

Carbon Tax and Environmental Justice in Indonesia: Assessing the Distributional Effects of Carbon Pricing on Households and Industries

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Abstract

Indonesia's transition toward a low-carbon economy increasingly relies on fiscal instruments capable of changing producer and consumer behavior while generating public revenue. Carbon taxation, however, may produce unequal economic effects across industries, households, and regions. This article examines the environmental and distributive justice implications of carbon pricing in Indonesia. Using normative juridical and policy analysis, the study evaluates carbon tax design, taxpayer obligations, revenue allocation, and mechanisms for mitigating potential regressive effects. The article argues that carbon taxation should not be assessed solely according to its environmental effectiveness but also according to who bears its economic costs and who benefits from the resulting public revenue. Energy-intensive industries may face significant compliance costs, while households may experience indirect price increases. The study proposes a carbon tax justice framework combining polluter-pays principles with targeted social protection, transparent revenue allocation, industrial transition assistance, and regional redistribution. Particular attention is given to the need to ensure that low-income households do not disproportionately bear the costs of decarbonization. The article concludes that carbon taxation can contribute to both environmental and fiscal objectives when its design explicitly incorporates distributive justice and mechanisms protecting economically vulnerable groups.

[Transisi Indonesia menuju ekonomi rendah karbon semakin bergantung pada instrumen fiskal yang mampu mengubah perilaku produsen dan konsumen sekaligus menghasilkan pendapatan negara. Namun, pajak karbon dapat menghasilkan dampak ekonomi yang tidak merata di berbagai industri, rumah tangga, dan wilayah. Artikel ini mengkaji implikasi keadilan lingkungan dan distributif dari penetapan harga karbon di Indonesia. Dengan menggunakan analisis yuridis dan kebijakan normatif, studi ini mengevaluasi desain pajak karbon, kewajiban wajib pajak, alokasi pendapatan, dan

mekanisme untuk mengurangi potensi dampak regresif. Artikel ini berpendapat bahwa pajak karbon tidak boleh dinilai hanya berdasarkan efektivitas lingkungannya, tetapi juga berdasarkan siapa yang menanggung biaya ekonominya dan siapa yang mendapat manfaat dari pendapatan negara yang dihasilkan. Industri yang intensif energi mungkin menghadapi biaya kepatuhan yang signifikan, sementara rumah tangga mungkin mengalami kenaikan harga tidak langsung. Studi ini mengusulkan kerangka kerja keadilan pajak karbon yang menggabungkan prinsip pencemar membayar dengan perlindungan sosial yang ditargetkan, alokasi pendapatan yang transparan, bantuan transisi industri, dan redistribusi regional. Perhatian khusus diberikan pada kebutuhan untuk memastikan bahwa rumah tangga berpenghasilan rendah tidak menanggung biaya dekarbonisasi secara tidak proporsional. Artikel ini menyimpulkan bahwa pajak karbon dapat berkontribusi pada tujuan lingkungan dan fiskal apabila desainnya secara eksplisit memasukkan keadilan distributif dan mekanisme yang melindungi kelompok-kelompok yang rentan secara ekonomi.]

Keywords: Carbon tax, environmental justice, climate policy, distributive justice, Indonesia

Introduction

Indonesia's climate policy has increasingly moved from voluntary environmental commitments toward economic instruments capable of changing incentives for producers and consumers. The country's Enhanced Nationally Determined Contribution increased the 2030 emissions-reduction target to 31.89 percent through domestic efforts and 43.20 percent with international assistance, while Indonesia has maintained a long-term ambition of reaching net-zero emissions by 2060 or earlier (Government of Indonesia 2022). Achieving these objectives requires substantial transformation in electricity generation, transportation, manufacturing, mining, and household energy consumption. Carbon pricing is therefore increasingly relevant because it seeks to attach an economic cost to greenhouse gas emissions and thereby alter investment and consumption decisions. Yet the introduction of carbon pricing raises a fundamental question of environmental justice. Climate policy does not distribute costs and benefits neutrally. Industries with high carbon intensity may face higher production costs, while households may experience indirect increases in electricity, transportation, food, and other prices. The central issue is therefore not whether Indonesia should reduce emissions, but whether the economic burden of decarbonisation is distributed fairly.

Indonesia established a statutory carbon tax through Law No. 7 of 2021 concerning the Harmonization of Tax Regulations. The law provides that carbon tax may apply to the purchase of carbon-containing goods or activities generating specified carbon emissions and establishes a minimum rate of IDR 30 per kilogram

of CO₂ equivalent, subject to the relationship between the tax and prevailing carbon-market prices (Government of Indonesia 2021). The original framework envisaged implementation beginning with coal-fired power plants through a cap-and-tax mechanism. However, implementation has developed gradually alongside the country's emerging emissions-trading system. The Ministry of Energy and Mineral Resources reported that carbon trading in the electricity subsector generated transactions of approximately IDR 84.17 billion in 2023, covering 7.1 million tonnes of CO₂ equivalent, while participation expanded from 99 generating units in 2023 to 146 units in 2024 (Ministry of Energy and Mineral Resources 2024). The development demonstrates that Indonesia's carbon-pricing architecture is evolving through interaction between taxation and market mechanisms rather than through an immediate economy-wide carbon tax.

