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STUDY OF SUPPLY-DEMAND OF INDONESIA BUTON ASPHALT

KAJIAN PEMASOKAN-KEBUTUHAN ASPAL BUTON INDONESIA

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ABSTRACT

National asphalt that was needed around 1.2 million tons per year are fulfilled by Pertamina's oil asphalt production around 272,040 tons (22.27%). Such a production is related to US$283.77 million, Indonesian natural asphalt (Asbuton) from Buton around 21,226 tons (1.74%) that is worth US$9.13 million. Its shortfall was met by the an import of 945,180 tons (77.39%) that is worth of US$473.77 million. The Asbuton resources are enormous around 792.5 million tons and its reserve is approximately 182.65 million tons. There are 16 Asbuton processing factories with the total capacity of roughly 2.03 million tons per year. However, their production is still 43,128 tons per year. It means the production utility is only 2.1% of the total production capacity. This study aims to optimize the use of Asbuton. Secondary data is obtained from various agencies, official websites, research reports, journals, and sharing sessions. Data analysis using an econometric model with a simple linear regression equation. The results show that the import substitution program starts in 2023, where the national asphalt needs are 935,180 tons, and its production is 253,473 tons and its import substitution in the first year is gradually around 96,061 tons, which means that the will be 585,647 tons so that the country can save foreign exchange of US $ 65.66 million. In 2031, substitution has exceeded the imports number, result and the excess capacity, thus opening up the export opportunities of 96,060 tons. Referring to such condition, the country can get additional income around US$656.59 million. This situation will continue until the end of the projection year in 2045.

Keyword: Asbuton, road, asphalt demand, asphalt import.

ABSTRAK

Kebutuhan aspal nasional sebesar 1,2 juta ton per tahun, dipenuhi oleh aspal minyak produksi Pertamina 272.040 ton (22,27%) senilai US$283,77 juta, aspal alam buton Indonesia (Asbuton) sebesar 21.226 ton (1,74%) senilai US$9,13 juta, dan kekurangannya dipenuhi oleh impor 945.180 ton (77,39%) senilai US$473,77 juta. Sumber daya Asbuton sangat besar sekitar 792,5 juta ton dengan cadangan sekitar 182,65 juta ton. Ada 16 pabrik olahan Asbuton dengan total kapasitas sekitar 2,03 juta ton per tahun, namun produksinya hanya 43.128 ton per tahun artinya utilitas produksi hanya 2,1% dari total kapasitas produksi. Penelitian ini bertujuan untuk optimalisasi pemanfaatan Asbuton. Data yang digunakan adalah data sekunder yang diperoleh dari berbagai instansi, website resmi, laporan penelitian, jurnal, juga melalui sharing session. Analisis data menggunakan model ekonometrika dengan persamaan regresi linier sederhana. Hasil penelitian menunjukan bahwa program substitusi impor dimulai pada 2023, dengan kebutuhan aspal nasional 935.180 ton, dan menghasilkan produksi 253.473 ton. Substitusi impor secara bertahap pada tahun pertama sebesar 96.061 ton yang berarti jumlah impor menjadi 585.647 ton sehingga negara dapat menghemat devisa US$65,66 juta. Pada 2031, substitusi telah melampaui jumlah impor sehingga terjadi ekses kapasitas sehingga terbuka peluang ekspor sebesar 96.060 ton dan negara berkesempatan untuk mendapatkan tambahan pendapatan sebesar US$656,59 juta. Keadaan ini akan berlangsung terus hingga akhir tahun proyeksi pada 2045.

Kata kunci: Asbuton, jalan, kebutuhan aspal, impor aspal.

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INTRODUCTION

Roads are one of the most important infrastructures in building inter-regional connectivity facilities and become a driving force for the emergence of inter-regional trade. Road infrastructure can create production transactions and economic agglomeration that can increase the economic growth of each region (Murwito *et al.*, 2013). Road infrastructure development is a very important national priority to improve public access to basic services and increase productivity and competitiveness. Roads are the basic and main infrastructure in driving the wheels of the national and regional economy. The function of the road is to encourage the distribution of goods and services as well as population mobility (Sulila, 2015). The important and most widely used material as a binder in road construction is asphalt (Sulila, 2015; Ardianti, Putra and Karami, 2018). The properties possessed by asphalt, apart from being hard, are also flexible so that they are comfortable when driving.

Asphalt is a solid or semi-solid material, black to dark brown, adhesive (cementitious) which will soften and melt when heated. Asphalt is composed mainly of mostly bitumen. All of which are in a solid or semi-solid form from nature or petroleum refining, or is a mixture of bituminous materials with petroleum or its derivatives (ASTM, 1994).

