or poorly accounted emission reductions risk falling into the category of excessive uncertainty (*gharar fāḥish*), which renders transactions invalid (*bāṭil*). Furthermore, centralized transaction registries—such as the World Bank's Carbon Asset Tracking System—provide standardized serial numbering and mitigate double-counting across jurisdictions.

Ownership and measurability are also essential. In Indonesia, tradable units such as SPE-GRK must be uniquely traceable, with issuance and retirement recorded in the national SRN-PPI platform. Centralized registries have been identified as critical infrastructure to prevent double-counting and enhance ownership clarity (The World Bank 2021). This institutional arrangement supports the condition of complete legal ownership (*milk al-tām*) and helps prevent unauthorized reselling. Nevertheless, FGD feedback noted that credits from voluntary nature-based projects often lack standardized issuance procedures—raising the risk of invalid trades under Islamic commercial standards.

Speculation poses another significant concern. Islamic law prohibits trade involving uncertainty (*gharar*) or games of chance (*maysir*), both of which may arise if carbon credits are treated merely as financial instruments—especially when traded via futures contracts or derivatives that are not linked to actual, verifiable emission reductions. Experts such as Khan and Mirakhor (1987) and Iqbal and Mirakhor (2017) argue that speculative derivative trading without delivery violates Islamic contract justice, as it trades risk rather than value. Classical

Islamic contract structures—like *ijārah mawsūfah fī al-dhimmah* or *istisnāʿ*—provide *Shariʿah*-compliant pathways for structuring future-oriented offset projects, provided deliverables are clearly defined and transparently managed.

Moreover, the purpose of such trading must be lawful (*ḥalāl*) and oriented toward public good. Revenues from carbon credits—whether from taxes, auctioning, or voluntary offset sales—must not be used to fund impermissible (*ḥarām*) activities. In the Indonesian context, while the legal framework mandates carbon pricing, there is still a lack of clarity in how revenues are allocated. Ideally, these funds should support climate justice (*ʿadl*) and public welfare (*maṣlaḥah*), such as expanding clean energy access, subsidizing climate-resilient agriculture, or building MSMEs' capacity in low-carbon transitions. These goals resonate with the objectives of Islamic law (*maqāsid al-shariʿah*), particularly the protection of life, wealth, and environmental stewardship.

Some Islamic economists, including Kahf (2015) and Chapra (2000), support the view that trading intangible environmental services is permissible (*mubāḥ*) as long as the underlying assets are lawful, measurable, and transparently transacted. This opens room for creative contract models—such as leasing the environmental benefit of mitigation (*ijārah*), commissioning verified emissions reductions (*istisnāʿ*), or joint financing of mitigation projects through equity partnerships (*mushārakah*), where both risks and benefits are shared fairly among parties.

The current design of Indonesia's carbon pricing framework—anchored in SRN-PPI, third-party verification protocols, and an evolving legal architecture—contains several components that are broadly consistent with Islamic commercial norms. However, unresolved issues related to MRV enforcement, clarity of asset ownership, and transparency in the allocation and reinvestment of revenues continue to present challenges from a *Shariʿah* compliance perspective. Addressing these areas through fiqh-aligned contractual models and ethical governance practices may offer practical avenues for enhancing both the credibility and inclusivity of Indonesia's emerging carbon market.

Policy implications. The comparative analysis of carbon pricing mechanisms in Indonesia, the EU, and the UK reveals both technical and ethical dimensions that are critical for policy design. While the EU and UK exhibit regulatory maturity, their systems are the result of decades of policy iteration, strong institutional capacity, and integration with broader sustainability agendas. Indonesia, by contrast, is still navigating its early implementation phase, with hybrid instruments in place—emissions trading, result-based payments, and carbon taxes—yet facing structural challenges in MRV capacity, public awareness, and governance of carbon revenues. Drawing from both empirical findings and normative Islamic principles, a number of policy implications can be proposed to strengthen the legitimacy and effectiveness of Indonesia's carbon pricing architecture. These recommendations synthesize coded insights from stakeholder interviews and FGDs, interpreted through the normative lens of Islamic economic principles, particularly justice (*ʿadl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*).

