

## The retail fuels market in Indonesia

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### Introduction

Indonesia is the largest motor vehicle market in Southeast Asia and has a complex retail fuels market. Fuel pricing policies change somewhat often and there have not been the same advancements with fuel quality standards in recent years as there have been in other developing countries. This is the second in a series of working papers exploring how fuel and vehicle policies are interacting in Indonesia. Here we describe existing fuel pricing and subsidy mechanisms, and summarize the latest developments regarding fuel quality standards.

Dirty fuels are a barrier to cleaner vehicles and they increase outdoor air pollution and greenhouse gas emissions. They harm public health and the climate. Today, fuels sold in Indonesia can have high levels of sulfur and other additives because fuel quality standards remain generally lax. Outdated fuel quality standards also hinder the advancement of vehicle emission standards, which must progress more or less in parallel with fuel standards for advanced emission control technologies to function properly. As reforms to fuel quality standards and to current pricing mechanisms would help shape the market in the direction of cleaner fuels, they are important for protecting public health and the environment in Indonesia.

### Market landscape

Pertamina, the state-owned oil company, is the dominant player across the oil supply chain in Indonesia. Besides its upstream activities in oil production, refining, and imports, Pertamina is also the biggest retail supplier of gasoline and diesel fuels. It was a monopoly in the retail market until 2004, when the Indonesian government liberalized the downstream oil and gas retail market.<sup>1</sup> Since then, other distributors in Indonesia have met with varying degrees of success. Malaysia's national oil company, Petronas, arrived in 2005 and planned to build more than 450 gas stations across the country.<sup>2</sup> Additionally, in 2009, retailers other than Pertamina were permitted to sell subsidized fuels. For example, Petronas was given permission to sell subsidized research octane number (RON) 88 gasoline, and a private Indonesian company, PT AKR Corporindo Tbk (AKR), was allowed to sell subsidized diesel in a few regions.<sup>3</sup>

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1 Regulation No. 36/2004 on Oil and Gas Downstream Business, the Republic of Indonesia, October 14, 2004, <https://www.pwc.com/id/en/energy-utilities-mining/assets/gr36-2004.pdf>

2 Bloomberg, "Petronas to open first station in Indonesia," *The Star*, December 22, 2005, <https://www.thestar.com.my/business/business-news/2005/12/22/petronas-to-open-first-station-in-indonesia/>.

3 Reuters, "Indonesia picks Petronas to end fuel supply monopoly," *The Star*, December 29, 2009, <https://www.thestar.com.my/business/business-news/2009/12/29/indonesia-picks-petronas-to-end-fuel-supply-monopoly>.

Petronas failed to gain a foothold and eventually ceased Indonesian operations in 2013.<sup>4</sup> AKR is still a distributor in the market.

Today, Pertamina's supply network includes more than 5,500 retail fuel stations across the country.<sup>5</sup> Other vendors operate a much smaller number of stations (Table 1).

**Table 1.** Non-Pertamina fuel retailers in Indonesia

Vendor name	Number of gas stations as of 2019	Market entry year	Notes
ExxonMobil	5 <sup>a</sup>	Unknown	—
Shell	111 <sup>b</sup>	2005	—
Total	18 <sup>c</sup>	2009	—
AKR	130 <sup>d</sup>	2010	An Indonesian logistics and supply chain company that trades in petroleum and chemicals and is partnering with BP on a joint venture (see below).
Vivo	6	2017	A subsidiary of the Dutch-Swiss oil trading company Vitol.
BP	15 <sup>e</sup>	2017	Partner with PT AKR on a joint venture that operates under the name BP AKR Fuels Retail. Plans to expand to around 350 retail locations in Indonesia in the next decade. <sup>f</sup>

<sup>a</sup> Directorate General of Oil and Gas, Ministry of Energy and Mineral Resources of Indonesia, "Daftar penyalur BBM badan usaha non Pertamina," February 2019, <https://migas.esdm.go.id/uploads/uploads/daftar-penyalar-2019/penyalur-bbm-non-pertamina-februari-2019.pdf>

<sup>b</sup> "Ekspansi SPBU Shell: Shell jalin kerja sama dengan KADIN Jawa Barat," Shell Indonesia, March 6, 2020, [https://www.shell.co.id/in\\_id/ruang-media/news-and-media-releases/tahun-2020/shell-spbu-expansion-shell-cooperates-with-west-java-chamber-of-commerce-and-industry.html](https://www.shell.co.id/in_id/ruang-media/news-and-media-releases/tahun-2020/shell-spbu-expansion-shell-cooperates-with-west-java-chamber-of-commerce-and-industry.html)

<sup>c</sup> "Lokasi SPBU," TOTAL Indonesia, accessed May 22, 2020, <https://www.id.total.com/id/spbu/lokasi-spbu>.

<sup>d</sup> "Home - PT AKR Corporindo Tbk," AKR Corporindo Retail, accessed April 1, 2020, <https://retail.akr.co.id/>.

<sup>e</sup> "BP - AKR Retail | PT AKR Corporindo Tbk," PT AKR Corporindo Tbk, accessed May 7, 2020, <https://www.akr.co.id/akr-retail-petroleum>

<sup>f</sup> Ridwan, "Perluas ekspansi, AKR-BP buka SPBU BP di kawasan industri Jababeka," industry.co.id, December 21, 2018, <https://www.industry.co.id/read/46678/perluas-ekspansi-akr-bp-buka-spbu-bp-di-kawasan-industri-jababeka>.

## Motor fuel quality grades and specifications

The Government of Indonesia's fuel specifications establish four grades of gasoline and two grades of diesel (Table 2).

