

ANALYSIS OF FUEL CONSUMPTION DATA AS A RESPONSE TO ENERGY EFFICIENCY POLICIES FOLLOWING THE POTENTIAL CLOSURE OF THE STRAIT OF HORMUZ

Elvina Alya Muzhaffar¹, Naufal Faaq Alluqman², Habibi Khoirul Rosit³, Taqiy Faqihuddin⁴, Alvin Adrian Fauzi Pramudita⁵, dan Faridhatun Nikmah⁶

¹ Data Science Study Program, Universitas Islam Negeri Raden Mas Said Surakarta
email: elvinaalya04@gmail.com

² Data Science Study Program, Universitas Islam Negeri Raden Mas Said Surakarta
email: nauf7787@gmail.com

³ Data Science Study Program, Universitas Islam Negeri Raden Mas Said Surakarta
email: goirulhabibi@gmail.com

⁴ Data Science Study Program, Universitas Islam Negeri Raden Mas Said Surakarta
email: taqiyhuddin008@gmail.com

⁵ Data Science Study Program, Universitas Islam Negeri Raden Mas Said Surakarta
email: alvinadriann222@gmail.com

⁶ Universitas Islam Negeri Raden Mas Said Surakarta
email: faridhatunnikmah28@gmail.com

Abstrak. *Global energy demand, which still heavily depends on fossil fuels, has made world energy stability highly influenced by international geopolitical conditions. One of the most strategic regions in global oil distribution is the Strait of Hormuz, meaning that disruptions in this route can affect global oil prices and impact fuel consumption in various countries, including Indonesia. This study aims to analyse fuel oil (BBM) consumption as a response to energy efficiency policies resulting from geopolitical dynamics in the Strait of Hormuz and to identify their impacts on Indonesian society. This research employs a qualitative method with a descriptive approach. The data used are secondary data obtained from scientific journals and various other supporting sources. Data collection techniques were carried out through documentation studies and literature reviews, which were then analysed descriptively to understand the relationship between global geopolitical conditions, fuel efficiency policies, and changes in public consumption patterns. The results show that the threat of disruption to oil distribution in the Strait of Hormuz has caused an increase in global oil prices, which consequently affected fuel price adjustments in Indonesia. These conditions encouraged the government to implement efficiency policies such as restrictions on subsidized fuel, digital distribution monitoring, biodiesel development, and the promotion of electric vehicles. These policies have influenced public behaviour in energy consumption and increased public awareness of the importance of national energy efficiency.*

Keywords: *Fuel Consumption, Government Policy, Strait of Hormuz, Geopolitics*

I. INTRODUCTION

Global energy demand remains heavily dominated by fossil fuels, particularly petroleum-based fuels, making the global energy system highly vulnerable to geopolitical dynamics. One of the most strategic routes in global oil distribution is the Strait of Hormuz. This waterway serves as a critical gateway for oil exports from the

Middle East to international markets, including Indonesia. According to Kompas.id (2026), any disruption or closure of the Strait of Hormuz has the potential to trigger fluctuations in global oil prices and affect fuel availability and consumption at the national level. This situation demonstrates that a country's energy security is influenced not only by domestic factors but also by global

developments that are largely beyond national control.

As a country that continues to rely significantly on fossil fuels, Indonesia faces substantial challenges in maintaining the stability of its energy supply and consumption. In response to external pressures, the government typically implements fuel-efficiency policies, including distribution control mechanisms, consumption restrictions, and fuel price adjustments. These measures are intended to balance energy availability with public demand while reducing the fiscal burden on the state [1]. However, such policies may also influence public consumption patterns, both in terms of fuel consumption volume and energy-use behavior.

Changes in energy policy have direct implications for public behavior and economic activities [2]. Fuel price increases, for instance, may reduce purchasing power and encourage individuals to decrease private vehicle usage or shift toward more efficient public transportation alternatives. Furthermore, sectors such as transportation, logistics, and micro, small, and medium-sized enterprises (MSMEs) are significantly affected by changes in fuel-related policies. Therefore, it is important to analyze how fuel consumption patterns change in response to efficiency measures and to assess the extent to which such policies generate tangible impacts on society. To better understand these effects, an analysis based on fuel consumption data is required to identify changes in energy-use behavior before and after the implementation of energy-efficiency policies.

A data-driven approach is essential for examining fuel consumption patterns objectively and comprehensively. In this study, secondary data are utilized to describe changes in fuel consumption before and after the implementation of energy-efficiency measures. These data are then analyzed descriptively to understand consumption trends influenced by economic conditions, government policies, and global geopolitical developments.

Accordingly, this study addresses two primary research questions: (1) How does fuel consumption change in response to energy-efficiency policies? and (2) What impacts do these policies have on fuel consumption behavior among Indonesian society? The objectives of this study are to analyze changes in fuel consumption patterns in Indonesia as a response to energy-efficiency policies, identify the impacts of such policies on public consumption behavior, and examine the influence of global geopolitical dynamics on national energy conditions. Furthermore, this study aims to explore the relationship among fuel price increases, government policies, and changes in public energy-consumption patterns.

This research is important because fuel consumption is closely related to economic activities, public mobility, and national energy stability. Potential disruptions to global oil distribution routes, such as the closure of the Strait of Hormuz, can significantly affect energy prices and economic conditions in Indonesia. Therefore, an in-depth analysis is needed to understand how governments and society respond to such circumstances through energy-efficiency policies. The findings of this study are expected to contribute academically to the growing body of literature on energy policy and fuel consumption in Indonesia, while also providing practical insights for policymakers in designing more effective, adaptive, and targeted energy policies.