The distinction between carbon taxation and carbon trading is important for assessing justice. A conventional carbon tax imposes a monetary price on emissions, whereas an emissions-trading system creates a market for emission allowances or carbon units. Both mechanisms can influence production costs and consumer prices, but they distribute risks differently. Under a carbon tax, firms face greater certainty concerning the nominal price but less certainty concerning the quantity of emissions reductions. Under emissions trading, the emissions quantity may be more directly constrained while the carbon price can fluctuate. Indonesia's power-sector mechanism has developed primarily as an intensity-based trading system, with emissions benchmarks and trading obligations applying to covered power plants (World Bank 2025). The government has also expanded the carbon-trading framework, with the electricity sector roadmap anticipating progressively tighter emission standards and broader participation. These developments create an important justice issue because carbon pricing may initially concentrate on carbon-intensive industries while its costs are eventually transmitted through electricity prices and other economic activities to households.

The distributive effects of carbon pricing are not necessarily identical across income groups. Conventional environmental-tax analysis often assumes that carbon taxes are regressive because low-income households spend a larger proportion of their income on basic energy and energy-intensive goods. This assumption, however, does not universally apply to developing economies. Yusuf and Resosudarmo's computable general equilibrium analysis of Indonesia found that a carbon tax was not necessarily regressive because structural changes and resource reallocation could benefit factors disproportionately held by rural and lower-income households (Yusuf and Resosudarmo 2015). More recent comparative research involving Indonesia and other developing Asian countries similarly found considerable variation in carbon-pricing incidence within and across income groups, with equal revenue recycling capable of overcompensating the burden on poorer households (Steckel et al. 2021). The critical implication is that the distributional character of carbon pricing depends not simply on the carbon price

but on the structure of the economy, household consumption patterns, sectoral coverage, and—most importantly—the way governments use the resulting revenue.

Recent Indonesia-specific evidence reinforces this conclusion. Darwili, Storm, and Schruder find that carbon policy reform in Indonesia can be progressive when carbon-tax revenue is recycled through transfers, with the poorest households experiencing a relatively smaller net burden as a proportion of expenditure than higher-income households. Their modelling suggests that the distributional outcome depends more strongly on the tax design and percentage of revenue recycled than on the carbon-tax rate itself, and that recycling at least 25 percent of carbon-tax revenue could protect the poorest 40 percent of households from inflationary pressure (Darwili, Storm, and Schruder 2025). This finding challenges the simplistic argument that carbon taxation is inherently anti-poor. It instead suggests that environmental justice is a design question. A carbon tax becomes socially problematic when its costs are transferred to vulnerable households without adequate compensation. Conversely, the same instrument can contribute to progressive fiscal policy when polluters bear the initial burden and revenues are transparently redirected toward households and communities most exposed to transition costs.

The industrial dimension is equally important. Carbon-intensive sectors such as coal-fired electricity, cement, steel, mining, chemicals, and other energy-intensive industries may face significant compliance and transition costs. A carbon price can increase input costs, encourage technological change, and alter the relative competitiveness of firms depending on their energy intensity. Rokhmawati et al. find that simulated carbon-tax increases in Indonesia's manufacturing sector generate additional input costs while also creating incentives for industries to adopt energy-efficient technologies (Rokhmawati et al. 2024). The justice question therefore extends beyond consumers. Workers employed in carbon-intensive industries may experience employment risks, while firms with limited access to capital may find decarbonisation more difficult than large corporations. A carbon tax that ignores these differences may produce an uneven transition in which economically stronger firms adapt while smaller firms and workers absorb disproportionate adjustment costs. Environmental justice must consequently include a concept of industrial transition justice, ensuring that decarbonisation does not simply relocate economic burdens from polluters to workers and vulnerable production communities.

Carbon-tax revenue is therefore central to the legitimacy of the policy. The legal framework provides an environmental rationale for the tax, while the broader fiscal system determines whether revenue becomes a general source of state income, supports mitigation activities, finances social protection, assists industrial transformation, or is allocated through other mechanisms. Pertiwi and Wisaksono demonstrate that the HPP Law creates a legal framework for allocating carbon-tax revenue toward climate-change control, while the constitutional and legal structure surrounding earmarking remains an important policy question (Pertiwi and

Wisaksono 2025). The issue is significant because revenue allocation determines whether carbon taxation operates merely as a price increase or as a broader fiscal redistribution mechanism. From an environmental-justice perspective, carbon revenue should be understood as a social resource generated from imposing a cost on environmentally harmful activities. Its allocation therefore requires transparency and distributive justification rather than being treated as an ordinary revenue stream disconnected from the social effects of decarbonisation.

This article argues that Indonesia should conceptualise carbon taxation as a justice-sensitive transition instrument rather than a stand-alone environmental tax. The polluter-pays principle provides the normative basis for requiring carbon-intensive activities to bear environmental costs, but it is insufficient by itself because carbon costs can be passed through supply chains to households and workers. The ability-to-pay principle and distributive justice therefore need to complement polluter-pays logic. The core proposition of this article is that Indonesia should impose progressively stronger carbon incentives on high-emission activities while recycling a meaningful share of revenues toward vulnerable households, workers, regions, and industries facing credible transition costs. Such a framework would preserve the environmental function of carbon pricing while preventing climate policy from becoming a mechanism through which low-income households finance decarbonisation undertaken primarily because of historical emissions by higher-income consumers and carbon-intensive industries.

