To: **Sri Mulyani Indrawati, Indonesia Minister of Finance**

Subject: **Implementing suitable fiscal intervention in GHG emission abatement**

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The urgent need for fiscal intervention in GHG emission abatement

Indonesia, as the 16th largest country, a country filled with thousands of vulnerable small islands, and the presidency of the previous G20, has not yet implemented any government intervention in greenhouse gas emission abatement, even though an underlying law has been stipulated (Tax Regulation Harmonization Law, 2021). In the law, Indonesia tries the combination of a carbon tax and an emission trading system, this complexity creates unreadiness in the market (Ermida Maulia, 2022). This shows that the current proposed solution is not suitable for Indonesia's market, yet; hence, other alternatives should be implemented soon.

The Ministry of Finance's (MoF) intervention is crucial to solving this issue because fiscal interventions are still the most suitable policy for Indonesia. Since the most impactful strategy of emission abatement policy is a behavioural change, producers need to change their energy source to a sustainable source, while consumers need to choose more sustainably manufactured goods ("**impacted firms**"). The easiest way is to include the cost of externalities in the price of goods, which will change both production and consumption behaviour (Dissanayake et al., 2020). To achieve this, we cannot rely on the government's capped emission level, which is also known as the **Command-and-Control** approach. This method has been proven to be less impactful (Philip Rossetti et al., 2018). Market-based instruments are a more efficient way to control emission level compared to the Command-and-Control (Nordhaus, 2014; Philip Rossetti et al., 2018). Defining the most suitable market-based instrument for the Indonesian market is the main objective of this memo.

Finding the most suitable policy should be done as soon as possible, because:

- This policy can be used as a **data-driven tool to put pressure on rich countries to fulfill their commitment** to fund global climate action. Even though there is still no clear mechanism, COP 27 in Egypt has managed to create the Sharm el-Sheikh Implementation Plan, which highlights the importance of USD 4-6 trillion in annual funding to help vulnerable countries due to climate change (UNFCC, 2022). In addition, the Bali G20 has also secured USD 20 billion in funding for just energy transition activities in Indonesia

(Plumer, 2022). Therefore, if we delay this intervention, we might lose the opportunity to maximize this funding, especially to mitigate negative externalities faced by vulnerable sectors, which make these sectors less productive (Malahayati & Masui, 2021).

- Furthermore, further delays in investing in abatement activities will make the **government provides more budget for mitigation measures in the coming years**, making meeting the emission target more difficult (Malahayati & Masui, 2021). Even though technology costs are expected to fall as experience increases, problems in the future may be more complex and thus more expensive to solve.

Evaluation criteria to solve the root problem

Based on the problem definition above, we can conclude several criteria that can help us define the best solution. Therefore, a policy with the highest score according to these criteria will be deemed the most feasible:

- **Environmental impact (maximum 3/3)**: The main objective of this policy should be overall emission abatement. This parameter can be compared using various research papers that have been written regarding this topic. A maximum score of 3/3 indicates that the policy is most impact-oriented and most likely to reach the emission abatement target.
- **Economic impact (maximum 3/3)**: Emission abatement policies will always slow economic growth because they increase production costs. Increased production costs shift the market equilibrium to produce less at a higher price, resulting in less overall benefit to both producer and consumer. This parameter can be compared based on various research papers. A maximum score of 3/3 indicates that the policy is least harmful to the economy both in the long and short term.
- **Market readiness (maximum 3/3):** Since the root problem is the market's unreadiness for the policy, this parameter should also be compared as a priority. This parameter can be analyzed qualitatively based on various research papers that have discussed this topic. A maximum score of 3/3 indicates that the policy is the simplest and fastest to be implemented by the market or impacted population.

Policy alternatives

There are varieties of GHG mitigation policies that many countries have applied, ranging from taxes to emission quotas (Wing, 2009), each with its benefits and challenges. Based on the

problem definition in Indonesia, three fiscal intervention alternatives are compared to find the most suitable solution that reflects to the abovementioned evaluation criteria.[1]

1. **Emission Trading System (total score of 5/9):**

Because each producer will be capped at the maximum emission they can emit, this is the most direct government intervention that can theoretically achieve a precise amount of emission abatement (Elkins & Baker, 2001).

