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The Philosophy of Sustainable Development in Comparative Carbon Tax Policies

Ayunisa Faradita, ayunisa.faradita-2025@fh.unair.ac.id (*)
Program Studi Ilmu Hukum, Universitas Airlangga, Indonesia

Angelina Sech Putri Yulia Utono, angelina.sech.putri-2025@fh.unair.ac.id
Program Studi Ilmu Hukum, Universitas Airlangga, Indonesia

Keisha Cassandra, keisha.cassan-2025@fh.unair.ac.id
Program Studi Ilmu Hukum, Universitas Airlangga, Indonesia

(*) Corresponding author

Abstract

General Background: Carbon pricing is an environmental law instrument that integrates climate mitigation, economic development, and intergenerational responsibility through regulatory mechanisms. **Specific Background:** Indonesia establishes a statutory carbon tax within a national carbon-economic-value framework, whereas the Netherlands applies an industrial CO2 levy alongside the European Union Emissions Trading System (EU ETS). **Knowledge Gap:** Existing scholarship insufficiently integrates these distinct legal architectures into a common framework addressing institutional coordination, environmental integrity, distributive justice, and long-term sustainability. **Aims:** This study compares the philosophical and legal foundations of carbon pricing in both jurisdictions and examines how sustainable development principles are operationalized through environmental regulation. **Results:** Using normative-comparative legal research with statutory, conceptual, and comparative approaches, the analysis identifies two institutional pathways: national regulatory integration in Indonesia and multilevel climate governance in the Netherlands. Five interdependent requirements emerge: environmental credibility, legal certainty, institutional coordination, distributive justice, and intergenerational responsibility, supported by transparent monitoring, reporting, verification, and carbon registry systems. **Novelty:** The study establishes an integrated comparative legal framework connecting carbon taxation, emissions trading, institutional accountability, information integrity, and sustainability principles beyond conventional fiscal analysis. **Implications:** The findings provide normative guidance for coherent carbon-pricing legislation, transparent regulatory administration, equitable transition arrangements, and context-specific climate governance without assuming legal equivalence or demonstrated emissions outcomes.

Highlights:

- Indonesia adopts national regulatory integration, while Dutch industrial taxation operates alongside the EU ETS.
- Five interconnected legal requirements underpin credible and equitable climate governance.
- Transparent emissions monitoring and registry infrastructure support accountability and long-term regulatory certainty.

Keywords: Carbon Tax, Sustainable Development, Environmental Law, Carbon Pricing, Comparative Law

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Introduction

Climate change has transformed environmental law from a predominantly protective regime into a field that increasingly regulates economic behaviour, investment decisions, energy systems, and intergenerational distribution. Carbon pricing is central to this transformation because it attempts to translate the environmental cost of greenhouse-gas emissions into a legal and economic signal. The legal question, however, is not merely whether carbon should be priced, but how the design, institutional setting, and distributional consequences of that price reflect the normative commitments of sustainable development. Carbon taxation is commonly understood as a direct price imposed on carbon dioxide or its equivalent, while carbon pricing more broadly includes market-based mechanisms such as emissions trading. The literature identifies carbon pricing as potentially cost-effective, while also emphasizing competitiveness, household distribution, political acceptance, revenue use, and institutional capacity [1], [2]. Firm-level evidence from the EU ETS has also examined whether carbon pricing is associated with emissions reductions and economic outcomes, but such evidence is jurisdiction- and institution-specific [21]. These findings are relevant as contextual evidence, not as direct empirical tests of the legal comparison undertaken in this article.

Indonesia presents a distinctive legal setting. Law No. 7 of 2021 introduced a statutory carbon tax, while Presidential Regulation No. 98 of 2021 previously established a broader framework for the economic value of carbon. Presidential Regulation No. 110 of 2025 subsequently repealed Perpres 98/2021 and reorganised the national framework for carbon-economic instruments and greenhouse-gas control [3]–[5]. The current regulation expressly links climate-change control with national economic development based on sustainable and environmentally oriented development [5]. In 2026, the framework has also been supplemented by implementing rules, including the Carbon Unit Registry System, which is relevant to traceability, integrity, and prevention of double counting [22]. The Netherlands provides a contrasting European framework. Its industrial CO_2 levy has operated since 2021 alongside the EU Emissions Trading System. The Dutch Emissions Authority describes the levy as an instrument for reducing industrial emissions, while the applicable legal design adjusts the charge for covered ETS installations by reference to the EU ETS price [6], [7], [19], [20]. The wider framework is shaped by EU ETS reforms under Directive (EU) 2023/959 [23] and by Dutch climate targets. The Dutch Climate Plan 2025–2035 identifies 90 percent lower greenhouse-gas emissions in 2040 as a logical interim step toward climate neutrality in 2050 [8], [24]. As of 2026, the levy remains legally operative; any prospective policy change should therefore be distinguished from the law currently in force.

Existing scholarship has examined Indonesia's carbon tax in relation to sustainable development, energy policy, social justice, and economic effects [9]–[12]. Other studies examine carbon pricing from the perspectives of environmental justice, distributive fairness, revenue recycling, poverty effects, and intergenerational equity [13]–[18]. The more specific comparative legal gap is threefold. First, Indonesia-focused studies commonly analyse domestic legal construction, implementation, or economic effects. Second, broader carbon-pricing scholarship frequently addresses justice or policy design across jurisdictions without reconstructing the legal architecture of each regime. Third, existing discussions do not sufficiently connect the Indonesian and Dutch instruments through a common environmental-law framework that distinguishes statutory form, institutional coordination, information infrastructure, distributional implications, and intergenerational responsibility. This article addresses that gap through a normative comparison rather than an econometric evaluation of policy effectiveness.

This study therefore asks: (1) how do the legal and philosophical foundations of sustainable development shape carbon-pricing instruments in Indonesia and the Netherlands; (2) how are environmental protection, economic development, and justice reflected in each framework; and (3) what does the comparison reveal about the role of environmental law in operationalising sustainable development through carbon pricing? The article's novelty lies in integrating comparative environmental law with the philosophy of sustainable development through a common legal framework that examines not only the existence of carbon-pricing instruments, but also their legal function, institutional coordination, information infrastructure, distributive implications, and intergenerational orientation. The study treats carbon pricing not simply as a fiscal instrument, but as a mechanism through which environmental law allocates responsibilities, incentives, and risks across present and future generations.

Method

This research uses normative-comparative legal research. The method is appropriate because the principal object is the legal construction of carbon pricing and its normative relationship with sustainable development rather than the estimation of causal economic effects. The statutory approach identifies legal bases, scope, institutional arrangements, and operational mechanisms. The conceptual approach interprets sustainable development, intergenerational equity, environmental justice, and the polluter-pays principle. The comparative approach places the Indonesian and Dutch frameworks within a common analytical matrix. The comparison is designed to identify functional similarities and legal differences without assuming that one jurisdiction's institutional solution can be directly transplanted into the other.

The primary legal materials comprise Indonesian Law No. 7 of 2021, Presidential Regulation No. 110 of 2025, relevant 2026 implementing regulations, the Dutch Wet belastingen op milieugrondslag, official materials of the Dutch Emissions Authority, and EU ETS legislation [3]–[8], [19], [20], [22]–[24]. Secondary materials comprise peer-reviewed literature published primarily from 2022 to 2026 on carbon taxation, sustainable development, environmental justice, distributional effects, and carbon-pricing governance [1], [9]–[18], [21]. Official legal databases and competent administrative authorities are treated as primary sources for current legal status, while academic studies are used to interpret economic, distributive, and normative dimensions.

The unit of comparison is the legal architecture of carbon pricing rather than the absolute level of carbon taxation. Six dimensions are examined: (1) legal architecture and policy objective; (2) taxable or chargeable emissions; (3) relationship with emissions trading; (4) institutional, monitoring, and information arrangements; (5) distributional and intergenerational concerns; and (6) connection between carbon pricing and sustainable development. These dimensions were derived from the research questions and from the principal legal functions of carbon pricing: norm-setting, allocation of regulatory responsibility, price formation, institutional implementation, distribution of transition burdens, and temporal allocation of environmental responsibility. The analysis follows the sequence of legal identification, conceptual interpretation, cross-jurisdictional comparison, and normative synthesis.

Results and Discussion

A. Sustainable development as a normative foundation of environmental law

Sustainable development provides a normative bridge between environmental protection and development. In legal scholarship, its significance lies not in requiring a single policy instrument, but in structuring how competing interests are reconciled. The principle becomes particularly demanding when environmental measures impose present costs for benefits that accrue partly in the future. Scholarship on equity and the Sustainable Development Goals emphasizes that justice is not external to sustainability; distributional and

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procedural questions influence whether sustainability can be implemented legitimately [14]. In carbon-pricing law, this means that environmental objectives cannot be analysed independently from the allocation of regulatory burdens and institutional decision-making.

For carbon pricing, the legal validity of a tax or levy is only one part of the analysis. A sustainable legal design should also consider whether responsibility for emissions is appropriately allocated, whether the regulatory process provides adequate transparency and accountability, whether revenue or avoided environmental costs can support transition objectives, and whether present policy leaves reasonable environmental capacity for future generations [13]–[18]. These are normative criteria for assessing legal design; they are not treated in this article as empirical proof that a particular regime has achieved a given emissions outcome.