Literature Review and Research Gap

The theoretical foundation of carbon taxation originates primarily from the concept of environmental externalities. Pigou argued that when private economic activities generate social costs that are not reflected in market prices, corrective taxation can align private incentives with social welfare (Pigou 1920). Carbon emissions constitute a particularly significant externality because emitters do not ordinarily bear the full global and local costs associated with climate change. Carbon taxation therefore attempts to internalise part of this cost by attaching a monetary price to emissions. From an efficiency perspective, the logic is compelling: if emitting carbon becomes more expensive, producers and consumers have incentives to reduce emissions, improve energy efficiency, and substitute toward lower-carbon technologies. Yet Pigouvian efficiency does not automatically resolve distributive questions. The tax may be efficient while its costs are distributed unequally. Environmental justice therefore requires extending the analysis from the question of whether carbon should be priced to the question of how the resulting costs and revenues are distributed across society.

The polluter-pays principle provides a complementary normative basis. Under this principle, actors responsible for environmental damage should bear an appropriate share of the costs associated with preventing, controlling, or remedying that damage. The principle is embedded in international environmental governance and is consistent with the broader logic of making environmentally harmful

activities economically costly. In carbon taxation, the principle implies that firms and consumers generating greater emissions should contribute more to the fiscal cost of climate mitigation. However, the principle becomes more complicated when emissions are embedded in supply chains. A coal-fired power producer may be the formal taxpayer, but the economic burden can be passed to electricity distributors, manufacturers, service providers, and households. The formal incidence of the tax is therefore different from its economic incidence. Environmental justice requires analysing both. A policy that appears to make polluters pay at the statutory level may become regressive if the final burden is shifted disproportionately to households with limited capacity to absorb higher prices.

The literature on carbon pricing increasingly distinguishes between vertical equity and horizontal equity. Vertical equity concerns the distribution of burdens across income groups, while horizontal equity concerns whether households or firms in similar economic circumstances face similar effective burdens. Carbon pricing may violate vertical equity when low-income households experience larger relative expenditure losses. It may violate horizontal equity when households with similar income levels but different geographic or consumption patterns face substantially different carbon burdens. Steckel et al.'s comparative analysis of developing Asia demonstrates that carbon-pricing impacts vary significantly because households consume energy differently across countries and income groups (Steckel et al. 2021). The implication is important for Indonesia because national averages may conceal substantial differences between urban and rural households, Java and non-Java regions, households with access to public transportation and private vehicles, and households relying on electricity, LPG, biomass, or other energy sources. Environmental justice therefore requires disaggregated analysis rather than relying solely on aggregate national incidence.

Indonesia-specific research reinforces the importance of structural characteristics. Yusuf and Resosudarmo found that carbon taxation in Indonesia could avoid the strong regressivity often observed in developed economies because lower-income and rural households have different expenditure patterns and may benefit from economic restructuring associated with carbon taxation (Yusuf and Resosudarmo 2015). Their findings challenge the assumption that carbon taxation automatically harms poor households. Nevertheless, the result should not be interpreted as evidence that distributional concerns can be ignored. A tax that appears neutral or progressive before revenue recycling may produce different results when applied to electricity, transport, or other essential commodities. Conversely, revenue recycling can substantially improve distributional outcomes. Darwili, Storm, and Schruder's more recent microsimulation confirms that the proportion of revenue recycled to households can be more important for distributional outcomes than the nominal tax rate (Darwili, Storm, and Schruder 2025). The literature therefore increasingly supports a policy sequence in which

carbon pricing and revenue redistribution are designed together rather than as separate instruments.

Another important strand of literature concerns energy subsidies and their interaction with carbon pricing. Indonesia has historically used energy subsidies to protect consumers from volatile fuel and electricity prices. However, research demonstrates that universal or poorly targeted energy subsidies can disproportionately benefit higher-income households because wealthier households consume more subsidised fuel and electricity in absolute terms (Dartanto 2013). A carbon tax introduced into such a system can create contradictory incentives if the government simultaneously prices carbon while subsidising carbon-intensive consumption. From an environmental perspective, subsidies weaken the carbon-price signal; from a distributive perspective, eliminating them without adequate compensation can harm vulnerable households. The appropriate response is therefore not simply to maintain or remove subsidies but to redesign fiscal support so that vulnerable households receive targeted protection rather than universal subsidies that also benefit high-income consumers. This distinction is central to environmental justice because carbon pricing should not be assessed in isolation from the broader energy-tax and subsidy system.

The industrial literature focuses on competitiveness, technological change, and transition costs. Carbon pricing can affect industries through higher energy prices, direct compliance costs, capital expenditure for cleaner technologies, and changes in consumer demand. In Indonesia, the risk is particularly significant because economic development remains connected to coal, mining, manufacturing, and energy-intensive production. A poorly designed carbon tax could reduce competitiveness if domestic firms face higher costs than international competitors without comparable carbon constraints. Yet failure to price carbon also creates long-term competitiveness risks because global markets are increasingly incorporating carbon considerations into trade and investment. The European Union's Carbon Border Adjustment Mechanism, for example, creates additional incentives for exporting countries to reduce the carbon intensity of products entering the European market. Carbon pricing can therefore be understood not only as an environmental policy but also as an industrial-modernisation strategy. The justice challenge is ensuring that adjustment costs are distributed fairly between corporations, workers, consumers, and the state.