Based on the method of obtaining it, the asphalt can be divided into a natural asphalt and an artificial asphalt (Simanjuntak and Saragi, 2013). The natural asphalt is an asphalt which is an available in the nature such as lake asphalt in Trinidad and mountain asphalt in Buton Island. The artificial asphalt is an asphalt that is obtained from the distillation process of petroleum (oil asphalt) and coal (Mashuri, 2010). According to Riadi (2019), there are three types of asphalt that are commonly used as the road pavement construction materials, namely natural asphalt, artificial asphalt, and polymer asphalt. The natural asphalt is found at Buton island (Southeast Sulawesi, Indonesia), France, Switzerland, and the United States. Artificial asphalt is a petroleum refining residue with characteristics that depend on the type of petroleum being refined. It can be petroleum-based asphalt (asphaltic base), paraffin (parafine based), or mixture-based (mixed base). Polymer asphalt is a material produced from the modification of the natural polymers or synthetic polymers with asphalt. Polymer modified asphalt (PMA) has been developed over the last few decades. The function of asphalt as a road pavement material is as a binder between the asphalt and aggregate between asphalt and as a filler material to fill the voids between the aggregate grains and the pores in the aggregate grains themselves.

The length of roads in Indonesia until 2021 has reached around 546,116 km. Direktorat Statistik Distribusi (2021), 81% of the size of the road is the length of the district road, 10% the length of the provincial road and 9% the length of the national road. During 2000-2020, the addition of road length in Indonesia was only increased by 2.32% per year. The length of the national road increased by 3.17% per year, the district increased by 2.33% per year and the increase in the additional length of the national road was increased by 1.8%.

The need of asphalt for road construction in Indonesia is 1.2 million tons per year on average. Only 22.27% was able to fulfill by Pertamina in the form of oil asphalt (Asmin), 1.74% of Buton's natural asphalt, and the rest must be imported. Every year, Indonesia has to import asphalt with a value of Rp. 50 trillion (Anggraeni, 2021) and Indonesia is listed as a country with the 10th rank asphalt importer in the world (Adharsyah, 2019). Since 1989, Indonesia has always imported asphalt, even though the value of asphalt imports tends to increase every year. Indonesia has Buton's natural asphalt resources around 792.5 million tons and reserves around 182.65 million tons (Direktorat Jenderal Mineral dan Batubara, 2020). In addition, until 2021, Indonesia has 16 Buton asphalt processing companies with a total capacity around 2.03 million tons per year (ASPABI, 2022). However, its production is only 43,128 tons per year, meaning that the production utility is only 2.1% of the total production capacity. If production capacity can be maximized, imports can be reduced or even stopped. Various regulations such as Regulation of the Minister of Public Works Number: 35/PRT/M/2006 (Menteri Pekerjaan Umum dan Perumahan Rakyat, 2006), Southeast Sulawesi Provincial Regulation Number 2 of 2016, Regulation of the Minister of Public Works and Housing Number 18 of 2018 (Menteri Pekerjaan Umum dan Perumahan Rakyat, 2018), Regulation of the

Minister of Home Affairs Number 33 of 2019 (Menteri Dalam Negeri, 2019), Memorandum of Understanding between the Ministry of Industry and the Ministry of State-Owned Enterprises Number 522/M-IND/12/2005 and 581/MBU/2005 have been issued to encourage the participation of local asphalt companies to contribute to road infrastructure development (Kementerian Perindustrian dan Perdagangan, 2005).

However, until now the role of this policy has not been implemented that can be seen from the level of production which is still low and imports are high. Several previous studies, including Wirahaji, Wardani and Widyatmika (2018) stated that the Asbuton had not been utilized optimally because it had to compete with Asmin which had a better quality. Meanwhile, according to Ikawati (2011) irefined petroleum type, the Asbuton mining has long been abandoned due to the high operating costs which are no longer commensurate with the income.

The Central Bureau of Statistics (2019), noted that the construction sector was in the third position as the main source of Indonesia's economic growth in 2018, growing by 5.17% (Badan Pusat Statistik, 2019). Along with the growth of the construction sector, especially road infrastructure, both for maintenance, improvement, and development of road transportation accessibility, which continues to increase, the demand for asphalt is also increasing. Therefore, it is necessary to study the optimization of Asbuton utilization from the aspects of resources and reserves, processing, economy, and optimization of Asbuton utilization. The results of this study are expected to provide an overview of the general description of the development and role of Asbuton in the development of road infrastructure in Indonesia. From the results of the study, it is hoped that there will be a solution to increase the role of Asbuton in national infrastructure development to reduce Indonesia's dependence on imported asphalt and increase the use of Asbuton, especially as an optimal substitute.