The polluter-pays principle provides one doctrinal bridge between environmental responsibility and carbon pricing. Yet the principle does not resolve every question of justice. Historical responsibility, ability to pay, vulnerability, and the distribution of policy benefits may point toward additional considerations. Carbon pricing and justice are therefore compatible only when policy design addresses distributive and procedural concerns rather than assuming that a uniform price is automatically fair [13], [15], [16].

B. Indonesia: from carbon tax to an integrated carbon-economic-value framework

Indonesia's statutory carbon tax was introduced through Law No. 7 of 2021. The law provides that the carbon-tax rate must at least equal the carbon-market price and, where the market price is below Rp30 per kilogram of CO2e, the tax rate is at least Rp30 per kilogram of CO2e, equivalent to Rp30,000 per tonne of CO2e. The law also permits carbon-tax revenues to be allocated to climate-change control and allows interaction with emissions trading and other environmental mechanisms [3]. This statutory provision should be distinguished from the broader carbon-economic-value framework established through presidential regulation. The broader framework was initially articulated through Presidential Regulation No. 98 of 2021. As of 2026, however, the current framework must be read through Presidential Regulation No. 110 of 2025, which repealed Perpres 98/2021 and establishes rules on carbon allocation, NDC, carbon-economic instruments, transparency, monitoring and evaluation, capacity building and financing, and a steering committee [5]. The distinction is legally important: Law No. 7 of 2021 supplies the statutory basis for the carbon tax, while Perpres 110/2025 supplies the current overarching architecture for carbon-economic instruments and national greenhouse-gas control.

The 2025 regulation is particularly important because its legal rationale expressly states that climate-change control should proceed in line with national economic development and the principles of sustainable and environmentally oriented development [5]. The regulation therefore positions carbon-economic instruments within a developmental environmental-law framework rather than as a stand-alone fiscal measure. The relevant legal question is consequently how the tax and other carbon instruments are coordinated within this wider architecture, rather than whether the tax rate alone represents sustainable development. The 2026 implementing rules further illustrate the movement toward integrated governance. Regulation No. 10 of 2026 on the Carbon Unit Registry System provides for a decentralised, transparent, and integrated registry architecture designed to support recording, traceability, carbon-unit integrity, prevention of double counting, domestic and international carbon trading, and corresponding adjustment [22]. Regulation No. 6 of 2026 establishes procedures for forestry-sector carbon trading and replaced the earlier 2023 forestry trading regulation [25]. These rules are significant because they convert abstract commitments to transparency and integrity into institutional infrastructure for carbon governance.

Recent literature identifies both potential and structural challenges in Indonesia. Hartono et al. find through a dynamic CGE model that revenue recycling combining household transfers and renewable-energy investment can improve medium- and long-term GDP and employment outcomes while reducing energy intensity [9]. A recent systematic review identifies issues involving carbon-tax levels, sectoral coverage, and institutional readiness [10]. Legal scholarship has additionally emphasised legal certainty and implementation rules [11], [12]. These findings suggest that the sustainable-development dimension of Indonesian carbon taxation depends not only on the existence of a tax but on its interaction with transition policy, institutional capacity, and mechanisms for distributing costs and benefits.

C. The Netherlands: industrial CO2 levy within a multi-level climate-law framework

The Dutch approach differs structurally. The industrial CO2 levy is a statutory charge on specified industrial greenhouse-gas emissions and has operated since 1 January 2021. The Dutch Emissions Authority explains that the levy is intended to reduce industrial emissions and applies to covered industrial installations, with interaction between the levy and EU ETS allowances [6], [7]. The Wet belastingen op milieugrondslag contains the legal basis for the industrial CO2 levy [19]. The legal object is therefore not a general economy-wide carbon tax but a targeted industrial levy embedded in a multi-level carbon-pricing system. For 2026, the Dutch Emissions Authority reports a levy rate of €78.67 per tonne for ETS and nitrous-oxide installations and €103.66 for waste-incineration installations. For ETS installations, the amount payable is reduced by the applicable EU ETS allowance price; the Authority reports a 2026 EU ETS reference price of €79.42, producing a zero net levy for ETS installations under that calculation [20]. The Dutch authority also explains that the levy functions as a minimum price mechanism for covered emissions and that the statutory rate path remains set through 2030 [20]. The comparison should therefore focus on the interaction of price instruments rather than on nominal statutory rates alone.

This design illustrates a multi-level conception of environmental law. National taxation is coordinated with European emissions trading and climate targets. Directive (EU) 2023/959 amended the EU ETS to strengthen its contribution to the Union's climate-neutrality objective and climate targets [23]. The Dutch climate framework complements this supranational structure by establishing long-term national targets and sectoral transition measures [8], [24]. The Dutch case therefore demonstrates how sustainable-development objectives may be distributed across national legislation and supranational regulation rather than expressed in a single carbon-pricing statute. The Dutch system also demonstrates that a mature carbon-pricing architecture does not eliminate normative tensions. Legal certainty and predictability remain important because industrial investment depends on expectations about future carbon costs. At the same time, the current 2026 tariff structure and the interaction with the EU ETS show that the legal effect of the levy depends on the wider regulatory trajectory [6], [7], [20]. Accordingly, the analysis distinguishes current law from prospective policy reform and does not treat an announced policy intention as an enacted legal change.

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D. Comparative legal analysis: different legal architectures, shared sustainable-development challenge

The comparison demonstrates that Indonesia and the Netherlands do not represent two versions of the same carbon-tax model. Indonesia's architecture is characterised by a statutory carbon tax embedded in a broader national carbon-economic-value system, while the Netherlands uses a targeted industrial CO2 levy as a supplementary instrument within the EU ETS. The relevant comparative question is therefore functional: how does each legal architecture translate sustainable-development objectives into enforceable duties, incentives, monitoring arrangements, and distributional choices? The first difference concerns legal function. In Indonesia, carbon pricing forms part of a national architecture for climate governance, NDC implementation, carbon allocation, monitoring, transparency, and financing [5]. In the Netherlands, the industrial levy operates as an additional price mechanism within an established European emissions-trading system [6], [23]. The instruments consequently perform different legal functions even where both seek to internalise the environmental cost of emissions.

The second difference concerns institutional coordination. Indonesia's principal governance challenge is coordination across national institutions and sectors within an evolving carbon-economic-value framework. The Netherlands faces an additional layer of coordination between domestic institutions and EU-level climate governance. The difference means that institutional complexity exists in both systems, but its legal source and allocation of responsibility differ. The third difference concerns the meaning of the carbon-price signal. Indonesia's statutory carbon-tax rate is connected to carbon-market conditions [3], whereas the Dutch levy for covered ETS installations is explicitly adjusted through the EU ETS price [20]. Comparing nominal rates without considering these interactions would therefore produce a legally incomplete comparison. In both systems, the effective legal signal depends on how the carbon charge interacts with other instruments and on the rules governing their coordination. The fourth difference concerns the transition context. Indonesia must reconcile decarbonisation with development, energy access, and institutional capacity. The Netherlands operates within a high-income, EU-integrated economy where industrial decarbonisation, competitiveness, infrastructure, and technological transition are central considerations. These contextual differences limit direct legal transplantation and support a functional comparison focused on legal-design principles rather than institutional imitation.

E. Carbon pricing, environmental justice, and intergenerational equity

Carbon pricing distributes costs. Producers may face increased production costs, consumers may face higher prices for carbon-intensive goods and energy, and governments may receive additional fiscal resources. The distribution of these effects is relevant to procedural and substantive legitimacy. Literature on fairness emphasises revenue recycling, social protection, and institutional design as important conditions for reconciling climate objectives with distributive concerns [13], [15]–[17]. The present study uses these findings to identify legal-design questions rather than to conclude that either jurisdiction has achieved a particular distributional outcome. In Indonesia, distributive questions are closely connected with development needs and energy access. The legal framework provides possibilities for linking carbon-economic instruments with climate financing and broader transition measures [5]. The relevant legal question is therefore whether the emerging governance architecture creates mechanisms capable of directing carbon-related resources and avoided environmental costs toward legitimate transition objectives. Evidence of actual distributional outcomes would require a separate empirical study.

In the Netherlands, distributive questions arise within an industrial transition governed by both national and EU law. The burden on industrial installations must be understood alongside the EU ETS, technological investment, and competitiveness considerations. The justice question is consequently not simply who pays a levy, but how the combined legal architecture allocates costs, transition opportunities, and environmental benefits. This is a normative issue that cannot be resolved by the nominal levy rate alone. Intergenerational equity adds a temporal dimension. Current actors bear mitigation costs, while a substantial share of avoided climate damage benefits future generations. Climate-law scholarship has increasingly treated future generations as legally relevant subjects and has questioned the legitimacy of deferring climate burdens [18]. Carbon pricing can therefore be interpreted as one legal mechanism for addressing the temporal distribution of environmental responsibility. Whether it produces actual mitigation sufficient to protect future generations, however, is an empirical question beyond the scope of this normative-comparative study.

