



Outlook on global refining to 2028

August 2024

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Executive Summary

In 2023, global refining capacity was estimated at 103.5 million barrels per day (b/d)¹. With recent structural changes to world petroleum markets in reaction to the COVID-19 pandemic, Russia's invasion of Ukraine, and shipping disruptions in the Red Sea, there is increased interest in how much refinery capacity may enter service within the next few years to meet rising demand. This analysis looks at several major refinery investments with plans to enter service through 2028, their collective refined product output, and their meaning for global crude oil and refined product trade. The bulk of planned growth in refined product output is in the Asia-Pacific (mostly China and India) and the Middle East. We estimate that between 2.6 million barrels b/d and 4.9 million b/d of refining capacity will come online over 2024–28.

Our analysis discusses only projects with reasonable expectations of coming online within the next four years, based on project announcements. Because of the inherent uncertainty of all refinery projects, we estimate a wide range of capacity could enter service by 2028. Refinery projects are regularly delayed because of financing, crude oil supply agreements, logistics, unit testing, stockpiling operational inventories, and other factors that complicate the start-up of new facilities.

New refineries take time to begin operating at normal utilization. Our analysis also does not include planned or hypothetical refinery closures through 2028, which would offset expansions on world markets. Nonetheless, we acknowledge a greater risk of closure in the competitive Atlantic Basin market and among smaller, independent refineries in China.

Rising consumption and new refineries in growing demand centers will affect crude oil and refined product trade significantly. In our *International Energy Outlook 2023* (IEO 2023), we projected continued OPEC+ production restraint through 2028; additionally we pointed out that growing domestic refinery capacity and refined product demand may limit crude oil exports from Middle East producers through 2028. As a result, we expect that crude oil production growth in several countries outside OPEC+—such as the United States, Canada, Brazil, and Guyana—will supply crude oil to new refineries in China or India.

Aside from the implications of these expansions on world trade in crude oil and petroleum products, we expect refinery expansions in the Atlantic Basin market to face slow demand growth amid a highly competitive refining market. Refining expansions in Nigeria and Mexico will encounter different market conditions than the projects opening in China, India, and the Middle East, where product demand is increasing. Recent geopolitical tensions following Yemen-based Houthi attacks in the Red Sea are increasing [shipping lengths](#) and costs, which could further isolate the Atlantic and Pacific markets and solidify these divergent trends.

Global liquid fuels consumption through 2028

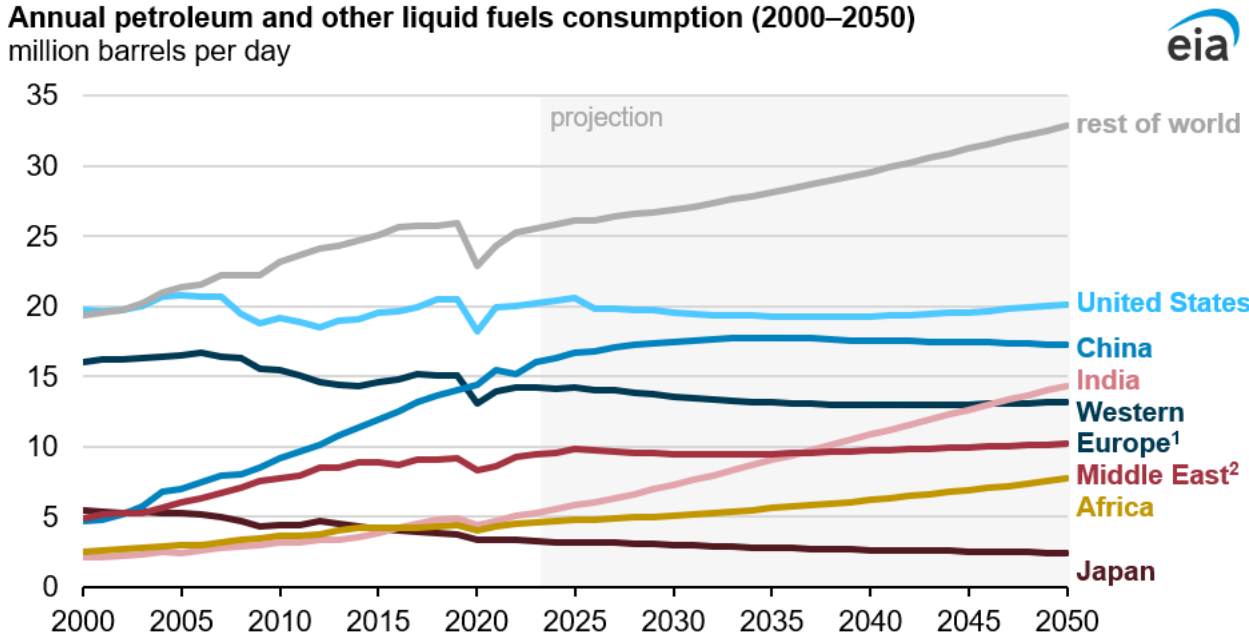
Refiners add capacity to meet customers' fuel demands and to profit from market opportunities. In some countries, refiners are state-owned enterprises and may pursue refining projects to secure stable

