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Political Economy of Subsidized Fuel Control: Assessing Indonesia's Technological Approach and Potential Savings

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Abstract

This study analyzes the potential of Indonesia's technological approach to control subsidized fuels. To achieve its objective, the study employs both quantitative and qualitative analyses. Quantitatively, the research seeks to estimate the potential value of inefficiently targeted fuel subsidies and assess the potential fiscal savings achievable through diverse fuel restriction measures. In this case, the study carried out four simulations to assess the impact of fuel consumption controls. Meanwhile, the qualitative analysis aims to delve into details of Indonesia's technological infrastructure used to control the consumption of subsidized fuels. Furthermore, the study investigates the key challenges and successes associated with Indonesia's technological approach to control subsidized fuels. This study contributes insights into achieving fairness in fuel regulatory policies while calculating fiscal savings and the potential of technology-driven solutions. While promising, ongoing challenges of MyPertamina necessitate further improvements for optimal functionality in assignment fuels (JBKP) distribution. This research informs discussions on equitable and technologically-driven energy policy solutions in the context of achieving global climate goals and local economic dynamics.

Keywords: fuel consumption control, political economy, technology-based control

Introduction

The world stands at a crossroad, particularly in the context of the low-carbon energy transition. A report published by the U.N. Intergovernmental Panel on Climate Change (IPCC) in March highlighted that the world is currently on a trajectory to exceed a 1.5°C temperature increase by the end of the 21st century. This amplifies the challenge of restricting the temperature rise to within 2°C (IPCC, 2023).

One effective measure to reverse this trend is the reduction of fossil fuel consumption, as fuel combustion activities constitute a major contributor to carbon emissions globally. In 2021, total carbon emissions from fuel combustion reached 33,572 million tonnes of CO2. Notably, the energy sector, manufacturing and transport sectors emerged as the three primary contributors, accounting for 44%, 19% and 23% of the total carbon emissions from fuel combustion, respectively (IEA, 2023).

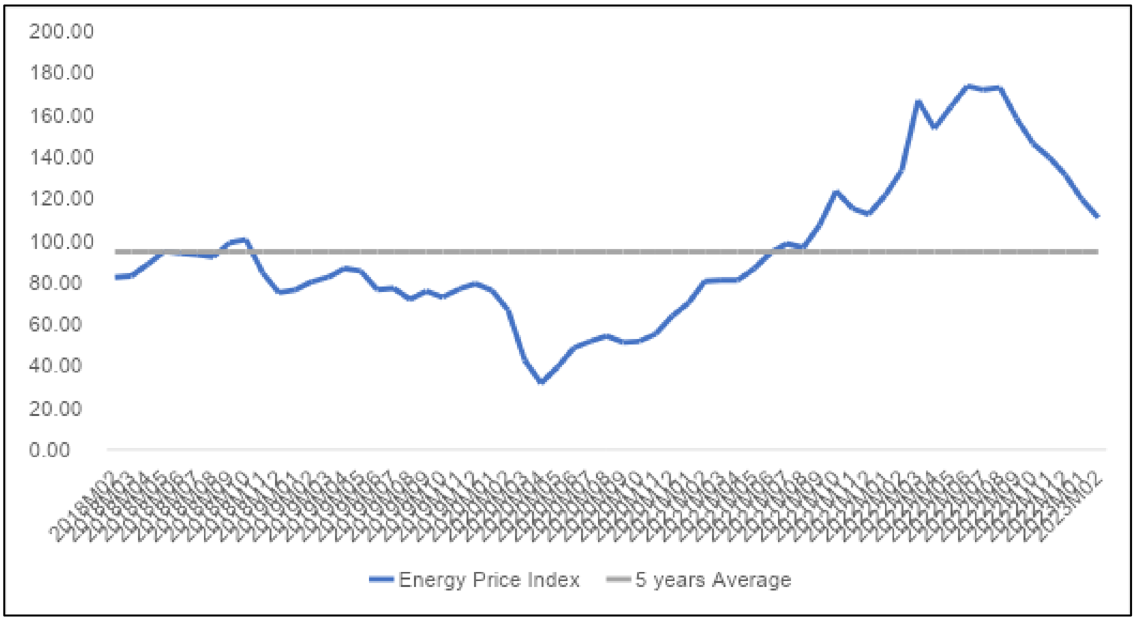
Failing to address fossil fuel combustion issue will undermine global progress in achieving multiple Sustainable Development Goals (SDGs), in particular air pollution (SDG 3), environmental degradation and climate change (SDG 13) and also can negatively impact the life below water and on land (SDGs 14 and 15). The insufficiency of controlled measures on fossil fuel consumption also compromises the responsible consumption and production as stated in SDG 12.