METHOD

The data used to analyze this project is the secondary data obtained from various agencies, official ebsites, research reports, and journals also conducted through sharing sessions. While the model used to analyze the data is a simple regression model (Rahman, 2019), in the following equation:

$$\hat{Y}=a+b$$

Y = regression line/ response variable
a = constant (intercept), the intersection with the vertical axis
b = regression constant (slope)
X = independent variable/ predictor

The magnitude of the constants a and b can be determined using the equation:

$$a = \frac{(\sum Y_i)(\sum X_i^2)-(\sum X_i)(\sum X_i Y_i)}{n\sum X_i^2-(\sum X_i)^2}$$

$$b=\frac{n\left(\sum X_i Y_i\right)-(\sum X_i)\,(\sum Y_i)}{n\sum X_i^2-(\sum X_i)^2}$$

where n is the number of observation data

Demand forecasting is about predicting the future, forecasting is used to predict the demand or need for the company's products and services in the future, to be able to meet customer desires over a certain period which is done using historical data, usually based on demand data. Having a good forecast is essential for having efficient service and for manufacturing operations (Heizer and Render, 2014). Substitution of imports is an economic and trade policy that aims to replace imports with domestic production (Brian, 2009). So that it can protect the domestic economy, secure the trade balance, protect producers from unfair import competition for similar products, and develop productivity and competitiveness. The effective capacity (utilization) shows the maximum output at a certain operating level. Such an effective capacity is the capacity that is expected to be achieved by a company with current operating limitations (Heizer and Render, 2014).

From supply and demand sides actors that affect the demand are estimated from asphalt demand, developments in consumption or use of Asbuton, export developments, and developments in domestic and export prices. The factors that influence the supply include the development of national asphalt production, the development of asphalt imports, the development of asphalt prices, and the development of crude oil prices. An analysis of the strategy to inhibit imports was

also carried out by simulating substitution and a strategy of saving foreign exchange by increasing the use of domestic products.

RESULTS AND DISCUSSION

National Asphalt Production

Until the end of 2021, the only oil asphalt producer in Indonesia is PERTAMINA with a production capacity of 350,000 tons per year. PERTAMINA's total asphalt production during 2016-2021 is 1.48 million tons or an average of 247 thousand tons per year.

According to ASPABI data as of May 2022, 15 Asbuton processing companies are members, with various types of products such as B 5/20, B 50/30, Murni, and CPHMA whose factory locations are located in several provinces in Indonesia. Total Production capacity of the 15 companies (all product types) is 1,578,600 tons per year which consist of 102,000 tons of Asbuton B 5/20, 372,000 tons of Asbuton B 50/30, 150,000 tons of pre-mixed Asbuton, and CPHMA of 150,000 tons. 894,000 tons and pure Asbuton only 60,600 tons per year. The average production realization was 43,128 tons or 2.1%.

National Asphalt Consumption

Until now, the Indonesia Government is continuing to construct the road infrastructure to support the economic and social movement of the community both within an area and between regions. With the high growth of road construction, the asphalt material as one of the main materials in road construction for years the need continues to increase.

The average national asphalt demand is 1.2 million tons per year, which is met from PERTAMINA's oil asphalt production of 22.27% with a value of US$283.77 million, Asbuton of 1.74% worth US$9.13 million, and the shortfall is met of imports by 77.39% with a total value of US$473.77 million Table 1.

During 2016-2021, Indonesia's asphalt consumption experienced fluctuating changes and tends to decline. The highest consumption occurred in 2016, which reached 1.7 million tons. Until 2018, consumption fell to 1.22 million tons. Although it had increased by 1.31 million tons in 2019, the following year it decreased. In 2021, the total consumption will be 883,731 tons.