This approach is also believed to be the most efficient in terms of the overall cost incurred by the parties since it allows for the trading of emission allowances between producers. In terms of GDP, this approach slows GDP growth only by 0.11% compared to business-as-usual (Dissanayake et al., 2020). However, since this solution is a more market-based solution, the government cannot directly control the carbon price. What happened in EU as the carbon price is highly fluctuating is the extreme condition of this risk (Feng et al., 2011). In addition, if the price is high enough and combined with poor carbon accounting, an irresponsible party may decide that it is more cost-effective for them to produce GHG in order to be paid to destroy them (Gonzales & Blumberg, 2020).

On top of that, the ETS is one that is very complicated to implement as it requires a mature carbon accounting system as well as an internal restructuring of the firm. This complication slows adoption of the ETS mechanism by many firms, even state-owned enterprises (Dissanayake et al., 2020), which has been a problem since last year when the law was stipulated (Reuters, 2022).

2. **Carbon tax (total score of 7/9):**

This is the most direct intervention, requiring the producer to factor in the externalities they created when determining the quantity produced to maximize profit. Economically, the producer will produce less to reflect the additional cost of the tax. If the tax is calculated correctly to find the value that appropriately reflects the externalities' cost, the Pigouvian tax (Bollino & Polinori, 2011), it can be considered the most stable-priced instrument (Dissanayake et al., 2020). However, because the government can only set the tax rate, the amount of emission reduction will be determined by market decisions. How much each firm will reduce their emission will be based on the firm's marginal cost of abatement. This will create the need for the government to iterate the

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[1] An overall policy comparison matrix can be seen in Appendix A of this memo.

level of carbon tax to respond to the market; hence, an efficient policymaking process in this matter is required. A policy tool can help to answer this problem, which will be explained later in this memo[2].

In theory, increased costs will result in less quantity produced, resulting in an economic slowdown, or deadweight loss (Philip Rossetti et al., 2018). However, the economic impact is indistinguishable from the carbon trade approach (Dissanayake et al., 2020), only reduces the growth by 0.12% compared to BaU.

Carbon tax does not require a market to be ready first; hence, it will be simpler to implement (Dissanayake et al., 2020), since this tax basically acts as an additional tax on top of the already practiced income tax. On top of that, this solution has been set as law; therefore, politically, this approach has been agreed upon by the majority of political parties.

3. **Fuel tax or fuel subsidy cut (total score of 6/9):**

The third alternative is to give fossil fuels a tax or cut their subsidies. There are several fuels available in Indonesia that are still subsidized, including low-octane gasoline and diesel fuel. This approach is also being studied because the transportation and power sectors, which are deemed to be the most emission-intensive sectors, are still the major users of these fuels (Eko Cahyono et al., 2022). In terms of impact, this approach will be effective in reducing fuel consumption and promoting the transition to a more sustainable alternative, resulting in emission reduction (Yan & Crookes, 2009); however, the target of achieving a certain amount of emission abatement will be hard to predict.

Regarding market readiness, this approach is the easiest compared to the other two since it does not require any structural changes in the firm's or government's structure. The subsidy cut and price increase can be easily done by using a Ministerial Decision just like what has happened previously on several occasions (Nangoy, 2022).

On top of that, as opposed to the other two alternatives, in the long term, GDP is projected to grow under this approach because $46 billion of the national budget savings can be invested in another sector (Charlie Barnes & Rania Teguh, 2022), such as in kind compensation to people in need. However, this approach will create a massive inflation, since fuel prices are directly related

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[2] Will be explained in the Chapter: Policy Tools – Abatement cost survey

to many basic goods, making this a very unpopular policy. Furthermore, the government will struggle to conduct tax or subsidy cut trials to determine the amount of tax that appropriately results in the targeted abatement level.

