Centre for Strategic and International Studies

RESEARCH REPORT

ENERGY SUBSIDY REFORM REPORT

CSIS Indonesia

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Research Report by CSIS Indonesia

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Executive Summary

Energy subsidies in Indonesia are not a new phenomenon. These subsidies, particularly for Pertalite fuel, diesel fuel, and 3-kg LPG cylinders, were initially intended to maintain stable and affordable energy prices, especially for the underprivileged. However, the structure and magnitude of these subsidies have presented various challenges. First, the large allocation of energy subsidies threatens fiscal stability and long-term economic growth prospects. Second, substantial energy subsidies disrupt economic efficiency and environmental sustainability. Third, energy subsidies are often deemed ineffective in achieving social equity and instead exacerbate social inequalities. These challenges further underline the need for a critical evaluation of the scale and management of energy subsidies.

Currently, Indonesia is a net oil importer, requiring imports of 1.6 million barrels per day in 2023, a stark contrast to its status in 2000 as a net exporter with a surplus of 344 thousand barrels per day. Other than high domestic consumption, external factors, such as global oil price fluctuations and the rupiah's exchange rate against the U.S. dollar, significantly impact Indonesia's energy subsidies. A weaker rupiah and higher oil prices increase the subsidies that the government must allocate. In response, during the administration of Susilo Bambang Yudhoyono (SBY) and Jusuf Kalla (JK), retail fuel prices were adjusted by 30%. However, the subsequent administration (SBY-Boediono) was less willing to make similar adjustments due to political and security concerns. Later, the Joko Widodo (Jokowi)-JK administration undertook subsidy reforms early in its tenure, and price adjustments continued under the Jokowi-Ma'ruf Amin administration.

In addition to subsidies, compensation payments have also risen. Both of these increases, further inflates fiscal burdens, straining the state's financial health, and fostering inequity. The implication of the increase in fiscal burden is increased budget deficits which leads to additional debt, while equity issues arise from misdirected subsidies, particularly inclusion errors benefiting higher consumption classes for LPG, diesel fuel, and Pertalite, which exacerbate inequality.

This study aims to address several questions. First, what are the estimated levels of energy consumption (Pertalite, diesel fuel, and 3-kg LPG) and its subsidies if the current subsidy scheme remains unchanged, and what are the impacts on the State Budget (APBN), as well as the social, economic, and environmental conditions of the community? Second, under various subsidy reduction scenarios, what are the effects of reduced energy subsidies on inflation, economic growth, and employment? Third, what are the alternative strategies for energy subsidy reform to balance fiscal sustainability and social stability? Lastly, how can the reallocated funds from reduced energy subsidies be effectively utilized?

To estimate the fiscal, environmental, and socio-economic impacts of energy subsidy reform scenarios, this study employs a mixed-methods approach (quantitative and qualitative). The quantitative methods include Least Absolute Shrinkage and Selection Operator (LASSO), input-output (I-O) analysis, and Commitment to Equity (CEQ) analysis. Additionally, focus group discussions were conducted to align assumptions and gather expert insights. The reform scenarios considered in this study include: 1) *business-as-usual*, 2) *dynamic pricing*, 3) *increasing administered price*, 4) Quota restrictions based on vehicle engine capacity (CC), and 5) Quota restrictions based on vehicle engine capacity and the removal of Pertalite subsidies for cars.

Fiscal and Environmental Impacts

The dynamic pricing scenario offers the largest fiscal savings, amounting to IDR 463.8 trillion, and the highest environmental improvement valuation at IDR 289.7 trillion by 2029. However, this scenario carries the highest inflation risk. Meanwhile, the increasing administered price scenario exhibits the most consistent growth in both fiscal savings and environmental improvement valuation. In contrast, the quota restriction scenario based on vehicle engine capacity (CC) results in lower average fiscal savings and environmental improvement valuations, regardless of whether Pertalite subsidies for cars are removed.

Socioeconomic Impacts by Commodity

- **Pertalite**:
  In the dynamic pricing scenario, Year-over-Year (YoY) inflation increases by 1.94 percentage points initially but gradually declines to 0.15–0.16 percentage points in subsequent years. In comparison, the increasing administered price scenario causes a YoY inflation increase of 0.58 percentage points from 2025 to 2029. Both scenarios show trends of rising poverty rates and a decline in middle-class households, with dynamic pricing posing higher risks due to greater price changes from existing levels.

- **Diesel Fuel**:
  The dynamic pricing scenario results in a significant YoY inflation increase of 5.44 percentage points in 2025, higher than the increasing administered price scenario. However, the increase in the inflation rate decreases in subsequent years under dynamic pricing. This is due to the widespread use of diesel fuel in productive sectors such as transportation and logistics. Diesel fuel subsidies are estimated to push over 90 million people, especially those in the aspiring middle class (AMC) and middle class, into lower socioeconomic classes under dynamic pricing—this impact is far greater compared to the increasing administered price scenario.

- **3-kg LPG**:
  The dynamic pricing scenario leads to a YoY inflation increase of 4.02 percentage points in 2025, which then approaches zero in subsequent years. In contrast, the increasing administered price scenario causes a constant inflation increase of 0.233 percentage points. The socioeconomic impact of the increasing administered price scenario is less severe compared to dynamic pricing.

However, social assistance such as cash transfers of IDR 250,000 per household can effectively mitigate these socioeconomic impacts under both the Dynamic Pricing and Increasing Administered Price scenarios.

To ensure the success of energy subsidy reforms, the government must consider social protections, develop communication strategy, and consider the appropriate time to enact the reforms. Strengthening social safety is imperative to address the potential increase in poverty and extreme poverty. Additionally, the increase in prices due to the subsidy adjustment may also push the middle class into a lower socio-economic class, thus, it is also crucial to implement "shock absorbers" in that class. And lastly, choosing the right moment for implementation is important, taking into account socio-political and economic dynamics, particularly the risks to the middle class, which could face further strain amidst other pressing challenges

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Background

Energy subsidies have been a key policy in Indonesia's economy for many years. Initially, these subsidies were aimed to maintain stable and affordable energy prices for businesses and consumers, particularly for low-income groups. Energy subsidies cover various energy sources, primarily fuel (BBM) and Liquefied Petroleum Gas (LPG). Despite their well-intended purpose, the effectiveness and sustainability of energy subsidies have been questioned over time. Their structure and scale have created numerous problems and challenges, including fiscal pressure on the state budget (APBN), market distortions, environmental degradation, and social inequality.

Energy subsidies have significantly influenced Indonesia's APBN and fiscal health, taking up a large portion of government spending. After declining from IDR 341.8 trillion in 2014 to IDR 119.1 trillion in 2015 due to energy subsidy reforms early in the Jokowi-Jusuf Kalla administration, the scale of energy subsidies and compensation steadily increased, peaking at IDR 551.2 trillion in 2022 before decreasing to IDR 339.6 trillion in the 2023 APBN. In the 2024 APBN, the allocations for energy subsidies and compensations are IDR 329.9 trillion, approximately 10% of the government's total expenditure of IDR 3,325.1 trillion.

This large allocation of subsidized energy poses challenges to fiscal stability and long-term economic growth prospects. Energy subsidies represent a significant opportunity cost, as these funds could be invested in more productive and impactful sectors such as healthcare, education, and infrastructure (Mahanani & Fitrady, 2018). The high subsidy costs often lead to budget deficits and force the government to increase debt. Additionally, rising global oil prices exacerbate fiscal deficits and budget planning challenges. The persistent budget deficit has driven Indonesia's debt from IDR 3,113.64 trillion at the end of 2015 to IDR 8,191.2 trillion by the end of 2023, further increasing future fiscal burdens.

Beyond fiscal stability, the current scale of energy subsidies also significantly affects economic efficiency and environmental sustainability. Low fuel prices due to subsidies have distorted markets, incentivizing commodities that are not in line with environmental improvement agendas. This has hindered investments in energy-efficient and environmentally friendly technologies while increasing reliance on non-renewable fossil fuels. Such distortions have driven excessive fossil fuel consumption (Perdana, 2022), resulting in increased greenhouse gas emissions and environmental degradation. This contradicts Indonesia's targets for net-zero emissions (NZE) by 2060 and its commitment to enhancing its nationally determined contribution (NDC) target from a 29% to a 31.89% reduction in emissions (independently) by 2030.

Additionally, large energy subsidies are considered ineffective in achieving their primary goal of social equity. Although designed to assist low-income groups, most subsidy benefits are enjoyed by middle- and upper-income households, which generally consume more energy. For diesel fuel, 89% is consumed by businesses, with only 11% benefiting households. Of this, 95% is used by affluent households, leaving only 5% for low-income households, such as farmers and fishermen. For Pertalite, 14% is consumed by businesses, and 86% is used by households. However, 80% of this household share benefits wealthier households, while only 20% benefits the poor (Susenas, 2023). This misallocation exacerbates social inequality, with wealthier individuals receiving larger benefits, contrary to the subsidy’s intent as social assistance for the underprivileged.

These issues highlight the urgent need for a critical re-evaluation of energy subsidy sizes and management. A comprehensive review is necessary to address economic inefficiencies, environmental damage, and social equity challenges (Pusat Kajian Anggaran DPR RI, 2021). This study aims to analyze the role of subsidies in the APBN, their economic, social, and environmental impacts, and explore reform strategies. It will also assess challenges posed by subsidy reforms, including their effects on inflation, economic growth, and employment, and propose strategies that balance fiscal sustainability with social stability.

Based on these facts, this study seeks to reassess the role and impact of energy subsidies in Indonesia's APBN, evaluate their economic, social, and environmental consequences if current schemes persist, and explore potential reform strategies.

Specifically, it aims to address the following questions:

What is the estimated consumption of subsidized energy—specifically Pertalite, diesel fuel, and 3-kg LPG—and associated subsidy costs if the current subsidy scheme remains unchanged? What are the impacts on the APBN, and what are the social, economic, and environmental consequences?

Under various subsidy reduction scenarios, what are the impacts of decreasing energy subsidies on inflation, economic growth, and employment?

What alternative strategies can be implemented to reform energy subsidies, balancing the need for fiscal sustainability with social stability?

Overview of Energy Subsidy Policy in Indonesia

In Indonesia, energy subsidies are part of the Public Service Obligation (PSO) carried out by state-owned enterprises such as PT Pertamina and PT Perusahaan Listrik Negara (PLN), which provide fuel (BBM), electricity, and LPG at non-commercial prices. By setting affordable energy prices, this policy enables the general public to benefit from the country's local energy production. Energy subsidies aim to support low-income households and drive economic development. For decades, fuel and electricity prices in Indonesia have been tightly regulated. The government sets the retail prices for subsidized fuel, with adjustments made on an ad hoc basis, and the subsidy amounts are approved by the House of Representatives (DPR).

Energy subsidy policies have been in place since the era of President Soekarno to this day. Initially, these policies were manageable because Indonesia was an oil-producing and exporting country. However, as oil production declined and domestic energy demand grew, Indonesia became a net oil importer, and the subsidy burden increased, straining the government budget. The subsidy amounts spiked dramatically during periods of rising global oil prices and a weakening rupiah, such as during the 1997–98 Asian financial crisis. Consequently, energy subsidies have exerted significant fiscal pressure, necessitating periodic policy adjustments or reforms. Figure 1 illustrates the historical trajectory of energy subsidy reforms across different administrations in Indonesia.

Energy subsidy policies in Indonesia are governed by various laws and regulations, including Law No. 30/2007 on Energy, Law No. 22/2001 on Oil and Gas, Law No. 30/2009 on Electricity, Government Regulation No. 117/2021 (the third revision of Government Regulation No. 191/2014 on the Provision, Distribution, and Retail Prices of Subsidized Fuel). According to Government Regulation No. 191/2014, there are three types of fuel products; Certain Types of Fuel (JBT) which includes diesel fuel and kerosene, where retail prices are set by the government and explicitly subsidized; Specially Assigned Fuel Types (JBKP), which includes Premium (RON 88), which is directly subsidized with an additional 2% cost and distributed in Java, Madura, and Bali; General Fuel Types (JBU) which excludes diesel, kerosene, and Premium, and is not directly subsidized. Examples include Pertalite (RON 90) and Pertamax (RON 92 or higher).

Figure 1: Energy Subsidy Reforms in Indonesia, 1998–2022

Sumber: Adopted from Jazuli et al. (2021) with author's modification

According to those regulations, the government compensates PLN and Pertamina for the difference between the economic price (supply cost) and the regulated price for energy products (retail price). The economic price of fuel, LPG, and electricity is determined using a government-regulated formula that considers several factors, including global oil prices, exchange rates, import shipping and distribution costs, and profit margins. Meanwhile, the regulated retail price, typically set below the cost of provision and distribution, accounts for the government's budget availability, economic conditions, and the public's purchasing power. Currently, subsidized energy products include electricity, various fuels such as Pertalite, diesel fuel, and 3-kg LPG, each subsidized differently according to formulas established in government regulations and their derivatives.