Several previous studies have examined issues related to energy consumption and supply. Research conducted by Septyani et al. (2025) indicated that domestic crude oil availability is projected to remain sufficient to meet national demand until 2030, despite a growing trend in consumption that is not matched by reserve growth. While that study shares similarities with the present research in discussing energy consumption and utilizing data-based analysis, it primarily focuses on forecasting crude oil supply through quantitative methods. In contrast, the present study emphasizes changes in public fuel consumption as a response to energy-

efficiency policies and global geopolitical dynamics.

Similarly, Rohani et al. (2025) found that unstable traffic conditions significantly increase fuel consumption levels. Although both studies examine fuel consumption and its influencing factors, Rohani et al. focused on transportation-related technical aspects and traffic conditions through field surveys. The current study, however, investigates fuel consumption from the perspective of energy policy, geopolitical conditions, and public consumption behavior using a descriptive analytical approach.

Another study conducted by Saffanah et al. (2014) revealed that fuel-efficiency policies had not been implemented optimally due to challenges related to communication, resources, bureaucratic structures, and implementer disposition. While both studies discuss government fuel-efficiency policies, the previous research focused on policy implementation at the regional level using a qualitative approach. In contrast, the present study emphasizes changes in public fuel consumption patterns based on secondary data while incorporating global factors such as the potential closure of the Strait of Hormuz.

Based on the existing literature, a research gap can be identified. Previous studies have generally examined energy forecasting, transportation-related factors, or policy implementation separately. Few studies have comprehensively integrated public fuel consumption, energy-efficiency policies, and the impacts of global geopolitical dynamics within a single analytical framework. Therefore, this study seeks to address this gap through a descriptive qualitative approach that utilizes secondary fuel-consumption data while linking it to energy-efficiency policies and global geopolitical developments.

The novelty of this study lies in its use of a descriptive qualitative approach supported by secondary fuel-consumption data to analyze changes in public consumption behavior. Furthermore, the study integrates global geopolitical factors, particularly developments in the Strait of Hormuz, with government fuel-efficiency policies within a

comprehensive analytical framework. The research also highlights behavioral changes in energy consumption as a response to rising fuel prices and energy-efficiency measures implemented by the government.

From a practical and academic perspective, this study is expected to contribute to the development of data-driven energy policy research and provide valuable insights for policymakers in designing more effective and adaptive energy strategies. The study is grounded in consumption theory and public policy theory, particularly George Edward III's policy implementation framework, which is used to analyze the relationship between energy-efficiency policies and changes in fuel consumption behavior.

II. RESEARCH METHODOLOGY

This study employed a qualitative research method with a descriptive approach. Qualitative research is designed to understand and explain a phenomenon in depth based on non-numerical data, such as documents, literature, and findings from previous studies [3]. Meanwhile, the descriptive approach was used to describe conditions, events, and relationships among phenomena related to fuel consumption and energy-efficiency policies resulting from global geopolitical dynamics, particularly the potential closure of the Strait of Hormuz.

The data utilized in this study consisted of secondary data obtained from various reliable sources, including scientific journals, official government reports, news articles, publications issued by Statistics Indonesia (BPS), the Ministry of Energy and Mineral Resources (ESDM), and reports published by PT Pertamina (Persero). These data were used to obtain information regarding fuel consumption patterns, energy-efficiency policies, the impacts of fuel price increases, and the effects of geopolitical conflicts on energy distribution.

Data collection was conducted through documentation studies and literature reviews. Documentation studies involved collecting various documents, reports, and data relevant to the research topic. Meanwhile, the literature

review was carried out by examining scientific journals, scholarly articles, and previous studies relevant to the subject in order to strengthen the theoretical foundation and analytical framework of the research.

In this study, the researcher served as the primary research instrument (human instrument), responsible for collecting, selecting, interpreting, and analyzing the data. In addition, documentation sheets and literature review notes were utilized to facilitate data classification and organization according to the research focus.

The research procedure consisted of several stages, namely problem identification, collection of relevant literature and documents, data selection based on relevance to the research topic, data classification according to the focus of discussion, data analysis, and conclusion drawing. Data analysis was conducted descriptively by interpreting information obtained from various sources to understand the relationship between the potential closure of the Strait of Hormuz, fuel-efficiency policies, and changes in fuel-consumption patterns among Indonesian society.

To ensure the trustworthiness and credibility of the data, source verification was carried out by comparing information obtained from multiple relevant and reliable references. The selection of sources was based on their credibility, validity, and relevance to the research topic, thereby ensuring that the findings could be scientifically justified and supported.

III. RESULTS AND DISCUSSION

The Strait of Hormuz is one of the most strategic maritime routes in the world, connecting major oil-producing regions in the Middle East with global markets [4]. A substantial portion of the world's oil supply passes through this route, making any disruption, geopolitical conflict, or military tension in the region capable of causing instability in global energy supplies.

Over the past several decades, the Persian Gulf region has frequently experienced geopolitical conflicts, including

tensions between Iran and the United States, as well as broader conflicts in the Middle East that have the potential to disrupt global oil distribution [5]. The threat of closing the Strait of Hormuz often emerges during periods of escalating conflict as a form of geopolitical pressure, directly affecting international energy trade routes.

When conflicts occur or when there is a threat of closure along this strategic route, crude oil transportation and distribution become disrupted. In addition to geopolitical tensions, oil production policies established by the Organization of the Petroleum Exporting Countries (OPEC) also influence fuel price fluctuations in various countries, including Indonesia [6]. These conditions reduce global oil supply and contribute to rising international oil prices. Consequently, countries that remain dependent on crude oil imports and petroleum-based fuel products, such as Indonesia, are particularly vulnerable to these developments [7]. Therefore, geopolitical changes in the Strait of Hormuz region can indirectly affect domestic fuel prices and national energy stability.

