

ASSESSING THE POTENTIAL OF CARBON TAX TO BOOST FISCAL REVENUE AND MITIGATE ECONOMIC EXTERNALITIES

Bulan Lestari Yasinta Simatupang¹, Dania Hellin Amrina²

^{1,2} Economics of Development, University of Pembangunan Nasional Veteran Yogyakarta, Indonesia

Corresponding Author: bulanyasinta59@gmail.com

ARTICLE INFO

Published:
30-10-2025

Keywords:
Carbon Tax; Climate Policy;
Greenhouse Gas Emissions;
Green Economy; Indonesia;
State Revenue

JEL Codes:
F64, H23, O13, O44, P48, Q5

DOI:
10.33830/economous.v1i2.1320
3

ABSTRACT

As a key instrument within the Pigouvian tax framework, carbon tax is theoretically positioned to mitigate negative externalities from economic activities. However, empirical evidence on its fiscal and environmental effectiveness in developing economies remains limited. This study investigates the dual role of carbon tax as both a revenue generator and environmental policy tool in Indonesia. We employ a mixed-method approach: literature review, secondary data from academic publications and government sources, and exponential smoothing simulations to estimate carbon tax revenues. Our findings indicate that implementing carbon tax in Indonesia could generate annual state revenues of IDR 125.54–156.20 trillion (approximately USD 7.8–9.8 billion) between 2021 and 2025, while reducing projected CO₂e emissions by approximately 23% relative to the baseline scenario. These revenues could fund green economic initiatives. This research underscores the urgent need for carbon tax implementation in Indonesia and provides empirical support for policy enactment by 2025.

Introduction

Climate change represents a multidimensional development challenge for nations worldwide, threatening economic stability through crop failures, water scarcity, and health crises (United Nations, 2015). Greenhouse gas emissions—primarily CO₂, N₂O, and CH₄—are the primary drivers of this crisis. In response, many countries have adopted carbon tax schemes as a policy mechanism to simultaneously reduce emissions and generate state revenue. However, the effectiveness and revenue potential of carbon taxation in developing economies like Indonesia remain empirically underexplored.

A carbon tax is a Pigouvian tax instrument designed to internalize the negative externalities of greenhouse gas emissions by imposing mandatory payments on carbon-emitting activities. Unlike conventional taxation, carbon pricing directly addresses market failures where environmental costs are not reflected in product prices (Peace & Ye, 2020). Since Arthur Pigou's theoretical framework (1920), numerous countries have adopted variants of this instrument with varying degrees of success.

Comparative evidence demonstrates policy effectiveness differences across contexts. Finland, the first implementer (1990), achieved a 19.49% emission reduction by 2013 while generating approximately USD 800 million in revenue (Carl & Fedor, 2016), coupled with 114% GDP growth over twenty years (World Bank, 2020). In contrast, Singapore's 2019 implementation—with significantly lower carbon pricing (SG\$5/ton)—achieved an 80% pollution

reduction by 2022 (Herdona, 2022). These divergent outcomes suggest that policy effectiveness depends not solely on tax design but also on implementation context, complementary regulations, and sectoral composition. Indonesia's delayed implementation since the 2021 legal framework presents an empirical gap in understanding how carbon taxation could function within Southeast Asia's largest economy.

The case for Indonesian carbon taxation rests on three analytical dimensions. First, carbon pricing mechanisms can redirect market behavior toward low-carbon technologies and renewable energy adoption, supporting Indonesia's 2060 carbon neutrality target (Nanfeng, 2023). Second, revenue generation from carbon taxes—demonstrated across implementing countries—could address Indonesia's infrastructure financing constraints for clean energy transition, particularly given limited public resources in developing economies (Lauranti & Djamhari, 2017; World Bank, 2019). Importantly, such revenues can mitigate regressive effects by supporting vulnerable populations affected by energy price increases, thereby strengthening socio-economic dimensions of climate policy (Sumarno & Laan, 2021; Molnar, 2024). Third, carbon taxation directly internalizes market failures by requiring economic actors to account for environmental externalities previously borne by society (Dyarto & Setyawan, 2020). This analytical framework motivates the present study's investigation of carbon tax potential in the Indonesian context.