Recommendation

In consideration of the policy evaluation, **it is strongly recommended for the Ministry of Finance to implement Policy Two: Carbon Tax (highest score 7/9)** as soon as possible without needing to wait for the carbon trade to be ready. In addition, if deemed necessary, carbon tax can also be used as a preliminary approach in order to prepare the market for the Emission Trading Policy (Dissanayake et al., 2020). The tax amount can be set by using ministerial regulation, which does not require a lengthy political process such as creating a law. It means finding the appropriate tax level that can correctly reflect externalities' costs will be easier[3]; thus, the economic impact will be minimized in the short term.

Stakeholder analysis:

Three stakeholders that show the highest interest in Policy Two are the **impacted firms, the Ministry of Energy and Mineral Resources (MoEMR)**, and the **Ministry of Environment (MoEnv).** While the stakeholders that will have the highest level of influence on the policy will be the **Indonesian Parliament** and **MoEnv**. We can determine their position on this policy based on the analysis below[4]:

- **Impacted firms** are very interested since this policy will directly impact their net income. A more energy-intensive manufacturing firm will rationally show higher interest since emissions are directly related to energy use, hence higher tax expenses. However, their influence in this matter is very small, and we can also explain that there is possibility that carbon tax level will depend on the marginal cost of abatement for each sector, which should not reduce their level of competitivity in each other.
- **The Ministry of Environment (MoEnv)** is primarily responsible for meeting the emission reduction target and thus is the primary supporter of this policy. MoEnv has capable on-the-ground staff to oversee Policy Two implementation. Moreover, MoEnv will be a key

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[3] A policy tool that can help answer this issue will be explained in more detail in Chapter: Policy Tool – Randomized Controlled Trial on carbon tax implementation

[4] To better illustrate each stakeholder position, an interest vs. influence matrix is used and can be seen in Appendix B – Influence vs. Interest Matrix

partner in ensuring the tax is appropriately calculated by implementing a survey, which will be explained in the later chapters[5].

- **The Ministry of Energy and Mineral Resources (MoEMR)** holds the responsibility to ensure the energy security of Indonesia; hence, they will have high interest in this matter. However, since tax and emission control are not their responsibilities, their influence on Policy Two implementation is not very important. However, we should still address MoEMR's concern to prevent the downturn of the power and energy sectors due to the implementation of Policy Two, which may threaten the energy security of Indonesia.

- Lastly, the **Indonesian Parliamen**t is also a key stakeholder, as they have shown their interest when stipulating the law that supported the implementation of the carbon tax. Even though there is not yet any specific mechanism regarding how or when carbon should be taxed in the law, it already acknowledges that there are emission-related taxes that are going to be implemented. Their level of influence is very high since they hold the interpellation right and inquiry right, which allow them to investigate the implementation of the law (DPR-RI, 2016).

Stakeholder engagement

Policy Two is fully supported by the **MoEnv**, as it will make their target more achievable instead of only relying on agriculture-based projects. The MoF should work with MoEnv to create a reasonable emission abatement roadmap and to properly spread the responsibility to several key sectors, such as agriculture and forestry, industrial and manufacturing, energy and power, as well as transportation. Technical support from MoEnv will be very helpful to create a good economic model to determine the level of tax.

The **Indonesian Parliament** has supported this scheme by stipulating the underlying law. The MoF should maintain a good relationship between these two institutions to prevent any setbacks from the political parties.

Lastly, **MoEMR** will be reluctant to go with this mechanism, or at the very least want to make sure it is the lowest tax possible, because this will create a price increase for electricity. And, because maintaining the level of electricity prices is also their role, this mechanism will almost certainly put pressure on MoEMR to enact another law regarding electricity price increases to account for the

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[5] Chapter: Policy Tools: Abatement cost survey

additional cost. To obtain a very accurate marginal cost of abatement model, the cost information must be supplied by the MoEMR, which has the authority to ask for these data from the power plant operator. To improve the level of support from MoEMR, the revenue gained from this tax should be given proportionately to MoEMR since electricity and power are two of the most heavily impacted sectors. This allocation can be invested to improve the electrical grid and, hence, better grid control, which can reduce further emissions and improve electricity grid efficiency.