The concept of just transition extends environmental justice into labour and regional policy. A low-carbon transition may reduce demand for coal mining, coal-fired power generation, petroleum-related activities, and other carbon-intensive industries while increasing demand for renewable energy, energy efficiency, and low-carbon manufacturing. The benefits and costs are unlikely to arise in the same geographic locations. Coal-producing regions may experience employment and revenue losses while urban areas receive greater benefits from cleaner air and new green industries. A nationally uniform carbon policy can therefore create

geographically concentrated costs. Just-transition scholarship argues that climate policy should incorporate employment protection, retraining, regional development, social dialogue, and investment in alternative economic opportunities (International Labour Organization 2015). In Indonesia, this perspective is particularly relevant because coal-dependent communities cannot be expected to absorb transition costs simply because national emissions targets require structural change. Carbon taxation should therefore be linked to transition finance that addresses both household vulnerability and regional economic restructuring.

The literature on revenue recycling provides perhaps the strongest bridge between environmental taxation and distributive justice. Klenert et al. argue that carbon-tax revenues can be used through multiple channels, including lump-sum transfers, reductions in other taxes, public investment, or support for clean technologies, with different distributional and political consequences (Klenert et al. 2018). The IMF similarly finds that revenue recycling can mitigate regressive effects and improve public acceptance of climate policy, particularly when revenues are used to assist low-income households and affected workers (International Monetary Fund 2023). The design of recycling matters. Universal transfers are simple and visible but may distribute resources to households that do not need protection. Targeted transfers are more progressive but require administrative capacity and accurate beneficiary data. Investment in renewable infrastructure can create long-term benefits but may not immediately compensate households for higher energy prices. Environmental justice therefore requires an explicit hierarchy of objectives rather than assuming that any use of carbon revenue is automatically equitable. IMF

Despite the growing literature, a research gap remains in the Indonesian context. Existing studies have extensively examined the economic incidence of carbon taxation, household impacts, energy subsidies, and industrial competitiveness, while legal scholarship has focused on the regulatory structure and constitutional questions surrounding carbon-tax implementation. Less attention has been given to integrating these dimensions into a unified environmental-justice framework that connects the taxpayer, ultimate economic bearer, industrial transition, and revenue beneficiary. This article addresses that gap by arguing that carbon-tax justice cannot be evaluated solely through the statutory identity of the taxpayer or the aggregate amount of emissions reduced. Instead, the analysis must trace the full distributional chain from emissions to tax liability, price transmission, household expenditure, industrial adjustment, employment effects, and revenue redistribution. The contribution is therefore conceptual as well as juridical: it reframes Indonesian carbon taxation as a question of fiscal justice within the broader process of decarbonisation.

Method

This study employs a normative juridical method combined with descriptive, argumentative, and analytical policy analysis. The normative juridical approach is

used to examine the legal architecture governing carbon taxation and carbon economic value in Indonesia, while policy analysis is employed to evaluate whether the existing framework adequately incorporates environmental and distributive justice. The primary legal materials include Law No. 7 of 2021 concerning the Harmonization of Tax Regulations, relevant implementing provisions governing carbon taxation, the regulatory framework for carbon economic value, and the national climate-policy framework. Particular attention is given to the statutory provisions defining the object and subject of carbon taxation, the minimum carbon-tax rate, the relationship between carbon tax and carbon-market prices, and the legal basis for allocating carbon-tax revenue. The study also examines the transition from Perpres No. 98 of 2021 to Perpres No. 110 of 2025, which provides the latest pre-2026 framework for carbon economic value and national greenhouse-gas control.

The research also analyses Indonesia's electricity-sector carbon-trading framework because carbon taxation cannot be understood separately from the broader carbon-pricing system. The Ministry of Energy and Mineral Resources established rules for the implementation of carbon economic value in electricity generation through Ministerial Regulation No. 16 of 2022, which provides the operational basis for emissions trading in the power sector (Ministry of Energy and Mineral Resources 2023). The system initially targeted coal-fired power plants connected to the PLN grid and subsequently expanded participation. Official government data indicate that 99 generating units participated in 2023 and 146 units in 2024, while the government envisaged further expansion and progressively tighter emissions standards (Ministry of Energy and Mineral Resources 2024). The study treats this development as an important empirical component because the actual distributional consequences of carbon pricing depend on how taxation and emissions trading interact. The legal analysis therefore evaluates not only the carbon tax as a statutory instrument but also the institutional architecture through which carbon prices are transmitted into industrial and household economic activity. Ministerio de Energía+1

Secondary materials include peer-reviewed academic literature, international institutional publications, Indonesian government reports, official climate-policy documents, and empirical studies on household distribution, industrial competitiveness, energy subsidies, and revenue recycling. Particular reliance is placed on the studies of Yusuf and Resosudarmo, Steckel et al., and Darwili, Storm, and Schruder because they provide empirical foundations for understanding carbon-pricing incidence in Indonesia and comparable developing Asian economies. International literature from the OECD, World Bank, IMF, and International Labour Organization is used to develop comparative principles concerning carbon pricing, environmental taxation, social protection, and just transition. Government and institutional sources are used to establish the factual development of Indonesia's carbon-pricing framework and avoid relying on speculative descriptions of implementation. Consistent with the research

requirement, the study excludes sources published in 2026 and uses literature and legal materials available through 2025.