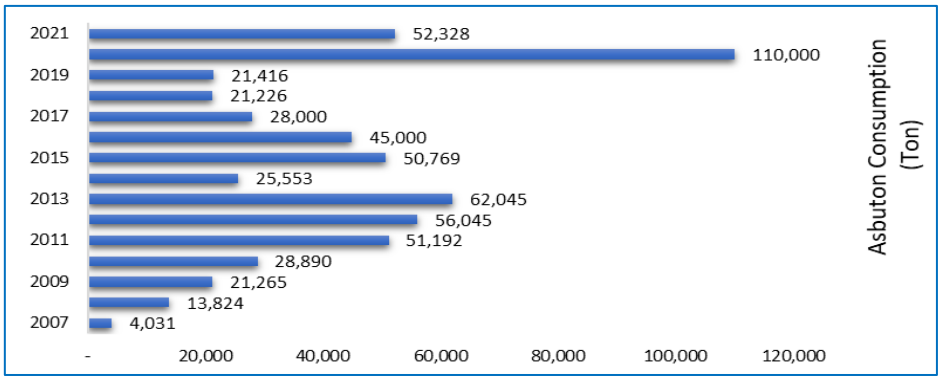
Table 1. National asphalt demand

Year	Volume (tons)	Value (US$)
2016	1,700,000	925,245,500
2017	1,418,000	787,536,440
2018	1,217,219	647,712,390
2019	1,311,318	691,461,196
2020	828,544	430,462,072
2021	883,731	471,127,472

In general, the national consumption of asphalt decreased by 37%. The biggest decrease occurred in PERTAMINA ex Import asphalt (storage) which was 49%. This is due to the COVID-19 pandemic which is an epidemic that has attacked many people and spread to various countries. The COVID-19 pandemic is a big test that must be passed by Indonesia. In the context of infrastructure, most of the physical construction (construction activities) has been delayed due to the very high rate of virus transmission. The delay in construction activities has an impact on the non-absorption of domestic raw materials, a decrease in imports of capital goods, and the loss of jobs that contribute to an increase in the unemployment rate so that there is no economic benefit derived from infrastructure development.

Consumption of Asbuton

The development of national Asbuton consumption during 2007-2013 showed a very good growth and continued to increase with an average growth rate of 32.35%. This is inseparable from the important role of the Ministry of Public Works and Housing which has a high commitment to encourage the use of Asbuton material by publishing Regulation of The Ministry of Public Works No. 35/PRT/M/2006 (Menteri Pekerjaan Umum dan Perumahan Rakyat, 2006). However, during 2013–2017, the consumption of national Asbuton continued to decline from 62,045 tons and continued to decline quite sharply to a low level of 28,000 tons or decreased by 9.28%. Meanwhile, during 2007-2018, as a whole the total consumption of Asbuton was only 407,840 tons or only 0.06% of the total deposit reserves owned (Figure 1).



Source: Modified from ASPABI (2019)

Figure 1. Development of national Asbuton consumption 2007 – 2021 (tons)

One of the reasons for the decline was that the regulations that had been set to regulate the use of Asbuton were advisory in nature, so that there were no sanctions for project implementers if they did not use it. In addition, the existing road project implementers feel more convenient and comfortable by using Asmin. Referring to this, the Ministry responded by updating the Ministry of Public Works and Housing Regulation Number 18 of 2018 (Menteri Pekerjaan Umum dan Perumahan Rakyat, 2018). Article 2 of the Ministry of Public Works and Housing Regulation contains the guidelines for relevant institutions in the Central Government and Regional Governments, as well as business partners in seeking to increase the use of Asbuton for road construction and preservation in an effective, efficient, transparent, accountable, and sustainable manner. Meanwhile, the objectives of the issuance of this Ministerial Regulation are:

a. increase the use of Asbuton as a quality, consistent, sustainable, and effective road material;
b. increase the supply capacity of Asbuton as an added material, substitute material, and/or substitute for oil asphalt; and
c. increase the economic benefits and independence of the Asbuton industry for the local community and environment.

As a follow-up to the Regulation of the Minister of Public Works and Housing, it was issued by the Direktorat Jenderal Bina Marga in 2019. The letter stated that the length of the road that will use Asbuton technology is 793 km with a volume of 41,929 tons of Asbuton. Asbuton used according to General Specification 2018 for Road and Bridge Construction (Revision 2) is Asbuton type B 5/20, Asbuton B 50/30, and Asbuton Premix (Munawir, 2021).

Ministerial regulations and the Director General's Instructions are effective enough to encourage the consumption of national Asbuton B 50/30 in 2018 of 3,075 tons, an increase of 10,547 tons or 342.99% to 13,622 tons in 2019. Likewise with CPHMA experienced, an extraordinary increase occurs from 1,755 tons in 2018, increasing of 103,245 tons or 5882% to 105,000 tons in 2020. However, when compared or converted from various types of Asbuton products consisting of Asbuton B 5/20, B 50/30, Premix, and CPHMA to Asmin from the 2018-2021 period with a total of 204,970 tons (Table 2).