In response to such circumstances, the Indonesian government typically implements fuel price adjustment policies and energy-efficiency measures. These policies are intended to regulate energy consumption, maintain a balance between energy demand and available supply, and reduce pressure on the national budget. The measures may include restrictions on subsidized fuel consumption, tighter fuel distribution controls, and public campaigns promoting energy conservation. The impacts of these policies are subsequently reflected in changes in fuel-consumption patterns among Indonesian society [1].

3.1. Forms of Energi-Efficiency Policies Implemented by the Government

In response to global energy and economic conditions during the period from April to May 2026, the Indonesian government implemented various fuel-efficiency policies aimed at maintaining national energy-consumption stability,

reducing pressure on the state budget, and mitigating the impacts of global geopolitical developments on international oil prices. These policies focus not only on controlling fuel consumption but also on accelerating the energy transition and reducing dependence on fossil fuels.

One of the major policies introduced by the government is the B50 biodiesel program, which officially came into effect on July 1, 2026. This program involves blending diesel fuel with 50% biofuel derived from renewable sources as part of an effort to reduce reliance on fossil-fuel-based energy. Through this initiative, the government aims to reduce fuel consumption by millions of kiloliters annually while simultaneously decreasing the fiscal burden associated with energy subsidies.

In addition, the government has strengthened the monitoring of subsidized fuel distribution through the implementation of a barcode verification system integrated into the MyPertamina application. This policy was introduced to regulate the purchase of subsidized fuels, such as Solar and Pertalite, and ensure that subsidies are distributed more accurately to eligible beneficiaries. Restrictions on fuel purchases have also been imposed to prevent subsidy misuse and reduce excessive fuel consumption among the public [8].

Another energy-efficiency measure involves the implementation of flexible working arrangements, including work-from-home (WFH) policies for civil servants (ASN) during specific periods [9]. This policy aims to reduce daily mobility, thereby lowering fuel consumption within the transportation sector. Furthermore, the government has expanded the use of digital services in administrative and governmental activities to minimize official travel and reduce energy-intensive operations.

At the same time, the government has accelerated the promotion of electric vehicles as part of its long-term strategy to reduce fuel consumption. The increased adoption of electric vehicles and alternative-energy transportation systems is expected to lessen public dependence on fossil-fuel-based

energy sources. Government support for electric vehicle adoption includes the development of charging infrastructure, public campaigns promoting environmentally friendly energy use, and initiatives aimed at increasing public awareness of energy efficiency and emission reduction.

Within the defense sector, the government, in collaboration with relevant ministries and institutions, has implemented fuel-saving measures in operational activities without compromising national preparedness and security. Efficiency measures have also been introduced in the food distribution and logistics sectors through more structured distribution management systems, particularly in food-service programs. However, special exemptions remain in place for disadvantaged, frontier, and remote regions (3T areas) to ensure the continued availability of essential supplies.

The government has also encouraged behavioral changes among citizens through energy-conservation campaigns promoting the use of public transportation, electric vehicles, cycling, and walking. These initiatives are intended to increase public awareness of the importance of energy efficiency and reduce dependence on petroleum-based fuels.

Collectively, these energy-efficiency policies demonstrate the government's commitment to maintaining national energy-consumption stability amid increasing global pressures on the energy sector. In addition to controlling fuel usage, these measures are designed to safeguard the 2026 State Budget (APBN) by ensuring that energy subsidies remain manageable and do not impose a greater economic burden on the country.

3.2. Analysis of Fuel Consumption Data in Indonesia

Fuel consumption in Indonesia has changed over time as a result of various influencing factors, including economic conditions, public mobility, government policies, and global geopolitical dynamics. As a country with a high level of energy demand, Indonesia continues to experience substantial

fuel consumption, particularly in the transportation and industrial sectors. However, fluctuations in global oil prices, the implementation of energy-efficiency policies, and potential disruptions to oil distribution through the Strait of Hormuz have also affected fuel-consumption patterns among the population. Figure 1 presents fuel-consumption trends in Indonesia.

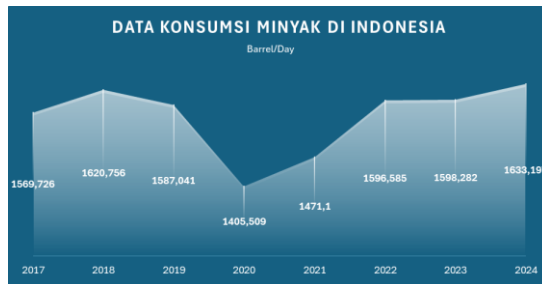


Figure 1. Fuel Consumption Trends in Indonesia, 2017–2024

Source: Adapted from CEIC data, 2024.

Based on the data presented above, fuel consumption in Indonesia exhibited fluctuating trends throughout the observed period. Between 2017 and 2019, fuel consumption showed a steady increase. This trend was largely driven by economic growth, rising public mobility, and the increasing number of motor vehicles in the country. The widespread use of private vehicles and the expansion of goods distribution activities contributed significantly to the growing demand for fuel during this period.

However, fuel consumption declined considerably in 2020 [10]. This decrease was primarily attributed to the COVID-19 pandemic, which led to restrictions on public activities, reduced mobility, and a decline in transportation and industrial operations [11]. Government-imposed social restriction policies resulted in lower utilization of both private and public transportation, thereby reducing overall fuel consumption [12].

During the period from 2021 to 2023, fuel consumption gradually increased once again. This recovery was driven by the resurgence of economic activities and the restoration of public mobility following the pandemic. Furthermore, the increased use of private vehicles after the pandemic

contributed to higher fuel demand. As national economic conditions improved, energy consumption rose accordingly, reflecting the growing need for transportation and industrial activities [9].