The analytical framework evaluates carbon-tax justice through five interconnected dimensions: environmental effectiveness, economic incidence, ability to pay, transition capacity, and revenue distribution. Environmental effectiveness concerns whether carbon pricing provides sufficient incentives to reduce emissions and encourage technological substitution. Economic incidence examines who ultimately bears the tax after producers adjust prices and production decisions. Ability to pay evaluates whether the resulting burden corresponds reasonably to the economic capacity of affected households and firms. Transition capacity examines whether industries and workers possess sufficient financial and institutional resources to adapt to a low-carbon economy. Revenue distribution evaluates whether carbon-tax revenues are allocated in ways that mitigate regressive effects and support broader climate objectives. These dimensions are analysed together because carbon pricing may be environmentally effective but socially regressive, or fiscally progressive but environmentally weak. The objective is therefore to identify a policy configuration in which environmental and distributive objectives reinforce rather than undermine one another.

Analysis and Discussion

A. Carbon Tax as an Instrument of Environmental and Fiscal Justice

Indonesia's carbon tax represents a significant conceptual development in the national tax system because it expands taxation beyond conventional revenue collection toward behavioural and environmental regulation. Law No. 7 of 2021 explicitly establishes carbon taxation as an instrument associated with emissions-generating activities and carbon-containing goods, while setting a minimum rate of IDR 30 per kilogram of CO₂ equivalent (Government of Indonesia 2021). The design reflects the Pigouvian rationale that environmentally harmful activities should bear an additional economic cost. The tax therefore serves two functions simultaneously. First, it seeks to correct an environmental externality by increasing the cost of carbon-intensive activities. Second, it creates fiscal resources that can potentially finance climate mitigation and social protection. The combination is important because environmental taxes differ from ordinary taxes precisely because their effectiveness depends partly on changing taxpayer behaviour. If the tax merely raises revenue without reducing emissions, its environmental function is weakened. Conversely, if it changes behaviour but creates severe economic hardship without redistribution, its distributive legitimacy becomes questionable.

The minimum rate of IDR 30 per kilogram of CO₂ equivalent, equivalent to IDR 30,000 per tonne, provides a statutory price floor but does not by itself determine the actual environmental effect of the policy. The law links the carbon-tax rate to the prevailing carbon-market price, providing that the tax rate should be at least equivalent to the market price and not below IDR 30 per kilogram where the market price is lower (Government of Indonesia 2021). This mechanism seeks

to coordinate the tax with market-based carbon pricing rather than allowing the two instruments to operate entirely independently. However, a relatively low initial carbon price may produce limited behavioural effects where firms can absorb the cost or pass it to consumers. IMF analysis has previously noted that Indonesia's initial carbon-tax rate was comparatively low and should be regarded as an important first step rather than a complete carbon-pricing solution (International Monetary Fund 2022). The environmental-justice implication is that the government should not justify substantial distributional costs on the assumption that any carbon tax automatically produces proportionate environmental benefits. The effectiveness of the price signal must be monitored continuously.

The development of the electricity-sector emissions-trading system demonstrates why carbon taxation must be analysed as part of a broader policy mix. Indonesia launched mandatory carbon trading for the electricity subsector in 2023, initially involving coal-fired generating units connected to the PLN network. By 2024, participation had expanded to 146 units, while the government established a phased roadmap intended to progressively tighten emissions standards and expand the scope of covered power plants (Ministry of Energy and Mineral Resources 2024). The World Bank describes the Indonesian electricity-sector system as an intensity-based baseline-and-credit emissions-trading system with free allocation and mandatory participation (World Bank 2025). This architecture can reduce the immediate cost burden on regulated firms compared with a straightforward tax on every tonne of emissions, but it also creates distributional questions concerning allocation of emission allowances, monitoring, offsets, and the eventual pass-through of carbon costs into electricity prices.

From a justice perspective, the polluter-pays principle should be applied primarily to economic actors with substantial capacity to reduce emissions and absorb transition costs. Large coal-fired power producers, energy-intensive industries, and other major emitters possess greater technical and financial resources than individual households. Requiring these actors to bear a significant initial carbon burden is therefore more consistent with both environmental responsibility and ability to pay. However, the principle should not be understood as requiring firms to absorb every cost indefinitely. Carbon pricing is intended to change behaviour, which means that firms should be able to reduce their liability through genuine emissions reductions, technological improvements, renewable-energy adoption, and efficiency investments. A justice-sensitive carbon tax should consequently reward decarbonisation rather than simply punish emissions. The most equitable system is not necessarily the one that collects the greatest amount of tax from industry, but the one that creates credible incentives for emissions reduction while preventing firms from transferring disproportionate costs to economically vulnerable groups.

The legal architecture introduced through Perpres No. 110 of 2025 strengthens the broader carbon-economic-value framework by replacing Perpres No. 98 of 2021 and establishing provisions concerning carbon allocation, NDC

implementation, carbon economic-value instruments, transparency, monitoring, evaluation, capacity building, financing, and governance (Government of Indonesia 2025). The regulation is significant because it demonstrates that carbon pricing is no longer merely a tax-policy issue. It forms part of a wider national climate-governance architecture. The justice implication is that carbon taxation should be integrated with climate finance, emissions monitoring, and social policy rather than administered exclusively as a tax collection mechanism. The more closely carbon pricing is connected to national mitigation planning and public financing, the stronger the case for requiring transparency concerning how carbon-related revenues and economic benefits are distributed.