F. Toward a comparative legal framework for sustainable carbon pricing

The comparison supports five interconnected legal requirements. First, environmental credibility: the carbon-pricing framework should create a legally intelligible incentive to reduce emissions and support transition investment. Second, legal certainty: taxable or chargeable emissions, rate rules, exemptions, interactions with other instruments, and institutional responsibilities should be sufficiently predictable. Third, institutional coordination: tax, environmental, energy, industrial, and climate institutions should operate coherently. Fourth, distributive justice: the allocation of costs and benefits should be explicitly considered. Fifth, intergenerational responsibility: current regulatory choices should not systematically transfer avoidable climate burdens to future generations. Transparent MRV and registry systems support all five requirements by making compliance and carbon-unit claims legally verifiable.

These requirements suggest that sustainable development functions as an integrative legal principle rather than a decorative policy objective. It does not prescribe one universal tax rate or institutional design. Instead, it provides normative criteria for assessing whether different carbon-pricing architectures reconcile environmental protection, economic development, justice, and long-term responsibility. This approach also clarifies the limits of comparison: a legally coherent instrument in one jurisdiction may require different institutional arrangements in another.

For Indonesia, the implication is that Perpres 110/2025 should be analysed as part of a comprehensive carbon-governance architecture rather than in isolation. Its provisions on carbon allocation, NDC, transparency, monitoring, evaluation, financing, and institutional coordination provide infrastructure within which carbon pricing can operate [5]. The 2026 registry and forestry rules further indicate that implementation is moving toward a more integrated system [22], [25]. The legal priority is therefore not simply the adoption of a carbon price, but coherence between pricing, registry integrity, MRV, institutional responsibility, and transition financing. For the Netherlands, the implication is that the industrial CO2 levy should be analysed together with the EU ETS and the wider climate-neutrality trajectory. The Dutch case demonstrates how a domestic levy can operate as a supplementary incentive within a supranational carbon market rather than as an independent national tax [6], [20], [23]. Its legal significance lies in the interaction between instruments, including the rules that determine when the national levy produces an additional price signal and when the EU ETS price effectively offsets it.

The comparative lesson is not that Indonesia should reproduce the Dutch model. Rather, the comparison identifies legal-design principles that can be adapted contextually: credible price signals, reliable MRV and registry systems, institutional coordination, predictable long-term rules, distributive safeguards, and alignment between carbon pricing and wider transition policy. The comparison thus supports legal adaptation rather than direct transplantation.

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Table 1. Comparative legal architecture of carbon pricing in Indonesia and the Netherlands

Dimension	Indonesia	Netherlands
Legal architecture	Carbon tax within national carbon-economic-value framework; revised by Perpres 110/2025.	Industrial CO2 levy within national tax law and EU ETS framework.
Primary linkage	NDC, national development, climate control and sustainable resource management.	Industrial emission reduction, Dutch climate targets, and EU climate governance.
Relationship with ETS	Carbon tax can interact with emissions trading and other carbon mechanisms.	Levy interacts directly with the EU ETS price for covered installations.
Institutional logic	National and cross-sectoral governance within an evolving framework.	National institutions operating within EU-linked governance.
Justice dimension	Development, energy access, revenue use, and transition burdens.	Industrial transition, competitiveness, and broader distributional legitimacy.
Sustainability challenge	Legal certainty, implementation, price signal, coverage, MRV, and revenue use.	Policy continuity, industrial decarbonisation, EU coordination, and distributional legitimacy.

This study has two principal limitations. First, it is a normative-comparative legal study and therefore does not estimate the causal effect of carbon prices on emissions, investment, household welfare, or industrial competitiveness. Second, the Dutch and Indonesian frameworks are institutionally non-equivalent, so the comparison is functional rather than a claim of legal equivalence. These limitations are deliberate and define the scope of the article's contribution.

These research directions reinforce the value of combining legal and empirical methods. Environmental law determines the institutional architecture within which carbon pricing operates, while empirical research can test the consequences of that architecture. The two perspectives should therefore be treated as complementary rather than competing approaches. A fourth direction is comparative constitutional and administrative law. Carbon pricing can affect property interests, economic freedom, equality, taxation principles, and administrative discretion. Future research could examine how different constitutional systems frame these questions and whether judicial review influences the stability or design of carbon-pricing legislation.

A third direction concerns administrative performance. Researchers could evaluate the accuracy and timeliness of MRV systems, registry transactions, verification procedures, and administrative decisions. This would direct test the proposition that information integrity is a substantive component of carbon-pricing credibility. Comparative work could identify whether differences in administrative architecture affect compliance costs or environmental integrity.

A second direction is distributional analysis. Household-level data could be used to estimate the incidence of carbon prices across income groups and regions. In Indonesia, this could be combined with analysis of energy access and the allocation of carbon-related fiscal resources. In the Netherlands, it could be combined with industrial employment, energy costs, and the distribution of transition support. Such research would test whether the legal mechanisms identified as relevant to justice are associated with measurable outcomes.

The present study establishes a normative-comparative foundation that can support subsequent empirical research. One direction is to test whether the identified legal-design features correlate with emissions outcomes. Such research could compare changes in emissions intensity before and after major regulatory changes, while controlling for energy prices, economic growth, technology, and other factors. The legal analysis would supply the institutional variables necessary to interpret the empirical findings.

G. Toward a research agenda beyond normative comparison

Sustainable development therefore requires a form of adaptive legal stability: stable objectives and procedures combined with the capacity to adjust instruments when evidence or circumstances change. This balance is especially important for carbon pricing because the instrument is intended to influence long-lived economic decisions. The Netherlands illustrates a different continuity issue because the current industrial levy remains in force while its future has been the subject of policy discussion. For the purposes of this article, the legal rule is straightforward: a prospective policy intention should not be treated as enacted law. For investment decisions, however, the existence of a credible reform process can still influence expectations. This demonstrates why legal analysis should distinguish binding rules from policy signals while recognising that both may affect behaviour.

Indonesia's regulatory transition illustrates the importance of communicating legal continuity. The move from Perpres 98/2021 to Perpres 110/2025 changed the broader regulatory architecture [4], [5]. A future-oriented carbon-pricing system should make clear which rights, duties, institutions, and procedures continue, which are replaced, and how existing carbon units or compliance positions are treated. Such clarity reduces uncertainty during regulatory transition. Long-term climate policy requires continuity across changes in governments, economic conditions, and technological assumptions. Carbon-pricing systems can influence investment only if regulated actors have reasonable expectations about future rules. This does not mean that climate law must never change. Rather, changes should occur through transparent legal processes and remain connected to stable long-term objectives.

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H. Policy continuity and the credibility of long-term climate governance

The broader sustainable-development implication is that carbon pricing cannot be separated from carbon accounting. If the environmental claim is unreliable, the economic price attached to it loses part of its normative justification. Registry and accounting rules are therefore part of the substantive environmental architecture rather than merely technical compliance procedures. The Dutch and EU systems address environmental integrity through a different architecture. The EU ETS is based on regulated allowances and monitoring, while other carbon claims are governed by distinct rules. The comparison shows that environmental integrity does not require identical institutional mechanisms. It requires that the legal system prevent contradictory claims and maintain a credible relationship between the environmental activity and the legal unit or obligation.

Indonesia's 2026 Carbon Unit Registry System directly addresses this dimension [22]. The legal significance is considerable because a registry creates an institutional record of carbon-unit status. When combined with verification and accounting rules, it can reduce uncertainty about whether a unit has already been used to substantiate a claim. The issue is not simply market administration; it concerns the legal credibility of the environmental asset on which carbon governance relies. Carbon markets and offset mechanisms introduce a specific environmental-law risk: the same emission reduction may be counted more than once or claimed by more than one actor. Double counting can undermine the credibility of carbon units and weaken the relationship between the legal price and the underlying environmental benefit. The legal response therefore requires rules concerning accounting, registry entries, transfers, retirement, and corresponding adjustments.

I. Environmental integrity and the problem of double counting

Regulatory coherence is consequently a core element of sustainable development. The more complex the instrument mix becomes, the more important it is that legal hierarchy, cross-references, definitions, and institutional responsibilities remain clear. Coherence reduces compliance costs, strengthens accountability, and makes the environmental purpose of the system more intelligible. The Dutch system also demonstrates hierarchical interaction because national tax law operates alongside EU legislation. The domestic industrial levy must be interpreted within the legal environment established by the EU ETS [19], [23]. National legislation therefore cannot be understood entirely in isolation from supranational rules. This is an important methodological point: comparative environmental law must identify not only the text of a national statute but also the external legal instruments that determine its practical operation.

Indonesia's development from Perpres 98/2021 to Perpres 110/2025 illustrates this issue. Perpres 98/2021 remains relevant for historical analysis, but it should not be cited as current law because it was repealed [4], [5]. The current architecture should therefore be anchored in Law No. 7 of 2021 for the statutory carbon tax and Perpres 110/2025 for the current broader carbon-economic-value framework. This distinction improves both doctrinal accuracy and the credibility of comparative analysis. Carbon pricing often requires legislation, regulations, administrative rules, and technical standards. The relationship among these instruments affects legal certainty. A statutory tax provision may establish the basic obligation, while regulations specify implementation, and administrative rules determine technical procedures. The hierarchy must remain visible so that regulated actors can identify the source and scope of each obligation.