**Table 2.** Retail fuel grades and specifications in Indonesia as of August 2020

Gasoline				Diesel			
Minimum research octane number (RON)	88	90	91	95+	Minimum cetane number (CN)	48	51
Sulfur (maximum parts per million, ppm)	500			50	Sulfur (maximum ppm)	2,500	500
Benzene (maximum % volume)	Not regulated	5			Polycyclic aromatic hydrocarbons, PAHs (maximum % volume)	Not regulated	
Aromatics (maximum % volume)	Not regulated	50	40		Total contamination (mg/kg)	Not regulated	
					Biodiesel content (%)	30	30

The government has, at times, regressed fuel quality standards. In 1999, the Directorate General of Oil and Gas of the Ministry of Energy and Mineral Resources (MEMR) required that by 2003, Indonesia's gasoline and diesel fuel meet the specifications for Euro 2/II emission standards, which call for unleaded gasoline and a limit of 500 ppm sulfur content in both gasoline and diesel. However, this target was not achieved and in 2006, the Directorate General of Oil and Gas at MEMR relaxed the maximum sulfur content for CN 48 diesel to 3,500 ppm. In 2013, regulation SK 933/2013 removed leaded gasoline

<sup>4</sup> Pingit Aria, Rosalina, and Fery Firmansyah, "Pertamina buys 9 Petronas fuel stations," *Tempo.co*, April 4, 2013, <https://en.tempo.co/read/471245/pertamina-buys-9-petronas-fuel-stations>.

<sup>5</sup> *Energia Weekly*, Pertamina Digital Media, January 28, 2019, <https://www.pertamina.com/Media/File/Energia-04-28-Jan-2019.pdf>

from the list of approved fuel specifications and retained the 500 ppm Euro 2/II-level sulfur limit, but delayed implementation of even the 3,500 ppm sulfur limit for CN 48 diesel to 2015.

More recently, though, there has been some progress toward improving fuel quality standards. Regulation SK 978/2013 introduced progressively stricter fuel sulfur limit targets for CN 48: 3,000 ppm by 2016, 2,500 ppm by 2017, 500 ppm by 2021, and 50 ppm by 2025. However, the current popularity of the dirtiest fuels raises questions about how well this timeline is harmonized with proposed vehicle emission standards.

Four-wheeled vehicles, both light and heavy duty, and fueled by diesel and gasoline, have been subject to Euro 2/II emission standards since 2005. In 2017, the Ministry of Environment and Forestry (MoEF) adopted Euro 4/IV vehicle emission standards and they have applied to new gasoline vehicles since September 2018. But MoEF recently delayed the implementation for Euro 4/IV diesel emission standards by one year, to April 2022, citing the impact of COVID-19.<sup>6</sup> Euro 4/IV standards require 50 ppm sulfur fuels, and those will not be mandated for all fuel specifications until three years later, in 2025, according to the government's timeline. Although Pertamina's domestic refinery upgrades in its Refinery Development Master Plan (RDMP) and Grass Root Refinery (GRR) projects will deliver higher quality fuel suitable for Euro 4/IV standards, they are still far from completion.<sup>7</sup> If there is not a sufficient supply of 50 ppm sulfur fuels, investments in Euro 4/IV engines will not be effective and vehicle manufacturers and owners will face technical challenges. Thus, if Pertamina seeks to increase the supply of 50 ppm fuels in the near term, it might need to rely on imports.

## Consumption of gasoline and diesel at the pump

While Indonesia's Directorate General of Oil and Gas sets four grades of gasoline and two grades of diesel in its fuel standards, as was outlined in Table 2, the MEMR Handbook of Energy and Economic Statistics reports consumption statistics for gasoline in two RON value categories that are not in alignment with the standards; additionally, one of the two grades of diesel is not in alignment.<sup>8</sup> This means that fuel retailers sell products that fall outside of government specifications. A few examples of distributors and their product labels are provided in Table 3.<sup>9</sup>

6 Wawan Priyanto, "Penerapan Standar Emisi Euro 4 Mesin Diesel Ditunda hingga 2022," *Tempo.co*, June 27, 2020, <https://otomotif.tempo.co/read/1358384/penerapan-standar-emisi-euro-4-mesin-diesel-ditunda-hingga-2022>.

7 Norman Harsono, "Pertamina's clean fuel goals remain far as deadline looms," *The Jakarta Post*, July 11, 2020, <https://www.thejakartapost.com/paper/2020/07/10/pertaminas-clean-fuel-goals-remain-far-as-deadline-looms.html>.

8 Ministry of Energy and Mineral Resources of Indonesia, "Handbook of Energy & Economic Statistics of Indonesia 2018 (Final Edition)," (January 2019), <https://www.esdm.go.id/assets/media/content/content-handbook-of-energy-and-economic-statistics-of-indonesia-2018-final-edition.pdf>.

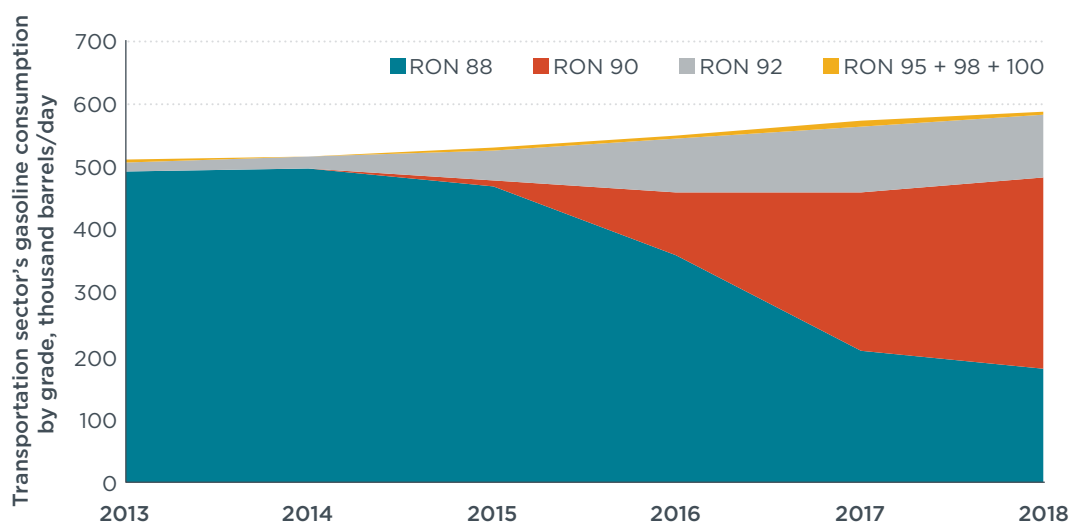
9 Regulation No. 19 K/10/MEM/2019 Ministry of Energy and Mineral Resources of Indonesia, "Laporan Harga Jual Eceran Jenis BBM Umum berdasarkan Kepmen ESDM Nomor 19 K/10/MEM/2019," (March 2019), <https://www.esdm.go.id/assets/media/content/content-lampiran-harga-jual-eceran-jenis-bbm-umum-berdasarkan-kepmen-esdm-nomor-19-k-10-mem-2019-1.pdf>.