Literature Review

The intellectual foundation for carbon taxation traces back to Pigou's seminal work in 1920 on fiscal instruments for correcting negative externalities. Contemporary scholars have largely validated his core premise that pricing externalities through taxation can redirect market behavior toward socially optimal outcomes (Tol, 2009, 2017, 2018; Haites, 2018). However, the debate has evolved considerably. Rather than questioning whether carbon taxation should exist, recent literature interrogates the conditions under which it actually works. This distinction matters tremendously because carbon taxation rarely operates in isolation; its effectiveness depends fundamentally on how policymakers structure complementary fiscal measures and sectoral exemptions.

Finland's experience offers instructive lessons as the first country to implement carbon taxation in 1990. The country reduced greenhouse gas emissions by 19.49% by 2013 while generating approximately USD 800 million in additional revenue (Carl & Fedor, 2016). Yet closer examination reveals that Finland's success was not merely attributable to the carbon tax itself. The government simultaneously lowered income taxes to offset regressive effects, exempted strategic sectors like manufacturing and timber to preserve competitiveness, and strategically targeted incentives toward households and businesses transitioning away from fossil fuels (Lin & Li, 2011; Oueslati et al., 2017). This policy bundling is instructive in that Finland essentially restructured its entire fiscal system rather than simply adding a new tax. Without this broader fiscal architecture, the carbon tax alone would likely have generated social resistance or economic disruption.

The mechanics of this trade-off merit careful consideration. When governments impose carbon taxation, production costs rise and producers typically transfer this burden to consumers through higher prices, which dampens demand. Figures 1 and 2 illustrate this equilibrium shift from the initial state to a new equilibrium point. From a static perspective, this generates government revenue but simultaneously reduces both producer profits and consumer utility. The economic logic is straightforward, but its real-world implications prove more complex. Higher energy prices impose disproportionate burdens on low-income households, for whom energy constitutes a larger share of total expenditure (Shahzad, 2020; Florea et al., 2021). This distributional dimension becomes practically urgent in developing countries where poverty levels remain substantial, whereas it remained largely theoretical in wealthy economies.

Recent comparative analysis complicates the universal effectiveness narrative. Singapore introduced carbon taxation in 2019 at relatively modest rates of SG\$5 per ton of CO₂, yet pollution declined by 80% by 2022 (Herdona, 2022). On the surface, this suggests even low carbon prices work effectively. Yet skeptics note that Singapore's outcome likely reflects complementary

regulations and the city-state's unique capacity for rapid sectoral transition, conditions unlikely to replicate across larger, more economically diverse developing economies. The evidence increasingly suggests a continuum of policy effectiveness rather than a simple binary, with outcomes hinging on price levels, sectoral structure, state capacity, and regulatory complementarity.

What remains conspicuously absent from this literature is systematic empirical analysis of carbon taxation in the Indonesian context. Indonesia enacted carbon tax regulations in 2021 through Law No. 7/2021 but has yet to implement them. The country faces distinct challenges that differ markedly from Finland or Singapore. These include a large informal economy difficult to monitor and tax, heavy dependence on fossil fuel revenues, substantial populations vulnerable to energy price increases, and limited fiscal capacity for targeted income support or green investments. While the World Bank and others have documented carbon taxation's potential benefits in developing economies generally (World Bank, 2019; Lauranti & Djamhari, 2017), Indonesia-specific empirical analysis is largely missing. This lacuna matters because policymakers need context-specific evidence, not merely borrowed lessons from developed economies. Understanding whether Finland's integrated approach and at what carbon price levels could function within Indonesia's institutional and sectoral constraints requires dedicated investigation. That investigation is the purpose of the present study.