J. The role of legal hierarchy and regulatory coherence

The comparative lesson is that sustainable development includes procedural institutional capacity. A carbon-pricing regime may have ambitious substantive targets but still face legitimacy problems if regulated actors cannot understand how liabilities are calculated or challenge administrative errors. Environmental law should therefore integrate substantive climate objectives with administrative safeguards. In the Netherlands and EU ETS, monitoring and verification similarly provide the factual basis for compliance.The administrative authority's role is not merely technical. It helps determine whether the regulated entity has satisfied its environmental obligations. A transparent administrative framework therefore contributes to both environmental integrity and legal certainty.

The Indonesian registry framework demonstrates the administrative importance of reliable information. If carbon units are recorded and transferred through a formal registry, the registry becomes a source of legal evidence concerning ownership, status, and environmental claims [22]. Clear rules concerning data, verification, corrections, and access can strengthen confidence in the system. The same logic applies to emissions reporting used to determine carbon-tax or carbon-market obligations. Carbon pricing creates administrative decisions that can affect substantial economic interests. Determining emissions, calculating liabilities, verifying carbon units, imposing sanctions, and maintaining registries are administrative functions with legal consequences. Administrative-law principles such as transparency, competence, reviewability, and procedural fairness are therefore relevant to the legitimacy of carbon-pricing systems.

K. Administrative law, transparency, and accountability

A comparative legal approach should consequently examine complementary instruments such as transition financing, technology support, energy-system reform, and predictable regulatory trajectories. Carbon pricing is more likely to function coherently when regulated actors have legally and institutionally available pathways for responding to the price. The price signal and the transition infrastructure should therefore be analysed together. Indonesia faces a different development context. Carbon pricing must operate alongside industrialisation, energy access, infrastructure constraints, and evolving institutional capacity. These conditions can make a rapid increase in carbon costs more challenging for certain sectors. At the same time, delaying carbon pricing can increase the risk of carbon-intensive investment and future adjustment costs. Sustainable development therefore requires a legal framework capable of managing transition rather than simply choosing between environmental protection and economic development.

The Netherlands provides a useful setting because its industrial levy operates in an economy already subject to the EU ETS. The interaction reduces the possibility of analysing competitiveness through the national levy alone. Firms operate within a broader European regulatory environment, and the domestic levy is designed in relation to the allowance price [20], [23]. The legal architecture therefore distributes part of the competitiveness question across EU-level and national instruments. Competitiveness is frequently raised in discussions of industrial carbon pricing because firms may face higher costs relative to producers operating under less stringent climate regulation. In environmental law, however, competitiveness should be treated as one regulatory consideration among several rather than as an automatic reason to reduce environmental obligations. The relevant legal question is how the system manages transition while maintaining credible climate objectives.

L. Competitiveness, industrial transition, and the limits of the carbon-price signal

The Dutch industrial levy presents a different revenue context because its principal legal function is industrial emissions reduction within a wider EU carbon market. The comparison shows that revenue generation need not be the defining feature of every carbon-pricing instrument. A supplementary levy can primarily be designed around emissions incentives and price interaction. Sustainable development therefore requires clarity about the objective of revenue and the objective of the price itself; otherwise fiscal and environmental purposes

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can become conflated. Economic modelling can inform this legal question without replacing it. Hartono et al. examine revenue recycling through household transfers and renewable-energy investment and report favourable outcomes under their model assumptions [9]. The relevance of such research to environmental law is that it demonstrates why revenue design can alter the distributional and macroeconomic consequences of a carbon price. The legal framework can facilitate or constrain these possibilities through rules concerning earmarking, budgeting, accountability, and institutional responsibility.

Law No. 7 of 2021 permits carbon-tax revenue to be allocated for climate-change control [3]. Perpres 110/2025 also includes financing within the broader carbon-economic-value architecture [5]. These provisions provide a legal pathway for connecting the fiscal side of carbon pricing with the expenditure side of sustainable development. However, the existence of such a pathway should not be equated with proof that revenue has produced a particular transition outcome. That question requires examination of budgetary implementation and actual expenditure. Revenue is an important but often misunderstood dimension of carbon pricing. A carbon tax can generate public revenue, but the fiscal yield is not itself the environmental objective. From a sustainable-development perspective, the significance of revenue lies in how the legal system connects it to transition financing, environmental protection, social support, or other legitimate public purposes. The allocation rules can therefore affect both the distributive legitimacy and the environmental credibility of the instrument.

M. Carbon-pricing revenue, financing, and transition policy

The comparison indicates that sectoral differentiation is not necessarily inconsistent with sustainable development. The key legal requirement is transparency about why sectors are covered differently and how the resulting gaps are addressed. Differentiation can be justified by measurement capacity, technological characteristics, or institutional feasibility, but unexplained exemptions can weaken environmental credibility and distributive legitimacy. The legal architecture should therefore make the rationale and interaction of sectoral instruments visible. The Netherlands' industrial CO2 levy is similarly sector-specific. Its legal object is industrial emissions rather than all sources of greenhouse gases. Other sectors are addressed through different instruments, including the EU ETS and wider climate policies [6], [23], [24]. The sectoral focus can be understood as an institutional choice that concentrates the domestic levy where emissions measurement and industrial transition policy are particularly developed. It also means that the levy cannot be evaluated independently from the wider set of sectoral climate measures.

Indonesia's evolving framework illustrates the importance of differentiated sectoral regulation. The 2026 forestry regulation establishes specific procedures for carbon trading through emission offsets in the forestry sector [25]. This reflects the distinctive character of land-based mitigation, where carbon accounting is affected by biological processes, land tenure, permanence, leakage, and other considerations. The existence of a general carbon-pricing framework does not eliminate the need for sector-specific legal rules; instead, it creates the umbrella within which such rules can be coordinated.Carbon pricing also raises a question of regulatory scope. Greenhouse-gas emissions arise across electricity, industry, transportation, buildings, waste, agriculture, forestry, and land use, but the measurement capacity and policy instruments available in each sector differ. A sustainable legal architecture must therefore determine whether a uniform price is appropriate, whether differentiated rules are necessary, and how gaps between sectors affect the overall integrity of the system.

N. Sectoral coverage and differentiated regulatory treatment

The comparative implication is that carbon-pricing regimes should be evaluated through their interaction rules. A jurisdiction may have a relatively modest statutory tax but a stronger effective price if the tax interacts with other instruments in a way that reinforces incentives. Conversely, multiple instruments may produce little additional signal if their legal effects overlap or offset each other. Sustainable-development analysis therefore requires attention to the architecture of interaction rather than a simple inventory of instruments. The Dutch system provides a more established example of legal interaction. The industrial CO2 levy for covered ETS installations is calculated with reference to the EU ETS price [20]. The domestic levy therefore operates partly as a supplementary mechanism. Its legal effect is not equivalent to simply adding the nominal levy rate to the EU allowance price. Instead, the legislation determines the additional amount after accounting for the allowance price. The 2026 figures illustrate why the legal formula matters: the reference EU ETS price can offset the domestic levy for covered installations.

Indonesia's statutory framework permits interaction between carbon taxation and carbon-market mechanisms [3]. The broader national carbon-economic-value framework further provides a legal environment in which different carbon instruments can coexist [5]. The challenge is to define the circumstances in which an entity subject to one mechanism also faces another obligation and how the instruments are accounted for. Without clear interaction rules, multiple instruments could generate uncertainty about compliance or create incentives that are difficult for regulated actors to anticipate. Carbon taxation and emissions trading are often presented as alternative market-based instruments, but the comparative cases demonstrate that the legal relationship can be more complex. A carbon tax establishes an obligation according to a statutory formula, whereas an emissions-trading system establishes a tradable entitlement architecture in which scarcity and market exchange contribute to price formation. When both instruments operate in the same regulatory space, the legal system must determine whether they complement, duplicate, or partially offset one another. This is a question of legal design rather than merely economic theory.

O. The relationship between carbon taxation and emissions trading

This proposition also explains why direct legal transplantation should be avoided. An institutional mechanism developed for a mature EU emissions-trading market may not perform the same function in an emerging national carbon-market architecture. Conversely, a national framework designed around development and cross-sectoral carbon governance may not be appropriate for an EU-integrated industrial system. Comparative environmental law is therefore most productive when it identifies transferable principles while preserving contextual differences. Indonesia and the Netherlands illustrate this proposition particularly clearly. Indonesia's current framework emphasises national integration of carbon-economic instruments, NDC implementation, monitoring, financing, and registry development. The Netherlands emphasises a supplementary industrial levy operating within the EU ETS and a multi-level European climate framework. The two systems should not be treated as interchangeable. Their comparative value lies in demonstrating different institutional routes toward the same broad environmental-law challenge: translating the long-term objective of decarbonisation into present legal obligations and incentives.

The central comparative proposition emerging from the study is that a sustainable carbon-pricing system is not defined by whether it is labelled a tax, levy, or emissions-trading mechanism. It is defined by whether the legal architecture creates a coherent relationship between environmental harm, legal responsibility, credible information, economic incentives, institutional accountability, distributive arrangements, and long-term environmental objectives. Different jurisdictions may therefore satisfy the same normative requirements through different legal forms.