First, robust and transparent MRV systems must be prioritized as a foundational infrastructure. As emphasized by participants in FGDs and verification institutions, the credibility of carbon trading depends on traceable, verifiable emission reductions. Without comprehensive CEMS coverage and consistent third-party validation, carbon credits risk falling into uncertainty (*gharar*), rendering them economically unreliable and ethically questionable. Strengthening MRV systems is therefore not only a technical necessity but also a *Shariʿah* imperative to uphold transparency (*shafāfiyyah*) and trust (*amānah*) in environmental

finance. These requirements are aligned with the Islamic principle of stewardship (*khilāfah*), which emphasizes responsible and accountable management of environmental resources (Qur'an 4:58).

Second, equity in emission quota allocation must be addressed. Islamic ethics demand distributive justice (*ʿadl*), especially for MSMEs and marginalized regions that may lack the capacity to engage in complex carbon markets. Policymakers should design tiered or simplified mechanisms for participation, such as sector-specific allocation formulas or carbon cooperatives, ensuring that smaller actors are not structurally excluded. This would prevent concentration of carbon market benefits among large industrial actors and align with *maqāṣid al-sharīʿah* by promoting inclusive development. This emphasis on fairness directly reflects the Qur'anic injunction to uphold justice even when it challenges vested interests (Qur'an 5:8).

Third, revenues from carbon taxes or auctioning must be earmarked for socially beneficial and environmentally restorative programs. In the current Indonesian framework, revenue allocation remains opaque, raising concerns over missed opportunities to align with *maṣlaḥah*-oriented development goals. Islamic public finance encourages the use of fiscal tools to enhance collective welfare, particularly in the areas of rural electrification, sustainable agriculture, clean transportation, and the empowerment of vulnerable populations. Embedding this ethical redistributive logic into Indonesia's carbon pricing strategy can enhance both its public legitimacy and its developmental impact. This approach is also consistent with the Islamic worldview that economic instruments must serve the public welfare (*maṣlaḥah*) and not merely private gain.

Fourth, legal structuring of carbon transactions must avoid speculative and ambiguous elements. Islamic jurisprudence permits innovation (*ijtihād*) in contract design, provided it adheres to core legal and ethical principles. Carbon credits can be transacted under contracts such as lease of a future deliverable (*ijarah mawsūfah fī al-dhimmah*) or commissioned output (*istisnāʿ*), as long as they are tied to real, measurable outcomes. Regulators should develop *Sharīʿah*-compliant templates and verification protocols that clarify ownership, usage rights, and delivery timelines—especially for offset projects that involve nature-based solutions or future mitigation benefits. These structures reflect the Islamic legal requirement that all traded goods must be measurable, lawful (*ḥalāl*), and free from excessive uncertainty (*gharar*).

Finally, Indonesia should leverage its unique cultural and religious context to pioneer a faith-aligned model of climate governance. Cross-border engagement with countries that have mature carbon pricing systems—such as through South-South cooperation, knowledge transfer platforms, and ESG-linked financing—can help accelerate domestic capacity building. At the same time, integrating Islamic environmental ethics and *fiqh*-based legitimacy can position Indonesia as a global leader in value-based carbon market innovation. Such a model would not only meet the technical demands of environmental integrity but also resonate with the ethical expectations of its majority-Muslim population, amplifying trust, compliance, and long-term sustainability. This aspiration draws from the Islamic concept of unity of creation and divine ownership (*tawḥīd*), which places humans as trustees (*khulafāʾ*) obligated to preserve ecological balance (*tawāzun*).

In practical terms, linking ethical imperatives to Indonesia's governance gaps reveals three priority areas. First, MRV enforcement must be expanded beyond technical compliance to embody Islamic values of trust (*amānah*) and transparency (*shafāfiyyah*). Strengthening CEMS coverage and ensuring independent verification would close credibility gaps while

aligning with stewardship (*khilāfah*). Second, distributive equity requires reforming quota allocation to ensure inclusion of MSMEs and vulnerable regions, preventing concentration of market benefits among large incumbents. This directly operationalizes justice (*ʿadl*) by safeguarding weaker actors against systemic exclusion. Third, the allocation of carbon revenues remains a critical test of *maṣlaḥah*. Current ambiguity risks undermining public confidence, whereas earmarking revenues for rural electrification, green MSME development, or green *waqf* initiatives would reinforce the public welfare objective while situating carbon markets within Islamic fiscal ethics (Chapra 2000; Hassan and Lewis 2007).