¹ Energy Institute Statistical Review of World Energy 2024, accessed June 2024

fuel supplies, reduce imports, or other reasons. Government mandates to produce cleaner fuels may also drive some expansions or investments in new units.

In our August 2024 *Short-Term Energy Outlook* (STEO), we forecast that world consumption of petroleum and liquid fuels will total 103 million barrels per day (b/d) in 2024. In our *International Energy Outlook 2023* (IEO 2023), released in October, 2023, we projected world consumption of petroleum and other liquid fuels would rise to 105 million b/d by 2028.

Figure 1



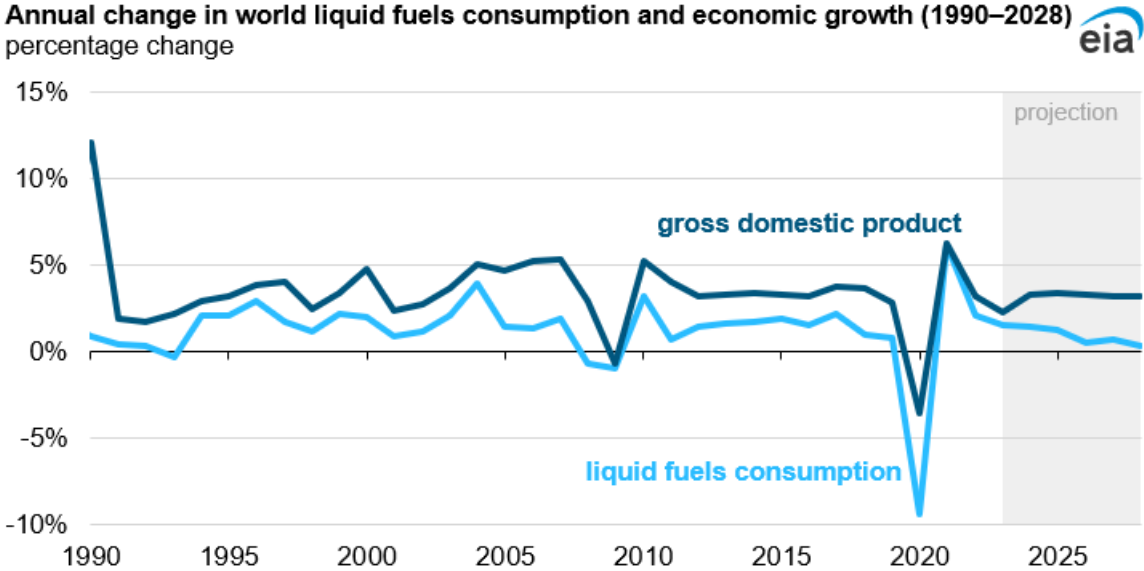
Data source: U.S. Energy Information Administration, *International Energy Statistics*; *Short-Term Energy Outlook*, August 2024; and *International Energy Outlook 2023*

¹ *Western Europe* includes Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Faroe Islands, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye, and the United Kingdom.

