Chapter 3

Indonesia's Grand Experiment in Implementing a Fair and Acceptable Carbon Tax

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A. The Urgency of Carbon Tax

The economic recovery from COVID-19 should be used as an opportunity to implement policy reforms that will help climate change mitigation and adaptation. Climate change will cause economic and health issues if it is left unchecked. Efforts to tackle climate change must be made at the multilateral, regional, and national levels. At the multilateral level, 196 parties in Paris, France, on December 12, 2015, signed a legally binding international treaty on climate change. Commonly referred to as the Paris Agreement, the goal is to limit temperature rise between 1.5–2°C compared to pre-industrial times. Other multilateral initiatives include the Network for Greening the Financial System (NGFS), a network of 114 central banks and financial supervisors aiming to accelerate the scaling of green finance. Regional

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policies to tackle climate change include the EU's launching of a green taxonomy, which seeks to improve money flow towards sustainable activities. The EU also plans to implement a Carbon Border Adjusted Tax Mechanism, which will equalize the carbon price between domestic and imported products. At the national level, individual countries and jurisdictions have various carbon-energy policies to meet their climate change commitments pledged in the Paris Agreement. One of those climate-energy policies is a carbon tax. A carbon tax aims to charge the carbon content of fossil fuels, increasing fossil fuel prices and driving demand for lower-carbon fuels (Parry, 2019).

There is an urgency in Indonesia to implement a carbon tax. Indonesia is the world's eighth-biggest greenhouse gas emitter and has pledged to cut back nearly one-third of its carbon emissions in 2030 with its efforts. Air pollution kills an estimated 120,000 Indonesians annually. Indonesia introduced a carbon tax as part of its most comprehensive tax reforms, including scrapping a corporate tax cut and introducing a higher income tax rate for wealthy individuals. These reforms are expected to increase the country's tax revenue in 2022 by IDR 139.3 trillion (USD 9.8 billion) and boost the tax ratio from 8.44% to 9.22% of GDP (Suroyo & Nangoy, 2021).

Introducing a carbon tax is a step forward for Indonesia to achieve its greenhouse gas emission reduction goals. The Ministry of Finance's next step is to issue a ministerial regulation on the carbon tax, which is expected to be in force in July 2022 after being pushed back from April 2022. Currently, the Harmonized Tax Bill broadly defines the tax rate for the carbon tax and the tax base. The tax rate is set at a minimum of IDR 30 per kilogram of Carbon Dioxide equivalent (CO_2e) or an equivalent unit. If converted into tons, this would mean the tax would be at a minimum of IDR 30,000 per ton, or a little over USD 2. As for the tax base, the government can impose tariffs on individuals or bodies who purchase goods with carbon content or conduct activities that emit carbon. The carbon tax is still a work in progress as the government must determine the final design of the tax, which is expected to answer critical questions such as the

scope of sectors included, how the rate will develop over time, how to determine the use of revenues, and how to ensure oversight and compliance.

Governments in 40 countries worldwide and another 16 state or provincial governments have been estimated to collect more than USD 28.3 billion in "carbon revenues" annually (Carl & Fedor, 2016). Through paired tax cuts or direct rebates, around 36% of such revenues have been returned to corporate or individual taxpayers. While 27% and 26% respectively have gone toward state general funds or used to subsidize "green" spending in energy efficiency or renewable energy. Despite that and the potential that carbon taxes have in reducing greenhouse gas emissions in the environment, governments around the world have experienced challenges when trying to implement a carbon tax that is technically correct, politically supportable, and organizationally implementable. There have been groups and constituents that have opposed carbon taxes. Policies that may broadly benefit society, in theory, have had a higher chance of failure if their actual or perceived costs are concentrated among a smaller group that is highly motivated to campaign aggressively against the policy (Olson, 1971). In the case of carbon taxes, such groups can be businesses or industries that produce fossil fuels such as oil and coal. Even successful implementors of the carbon tax, such as the British Columbia government in Canada, faced hurdles in passing the carbon tax despite having wide political, voter, and business support for the tax and an electricity system backed mainly by hydropower and carbon-free.