P. Final comparative proposition

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The comparative conclusion is that sustainable development is most useful when it is operationalised through legal mechanisms. The principle should inform the design of institutional responsibilities, information systems, fiscal rules, transition measures, and long-term commitments. This converts sustainable development from a general policy aspiration into an analytical criterion for environmental-law design. In the Netherlands, integration takes place in a different setting. Industrial decarbonisation is connected to EU climate policy, energy infrastructure, competitiveness, technological investment, and national climate planning. The industrial levy is therefore one component of a larger transition strategy. Its legal effect cannot be interpreted solely through the amount of the levy because the EU ETS, climate targets, and sectoral policies jointly shape the incentives facing regulated entities.

In Indonesia, the integration problem is closely connected with development. Carbon pricing must operate in an economy in which energy demand, industrialisation, infrastructure development, and social welfare remain important. A sustainable-development approach does not require ignoring these considerations; it requires making their relationship to decarbonisation explicit. Transition financing, renewable-energy investment, household protection, and institutional capacity can therefore be treated as components of the legal environment within which a carbon price operates. The philosophy of sustainable development is sometimes criticised for allowing environmental objectives to be diluted by competing economic interests. Carbon pricing shows why the principle should instead be interpreted as an integration requirement. Environmental objectives should influence economic decision-making, while the distributional and institutional consequences of environmental regulation should be made visible and managed through law. The objective is not to place environmental protection and development on opposite sides of a scale, but to design institutions in which economic activity is conducted within recognised environmental limits.

Q. Integrated interpretation of environmental, economic, and social objectives

For the Netherlands, the same principle applies to the relationship between the current industrial CO2 levy and prospective policy changes. The legal status of the levy in 2026 should remain the reference point for current compliance analysis. If legislative reform is pursued, the process should identify how existing obligations, investment expectations, and interactions with the EU ETS will be treated. The comparative lesson is that adaptive climate law is most credible when change is transparent rather than abrupt or ambiguous. For Indonesia, this means that the transition from Perpres 98/2021 to Perpres 110/2025 should be accompanied by clear communication of the current legal basis and institutional responsibilities. The distinction between historical and current law is essential not only for academic accuracy but also for compliance. The 2026 implementing regulations demonstrate that the framework continues to develop. The legal system should therefore maintain a clear hierarchy in which statutory obligations, presidential regulations, ministerial rules, and technical procedures can be understood as parts of a coherent structure.

The dynamic nature of carbon regulation creates a special challenge for legal certainty. Climate science, international commitments, technology costs, and market conditions evolve. Governments may therefore need to revise rates, coverage, administrative procedures, and institutional arrangements. Yet frequent or unclear changes can undermine the capacity of regulated actors to anticipate their obligations. Sustainable-development law must therefore provide a structure for adaptation that is procedurally clear and substantively connected to long-term environmental objectives.

R. Implications for legal certainty in a changing carbon-pricing environment

The Indonesian and Dutch cases therefore demonstrate a broader doctrinal shift from single-instrument regulation toward system-based environmental governance. The unit of legal analysis is increasingly the regulatory architecture rather than the individual statute. This shift is particularly important for climate change because emissions are produced across interconnected economic sectors and jurisdictions. A legal rule that appears effective in isolation may have limited environmental significance if it is disconnected from energy policy, carbon markets, land-use governance, or international accounting. This hybrid character requires environmental-law scholarship to pay attention to institutional relationships. The legal validity of a carbon charge does not automatically guarantee its environmental credibility. The environmental objective depends on the measurement of emissions, the calculation of the charge, the interaction with other instruments, and the enforcement capacity of public institutions. Sustainable development provides a normative framework for evaluating these relationships because it connects environmental objectives with economic and social consequences rather than treating them as separate policy fields.

The comparison has a doctrinal significance beyond the specific instruments examined. Carbon pricing demonstrates how environmental law increasingly operates through hybrid regulatory techniques that combine taxation, markets, administrative information, and long-term planning. The traditional distinction between command-and-control regulation and market instruments is therefore insufficient to capture the contemporary legal architecture of climate governance. A carbon tax may be established in tax legislation but depend on environmental measurement; a carbon levy may be national but depend on an EU market; and a carbon unit may be traded commercially but acquire its legal meaning through a public registry.

S. Doctrinal significance of the comparison

The study consequently supports a contextual approach to comparative environmental law. Indonesia and the Netherlands should not be treated as competing models from which a single winner can be selected. Their value for scholarship lies in the contrast between their institutional architectures and in the legal functions that can be observed across the difference. The resulting comparative framework provides a basis for future empirical evaluation and for further research on how environmental law can structure economically credible and socially legitimate pathways toward decarbonisation.

The philosophical contribution of sustainable development is to provide a common normative vocabulary for these different systems. It does not dictate identical institutions. Instead, it asks whether legal design enables environmental protection to be integrated with economic transformation, social legitimacy, and responsibility toward future generations. In this sense, carbon pricing is a practical test of whether environmental law can translate a broad normative principle into specific legal duties, administrative processes, and economic incentives.

The Dutch framework demonstrates a different form of integration. The industrial CO2 levy is not designed to operate independently of the EU ETS. Its legal significance depends on the interaction between the national levy and the European allowance market, while its broader policy context is provided by Dutch and EU climate targets. The 2026 position illustrates that a domestic carbon charge may have a limited marginal effect at a particular allowance price without ceasing to exist as a legal instrument. This distinction is important for both doctrinal accuracy and comparative analysis. The Indonesian framework shows the importance of building institutional coherence while the carbon-pricing system continues to develop. The statutory tax, the current carbon-economic-value framework, the 2026 registry, and sector-specific carbon-trading rules should be read as interconnected components. Their legal value lies in their capacity to produce predictable obligations and credible environmental information while supporting national climate commitments. The principal legal

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challenge is therefore one of coordination and implementation rather than the mere existence of a tax.

Taken together, the Indonesian and Dutch cases demonstrate that the legal architecture of carbon pricing should be assessed as a system of relationships rather than as an isolated financial obligation. The system must connect the definition of emissions, the allocation of responsibility, the calculation of the price, the verification of information, the authority of institutions, and the distribution of transition costs. This integrated approach is particularly appropriate for sustainable development because the principle itself requires environmental, economic, social, and temporal dimensions to be considered together.

T. Carbon pricing as hybrid environmental governance

The comparative evidence supports a broader doctrinal proposition: contemporary carbon pricing is best understood as a form of hybrid environmental governance. A carbon tax or levy may originate in fiscal legislation, but its environmental operation depends on emissions measurement, administrative verification, energy regulation, market institutions, and long-term climate planning. This hybrid character complicates conventional legal categorisation. The legal instrument is neither purely fiscal nor purely environmental. Its legitimacy and effectiveness depend on the interaction between legal rules that define the liability and institutional systems that establish the factual basis of that liability. This point is important for sustainable development because sustainable development itself is integrative. It requires environmental protection to be considered together with economic activity, social welfare, and temporal responsibility. A carbon price therefore should not be assessed only by asking whether the State has imposed a charge on emissions. The more relevant legal questions are whether the charge is connected to a credible environmental objective, whether the underlying emissions data are reliable, whether the responsible institutions are clearly identified, and whether the transition burden is allocated through transparent rules.

Recent empirical literature reinforces the importance of examining carbon pricing as part of a broader policy architecture. A meta-analysis by Ahmad, Li, and Wu covering 81 studies and 2,032 estimates finds that the effectiveness of carbon taxes and emissions trading systems varies across contexts and policy designs [26]. This finding is significant for comparative environmental law because it cautions against treating the legal label of an instrument as a proxy for its environmental performance. The same formal instrument can operate differently depending on coverage, price level, enforcement, complementary policies, and institutional capacity. The British experience provides another useful illustration. Gugler, Haxhimusa, and Liebensteiner find a substantial reduction in power-sector CO_2 emissions following the introduction and subsequent increases of Britain's carbon tax, while also identifying possible international and EU ETS interactions [27]. The evidence does not establish that the Dutch or Indonesian regimes will generate identical outcomes. It does, however, demonstrate why legal analysis should recognise the behavioural function of price signals while remaining attentive to system-level interactions. The implication for Indonesia is that the carbon tax should be analysed as one node in a network of environmental, fiscal, energy, and administrative rules. Law No. 7 of 2021 establishes the statutory tax foundation, while the broader framework under Perpres 110/2025, registry rules, carbon trading procedures, and related climate-governance mechanisms provide the institutional environment in which the tax acquires practical meaning [3], [5], [22], [25]. The legal question is therefore one of coherence: can the various instruments be read together so that regulated entities understand the relationship between taxation, trading, measurement, reporting, verification, and climate-financing obligations?

The Dutch case presents the same problem in a different institutional form. The industrial CO_2 levy cannot be understood independently from the EU ETS. The domestic levy and the European allowance market create an interaction in which the effective additional charge depends on the relationship between the statutory levy and the ETS price [6], [20], [23]. This is an example of regulatory layering: a national instrument performs a supplementary function within a supranational market architecture. Sustainable development therefore requires a shift from instrument-centred analysis to architecture-centred analysis. The relevant object of legal comparison is not simply "carbon tax versus carbon levy," but the institutional system that determines how each instrument defines responsibility, produces information, creates incentives, allocates burdens, and supports long-term transition.