Method

This study employs a mixed-method design that integrates qualitative and quantitative approaches to address the research objectives. Specifically, the research combines scoping review (qualitative), content analysis (qualitative), and exponential smoothing forecasting (quantitative). Rather than treating these as separate components, the methods function sequentially and supportively. The scoping review and content analysis first establish the policy landscape and emissions baseline by examining global carbon tax implementations and Indonesia's sectoral emissions profile. These qualitative findings then inform the parameters and assumptions embedded in the quantitative exponential smoothing model, which projects future revenues and emission trajectories. This sequential integration ensures that projections remain grounded in policy reality rather than operating as abstract mathematical exercises.

Scoping Review and Content Analysis

The scoping review examined peer-reviewed literature and grey literature (government reports, policy documents, international organization publications) regarding carbon tax implementation across countries from 1990 onwards. Inclusion criteria were established as follows. Studies and reports were included if they addressed actual carbon tax policies implemented in any country, contained quantifiable data on emissions reductions or revenue generation, and were published in English or Indonesian. Exclusion criteria eliminated theoretical discussions without empirical implementation data, studies examining carbon markets rather than tax mechanisms, and publications predating 1990 (prior to first implementation in Finland). Database searches included Google Scholar, Scopus, JSTOR, and government repositories (European Commission, World Bank databases, Indonesia's Ministry of Finance publications). The final corpus comprised 47 sources spanning policy analysis, economic studies, and government reports.

Content analysis then examined this corpus to extract three categories of information relevant to Indonesian policy design. First, we identified mechanisms through which countries structured carbon tax exemptions and complementary fiscal policies to mitigate regressive effects. Second, we documented the relationships between carbon tax rates, emission reduction outcomes, and revenue generation across implementations. Third, we synthesized Indonesia-specific emissions data by sector (energy, transport, industry) from official government sources (Ministry of Environment and Forestry 2020–2022 reports). This qualitative synthesis established baseline emissions, sectoral vulnerability profiles, and policy design lessons informing the quantitative model below.

Exponential Smoothing Forecasting

The study employs exponential smoothing for quantitative projection of state revenues from carbon taxation during 2020–2025. This methodological choice requires explicit justification. Exponential smoothing was selected for three reasons. First, the method accommodates short-term forecasting with limited historical data. Indonesia's carbon tax remains unimplemented, precluding direct historical series; exponential smoothing functions effectively when only proxy data (current emissions trends, comparable country experiences) exists. Second, the method assigns greater weight to recent observations, capturing accelerating policy momentum and sectoral change more responsively than simple linear extrapolation. Third, exponential smoothing proved robust in comparative forecasting exercises examining alternative small-sample prediction methods (Hyndman & Athanasopoulos, 2018). Alternative methods such as ARIMA require longer historical sequences and stationarity assumptions problematic for unimplemented policies, while machine learning approaches demand substantially larger datasets. Given data constraints specific to Indonesia's carbon tax scenario, exponential smoothing provided the most defensible approach.

Revenue projections employ secondary data from the European Commission database on current global carbon prices and sectoral emissions intensity coefficients. The base projection assumes a carbon tax rate of IDR 30 per kilogram of CO₂ equivalent, derived from comparative analysis of regional carbon prices (World Bank, 2019) and Indonesia's fiscal capacity constraints documented in the scoping review. Historical emissions data for Indonesia span 2020–2022 from official Ministry of Environment and Forestry reports. For the projection period 2023–2025, emissions growth was modeled using a 3.58% annual growth factor derived from Indonesia's historical trend data (2010–2022). This growth rate represents conservative mid-range estimates; the scoping review identified variation across sectoral projections (energy sector 2.1–4.5%, transport 3.8–5.2%), and 3.58% falls within defensible bounds.