In general, energy subsidies can be categorized into explicit subsidies and implicit subsidies. In the existing APBN, explicit subsidies are expenditures allocated for fuel (BBM), LPG, and electricity subsidies that comply with the criteria and provisions established in budget legislation. Explicit subsidies are recorded as separate items or expenditure lines in the APBN (state budget). Criteria may include the type of fuel, volume, subsidy mechanism (e.g., fixed per liter), or electricity connection category. Whereas implicit subsidies are discretionary expenditures for energy-related subsidies arising from deviations in assumptions or policies set forth in the state budget law, such as macroeconomic assumptions and subsidized fuel volumes. Implicit subsidy costs occur due to the absence of adjustments to retail fuel prices when global oil prices or the exchange rate change. These discretionary expenditures may take various forms, such as compensation (for current-year spending) or arrears payments to state-owned energy enterprises like Pertamina or PLN.

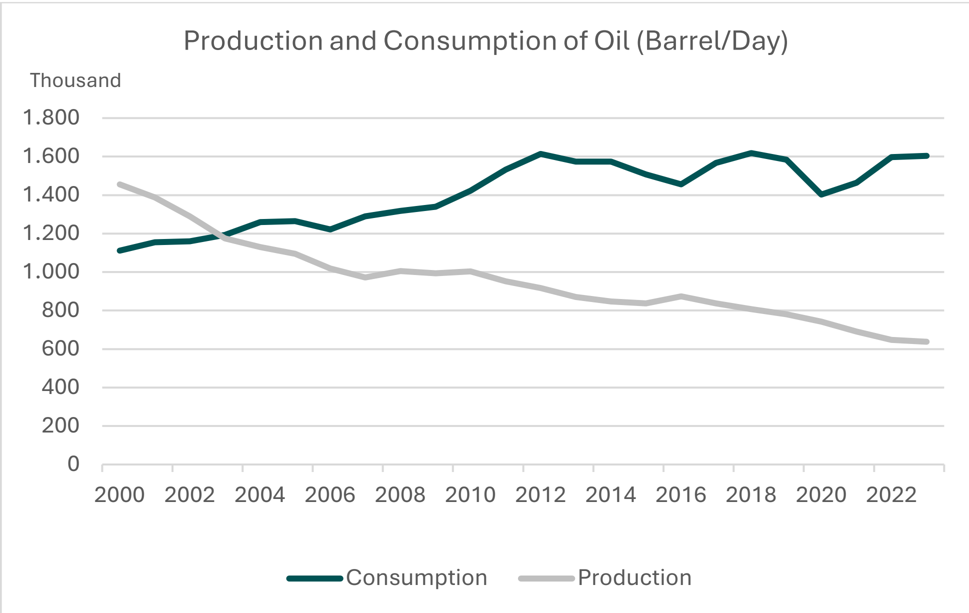
Explicit and implicit subsidies apply, for instance, to subsidized fuels such as Pertalite and diesel fuel. Subsidy reforms in 2015 removed Premium (RON 88) from the category of subsidized fuels, gradually replacing it with Pertalite, which was not originally subsidized. However, in practice, the retail price of Pertalite is set below its economic price, causing losses for PT Pertamina which were not reported as explicit subsidies in the APBN. Since April 2022, the government has compensated these losses through transfers recorded under "compensation" expenditures, effectively constituting an implicit subsidy borne by the government.

A similar implicit subsidy mechanism applies to diesel fuel. Due to the gap between the government-determined retail price and the cost of provision, even after accounting for the explicit subsidy per liter set in the APBN, the government compensates PT Pertamina for these losses. Therefore, even though the government sets an explicit subsidy of IDR 1,000 per liter for diesel fuel and Pertalite, the difference between the subsidized price and the economic price can reach IDR 3,000 (Pertalite) to IDR 6,000 (Solar) per liter. This gap constitutes an implicit subsidy.

Development and Challenges in Energy Consumption and Subsidies in Indonesia

As economic activity grows, energy consumption has also increased, leading to a corresponding rise in the energy subsidies the government must bear. Over the past two decades, for example, Indonesia's oil production has declined significantly, from 1.46 million barrels per day in 2000 to just 638 thousand barrels per day in 2023. This contrasts sharply with domestic consumption, which rose from 1.1 million barrels per day to 1.6 million barrels per day over the same period (Figure 2). Currently, Indonesia is a net oil importer, requiring imports of 1.6 million barrels per day in 2023. This is a stark shift from its position in 2000 as a net oil exporter with a surplus of 344,000 barrels per day.

Figure 2: Indonesia's Oil Production and Consumption, 2000–2023

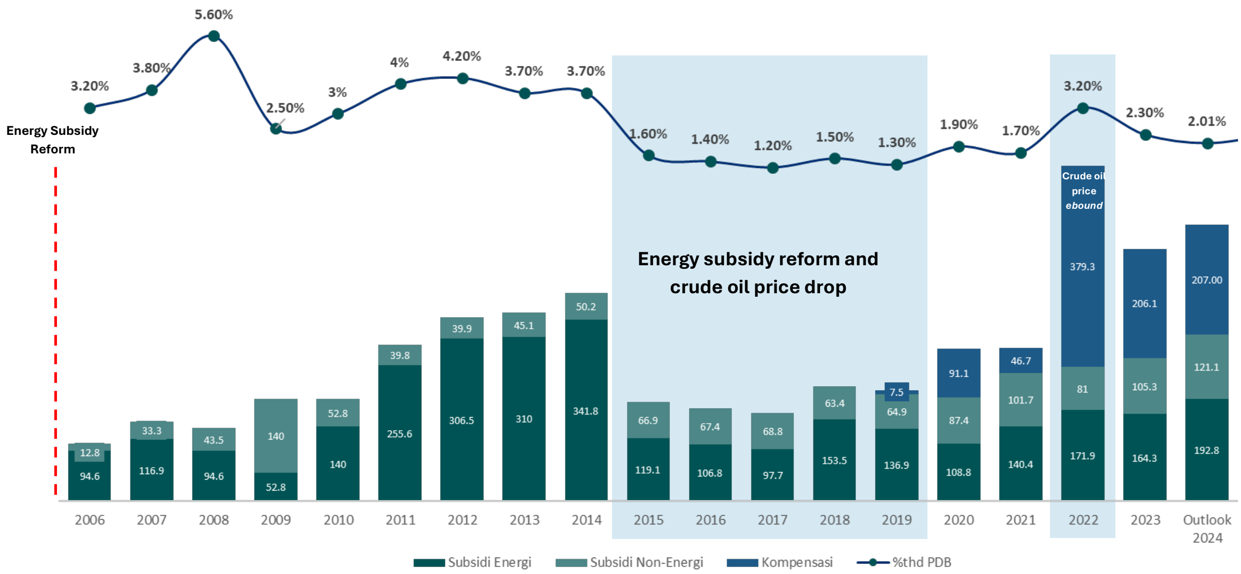


Source: BP PLC (CEIC Database)

Beyond high consumption, Indonesia's energy subsidies are highly susceptible to external factors, particularly changes in global oil prices and the exchange rate of the rupiah against the US dollar as approximately 40% of Indonesia's fuel consumption is derived from imports. Over the past two decades, both global oil prices and the rupiah-dollar exchange rate have tended to increase, significantly impacting energy subsidies and compensation. Global oil prices have risen from around USD 30/barrel in 2000 to USD 85/barrel in 2024. During the same period, Rupiah-Dollar exchange rate has weakened from approximately IDR 8,200/USD in 2000 to IDR 13,800/USD in 2024.

Due to these factors, energy subsidies in Indonesia have generally trended upwards, despite repeated subsidy reforms and price adjustments by the government. Figure 3 highlights the trends in energy and non-energy subsidies from 2006 to 2024, showing the strong influence of oil prices and exchange rates on the magnitude of energy subsidies borne by the state budget (APBN). From 2006-2014, energy subsidies rose from IDR 94.6 trillion in 2006 to IDR 341.8 trillion in 2014. During this period the rupiah depreciated from IDR 9,167/USD in 2006 to IDR 12,440/USD in 2014. And at the same time, Indonesia Crude Price (ICP) increased from USD 64.3/barrel in 2006 to USD 96.1/barrel in 2008.

Figure 3: Energy subsidy and compensation, 2006-2024



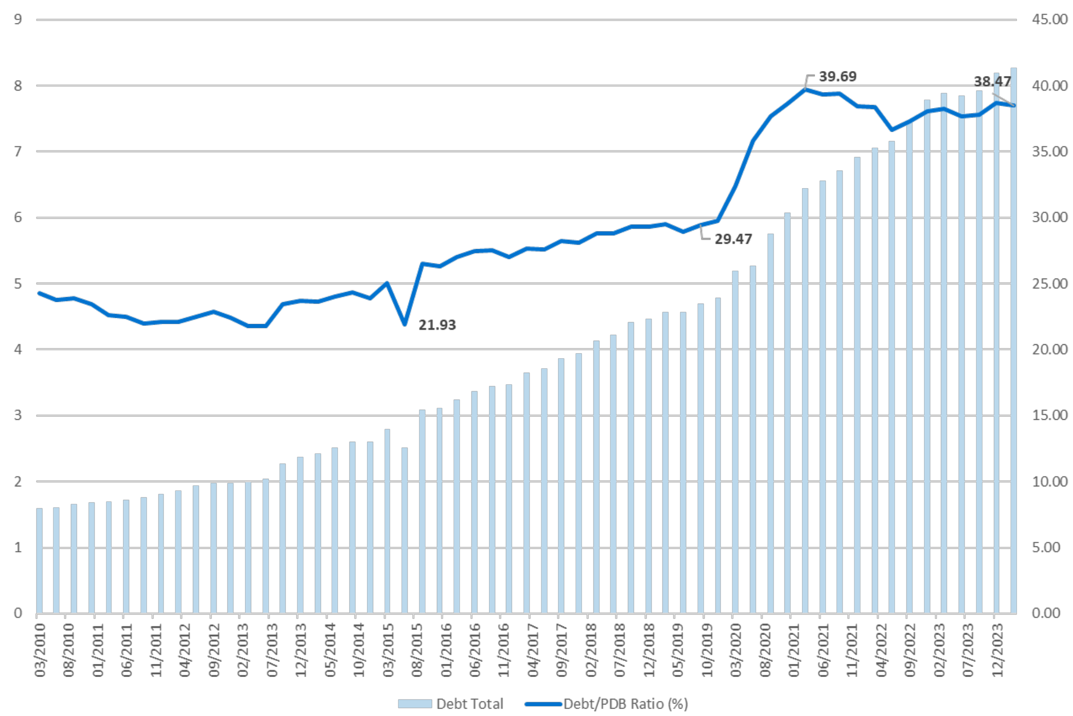
Source: Pusat Kebijakan APBN, Kementerian Keuangan RI

The significant rise in global oil prices forced the administration of Susilo Bambang Yudhoyono (SBY)-Jusuf Kalla (JK) to adjust retail fuel prices by 30%. While oil prices temporarily declined to USD 61.6/barrel in 2009, they rose again and remained above USD 100/barrel during 2011–2014, leading to a substantial increase in energy subsidies. However, unlike the earlier administration, the SBY-Boediono government refrained from adjusting fuel prices during this period due to political and security concerns.

Furthermore, despite experiencing a decline during the 2016-2017 period, the amount of energy subsidies and compensation in the following years increased sharply again. Reforms during the early Jokowi-JK administration, coupled with falling global oil prices, reduced energy subsidies significantly to IDR 119.1 trillion in 2015 and IDR 97.7 trillion in 2017. However, as global commodity prices increases, the amount of subsidies drove back up, reaching IDR 171.9 trillion in 2022 before declining slightly to IDR 164.3 trillion in 2023 after adjustments to fuel prices in the previous year.

The total burden on the government increased significantly due to implicit subsidies, primarily in the form of compensation funds. Total energy subsidies, both explicit and implicit, increased from IDR144.3 trillion in 2019 to IDR551.2 trillion in 2022, then decreased to IDR370.4 trillion in 2023. In the 2024 State Budget, energy subsidies and compensation are budgeted at IDR329.9 trillion, around 10% of total government spending or 1.5% of GDP. Fuel subsidies themselves range from 12-15% of total energy subsidies with a trend that continues to increase due to energy consumption, world oil prices, and the US dollar exchange rate against the Rupiah.