Stiglitz and Rosengard (2015) explain five characteristics of a desirable tax system. The first would be economic efficiency, meaning the tax system should not interfere with the efficient allocation of resources. The second would be the simplicity of administration, meaning the tax system should not be expensive and difficult to administer. The tax should make it easy for the tax base to voluntarily self-comply. The third would be flexibility, or the adaptiveness of the tax system to respond quickly or even automatically to changed economic circumstances. The fourth would be political responsibility

or the need for the tax system to be designed, so taxpayers know what they are paying and evaluate how accurately the system reflects their preferences. Finally, the fifth would be fairness in treating different individuals.

On these grounds, this chapter analyzes the complexities of implementing a carbon tax in Indonesia, including proposing measures to help implement the carbon tax. The article is structured by discussing international climate change policy, domestic climate-energy policies, and offering the design of the Indonesian carbon tax.

B. Climate Change Policy

Human activities such as the burning of fossil fuels, deforestation, and changes in land use since the Industrial Revolution have released large amounts of carbon dioxide and other greenhouse gases such as methane and nitrous oxide into the atmosphere, causing a level of greenhouse gases not seen in at least the past 650,000 years (Stern, 2006). Human influence on climate has outweighed the impact caused by natural factors such as changes in the sun's energy and volcanic eruptions (the United States Environmental Protection Agency, n.d.). Evidence of humans causing warmer temperatures and increasing pressure from the public to act against climate change have triggered governments worldwide to issue policies to reduce greenhouse gas emissions.

From an economic point of view, climate-energy policies are needed to address the market failure of environmental externalities. Emitting greenhouse gases are detrimental because it imposes a social cost on the environment, such as pollution, which lowers the quality of life. The government can intervene and correct the market failure by issuing incentives to change the emission behaviors of individuals and businesses by making emitters responsible for the externalities caused by emissions (World Bank, 2017).

Climate-energy policies motivate greenhouse gas-reducing actions by individuals and firms and can be differentiated between non-compulsory and compulsory policies (Jaccard, 2020). Non-com-

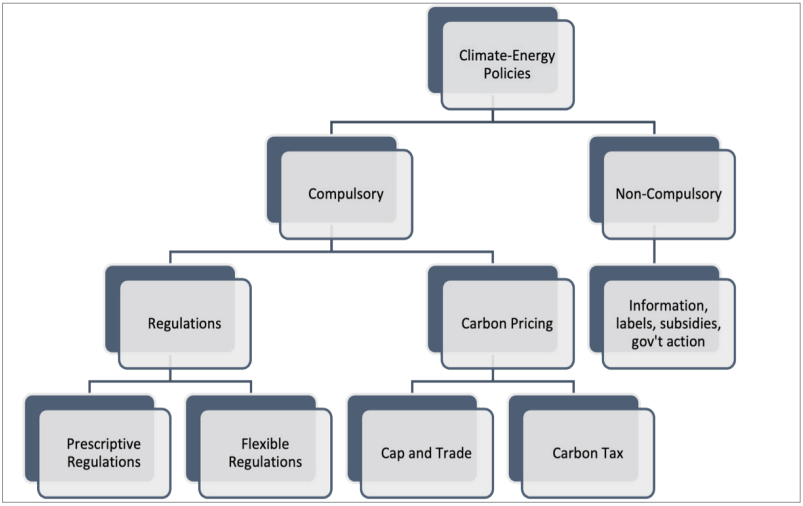
pulsory policies attempt to convince people to voluntarily alter their technology choices and behavior for altruistic or financial self-interest, such as labels on vehicles and electronic appliances which state their emissions rating or energy usage, corporate social responsibility, or government policies to subsidize mass transit. Meanwhile, compulsory policies oblige entities to reduce emissions or shift to lower-emissions technologies.

Carbon taxes are a form of compulsory climate-energy policy and a cap-and-trade system. A carbon tax allows the government to impose taxes to match the carbon content of each fossil fuel, such as coal, natural gas, and gasoline. A carbon tax differs from a cap-and-trade system that sets an emission cap and distributes tradeable permits totaling the cap allocated. Meanwhile, a cap-and-trade system allows firms to decide how they value emissions. Firms that can reduce emissions in their production process can share their surplus quota with their competitors who cannot do so. Some jurisdictions, such as the E.U., combined carbon taxes with a cap-and-trade system, rarely carrying carbon taxes as an isolated or stand-alone policy. Instead, they are part of more considerable energy and excise tax reform efforts.