B. Distributional Effects on Households and the Risk of Regressivity

The central household justice problem arises from indirect price transmission. Households do not necessarily pay the carbon tax directly, but they may experience its effects through higher electricity, transportation, cooking fuel, food, and other prices. Producers facing higher carbon-related costs can pass part of the burden through supply chains. The final incidence depends on market structure, demand elasticity, competition, and the availability of low-carbon alternatives. Low-income households may be vulnerable because energy and basic commodities can represent a larger share of their expenditure. However, the Indonesian case demonstrates why a simple assumption of regressivity is insufficient. Yusuf and Resosudarmo found that lower-income rural households could experience relatively different effects because their consumption structure and factor endowments differ from those of higher-income urban households (Yusuf and Resosudarmo 2015). The appropriate policy response should therefore be based on empirical incidence rather than theoretical assumptions imported from developed economies with different energy-consumption structures.

More recent research provides stronger evidence that revenue recycling determines the distributional character of carbon pricing. Darwili, Storm, and Schruder's Indonesia-specific microsimulation finds that carbon policy reform tends to be progressive when carbon-tax revenues are recycled, with the poorest households receiving protection from inflationary pressure through transfers (Darwili, Storm, and Schruder 2025). Their analysis suggests that at least 25 percent of carbon-tax revenue would need to be recycled to protect the poorest 40 percent of households under the scenarios examined. This result has major policy implications because it shifts attention from the tax rate to the complete policy package. A carbon tax accompanied by targeted transfers may have a fundamentally different distributional outcome from the same tax without redistribution. The justice question should therefore not be framed as “carbon tax or no carbon tax,” but as “what carbon price, what revenue recycling mechanism, and what distribution of protection?” This integrated perspective provides a stronger foundation for Indonesia's policy design.

Revenue recycling should nevertheless avoid reproducing the weaknesses of universal energy subsidies. Indonesia's historical experience demonstrates that broad energy subsidies can disproportionately benefit wealthier households because higher-income groups consume greater quantities of subsidised fuel and electricity (Dartanto 2013). A carbon-tax revenue system that simply subsidises energy prices for everyone could therefore undermine both environmental and distributive objectives. It would weaken the carbon-price signal while directing fiscal resources toward households that may not need protection. Targeted cash transfers provide a potentially more efficient alternative because they compensate vulnerable households without reducing the price incentive to lower carbon consumption. The challenge is administrative capacity. Targeting requires reliable social registries, updated household data, payment infrastructure, and mechanisms for correcting exclusion errors. Indonesia's experience with social assistance provides an institutional foundation, but carbon-tax recycling should be designed to ensure that assistance reaches households affected by carbon-related price increases rather than becoming a general subsidy unrelated to climate exposure.

The regional dimension is equally important. Indonesia's economic structure and energy access vary significantly across provinces. Households in major urban centres may have greater access to public transportation, electricity, digital services, and alternative technologies, whereas remote communities may have fewer options and higher dependence on fossil-fuel-based transportation or local energy systems. A uniform carbon price can therefore produce different real burdens across regions even when nominal tax rates are identical. Environmental justice requires recognising this geographic variation. Revenue recycling should consequently include a regional component that supports communities facing higher transition costs and finances clean-energy infrastructure in underserved areas. Such an approach would prevent carbon taxation from becoming a fiscal transfer from energy-dependent regions toward central government revenues without corresponding investment in local resilience. Regional redistribution is particularly important in Indonesia because carbon-intensive economic activities and natural-resource extraction are geographically concentrated, while the environmental and fiscal benefits of decarbonisation may be distributed nationally.

Household protection should also distinguish between compensation and structural transformation. Cash transfers can offset immediate price effects, but they do not necessarily solve the underlying problem of dependence on carbon-intensive energy. If households receive transfers while continuing to face expensive and unreliable transportation or electricity systems, the policy may create permanent compensation obligations. Carbon-tax revenues should therefore finance both short-term social protection and long-term access to affordable low-carbon alternatives. Investments in public transportation, energy efficiency, renewable electricity, clean cooking technologies, and distributed energy systems can reduce the carbon intensity of household consumption and thereby reduce future exposure to carbon prices. This dual approach is more consistent with

environmental justice because it does not merely compensate people for harm; it changes the structural conditions that make them vulnerable to carbon pricing in the first place.

C. Industrial Competitiveness and Just Transition

Carbon pricing creates particularly complex distributional effects for industries because firms differ significantly in carbon intensity, technological capacity, market power, and access to capital. A large multinational corporation may be able to finance energy-efficiency investments, renewable electricity contracts, and cleaner production technologies, while a smaller domestic manufacturer may lack access to affordable financing. If both face the same nominal carbon price, their effective adjustment burden can differ substantially. Environmental justice therefore requires recognising differences in transition capacity without allowing “competitiveness” arguments to become permanent exemptions for major emitters. Carbon pricing should encourage investment in cleaner technologies while providing temporary and conditional assistance to firms that demonstrate credible decarbonisation plans. The policy objective should be to reduce the cost of transition without eliminating the incentive to transition. Assistance should therefore be linked to measurable improvements in emissions intensity, energy efficiency, technology adoption, or worker protection rather than simply being granted to carbon-intensive firms because they claim that taxation would increase production costs.