**Table 3.** Different retail fuel labels in Indonesia

Fuel grade per fuel quality standards	RON 88 gasoline	RON 90 gasoline	RON 91 gasoline	RON 95 gasoline	CN 48 diesel		CN 51 diesel
<b>Pertamina's product grades</b>	Premium RON 88	Pertalite RON 90	Pertamax RON 92	Pertamax Plus RON 95, Pertamax Turbo RON 98	Solar/Biosolar CN 48	Dexlite CN 51 <sup>a</sup>	Pertadex CN 53
<b>Shell's product grades</b>		Regular RON 90	Super RON 92	V-POWER RON 95	Diesel Extra CN 48		Diesel CN 51
<b>Vivo energy's product grades</b>	Revvo 89	Revvo 90	Revvo 92	Revvo 95			

<sup>a</sup> 'Dexlite' is a product with a 1,200 ppm sulfur content and does not fall strictly under official CN 48 or CN 51 diesel specifications.

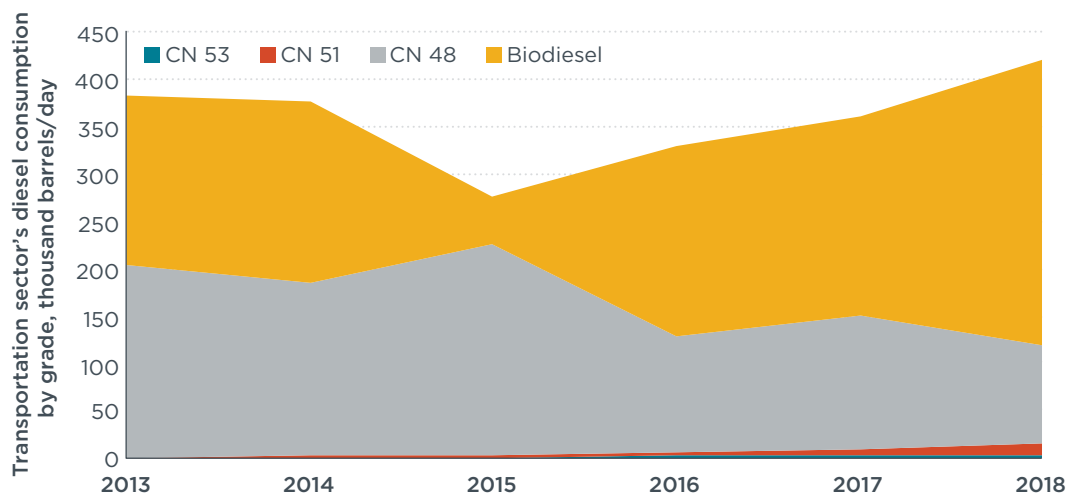
As consumption of motor fuels increases in Indonesia, diesel and gasoline consumption trends are also changing.<sup>10</sup> Figures 1 and 2 show a clear trend of growing total fuel demand in the transportation sector from 2013 to 2018.<sup>11</sup> Consumption of the lowest grade of gasoline, RON 88, declined 63% during this period. This decline accelerated in 2015 when the Indonesian government stopped subsidizing the fuel and excluded its distribution from the populous islands of Java, Madura, and Bali. Nonetheless, RON 88 Premium retained its status as a “special task” fuel that had a regulated and discounted price outside Java, Bali, and Madura. In 2015, Pertamina introduced RON 90 Pertalite. RON 90 gasoline has rapidly gained market share, and grew from 1.24% in the first year to more than half of the market in 2018. In 2013, RON 92 Pertamax gasoline accounted for 2.9% of gasoline market share. By 2018, the share had risen to 16.5%. Higher octane gasoline—RON 95 and above—is a niche product and has had about 1% market share over the last several years.



**Figure 1.** Transportation sector's total gasoline consumption by grade, thousand barrels/day

10 Yihao Xie and Marietta Harjono, *A review of motor vehicle fuel demand and supply in Indonesia*, (ICCT: Washington, DC, 2020), <https://theicct.org/sites/default/files/publications/Indonesia-fuel%20supply-demand-sept2020.pdf>.

11 Ministry of Energy and Mineral Resources of Indonesia (January 2019).



**Figure 2.** Transportation sector’s total diesel consumption by grade, thousand barrels/day.  
*Note:* A 20% blending requirement took effect across all transport sectors in 2018, but MEMR statistics do not include details of this blending.

For diesel, the increase in total consumption is predominately in biodiesel, as consumption of it grew by 70% from 2013 to 2018.<sup>12</sup> This growth likely stemmed, in part, from a government mandate to blend palm-based biodiesel in retail motor diesel fuels that went into effect in 2018. Meanwhile, the volume of fossil diesel consumption in transportation decreased by more than 42% from 2013 to 2018. CN 48 diesel retains by far the most dominant share of the diesel fuel market. CN 51 Dextrite with a sulfur level of 1,200 ppm was introduced in April 2016, and this diesel grade gained 2.7% of the market in 2018. The premium grade diesel CN 53 Pertadex, marketed as 300 ppm sulfur content, had a less than 1% market share.

Consumption trends are partially reflective of fuel prices. Across all retailers, fuels that have relatively higher CN/RON values cost more at the pump, and that likely helps to explain the dominant market share of lower grade RON gasoline and CN diesel (Table 4).<sup>13</sup> Additionally, the gasoline and diesel fuel grades that have dominated fuel sales in recent years, CN 48 Biosolar diesel and RON 88 Premium gasoline, have historically been subsidized by the Indonesian government. In 2015, the Government of Indonesia implemented fuel subsidy reforms that ended subsidies for RON 88 gasoline. Still, the Indonesian government has maintained price controls, referred to as a “one price” policy, to ensure RON 88 gasoline distributed by Pertamina and AKR are sold at the same discounted price across the country. Moreover, CN 48 diesel sold by Pertamina continues to be subsidized at a fixed price of 5,150 Indonesian Rupiah (IDR)/liter, which is less than half the price of the next highest diesel fuel grade, CN 51.