Nevertheless, a declining trend in fuel consumption began to emerge in 2024. This decline may be associated with rising global oil prices caused by geopolitical tensions in the Middle East, particularly concerns regarding potential disruptions to oil distribution through the Strait of Hormuz [13]. The increase in global oil prices resulted in adjustments to domestic fuel prices, prompting consumers to reduce excessive fuel usage and adopt more energy-conscious consumption practices.

These conditions continued into 2026, when the potential closure of the Strait of Hormuz increasingly affected the stability of global oil distribution. Disruptions along this strategic route reduced global energy supplies and contributed to rising crude oil prices. Indonesia experienced the effects of these developments through higher domestic fuel prices and increased energy-distribution costs. Consequently, fuel consumption declined as some members of society reduced their reliance on private vehicles, limited unnecessary mobility, and sought more energy-efficient transportation alternatives [14].

In addition to global influences, the decline in fuel consumption during this period was also associated with the energy-efficiency policies implemented by the government. These measures included restrictions on subsidized fuel usage, tighter fuel-distribution controls, and public campaigns promoting energy conservation. Such policies indirectly encouraged the public to use fuel more responsibly and increased awareness of the importance of energy efficiency.

Based on the findings of this analysis, it can be concluded that changes in fuel consumption in Indonesia are influenced by multiple interrelated factors, including economic conditions, public mobility, global oil prices, geopolitical conflicts, and government policy interventions. These

findings indicate that national energy consumption is closely linked to both domestic and international developments. Therefore, energy-efficiency policies play a crucial role in maintaining fuel-consumption stability and strengthening energy security in Indonesia.

3.3. Comparison of Fuel Consumption Data Before and After the Implementation of Energy-Efficiency Policies

Based on the observed consumption patterns, there are notable differences in fuel consumption before and after the escalation of geopolitical tensions in the Strait of Hormuz region. Prior to the emergence of threats to global oil distribution, fuel consumption in Indonesia tended to remain stable and increase gradually over time. Economic growth, the widespread use of private vehicles, and high levels of public mobility were among the primary factors contributing to the rising demand for fuel during this period.

However, after geopolitical tensions in the Middle East began to affect global oil distribution, fuel-consumption patterns started to change. Rising global oil prices led to increases in domestic fuel prices, causing consumers to become more cautious in their fuel usage. Many individuals reduced their reliance on private vehicles in order to minimize expenditures associated with higher energy costs. In addition, the transportation and logistics sectors adjusted their operations in response to increasing operational expenses [15].

These changes in fuel-consumption behavior were also influenced by the energy-efficiency policies implemented by the government. Measures such as restrictions on subsidized fuel consumption, stricter fuel-distribution monitoring, and public campaigns promoting energy conservation contributed to more controlled fuel usage compared with previous periods. This finding indicates that fuel-consumption levels are influenced not only by daily mobility and economic activities but also by fluctuations in energy prices and government interventions aimed at maintaining national energy stability [16].

Therefore, a comparison of fuel-consumption conditions before and after the impacts associated with the potential closure of the Strait of Hormuz reveals significant changes in consumption patterns in Indonesia. Before the emergence of global energy pressures, fuel consumption was largely driven by economic growth and increasing public activities. In contrast, following disruptions to global oil distribution, fuel consumption began to adjust in response to rising energy prices and the implementation of government energy-efficiency policies.

These findings suggest that fuel-consumption behavior is highly responsive to both external geopolitical developments and domestic policy interventions. Consequently, adaptive energy policies are essential for maintaining energy security, controlling fuel demand, and promoting more sustainable patterns of energy consumption in Indonesia.

3.4. Impact of Energy-Efficiency Policies on Public Consumption Behavior

The implementation of various fuel-efficiency policies by the Indonesian government has influenced changes in public energy-consumption behavior. Rising fuel prices, restrictions on subsidized fuel usage, and energy-conservation campaigns have encouraged individuals to pay greater attention to fuel consumption in their daily activities. These developments indicate that energy-efficiency policies not only contribute to controlling fuel consumption at the national level but also influence how society utilizes energy.

One of the most noticeable changes is the growing public awareness of reducing private vehicle usage, particularly for non-essential activities. Many individuals have begun utilizing public transportation or planning their travel more efficiently in order to minimize expenditures associated with increasing fuel costs. In addition, the implementation of work-from-home (WFH) policies in certain employment sectors has contributed to reducing daily mobility, thereby helping to lower fuel consumption within the transportation sector [9].

The restriction of subsidized fuel distribution through the barcode verification system integrated into the MyPertamina application has also affected public consumption behavior. Enhanced monitoring of fuel purchases has resulted in more controlled fuel usage compared to previous periods. Consumers have increasingly adjusted their fuel consumption according to priority needs, thereby reducing unnecessary fuel expenditures [17].

Furthermore, the growing promotion of environmentally friendly energy use has encouraged some members of society to consider adopting electric vehicles and other energy-efficient transportation alternatives. Although the adoption of electric vehicles in Indonesia is still in its developmental stage, increasing public interest in more efficient transportation technologies reflects a gradual shift in attitudes toward long-term energy consumption.

In the business and logistics sectors, rising fuel prices have also prompted business operators to adjust transportation practices and operational expenditures. Several industries have implemented energy-saving strategies to prevent excessive increases in distribution and operational costs. This finding demonstrates that fuel-efficiency policies have broader implications for economic activities beyond individual consumer behavior.

Therefore, the fuel-efficiency policies implemented by the government have had a significant impact on public consumption behavior, including private vehicle usage, energy utilization, and daily mobility patterns. These changes suggest that rising energy prices, combined with government policy interventions, can encourage individuals and businesses to adopt more responsible and efficient fuel-consumption practices.