Table 2. Consumption of Buton asphalt (in tons)

Description	2018	2019	2020	2021
Asbuton B 5/20	3,434	2,960	1,000	5,905
Asbuton B 50/30	3,075	13,622	3,000	3,160
Asbuton Prior to mixing	12,962	4,834	1,000	1,851
CPHMA	1,755	0	105,000	41,412
Asmurni	4,153	4,964	7,450	4,826

Source: Putranto (2021)

Export Development

The realization of Asbuton exports in 2014-2021 period to various destination countries reached 452,536 tons or US$19.39 million consist of Asbuton B 5/20 (BGA) amounting to 57,389 tons or US$5.17 million, and in the form of raw materials amounting to 395,147 tons or US$14.22 million. In that period, the highest number of exports for the Asbuton B 5/20 type in 2017 was 13,223 tons, or equivalent to a value of US$1.19 million. The highest export occurred in 2014 at 165,328 tons or US$5.95 million (Table 3).

China is the export destination country with the largest number, because this country is in a dire need of asphalt to support the construction of road infrastructure as well as other industries. In addition, China is conducting a suitability study for road asphalt to find out other minerals contained in Asbuton. The fact that there are Asbuton exports is certainly not a positive thing because, on the other hand, most of the national asphalt needs are met with the imports, for that the government needs to immediately make a policy on the use of Asbuton and gradually limit it and then ban imports.

Asphalt Import

The total imported asphalt in 2018-2021 period from three groups of import players, namely PERTAMINA (Storage), PERTAMINA (3rd Party), and other private sectors, amounted to 3,536,622 tons. During 2018-2020, PERTAMINA's asphalt imports decreased. Although there is an increase in imports in 2021, in general, there is a decline of 8.72% per year. Likewise, other private imports fluctuated but overall during the period, there was a decrease in the number of imports by 13.64%. In contrast to the two previous groups, although they both fluctuated, the overall number of imports carried out by PERTAMINA Imports (3rd Party) showed a tendency to increase with an average increase of 30.95%. Asphalt imports of PERTAMINA namely the ex Import (3rd party) in 2018 reached 164,398 tons and in 2019 increased by 156,353 tons or an increase of 95% to 320,933 tons, as well as the asphalt imports carried out by the private parties in 2018 reached 592,278 which increased in 2019 by 17,791 tons to 610,069 tons.

At the end of 2021, economic activity slowly began to show movement, even though the pandemic period was not over yet, economic sector activities including road and bridge infrastructure development activities were slowly starting to run again with strict health protocol requirements. This can be seen in the national asphalt imports, both carried out by PERTAMINA and other private parties, which have increased asphalt imports by between 5 and 50%.

Analysis Results

Based on the Center for Data and Information Technology of the Ministry of Public Works and Public Housing (Pusat Data dan Teknologi Informasi Kementerian PUPR, 2017), the condition of Indonesia's national roads, in general, is in stable condition with a percentage of 91.90%, while the condition is not stable at 8.1%. Achievements up to 2021, the length of national roads is 47,017.39 km, provincial roads are 47,874.42 km, district roads are 437,310.84 and city roads are 45,149.58 km and toll roads are 3,113.00 km, so the total road length is reached 580,465.23, this number does not include rural roads (Table 4).

Table 3. Amount and value of Asbuton exports, 2014 – 2021

Year	Asbuton B 5/20 (BGA)		Raw material	
	Volume (Ton)	Value US$	Volume (Ton)	Value US$
2014	8,589	773,010	165,328	5,951,808
2015	7,744	696,960	21,855	786,780
2016	836	75,240	82,518	2,970,648
2017	13,223	1,190,070	7,786	280,296
2018	5,997	539,730	42,660	1,535,760
2019	6,000	540,000	-	-
2020	9,000	810,000	-	-
2021	6,000	540,000	75,000	2,700,000

Table 4. Existing road conditions

No.	Road Type	Long Road 2021 (KM)	Steady 2021 (%)	Target 2022 - 2024 (%)	Program 2022-2024 (%)
1	National	47,017.39	91.90	100.00	8.10
2	Province	47,874.42	68.95	75.00	6.05
3	Regency	437,310.84	55.82	65.00	9.18
4	City	45,149.58	76.80	65.00	-
5	Highway	3,113.00	100.00	100.00	-

Source: Pusat Data dan Teknologi Informasi Kementerian PUPR (2017).