Consumption patterns of fuels by grades could change going forward, based on Pertamina’s recent adjustments to retail prices and policies. Pertamina launched a campaign in 2020 in Denpasar City, Bali, and South Tangerang outside of Jakarta to encourage the adoption of higher quality fuels. In South Tangerang, the Peralite price was cut to IDR 6,450/liter—the price of RON 88 Premium gasoline.<sup>14</sup> In Denpasar, RON 90 Peralite gasoline saw a 69% increase in consumption in July and August 2020, even before Pertamina decided to decrease Peralite prices to further incentivize customers.<sup>15</sup>

12 Bernadette Christina, “Indonesia to make biodiesel use compulsory from September 1: Official,” *Reuters*, August 1, 2018, <https://www.reuters.com/article/us-indonesia-biodiesel-idUSKBN1KM4WK>.  
 13 Ministry of Energy and Mineral Resources of Indonesia (January 2019).  
 14 Christine Novita Nababan, “Alasan harga Peralite Setara Premium di Rp6.450 per liter,” *CNN Indonesia*, September 14, 2020, <https://www.cnnindonesia.com/ekonomi/20200914103307-85-546118/alasan-harga-peralite-setara-premium-di-rp6450-per-liter>.  
 15 CNBC Indonesia, “Konsumsi Peralite di Bali naik signifikan,” September 14, 2020, <https://www.cnbcindonesia.com/news/20200914090519-4-186523/konsumsi-peralite-di-bali-naik-signifikan>.

In September 2020, MEMR made preliminary plans to phase out RON 88 Premium gasoline altogether in favor of RON 90 Pertalite gasoline in the islands of Java, Madura, and Bali.<sup>16</sup>

**Table 4.** Official compilation of retail fuel prices in Indonesia as of February 2019. Source: Ministry of Energy and Mineral Resources Indonesia (March 2019).

Retailer	Gasoline price by grade, IDR/liter						Diesel price by grade, IDR/liter		
	Fixed price RON 88	RON 88	RON 90	RON 91	RON 95	RON 98	Subsidized CN 48	CN 48	CN 51
AKR	6,450			9,700 – 9,900					
ExxonMobil				9,800 – 9,900					
BP AKR			9,350	9,900	10,950			11,100	
Vivo		7,600	9,750	9,800	10,850				
Shell				9,900	10,950			11,550	11,900
Total			9,300	9,900	10,950				11,850 – 11,900
Pertamina	6,450		7,650 – 8,000	9,850 – 10,150		11,200 – 11,600	5,150	10,200 – 10,600	11,700 – 12,200

## Retail fuel subsidies in Indonesia

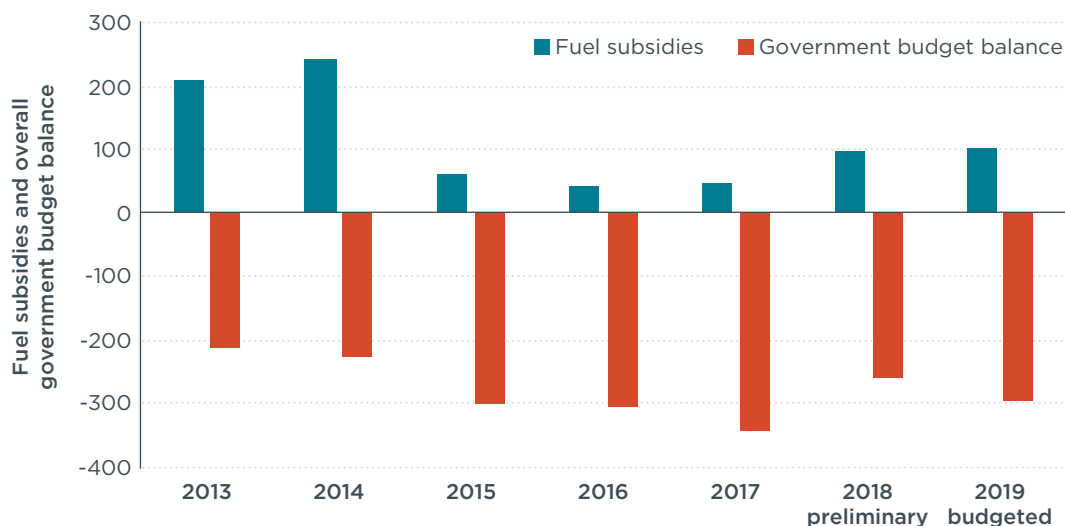
The fuel subsidy program in Indonesia has an important social and political context. The earliest subsidies can be traced back to the 1960s when Indonesia first became a member of the Organization of Petroleum Exporting Countries as a major oil producer.<sup>17</sup> The subsidies program survived Indonesia’s transition to a net oil importer in 2004. After getting elected in 2004, President Yudhoyono began to reduce subsidies while simultaneously introducing a social welfare system to shield low-income groups from the related economic burden.<sup>18</sup> However, some of these subsidy reductions were not fully implemented due to public resistance. Expenditure on fuel subsidies is compared to Indonesia’s fiscal budget balance in recent years in Figure 3.<sup>19</sup> High international oil prices and a weak Rupiah relative to the U.S. dollar make it more costly for Indonesia to subsidize fuel.

16 Muhammad Ridwan, “Rencana uji coba penghapusan premium, 4 daerah dipilih,” *Bisnis.com*, September 2, 2020, <https://ekonomi.bisnis.com/read/20200902/44/1286381/rencana-uji-coba-penghapusan-premium-4-daerah-dipilih>.

17 United Nations Environment Programme, “Durability as a measure of success: An analysis of fossil fuel subsidy reform in Indonesia” (2016), <https://www.cbd.int/doc/case-studies/inc/cs-inc-indonesia-fuel.pdf>.