Overall, the findings indicate that energy-efficiency policies can serve as effective instruments for promoting energy conservation, reducing excessive fuel consumption, and fostering more sustainable patterns of energy use within society.

3.5. Impact of Fuel Price Increases on Public Purchasing Power

The increase in fuel prices has been driven by rising global oil prices resulting from geopolitical instability, particularly tensions in the Middle East and concerns regarding disruptions to oil transportation through the Strait of Hormuz. Disturbances along this strategic oil trade route have constrained global energy supplies, leading to higher crude oil prices in international markets. These developments have also affected Indonesia, as a significant portion of the country's energy needs continues to be met through imports of crude oil and refined petroleum products.

Rising fuel prices have had a significant impact on public purchasing power because fuel is an essential commodity closely linked to transportation and various economic activities. Higher fuel costs increase transportation and distribution expenses, which subsequently contribute to rising prices of basic necessities and other consumer goods [18]. As a result, households are required to adjust their spending patterns in order to maintain their ability to meet daily needs.

The effects of fuel price increases are felt most strongly by low- and middle-income households. Increased transportation costs place additional pressure on household budgets, while rising prices of goods and services further reduce consumers' ability to meet certain needs. Consequently, many individuals become more cautious in their spending behavior and reduce expenditures considered non-essential or less urgent.

In the transportation sector, higher fuel prices increase travel costs for both private vehicle users and public transportation operators. This situation encourages some members of society to reduce their mobility or seek more cost-efficient transportation alternatives. Furthermore, small and medium-sized enterprises (SMEs) are also affected by rising distribution and operational costs, which may negatively influence business performance and profitability.

Fuel price increases also have broader implications for household economic

conditions. Many families respond by adjusting their consumption patterns, such as reducing private vehicle usage, adopting energy-saving practices, and limiting expenditures on secondary or non-essential goods. These behavioral adjustments demonstrate the close relationship between energy prices, household welfare, and consumer purchasing power [19].

Although the government has implemented energy-efficiency measures and subsidy-control policies to maintain national economic stability, rising fuel prices continue to exert pressure on household finances and overall economic conditions. Therefore, policymakers face the challenge of balancing energy-efficiency objectives with the need to protect public purchasing power. Appropriate policy interventions are necessary to ensure that efforts to promote energy conservation do not impose excessive economic burdens on society.

Overall, the findings indicate that fuel price increases have significant socioeconomic consequences, affecting not only energy consumption patterns but also household welfare, consumer behavior, and economic stability. Consequently, a balanced policy approach is required to simultaneously support energy efficiency, maintain economic resilience, and safeguard public purchasing power.

3.6. Impact of Fuel Price Increases Across Various Sectors

Fuel price increases affect not only public purchasing power but also various economic and social sectors. The magnitude of these impacts differs across sectors depending on the extent to which fuel is utilized in operational activities and distribution processes. This demonstrates that changes in energy prices have far-reaching implications for both societal activities and national economic conditions.

The transportation sector is among the sectors most significantly affected by rising fuel prices. Higher fuel costs increase vehicle operating expenses for both public transportation services and freight

transportation. As a result, transportation fares and distribution costs tend to rise, placing additional burdens on economic activities and household expenditures. However, these circumstances also encourage individuals to adopt more energy-efficient transportation practices, such as using public transportation, carpooling, and selecting more fuel-efficient modes of travel.

In the trade sector and among micro, small, and medium-sized enterprises (MSMEs), fuel price increases contribute to higher production and distribution costs [20]. Many business operators experience declining profits due to increased operational expenses, while weakened consumer purchasing power further reduces demand for goods and services. Consequently, some businesses are compelled to adjust product prices and modify their business strategies in order to remain competitive and sustainable. At the same time, these challenges encourage the adoption of energy-saving measures and efficiency-oriented operational practices.

The industrial sector is also affected by rising energy and raw-material transportation costs. Increased fuel prices lead to higher production expenses, prompting some companies to reassess and optimize their operational expenditures. Nevertheless, these conditions have also stimulated technological innovation and the adoption of more efficient production systems aimed at reducing dependence on fossil fuels and improving operational efficiency.

In addition to their negative effects, rising fuel prices have contributed positively to the development of alternative energy sources and electric vehicles. As the cost of conventional fuel increases, consumers become more interested in adopting transportation technologies that offer greater energy efficiency. This trend has contributed to the growing use of electric vehicles and heightened public awareness of environmentally sustainable energy consumption. Furthermore, the government has intensified efforts to promote energy transition initiatives through the development of biofuels and renewable energy sources,

with the objective of reducing dependence on petroleum-based fuels.

The agricultural and fisheries sectors have also been affected by fuel price increases. Rising fuel costs increase the expenses associated with production equipment, transportation, and distribution activities. These additional costs may reduce the income of farmers and fishers due to higher operational expenditures. However, such circumstances also encourage the adoption of more efficient and energy-saving production methods as a means of controlling costs and improving productivity.

Overall, fuel price increases generate complex and multidimensional impacts across various sectors of society. Negative effects include higher operational and distribution costs, increased production expenses, and reduced consumer purchasing power. Conversely, positive outcomes include greater awareness of energy conservation, increased adoption of energy-efficient transportation systems, and accelerated development of alternative energy sources and electric vehicles in Indonesia.

These findings suggest that while rising fuel prices create short-term economic challenges, they may also serve as catalysts for long-term structural changes in energy consumption patterns, technological innovation, and the transition toward a more sustainable energy system.

3.7. Implementation of Fuel-Efficiency Policies Based on George Edward III's Policy Implementation Theory

George Edward III's policy implementation theory explains that the success of a policy is influenced by four key factors: communication, resources, disposition, and bureaucratic structure. These four aspects are interrelated and play a crucial role in determining the effectiveness of policy implementation within society. In this study, the theory is employed to analyze the implementation of fuel-efficiency policies introduced by the government in response to increasing global energy pressures resulting

from potential disruptions to oil distribution through the Strait of Hormuz.