Fossil fuel combustion significantly contributes to carbon emissions in developing countries, particularly as they aspire to become industrialized economies and experience a rise in GDP per capita, leading to increased fossil fuel consumption. Indonesia, as one of the emerging economies, has witnessed a notable upward trend in carbon emissions. Reports indicate that between 2000 and 2020, Indonesia's per capita emissions increased by 73.6% for production-based emissions and 108.4% for consumption-based emissions (ACE, 2023).

This escalating trajectory of carbon emissions has raised concerns in Indonesia, prompting a re-evaluation of its commitment to decarbonization. In line with the updated Nationally Determined Contributions (NDC), the Indonesian government has pledged to reduce emissions by 29% (unconditional) up to 41% (conditional) against the 2030 businessas-usual scenario. However, achieving this goal will prove to be unattainable without substantial efforts to reduce emissions, especially given Indonesia's long dependence on fossil fuels.

The dependence on fossil fuels not only leads to environmental harms but also places oil-importing countries such as Indonesia in precarious positions, particularly in the face of geopolitical instability. The oil market has witnessed extreme volatility since the onset of the pandemic in 2020. In the initial phases of the pandemic, the sluggish global economy and the policies implemented by many countries had adverse effects on the global energy sector. Globally, energy consumption dwindled during this period, impacting almost all types of fuel, with petroleum experiencing a significant decline.

This decline in demand contributed to historically low oil prices, with April 2020 marking the first instance in history when US crude oil prices plummeted to negative figures. Oil price shocks, however, stem not only from demand-side issues, such as reduced transportation and an unprecedented global economic slowdown but are also influenced by supply-side factors such as disagreements among OPEC members regarding production targets (World Bank, 2020). However, fueled by economic recovery, the global energy commodity price index has continued to rise since April 2020, reaching its peak in November 2021 (see Figure 1). In the subsequent months, there was a decline in the energy commodity price index. However, Russia's invasion of Ukraine since February 24, 2022, significantly impacted the energy commodity price index, causing it to rise to 173.48 in June 2022. This marked the highest energy commodity index in the last 13 years. Although the energy commodity price index at the beginning of 2023 has decreased to 110.63, this value still exceeds the average of the last 13 years, which was at the level of 94.45 (World Bank, 2023).