Policy tools

Randomized Control Trials (RCT) on carbon tax implementation

One critical aspect of Policy Two that must be ensured is the level of the carbon tax; one way to check this is to conduct a randomized control trial in several government-owned Special Economic Zones (industrial zones). To improve accuracy and prevent any lurking variables, the special economic zones chosen should be as similar as possible, so the Arun Economic Zone ("**Area 1**") and Gresik Economic Zone ("**Area 2**") are picked, since they are made specifically for chemical and energy industries. In each of these two areas, 10 firms will be chosen randomly from a pool of mid to large sized firms to also ensure size similarity.

Firms in Area 2 will not be taxed for their emissions, instead only receiving the BaU treatment of annual emission survey by MoEnv ("**Control Group**"). While the firms in Area 1 will also be subjected to a carbon tax at a fixed rate as an incentive to abate their emissions ("**Treatment Group**").

The time duration for this RCT is expected to be one full year, during which the firms should be able to implement emission abatement measures. At the end of the RCT's duration, in addition to BaU emission survey, there will also be several other pieces of information to be collected, such as productivity level, worker count, export amount, etc., which will help determine the economic impact of this policy.

This different treatment will surely create tension in the Treatment group, especially those located close to Area 1. To mitigate this, the Treatment Group will receive a tax subsidy for one year if a carbon tax is implemented after the RCT period has ended and an equivalent subsidy if the carbon tax is deemed unsuitable.

Abatement cost survey

A limitation of RCT is that we cannot gain the same understanding for firms with different conditions. To tackle this, a survey should be conducted to gain a better understanding of the other firms' conditions, specifically their emission abatement activities. By doing this survey, MoF can better understand the differences between all other firms and the trial group in the RCT; a more comprehensive view will be gained to decide on the country-wide rollout of this policy.

This survey will be done after the annual financial statement closing of each firm's fiscal year to better understand the annual condition.

In this survey, several pieces of information are expected to be gathered, such as: productivity, emission levels associated with the productivity, main emission sources, and, most importantly, the options of abatement activities each firm can do and the cost correlated with each activity. With the support of MoEnv, this survey can be included in the annual emission checking activities. By doing this, all firms would be required to participate, avoiding nonresponse bias and untruthfulness. However, in the case that there is some information that is deemed confidential by the firms, the surveyor can propose to create a non-disclosure agreement or an anonymity agreement.

Knowing the difference in abatement capability and cost will help the MoF determine how high the tax should be to accurately reflect the emission abatement, and also open the possibility of determining the tax differently based on a sector's or firm's size. If the survey showed that a certain sector is naturally an expensive sector to be abated, it is more logical to lower the carbon tax compared to another sector whose emissions are cheaper to abate.

Appendix A: Evaluation Criteria – Overall Comparison

	Policy One: Emission trading system (ETS)	Policy Two: Carbon tax	Policy Three: Fuel tax or subsidy cut
Emission abatement impact: the certainty to reach the emission abatement target	**High**: Direct emission cap to the producer, hence the most certain out of all alternatives. However, a risk of failure might happen in the case of poor carbon accounting, such as the case where a producer thinks that producing GHG to get paid by destroying them.	**Medium**: Tax figure directly corelated with the amount of emission abatement which is the market respond due to the tax. Therefore, careful calculation should be made to find current amount of tax. An approach can be made using RCT which will be explained in more detail on later chapter of this memo.	**Medium**: Fuel subsidy cut will reduce the quantity used by the population, hence emission abatement. The amount of subsidy cut, or tax should be carefully studied to reach emission abatement target.
Economic impact: the economic impact in terms of GDP growth/shrink based on model	**Low**: ETS will negatively impact GDP growth, due to additional cost given to various production activity (Dissanayake et al., 2020).	**Medium**: Carbon tax will negatively impact GDP growth, due to additional cost given to various production activity (Dissanayake et al., 2020). However, since the control of the carbon tax is with the government, it can be easily adjusted to reflect the current economic condition.	**High**: Fuel tax will improve overall GDP in the long term, since subsidy is a form of economic inefficiency and creating a deadweight loss (Dissanayake et al., 2020). However, in the short term, the fuel price increase will create a huge shock to the middle-low economic portion, hence price