In the Strategic Plan of the Ministry of Public Works and Housing 2020-2024 (Menteri Pekerjaan Umum dan Perumahan Rakyat, 2020), the stages to be achieved in road management are steady road conditions of up to 97%, construction of 1,500 km of toll roads, construction of 2,500 km of new roads and construction of new bridges of 60,000 m. While in 2025-2030, the stages to be achieved are 99% steady condition, construction of 2,000 km of toll roads, construction of 3,000 km of new roads, and construction of new bridges of 70,000 m. The description of the condition of the road flatness and the target to be achieved by the Ministry of Public Works and Housing for road operations will certainly increase the need for asphalt. Base on the steady condition of the road and the target the growth of asphalt demand, it will be grown by 2.59%.

The assumption that the national asphalt demand for 2022–2026 that is based on the 2020-2024 RPJMN is 4.99 million tons, in 2022–2024 the annual demand is 862 thousand tons and in 2025-2026 the demand is 1.2 million tons. While the Pertamina's asphalt production capacity per year is 350 thousand tons, the production capacity of Asbuton product type B 5/20 B is 102 thousand tons per year, B 50/30 372 thousand tons per year, Premix 150 thousand tons per year, CPHMA 894 thousand tons per year of Aspure 60 thousand tons per year so that the total national production capacity is 1.93 million tons. Mean while, the effective capacity (utilization) that is expected to be achieved by the Asbuton industry in refining processing with the current operating limitations is 80% (1.5 million tons) of the designed capacity.

As an illustration, the use of Asbuton product, CPHMA type (cold mix) on 1 km road with 6-m width and a thickness of 4 cm requires the Asbuton B 50/30 as much as 110.4 tons, CPHMA (hot mix) Asbuton B 50/30 as much as 55.2 tons. While the need for Asbuton B 5/20 for CPHMA (hot mix) in a 1 km road with a width of 6 m and a thickness of 4 cm requires the Asbuton B 5/20 as much as 16.56 tons. If the use of Asbuton is under production capacity, then in 2022 for Asbuton B 5/20, if used for CPHMA (hot mix), it can contribute to 6,159 km of roads; the Asbuton B 50/30 if used with CPHMA (cold mix) can contribute to 3,370 km of roads; and if used with CPHMA (hot mix), it can contribute to 674 km of roads and if pre-mixed asphalt is used with CPHMA (hot mix), it can contribute to 4,529 km of roads, and if converted to the road surface conditions in 2021, namely along 46,964.77 km, it can contribute to the road by 31.37%. This shows that the contribution of Asbuton to the road operations is still very small that is similar with the asphalt product of Pertamina.

The development of world asphalt prices in the period of 2012-2021 fluctuated; in 2012 it reached US$605.44 per ton and decreased very sharply to the lowest point in 2016 to US$344.48 per ton or a decrease of 43.10%, then increased again in 2018 to US$501.25 per ton or an increase of 45.51%, then decreased again in 2021 to 497.08 or decreased by 0.83% and increased very high in August 2022 to US$795.00 per ton (Maryland Asphalt Association, 2022).

In the same period, the development of crude oil prices in 2012 reached US$111.57 per barrel. There was also a very sharp decline in 2016 to US$45.13 per barrel or a decline of 59.55%, and increased again in 2018. to US$71.34 per barrel or increased again by 58.08%, decreased again in 2020 to US$ 41.96 per barrel, and decreased again in 2021 to US$70.86 per barrel or decreased by 0.67 % (Macrotrends, 2023).

Based on the explanation above, it shows that the development of asphalt prices is strongly influenced by the price of crude barrel. There is very different from the price of natural asphalt in this case Asbuton, the price of crude oil has no effect at all (Figure 2).

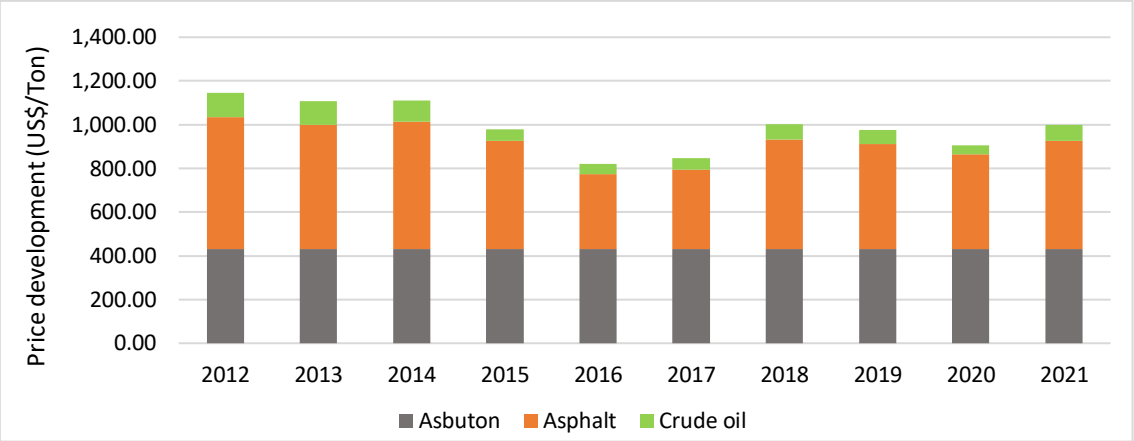


Figure 2. Price development of asphalt, crude oil, and Asbuton (Putranto, 2021; Maryland Asphalt Association, 2022; Macrotrends, 2023)