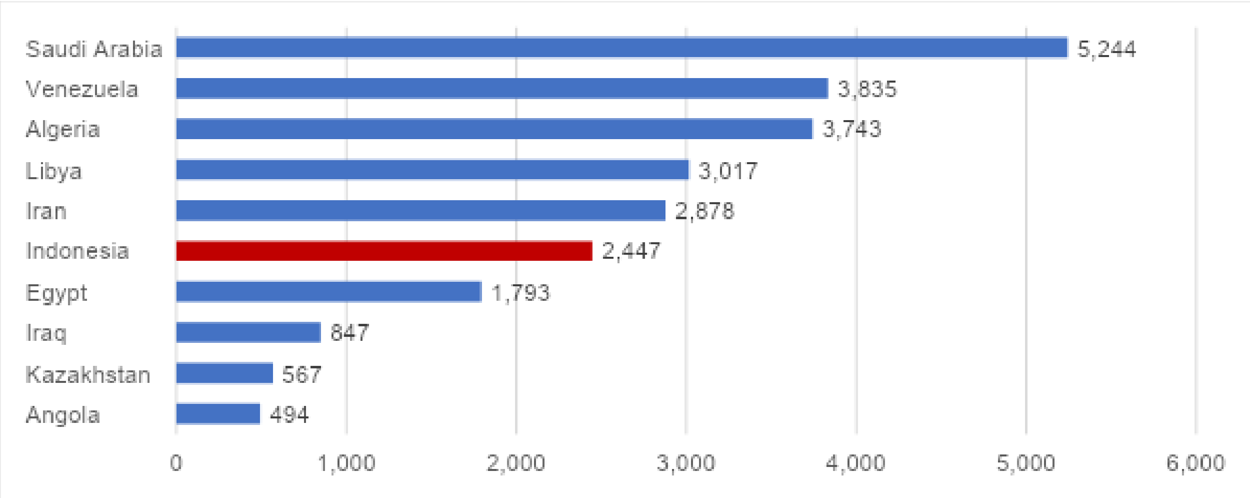


Source: World Bank (2023, authors' elaboration)

Figure 1. Global Energy Commodity Price Index (2010=100)

The surge in energy prices on the global commodity market has significantly affected the economies of countries worldwide, particularly those reliant on oil and energy imports, including Indonesia, which has held net-importing status since 2003. Globally, the increased energy prices are adding pressure to inflation levels that are already affecting numerous countries. The recent spike in energy prices has further contributed to the resurgence of stagflation—characterized by low economic growth and high inflation—an economic condition reminiscent of the 1970s (World Bank, 2022).

Geopolitical instability is compounding these challenges by driving up commodity prices, influencing inflation rates, and impacting the monetary policies of developed countries. This also diminishes the fiscal capacity of developing countries like Indonesia, which maintains energy subsidies. Presently, Indonesia stands as one of the world's biggest countries in terms of oil subsidies, as depicted in Figure 2. Notably, among the countries with the most substantial oil subsidies for transportation globally, the majority are net oil exporters. Indonesia and Egypt are exceptions, being net-importing countries. Given its net-importing status, Indonesia's heavy reliance on oil subsidies renders its fiscal condition highly susceptible to fluctuations in global oil prices. Additionally, the rise in energy prices has triggered inflation. In October 2022, for instance, the increase in fuel prices had a notable impact, contributing to a 5.7 percent rise in inflation (BPS, 2022).



Source: IEA (2022)

Figure 2. Oil Subsidies (for Transportation) by Country (USD Billion)

In the pursuit of achieving climate targets and reducing dependence on fossil fuels, many countries find themselves needing to control fuel consumption. However, for economies that have long provided fuel subsidies, reducing such fuel subsidies is far from a straightforward task. Indonesia is a case in point. Historically, Indonesia was an oil-exporting economy, allowing the government to maintain affordable fuel prices. Nevertheless, a combination of reduced oil production and increased energy demand led Indonesia to transition into an oil-importing economy in 2003. Faced with this situation, the government kept fuel prices low by offering substantial subsidies. Over the years, attempts have been made to cut oil subsidies. However, removing subsidies has proved to be challenging due to strong opposition from both legislative bodies and society at large. Against this backdrop, it is crucial to conduct an analysis of various options to control fossil fuel consumption, particularly the consumption of subsidized fuels.

Numerous ways can be explored to accomplish this goal. For instance, demand reduction through energy efficiency and individual behavioral shifts has been recognized by the International Energy Agency (IEA, 2022). Realizing the importance of energy efficiency, Indonesia has implemented several policies and made small progress in an attempt to reduce fossil fuel consumption. For example, since early 2016, Indonesia has enforced a mandatory 20% blending of biodiesel (B-20) to encourage greater consumption of renewable energy. Furthermore, through the enactment of Presidential Regulation No. 191/2014, the Indonesian government completely removed the subsidy for gasoline (RON88) and also established a fixed and targeted subsidy for diesel in 2015.