18 United Nations Environment Programme (2016).

19 International Monetary Fund, “Indonesia 2015 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Indonesia,” (2016), <http://dx.doi.org/10.5089/9781513583624.002> and International Monetary Fund, “Indonesia: 2019 Article IV Consultation-Press Release ; Staff Report; and Statement by the Executive Director for Indonesia,” (2019), <http://elibrary.imf.org/view/IMF002/28270-9781513509129/28270-9781513509129/28270-9781513509129.xml>



**Figure 3.** Fuel subsidies and overall government budget balance, trillion IDR.

The most significant reform to-date to Indonesian fuel subsidies occurred in 2015 with the inauguration of President Joko Widodo, who suspended the sale of RON 88 Premium gasoline in Java, Bali, and Madura, the most populated islands in Indonesia; eliminated nearly all gasoline subsidies, excluding distribution costs to remote regions; and set a fixed overall subsidy of 500 IDR/liter for CN 48 diesel.<sup>20</sup> Under the new scheme, Pertamina first pays the cost of providing fixed cost gasoline which are then reimbursed by the government. The costs of diesel subsidies are covered by the state budget. Palm oil biodiesel blends in retail diesel also receive incentives from the palm oil export levy, collected and managed by the Palm Oil Estate Fund. The introduction of this revised pricing and subsidy scheme coincided with a period of low global oil prices and this meant domestic price increases were limited (Figure 4).<sup>21</sup> Table 5 captures major changes to fuel pricing and subsidy policies and regulations post 2015.<sup>22</sup> The 2015 reforms explain, in part, the significant decrease in fuel subsidy payments in the years that followed. However, payments in 2018 and in 2019 rose again in response to an increase in global oil prices.

20 Global Subsidies Initiative, and International Institute for Sustainable Development, "Indonesia Energy Subsidy Briefing February 2015," (2015), [https://www.iisd.org/gsi/sites/default/files/ffs\\_newsbriefing\\_indonesia\\_feb2015\\_eng.pdf](https://www.iisd.org/gsi/sites/default/files/ffs_newsbriefing_indonesia_feb2015_eng.pdf).

21 U.S. Energy Information Administration. Short-term energy outlook data browser - 2. Energy prices, Brent crude oil spot price, accessed August 11, 2020, <https://www.eia.gov/outlooks/steo/data/browser/#/?v=8&f=Q&s=&start=201301&end=201904&map=&id=&maptype=0&ctype=linechart&linechart=-BREPUUS>.

22 Tara Laan and Neil McCulloch, *Energy transition in support of the low-carbon development initiative in Indonesia: Transport sector*, (International Institute for Sustainable Development: Winnipeg, Canada, 2019), <https://www.iisd.org/sites/default/files/publications/energy-transition-transport-sector-indonesia.pdf>.





Figure 4. Brent crude oil spot price, U.S. dollars per barrel.

Table 5. Timeline of recent Indonesian government policies and actions related to fuel pricing.

Date	Government actions and policies
January 2015	Presidential Regulation No.191/2014 and MEMR Regulation No. 39/2014. Budgetary subsidy removed for Premium gasoline, and Java, Madura, and Bali excluded from its area of distribution; fixed subsidy level at IDR 1,000/liter for Solar/Biosolar diesel. Introduced a price band, ceiling and floor, for unsubsidized fuels
July 2016	MEMR Regulation No. 27/2016. Diesel subsidy reduced to IDR 500/liter
Late 2016	MEMR Regulation No. 36/2016. Single price for fixed-price Premium RON 88 gasoline and subsidized diesel established across Indonesia, including areas with less developed infrastructure
April 2018	Government enforced policy in MEMR Regulation No. 39/2014, on maximum retail price for non-subsidized fuel products. Retailers could not raise non-subsidized fuel prices without government approval <sup>a</sup>
May 2018	MEMR Decree No. 1851 K/15/MEM/2018. Fixed price Premium gasoline reintroduced in Java, Madura, and Bali
September 2018	MEMR Regulation No. 40/2018. Diesel subsidy raised to IDR 2,000/liter
October 2018	Premium gasoline price initially raised to IDR 7,000/liter but was quickly restored to IDR 6,450/liter <sup>b</sup>
May 2019	Price of Premium gasoline adjusted to 6,500 IDR/liter in Java, Madura, and Bali <sup>c</sup>
August 2019	2020 state budget reduces diesel subsidies back to IDR 1,000/liter <sup>d</sup>
February 2020	MEMR Decree No. 62 K/12/MEM/2020. Revised fuel pricing formula, removed the price floor for unsubsidized fuels
July 2020	MEMR to cut diesel subsidy by 50% to IDR 500/liter in the 2021 budget <sup>e</sup>

<sup>a</sup>Ad hoc adjustments to fuel prices are not captured in the table.

<sup>b</sup> Wilda Asmarini and Tabita Diela, "Indonesia to regulate non-subsidized fuel prices to control inflation," Reuters, April 9, 2018, <https://www.reuters.com/article/us-indonesia-gasoline-prices-idUSKBN1HG1DQ>

<sup>c</sup> Reinard Stefano Sulaiman, "Government abruptly cancels plan to increase subsidized fuel prices," The Jakarta Post, October 20, 2018, <https://www.thejakartapost.com/news/2018/10/10/government-abruptly-cancels-plan-to-increase-subsidized-fuel-prices.html>.

<sup>d</sup> CNN Indonesia, "Formulasi Harga BBM Diubah, Pertamina Yakin Keuangan Aman," February 11, 2019, <https://www.cnnindonesia.com/ekonomi/20190211201743-85-368342/formulasi-harga-bbm-diubah-pertamina-yakin-keuangan-aman>.

<sup>e</sup> "Indonesia's 2020 energy subsidy policy 'flexible,' price freeze may stay - officials," Reuters, August 20, 2019, <https://www.reuters.com/article/indonesia-budget-subsidies-idAFL4N25G1UG>.

<sup>f</sup> Norman Harsono, "Govt to slash diesel subsidy 50%, generate trillions in 2021 savings," The Jakarta Post, July 1, 2020, <https://www.thejakartapost.com/news/2020/07/01/govt-to-slash-diesel-subsidy-50-generate-trillions-in-2021-savings.html>.