This situation has impacted the price of asphalt imports that turn to be high, while Indonesia in the implementation of road operations is still very dependent on asphalt imports. As an illustration, national asphalt imports in 2018-2021 period reached 83.15%. This creates a current account deficit that will burden the country's foreign exchange reserves. Maximum efforts are needed to encourage the use of Asbuton products so that the value and volume of asphalt imports decrease. The decrease is expected to save foreign exchange spent abroad. Formulation of increasing Asbuton products to suppress the value and volume of imports which in turn can save foreign exchange. This is shown in the following projection trend analysis (Table 5).

Table 5. Projected demand – supply, import substitution, and savings foreign exchange/income

Year	Demand (Ton)	Production (Ton)	Deviation/ Import (Ton)	Sub-stitution (Ton)	Import after substitution (Ton)	Export Oppor-tunity (Ton)	Substitution + Export (Ton)	Foreign Exchange Thrift/ inland revenue (US$)
2022	911,570	203,473	708,098	-	-	-	-	-
2023	935,180	253,473	681,707	96,061	585,647	-	-	65,659,340
2024	959,401	303,473	655,928	192,122	463,807	-	-	131,318,712
2025	984,250	350,000	634,250	288,182	346,068	-	-	196,978,085
2026	1,009,742	350,000	659,742	384,243	275,499	-	-	262,637,457
2027	1,035,894	350,000	685,894	480,304	205,590	-	-	328,296,829
2028	1,062,724	350,000	712,724	576,365	136,359	-	-	393,956,202
2029	1,090,249	350,000	740,249	672,426	67,823	-	-	459,615,574
2030	1,118,486	350,000	**768,486**	**768,486**	-	-	-	-
2031	1,147,455	350,000	797,455	864,547	(67,092)	96,060	960,608	656,593,465
2032	1,177,174	350,000	827,174	960,608	(133,434)	192,121	1,152,729	787,912,210
2033	1,207,663	350,000	857,663	1,056,669	(199,006)	288,182	1,344,851	919,230,954
2034	1,238,941	350,000	888,941	1,152,730	(263,788)	384,243	1,536,972	1,050,549,699
2035	1,271,030	350,000	921,030	1,248,790	(327,761)	480,304	1,729,094	1,181,868,444
2036	1,303,949	350,000	953,949	1,344,851	(390,902)	576,364	1,921,216	1,313,187,188
2037	1,337,722	350,000	987,722	1,440,912	(453,190)	672,425	2,113,337	1,444,505,933
2038	1,372,369	350,000	1,022,369	1,536,973	(514,604)	768,486	2,305,459	1,575,824,678
2039	1,407,913	350,000	1,057,913	1,633,034	(575,121)	864,547	2,497,580	1,707,143,423
2040	1,444,378	350,000	1,094,378	1,729,094	(634,716)	960,608	2,689,702	1,838,462,167
2041	1,481,787	350,000	1,131,787	1,825,155	(693,368)	1,056,668	2,881,824	1,969,780,912
2042	1,520,166	350,000	1,170,166	1,921,216	(751,050)	1,152,729	3,073,945	2,101,099,657
2043	1,559,538	350,000	1,209,538	2,017,277	(807,739)	1,248,790	3,266,067	2,232,418,401
2044	1,599,930	350,000	1,249,930	2,113,338	(863,408)	1,344,851	3,458,188	2,363,737,146
2045	1,641,368	350,000	1,291,368	2,209,398	(918,030)	1,440,912	3,650,310	2,495,055,891

In 2022, the need of asphalt is 911,571 tons and met from the domestic production of 203,473 tons and the imports of 708,098 tons. The import substitution program will begin in 2023, with the hope that regulations/laws that are more superpower than the existing ones will be completed and issued by the end of 2022. Meanwhile, the Ministry of Public Works and Housing's seriousness and consistency in increasing the use of domestic products continues to be carried out. Through the Directorate General of Highways in November 2021, the Director General of Highways instructed all Heads of Agency to use technology in the implementation of preservation and road construction in the 2022 budget year, the length of the road is 670.31 km with a volume of 31,949 tons of Asbuton. Likewise for 2023, the Directorate General of Highways in August 2022 again instructed all Heads of Agency to use Asbuton technology of 65,000 tons.