The Indonesian manufacturing sector illustrates this tension. Rokhmawati et al.'s system-dynamics simulation indicates that increasing carbon-tax rates can raise industrial input costs while encouraging firms to adopt energy-efficiency measures (Rokhmawati et al. 2024). This result suggests that carbon pricing can generate both a burden and an innovation incentive. From an environmental-justice perspective, the relevant question is whether the transition cost is proportionate to the firm's capacity and whether workers and consumers are protected from excessive pass-through. If firms respond to carbon pricing by improving efficiency, the long-term economic burden may decline. If firms simply increase prices, the burden may shift toward consumers. If firms reduce employment without transition support, workers may absorb the cost. Carbon taxation should therefore be accompanied by industrial-policy instruments that facilitate technological upgrading, particularly for sectors that are strategically important for employment and exports. Such assistance should be temporary, conditional, transparent, and tied to measurable decarbonisation outcomes.

The risk of carbon leakage further complicates industrial justice. If carbon-intensive production relocates to jurisdictions with weaker carbon constraints, domestic emissions may decline while global emissions remain unchanged. Industries may also lose export competitiveness if domestic carbon prices rise more rapidly than those in competing markets. Yet delaying carbon pricing indefinitely because of these risks would create another injustice because firms and consumers

would continue to benefit from an economic system that does not fully price environmental damage. The appropriate response is gradual and predictable carbon-price escalation combined with transition finance, technological support, and alignment with international carbon-pricing developments. Indonesia's exporters increasingly face international carbon-related requirements, making domestic decarbonisation relevant to market access as well as domestic environmental policy. Carbon pricing should therefore be designed as part of industrial upgrading rather than treated solely as an additional tax imposed on existing production.

Workers require particular protection because they may not possess the mobility or capital necessary to benefit immediately from new green industries. A coal-mining worker who loses employment cannot necessarily become a renewable-energy technician simply because government policy has changed the relative price of carbon. Just transition therefore requires vocational training, income support, job-placement services, regional development, and social dialogue. The International Labour Organization emphasises that a transition toward environmentally sustainable economies should promote decent work, social protection, and social dialogue rather than treating employment consequences as secondary policy concerns (International Labour Organization 2015). In Indonesia, carbon-tax revenues could contribute to a transition fund targeted at workers and communities economically dependent on carbon-intensive industries. Such a fund would make the polluter-pays principle more socially sustainable because the costs of transition would be financed partly by revenues generated from the carbon-intensive activities being phased down.

The industrial transition should also recognise differences between large corporations and small and medium-sized enterprises. Large firms often possess greater access to capital markets and technical expertise, whereas smaller firms may struggle to measure emissions or finance cleaner equipment. A uniform compliance regime can therefore produce disproportionate administrative costs for smaller firms. Environmental justice should not be confused with identical obligations. A proportionate framework can maintain the same environmental objective while differentiating compliance support according to firm size and capacity. Technical assistance, simplified reporting for smaller emitters, concessional green financing, and shared energy-efficiency programmes can reduce adjustment costs without granting permanent exemptions. The key principle should be that administrative simplicity and financial assistance are justified where they facilitate actual decarbonisation. If assistance merely protects inefficient production from carbon pricing, it would undermine both environmental effectiveness and fairness.

D. Revenue Allocation, Transparency, and a Justice-Oriented Carbon Tax Framework

The distribution of carbon-tax revenue represents the most direct mechanism through which environmental taxation can be transformed into distributive policy.

Carbon revenue can finance several objectives, including household transfers, renewable-energy investment, public transportation, industrial transition, worker protection, adaptation, and environmental restoration. Each allocation produces different distributional consequences. Direct transfers can quickly protect vulnerable households, while infrastructure investment can generate broader long-term benefits. Industrial transition support can preserve employment and competitiveness, while environmental restoration can benefit communities exposed to pollution and climate risks. The challenge is to avoid treating all spending as equally justifiable. Revenue allocation should be assessed according to who benefits, when benefits arise, and whether the spending reduces the underlying vulnerability created by carbon pricing. IMF research indicates that transparent revenue recycling can mitigate regressive effects and strengthen public acceptance of climate policies (International Monetary Fund 2023). This makes revenue allocation a central component of carbon-tax legitimacy rather than an administrative issue following the tax decision.

The legal question of earmarking is therefore important. Pertiwi and Wisaksono examine the constitutional dimension of earmarking carbon-tax revenues and conclude that Indonesian law provides a basis for allocating carbon-tax revenues toward climate-change control while leaving important policy choices to the government (Pertiwi and Wisaksono 2025). From a justice perspective, earmarking should not necessarily mean that every rupiah of carbon revenue must be spent on a narrowly defined environmental project. A more appropriate approach is functional earmarking, under which a clearly defined share of revenues is committed to climate mitigation, vulnerable-household protection, and transition support, while the government retains sufficient flexibility to respond to economic conditions. This approach balances fiscal governance with distributive accountability. What matters is not merely whether revenues are legally earmarked but whether the public can identify the social and environmental outcomes generated by carbon taxation.