3.7.1 Communication Aspect

The communication aspect concerns how policies are communicated to both the public and policy implementers. In the implementation of fuel-efficiency policies, the government has conducted various outreach and awareness programs regarding energy conservation, restrictions on subsidized fuel consumption, and the use of digital systems such as MyPertamina. This information has been disseminated through mass media, social media platforms, and various government initiatives. Nevertheless, some members of the public still lack a comprehensive understanding of the policy mechanisms, particularly regarding the use of barcode verification systems and restrictions on subsidized fuel purchases. This condition indicates that the effectiveness of policy communication still requires improvement to ensure more effective and efficient policy implementation [21].

3.7.2. Resource Aspect

The resource aspect encompasses the availability of facilities, infrastructure, and supporting capacities required for effective policy implementation. In the context of fuel-efficiency policies, the government has promoted the use of public transportation and electric vehicles as alternatives for reducing fuel consumption. However, the implementation of these policies continues to face several resource-related challenges, including the uneven availability of public transportation services and the limited distribution of electric vehicle charging infrastructure across different regions. Furthermore, a significant proportion of the population remains dependent on fossil-fuel-powered private vehicles for daily activities and mobility. These limitations constitute major obstacles to achieving substantial reductions in fuel consumption [22].

3.7.3. Disposition Aspect

The disposition aspect refers to the attitudes, commitment, and awareness of both the public and policy implementers regarding the policies being implemented. The findings

of this study indicate that gradual changes in public energy-consumption behavior have begun to emerge. Some individuals have reduced their reliance on private vehicles, adopted fuel-saving practices, and considered using electric vehicles or public transportation as alternative means of mobility. Nevertheless, certain groups within society remain unable to significantly reduce their fuel consumption due to occupational demands and high mobility requirements. This finding suggests that levels of public acceptance, commitment, and awareness regarding energy-efficiency policies vary considerably among different segments of society [16].

3.7.4. Bureaucratic Structure Aspect

The bureaucratic structure aspect is concerned with supervisory systems, implementation mechanisms, and coordination among institutions involved in policy execution. The government has implemented monitoring mechanisms for subsidized fuel distribution through the use of barcode verification systems and the MyPertamina application to ensure that fuel subsidies are distributed more accurately and reach eligible beneficiaries. In addition, the government has introduced fuel-distribution controls and energy-efficiency measures across various sectors.

However, several challenges remain in the implementation process, including limited access to digital technologies in certain regions and monitoring systems that have not yet operated optimally. These conditions indicate that the effectiveness of the bureaucratic structure still requires strengthening to ensure that fuel-efficiency policies can be implemented more effectively and efficiently [21].

Based on the four dimensions proposed by George Edward III, it can be concluded that the implementation of fuel-efficiency policies has begun to influence changes in public fuel-consumption patterns. Nevertheless, policy implementation continues to face several challenges, including infrastructure limitations, public dependence on fossil-fuel-

based energy, and weaknesses in policy monitoring and enforcement mechanisms. Therefore, greater efforts are required to improve public awareness campaigns, expand access to alternative-energy infrastructure, and strengthen policy supervision in order to achieve the objectives of energy-efficiency policies more effectively.

Overall, the findings suggest that the success of fuel-efficiency policies depends not only on the formulation of appropriate regulations but also on the effectiveness of communication, the availability of supporting resources, public commitment to policy objectives, and the capacity of bureaucratic institutions to implement and monitor policies consistently.

3.8. Analysis of Policy Compatibility with Field Conditions

Although the Indonesian government has implemented various fuel-efficiency policies to maintain national energy stability, the implementation of these policies continues to face several challenges in practice. Fundamentally, these policies are intended to regulate fuel consumption, reduce the burden of energy subsidies, and maintain fiscal stability amid rising global oil prices. However, actual conditions within society indicate that policy implementation has not yet fully achieved its intended objectives.

In practice, the policy of restricting subsidized fuel consumption through the barcode verification system and the MyPertamina application has helped the government improve the monitoring and targeting of fuel distribution. Nevertheless, several obstacles remain, including limited access to digital technology in certain regions, insufficient public understanding of digital systems, and the potential misuse of subsidized fuel distribution. These conditions suggest that policy supervision and public awareness efforts still require significant improvement [17].

Furthermore, policies aimed at reducing private vehicle usage have not been implemented effectively across all regions. In some areas, people remain highly dependent

on private vehicles due to inadequate public transportation infrastructure. Consequently, despite rising fuel prices, many individuals continue to rely on private transportation to support their daily activities and economic needs.

The development of electric vehicles and alternative energy sources represents another important government strategy to reduce dependence on fossil fuels [23]. However, the implementation of this policy continues to face various challenges, including the relatively high cost of electric vehicles, the limited availability of charging stations, and unequal access to supporting technologies across different regions. As a result, the transition toward alternative energy adoption remains gradual and uneven.

On the other hand, energy-efficiency policies have generated positive outcomes by increasing public awareness of the importance of energy conservation. Many individuals have begun limiting fuel consumption, choosing more energy-efficient transportation options, and supporting the adoption of environmentally sustainable energy sources. These developments indicate that government policies have started to influence long-term behavioral changes in energy consumption patterns.

Therefore, it can be concluded that the objectives of fuel-efficiency policies are consistent with broader efforts to strengthen national energy security and regulate fuel consumption. However, policy implementation in the field continues to be influenced by various factors, including household economic conditions, infrastructure readiness, technological accessibility, and the degree of public dependence on fossil fuels. Consequently, improvements in public transportation systems, broader access to alternative-energy infrastructure, and more effective policy communication and outreach programs are necessary to ensure that policy objectives can be achieved more effectively and sustainably.