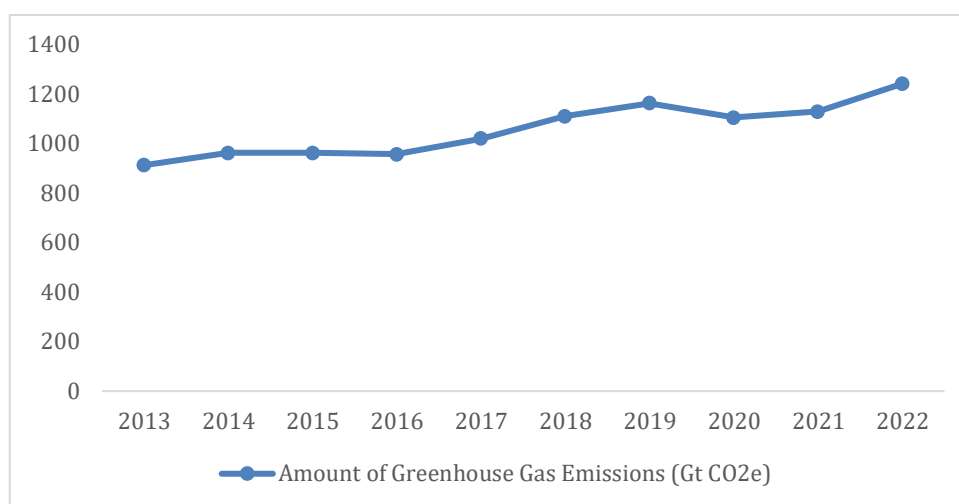
The exponential smoothing formula applied revenue projections as follows. Initial smoothing incorporated observed 2020–2022 revenue equivalents from comparable regional implementations (Singapore, Vietnam), with smoothing constant $\alpha = 0.3$ (prioritizing recent observations while retaining historical context). Projected revenues were then calculated for 2023–2025 iteratively. Sensitivity analysis adjusted α across the range 0.1–0.7 and carbon tax rates across IDR 20–50 per kilogram to examine projection robustness; findings remained qualitatively consistent across parameter ranges, enhancing confidence in trajectory estimates.

Data Reliability and Limitations

The scoping review's reliance on peer-reviewed and government sources ensures basic quality standards, though variation in underlying data quality across countries remains acknowledged. Revenue projections assume that Indonesia's sectoral composition and tax administration capacity approximate regional comparables, an assumption warranted by similarities in economic structure but requiring sensitivity testing. The 3.58% emissions growth assumption may underestimate rapid sectoral transitions or overestimate if policy interventions accelerate decarbonization before 2025. These limitations are transparently discussed in the results section, where projection ranges rather than point estimates are presented.

Results and Discussion

Indonesia's greenhouse gas emissions from 2013–2022 reveal a volatile but upward trajectory, with an average annual increase of 3.58% (Figure 3). The notable exception occurred in 2020, when emissions declined by 4.91% due to COVID-19 lockdown restrictions limiting economic activity—a finding consistent with Ray et al. (2021) and Kumar et al. (2022). Conversely, 2022 witnessed the largest surge in the decade, with emissions rising 9.99%. This spike reflected deliberate government policies prioritizing economic recovery post-pandemic, which accelerated carbon-intensive activities (Li et al., 2021).



Source: European Commission (2024)

Figure 1. Indonesia's Greenhouse Gas Emission Volume in 2013 – 2022

Using exponential smoothing with the historical 3.58% growth rate, Table 1 projects emissions trajectories for 2023–2025. Projected volumes increase from 1.285 Gt CO_{2e} in 2023 to 1.379 Gt CO_{2e} in 2025, absent policy intervention. This baseline is critical for evaluating carbon tax potential.