Figure 4: Trend of Indonesian Government Debt, 2015-2024

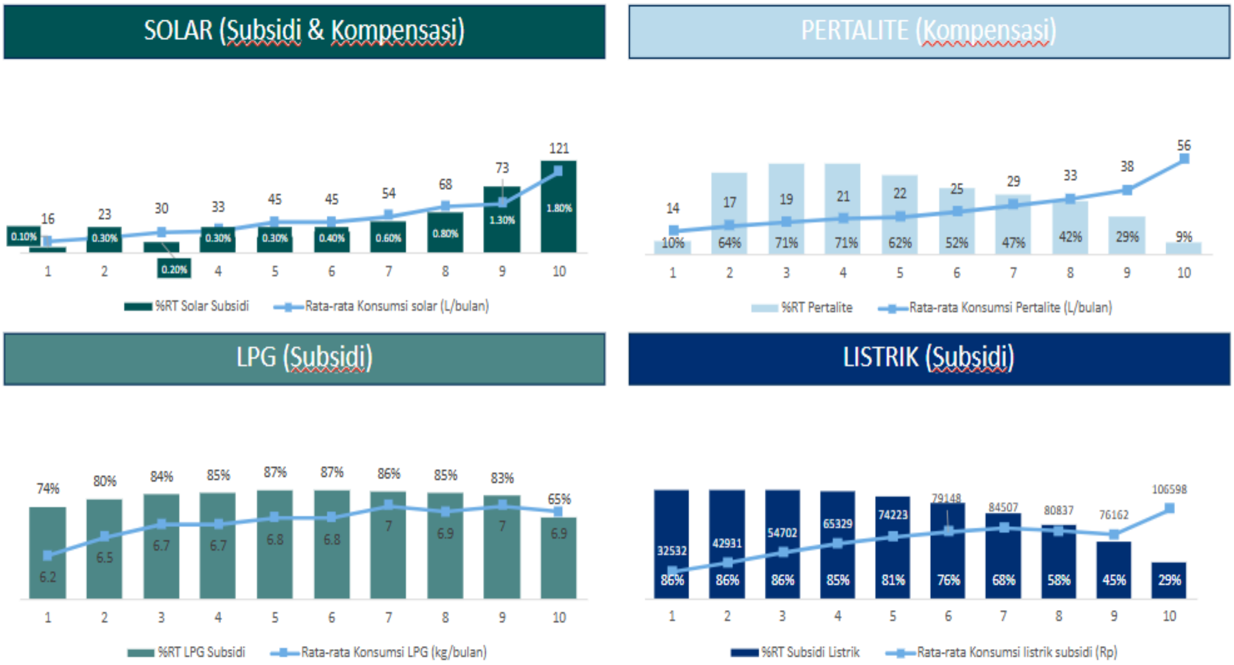


Source: Ministry of Finance of the Republic of Indonesia, 2024

The rising cost of energy subsidies and compensations has significantly increased the fiscal burden, threatening the country's financial health. The high subsidy costs often lead to growing budget deficits, forcing the government to increase borrowing to cover revenue shortfalls. This persistent budget deficit has resulted in a substantial rise in government debt, which has grown from IDR 3,113.64 trillion at the end of 2015 to IDR 8,191.2 trillion at the end of 2023. The growing debt burden limits the government's fiscal flexibility, reducing its ability to allocate spending for other critical needs, particularly development expenditures. Figure 4 illustrates the trend of government debt over the 2015–2024 period.

In addition to fiscal strain, energy subsidies and compensations raise concerns about fairness, as they are often poorly targeted and regressive. A significant portion of these subsidies are enjoyed by wealthier households rather than the intended low-income beneficiaries. Figure 5 shows that subsidized fuels, LPG, and electricity are disproportionately consumed by higher-income groups (inclusion error).

Figure 5: Consumption of Subsidized Fuel, LPG and Electricity by Household Income Decile, 2023

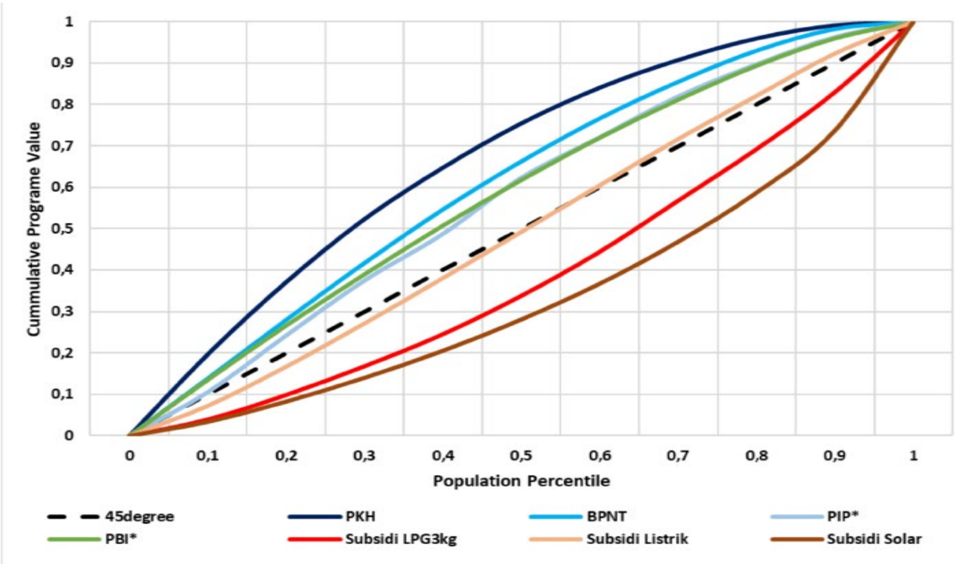


Source: author's calculation, Susenas 2023

The severity of targeting errors in energy subsidies (inclusion error) varies by type of subsidized energy. For subsidized LPG, for example, although the average household LPG consumption is relatively uniform at 6.5–7 kg per month, a high percentage of households in income deciles 5 and above still benefit from subsidized LPG - over 83%. Even in decile 10 (the highest income group), 65% still enjoy subsidized LPG subsidies. On the other hand, the recipients of electricity subsidies are much more progressive and targeted, where 86 percent of household groups in deciles 1 to 3 receive the benefits of this subsidy, much higher than 68% for decile 7 to only 29% for decile 10.

These poorly targeted energy subsidies actually exacerbate inequality between income groups. Subsidies on energy commodities, such as fuel and 3 kg LPG, are regressive because they have a high level of inclusion error, unlike people-based subsidies (such as Food Social Assistance, PKH, PBI or PIP) which are more progressive. As a result, the distribution of these energy subsidies is ineffective and instead triggers even worse inequality. Figure 6 shows the effectiveness of energy subsidies compared to people-based social assistance placed in the Lorenz curve framework, where the inequality in diesel subsidies and 3 kg LPG subsidies is greater than electricity subsidies and people-based social assistance subsidies.

Figure 6: Effectiveness of subsidy and social assistance in Lorenz Cruve, 2023



Source: SUSENAS 2023 (based on Pusat Kebijakan APBN, Kementerian Keuangan RI)

Energy Subsidy Reform Policies in Various Countries

Various countries have made efforts to reform the existing fuel subsidy system. In this section, we look at several countries that have carried out subsidy reform, both in terms of motivation, implementation strategy, and policies and accompanying programs to mitigate the impact of the reform. These countries include India, Brazil, Peru, Ghana, Iran, Yemen, Argentina, Bangladesh, Sri Lanka, Zambia, and Colombia. These countries have something in common with Indonesia: they are all classified as developing countries. As shown in Table 1, the background, strategy, and policy packages of subsidy reform policies are generally heterogeneous between countries, with varying reform periods.

Table 1: Summary of comparative analysis energy subsidy reform

Country	**Reform Period**	**Implementation Strategy**	**Subsidy Policy Package**
India	2012 - 2014	Increase the price of diesel fuel gradually every month (excluding tax) and relax controls on bulk purchases.	Introducing household LPG quotas
Brazil	1990s - 2001	Liberalization of fuel prices started with a gradual reduction in subsidies for petroleum derivative products (asphalt and lubricants) and continued with gasoline, LPG and diesel.	Public communication; conditional cash assistance "Bolsa Escola"; import tax; LPG purchase vouchers
Peru	2010	Announcing limits every 2 months and price changes are limited to 5%, except for domestic LPG consumption (1.5%)	N/A
Ghana	2005	Announces biweekly price adjustments by the National Petroleum Agency.	Public communication; social assistance programs for vulnerable groups (Livelihood Empowerment against Poverty [LEAP]); increasing public transportation; eliminating primary and secondary education fees; increasing the minimum wage; investing in rural electricity provision

Iran	2010	Targeted energy subsidy reform was carried out gradually by cutting indirect subsidies and allocating them to transfer programs. However, subsidy reform was halted in 2012 due to rising inflation.	Transfer assistance to households; using multi-tier tariffs for electricity, natural gas, and water; electronic cards for gasoline purchase quotas
	2014	Increase gasoline prices by 75%.	N/A
	2019	Reducing fuel subsidies by increasing prices by ~50%.	Limiting internet access to 7% of normal levels and access to mobile phones to limit public protests.
Yemen	2010	The gradual increase in the price of gasoline, diesel, and kerosene up to 30% on average; the increase in the price of LPG up to 2 times in a period of 9 months	Replacing diesel-based power plants with natural gas-based power plants; expanding transfer assistance to 50%
Argentina	2022 - 2024	Phase out natural gas subsidies and target subsidies based on consumption to the most vulnerable sectors.	
Bangladesh	2022	Cutting subsidies in the energy sector by increasing the prices of fuel, natural gas and electricity to international prices.	Expanding the social safety net if subsidy cuts are successful
Sri Lanka	2022 dan 2023	Reducing subsidies for transportation fuel.	Strengthening social protection through transfer assistance.
Zambia	2021	Eliminate fuel subsidies in the energy and agriculture sectors.	Allocate savings from subsidies to eliminate secondary education fees.
Kolombia	2022	Increase gasoline prices and implement market-based pricing. Diesel prices are targeted to increase starting in 2024.	

Source: IMF (2013), IISD (2015), UNDP (2021), Laan & Sharma (2024)

Motivation for Subsidy Reform

The background reasons for fuel subsidy reforms are not the same across all countries. However, the outcomes are often similar, such as creating greater fiscal space. Table 2 summarizes the motivations of various countries to reform their fuel subsidies. It is important to note that, in addition to reducing fiscal burdens, nearly all countries implement subsidy reforms to alleviate poverty by reallocating those subsidies.

Table 2: Motivations of energy subsidy reform from different countries

	Regulating market players	Complying with IMF loan rules	Part of industrial policy	Global oil price volatility	Poverty alleviation	Geopolitics
Argentina	✓	✓			✓	
Bangladesh		✓	✓		✓	
Brazil	✓				✓	
Ghana	✓				✓	
Iran				✓	✓	✓
Colombia			✓			
Peru				✓		
Sri Lanka		✓			✓	
Yemen		✓			✓	
Zambia		✓	✓		✓	

Source: Author's own analysis

Strategies for Implementing Subsidy Reforms

Implementation strategies also tend to vary and can be observed based on their duration and frequency. These choices are made by considering the respective countries' macroeconomic and market conditions. For example, the Brazilian government's implementation strategy took into account the potential for social unrest and the monopoly in the oil market. Another example is in Peru, where the decision to adjust prices to international levels was made during the momentum of declining global oil prices in 2010.

The duration of various countries' reforms of energy subsidies also varies; some were completed within a year, while others were phased over several years. For instance, Brazil implemented fuel price liberalization to reduce subsidies starting in the 1990s and continuing until 2001. On the other hand, Iran took a significantly longer time, nearly a decade, and even experienced halts due to a lack of mitigation policies to address the spillover effects of rising fuel prices caused by the reforms (UNDP, 2021).

Furthermore, some countries adjust domestic prices to international prices at different frequencies—some gradually and others at regular intervals. An example of a country that implemented reforms gradually is Brazil, Peru, and Yemen (IMF 2013; UNDP 2021).

Brazil gradually adjusted prices by first increasing the prices of petroleum-derived products, followed by other fuels. In Peru, fuel price increases were implemented every two months by 5%. Meanwhile, adjustments at regular intervals were made by Ghana, where price adjustments were announced relatively more frequently compared to other countries undertaking fuel subsidy reforms. The National Petroleum Agency in Ghana adjusted prices to international levels every two weeks.

Mitigating the Impacts of Subsidy Reforms

These countries have adopted various mitigation measures to address the impacts of subsidy reforms, ranging from public communication to reallocating compensation to various programs and expenditures. First, public communication is often carried out by the government through the head of state, the Minister of Finance, or other authorized officials. In Ghana, the government announced fuel subsidy cuts while highlighting the benefits of these reforms, such as reallocating subsidies to prioritized social programs.

In addition to public communication, governments in various countries provide cash transfers to vulnerable groups and expand social protection to the aspiring middle class. These cash transfers may be unconditional or conditional. Countries providing cash transfer assistance include Brazil, Ghana, Iran, and Sri Lanka. Meanwhile, social protection expansion has been implemented by the governments of Yemen and Bangladesh. Furthermore, subsidy reallocations have been directed toward expenditures that enhance public welfare, such as reducing education costs, increasing minimum wages, and expanding access to electricity.