Overall, the findings demonstrate that while fuel-efficiency policies are conceptually aligned with national energy-security goals,

their effectiveness ultimately depends on the government's ability to address practical implementation challenges and adapt policy measures to the diverse socioeconomic conditions of Indonesian society.

IV. CONCLUSION AND RECOMMENDATIONS

Based on the findings of this study, it can be concluded that fuel consumption in Indonesia is influenced not only by domestic factors, such as economic activities and public mobility, but also significantly by global geopolitical dynamics, particularly developments in the Strait of Hormuz. Potential disruptions to global oil distribution routes contribute to increases in crude oil prices, which subsequently affect fuel pricing policies in Indonesia. These conditions have encouraged the government to implement various energy-efficiency measures aimed at maintaining fuel-consumption stability and reducing pressure on the national budget.

The findings indicate that changes in fuel-consumption patterns occur gradually in response to both economic conditions and government policy interventions. Prior to the escalation of global geopolitical tensions, fuel consumption generally increased due to high levels of mobility and expanding economic activities. However, following disruptions to global energy distribution and increases in international oil prices, fuel-consumption patterns began to adjust. Consumers became more cautious in their fuel usage, reduced their reliance on private vehicles, and increasingly considered more energy-efficient transportation alternatives.

Government initiatives, including restrictions on subsidized fuel consumption, digital monitoring of fuel distribution systems, the implementation of work-from-home (WFH) arrangements, and the development of electric vehicles and biodiesel programs, demonstrate a comprehensive effort to regulate national energy consumption. These policies have not only contributed to reducing fuel usage but have also influenced public behavior by

encouraging more efficient and sustainable energy-consumption practices.

Despite these achievements, the implementation of energy-efficiency policies continues to face several challenges, including inadequate public transportation infrastructure, uneven adoption of electric vehicles, and limited technological accessibility in certain regions. These findings suggest that the success of energy-efficiency policies depends not only on government regulations but also on infrastructure readiness, socioeconomic conditions, and the degree of public dependence on fossil fuels.

Overall, this study demonstrates that fuel-efficiency policies play a vital role in maintaining national energy stability amid global uncertainty. The findings further reveal that changes in public energy-consumption patterns can serve as indicators of social and economic responses to both government policy interventions and international geopolitical developments. Future studies are encouraged to utilize broader energy-consumption datasets, apply more advanced analytical methods, and further investigate the effectiveness of energy-transition policies and renewable-energy adoption in reducing Indonesia's dependence on fossil fuels.

RECOMMENDATIONS

Based on the findings of this study, several recommendations are proposed to enhance the effectiveness of fuel-efficiency policies and strengthen national energy resilience:

1. The government should continue improving fuel-distribution monitoring systems through digital technologies while ensuring broader public understanding and accessibility of these systems.
2. Greater investment in public transportation infrastructure is necessary to provide viable alternatives to private vehicle use and reduce dependence on fossil-fuel consumption.
3. The development of electric vehicle ecosystems, including charging infrastructure and incentive programs,

should be accelerated to support the transition toward cleaner and more sustainable transportation systems.

4. Public awareness campaigns on energy conservation should be expanded and implemented consistently to encourage long-term behavioral changes in energy consumption.
5. Policymakers should ensure that energy-efficiency measures are accompanied by social protection mechanisms to minimize adverse impacts on household purchasing power, particularly among low- and middle-income groups.
6. Efforts to diversify national energy sources through the development of renewable energy and biofuel programs should be strengthened in order to reduce vulnerability to fluctuations in global energy markets.
7. Future research should explore the long-term impacts of energy-efficiency policies and energy-transition initiatives by employing broader datasets and more comprehensive analytical approaches.

By implementing these recommendations, Indonesia can enhance its energy security, improve the effectiveness of energy-efficiency policies, and promote a more sustainable and resilient energy system in the face of future geopolitical and economic uncertainties.

REFERENCE

- [1] S. Z. Avrilya, S. S. Husna, R. N. Tarihoran, N. Azira, and S. R. J. Lumbansiantar, "Analisis Pengalihan Subsidi BBM ke Subsidi Langsung untuk Masyarakat Miskin, Efisiensi Fiskal dan Pemerataan Kesejahteraan," *RIGGS: Journal of Artificial Intelligence and Digital Business*, vol. 4, no. 4, pp. 572–580, Nov. 2025, doi: 10.31004/riggs.v4i4.3463.
- [2] T. Permana and A. Puspitaningsih, "Kebijakan Energi Nasional dan Implikasinya terhadap Pembangunan