More recently, Indonesia has implemented the use of technology to control the distribution and consumption of subsidized fuels. The adoption of more effective technology has proven to accomplish the goal of energy efficiency (Mushafiq et al., 2023). For instance, in India, the successful LPG reform utilized digital technology through the use of the biometric identification program Aadhaar, enabling the Indian government to register 1.2 billion individuals on its biometric database, achieving almost universal coverage in just over five years (Gelb and Mukherjee, 2019). This database, in turn, allowed India to better target beneficiaries, improving both equity and efficiency in public subsidies.

As for Indonesia, the innovative attempt to control subsidized fossil fuels via technology is through an app named MyPertamina. Developed by its state-owned energy company, Pertamina, this innovation aims to improve the supervision of subsidies so that energy subsidies received by the public are well-targeted, thus eradicating the long-standing issue of Indonesia's poorly targeted fossil fuel subsidy. However, the measurement of how much the innovation is able to achieve in terms of energy efficiency is still unclear. Therefore, this paper aims to analyze the potential of Indonesia's technological approach in controlling subsidized fossil fuels. The analysis should include the calculation of potential savings from such a policy.

In order to achieve the aforementioned objective, this paper formulates the following research questions:

1. To what extent has Indonesia's technological infrastructure been employed in the control of subsidized fuels, and what specific technologies have been utilized for this purpose?
2. What are the key challenges and successes associated with Indonesia's technological approach to control subsidized fuels, and how do these factors contribute to the overall effectiveness of the strategy?
3. What are the projected short-term savings associated with the implementation of technological solutions in the control of subsidized fuels in Indonesia, and how is the policy feasibility of implementing this policy?

Methods

This study employs mixed methods to address all research questions, a choice deemed desirable given the nature and framework of the research. Using mixed methods gained interest among scholars in social sciences and public policy given its ability to combine the best of both worlds (Mayoux, 2006). Specifically, qualitative approaches are used to answer research questions 1 and 2, while a quantitative approach is applied to address research question 3. The following section will delve into each approach in more detail.

Qualitative approach

Data for the qualitative part is drawn from three main sources. The first source is literature and documents, encompassing government reports, journals and relevant international institutions related to energy data. Statistical data, both economic and energy-related, are used to complement information gathered from literature studies. This statistical data is sourced from entities such as British Petroleum (BP), Oil and Natural Gas Downstream

Regulatory Agency (BPH Migas), the Central Bureau of Statistics (BPS), and the Finance Ministry of Indonesia.

The second data collection method involves semi-structured interviews. In addition to secondary data from literature and statistical studies, interviews are conducted to delve deeper into the technological potential, relying on critical questions to stimulate open discussions on topics like the potential of technology in achieving energy efficiency. Semi-structured interview method is deemed to be an appropriate technique as it enables exchange of information between the researcher and participants (Galleta, 2013). This method also proved to be both versatile and flexible for data collection as it allows researcher to gain information from two levels of questions: main themes and follow-up questions (Kallio et al., 2016). Interviews are carried out with relevant sources in the energy field, including government bodies such as the Ministry of Energy and Mineral Resources (ESDM), Oil and Natural Gas Downstream Regulatory Agency (BPH Migas), experts on energy policies and related companies, particularly Pertamina.

Lastly, online focus group discussions (FGD) are conducted to gather qualitative data. This method is chosen as FGD facilitates negotiation and evaluation of research problems and findings between different stakeholders, thereby giving rise to new perspectives (Nyumba et al., 2018). This method also allows researchers to identify a range of perspectives on the research topic, and gain profound understanding of the issues from the perspective of the participants themselves (Hennink M., 2013). In this method, participants are preselected and have similar backgrounds associated with the energy field, with the aim to uncover an array of perspectives and experiences.

Quantitative approach

The quantitative approach is utilized to project short-term savings associated with implementing technological solutions for controlling subsidized fuels in Indonesia. The results will be compared to the costs of implementing and maintaining the technology. To calculate the projected short-term financial savings, this study will collect several statistical data, including Indonesia's recent fiscal budget published by the Ministry of Finance, fuel consumption data from BPH Migas, and cars' population data from the Indonesian National Police (Polri).