Carbon taxes effectively operate as Pigouvian or corrective taxes, as duties and taxes governments have long imposed on cigarettes because the costs smokers impose costs on others, such as higher health costs for second-hand smokers. Corrective taxes are attractive because they correct market failures aside from raising revenue. Proponents of punitive taxes argue why productive "good" economic activities such as savings and hard work are taxed, but "bad" economic activities such as pollution are not (Stiglitz & Rosengard, 2015). Thus, carbon taxes would mimic a payment for the increment of or marginal damage individuals caused by emitting carbon.

For this reason, compulsory policies are more practical in tackling climate-energy problems. On the other hand, non-compulsory policies are considered adequate if the harm is only caused to oneself. However, the damage caused by greenhouse gas emissions is a negative externality that harms others in society, so a compulsory policy that

requires climate change mitigation goals and transition to a lower-carbon economy must be established seriously.



Source: Jaccard (2021)

Figure 3.1 Breakdown of Climate-Energy Policies

In Indonesia's context, carbon taxes can be used by the Indonesian government to support achieving their emission reduction goals specified in their Nationally Determined Contribution (NDC) under the Paris Agreement. Based on Indonesia's recently updated NDC, the energy sector is still expected to be the most dominant emission source of greenhouse gases in 2030, contributing to 1,669 million tons of Carbon Dioxide equivalent emissions in a business-as-usual scenario. From a purely environmental perspective, the scope of carbon taxes should be targeted at fossil fuels used in energy production.

Carbon taxes could also raise revenue to fund government expenditures for policies issued in response to COVID-19. Like most governments worldwide, the Indonesian government has issued several measures in response to COVID-19. In 2022, the Indonesian

government budgeted IDR 451 trillion (USD 31 billion) for the National Economic Recovery (PEN) program (Anggoro, 2022). This amount is on top of the near IDR 700 trillion (USD 49 billion) allocated in 2021 and IDR 579.78 trillion realized in 2020 (Antara, 2021). The stimulus measures were intended for the healthcare sector, social protection, tax incentives, and credit for businesses, SMEs, and State-Owned Enterprises (Klynveld Peat Marwick Goerdeler-KPMG), 2020). The government temporarily relaxed the State Budget deficit policy to finance the PEN. The deficit can now be above 3% of GDP for the fiscal years 2020, 2021, and 2022 (KPMG, 2020).

In late March 2022, the Indonesian government announced it would push back the carbon tax implementation, citing the impact of rising global energy prices on consumers. It is not uncommon to go back to climate-energy policies amid global developments in the first quarter of 2022. The United States, for example, decided to temporarily allow the sale of E15 over the summer months, a cheaper but dirtier type of fuel that has raised smog concerns, to lower record-high fuel prices.

The revenue from the carbon tax, for example, could be "recycled" back to the public to stimulate consumer spending in the short term. However, most notably, in the long-term, a carbon tax could help a country avoid future risks associated with climate change, which could be more costly to reverse later (Burke et al., 2020). Indonesia is in the top third of countries that face a high risk of a changing climate because of its high exposure to all types of flooding, sea-level rise, and extreme heat (Asian Development Bank, 2021). Physical and transition risks are two significant future financial risks to the economy (Basel Committee on Banking Supervision, 2021). Physical risks are the economic costs and financial losses resulting from the increasing severity and frequency of extreme climate change-related weather events such as heat waves and long-term gradual climate shifts such as rising sea levels. Transition risk, meanwhile, occurs when the businesses cannot adjust to the policies issued by a government or change consumer sentiment in transitioning to a low-carbon economy.

In addition, transition risk is often associated with stranded assets. Before the end of its economic life, the transition risk can no longer earn a financial return because of changes related to the transition to a low-carbon economy. A carbon tax that is implemented gradually would likely soften the impact of transition risk, as demand for fossil fuels subject to the tax will not be highly impacted. However, the slower the transition means there might be increased physical risk as the earth continues to warm because of high-carbon activities.