In 2023, the national asphalt demand is 935,180 tons, the production is 253,473 tons, and the import substitution in stages in the first year is 96,061 tons, meaning that the number of imports will be 585,647 tons so that the country can save foreign exchange of US $ 65.66 million.

Based on the results of the analysis, the demand in 2029 is 1.09 million tons, met from the production of 350,000 tons, substitution for imports of 672,426 tons and the number of imports after substitution is 67,823 tons, the amount of foreign exchange savings is US$ 459.61 million. In 2030 there will be a break-even point where the amount of production and substitution has been able to meet the national asphalt demand (Figure 3).

Entering 2031, substitution has been able to exceed the number of imports or a surplus, resulting in excess capacity, thereby opening up export opportunities of 96,060 tons so that the country has the opportunity to get an additional income of US$656.59 million. This situation will continue until the end of the projection year in 2045.

It should be observed that in 2039, the calculation of the gradual substitution program will reach 1.63 million tons, while the effective capacity is 1.54 million tons per year, meaning that production capacity development or investment opportunities are needed. In 2045, substitution will reach 2.21 million tons. If with the 15 existing factories, the 2022 annual production capacity of 1.62 million tons per year, the effective capacity of 80%, there is a difference of 666,518 tons, the new plants that need to be added are around 2-3 companies. Thus, the opportunity for additional state revenue of US$2.49 billion can be realized.

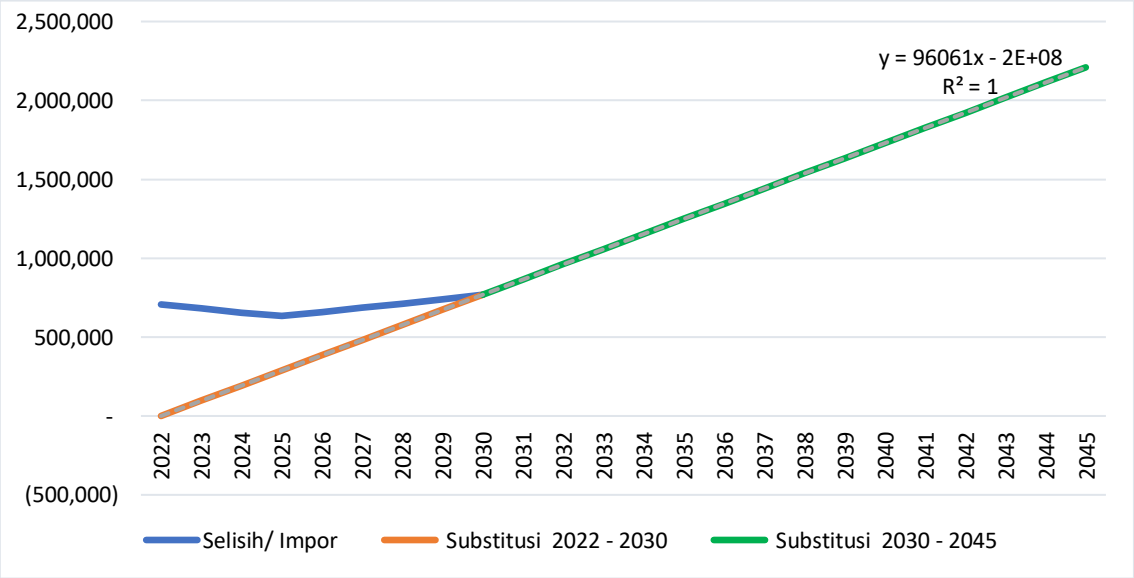


Figure 3. Projection of difference/import to substitution

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

To overcome the asphalt trade deficit which continues to increase every year, Indonesia must optimize the production of Asbuton processing plants to replace the import of Asmin. The lack of fulfillment of domestic asphalt needs until 2045 is an opportunity for domestic investors to increase Asbuton production, to absorb labor, and improve the regional economy and people's income.

The advantage of using Asbuton compared to imported Asmin for road construction in national road projects is that it has higher strength and elasticity as well as adhesiveness so it is more waterproof.

Recommendations

Encouraging the creation of a conducive business climate for the use of Asbuton to reduce asphalt imports to reduce foreign exchange expenditures. Encouraging business actors to process into pure Asbuton, so that they have better competitiveness compared to Asmin.

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