Results And Discussion

MyPertamina as a technology-based solution for fossil fuel subsidy distribution

MyPertamina is an application developed by Pertamina to ensure the proper distribution of subsidies. Initially designed as a service platform to appreciate loyal customers, especially Pertamina JBU (General Fuel Type) consumers, the application's capacity has evolved into an effective subsidy tool amid global oil price fluctuations. Available on Android and Apple OS, MyPertamina application has garnered over 12 million quality users. Currently, 85% of the total 5,518 gas station outlets are ready for digitalization, with plans to add 1,500 to 2,000 more outlets to maximize subsidized fuel distribution services and ensure proper subsidy volume control. The technology-based subsidy distribution control feature in MyPertamina application utilizes QR codes. The system generates a unique QR code for each user, serving to differentiate those entitled to subsidized fuel and limit the daily volume of subsidized fuel consumption.

Since December 1st, 2022, the trial phase for MyPertamina application has been launched in 11 cities/districts in Indonesia, focusing on diesel subsidy control. The trial areas for diesel purchases include Pandeglang Regency, Ciamis Regency, Kuningan Regency, Jepara Regency, Cilacap Regency, Wonogiri Regency, Mojokerto City, Kediri City, Lumajang Regency, Banjarmasin City and Payakumbuh City.

Based on the focus group discussions with Pertamina, Pertamina stated that the progress of the trial has shown positive results. Since implementation, residents enrolled in MyPertamina program have increased by 68%, with 62% actively making transactions at gas stations. Additionally, 26% of consumers have utilized QR codes for transactions. Although it's early in the interim results, consumer identification and monitoring have commenced, aiming to prevent individuals from making repeat purchases in volumes that do not comply with regulations, including those attempting to do so at different gas stations.

While the results of the trial phase show many positive things, many improvements and evaluations are needed by MyPertamina so that the appropriate subsidy program can run smoothly. Firstly, there needs to be proper internet network improvements to ensure that gas station systems and services can run well. Even though the number of smartphone users in Indonesia has reached 192 million (Statista, 2023), a smooth internet network is the key to the success of digital technology, this is also the case with MyPertamina application. Network quality, especially for remote areas, needs to be ensured that it is truly available and functioning well. This also applies to areas that are densely populated and busy with traffic, such as the capital city of Jakarta. Snaking queues at gas stations due to network damage or slow networks that disrupt daily activities must be prevented. Therefore, cooperation with network service providers in this case needs to be carried out. Second, in terms of security and protection of personal data, it is absolutely necessary to ensure that MyPertamina system can properly safeguard this data. And finally, from the user or community side, intensive outreach and communication is needed to educate the public. Moreover, with the introduction of MyPertamina, there is an additional process during subsidized fuel transactions at gas stations, which requires an adaptation process from the community. Therefore, continuous communication and outreach efforts by utilizing all media platforms, both print media and social media, must continue to be carried out so that the desired understanding is achieved.

Understanding the user or community side can be better defined by referring to research conducted by Softina R., Amin F., Wahyudi N. (2022), who conducted a study on factors that influence user resistance to MyPertamina innovation. The results of this study show that psychological factors such as tradition barriers and image barriers have a significant effect on MyPertamina's innovation resistance compared to functional factors. The traditional barrier can be explained by the level of people's habits that are used to and comfortable with existing fuel payment methods, so that the introduction of a new method from MyPertamina causes resistance in adopting this innovation. Meanwhile, the image barrier is the user's perception of the level of complexity of using new technology. At the introduction of MyPertamina, users saw the MyPertamina application as a tool that added complexity, and this became an important factor in resistance behavior.

To answer resistance from users or society, lessons from several other cases in introducing technology-based innovation can be used as good examples. The first case study is from India, which is reforming LPG gas subsidies by utilizing digital technology with the use of the Aadhaar program (India's biometric identification system). One of the toughest challenges facing the Indian government at that time was how to convince all stakeholders, this meant providing the right incentives, strict design and monitoring, and preparing a compatible IT system. In the context of users or society, the Indian government provides incentives by making the registration process on the Aadhaar database more flexible by providing several options for registration and verification of personal identity. However, as the adoption of Aadhaar increases, the entire community is encouraged to link their identity with Aadhaar. This makes database collection more inclusive, especially for areas with a severe lack of digital literacy.