C. Potential Design of Carbon Tax in Indonesia

The design of a carbon tax must consider a country's overall climate, energy, and fiscal policy framework. Designing the tax includes four components: (1) the tax base; (2) tax rate; (3) revenue use; and (4) oversight, compliance, and tax transparency (World Bank, 2017).

1. Choice of Tax Base

The tax base determines who should be responsible for paying the taxes and where the tax will be collected. In deciding who will pay the taxes, the regulation must determine the sectors covered by the tax, greenhouse gases covered, and the point of collection. The choice of the tax base must be considerate of the government's resources to administer and enforce the tax collection. The tax base will determine the potential tax revenue and the degree of reducing emissions that can be achieved.

There is a dilemma in deciding the sectors included within the scope of the carbon tax. Including all sectors and emissions within the scope of the carbon tax would undoubtedly lead closer to achieving greenhouse gas emission reduction goals. However, including all sectors may be administratively burdensome and politically unfeasible. As a result, some countries have notably excluded some sectors within the scope of carbon taxes, such as agriculture, fishing, international maritime transport, international aviation, and fuels intended for exports. For example, agriculture is often difficult to include in many jurisdictions due to opposition from farmers who fear the increasing costs of their operations (Skolrud, 2019). In addition, sectors that

are exposed to international competition are often carved out from the carbon tax (Asen, 2020). As for emissions, the carbon content of the three primary fossil fuels (coal, natural gas, and oil) is generally ascertainable once extracted and placed into commerce (Hsu, 2014).

Other countries or jurisdictions have taken varied approaches in the scope of fossil fuels included in existing and planned carbon taxes. For example, British Columbia in Canada, France, Japan, Sweden, and the United Kingdom include all fuels. On the other hand, Norway only covers oil and gas, and the nine Northeastern U.S. states currently participating in the Regional Greenhouse Gas Initiative (RGGI) only cover 19% of all greenhouse gas emissions in the RGGI states (Plumer & Popovich, 2019; Congressional Research Service, 2019). India and Mexico, respectively, also only include coal and oil. In addition, countries in the E.U. Emissions Trading System (ETS) also exclude sectors within the ETS in the scope of the carbon tax.

There are three options for collecting carbon taxes on the point in the supply chain. One would be the collection in upstream industries. Under an upstream system, the tax would be levied on crude oil reaching the refinery, natural gas leaving the processor to enter a pipeline, and coal as it goes the mind (Horowitz et al., 2017). Under the midstream system, an excise tax would be levied on petroleum-based fuels when they leave the refinery or are otherwise sold for use as natural gas. It leaves local distribution centers and fuels used by electric generating facilities or other industrial users that have not been previously taxed. Finally, a downstream approach levies the tax at the point of consumption, making this approach usually the most visible to consumers. However, this approach is undesirable because psychological research has shown that given a choice among taxing mechanisms, people seem to prefer hidden taxes over transparent ones (Hsu, 2014).

Upstream industries are the easiest and most feasible approach to regulating and collecting the tax (Jaccard, 2020). Managing the tax in upstream industries requires fewer capacities for measuring, reporting, and verifying (MRV) of emissions. An example illustrat-

ing the difficulty of collecting the taxes at the downstream level is measuring Methane released from a pile of cow manure, which would be unfeasible (Jaccard, 2020).

By narrowing the collection point to the upstream industry, carbon content could be easily measured because the number of taxpayers would be relatively small. In Indonesia, if coal were taxed at the upstream, taxing coal mine mouths that produce coal instead of firms that consume coal would be more easily identifiable. Doing a quick online check, anyone can identify 90 coal-producing companies listed as members of the Indonesian Coal Mining Association (APBI ICMA) as of February 2020 (Indonesian Coal Mining Association, n.d.). However, taxing coal mining companies might be damaging both politically and economically. Indonesia is the world's biggest thermal coal exporter, and its export earnings from coal are roughly $3 billion per month, mainly going to power the industries in China, Japan, and South Korea (Nangoy, Christina, 2022). When Indonesia imposed an export ban on high-caloric coal, Japan requested it is lifted and already allowed five loaded vessels to depart for Japan (Nangoy, Christina, 2022). A regulation mandating producers prioritize the supply of coal to the state-owned utility company Perusahaan Listrik Negara (PLN) at a price below the market keeps retail electricity prices low, which is a popular move in a country where electricity fees account for a smaller share of household expenses in low-income households compared to similar households in the United States[1].