Although the aforementioned mitigation measures are generally aimed at supporting the public, there are more restrictive accompanying policies for fuel subsidy reforms. For example, to manage public unrest, the Iranian government restricted internet access for some citizens during its 2019 reform (UNDP, 2021).

Simulation of Energy Subsidy Reform

The energy subsidy issues discussed in previous chapters require fundamental reforms. One fundamental aspect to consider is the strategy of pricing and quota allocation for subsidized energy commodities. This chapter explains several simulations of changes to subsidized commodities, including Pertalite, diesel fuel, and 3-kg LPG, and their impact on fiscal, socio-economic, and environmental conditions.

Methodology

This study uses a simulation approach combining several analytical models to assess the impact of energy subsidy reforms in Indonesia. Three main approaches are used:

1. **Fiscal Aspect**

   This study uses the Least Absolute Shrinkage and Selection Operator (Lasso) Model and the subsidy formula in current regulations to calculate the fiscal impact of energy subsidy reforms. The Lasso Model is a statistical method based on linear regression used to select the most relevant independent variables for the dependent variable. This model applies penalties to the number of variables used in linear regression to eliminate insignificant variables influencing the dependent variable.

   This study uses the consumption of subsidized energy commodities as the dependent variable (yt). Independent variables include Gross Domestic Product (gdp), population (pop), global oil prices (oil_price), the rupiah-to-dollar exchange rate (excrate), the consumer price index (cpi), and primary energy intensity (eintens). These data are sourced from various references listed in Appendix 1.

   After the model is regressed using Lasso, k-fold cross-validation is used to validate the consistency of the mean square error (MSE). Additionally, several regularization parameters (λ) are checked to determine predictor stability. Finally, a variance inflation factor (VIF) test is conducted to ensure that multicollinearity has been addressed through the coefficients penalized by the model.

   From the Lasso model, subsidy calculations are based on the formula outlined in Ministerial Decree No. 255.K/MG.011/MEM.M/2022 on the Base Price Formula for Special Assigned Fuel Types and Ministry of Energy Regulation No. 10 of 2024 on the Second Amendment to Ministry of Energy Regulation No. 20 of 2021 on Retail Fuel Price Calculations. In general, energy commodity subsidies represent the difference between economic and retail prices. Total subsidies are the value of the subsidy per unit of commodity multiplied by consumption, which is predicted using the Lasso model discussed earlier.

Data needed to calculate subsidies include estimates of economic prices, retail prices, base prices, Value Added Tax (VAT), Motorized Vehicle Fuel Tax (PBBKB), MOPS prices (for Pertalite and diesel fuel), and ARAMCO prices (for LPG). Some assumed values for these data are detailed in Appendix 1.

Once the subsidy values are determined, the model simulates scenarios discussed in the next subsection, "Hypothetical Scenarios." No additional data or assumptions are needed for the Pricing Strategy since the shock applied is in prices and subsidy adjustments, so the model is sufficient to provide the expected results. For the Quota Strategy, additional data on the number of vehicles by engine CC and type is required to calculate the reductions that occur if certain vehicle classes or types are excluded from energy subsidies. Furthermore, for the 3-kg LPG subsidy, this study also uses Susenas 2023 data to classify household expenditure deciles as the primary targets for the subsidy scenario.

2. Socio-Economic Aspect

This study estimates the socio-economic impacts of energy subsidy reforms using the input-output (I-O) analysis method and a simplified Commitment to Equity (CEQ) framework.

In calculating the inflation impacts using I-O, the base data used is the 2016 Indonesia I-O table, the most recent table available when this study was conducted. According to Miller & Blair, the main characteristic of I-O analysis is the linear input function—assuming that commodities are infinitely substitutable at any output level. The second characteristic of this analysis refers to the classical production function—assuming that the multiplication of inputs produces outputs proportionally (constant returns to scale). Furthermore, I-O analysis is a static model that only examines the impact of subsidy reforms at one point, but with slight modifications, it can produce quasi-dynamic I-O analysis.

Technically, I-O analysis estimates inflation impacts by applying shocks to the final demand of certain subsectors. The shock represents the value of the price increase for specific energy commodities within particular subsectors and energy consumer groups. Then, assuming a constant quantity, the output changes in the I-O analysis represent the price changes in each subsector. This assumption aligns with the pattern of energy consumption by the public, which is inelastic to changes in energy commodity prices. The estimation of direct inflation impact is the percentage change in prices in the subsector covering the specific type of energy. In contrast, the indirect inflation impact is the total percentage change in prices for other subsectors. The estimation of total inflation impact is the sum of the direct and indirect inflation impacts.

Second, the impact of socio-economic class shifts and changes in poverty levels is obtained through the simplified Commitment to Equity (CEQ) framework. This framework is commonly used to estimate the impacts of fiscal policies (Lustig, 2023). Simply put, this analysis examines how the total inflation effect from the previous estimation influences changes in the poverty line, which affects the composition of socio-economic classes under the assumption that the composition of goods consumed (bundle of goods) remains constant.

3. Environmental Aspect

Environmental impacts are assessed using the elasticity of subsidies to air pollution measured in CO2eq, following the methodology of Sasana et al. (2017). This study uses the elasticity of energy subsidies to greenhouse gas emissions derived from Sasana et al. (2017) due to the disruption in the correlation between greenhouse gas emissions and energy subsidies caused by COVID-19 from 2019 to 2022. Using pre-COVID-19 elasticity reflects trends aligned with Indonesia's economic conditions without pandemic-related disruptions, thereby providing a more accurate representation of environmental impacts.

To obtain the valuation of the environmental impacts in terms of economic losses, this study multiplies the Social Cost of Carbon (SCC) by CO2eq emissions. The SCC assumption used in this study is $38.8 per ton of CO2eq, based on research of Ricke et al. (2018), which calculates the SCC for individual countries and offers an insightful analysis.

Hypothetical Scenario

This study uses five main scenarios to simulate the impact of energy subsidy reforms. These scenarios can be categorized into two major groups: scenarios 2 and 3 as pricing strategies and scenarios 4 and 5 as quota strategies. The scenarios are as follows:

1. **Scenario 1: *Business as Usual* (BAU)**
   In this scenario, subsidies and compensation remain in place to cover the gap between selling prices and economic prices. Energy prices for products like Pertalite, Solar, and LPG are maintained at their current levels: IDR 10,000 per liter, IDR 6,800 per liter, and IDR 4,250 per kilogram, respectively.
2. **Scenario 2: *Dynamic Pricing***
   In this scenario, compensation is eliminated, and energy prices are adjusted based on market conditions. Subsidies are still provided but at lower levels compared to

the BAU scenario. The subsidy value per unit of commodity is fixed, for example, IDR 3,000 per liter for Pertalite, IDR 3,000 for Solar, and IDR 3,000 per kilogram for 3kg LPG.

3. **Scenario 3: *Increasing Administered Price***
   In this scenario, prices remain controlled by the government, similar to the BAU scenario. However, Pertalite, Solar, and 3kg LPG prices gradually increase by 10% annually until the government's desired subsidy level is reached.
4. **Scenario 4: *Quota CC***
   In this scenario, the prices of Pertalite, Solar, and 3kg LPG remain the same as in the BAU scenario, but the sale of these subsidized commodities is limited to (i) Pertalite for vehicles with engines <1500 cc and motorcycles <150 cc; (ii) Solar for vehicles with engines <2000 cc; (iii) LPG for consumers in income deciles 1–4.
5. **Skenario 5: *Quota* dan Penghilangan Subsidi Pertalite untuk Mobil**
   In this scenario, the prices of Pertalite, Solar, and 3kg LPG remain the same as in the BAU scenario, but the sale of subsidized commodities is restricted to (i) Pertalite for motorcycles <150 cc; (ii) Solar for vehicles with engines <2000 cc; (iii) LPG for consumers in income deciles 1–4.

Estimated Impacts of Energy Subsidy Reform

Fiscal Consequence

The reforms in the pricing strategy applied to Pertalite, Solar, and 3kg LPG have varying consequences across the scenarios, as depicted in Figures 7 and 8. These differences are summarized below:

1. **Scenario 1: *Business as Usual* (BAU)**
   In this scenario, subsidies remain in place without significant changes. As shown in Figure 7, energy subsidies under this scenario increase from IDR 427 trillion in 2024 to IDR 689 trillion in 2029. This reflects the continued growth in domestic energy consumption. Additionally, global energy commodity prices rise due to factors such as increased demand, declining fossil fuel reserves, and geopolitical issues and conflicts in key fossil fuel-producing regions.

   The weak correlation between domestic petroleum-based commodity prices and global prices means that rising global prices do not directly signal consumers to reduce consumption. Consequently, domestic energy consumption continues to increase, leading to higher subsidies. The BAU scenario illustrates that the subsidy burden on the state budget will continue to grow without policy changes.

2. **Scenario 2: *Dynamic Pricing* (DP)**

In this scenario, energy prices are dynamically adjusted based on market conditions, with lower subsidies compared to BAU. The impact of this scenario is significant, with subsidies drastically reduced from IDR 427 trillion in 2024 to IDR 184 trillion in 2025. This represents savings of IDR 243 trillion in the first year of implementation.

Over time, subsidies gradually increase again, from IDR 184 trillion in 2025 to IDR 225 trillion in 2029, driven by projected increases in global oil prices. Despite this, subsidies remain much lower than under BAU. Due to the reduction in subsidies, government savings gradually increase from IDR 298 trillion in the 2025 draft state budget (RAPBN) to IDR 464 trillion in 2029, as shown in Figure 8. This revenue stability reflects the consistency of dynamic pricing reforms, which allow energy prices to follow market fluctuations.

This scenario demonstrates that dynamic pricing can sustainably reduce the subsidy burden and increase savings, despite smaller subsidy increases compared to BAU in the coming years.

3. **Scenario 3: *Increasing Administered Price* (FAP)**

This scenario involves gradually increasing administered energy prices, with subsidies adjusted accordingly. Figure 7 shows subsidies under this scenario also decline from IDR 375 trillion in 2025 to IDR 264 trillion in 2029. Although initially subsidies remain relatively high, there is a consistent decline over the years, compared to the dynamic pricing scenario.

This decline is driven by consistent price increases implemented by the government for energy commodities. As a result of reduced subsidies, government savings increase from IDR 107 trillion in the 2025 RAPBN to IDR 425 trillion in 2029. While initial savings are lower compared to Scenario 2, this scenario generates higher savings in subsequent years.

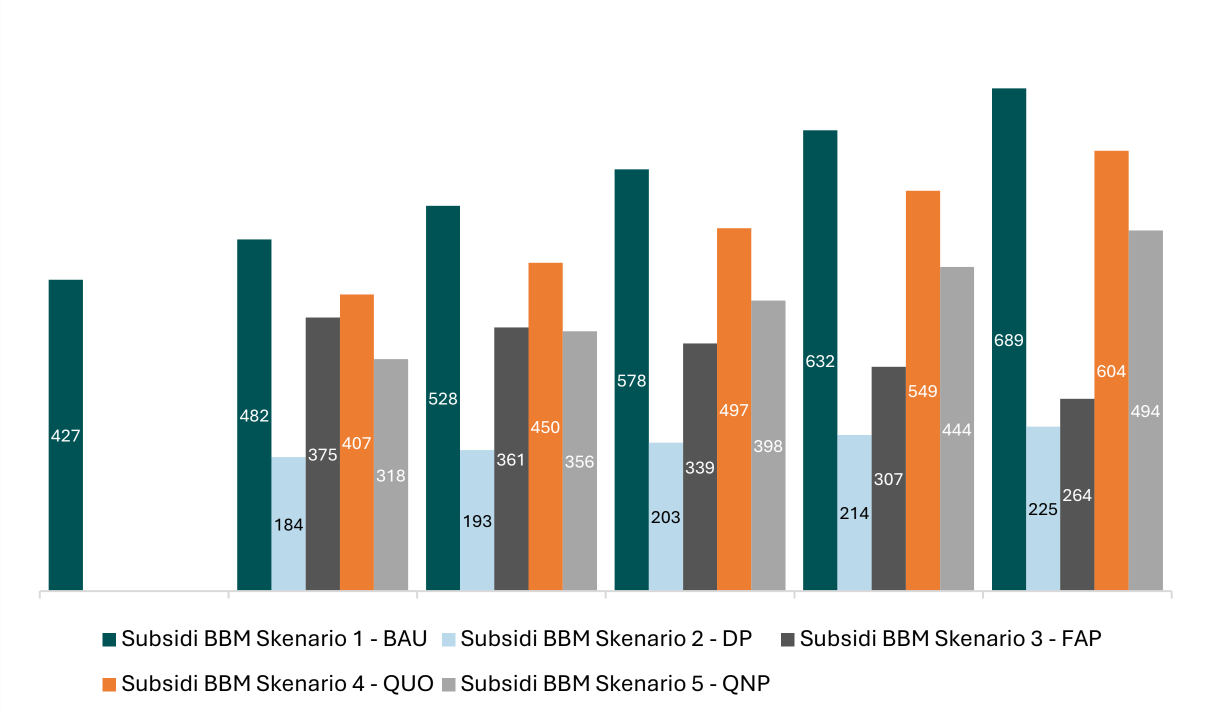
4. **Scenario 4: *Quota* based on CC**

In this scenario, fiscal savings are less significant than in other scenarios, ranging from IDR 114 trillion in 2025 to IDR 150.9 trillion in 2029. This highlights the limitations of savings achievable through quota restrictions alone.