Beyond aligning with ESG and SDG frameworks, embedding Islamic ethical imperatives strengthens policy legitimacy by framing carbon pricing not only as a technical instrument but also as a moral duty rooted in distributive justice (*ʿadl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*). This dual framing enhances both global credibility and local cultural resonance, positioning Indonesia's carbon market as a model for value-based climate governance (Asutay 2007; Dusuki and Abdullah 2007; Kahf 2015; The World Bank 2024).

Conclusion

This study examined the design and implementation of carbon pricing policies in Indonesia, the United Kingdom, and the European Union through a comparative ethical lens grounded in Islamic economic principles. The analysis shows that while each region adopts distinct approaches—Indonesia through its CEV framework, the UK through a post-Brexit ETS with price containment mechanisms, and the EU through its long-established ETS—they reflect different levels of institutional maturity, transparency, and socio-economic inclusivity. Drawing on policy document analysis and expert insights from FGDs, the findings indicate that the effectiveness and legitimacy of carbon pricing mechanisms may depend not only on technical market design but also on broader ethical considerations, institutional trust, and perceptions of distributive fairness.

From an Islamic ethical perspective, the study applied the principles of justice (*ʿadl*), stewardship (*khilāfah*), and public welfare (*maṣlaḥah*) as evaluative criteria to assess the governance structures of these carbon pricing systems. Indonesia's emerging framework demonstrates partial alignment with these principles but may require stronger monitoring, reporting, and verification (MRV) systems, clearer allocation mechanisms, and more transparent revenue governance to enhance ethical legitimacy. In contrast, the EU and UK systems—particularly the EU ETS—exhibit more established institutional mechanisms for emissions monitoring, policy transparency, and reinvestment of carbon revenues. These findings suggest that ethical considerations such as fairness, accountability, and distributive justice may contribute to strengthening the legitimacy and long-term sustainability of carbon pricing policies.

This study also contributes to the literature by proposing an Islamic ethical evaluation framework for carbon pricing. By incorporating values such as transparency, equity, and harm avoidance into the analysis of environmental policy instruments, the framework provides a normative lens for assessing climate governance beyond purely economic or technical criteria. In this sense, Islamic ethical principles may complement existing global sustainability frameworks by offering culturally grounded perspectives for policy evaluation in Muslim-majority contexts.

Overall, the findings suggest that integrating ethical considerations—including those derived from Islamic economic thought—may help strengthen the legitimacy, inclusiveness, and accountability of carbon pricing systems. For policymakers in

Indonesia and other Muslim-majority contexts, aligning climate policy design with ethical principles such as justice, stewardship, and public welfare could potentially enhance institutional credibility and societal support for long-term climate governance.

AI statement. This manuscript was written and edited by the authors. No generative AI tools were used to draft or generate any content. All interpretations and arguments reflect the authors' original work and cited scholarly sources.

Data availability

The qualitative materials underpinning this study are provided in the Supplementary Information, including the research data inventory and documentation (Supplementary File 1), policy document dataset (Supplementary File 2), anonymized participant metadata (Supplementary File 3), FGD protocol (Supplementary File 4), qualitative coding framework (Supplementary File 5), qualitative data analysis procedure (Supplementary File 6), anonymized synthesized FGD excerpts (Supplementary File 7), and the mapping between FGD questions and the ethical coding framework (Supplementary File 8). Additional supporting documentation may be obtained from the corresponding author upon reasonable request.

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Author contributions

AMR and ARD developed the study's concept and design, conducted the comparative analysis, and wrote the main manuscript text. EF contributed to data collection and analysis. RT provided preliminary feedback on the methodology. All authors reviewed and approved the final manuscript.

Competing interests

The authors declare no competing interests.

Ethics

This study was approved by the Institutional Review Board of Lembaga Penelitian dan Pengabdian Kepada Masyarakat Universitas Islam Bandung Ethics Committee under approval number Ref. 180/B.04/LPPM/XII/2023, dated 29 December 2023, in accordance with the national guidelines and ethical standards set forth by the Indonesian Ministry of Higher Education, Science and Technology. The research adhered to all guidelines established by the ethics committee to ensure ethical conduct in qualitative research involving human participants.

Consent to participate

Informed consent was obtained from all participants involved in the interviews and FGDs conducted as part of this research. Participants were fully informed of the study's purpose, procedures, potential risks, and their rights, including the option to withdraw at any point.

Additional information

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