U. Measurement, MRV, registry systems, and the legal credibility of carbon pricing

Carbon pricing depends on a prior legal act of measurement: the State must determine what emissions occurred, who is responsible for them, and what quantity is subject to a charge or compliance obligation. This makes monitoring, reporting, and verification (MRV) more than technical matters. They constitute part of the evidentiary infrastructure of environmental law. Where emissions data are uncertain, inconsistent, or not independently verifiable, the credibility of the resulting carbon obligation is weakened. The legal significance of information becomes particularly clear when carbon units are traded. A carbon unit is not merely a commodity; its environmental value depends on the integrity of the underlying accounting claim. If a reduction is counted twice, transferred without adequate traceability, or used inconsistently across national and international systems, the legal relationship between the unit and the environmental benefit becomes uncertain. The environmental-law problem is therefore not limited to market fraud. It concerns the validity of the environmental claim itself.

Indonesia's 2026 Carbon Unit Registry System provides an important institutional response to this problem. The regulation establishes a registry architecture intended to support recording, traceability, integrity, prevention of double counting, trading, and corresponding adjustment [22]. In normative terms, this transforms information management into a component of environmental governance. The registry can serve as an authoritative institutional record through which the status and history of carbon units become legally ascertainable. This development strengthens the sustainable-development dimension of the Indonesian framework in three ways. First, it can improve environmental integrity by reducing ambiguity about the status of carbon units. Second, it can strengthen administrative accountability because transactions and compliance positions can be documented. Third, it can support intergenerational responsibility by improving the credibility of claims that a particular mitigation activity contributes to national climate objectives.

The Netherlands and EU ETS employ a different institutional architecture, but the underlying legal principle is similar. Regulated installations are subject to monitoring and verification requirements, and compliance depends on reliable emissions information. The EU ETS therefore illustrates that a market mechanism requires a substantial administrative and informational infrastructure behind the visible price signal. Carbon pricing is not self-executing: it depends on institutions capable of translating physical emissions into legally relevant quantities.

The information dimension also affects legal certainty. If the calculation of an environmental charge depends on technical data that regulated entities cannot understand, access, or challenge, the formal clarity of the statute may not be sufficient. Administrative law principles—transparency, competence, reviewability, consistency, and procedural fairness become relevant because emissions data can determine substantial financial obligations. This suggests an expanded conception of legal certainty for carbon pricing. Traditional tax certainty focuses on the taxable object, taxpayer, rate, timing, and procedure. Environmental carbon pricing requires an additional informational layer: the regulated actor must also be able to identify how emissions are measured, which methodology applies, how verification is conducted, how discrepancies are corrected, and how data are recorded in the relevant registry. In other words, legal

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certainty is partly dependent on informational certainty.

The comparative lesson is therefore that MRV and registry infrastructure should be incorporated into the substantive analysis of sustainable development. They should not be relegated to technical annexes. Environmental integrity, administrative accountability, and intergenerational responsibility all depend on the reliability of the information architecture supporting the carbon price.

V. Revenue recycling, distributive justice, and social legitimacy

The justice dimension of carbon pricing deserves deeper treatment because the environmental benefit of a carbon price and its social burden may occur at different places and times. A carbon price can increase the cost of carbon-intensive production and consumption while simultaneously generating public revenue or stimulating investment in cleaner technologies. The distribution of these effects is not predetermined. It depends on the structure of the economy, household consumption patterns, sectoral exposure, and—critically—the legal design of revenue use. Shang's review identifies four major channels through which carbon pricing can affect poverty and inequality: consumption, income, health, and revenue recycling [28]. The implication is that it is analytically insufficient to classify carbon pricing as simply progressive or regressive. The same instrument can produce different distributional outcomes depending on which channel dominates and how government responds. This insight is particularly relevant to Indonesia, where energy access, regional inequality, household vulnerability, and development priorities interact with climate policy.

Recent research also demonstrates that the measurement of distributional effects itself can influence conclusions about fairness. Shei, Liu, and Hsieh show that estimates of carbon-pricing burdens vary depending on whether household economic status is assessed using income or expenditure [29]. For environmental law, this reinforces the importance of evidence-sensitive policy design. Legal rules intended to protect vulnerable groups should be based on a sufficiently nuanced understanding of who bears the burden and through which mechanisms. Revenue recycling consequently becomes a legal-design issue. Law No. 7 of 2021 permits carbon-tax revenues to be allocated to climate-change control [3], while Perpres 110/2025 places financing within the broader carbon-economic-value architecture [5]. These provisions create legal pathways for connecting the imposition of a carbon charge with the expenditure side of sustainable development. The existence of the pathway, however, should not be confused with evidence that the resulting expenditure has achieved a particular social or environmental outcome. Such a conclusion requires empirical examination of budgeting and implementation.

International literature suggests that the design of recycling matters. Li and Zhang's CGE analysis for China finds that carbon pricing can adversely affect social welfare and urban-rural equality, while mixed recycling approaches can mitigate these effects and support renewable-energy development [30]. Muth's cross-national analysis of thirty national policies similarly emphasises the role of compensation and hybrid revenue-recycling strategies in supporting more stringent carbon pricing [31]. These findings do not prescribe a single formula for Indonesia or the Netherlands, but they strengthen the normative proposition that the distributional consequences of carbon pricing should be addressed through institutional design rather than left as an externality.

The issue is also connected to procedural legitimacy. Bergquist et al.'s meta-analysis of 89 datasets across 33 countries identifies perceived fairness and perceived effectiveness as among the strongest determinants of public opinion toward climate taxes and laws [32]. Barrez's systematic review likewise finds that revenue-recycling arrangements have an important influence on public acceptability [33]. These studies do not convert public preference into a legal rule, but they provide evidence that legitimacy is influenced by whether citizens can understand the distributional logic of a carbon price. For Indonesia, this suggests that carbon-pricing governance should incorporate transparency concerning the destination and rationale of carbon-related fiscal resources. If the public understands that carbon pricing is connected to measurable climate investment, household protection, or transition infrastructure, the instrument may be more intelligible as a sustainable-development measure. The legal issue is not whether every unit of revenue must be earmarked for a single purpose, but whether the allocation framework is transparent, accountable, and demonstrably connected to the objectives for which the carbon instrument was established.

The Netherlands presents a different distributive context because the industrial CO2 levy primarily operates on covered industrial installations within the EU ETS framework. The relevant justice questions therefore include industrial employment, competitiveness, technology investment, and the distribution of transition costs across firms, workers, regions, and consumers. The domestic levy should not be treated as an isolated fiscal transfer because its economic effects are mediated by the broader European carbon market and national transition policies. The comparative analysis supports a procedural conception of environmental justice. Justice in carbon pricing has at least three dimensions: distributional justice, concerning who bears costs and receives benefits; procedural justice, concerning participation, transparency, and accountability; and temporal justice, concerning how present decisions affect future generations. Sustainable carbon pricing requires all three dimensions to be visible in the legal architecture.

W. Policy credibility, legal certainty, and adaptive climate governance

Carbon pricing creates an unusual problem for legal certainty because climate governance must be both durable and adaptable. Regulated entities make long-lived investment decisions, while governments must respond to changes in climate science, technology, energy markets, international commitments, and economic conditions. A carbon-pricing regime that is completely rigid may become obsolete; one that changes unpredictably may fail to provide credible incentives. Recent evidence from the EU ETS highlights the importance of policy credibility. Sitarz et al. find that the evolution of EU carbon prices has conveyed signals of policy credibility and encouraged more farsighted behaviour by market actors [34]. The significance for environmental law is not simply that prices rose. Rather, credible expectations about the persistence and direction of climate policy can influence decisions concerning investment and technology. Legal certainty therefore includes a temporal component: actors need reasonable expectations about how the regulatory framework will evolve.

This point is particularly relevant to the Netherlands. The industrial CO2 levy is embedded in a statutory trajectory while interacting with the EU ETS. Its legal significance therefore depends not only on the current rate but also on the predictability of the relationship between the domestic levy, EU allowance prices, and the broader climate-policy trajectory [20], [23]. The current legal position should remain distinct from prospective reforms or political proposals. At the same time, the existence of a transparent reform pathway can affect expectations even before a new rule enters into force. Indonesia faces a related challenge in the transition from Perpres 98/2021 to Perpres 110/2025. The repeal of the earlier regulation and establishment of the new framework demonstrate that carbon governance is institutionally dynamic [4], [5]. Such transitions require careful communication concerning which institutions, procedures, rights, obligations, and carbon-accounting arrangements remain valid. The objective is not to freeze the regulatory system, but to ensure that adaptation occurs through transparent legal processes. This can be conceptualised as adaptive legal stability. The term captures a balance between stable long-term objectives and revisable implementation mechanisms. Stable objectives provide direction and investment credibility; adaptable mechanisms permit government to respond to new evidence and technological conditions. For carbon pricing, this balance is preferable to either permanent rigidity or frequent discretionary change.