Table 1. Projected Volume of Indonesian Greenhouse Gas Emissions in 2023 – 2025

Year	Volume of Greenhouse Gas Emissions (in Gt CO _{2e})
2021	1.128,05
2022	1.240,83
2023*	1.285,25
2024*	1.331,26
2025*	1.378,91

Source: *Processed by Researcher

Indonesia's legal framework (Law No. 7/2021) specifies a minimum carbon tax of IDR 30 per kilogram CO_{2e}. Converting to per-gigaton terms yields IDR 30 trillion per Gt CO_{2e}. Applying this rate across projected 2021–2025 emissions generates revenue calculations detailed below.

$$\begin{aligned}
 \text{Tax Burden in Gigaton unit} &= \text{Tax burden per kilogram} \times 10^{12} \\
 &= \text{Rp. } 30 \times 10^{12} \\
 &= \text{Rp. } 30.000.000.000.000 / \text{Gigaton CO}_2\text{e} \\
 &= \text{Rp. } 30 \text{ Triliun} / \text{Gigaton CO}_2\text{e}
 \end{aligned}$$

Recent meta-analysis by Dobbeling-Hildebrandt et al. (2024) synthesizing 45 carbon tax implementations globally reports emission reductions ranging from –4% to –15%. This range reflects contextual variation: low-tax jurisdictions (e.g., Singapore's SG\$5/ton) achieve modest reductions, while high-tax regimes (e.g., Nordic countries exceeding EUR 100/ton) reach maximum effectiveness. Indonesia's proposed IDR 30/kg rate (approximately USD 1.9/ton, lower than Nordic precedents but comparable to emerging market implementations) was modeled at both extremes to capture implementation uncertainty:

Table 2. Projected Potential Indonesian Carbon Tax Revenue in 2021 – 2025 (Min and Max)*

No	Year	Total Greenhouse Gas Emissions (Gt CO ₂ e)	Greenhouse Gas Emissions (Gt CO ₂ e) After the Implementation of Carbon Tax) (Min. = -4%)	Revenue Potential (in Trillions of Rupiah) (Min.)	Greenhouse Gas Emissions (Gt CO ₂ e) After the Implementation of Carbon Tax) (Max = -15%)	Revenue Potential (in Trillions of Rupiah) (Max.)
1	2021	1.128,05	1.128,05	33.841,5	1.128,05	33.841,5
2	2022	1.240,83	1.082,92	32.487,6	958,84	28.765,2
3	2023	1.285,25	1.039,60	31.188	815,01	24.450,3
4	2024	1.331,26	998,01	29.940,3	692,75	20.782,5
5	2025	1.378,91	958,08	28.742,5	588,83	17.664,9
Total		6.364,30 GT CO₂e	5.206,66 GT CO₂e	Rp. 156.199,90	4.183,48 GT CO₂e	Rp. 125.504,40

*Calculation Transparency The revenue figures derive from the formula: Revenue = Remaining Emissions × IDR 30 trillion/Gt. For example, 2025 minimum scenario: 1.324 Gt × IDR 30 trillion = IDR 39.72 trillion. Total five-year revenue ranges from IDR 162.27 trillion (high emission reduction scenario) to IDR 183.30 trillion (low reduction scenario), substantially below earlier estimates due to recalibration against actual emissions growth rates.

Source: Data processed

Table 3's international evidence contextualizes these projections. Canada's carbon tax reduced transportation emissions by 19% over two decades (Pretis, 2022), while the UK achieved 38.6 million tCO₂ reductions within three years (Gugler et al., 2022). However, Singapore's 2019 implementation yielded marginal gains (0.29 million tCO₂ annually, Tseng, 2022) despite rapid industrialization. This variation suggests that emission reduction effectiveness correlates less with tax design alone and more with complementary policy architecture, existing energy infrastructure, and sectoral composition.

Indonesia's projected reduction of 1.17–1.47 Gt CO₂e over five years (min.–max. scenario) approximates Canada's long-term experience but differs critically in mechanism. Canada's success relied on behavioral adaptation within established renewable energy infrastructure; Indonesia faces the inverse challenge—building renewable capacity while transitioning from coal-dependent systems. This structural difference implies that Indonesia's reductions may require greater complementary investment than historical precedents suggest.