Impact of technology-based innovation on controlling fuel subsidy

In this section, we conducted an analysis of the potential savings and benefits associated with controlling fuel subsidies, with a focus on Gasoline (RON90), commonly known as Special Assignment Types of Fuel (JBKP). The existing regulations lack specific details regarding the target beneficiaries of this subsidy, unlike Presidential Decree No. 191 of 2014, which explicitly outlines the target consumers for Diesel/Certain Types of Fuel (JBT). This discrepancy has resulted in the distribution and disbursement of fuel subsidies and compensation, particularly JBKP, not being on target and widely enjoyed by the middle-upper class of society.

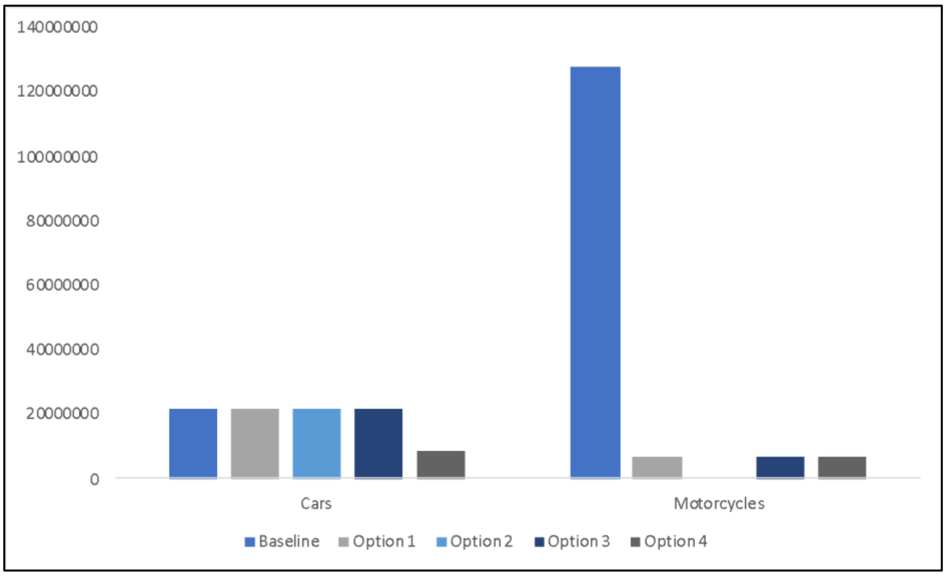
To address the control of fuel subsidies for Gasoline JBKP, the authors identify several options with the following scenarios: Option 1 - All general cars/black plate cars, official cars, and motorbikes over 150cc are on the negative list; Option 2 - All black plate cars and official cars are on the negative list; Option 3 - All black plate cars, official cars, and motorbikes over 150cc can access JBKP but with a quota; Option 4 - Black plate cars above 1400cc, official cars, and motorbikes above 150cc are on the negative list.

Tabel 1. Options for Restricting Subsidized Fuel Consumption and Compensation

Vehicle Type	Negative List			
	Option 1	Option 2	Option 3	Option 4
Black Plate Cars	All black plates	All black plates	All black plates with quota	Cars > 1.400 cc
Official car	All Official car	All Official car	All Official car with quota	All Official car
Motorcycle	Motorcycle > 150 cc	-	Motorcycle > 150 cc	Motorcyle > 150 cc

Source: Authors' elaboration (2023)