			inflation is inevitable. Controlling this inflation will be very important.
Market readiness: predicted market response to the policy	**Low**: ETS requires a complex structural change in majority of the firm, such as implementing the role of carbon accounting and/or emission supervisor, as well as sustainability officer. This implementation needs to be done gradually. On top of that, the trading system should also be created usually by adopting a similar mechanism as stock trading.	**High**: Carbon tax does not require complex structural changes in the firm; however, government agent should be trained to also audit the emission produced by the firm's activity. In the future, third party consultant can be involved representing the firm just like tax auditing process.	**Low**: Fuel tax or subsidy cut does not require any structural change in the firm. However, due to the nature of tax subsidy which is very populist issue for the middle-low economy, this approach is very hard to be supported by the congress. Moreover, if the amount of subsidy cut or tax is very high (Dissanayake et al., 2020).
	Overall grade by policy		
Grading	Emission abatement: 3 (high) Economic impact: 1 (low) Market readiness: 1 (low)	Emission abatement: 2 (medium) Economic impact: 2 (medium) Market readiness: 3 (high)	Emission abatement: 2 (medium) Economic impact: 3 (high) Market readiness: 1 (low)
Total grade	5/9	**7/9**	6/9

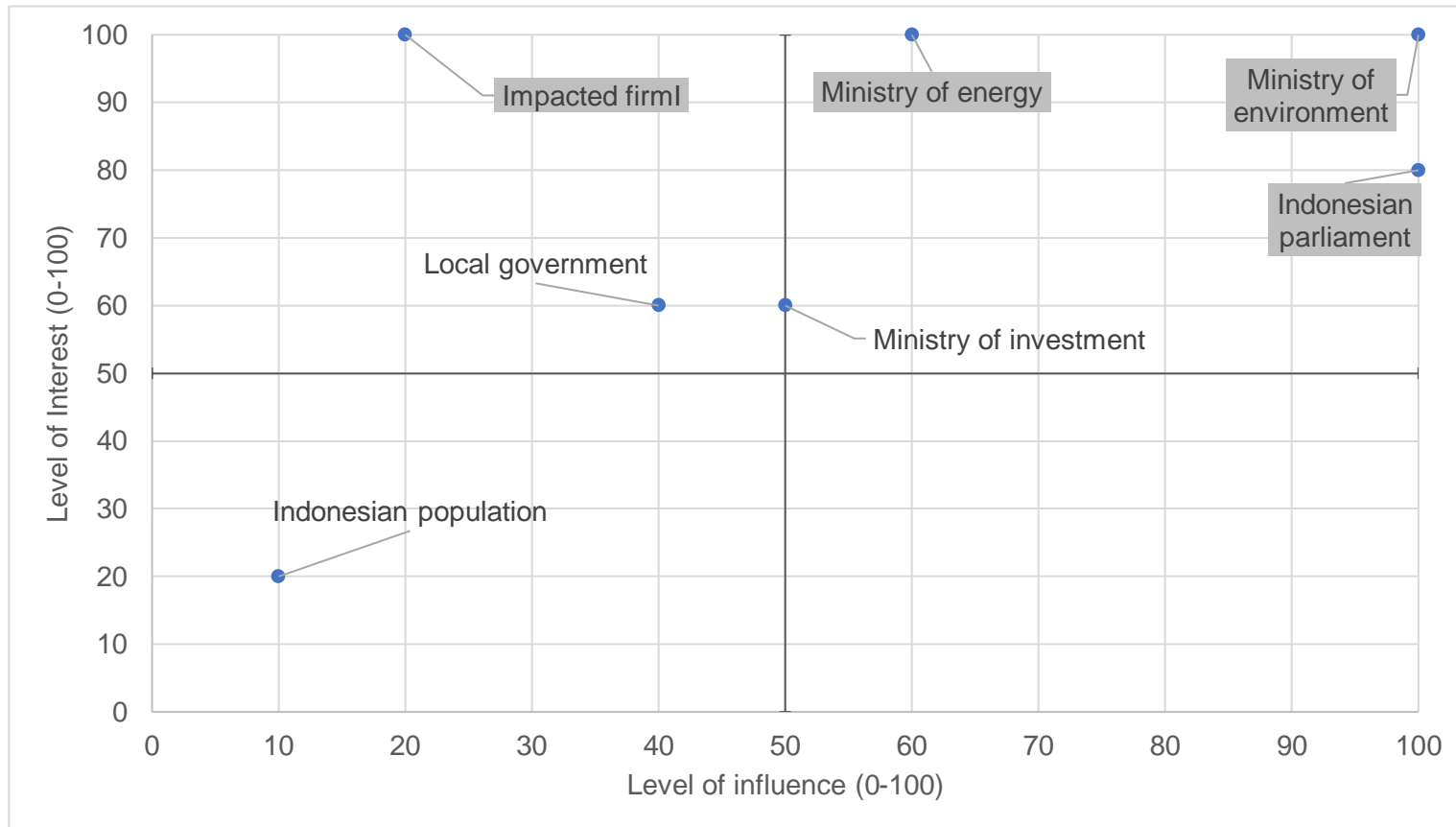**Therefore, the most suitable policy to implement is Policy Two – Carbon tax.**