The sensitivities of taxing the coal industry directly based on their production may be a reason why Indonesia, in 2022, decided that the initial scope of the carbon tax would be on coal power plants. The aim is to assist coal-fired power plants in reducing their greenhouse gas emissions per unit of output that follow a unit of production,

[1] Using households in Sumba as an example from Wen et al. (2022), which is considered in the study as a "profile of households in a deprived region of a developing country", households their pay monthly electricity fees amounting to 1.4–3.5% of their household income, which is lower than what low-income households in the United States who spend 8.1% of their income on energy costs according to American Council for an Energy-Efficient Economy (2020).

rather than an absolute cap on emissions (Tan & Muhammad, 2022). If coal power plants can produce electricity more efficiently, they can still burn more coal. This choice of a carbon tax for coal power plants is expected to balance energy generation and tackle environmental pollution (Che et al., 2019).

Further in Indonesia's context, coal still is the dominant energy source; therefore, directly taxing it would likely cause rising electricity prices. Unlike British Columbia, which generates most of its energy from hydropower, as of 2020, coal still energizes around 60% of Indonesia's power plants, while renewable energy sources only account for 19,5% (Endarwati, 2021; Al Faqir, 2020). Suppose coal that was taxed results in higher electricity prices for households, revenue from the tax may have to be used to offset the cost for low-income households. In South Africa, which relies on coal for 80% of its energy (Ellichipuram, 2021), the extra cost borne by energy users was found to be significant (Carattini et al., 2019).

After coal, Indonesia's gradual implementation of carbon taxes could be based on the most widely used energy sources. In Indonesia, they are oil, coal, and natural gas, whose carbon content can generally be ascertainable once extracted. In 2020, these three fuels contributed 37%, 32%, and 17% of total energy consumption (U.S. Energy Information Administration, 2021).

2. Tax rates

Carbon tax rates vary around the world. In USD per metric ton of CO_2 equivalent (CO_2e), Sweden has the highest rate at USD 137, while countries having the lowest rates include Argentina (USD 6), Chile (USD 5), and Japan (USD 3) (Statista.com, 2021). Indonesia's proposed carbon tax under the Harmonized Tax Bill specifies the minimum tax rate is IDR 30 per kilogram of Carbon Dioxide equivalent (CO_2e) or at an equivalent unit. In terms of a ton (1000 kilograms), this would mean the tax would be at a minimum of IDR 30,000 per ton, or around USD 2 at the current exchange rate.

Indonesia is using a gradual approach in determining its carbon tax rate carbon tax, which might be a necessary compromise for the policy to pass through. Still, it might be insufficient to meet its pledge to reduce greenhouse gas emissions by 29% with its efforts or 41% with international cooperation by 2030 as specified in its Nationally Determined Contribution (NDC) document in the Paris Agreement. To meet that goal, Indonesia must impose a carbon tax between USD 50 to USD 70 per ton (Sterner et al., 2020). Indonesia could opt to set a progressive carbon tax rate which would impose higher tax rates on polluters. However, a more progressive tax has the drawback of potentially causing a more considerable deadweight loss as people consume less of the goods than if they were taxed at a lower rate, leading to lower tax revenues transferred to the government. The annual demand for oil, natural gas, and coal is predicted to increase by 4.2, 4.0, and 3.8%, respectively, from 2017 to 2050, based on a business-as-usual scenario (Malik, 2021).

A progressive tax would also be an unpopular political move, as businesses could lobby against this proposal in parliament. Although a flat tax rate of USD 2 per ton for all greenhouse gas emissions could be futile in meeting climate goals, it would be easier to administer and collect. Indonesia has a history of implementing taxes with effectively low rates but easy to administer. One example would be the property tax reform conducted in the 1980s, which adopted a single tax rate for all property uses in all locations for all values lauded for uniformity, simplicity, and generality (Rosengard, 1998). Other climate-energy policies may be needed to complement the carbon tax to help the country achieve its greenhouse gas emissions reduction goals.