- Ekonomi di Indonesia,” *Ekonomi dan Manajemen*, Mar. 2026, [Online]. Available: <https://jurnal.mifandimandiri.com/index.php/ekonomi>
- [3] Sugiyono, “Metode Penelitian Kuantitatif Kualitatif dan R&D,” 2019.
- [4] Boy Anugerah, “Kala Iran Jadikan Selat Hormuz Senjata Geopolitik,” 2026.
- [5] A. Z. Madani and S. Qomar, “Pengaruh Konflik Timur Tengah dan Stabilitas Global dalam Perkembangan Negara-Negara Mayoritas Muslim,” *NAAFI: JURNAL ILMIAH MAHASISWA*, vol. 2, no. 2, 2025, doi: 10.62387/naafijurnalilmiahmahasiswa.v2i2.139.
- [6] M. G. Fansyah, B. Firmansyah, Y. T. Hapsari, and Sarpini, “Pengaruh OPEC (Organization of the Petroleum Exporting Countries) Terhadap Harga Bahan Bakar Minyak di Indonesia,” *JURNAL AKADEMIK EKONOMI DAN MANAJEMEN*, vol. 1, no. 4, pp. 144–151, Dec. 2024, doi: 10.61722/jaem.v1i4.3297.
- [7] B. M. Waruwu, “Krisis Energi dan Harga Minyak: Stabilitas Pasar dan Dampak Terhadap Ekonomi Dunia,” 2025.
- [8] A. P. Adhitama and H. Hartanto, “Dampak Pandemi COVID-19 Terhadap Implementasi Target Energi Terbarukan dalam Kerangka ASEAN Plan of Action for Energy Cooperation 2016-2025,” *JDKP Jurnal Desentralisasi dan Kebijakan Publik*, vol. 4, no. 2, pp. 50–60, Aug. 2023, doi: 10.30656/jdkp.v4i2.6910.
- [9] N. L. Widyastuti and H. Nugroho, “Dampak Covid-19 terhadap Industri Minyak dan Gas Bumi: Rekomendasi Kebijakan untuk Indonesia,” 2020. [Online]. Available: <https://www.statista.com/statistics/326017/weekly-crude-oil-prices/>
- [10] A. Kurniasari, D. Sakina, W. Zaldi, and R. Kurniawan, “Pengaruh Mobilitas Penduduk Dan Indikator Sosial Ekonomi Terhadap Emisi Karbon Di Indonesia Tahun 2020-2022,” vol. 18, no. 1, pp. 11–27, 2026, [Online]. Available: <http://creativecommons.org/licenses/by-sa/4.0/>
- [11] F. Fitrawaty and I. Maipita, “Analisis Dampak Kebijakan Pemulihan Ekonomi Nasional (Studi Kasus: Masa Pandemi Covid-19),” *Jurnal Samudra Ekonomi dan Bisnis*, vol. 14, no. 1, pp. 151–164, Jan. 2023, doi: 10.33059/jseb.v14i1.5047.
- [12] C. D. Aprida, “Menyulam Ketegangan Timur Tengah Dampak Ekonomi Global dari Konflik Iran-Israel,” 2025.
- [13] ITDP, “Ringkasan Eksekutif: Kenaikan Harga BBM dan Dampaknya Pada Kebijakan Transportasi Publik serta Energi Terbarukan,” 2022. [Online]. Available: <https://www.kompas.id/baca/nusantara/2022/03/16/transportasi-publik->
- [14] M. I. Al Islami, Q. Mauludin, S. D. Claritsa, E. Permana, and R. Amyulianthy, “Pengaruh Harga Bbm Terhadap Daya Beli Masyarakat di Indonesia, Malaysia dan Singapura,” *Jurnal Ilmu Komputer dan Bisnis*, vol. 14, no. 1, pp. 180–187, May 2023, doi: 10.47927/jikb.v14i1.451.
- [15] L. T. Hermawan and A. Prabhawati, “Implementasi Just Energy Transition Partnership Indonesia menuju Net Zero Emissions tahun 2060,” *Jurnal Energi Baru dan Terbarukan*, vol. 5, no. 3, pp. 28–38, Nov. 2024, doi: 10.14710/jebt.2024.24161.
- [16] I. Subairi, “Implementasi Sistem Pembelian Bbm Melalui Aplikasi MyPertamina Ditinjau Dari Perspektif Good Corporate Governance,” Jan. 2023.
- [17] A. Lutfi, A. Annisa Fitriani, I. Ramadani, N. Azahra Putri, and Y. Shizuka Nelsi, “EFEKVITAS PENGGUNAAN APLIKASI MY PERTAMINA DI ERA KENAIKAN BBM BERSUBSIDI,” vol. 1, no. 2, 2022.

-
- [18] M. I. Al Islami, Q. Mauludin, S. D. Claritsa, E. Permana, and R. Amyulianthy, "Pengaruh Harga Bbm Terhadap Daya Beli Masyarakat di Indonesia, Malaysia dan Singapura," *Jurnal Ilmu Komputer dan Bisnis*, vol. 14, no. 1, pp. 180–187, May 2023, doi: 10.47927/jikb.v14i1.451.
- [19] I. Chintia Simbolon, L. Karolina Sidebang, N. Theofani Margaret, S. Valencia Pangaribuan, P. Kemala Dewi Lubi, and U. Negeri Medan, "Analisis Dampak Kebijakan Perubahan Publik Harga BBM terhadap Perekonomian Rakyat Indonesia," vol. 5, no. 4, p. 2024, 2024.
- [20] H. Putri *et al.*, "Dampak Kenaikan Harga BBM 2022 Terhadap Biaya Operasional UMKM: Studi Kasus Mendalo Darat," 2025, doi: 10.22437/jeec.v4i2.49995.
- [21] M. R. Siombo and E. A. W. Adi, "Menilai Efektivitas Transisi Energi Indonesia Melalui Pengembangan Ekosistem Kendaraan Bermotor Listrik Berbasis Baterai," *Lex Renaissance*, vol. 10, no. 2, pp. 340–369, Dec. 2025, doi: 10.20885/JLR.vol10.iss2.art3.
- [22] N. Adiwinarni, D. R. Puspita, and S. Rosyadi, "Membaca Aspek Komunikasi, Sumber Daya, Disposisi, dan Struktur Birokrasi dalam Kebijakan Publik: Studi Implementasi Program Pertemuan Peningkatan Kemampuan Keluarga Dinas Sosial Kabupaten Cilacap," 2020.
- [23] S. Y. Kalpikajati and S. Hermawan, "Hambatan Penerapan Kebijakan Energi Terbarukan di Indonesia," *Batulis Civil Law Review*, vol. 3, no. 2, p. 187, Aug. 2022, doi: 10.47268/ballrev.v3i2.1012.