Appendix B: Key Stakeholder Identification[6]

Stakeholder	Level of influence (0-100)	Level of interest (0-100)	Comments
Impacted firm	20	100	The firms are very interested in this policy since it will directly impact their business. Their main interest of course to ensure the tax amount is not too high which can disrupt their prices compared to overseas goods
Indonesian population	10	20	Majority of Indonesian population is not yet aware of this policy, since the tax will not directly impact them.
Indonesian Parliament	100	40	Indonesian parliament has stipulated a Law which will cover this policy in 2021. However, the Law has not covered the specific mechanism on how the tax will be implemented. The mechanism will be regulated by Ministerial Regulation.
Ministry of Energy and Mineral Resources (MoEMR)	50	60	Ministry of energy is waiting from the decision of Ministry of Finance, since the electricity market is the biggest sector which will be impacted by this. PLN (utility State Owned Enterprise), also reported to this ministry, and majority of PLN's power plant are coal power plant which will be impacted by the tax.

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[6] *Greyed Area:* These are the stakeholders which deemed to be the most important stakeholders of the Policy Two based on the highest result of multiplication between interest and influence, which can we interpreted as the combination between the interest level and the influence level.

Ministry of Environment (MoEnv)	80	100	Ministry of Environment is waiting from the decision of Ministry of Finance, since they are the one that set the emission abatement target. Carbon audit and accounting mechanism will also be regulated by Ministry of Environment in a Ministerial Regulation.
Ministry of Investment (MoInv)	50	80	Ministry of Investment, whose main target is to increase the amount of FDI, is waiting for MoF decision. The carbon tax will reduce investor interest in Indonesia, however, import oriented sector will be able to open EU market which potentially use carbon import tax to protect their own manufacturing.
Local Government	40	60	Local government should be benefitted from the revenue of the carbon tax. Even though the externalities of carbon emitting process is on the global scale, local impact should also be prioritized to be mitigated using this fund.

Appendix C: Stakeholder Influence vs. Interest Matrix[7]

Chart showing stakeholders plotted on a Level of Influence (0-100) vs. Level of Interest (0-100) matrix:

- Impacted firm: influence 20, interest 100
- Ministry of energy: influence 60, interest 100
- Ministry of environment: influence 100, interest 100
- Indonesian parliament: influence 100, interest 80
- Local government: influence 40, interest 60
- Ministry of investment: influence 50, interest 60
- Indonesian population: influence 10, interest 20

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[7]**_Greyed Area:_** These are the stakeholders which deemed to be the most important stakeholders of the Policy Two based on the highest result of multiplication between interest and influence, which can we interpreted as the combination between the interest level and the influence level.

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