Later, when the public has become more accustomed to the carbon tax, there is an option of increasing the tax rate over time to ensure the tax responds to changed economic circumstances. The argument for initially imposing a low tax rate would be to soften the blow of the transition, allowing firms and households to prepare and adjust for potential changes in demand. Both Sweden and British Columbia

increased their carbon tax rates over time. As more greenhouse gases are emitted into the atmosphere, the tax rate can be increased to reflect the increasing social costs resulting from the emissions.

3. Determining the Use of Revenue

Revenues obtained from carbon taxes can be explicitly directed to carbon mitigation programs and individuals through policies such as reducing income taxes or supplementing government budgets (Sumner et al., 2009). A carbon tax that is made revenue neutral can be more publicly and politically acceptable as it signals that the tax is not merely intended to raise additional revenue for the government but operates as a tax shift. One way to make carbon taxes revenue neutral is to offer reductions to corporate and income taxes. The authorities in British Columbia, Canada, for example, used the revenue from its carbon taxes to lower annual personal and corporate income taxes equal to the government revenue obtained from carbon taxes to deliver spill-over economic effects (Jaccard, 2020).

Revenue from carbon taxes could also be transferred by giving lump-sum payment(s) to low-income families and small businesses. This policy intends to clarify that the less wealthy would not pay for the increased price of goods due to the carbon tax (Banerjee & Duflo, 2019). The British Columbia government also gave three lump-sum payments annually to low-income individuals. The lump-sum payments are essential because less wealthy citizens do not emit as much carbon as more affluent individuals. In India, for example, the 7% of the poorest population in India emits just 0.15 tons of CO_2 per year per person, while the average person in South Asia emits 2.2 tons of CO_2e per year per person (Banerjee & Duflo, 2019). Additionally, a revenue-neutral carbon tax would allow businesses and households to decide to what extent their behavior would be altered against the rising cost of fossil fuels.

Increasing spending could be undertaken to support environmentally friendly initiatives, such as subsidizing the price of home insulation, electric cars, public transit, and wind turbines. Doing so

would reduce the green premium or the difference between the price of zero-carbon solutions compared to their fossil-fuel counterparts. The green premium has been blamed as one reason the world emits so many greenhouse gases (Gates, 2021). If the cost of greener products is higher, businesses and individuals would be reluctant to pay for them. For example, the price of battery or electricity-powered cars in Indonesia is nearly twice as much as their gasoline-powered counterparts. This may be why our incentive to give tax cuts for the purchases has not been effective yet. However, an argument against this policy is that carbon taxes already incentivize businesses and individuals to take actions that alter their behavior on consuming carbon-intensive goods.

One way to estimate the revenue the government could obtain is to calculate the projected energy consumption in metric tons of equivalent to the tax rate. Based on the projected consumption of the three most used energy sources in Indonesia (coal, oil, and natural gas) and assuming the demand would remain the same in 2030, a carbon tax of IDR 30,000 per ton would yield the government an additional tax revenue of over IDR 4 trillion. An estimation by the Indonesian Taxation Analysis yielded the projected revenue of the carbon tax to be at IDR 6.5 trillion (Simaputang et al., 2021).

Table 3.1 Greenhouse Gas Subject to Carbon Tax and Projected Consumption in 2030

Type of Greenhouse Gas	Projected Consumption in 2030 (in a million tons)	Projected Annual Revenue (in a million IDR)
Oil	110	3,330,000
Natural Gas	25	750,000
Coal	10	300,000

Source: Malik (2021)

After obtaining the projected revenue, the government must decide how to use the revenue. In Indonesia's case, an option would

be either cash transfers to low-income families or subsidizing the prices of green alternatives. The government could choose the latter to promote non-gasoline powered cars to reduce the chronic pollution present in the large cities. Sales of these cars have never really taken off because their cost tends to be twice as expensive as their gasoline counterparts and due to the lack of charging stations, despite incentives such as tax breaks and an exemption from Jakarta's odd-even traffic policy. However, assuming that the difference in sale price between a gasoline-powered car and its green version is IDR 200 million, the government would need to churn out a massive sum of money to ensure the cost is comparable. So instead, using the revenue for direct cash transfers seems to be a more feasible option that impacts more people.