5. **Scenario 5: *Quota Based on CC and Removal of Pertalite Subsidies for Cars***

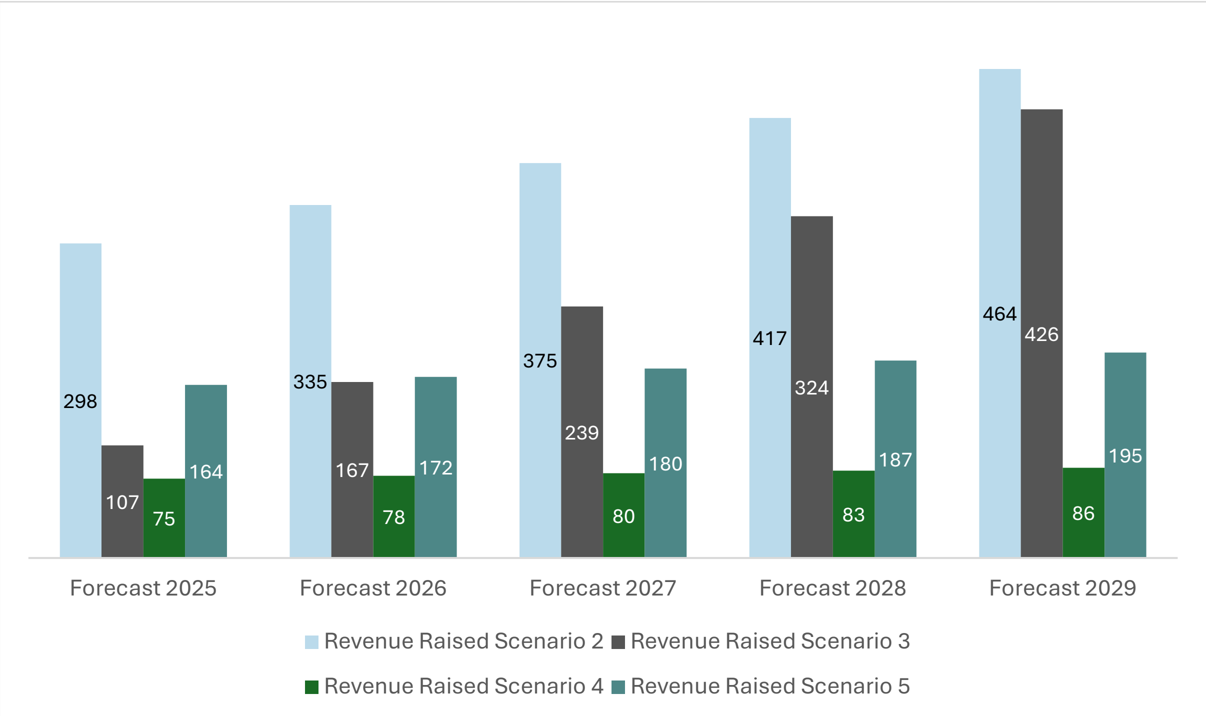
In this scenario, fiscal savings gradually increase from IDR 238.8 trillion in 2025 to IDR 340.1 trillion in 2029. The impact of this quota scenario is moderate—greater than Scenario 4 but less than Scenario 2. This indicates that Scenario 5 is a relatively ambitious quota strategy as it entirely removes Pertalite subsidies for cars.

Figure 8: Total of energy subsidy in different scenarios



Source: Model simulation result

Figure 8: Government revenue raised



Source: Model simulation result

In scenarios 2 and 3 (pricing strategy) for 2025, **Solar** contributes the highest to fiscal savings, amounting to IDR 127 trillion, followed by **Pertalite** at IDR 111 trillion and **LPG** at IDR 60 trillion. Similarly, in **Scenario 4** (vehicle engine capacity and income decile-based quota for LPG), Solar remains the largest contributor to fiscal savings at IDR 57.6 trillion, compared to Pertalite at IDR 43.5 trillion and LPG at IDR 31.9 trillion.

However, **Solar** is not the largest contributor to fiscal savings in the remaining scenarios; instead, **Pertalite** takes the lead. For instance, in **Scenario 3** (increasing administered price) in 2025, Pertalite contributes IDR 33.5 trillion to fiscal savings, while Solar contributes IDR 13.3 trillion and LPG contributes IDR 3.5 trillion. In this scenario, Pertalite becomes the largest contributing commodity to fiscal savings across all scenarios by 2028.

Figure 9: Fiscal savings from Pertalite subsidy reform

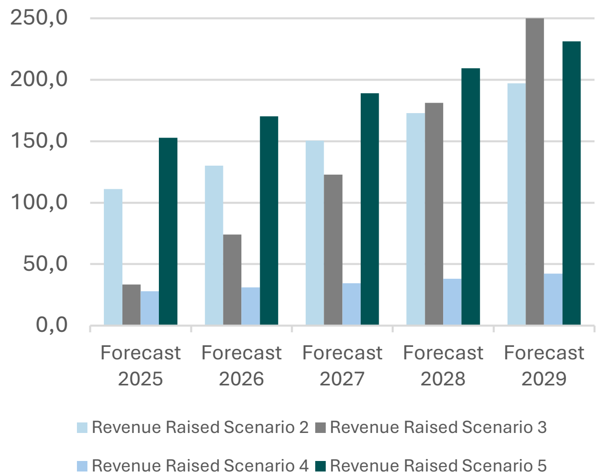


Figure 10: Fiscal savings from Solar subsidy reform

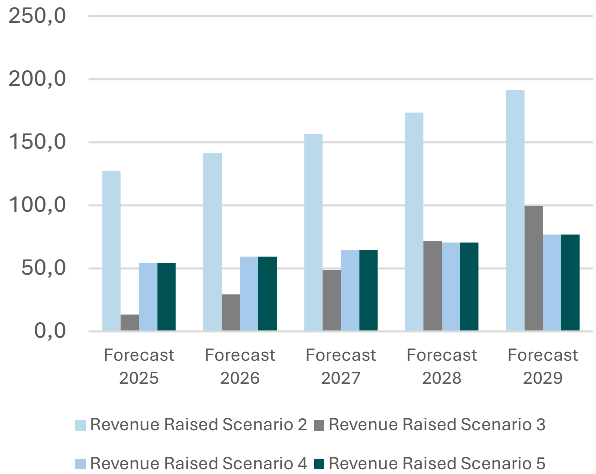
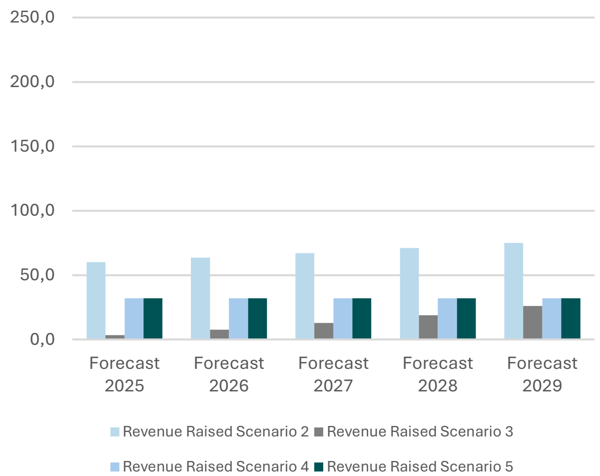


Figure 11: Fiscal savings from LPG subsidy reform



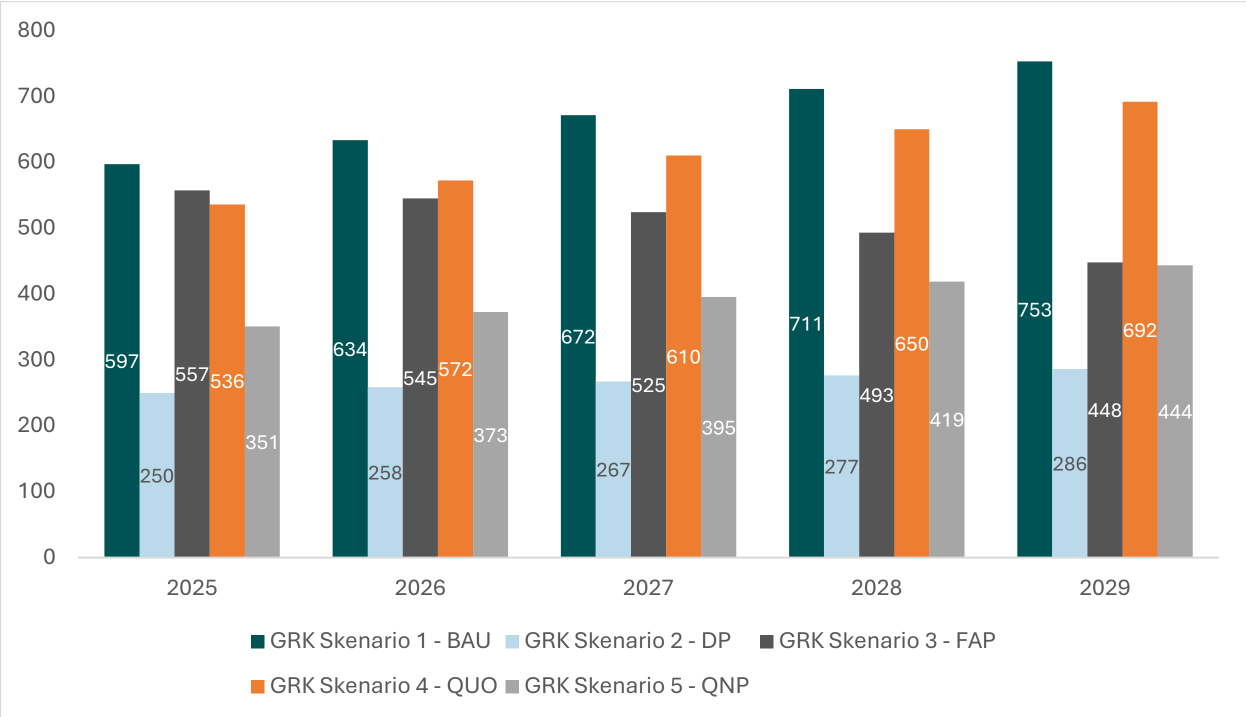
Source: Model simulation result

Impact on the Environment

The simulation results from the five scenarios show varying potential greenhouse gas (GHG) emissions resulting from subsidy reforms (see Figure 12). The second scenario, dynamic pricing, has the lowest GHG emission potential compared to the other subsidy scenarios from 2025 to 2029, ranging from 250 million tons CO2eq to 286 million tons CO2eq.

However, the trend in GHG emission potential under this scenario shows a slight increase over time compared to the increasing administered price scenario (Scenario 3), where emissions decrease over the same period, from 557 million tons CO2eq to 448 million tons CO2eq.

Figure 12: the potential greenhouse gas (GHG) emissions generated by each scenario in a million tons CO2eq



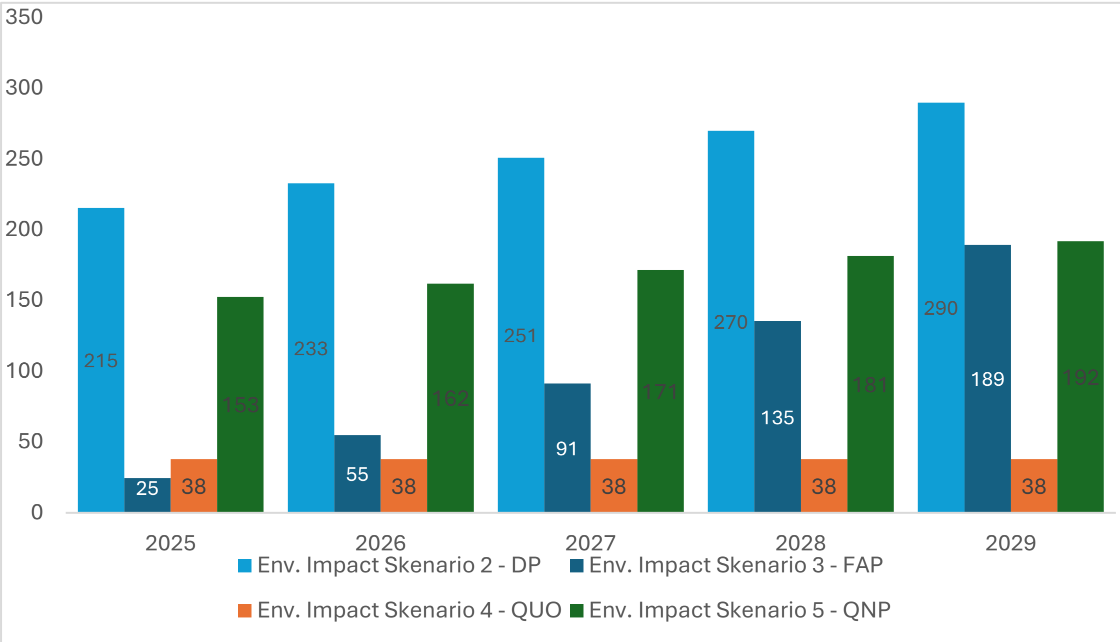
Source: Model simulation result

Then, the quota-based subsidy limitation scenarios based on vehicle engine capacity (CC), both without subsidy removal (Scenario 4) and with the removal of Pertalite subsidies for cars (Scenario 5), also show contrasting greenhouse gas (GHG) emission potentials. Among the scenarios, Scenario 4 produces the highest emissions from 2026 to 2029, with volumes ranging from 536 million tons CO2eq in 2025 to 692 million tons CO2eq. Compared to the BAU scenario, the difference is relatively small, in the 61–62 million tons CO2eq range. Meanwhile, in Scenario 5, the GHG emission potential remains stagnant from 2025 to 2029, increasing from 351 million tons CO2eq to 444 million tons CO2eq.