Before the 2019 elections, President Jokowi reversed course on the 2015 fuel subsidy reforms. He increased diesel subsidies to 2,000 IDR/liter and ordered Pertamina to offer below-cost RON 88 gasoline at fixed prices in Java, Madura, and Bali despite high international oil prices and a depreciating Rupiah.<sup>23</sup>

## Retail fuel price-setting formula

For unsubsidized fuels, the 2015 reforms established a new price-setting mechanism. MEMR sets fuel prices using a pricing formula that can be summarized as follows, and it was most recently updated in MEMR Decree 62 K / IO / MEM / 2020 in February 2020.

$$\text{Fuel price} = \text{Base Price} + \text{Constant} + \text{Margin}$$

The **base price** is an estimate of the international price in domestic currency terms, calculated as Mean of Platts Singapore (MOPS) × adjustment factor × exchange rate. MOPS is the benchmark price for many refined petroleum products in Southeast Asia. The adjustment factor for a fuel depends on whether it is gasoline or diesel and its octane/cetane value. For example, the base price for RON 90 gasoline is MOPS92 × 99.21%. MOPS92 is the Mid-Oil Platts Singapore price for RON 92 gasoline and it is adjusted by 99.21% to account for the difference in octane content between domestic RON 90 gasoline and the benchmark RON 92 price Indonesia used in the international market. The exchange rate from U.S. dollars to IDR is the average Bank of Indonesia exchange rate from the 24th to the 25th days of the previous month. Note that there is no formula in the decree for RON 88 Premium gasoline, the fixed-price lowest grade of gasoline in the market.

The **constant** in the formula is a value measured in IDR/liter, and accounts for procurement, transportation, and storage costs of fuel. The value of the constant is meant to be adjusted on a regular basis to reflect cost changes but the frequency of adjustments is not specified. In February 2020, the constants were set at IDR 1,800/liter for gasoline below RON 95 and diesel below CN 48, and IDR 2,000/liter for RON 95 and RON 98 gasoline, and CN 51 diesel.<sup>24</sup>

The **margin** establishes a price band, an instrument to limit profit margins and guard against market volatilities. The price band was introduced when the gasoline subsidies ended in 2015.<sup>25</sup> A fuel's price floor is calculated as  $5/95 \times (\text{base price} + \text{constant})$ , while the price ceiling is calculated as  $10/90 \times (\text{base price} + \text{constant})$ . In March 2020, the price floor was removed in MEMR Decree 62. K/12/MEM/2020, as global oil prices plummeted.<sup>26</sup>

In 2015, the Indonesian government first applied the formula on a three-month basis.<sup>27</sup> Reapplying this pricing formula at regular intervals with adjustments to the constants could reflect international oil market prices, limit volatility, and equalize prices across the country. In reality, though, price adjustments in recent years have sometimes been

23 "Indonesian govt to refund Pertamina up to \$1.3 bln for fuel sales costs," *Reuters*, November 28, 2018, <https://www.reuters.com/article/indonesia-pertamina-budget-idUSL4N1Y334J>.

24 Regulation No. K/12/MEM/2020 Ministry of Energy and Mineral Resources of Indonesia, "Formula Harga Dasar Dalam Perhitungan Harga Jual Eceran Jenis Bahan Bakar Minyak Umum Jenis Bensin Dan Minyak Solar Yang Disalurkan Melalui Stasiun Pengisian Bahan Bakar Umum Dan/Atau Stasiun Pengisian Bahan Bakar Nelayan Nomor: 62 K/12/MEM/2020," February 28, 2020, <https://jdih.esdm.go.id/storage/document/Kepmen%2062%20K%202020.PDF>.

25 Wilda Asmarini, "Indonesia to set price band for domestic fuel prices - official," *Reuters*, February 6, 2015, <https://www.reuters.com/article/indonesia-gasoline-idUSL4NOVG5U120150206>.

26 Norman Harsono, "Indonesia removes price floor for unsubsidized fuels amid global oil price war," *The Jakarta Post*, March 17, 2020, <https://www.thejakartapost.com/news/2020/03/17/indonesia-removes-price-floor-for-unsubsidized-fuels-amid-global-oil-price-war.html>.

27 Organisation for Economic Co-operation and Development, "Indonesia's Effort to Phase out and Rationalise Its Fossil-Fuel Subsidies: A Report on the G20 Peer-Review of Inefficient Fossil-Fuel Subsidies That Encourage Wasteful Consumption in Indonesia," (2019), [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPEP\(2019\)9&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/EPOC/WPEP(2019)9&docLanguage=En).

infrequent. Between April 2016 and June 2018, the fuel pricing formula was not applied to change retail fuel prices for RON 88 Premium gasoline even though the international oil price had almost doubled.<sup>28</sup> This practice avoided passing international market price increases on to consumers. But below-market pricing put pressure on Pertamina, which suffered financial losses. The government also lost revenue and taxes from state-owned Pertamina that it otherwise would have collected.<sup>29</sup> In one way, the gasoline subsidies were replaced by an infrequently adjusted fixed government price, and domestic and international market prices that do not necessarily align.

### Comparison of Indonesian fuel quality standards with other countries

Indonesia permits the sale of low-quality fuels. Even the most premium fuel products, which today constitute a small fraction of national fuel consumption—Pertamina’s highest grade of gasoline is the 50 ppm sulfur Pertamax Turbo and its highest grade of diesel is the 500 ppm sulfur Pertadex—are only compatible with Euro 4/IV and Euro III emission standards introduced in Europe more than 15 years ago. The vast majority of fuels consumed in the country would not support Euro 3/III gasoline vehicles first introduced in Europe in 2000 as they need 150 ppm sulfur fuel, or Euro II diesel vehicles first introduced in Europe in 1996, as they need 350 ppm sulfur fuel.

The quality of fuels in the Indonesian market are behind other G20 countries, as shown in Figure 5. Modern vehicle emission control technologies, including selective catalytic reduction (SCR) and diesel particulate filters (DPF) on diesel vehicles, and catalytic converters on gasoline vehicles, cannot operate fuels with such high sulfur content.