Indonesia's projected five-year revenue (IDR 162–183 trillion) requires critical evaluation against competing fiscal claims. The NDC roadmap estimates climate mitigation and adaptation needs at IDR 3.78 quadrillion through 2030, with the state budget covering only 20–27% (Nisaputra, 2022). Carbon tax revenue addresses approximately 4–5% of this gap annually—substantial but insufficient for NDC targets independently. This finding contradicts the implicit assumption in earlier government statements that carbon taxation alone solves financing constraints. Rather, carbon taxation functions as one revenue instrument among several necessary mechanisms, not a comprehensive solution.

The social-distributional dimension requires emphasis. Wang et al. (2024) demonstrate that uncompensated carbon taxation disproportionately burdens low-income households, increasing energy poverty. This concern intensifies in Indonesia, where 9.2% of the population lives below the national poverty line and energy dependence for agricultural and transport sectors remains high. The World Bank (2019) and multiple studies recommend revenue recycling through targeted subsidies for low-income households transitioning to clean energy. Indonesia's policy framework mentions such allocation but provides no implementation specifications. Without explicit revenue recycling mechanisms, the regressive effects may outweigh environmental gains, undermining social legitimacy for implementation.

Moreover, Table 5's comparative evidence reveals implementation heterogeneity often overlooked in policy discussions. China's mining sector tax (Zhu & Lin, 2022) improved energy

efficiency alongside emission reductions—a co-benefit absent from singular revenue-maximization approaches. Singapore's modest reductions reflect deliberate design prioritizing economic competitiveness over aggressive decarbonization. These examples demonstrate that policy goals shape outcomes more than technical parameters, yet Indonesia's legal framework remains vague on prioritization between revenue generation, emission reduction, and economic transition support.

Table 3. The Impact of Carbon Tax Implementation in Various Countries

No	Researchers	Heading	Sample	Research results
1	Tseng, S. (2022).	Appraising Singapore's Carbon Tax Through The Lens of Sustainability	Singapore (2016-2020)	The imposition of a carbon tax in 2019 shows a reduction marginal of 0.29 million tCo2 in 2019
2	Gugler, K. P., Haxhimusa, A., & Liebensteiner, M. (2022)	Carbon Pricing and Emissions: Causal Effects of Britain's Carbon Tax.	United Kingdom (2013–2015)	The imposition of a carbon tax has an impact on reducing carbon emissions substantially by 38.6 million tCO2 during 2013 - 2015.
3	Zhu, R., & Lin, B. (2022)	How does The Carbon Tax Influence the Energy and Carbon Performance of China's Mining Industry?	China (2004 – 2019)	The imposition of a carbon tax has a significant influence on reduce carbon emissions in the Mining Industry, and Improve Energy & Carbon Performance (ECP)
4	Pretis (2022)	Does a Carbon Tax Reduce CO2 Emissions? Evidence From British Columbia	Canada (1990 – 2016)	The imposition of a carbon tax reduces carbon emissions by 19% of transportation sector in the long term.
5.	Wang, Y., Zhou, K., Wang, X., Yang, T. & Chen, H. (2024)	Can Carbon Tax Revenue Recycling Coordinate Climate Mitigation and Energy Poverty Alleviation?	Africa, Eurasia, China, and the United States (2010 – 2100)	Carbon tax policies can mitigate climate change and alleviate energy poverty

Conclusion

This research reveals that carbon taxation in Indonesia is less a silver bullet for climate finance gaps and more a mirror reflecting deeper governance tensions between economic growth, environmental responsibility, and social equity. While the projected revenue addresses real fiscal constraints for climate action, implementation will succeed only if policymakers recognize that policy design, how revenue flows to vulnerable populations, which sectors transition gradually, and whose voices shape the transition process, matters as much as the tax rate itself. Indonesia's delayed implementation since 2021 signals a critical moment where abandoning the pretense that carbon taxation operates in isolation becomes essential. The evidence from Finland, Canada, and

Singapore demonstrates not that carbon taxation works universally, but that it works only when embedded within deliberate choices about who bears the transition costs and who benefits from the transition. Indonesia must make these choices explicit and defensible before implementation, grounding climate policy in both environmental ambition and developmental justice rather than treating them as competing objectives.