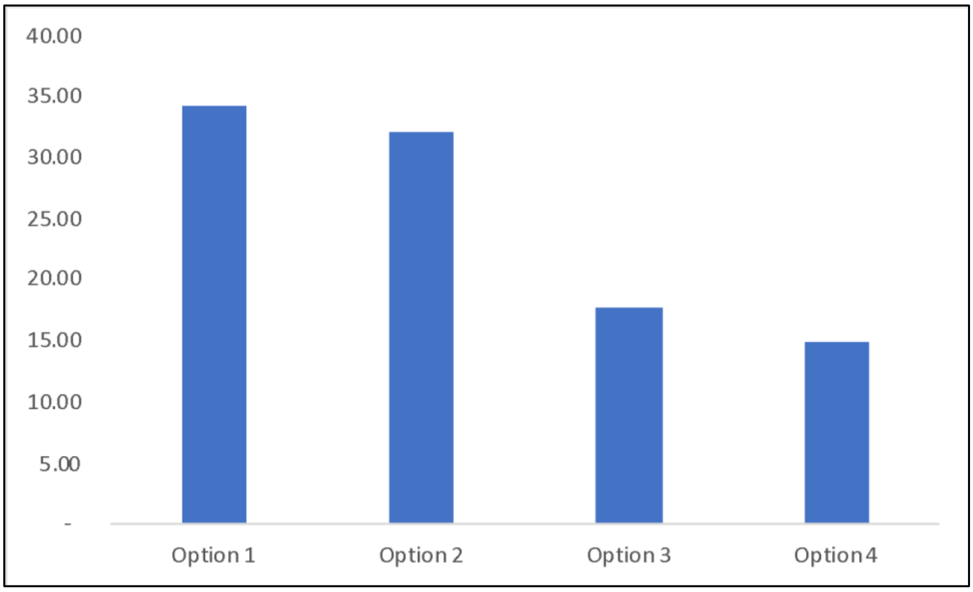
In each of the options for limiting subsidized fuel consumption and compensation above, based on data from Korlantas Polri and BPH Migas, there are 21.7 million units of black plate cars and 0.3 million units of official cars, while the total number of motorized vehicles is as many as 128.1 million units. The number of cars with specifications above 1400 cc is 8.4 million units, and motorbikes with specifications above 150 cc are 6.7 million units. Therefore, the total number of vehicles on the negative list in option 1 is 22 million cars and 6.7 million motorbikes. In option 2, there are 22 million cars and no motorbikes are on the list. For option 3, all 22 million car units and 6.7 million motorbike units are subject to a quota, and in the last option, there are 8.7 million car units and 6.7 million motorbike units.



Source: Authors' elaboration using data from Korlantas Polri

Figure 3. Total vehicles on the Negative List

Using the vehicle population data along with the fuel consumption for each vehicle and the economic price of gasoline, the potential fiscal savings for each implemented option can be calculated. In this calculation, several assumptions are made as follows: Firstly, the total consumption for cars is assumed to be 1,400 liters per year, and for motorbikes, it is 300 liters per year. Additionally, the ICP value follows the assumptions outlined in the 2023 APBN, with a barrel priced at 90 USD and an exchange rate of IDR 14,800.00.



Souce: Authors' own calculation

Figure 4. Potential Fiscal Savings (In Trillions of Rupiah)

As the figure shows, Option 1 yields the highest fiscal savings (IDR 34.24 trillion), while Option 2 results in savings of IDR 32.14 trillion. Despite the smaller amount in Option 2, it eliminates monitoring costs due to its uniform policy for all car and motorbike types. Option 3, although effective in curbing excessive consumption, is susceptible to misuse. On the other hand, Option 4 emphasizes fairness by restricting only cars with large cc, but it entails smaller potential savings and potential high monitoring costs.

From a fiscal savings perspective, Option 1 offers significant savings by excluding all black plate cars, official cars, and motorbikes over 150cc from accessing Special Assignment Type of Fuel. However, the complexity of its implementation is high, involving the registration and regulation of over 120 million motorbikes with specifications under 150cc.

Option 2, while providing comparable fiscal savings, is easier to implement, requiring no registration and regulation of the 120 million motorbikes with specifications below 150cc. Nevertheless, its fairness is somewhat compromised, as motorbike owners over 150cc, often considered affluent, retain access to subsidized fuel and compensation.