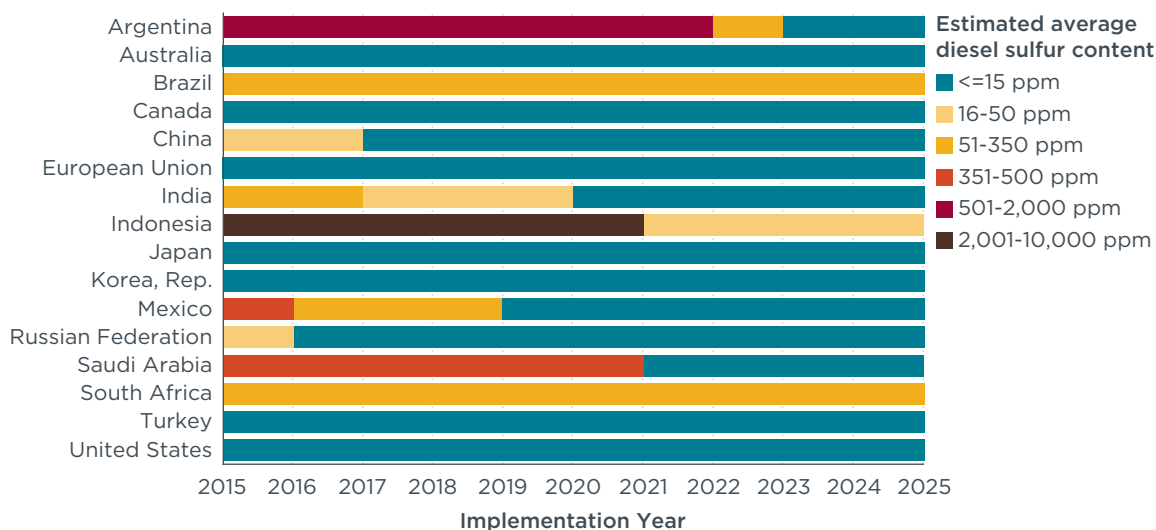


Figure 5. Diesel sulfur content timeline in major G20 countries

Additionally, fuel blending components that have been banned or restricted in most other major markets are permitted in even the highest fuel grades in Indonesia. For instance, India limits the percentage volume of aromatics at 35% and benzene at 1% in gasoline, in line with European fuel quality standards. China has the same aromatics volume limit of 35%, and a stricter cap on benzene at 0.8%. In contrast, Indonesia’s highest grade of gasoline has an aromatics limit of 40% volume, and for benzene it is 5%; RON 88 Premium does not have any limit on benzene or aromatics content.

28 Laan & McCulloch (2019)

29 Ibid.

In gasoline, higher volumes of aromatics increase tailpipe emissions of benzene, a known human carcinogen.<sup>30</sup> Heavy aromatics have also been linked to engine deposit formation in the combustion chamber that reduces engine reliability.<sup>31</sup> Increasing aromatics content in gasoline has been found to be associated with statistically significant increases in carbon monoxide (CO), particulate matter (PM), particulate number (PN), nonmethane hydrocarbon, and black carbon (soot) emissions.<sup>32</sup>

For diesel, Indonesia's current sulfur content limit of 500 ppm renders newer emission control technologies like SCR and DPFs ineffective. DPFs are necessary to control fine particulate matter, including ultrafine particles harmful to public health and black carbon pollution. Ultrafine black carbon particles are toxic air contaminants that get into the most sensitive regions of the lungs. Black carbon is also a short-lived climate pollutant (SLCP) and a major component of PM pollution. Exposure to black carbon is associated with adverse health outcomes including asthma, coronary heart disease and cancer, and is found to increase total cardiac and respiratory mortalities.<sup>33</sup>

Diesel blending components are subject to low or even no regulations in Indonesia. The Worldwide Fuel Charter Sixth Edition recommends a maximum of 3% mass of PAHs in diesel for countries with advanced vehicle emission control standards and this is to avoid the detrimental health effects of evaporative and tailpipe emissions of PAHs and their combustion products.<sup>34</sup> Indonesia does not regulate PAHs in diesel.

On the vehicle side, emission standards for both light-duty vehicles and heavy-duty vehicles in Indonesia are not in line with other G20 countries, and a comparison of heavy-duty standards is shown in Figure 6. By 2023, 70% of heavy-duty vehicle sales around the world are set to meet Euro VI emission standards, including those in China, India, and Brazil. ASEAN countries have also taken progressive steps—the Philippines, Thailand, Malaysia, and Vietnam have all mandated or made a near-term target of 50 ppm sulfur diesel, compliant with Euro IV emission standards, and Thailand is considering requiring Euro 6 for cars by 2022.<sup>35</sup> Indonesia could also learn from West Africa, where fuel quality standards and vehicle emission standards have been historically lax. In February 2020, 15 member countries of the Economic Community of West African States (ECOWAS) pledged to harmonize fuel quality standards, only import 50 parts per million or less sulfur fuels and require a minimum of Euro 4/IV vehicle emissions standard for imported vehicles from January 1, 2021.<sup>36</sup>

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30 Assessment and Standards Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency, "Assessing the effect of five gasoline properties on exhaust emissions from light-duty vehicles certified to tier 2 standards: Analysis of data from EPA Act Phase 3 (EPA Act/V2/E-89) final report," (EPA-420-R-13-002, April 2013), <https://nepis.epa.gov/Exe/ZyPDF.cgi/P100GA0V.PDF?Dockkey=P100GA0V.PDF>

31 European Automobile Manufacturers Association, Alliance of Automobile Manufacturers, Truck and Engine Manufacturers Association, and Japan Automobile Manufacturers Association, "Worldwide Fuel Charter Sixth Edition: Gasoline and Diesel Fuel," (October 2019), [https://www.acea.be/uploads/publications/WWFC\\_19\\_gasoline\\_diesel.pdf](https://www.acea.be/uploads/publications/WWFC_19_gasoline_diesel.pdf).