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Adaptive legal stability also has implications for delegated regulation. Carbon pricing often requires technical rules that cannot all be placed in primary legislation. Ministerial regulations, administrative guidance, technical standards, and registry procedures may need periodic adjustment. The legal hierarchy should nevertheless remain clear. Regulated actors must be able to distinguish statutory obligations from implementing rules and technical guidance, and they should have access to procedures for review and correction. The comparative framework therefore adds policy credibility as a cross-cutting dimension. Environmental credibility asks whether the system creates a meaningful incentive to reduce emissions. Legal certainty asks whether the obligations are sufficiently predictable. Policy credibility connects the two over time: regulated actors must believe that the stated long-term direction will be implemented through sufficiently durable rules. This dimension also explains why direct comparison of nominal carbon prices can be misleading. A higher statutory price does not automatically imply a more credible system if the institutional framework is unstable, coverage is narrow, or complementary policies are absent. Conversely, a price that appears modest in isolation may have greater practical significance when embedded in a coherent regulatory trajectory. Comparative environmental law should therefore examine both the current legal obligation and the expectations created by the architecture around it.

X. Environmental effectiveness and the limits of price-only governance

The literature also suggests that carbon pricing should not be treated as a complete climate policy in itself. A price can alter incentives, but the availability of technological alternatives, infrastructure, electricity-market design, industrial policy, and innovation support affects whether firms can respond to the signal. The legal architecture must therefore connect the carbon price with complementary measures that make low-carbon choices technically and economically feasible. This does not diminish the role of pricing. The causal evidence from Britain's carbon tax indicates that a carbon price can materially influence emissions through changes in the relative cost of fossil fuels [27]. Likewise, the meta-analysis by Ahmad et al. confirms that both carbon taxes and ETSs have measurable relationships with emissions reduction across a large empirical literature, although effects vary across studies and contexts [26]. The legal lesson is that price signals matter, but their effects are mediated by design. For the Netherlands, the EU ETS provides a clear example of price-plus-governance. The industrial levy operates within a broader regulatory environment that includes European emissions trading, national climate planning, industrial transition measures, and infrastructure considerations. The domestic levy can therefore be viewed as a supplementary instrument rather than a self-contained climate strategy.

Indonesia faces an even stronger need for complementary policy because carbon pricing is developing alongside energy-system expansion, industrialisation, infrastructure development, and national climate commitments. A sustainable-development framework should therefore ask whether carbon-pricing rules are accompanied by pathways that enable regulated actors to reduce emissions rather than simply imposing higher costs on carbon-intensive activity. This leads to a distinction between punitive and transformative conceptions of carbon pricing. A purely punitive conception views the carbon charge primarily as a cost imposed on emitters. A transformative conception views the charge as one element in a legal transition system that changes investment incentives, supports clean technologies, protects vulnerable groups, improves information, and progressively reduces dependence on high-carbon production.

The transformative approach is consistent with sustainable development because it connects present regulatory burdens with future productive capacity. If firms face a carbon price but lack access to renewable electricity, clean technologies, financing, or infrastructure, the price may function mainly as a cost. If the legal architecture simultaneously expands feasible low-carbon alternatives, the same price can function as an incentive within a broader transition. The comparative implication is that Indonesia and the Netherlands should be evaluated according to the coherence of their policy ecosystems rather than by the isolated strength of a single instrument. The Netherlands has a highly integrated European regulatory context; Indonesia is developing a national architecture in which registry, sectoral trading, climate finance, and NDC implementation are being progressively connected. The institutional trajectories differ, but the underlying legal question is similar: does the system provide a credible pathway from emissions responsibility to technological and institutional transition?

Y. Expanded comparative synthesis: five principles and two institutional pathways

The preceding analysis allows the sustainable carbon-pricing framework to be refined into five interdependent legal principles. First, environmental credibility requires a demonstrable relationship between the regulated emission and the legal incentive to reduce it. This includes adequate coverage, credible accounting, enforceable obligations, and interaction rules that prevent instruments from neutralising one another. The principle does not require a uniform price across sectors or jurisdictions; it requires that deviations from uniformity be legally intelligible and environmentally defensible. Second, legal and informational certainty requires more than a clearly written tax rate. Regulated actors should be able to determine the chargeable activity, measurement methodology, institutional authority, verification process, applicable exemptions, interaction with other instruments, and available review mechanisms. Registry and MRV systems are therefore part of the architecture of legal certainty.

Third, institutional coherence requires horizontal and vertical coordination. Horizontally, tax, environmental, energy, industrial, and finance authorities should have compatible responsibilities. Vertically, national rules should be coherent with supranational obligations where relevant. The Netherlands illustrates the vertical dimension through EU ETS integration; Indonesia illustrates the challenge of coordinating a rapidly developing national framework across sectors and institutions. Fourth, distributive justice requires explicit attention to the incidence of carbon pricing. The legal system should identify vulnerable groups, transition-exposed sectors, and affected regions and should provide transparent mechanisms for mitigation where justified. International research shows that distributional outcomes vary according to household characteristics and revenue-recycling design [28]–[33]. Justice therefore cannot be inferred from the tax instrument itself.

Fifth, intergenerational responsibility requires the legal system to consider the temporal consequences of present decisions. A carbon price asks current economic actors to bear a cost partly for environmental benefits that may materialise over decades. The legitimacy of this allocation depends on whether the legal system also prevents current actors from transferring avoidable climate risks to future generations. Intergenerational responsibility therefore complements rather than replaces distributional justice. These principles reveal two different institutional pathways. Indonesia represents a pathway of national integration: carbon taxation is situated within a broader national carbon-economic-value framework, NDC implementation system, registry infrastructure, financing arrangements, and sectoral rules. The Netherlands represents a pathway of multi-level integration: the domestic industrial levy operates within the EU ETS and a broader national and European climate-governance system. Neither pathway should be treated as a universal template. The comparative value lies in identifying functional principles that survive institutional differences. This is the central methodological advantage of functional comparative environmental law: it allows legal systems with different institutional histories to be compared according to the problems their rules are designed to solve.

The resulting framework can be represented as a legal chain: emissions definition → measurement and verification → allocation of

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responsibility → price or compliance obligation → revenue/market interaction → institutional enforcement → transition support → monitoring and review. Sustainable development is operationalised when these links form a coherent chain rather than a collection of disconnected rules. This expanded framework also clarifies the article's contribution. The central issue is not whether Indonesia or the Netherlands has adopted the "correct" carbon-pricing model. The relevant scholarly contribution is to show how environmental law can translate a philosophical principle—sustainable development—into concrete legal architecture. The comparison demonstrates that the philosophy becomes legally meaningful only when it shapes institutional responsibility, information integrity, distributional safeguards, and temporal accountability.

Table 2. Expanded legal-design matrix for sustainable carbon pricing

Legal-design principle	Indonesia	Netherlands
Environmental credibility	Carbon tax within national carbon-economic-value architecture; interaction with trading, NDC implementation, sectoral rules, and registry integrity.	Industrial CO_2 levy operates as supplementary instrument alongside EU ETS and broader climate policy.
Information certainty	Developing registry, MRV, carbon-unit accounting, and sector-specific rules; emphasis on traceability and double-counting prevention.	Established monitoring/verification and EU ETS compliance architecture provide the factual basis for obligations.
Institutional coordination	Cross-sector national coordination among climate, fiscal, environmental, energy, and sectoral institutions.	Domestic institutions operate within national climate law and EU-level ETS governance.
Distributional justice	Development, energy access, household impacts, transition finance, and transparent use of carbon-related resources.	Industrial transition, competitiveness, employment, technology investment, and wider distributional effects.
Intergenerational responsibility	NDC alignment, long-term emissions control, registry integrity, and financing for transition.	Long-term climate neutrality trajectory, EU ETS cap, national industrial transition, and policy credibility.
Adaptive legal stability	Transition from Perpres 98/2021 to Perpres 110/2025 requires clear continuity of duties and procedures.	Domestic levy remains embedded in a changing EU and national climate-policy trajectory.

Table 2 shows that the two jurisdictions address similar sustainable-development requirements through different institutional pathways. The matrix should be read functionally: it identifies comparable legal functions without suggesting that the underlying institutions are legally equivalent.

Conclusion

This study answers the first research question by showing that sustainable development shapes carbon pricing differently in Indonesia and the Netherlands because the principle is embedded in different legal architectures. Indonesia combines a statutory carbon tax under Law No. 7 of 2021 with a national carbon-economic-value framework now governed principally by Presidential Regulation No. 110 of 2025, whereas the Netherlands combines an industrial CO_2 levy with the EU ETS and a multi-level European climate-governance framework. The second research question is answered by showing that environmental protection, economic development, and justice are reflected through different institutional mechanisms: Indonesia emphasises integration with national development, NDC implementation, transparency, monitoring, financing, and carbon governance, while the Netherlands relies on the interaction of domestic industrial pricing, EU emissions trading, and long-term climate targets. The third research question is answered by the comparative finding that environmental law operationalises sustainable development through the design of legal responsibilities, price signals, information systems, institutional coordination, and mechanisms for distributing transition costs and responsibilities across present and future generations. The central contribution is therefore a comparative legal framework for analysing carbon pricing as an integrative environmental-law mechanism rather than merely a fiscal technique. The study does not establish the causal economic or emissions effectiveness of either current regime, and it does not support direct transplantation of one jurisdiction's model into the other. Its

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contribution is to identify legal-design principles that can be assessed and adapted in context: environmental credibility, legal certainty, institutional coherence, distributive justice, information integrity, and intergenerational responsibility. Future empirical research should test these normative propositions through evidence on emissions outcomes, household incidence, industrial responses, MRV performance, and revenue allocation.