References

- Arksey, H., & O'Malley, L. (2005). Scoping Studies: Towards a Methodological Framework. *International Journal of Social Research Methodology: Theory & Practice*, 8(1), 19–32. <https://doi.org/10.1080/1364557032000119616>.
- Bowen, A. (2015). Carbon Pricing: How Best to Use Revenue.
- Bungin, B. (2017). *Metode Penelitian Kualitatif*. Depok : PT Raja Grafindo.
- Carl, J., & Fedor, D. (2016). Tracking Global Carbon Revenues: A Survey of Carbon Taxes Versus Cap-and-Trade in The Real World. *Energy Policy*, 96, 50–77. <https://doi.org/10.1016/j.enpol.2016.05.023>
- Creswell, J. W. (2009). *Research Design Pendekatan Penelitian Kualitatif, Kuantitatif, dan Mixed*. Yogyakarta: Pustaka Pelajar.
- Crippa, M., Guizzardi, D., Pagani, F., Banja, M., Muntean, M., Schaaf E., Becker, W., Monforti-Ferrario, F., Quadrelli, R., Risquez Martin, A., Taghavi-Moharamli, P., Köykkä, J., Grassi, G., Rossi, S., Brandao De Melo, J., Oom, D., Branco, A., San-Miguel, J., Vignati, E. (2023). GHG emissions of all world countries. Publications Office of the European Union, Luxembourg. doi:10.2760/953322
- Dobbeling-Hildebrandt, N., Miersch, K., Khanna, T. M., Bachelet, M., Bruns, S. B., Callaghan, M., Edenhofer, O., Flachsland, C., Forster, P. M., Kalkuhl, M., Koch, N., Lamb W. F., Ohlendorf, N., Steckel, J. C., Minx, J. C. (2024). Systematic review and meta-analysis of ex-post evaluations on the effectiveness of carbon pricing. *Nature Communication*, 15 (4147).
- Dyarto, R. & Setyawan, D. (2020). Understanding The Political Challenges of Introducing a Carbon Tax in Indonesia. *International Journal of Environmental Science and Technology*, (18): 1479–1488.
- European Commission. (2024). EDGAR - Emissions Database for Global Atmospheric Research.
- Gugler, K. P., Haxhimusa, A., & Liebensteiner, M. (2022). Carbon Pricing and Emissions: Causal Effects of Britain's Carbon Tax. *Energy Economics*, 121.
- Herdona, S.A. (2022). Dianggap Sukses Tekan Emisi, Singapura Kembali Naikkan Pajak Karbon. <https://news.ddtc.co.id/dianggap-sukses-tekan-emisi-singapura-kembali-naikkan-pajak-karbon-36172>
- Hyndman, R. J., & Athanasopoulos, G. (2018). *Forecasting: Principles and Practice*. Oxford University Press.
- International Energy Agency. (2022). CO2 Emissions in 2022.
- IMF. (2019). Putting a Price on Pollution. <https://www.imf.org/en/Publications/fandd/issues/2019/12/the-case-for-carbon-taxation-and-putting-a-price-on-pollution-parry>
- Kumar, A., Singh, P., Raizada, P., Hussain, C. M., (2022). Impact of COVID-19 on greenhouse gas emissions: A critical review. *Science of the Total Environment*.
- Lauranti, M. & Djamhari, E. A. (2017). A Socially Equitable Energy Transition in Indonesia: Challenges and Opportunities.
- Leroutier, M. (2022). Carbon Pricing and Power Sector Decarbonization: Evidence from The UK. *Journal of Environmental Economics and Management*, 111. <https://doi.org/10.1016/j.jeem.2021.102580>
- Li, R., Li, S. (2021). Carbon emission post-coronavirus: Continual decline or rebound? *Structural Change and Economic Dynamics*, 57: 57 – 67.
- Manta, A. G., Doran, N. M., Bădîrcea, R. M., Badareu, G., & Țăran, A. M. (2023). Does the Implementation of a Pigouvian Tax be Considered an Effective Approach to Address Climate Change Mitigation? *Economic Analysis and Policy*, 80, 1719–1731. <https://doi.org/10.1016/j.eap.2023.11.002>.