Transparency should accompany revenue allocation. Taxpayers and citizens should be able to determine how much revenue is generated, which sectors contribute, which households receive compensation, what industries receive transition support, and what environmental outcomes result. Without transparency, carbon taxation can be perceived as an additional fiscal burden rather than a social contract for decarbonisation. Transparency is particularly important because the economic incidence of carbon pricing is difficult for ordinary citizens to observe. A household may not know whether an increase in electricity or transportation costs is attributable to carbon pricing, market conditions, subsidy reform, or other factors. Publishing carbon-tax revenue and expenditure information in accessible formats can therefore improve accountability. The transparency framework under Indonesia's carbon economic-value regime provides an important legal foundation, but transparency should extend beyond emissions accounting to include

distributional reporting. Environmental justice requires not only knowing how much carbon has been reduced but also knowing who paid and who benefited.

A justice-oriented allocation formula should prioritise vulnerable households while maintaining investment in structural decarbonisation. The empirical evidence from Indonesia suggests that recycling at least 25 percent of carbon-tax revenue could protect the poorest 40 percent of households under the scenarios modelled by Darwili, Storm, and Schruder (2025). This does not mean that 25 percent should be treated as a universal legal threshold. Rather, it provides evidence that a meaningful share of revenue must be recycled if carbon pricing is expected to avoid inflationary harm to vulnerable households. The actual percentage should depend on the carbon price, sectoral coverage, household incidence, and size of the revenue base. The principle should be dynamic rather than fixed: as the carbon price increases or coverage expands, the government should reassess the amount required for social protection. Revenue recycling should therefore operate as an automatic policy adjustment mechanism rather than a one-time political decision.

The remaining revenue should support the transition of carbon-intensive industries and regions, but assistance should be conditional. A large share of transition funding directed to firms without measurable environmental commitments would effectively socialise the cost of decarbonisation while privatising the benefits. Industrial support should therefore be linked to emissions-reduction plans, energy-efficiency improvements, worker protection, and transparent performance indicators. Regions dependent on coal and other carbon-intensive activities should receive infrastructure and economic-diversification investment, allowing them to develop alternative sources of employment and revenue. Such redistribution is justified not because carbon-intensive regions are entitled to preserve existing economic structures indefinitely, but because national climate policy creates concentrated transition costs that should not be borne exclusively by local communities. This approach transforms carbon revenue into a mechanism for managing structural change rather than merely compensating households for higher prices.

Finally, procedural justice should complement distributive justice. Communities, workers, industries, and households affected by carbon pricing should have meaningful opportunities to participate in policy design and evaluation. Public consultation can identify distributional effects that national models may overlook, particularly in remote regions and communities dependent on carbon-intensive employment. Participation also increases policy legitimacy because people are more likely to accept transition policies when they perceive the decision-making process as fair. Carbon pricing should therefore be accompanied by transparent consultation, periodic distributional assessments, public reporting, and mechanisms for reviewing the effectiveness of social protection. The ultimate measure of environmental justice should be whether Indonesia can reduce emissions while improving the capacity of vulnerable groups to participate in the low-carbon economy. Carbon taxation is most legitimate when it makes high-

emission activities more expensive, makes clean alternatives more accessible, and ensures that the transition costs are not systematically shifted onto those with the least economic and political capacity to bear them.

Conclusion

Carbon taxation in Indonesia should be understood as both an environmental instrument and a distributive fiscal policy. The statutory framework established by Law No. 7 of 2021 provides a legal foundation for pricing carbon and establishes a minimum carbon-tax rate, while the development of the electricity-sector emissions-trading system demonstrates that Indonesia is constructing a broader carbon-pricing architecture. The environmental rationale is strong because carbon-intensive activities generate costs that are not fully reflected in conventional market prices. However, environmental effectiveness alone cannot establish justice. Carbon prices can influence electricity, transportation, production, and consumer prices, creating indirect burdens for households and adjustment costs for industries. The Indonesian evidence demonstrates that these effects are not inherently regressive. Rather, distributional outcomes depend on sectoral coverage, household consumption patterns, industrial characteristics, and especially the extent to which carbon revenues are recycled. The central finding of this article is therefore that carbon taxation becomes environmentally and socially legitimate only when polluter-pays principles are combined with ability-to-pay considerations and explicit mechanisms for redistributing transition benefits and costs.

Indonesia should consequently develop a carbon-tax justice framework based on progressive environmental responsibility, targeted household protection, industrial transition assistance, regional redistribution, and transparent revenue allocation. High-emitting industries should face credible and gradually increasing carbon incentives, while firms demonstrating measurable decarbonisation should receive access to transition finance rather than permanent tax exemptions. Vulnerable households should receive targeted compensation and improved access to low-carbon alternatives, while workers and carbon-dependent regions should benefit from retraining, social protection, and economic diversification programmes. A meaningful share of carbon-tax revenue should be recycled according to empirically assessed distributional needs, with public reporting on who pays, who receives assistance, and what environmental outcomes are achieved. Indonesia should not choose between climate policy and social justice. Properly designed carbon taxation can advance both objectives by making environmental costs visible in economic decisions while using fiscal revenues to ensure that the transition toward a low-carbon economy does not disproportionately burden households, workers, regions, or industries with the least capacity to adapt.

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