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References

[1] G. R. Timilsina, "Carbon taxes," Journal of Economic Literature, vol. 60, no. 4, pp. 1456–1502, Dec. 2022, doi: 10.1257/jel.20211560.

[2] D. P. Ramadhani and Y. Koo, "Comparative analysis of carbon border tax adjustment and domestic carbon tax under general equilibrium model: Focusing on the Indonesian economy," Journal of Cleaner Production, vol. 377, Art. no. 134288, 2022, doi: 10.1016/j.jclepro.2022.134288.

[3] Republic of Indonesia, Law No. 7 of 2021 on Harmonization of Tax Regulations. Jakarta, Indonesia, 2021.

[4] Republic of Indonesia, Presidential Regulation No. 98 of 2021 on the Implementation of Carbon Economic Value for Achieving the Nationally Determined Contribution Target and Greenhouse Gas Emission Control in National Development. Jakarta, Indonesia, 2021. Repealed by Presidential Regulation No. 110 of 2025.

[5] Republic of Indonesia, Presidential Regulation No. 110 of 2025 on the Implementation of Carbon Economic Value Instruments and National Greenhouse Gas Emission Control. Jakarta, Indonesia, 2025.

[6] Nederlandse Emissieautoriteit, "CO2-heffing," Government of the Netherlands. Accessed: Sep. 26, 2026. [Online]. Available: https://www.emissieautoriteit.nl/regelgeving/co2-heffing

[7] Nederlandse Emissieautoriteit, "Wat is de CO2-heffing?" Government of the Netherlands. Accessed: Sep. 26, 2026. [Online]. Available: https://www.emissieautoriteit.nl/regelgeving/co2-heffing/wat-is-co2-heffing

[8] Government of the Netherlands, "Mitigating climate change," Government.nl. Accessed: Sep. 26, 2026. [Online]. Available: https://www.government.nl/topics/climate-change

[9] D. Hartono, W. Indriyani, B. S. Iryani, A. Komarulzaman, A. Nugroho, and R. Kurniawan, "Carbon tax, energy policy, and sustainable development in Indonesia," Sustainable Development, vol. 31, no. 4, pp. 2332–2346, 2023, doi: 10.1002/sd.2511.

[10] W. Sunanda, M. I. B. Setyonegoro, S. P. Hadi, and Sarjiya, "Advancing the carbon pricing framework in Indonesia: A systematic review of policies, challenges, and global lessons," Results in Engineering, vol. 28, Art. no. 107155, 2025, doi: 10.1016/j.rineng.2025.107155.

[11] I. P. G. Parwata and I. A. Sadnyini, "The sustainable development paradigm through carbon tax legal construction," Jurnal Hukum Prasada, vol. 11, no. 2, pp. 82–91, 2024, doi: 10.22225/jhp.11.2.2024.82-91.

[12] D. Rahmasari, S. A. Iskandar, and R. D. Prasetiya, "Carbon tax study as a social engineering tool in realizing the agenda of Sustainable Development Goals (SDGs) in Indonesia," Ikatan Penulis Mahasiswa Hukum Indonesia Law Journal, vol. 4, no. 1, pp. 147–165, 2024, doi: 10.15294/ipmhi.v4i1.71582.

[13] J. K. Boyce, M. Ash, and B. Ranalli, "Environmental justice and carbon pricing: Can they be reconciled?" Global Challenges, vol. 7, no. 4, Art. no. 2200204, 2023, doi: 10.1002/gch2.202200204.

[14] J. Gupta, A. Gupta, and C. Vegelin, "Equity, justice and the SDGs: Lessons learnt from two decades of INEA scholarship," International Environmental Agreements: Politics, Law and Economics, vol. 22, pp. 393–409, 2022, doi: 10.1007/s10784-022-09563-w.

[15] K. Mintz-Woo, "Carbon pricing is not unjust," Global Challenges, vol. 8, no. 1, Art. no. 2300089, 2024, doi: 10.1002/gch2.202300089.

[16] S. Sommer, L. Mattauch, and M. Pahle, "Supporting carbon taxes: The role of fairness," Ecological Economics, vol. 195, Art. no. 107359, 2022, doi: 10.1016/j.ecolecon.2022.107359.

[17] S. Zhao, S. Fujimori, T. Hasegawa, K. Oshiro, and K. Sasaki, "Poverty and inequality implications of carbon pricing under the long-term climate target," Sustainability Science, vol. 17, no. 6, pp. 2513–2528, 2022, doi: 10.1007/s11625-022-01206-y.

[18] P. Minnerop, "The 'advance interference-like effect' of climate targets: Fundamental rights, intergenerational equity and the German Federal Constitutional Court," Journal of Environmental Law, vol. 34, no. 1, pp. 135–162, 2022, doi: 10.1093/jel/eqab041.

[19] Kingdom of the Netherlands, Wet belastingen op milieugrondslag, art. 71j, current text in force in 2026.

[20] Nederlandse Emissieautoriteit, "Tarieven CO2-heffing," Government of the Netherlands, 2026. Accessed: Sep. 26, 2026. [Online]. Available: https://www.emissieautoriteit.nl/regelgeving/co2-heffing/tarieven

[21] J. Colmer, R. Martin, M. Muûls, and U. J. Wagner, "Does pricing carbon mitigate climate change? Firm-level evidence from the European Union Emissions Trading System," The Review of Economic Studies, vol. 92, no. 3, pp. 1625–1660, 2025, doi: 10.1093/restud/rdae055.

[22] Republic of Indonesia, Regulation of the Minister of Environment/Head of the Environmental Control Agency No. 10 of 2026 on the Carbon Unit Registry System. Jakarta, Indonesia, 2026.

[23] European Parliament and Council of the European Union, "Directive (EU) 2023/959 of 10 May 2023 amending Directive 2003/87/EC and Decision (EU) 2015/1814," Official Journal of the European Union, vol. L 130, pp. 134–202, 2023.

[24] Ministry of Climate and Green Growth, Kingdom of the Netherlands, Klimaatplan 2025–2035: Op weg naar een klimaatneutraal Nederland. The Hague, Netherlands, Mar. 2025.

[25] Republic of Indonesia, Regulation of the Minister of Forestry No. 6 of 2026 on Procedures for Carbon Trading through Greenhouse

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Gas Emission Offsets in the Forestry Sector. Jakarta, Indonesia, 2026.

[26] M. Ahmad, X. F. Li, and Q. Wu, "Carbon taxes and emission trading systems: Which one is more effective in reducing carbon emissions? A meta-analysis," Journal of Cleaner Production, vol. 476, Art. no. 143761, 2024, doi: 10.1016/j.jclepro.2024.143761.

[27] K. Gugler, A. Haxhimusa, and M. Liebensteiner, "Carbon pricing and emissions: Causal effects of Britain's carbon tax," Energy Economics, vol. 121, Art. no. 106655, 2023, doi: 10.1016/j.eneco.2023.106655.

[28] B. Shang, "The poverty and distributional impacts of carbon pricing: Channels and policy implications," Review of Environmental Economics and Policy, vol. 17, no. 1, pp. 64–85, 2023, doi: 10.1086/723899.

[29] C.-H. Shei, J. C.-E. Liu, and I.-Y. L. Hsieh, "Distributional effects of carbon pricing: An analysis of income-based versus expenditure-based approaches," Journal of Cleaner Production, vol. 465, Art. no. 141446, 2024, doi: 10.1016/j.jclepro.2024.141446.

[30] Y. Li and X. Zhang, "Recycling scheme of carbon pricing for inclusive decarbonization and energy transition: A recursive computable general equilibrium analysis in China," Renewable Energy, vol. 217, Art. no. 119130, 2023, doi: 10.1016/j.renene.2023.119130.

[31] D. Muth, "Pathways to stringent carbon pricing: Configurations of political economy conditions and revenue recycling strategies. A comparison of thirty national level policies," Ecological Economics, vol. 214, Art. no. 107995, 2023, doi: 10.1016/j.ecolecon.2023.107995.

[32] M. Bergquist, A. Nilsson, N. Harring, and S. C. Jagers, "Meta-analyses of fifteen determinants of public opinion about climate change taxes and laws," Nature Climate Change, vol. 12, pp. 235–240, 2022, doi: 10.1038/s41558-022-01297-6.

[33] J. Barrez, "Public acceptability of carbon pricing: Unravelling the impact of revenue recycling," Climate Policy, vol. 24, no. 10, pp. 1323–1345, 2024, doi: 10.1080/14693062.2024.2376747.

[34] J. Sitarz, M. Pahle, S. Osorio, G. Luderer, and R. C. Pietzcker, "EU carbon prices signal high policy credibility and farsighted actors," Nature Energy, vol. 9, pp. 691–702, 2024, doi: 10.1038/s41560-024-01505-x.

[35] C. Zimm, K. Mintz-Woo, E. Brutschin, S. Hanger-Kopp, R. Hoffmann, J. S. Kikstra, M. Kuhn, J. Min, R. Muttarak, S. Pachauri, O. Patange, K. Riahi, and T. Schinko, "Justice considerations in climate research," Nature Climate Change, vol. 14, pp. 22–30, 2024, doi: 10.1038/s41558-023-01869-0.

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