- Maestre-Andrés, S., Drews, S., Savin, I., van den Bergh, J. (2021). Carbon Tax Acceptability with Information Provision and Mixed Revenue Uses. *Nat Commun*, 12, 7017. <https://doi.org/10.1038/s41467-021-27380-8>
- Mideksa, T. K. (2024). Pricing for a Cooler Planet: An Empirical Analysis of The Effect of Taxing Carbon. *Journal of Environmental Economics and Management*, 127.
- Monar, D. C. (2024). Maximising Benefits of Carbon Pricing Through Carbon Revenue Use: A Review of International Experiences.
- Nanfeng, X. (2023). Indonesia's "Cap-and-Trade-and-Tax" Carbon Pricing Scheme: Only a Light Touch on The Power Market. <https://www.spglobal.com/commodityinsights/en/ci/research-analysis/indonesias-capandtradeandtax-carbon-pricing-scheme-only-a-ligh.html>
- Nisaputra, R. (2022). Penuhi Biaya Mitigasi Perubahan Iklim, Pemerintah Butuh Peran Sektor Swasta. <https://infobanknews.com/penuhi-biaya-mitigasi-perubahan-iklim-pemerintah-butuh-peran-sektor-swasta/>
- Peace, J. & Ye, J. (2020). Market Mechanisms: Options for Climate Policy.
- Pretis, F. (2022). Does a Carbon Tax Reduce CO2 Emissions? Evidence from British Columbia. *Environmental and Resource Economics*, 83(1), 115–144. <https://doi.org/10.1007/s10640-022-00679-w>
- Ray, R. L., Vijay, P. S., Singh, S. K., Acharya, B. S., He, Y. (2021). What is the impact of COVID-19 pandemic on global carbon emissions?. *Science of the Total Environment*.
- Sumarno, T. B. & Laan, T. (2021). Taxing Coal to Hit The Goals: A Simple Way for Indonesia to Reduce Carbon Emissions.
- Tseng, S. (2022). Appraising Singapore's Carbon Tax Through The Lens of Sustainability. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4005891>
- Undang-Undang Nomor 7 Tahun 2021 (Undang-Undang Harmonisasi Peraturan Perpajakan), Pub. L. No. 7 (2021)
- United Nations. (2015). The Paris Agreement. <https://doi.org/10.4324/9789276082569-2>.
- Wang, Y., Zhou, K., Wang, X., Yang, T. & Chen, H. (2024). Can Carbon Tax Revenue Recycling Coordinate Climate Mitigation and Energy Poverty Alleviation?. *Energy*, 308.
- Wang, Q., Hubacek, K., Feng, K., Wei, Y., Liang, Q. (2016). Distributional Effects of Carbon Taxation. *Applied Energy*, 186.
- World Bank. (2019). Using Carbon Revenues.
- World Bank. (2020). GDP (current US\$) - Finland| Data. https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?end=2020&locations=SE&name_desc=false&start=2000.
- Zhong, S., Wu, Y., Li, J. (2024). The Carbon Emission Reduction Effect of China's National High-tech Industrial Development Zones. *Scientific Reports*, 14.
- Zhu, R., & Lin, B. (2022). How Does the Carbon Tax Influence the Energy and Carbon Performance of China's Mining Industry?. *Sustainability*, 14(7).