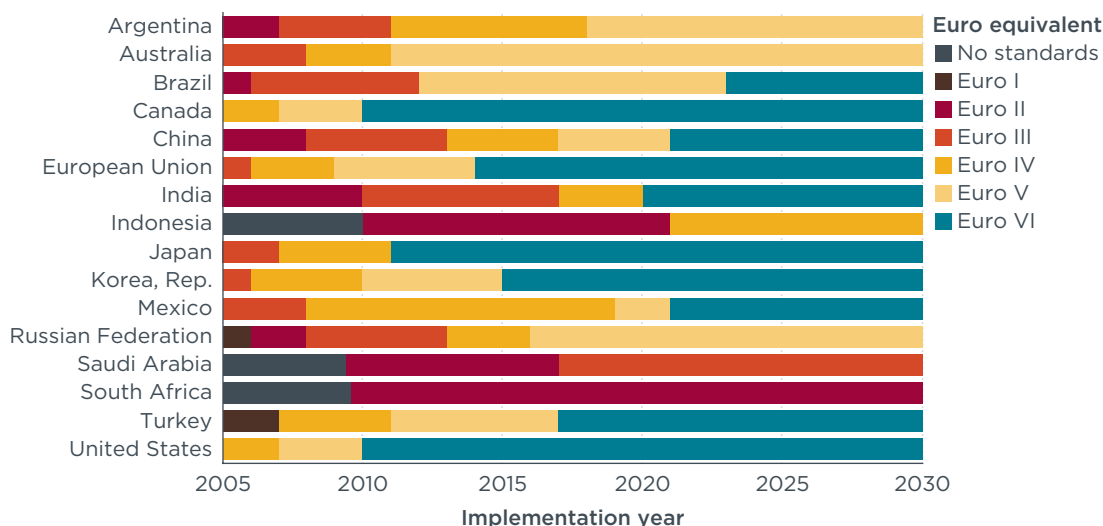
32 Georgios Karavalakis, Daniel Short, Diep Vu, Robert Russell, Maryam Hajbabaee, Akua Asa-Awuku, and Thomas D. Durbin. "Evaluating the effects of aromatics content in gasoline on gaseous and particulate matter emissions from SI-PFI and SIDI vehicles," *Environmental Science & Technology* 49, no. 11 (2015): 7021–31. <https://doi.org/10.1021/es5061726>.

33 Nicole AH Janssen, Miriam E Gerlofs-Nijland, Timo Lanki, Raimo O Salonen, Flemming Cassee, Gerard Hoek, Paul Fischer, Bert Brunekreef, and Michal Krzyzanowski, *Health effects of black carbon*, (WHO Regional Office for Europe: Copenhagen, 2012), [http://www.euro.who.int/\\_data/assets/pdf\\_file/0004/162535/e96541.pdf](http://www.euro.who.int/_data/assets/pdf_file/0004/162535/e96541.pdf).

34 European Automobile Manufacturers Association et al. (2019)

35 Hui He, *Why China should not postpone implementation of the China 6 emission standard for new cars*, (ICCT: Washington, DC, 2020), [https://theicct.org/sites/default/files/publications/China%206-position-brief\\_FINAL.pdf](https://theicct.org/sites/default/files/publications/China%206-position-brief_FINAL.pdf)

36 CCAC Secretariat, "West African ministers adopt cleaner fuels and vehicles standards," February 28, 2020, <https://www.ccacoalition.org/en/news/west-african-ministers-adopt-cleaner-fuels-and-vehicles-standards>.



**Figure 6.** Heavy duty vehicle emission timeline in major G20 economies

The costs of dirty fuels on public health are clear. Air pollution from transportation tailpipe emissions in Indonesia was linked to more than 7,000 premature deaths, at a social cost of more than U.S.\$4 billion, in 2015.<sup>37</sup> Still, the Indonesian government subsidizes the sale of CN 48 diesel and keeps a fixed price of RON 88 gasoline, the lowest quality fuels available in the country and arguably the largest contributors to transportation-attributed air pollution and climate change. There is a strong case for ending support for the dirtiest fuels and upgrading vehicle emission and fuel quality standards. Previous ICCT research showed that implementation of Euro 6/VI fuel and vehicle standards by 2030, in the Global Sulfur Strategy scenario, would result in net societal benefits of approximately \$81 billion, with a benefit-cost ratio of 8.7 to 1.<sup>38</sup>

## Conclusion

From an environmental and public health perspective, Indonesia's current fuel quality standards and fuel price programs are not equipped to reduce air pollution or transportation-related greenhouse gas emissions. This can undermine the social welfare benefits of providing affordable fuels, and the following actions would help address the situation:

- » Revise national fuel quality regulations to establish a timeline for the nationwide availability of gasoline and diesel fuels containing no greater than 10 ppm sulfur by 2023 to support implementation of Euro 6/VI vehicle emission standards. Additionally, design and implement fuel import regulations to only allow gasoline and diesel fuels containing no greater than 10 ppm sulfur.
- » Limit benzene content in fuels to no greater than 1% and ban all metallic additives, including manganese. Adopt fuel specifications for aromatics, octane, and other fuel quality characteristics in line with international guidelines adopted by the United Nations Economic and Social Council and the Worldwide Fuel Charter.<sup>39</sup>
- » End subsidies and/or fixed prices for dirty fuels such as RON 88 Premium gasoline

37 Susan Anenberg, Josh Miller, Daven Henze, and Ray Minjares, *A global snapshot of the air pollution-related health impacts of transportation sector emissions in 2010 and 2015*, (ICCT: Washington, D.C., 2019), [https://theicct.org/sites/default/files/publications/Global\\_health\\_impacts\\_transport\\_emissions\\_2010-2015\\_20190226.pdf](https://theicct.org/sites/default/files/publications/Global_health_impacts_transport_emissions_2010-2015_20190226.pdf).

38 Zhenying Shao, Josh Miller, and Lingzhi Jin, *Soot-free road transport in Indonesia: A cost-benefit analysis and implications for fuel policy*, (ICCT: Washington, D.C., 2020), <https://theicct.org/sites/default/files/publications/Indonesia-sootfree-CBA-02182020.pdf>.

39 The United Nations Economic Commission for Europe (UNECE) offers a global forum for harmonizing vehicle regulations. UNECE has developed recommendations for regulators to set fuel quality standards in line with vehicle emission control technologies.

and CN 48 Biosolar diesel, to favor both the purchase of low-sulfur fuels and the infrastructure upgrades to allow for domestic production of higher quality fuel.

- » Consolidate retail fuel grades to reflect official fuel quality specifications. Additionally, ensure fuel quality at the retail level, especially regarding sulfur content and organic blending components, by adopting a system of fuel quality compliance and enforcement that includes fuel quality sampling and reporting with publicly available data and penalties for non-compliance.