Considering this, Scenario 5 is relatively ambitious as it eliminates nearly all Pertalite car subsidies.

Additionally, the environmental improvement impacts of the five scenarios also vary (see Figure 13). Besides having the lowest GHG emission potential, the valuation of environmental improvement in the dynamic pricing scenario is also the largest, gradually increasing from IDR 215 trillion in 2025 to IDR 290 trillion in 2029. Then, the increasing administered price scenario (Scenario 3) shows the fastest growth in environmental improvement valuation compared to other scenarios from 2025 to 2029, starting from IDR 25 trillion to IDR 189 trillion. Similarly to fiscal savings, the valuation of environmental improvement in this scenario also shows the highest growth among all scenarios.

Figure 13: Estimated Impact on the Valuation of Environmental Restoration (trillion rupiah)



Source: Model simulation result

In the scenario with quota restrictions based on vehicle engine capacity (CC), the results of Scenario 4 tend to remain stagnant at IDR 38 trillion from 2025 to 2029. This figure makes it the scenario with the smallest valuation of environmental improvement impact compared to other scenarios.

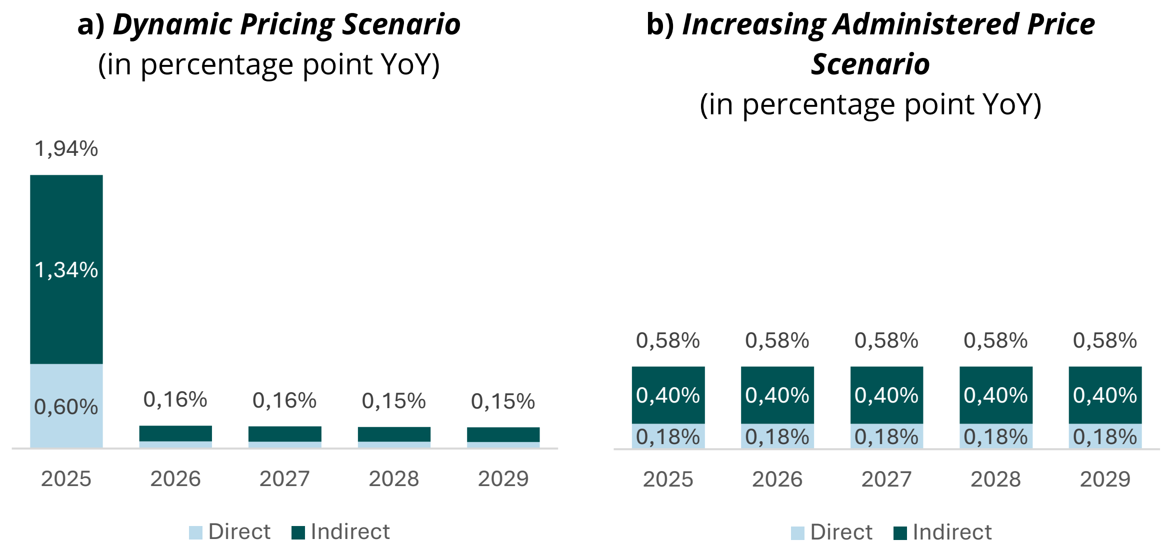
In contrast to Scenario 4, the quota restriction scenario based on vehicle engine capacity combined with the removal of Pertalite subsidies for cars (Scenario 5) has the second-highest average valuation of environmental improvement impacts after Scenario 2. The removal of nearly all Pertalite subsidies for cars, alongside quota restrictions based on vehicle CC, resulted in an environmental improvement valuation of IDR 153 trillion in 2025, increasing to IDR 192 trillion in 2029.

Estimated Impact on the Socio-economy from Each Subsidized Energy Commodity

Pertalite Subsidy Reform

Referring to the forecasted prices and total subsidies for Pertalite discussed in the previous chapter, this section estimates the impact on inflation and socioeconomic classes for two proposed scenarios. First, the study estimates the inflationary impact of Pertalite subsidy reforms by applying a shock to the Refined Petroleum and Gas Products subsector (Code 095). The proportion of Pertalite within this subsector is determined based on its production share, assuming it is proportional and parallel to the share of final sales in this subsector. This is calculated by multiplying the price adjustments for subsidized consumer subgroups by the coefficients of the Leontief Inverse Matrix. The results are then compared to the final output without the shock, which can subsequently be decomposed into direct inflation and indirect inflation.

Figure 14: Estimated Inflation Changes Due to Pertalite Subsidy Reform



Source: Authors, I-O analysis

Figure 14 illustrates the trend in the estimated inflation changes (YoY) for the two proposed scenarios.

Panel a show the estimated inflation impact for the dynamic pricing scenario. The results indicate that additional inflation from the Pertalite subsidy, predominantly driven by indirect inflation, reaches 1.94 percentage points YoY in 2025, then decreases to a range of 0.16 percentage points YoY in the following years. This is explained by the significant price adjustment for Pertalite, which rises by 33.20% from the initial price, accompanied by smaller price adjustments in the range of 0.16–0.15 percentage points in subsequent years.

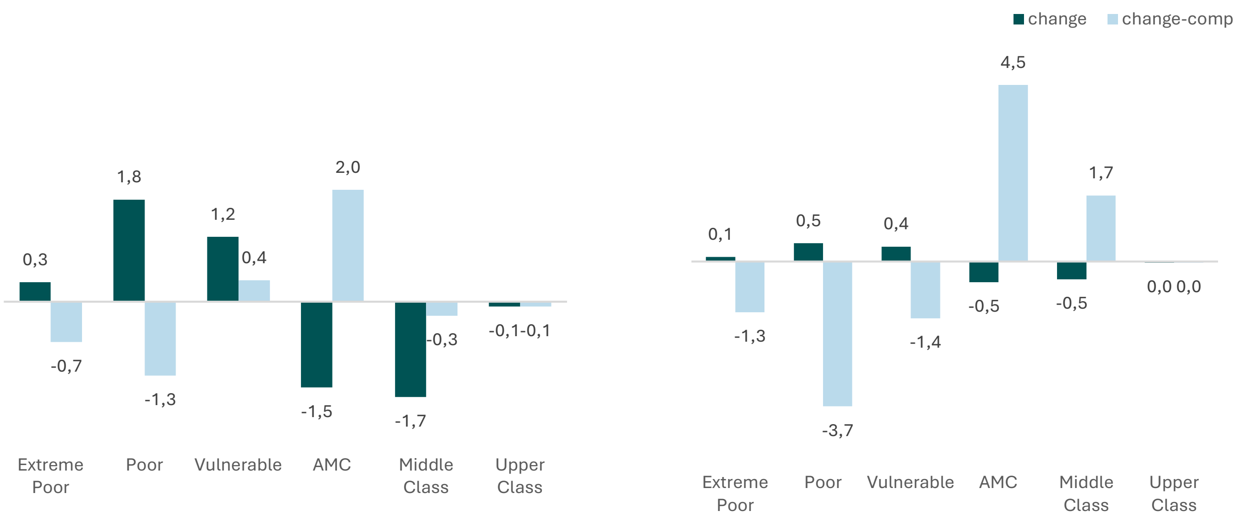
Panel b shows the estimated inflation impact for the increasing administered price scenario. In this case, the price of the RON90 or Pertalite commodity is gradually adjusted by 10% annually toward the economic price. The estimated inflation changes appear uniform at 0.58 percentage points YoY over the years, which corresponds to the relatively constant price adjustment for Pertalite. The explanation for the dominance of indirect inflation in both scenarios is the role of Pertalite fuel as an input for many economic activities—the most affected sectors include mining, logistics, financial services, telecommunications, and real estate services.

Figure 15 shows the results of changes in the population due to price adjustments—inflation that affects the poverty line (PL), assuming constant nominal expenditure and consumption bundles. The green graph depicts a simulation of subsidy changes without any compensation or social assistance, while the blue graph shows a simulation with social assistance provided to people below the middle class. The social assistance provided here is in the form of cash transfers equivalent to the household needs to maintain their consumption before the subsidy reform.

Figure 15: Estimated Socioeconomic Class Changes Due to Pertalite Subsidy Reform

a) ***Dynamic Pricing Scenario***
(in million people)

b) ***Increasing Administered Price Scenario***
(in million people)



Source: Susenas 2023, using CEQ

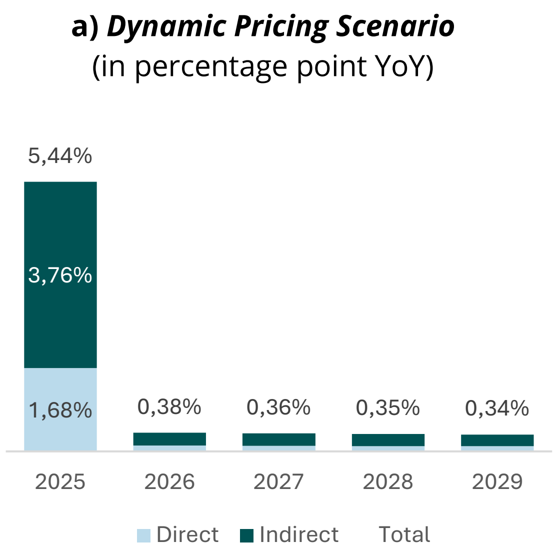
The figures shown represent the changes (in millions of people) compared to the baseline. In general, both the **Dynamic Pricing** scenario and the **Increasing Administered Price** scenario indicate a trend of increasing poor households and a decline in the Aspiring Middle Class (AMC) and Middle Class (MC) populations. The Dynamic Pricing scenario is considered to have higher risks due to the greater price changes from the existing price. It is important to note that this reflects an extreme condition with no compensation at all under the proposed Pertalite subsidy reform scenarios.

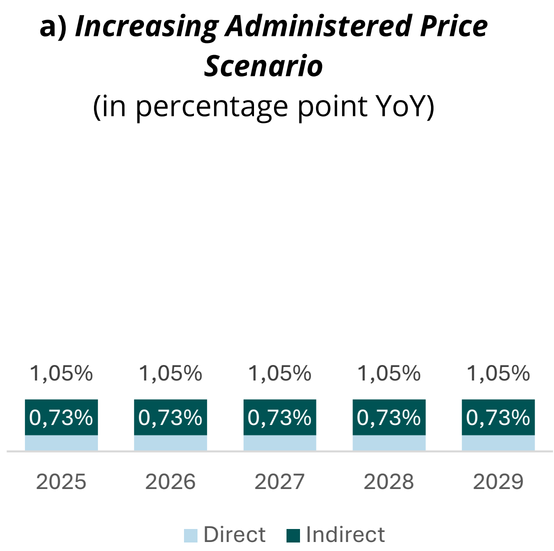
The blue graph, which illustrates subsidy reform with social assistance, shows that social assistance of **IDR 250,000** for Scenario 1 and **IDR 45,000** for Scenario 2 per household can help maintain their consumption levels. Although there is still a decline in the AMC and MC groups, the number of people affected can be significantly reduced compared to the scenario without social assistance. The graph also suggests that there is no increase in the population within the **Extreme Poor (EP)** category after social assistance is provided, reinforcing confidence that social assistance can mitigate the poverty risks potentially caused by energy subsidy reforms.

Solar Subsidy Reform

Using the same approach as with the previous commodity, the estimation of inflation and socioeconomic impacts for the CN48 or Diesel commodity also refers to the price forecast results from the previous chapter. The estimation of inflationary impacts for the proposed Diesel subsidy reform scenarios is obtained by multiplying the coefficients of the Leontief Inverse Matrix with the shock vector resulting from the price adjustments for Diesel. Similar to Pertalite, the CN48 or Diesel commodity is also part of the Refined Petroleum and Gas Products subsector (Code 095). The proportion of CN48 in this subsector is determined by its production share, assuming a proportional parallel relationship with its final sales share in the subsector. The estimated output obtained is compared to the final output without the shock, which can then be decomposed into direct inflation and indirect inflation.