Making the tax revenue-neutral is important for the public to view the carbon tax as a policy that would increase the burden of daily living costs, such as increasing electricity costs. Rising electricity costs could jeopardize the government's goal of ensuring universal energy access by 2030 and increase production costs in some industries, where electricity costs could account for as high as 80% of production costs (Simaputang et al., 2021). In British Columbia, the carbon tax did not significantly affect the price of electricity because most of the electricity was generated by hydropower, emitting fewer greenhouse gas emissions.

4. Oversight, Compliance, and Transparency

In determining oversight and compliance, the government should map the required roles and functions for administering the tax, determine whether needed parts can be carried out with existing capacities or if new roles and capabilities are required, establish clear procedures, and ensure coordination of crucial entities.

Administering the carbon tax in Indonesia would likely involve at least three ministries: the Ministry of Finance, the Ministry of Energy and Mineral Resources, and the Ministry of Environment and Forestry. Ideally, the carbon tax should be collected annually. It

can be enforced by either issuing a tax invoice similar to the one sent for property taxes to entities to which the carbon tax applies, such as coal mining companies. The companies would be easily tracked down because they have Taxpayers' Identification Numbers. They could pay the surcharge through several payment channels, such as bank wire transfers and e-commerce. What could be the challenge here is ensuring the consistency of the carbon content and CO_2 emissions produced by fossil fuel producers. Therefore, the Ministry of Finance would need to set up a mechanism with the Ministry of Energy and Mineral Resources to ensure the accuracy of the data collected. Ideally, after the emissions have been verified, the Directorate General of Taxes in the Ministry of Finance would send the tax invoice to the entities subject to the carbon tax.

For the tax to become transparent in ensuring revenue-neutral, the government can look at how the British Columbian government reports its carbon taxes each year. The British Columbian Ministry of Finance must file an annual report showing how tax proceeds are used (Carl & Fedor, 2016). This report will be subject to review and approval by the Legislative Assembly as part of a broader annual budget review process, and the government is also required to prepare a three-year plan on how to use the taxes.

Evaluating the carbon tax's effectiveness could use the following three indicators. The first is renewable energy investment and technological development (Dushime, 2021). The second is how significantly the tax affects economic growth, or what proponents of carbon taxes have argued is the elusive "Double Dividend" (Murphy et al., 2016). In this case, revenue from carbon taxes used for reducing taxes on labor or capital would reduce the economic cost of the tax. Thus, the carbon tax would simultaneously benefit tackling climate change and boosting economic growth. The third would be how would the carbon tax cause distributional effects across household income levels (Burtraw et al., 2020). An increase in energy cost due to carbon taxes would affect households directly (such as the cost of their electricity bills) or indirectly (such as the cost of goods like

food). Higher and lower-income households would likely see an increase in expenditures. However, low-income households may be more vulnerable to changes in energy prices because the expenses account for a larger share of their budgets, although they consume less energy. If energy expenditures consume more of the budget, programs such as cash transfers may be needed to offset the effect of carbon pricing on lower-income households.

D. Conclusion

Indonesia's carbon tax is a breakthrough measure to move closer to meeting its pledge to reduce greenhouse gas emissions. Based on estimates, the carbon tax could bring IDR 4 to 6.5 trillion in annual revenue to the government. Carbon taxes worldwide have historically faced hurdles in implementation despite gaining wide political, public, and business support.

Four factors to consider when designing a carbon tax are the tax base, tax rate, revenue use, oversight, compliance, and tax transparency. Indonesia has determined the tax rate and now must choose the other factors. The choice of tax base should be aligned with achieving climate change mitigation goals, which is the energy sector, specifically the oil, coal, and natural gas industries. However, when applying the carbon tax to these sectors, careful consideration must be taken not to reduce energy prices for consumers. Revenue obtained from the carbon taxes should be allocated for other purposes, such as corporate and personal income tax cuts or cash transfers to low-income households. Another option would be subsidizing the price of low carbon and more energy-efficient products to make them more mainstream and affordable. However, doing so may be costly for the government. Lastly, the tax must be easy to collect, which can be done by an annual collection to subjected entities, but a challenge exists in verifying the emissions produced.

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