Option 3 introduces fuel filling quotas for all black plate cars, official cars, and motorbikes over 150cc. Although offering moderate fiscal savings, its implementation is more feasible, targeting approximately 6.7 million units.

Finally, Option 4, with lower fiscal savings, proved to be challenging to implement due to the need for a comprehensive database of both motorbikes with specifications below 150cc and car vehicles below 1400cc. Despite its difficulty, it stands out as the fairest policy, allowing car owners with specifications below 1400cc, considered vulnerable to poverty, continued access to subsidized fuel and compensation.

Table 2. Policy Aspects of Options for Restricting Subsidized Fuel Consumption and Compensation

Policy Aspect	Option 1	Option 2	Option 3	Option 4
Fiscal Aspect	High	High	Low	Low
Implementation	Medium	Low	Medium	High
Fairness	Medium	Low	Medium	High

Source: Authors' elaboration (2023)

Conclusions

The global community faces a critical juncture in the low-carbon energy transition, evident in the U.N. Intergovernmental Panel on Climate Change's report projecting a trajectory exceeding a 1.5°C temperature increase by the century's end. Effective measures to counter this trend include reducing fossil fuel consumption, a major contributor to global carbon emissions. The escalating carbon emissions trajectory in developing countries like Indonesia, coupled with geopolitical instability impacting energy prices, poses challenges in meeting climate targets.

The recent surge in global energy prices further compounds economic difficulties, contributing to stagflation and placing fiscal stress on net-importing countries like Indonesia. As Indonesia grapples with the complex task of controlling fossil fuel consumption and reducing dependence on subsidies, a comprehensive analysis of viable options becomes imperative.

Despite various efforts, such as Indonesia's policy shifts and technological innovations like MyPertamina app, it is crucial to analyze the potential success of these approaches in achieving energy efficiency. In this context, regulating JBKP consumption for the four-wheeled vehicle group is essential. The study has explored and calculated several options to limit JBKP fuel consumption with the following scenarios: Option 1. All black plate cars, official cars and motorbikes over 150cc are on the negative list; Option 2. All black plate cars and official cars are on the negative list; Option 3. All black plate cars and official cars and motorbikes over 150cc can access JBKP but with a quota; Option 4. Black plate cars above 1400cc are official cars and motorbikes above 150cc are on the negative list.

Each of the options above has fiscal implications, ease of implementation, and fairness. Option 1 produces the largest fiscal savings (IDR 34.24 trillion). Meanwhile, for Option 2, the savings value is only IDR 32.14 trillion. Even though it is not as substantial as Option 1, there are no monitoring costs that must be incurred because the policy is uniform for all types of cars and motorbikes. In Option 3, this choice can prevent excessive consumption but is very prone to misuse. Meanwhile, Option 4 has a high level of fairness because only cars with large cc are on the negative list. However, the potential savings are smaller and monitoring costs are potentially high.

Simultaneously, the use of technology such as MyPertamina can be an instrument to combine aspects of fiscal savings and also aspects of justice. For example, implementing Option 4 requires the use of technology such as MyPertamina to control that only cars with small cc can access JBKP. Even though MyPertamina has been implemented, several improvements are needed so that MyPertamina can function better in the context of monitoring JBKP fuel distribution.

In the long term, considering that lower levels of society are very vulnerable to changes in fuel prices, the government needs to provide direct subsidies to poor households. In this case, it is necessary to change the pattern of fuel subsidies from goods subsidies to personal subsidies. The personal subsidy model is expected to make subsidies more targeted (well-targeted). This policy can be implemented by shifting the fuel subsidy and compensation budget to direct assistance to the poor, with a budget shift value of IDR 97 trillion (if the recipient group is the bottom 40%).

One of the primary challenges in implementing the JBKP fuel regulatory policy is ensuring high levels of fairness, in addition to achieving fiscal savings. Technology solutions, such as MyPertamina, can address fairness concerns within JBKP fuel regulatory policies. Despite encountering various technical problems that hinder its optimal functionality, using MyPertamina for monitoring technology-based fuel subsidies could initiate the development of a closed subsidy model for JBKP fuel.

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