Figure 16: Estimated Inflation Changes Due to Solar Subsidy Reform





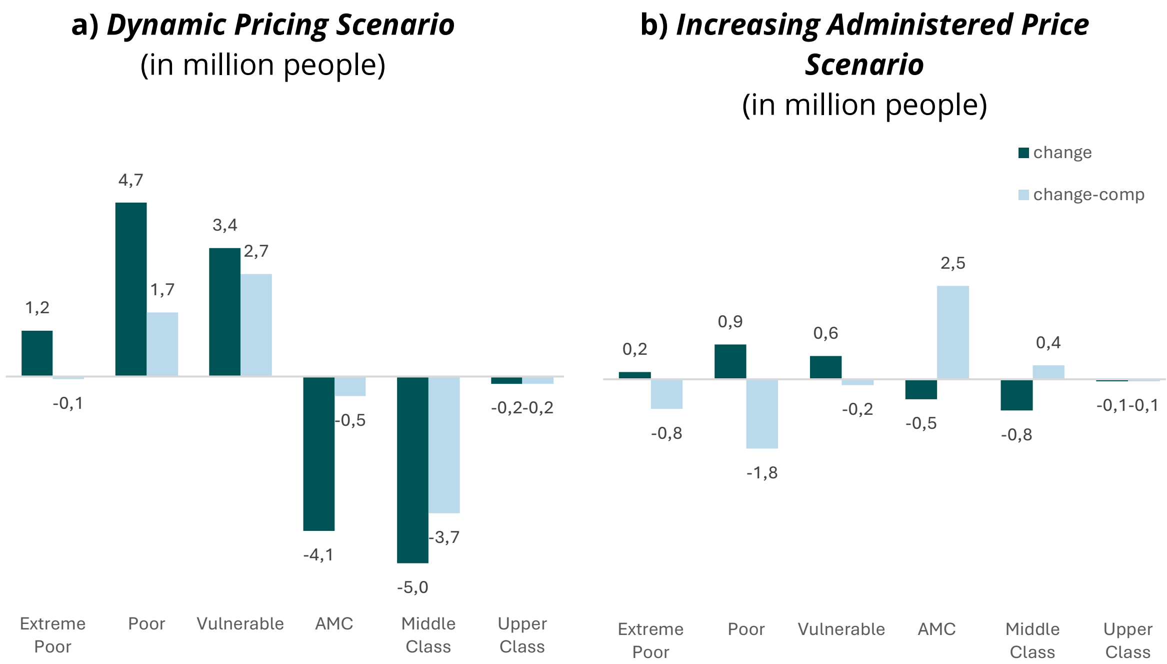
Source: Authors, I-O analysis

Figure 16 shows the estimated inflation changes for the proposed Dynamic Pricing scenario (Panel a) and the Increasing Administered Price scenario (Panel b) for the Diesel commodity.

In the Dynamic Pricing scenario, the estimated additional YoY inflation impact is 5.44 percentage points, which then significantly weakens in subsequent years to a range of 0.38–0.34 percentage points. This is due to the substantial gap between the subsidized price and the economic price, which increases by 51.70% from the initial subsidized price of IDR 6,800 to IDR 10,320, followed by price adjustments of approximately 3% in the following years.

Meanwhile, in the Increasing Administered Price scenario, with a 10% annual increase toward the economic price, the additional inflation remains relatively constant at 1.05 percentage points. Similar to RON90 or Pertalite, the additional inflation component for CN48 or Diesel is also dominated by indirect inflation, as Diesel serves as an input commodity in many subsectors. Consequently, the most affected sectors are similar: mining, logistics, financial services, telecommunications, and real estate services. However, unlike RON90 or Pertalite, Diesel has a higher subsector proportion due to the greater volume of domestic Diesel production compared to domestic gasoline production, resulting in a more significant impact.

Figure 17: Estimated Socioeconomic Class Changes Due to Solar Subsidy Reform



Source: Susenas 2023, using CEQ

The blue graph in Figure 17, particularly in Panel a (Scenario 2), illustrates that even with social assistance, significant class downgrades occur under the Dynamic Pricing scenario. This indicates that purchasing power cannot be maintained with the assistance amount of IDR 250,000 per household. This is due to the strong link between Diesel as an input for productive sectors; thus, the socioeconomic impact arises not only from increased expenses but also from reduced income caused by disruptions in productive sectors.

In Panel b (Scenario 3), the effects of social assistance are more apparent in maintaining consumption levels. In fact, in this scenario, social assistance can even result in some groups moving up in class, as the assistance provided exceeds the total additional expenditure caused by the subsidy reform.

LPG 3 KG Subsidy Reform

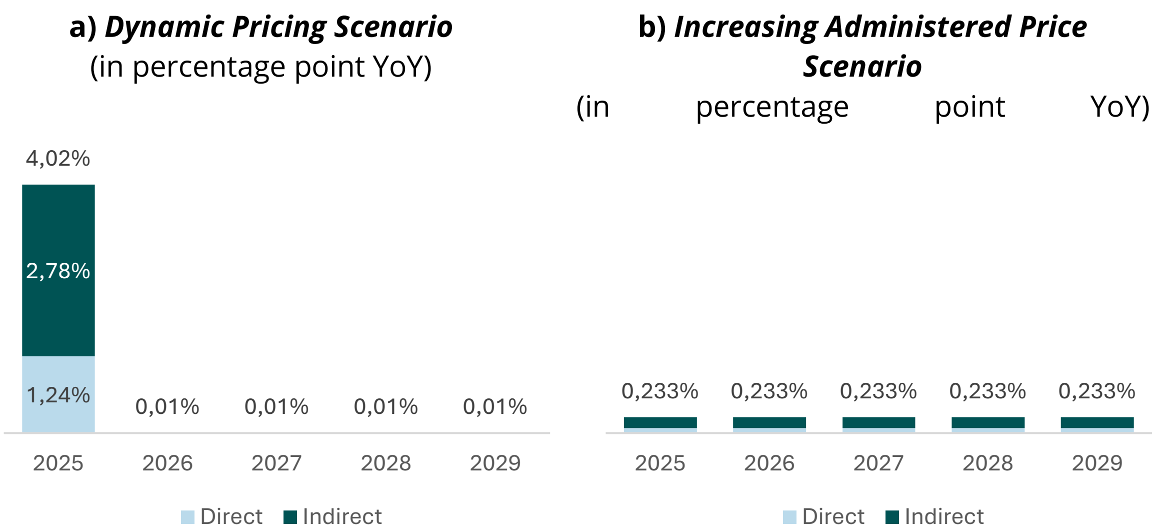
The estimated socioeconomic impact of the LPG 3KG subsidy reform is a consequence of the price change forecasts from the two proposed subsidy reform scenarios in the previous chapter. Specifically, the forecasted price changes from the proposed reforms are used as shock parameters for the Refined Petroleum and Gas Products subsector (Code 095). These values are adjusted to reflect the proportion of LPG within that subsector and its consumer groups, predominantly households (determined based on Susenas 2023 data). This shock is formulated as a vector, which is then multiplied by the Leontief Inverse Matrix coefficients to calculate output values. These are compared to output values without the reform shock to determine the inflation impact if the proposed scenarios are implemented.

Figure 18 presents the estimated inflation impacts for the Dynamic Pricing scenario (Panel a) and the Increasing Administered Price scenario (Panel b) for the LPG 3KG commodity.

In the Dynamic Pricing scenario, there is an additional inflation of 4.02 percentage points in the first year, followed by almost zero inflation in the subsequent years. Although the price adjustment in this scenario increases the price of 3kg LPG by 172.76% (higher than the adjustment for Diesel), the inflationary impact is not as significant as that of Diesel. This is because the use of LPG 3KG is predominantly limited to households or small-scale businesses operating at the household level.

In **Panel b**, representing the **Increasing Administered Price** scenario, the estimated inflation change remains steady at **0.233 percentage points YoY** for each 10% price increase from the current year's price annually. This indicates that the inflationary impact on the LPG 3KG commodity is not significant when there are no drastic price releases.

Figure 18: Estimated Inflation Changes Due to LPG 3KG Subsidy Reform



Source: Authors, I-O analysis

Figure 19 illustrates the estimated changes in socioeconomic composition during the first year after the reforms are implemented.

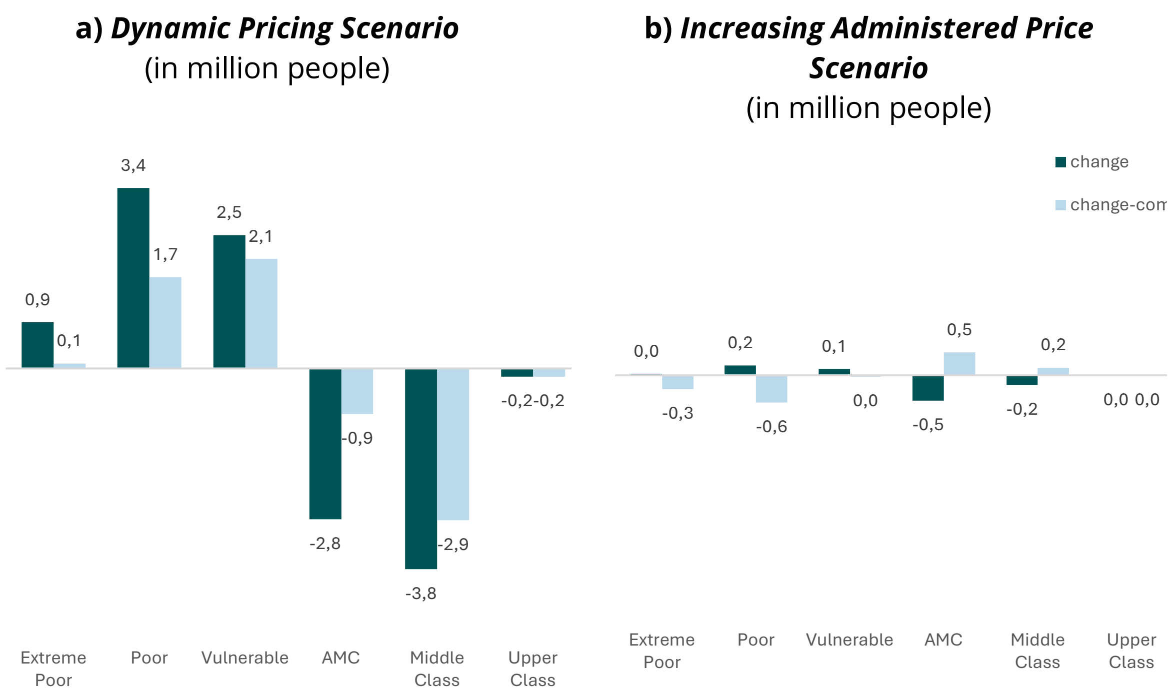
In the **Dynamic Pricing** scenario (**Panel a**), the 3kg LPG reform is estimated to reduce the **Aspiring Middle Class (AMC)** and **Middle Class (MC)** groups by **3.8 million** and **2.8 million** people, respectively. Conversely, the **Poor** and **Vulnerable Poor** groups are projected to increase by **2.5 million** and **3.4 million** people, respectively.

In contrast, the socioeconomic impact of the **Increasing Administered Price** scenario (**Panel b**) is less severe. In this scenario, the **AMC** and **MC** groups decrease by **0.7 million** people, while the **Poor** and **Vulnerable Poor** groups increase by **0.2 million** and **0.1 million** people, respectively.

The blue graph, particularly **Panel a (Scenario 2)** in **Figure 19**, shows that after the introduction of social assistance, the class downgrades can be mitigated. Although there is still an increase in the **Extreme Poor** group, the number is significantly smaller compared to the scenario without social assistance. LPG has a strong direct channel to households, and therefore, the direct impact of increased subsidized LPG prices leads to higher expenditures.

In **Panel b (Scenario 3)**, the impact of social assistance is still evident in maintaining consumption levels. In fact, this scenario may even result in some groups moving up in class, as the social assistance provided exceeds the total additional expenditures caused by the subsidy reform.

Figure 19: Estimated Socioeconomic Class Changes Due to LPG 3KG Subsidy Reform



Source: Susenas 2023, using CEQ

Conclusion and Policy Strategy Recommendation

Current fuel and LPG subsidy policies are regressive and sensitive to global economic and geopolitical uncertainties. This indicates that the subsidy policy has not effectively achieved its primary function of providing equity to those in need. A significant portion of subsidy recipients are higher-income groups. Furthermore, the current policy of maintaining unchanged fuel and LPG prices over an extended period—now exceeding two years—has led to excessive fuel consumption. Real fuel and LPG prices, when adjusted for inflation, have decreased, while international prices have risen due to supply and geopolitical issues, as well as the depreciation of the rupiah.

Based on this rationale, subsidy reform is needed to create a more equitable and resilient system that is less dependent on fossil fuels and more adaptive to global economic conditions.

This study examines five energy subsidy scenarios: (1) business as usual, (2) dynamic pricing, (3) increasing administered price, (4) quota based on engine capacity (cc), and (5) quota based on engine capacity excluding Pertalite for cars. Various simulations yielded findings regarding their impact on the state budget and the socio-economic condition of the public:

1. Without changes to the fuel and LPG subsidy policies, energy subsidies will increase from IDR 427 trillion in 2024 to IDR 689 trillion in 2029. This reflects the continuous increase in domestic energy consumption and the potential rise in global oil prices, which underpin energy production in Indonesia.
2. The dynamic pricing policy scenario results in the greatest fiscal savings compared to other scenarios. In this scenario, instead of setting fuel prices, subsidies are fixed at IDR 3,000 per liter for fuel and IDR 3,000 per kilogram for LPG. Prices fluctuate monthly based on international market rates.
3. The policy scenario involving fuel usage quotas based on engine capacity (cc) yields the smallest fiscal savings. However, when this quota is coupled with a ban on using Pertalite for cars, fiscal savings can be increased.
4. The scenario of gradually increasing fuel and LPG prices by 10% annually does not provide significant fiscal savings in 2025. However, over subsequent years, savings grow as domestic consumption prices approach international market levels.
5. Among these scenarios, the dynamic pricing policy results in higher socio-economic impacts, evidenced by increased inflation and reduced public welfare. These impacts are most pronounced during the first year of price adjustments but gradually diminish in subsequent years.

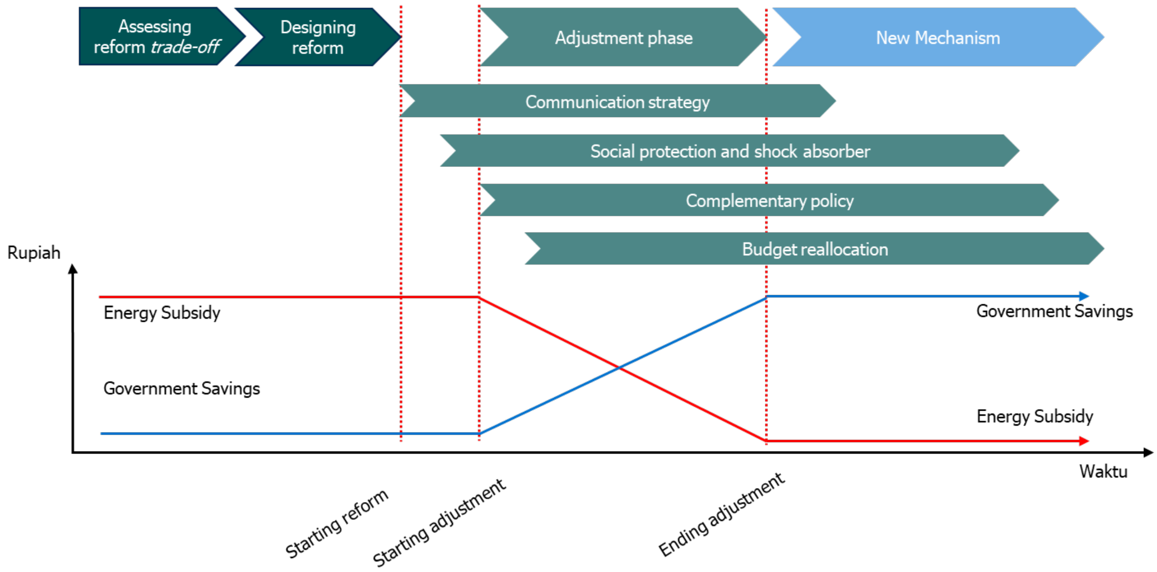
6. Providing social assistance for six months after implementing price adjustments significantly mitigates the socio-economic impacts. Welfare, particularly for low-income groups, can be improved to buffer the effects of rising inflation.

The five scenarios demonstrate varied results, with scenario 2 (dynamic pricing) offering the largest fiscal savings. However, implementing dynamic pricing requires robust governance in budget allocation, eliminating the mechanism of compensating the price difference between economic and retail prices. Socio-economically, dynamic pricing leads to more substantial impacts than increasing administered prices (scenario 3), as indicated by higher inflation and a larger group of people descending into lower income classes. To mitigate these effects, social protection measures can effectively safeguard vulnerable groups against these changes.

Compared to other scenarios, the engine capacity-based quota (4) provides the smallest fiscal space. However, removing Pertalite subsidies for cars under this scenario can create relatively significant fiscal space. Both quota-based scenarios require vehicle identification mechanisms, such as training for fuel station personnel or digital application registration. These scenarios can serve as transitional reforms before implementing dynamic pricing.

Successful energy subsidy reform requires good governance and consistent implementation to maintain the adjustment process. Supporting strategies such as social protection, communication strategies, and timing considerations (as illustrated in Figure 20) are essential. Several key points must be considered in implementing energy subsidy reforms, especially for fuel and LPG.

Figure 20: Energy Subsidy Reform Strategy



Source: Rentschler & Bazilian (2017) adjusted by authors

Good governance is critical, particularly for policies based on quotas and restrictions on subsidized energy use. These policies require vehicle identification mechanisms, such as training fuel station personnel or utilizing digital technology. While digital applications can help, their success largely depends on field-level implementation, which can be challenging to monitor, especially given the high incentives for misuse due to market segregation arising from quotas and restrictions.

Consistency in policy implementation is paramount when pursuing price adjustments, whether through dynamic pricing or administered prices. For administered prices, periodic increases are necessary, requiring the government to undertake unpopular actions. Dynamic pricing does not require price increases but necessitates continuous price adjustments by Pertamina for subsidized fuels. This practice, already in place for non-subsidized fuels, demands governmental courage to avoid price fixing during sharp international price hikes. This policy advantage lies in familiarizing the public with fuel and LPG price changes, prompting adjustments in consumption levels.

Strengthening social protection is a crucial step to address the potential increase in poverty and extreme poverty. Price hikes from subsidy adjustments can also impact the middle class. A shock absorber mechanism is needed to protect these groups. Simulations indicate the need to reallocate IDR 167 trillion for social assistance in the business-as-usual scenario (1) and IDR 33 trillion for dynamic pricing (2) within one year. This translates to monthly allocations of IDR 13.91 trillion and IDR 2.75 trillion, respectively, for scenarios 1 and 2, benefiting 55.95 million people to sustain purchasing power. These amounts represent 86-89% of 2025 income levels.

Drawing from the socio-economic impacts of the 2015 energy subsidy reform, where impacts peaked within three months before declining, the government should prepare at least four months of social assistance. This requires IDR 55.67 trillion (18.65%) for scenario 1 and IDR 916.7 billion (1.8%) for scenario 2.

Effective communication strategies and appropriate timing are essential for subsidy reform. Current issues include middle-class declines due to a weakening productive sector, additional levies like the Public Housing Savings Fund (Tapera), and planned VAT increases to 12%. Given these factors, the government must clearly communicate the importance of subsidy reforms, their potential benefits, and measures to mitigate socio-economic impacts.

References

Bank Dunia. (2019). *Aspiring Indonesia: Expanding the Middle Class*. World Bank. https://www.worldbank.org/en/country/indonesia/publication/aspiring-indonesia-expanding-the-middle-class

International Institute for Sustainable Development (IISD). 2015. Diesel Subsidy Report in India: Lesson Learned. Research Report May 2015.

International Monetary Fund (IMF). 2013. Energy Subsidy Reform: Lessons and Implications.

Laan, T. and S. Sharma (2024), "Pro-poor fossil fuel subsidy reform", in *Development Co-operation Report 2024: Tackling Poverty and Inequalities through the Green Transition*, OECD Publishing, Paris, https://doi.org/10.1787/60c06872-en.

Lustig, N. (2023). *Commitment to equity handbook: Estimating the impact of fiscal policy on inequality and poverty*. Brookings Institution Press. https://books.google.com/books?hl=en&lr=&id=Rvu6EAAAQBAJ&oi=fnd&pg=PP1&dq=commitment+to+equity&ots=5p1rw3UIfj&sig=IF-b3GrbMQwKGtb6bu4fOHui2y0

Miller, R. E., & Blair, P. D. (2009). *Input-output analysis: Foundations and extensions*. Cambridge university press. https://books.google.com/books?hl=en&lr=&id=viHaAgAAQBAJ&oi=fnd&pg=PR24&dq=miller+blair+input+output&ots=gsCpiBmY8V&sig=nuhDEEmDwABO0uxjFbwmNeuEkwU

United Nations Development Programme (UNDP). 2021. Fossil Fuel Subsidy Reform: Lessons and Opportunities.

Jazuli, M. R., Steenmans, I., & Mulugetta, Y. (2021). Navigating policy dilemmas in fuel-subsidy reductions: Learning from Indonesia's experiences. *Sustainability: Science, Practice and Policy*, *17*(1), 391–403. https://doi.org/10.1080/15487733.2021.2002024

Lustig, N. (2023). *Commitment to equity handbook: Estimating the impact of fiscal policy on inequality and poverty*. Brookings Institution Press. https://books.google.com/books?hl=en&lr=&id=Rvu6EAAAQBAJ&oi=fnd&pg=PP1&dq=commitment+to+equity&ots=5p1rw3UIfj&sig=IF-b3GrbMQwKGtb6bu4fOHui2y0

Mahanani, N. T., & Fitrady, A. (2018). *Dampak Penurunan Subsidi Energi terhadap Distribusi Pendapatan (Analisis Sistem Neraca Sosial Ekonomi Indonesia)*.

Perdana, A. P. (2022). *Selisih Harga Berpotensi Picu Distorsi Subsidi*.

Pusat Kajian Anggaran DPR RI. (2021). *Tantangan Transformasi Subsidi Energi*. DPR RI.

Rentschler, J., & Bazilian, M. (2017). Policy Monitor—Principles for Designing Effective Fossil Fuel Subsidy Reforms. *Review of Environmental Economics and Policy*, *11*(1), 138–155. https://doi.org/10.1093/reep/rew016

Ricke, K., Drouet, L., Caldeira, K., & Tavoni, M. (2018). Country-level social cost of carbon. *Nature Climate Change*, *8*(10), 895–900. https://doi.org/10.1038/s41558-018-0282-y

Sasana, H., Setiawan, A. H., Ariyanti, F., & Ghozali, I. (2017). *The Effect of Energy Subsidy on the Environmental Quality in Indonesia*. *7*(5).

Appendix I – Data Source

No	Description	Code	Unit	Period	Source
Annual Data					
1	Sales/Consumption RON88	r88	KL/Year	2000 - 2023	HEES
2	Sales/Consumption RON90	r90	KL/Year	2000 - 2023	HEES
3	Sales/Consumption RON88 + RON90	r88plus	KL/Year	2000 - 2023	HEES
4	Sales/Consumption RON92	r92	KL/Year	2000 - 2023	HEES
5	Sales/Consumption RON95	r95	KL/Year	2000 - 2023	HEES
6	Sales/Consumption CN48	cn48	KL/Year	2000 - 2023	HEES
7	Sales/Consumption CN51	cn51	KL/Year	2000 - 2023	HEES
8	Sales/Consumption CN53	cn53	KL/Year	2000 - 2023	HEES
9	Sales/Consumption biogasoil	bio	KL/Year	2000 - 2023	HEES
10	Sales/Consumption kerosene	ker	KL/Year	2000 - 2023	HEES
11	Sales/Consumption LPG 3KG	lpg	KL/Year	2000 - 2023	HEES
12	Vehicle per CC		Satuan/Year	2023	BPH Migas
13	Consumer Price Index	icp	US$/Barrel	1967 – 2023	CEIC
14	GDP and projection	gdp	$	1967 – 2023	CEIC, IMF
15	Population and projection	pop	People /Year	1967 – 2023	BPS, IMF
16	CO2 emission from energy sector	co2	Ton/Year	1967 – 2023	Energy Institute

Monthly Data

17	Price of RON88	US$/Barrel	MOPS
18	Price of RON90	US$/Barrel	MOPS
19	Price of kerosene	US$/Barrel	MOPS
20	Price of solar	US$/Barrel	MOPS
21	Price of LPG 3KG	US$/mmbtu	HEES
22	Consumer price RON 92+	Rp/L	HEES
23	Consumer price RON88	Rp/L	HEES
24	Consumer price RON90	Rp/L	HEES
25	Consumer price kerosene	Rp/L	HEES
26	Consumer price solar	Rp/L	HEES

Misc.

27	Assumption of *social cost of carbon*	$38,8 /CO2eq	IIEE
28	Table I-O 2016		BPS

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