² *Middle East* includes Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestinian Territories, Qatar, Saudi Arabia, Syria, United Arab Emirates, and Yemen.

Historically, growth in liquid fuels consumption has been linked with economic growth. Although this link remains, the relationship between the two may be weakening because of petroleum consumption efficiency gains as well as increased electrification of the global vehicle fleet, displacing motor gasoline consumption.

Figure 2



Data source: U.S. Energy Information Administration, *International Energy Statistics* and *International Energy Outlook 2023*

Note: Percentage change is calculated from GDP (purchasing power parity) in billion 2015 dollars.

Through 2028, refining projects are concentrated in growing demand centers: countries in Asia and the Middle East (Table 1). The economies and populations in these countries are generally growing faster than in the United States, Western Europe, and Japan. Countries in Asia and the Middle East face [growing incomes](#) and middle classes, which will increase consumption of consumer goods and transportation fuels within the next 10 years. As a result of these trends, refiners are adding capacity through at least 2028 to satisfy expected demand growth to 2050. Although we also expect significant growth in liquid fuels consumption in Africa after 2030, potential refinery capacity expansion projects in African countries are likely to face significant competitive pressure from imports from either the Atlantic or Indian Ocean basins.

**Table 1. List of refinery projects planned by 2028
(capacity in barrels per day)**

Country	Refinery operator (site location)	Estimated crude distillation unit capacity	Estimated startup year	Capacity type
China	Yulong (Shandong)	400,000	2025	New
China	Ningbo Daxie (Zhejiang)	120,000	2025	Expansion
China	Sinopec Zhenhai (Zhejiang)	250,000	2026	Expansion
China	Huajin Aramco (Liaoning)	300,000	2027	New
China	Sinopec Yueyang (Hunan)	40,000	2027	New
India	Indian Oil (Gujarat)	86,000	2025	Expansion
India	Indian Oil (Barauni)	60,000	2024	Expansion
India	Indian Oil (Bongaigon)	37,000	2028	Expansion
India	Indian Oil (Guwahati)	4,000	2024	Expansion
India	Indian Oil (Panipat)	200,000	2027	Expansion
India	Hindustan Petroleum (Visakhapatnam)	150,000	2024	Expansion
India	Hindustan Petroleum (Barmer)	180,000	2026	New
India	Chennai Petroleum (Nagapattinam)	180,000	2027	New
India	Numaligarh Refinery Ltd (Assam)	120,000	2027	Expansion
India	Indian Oil (Paradip)	200,000	2027	Expansion
India	Ratnagiri Refinery and Petrochemicals (Ratnagiri)	1,200,000	2028	New
Bahrain	Bahrain Petroleum (Sitra)	110,000	2025	Expansion
Iran	National Iranian Oil Refining and Distribution Company (Bandar Abbas)	120,000	2025	Expansion
Iran	National Iranian Oil Refining and Distribution Company (South Adish, Siraf)	60,000	2025	New
Iraq	Iraqi Ministry of Oil (Haditha)	20,000	2024	Expansion
Jordan	Jordan Petroleum Refinery Company (Zarqa)	50,000	2027	Expansion
Oman	Oman Oil Company, Kuwait Petroleum International (Duqm)	17,000	2024	Expansion
Saudi Arabia	Saudi Aramco Total Refining and Petrochemical Company - SATORP (al Jubail)	40,000	2026	Expansion
Nigeria	Dangote Group (Lagos)	650,000	2024	New
Mexico	Pemex Olmeca Refinery (Dos Bocas)	340,000	2025	New

Data Source: U.S. Energy Information Administration, Facts Global Energy, Bloomberg New Energy Finance, S&P Global

Refining investment

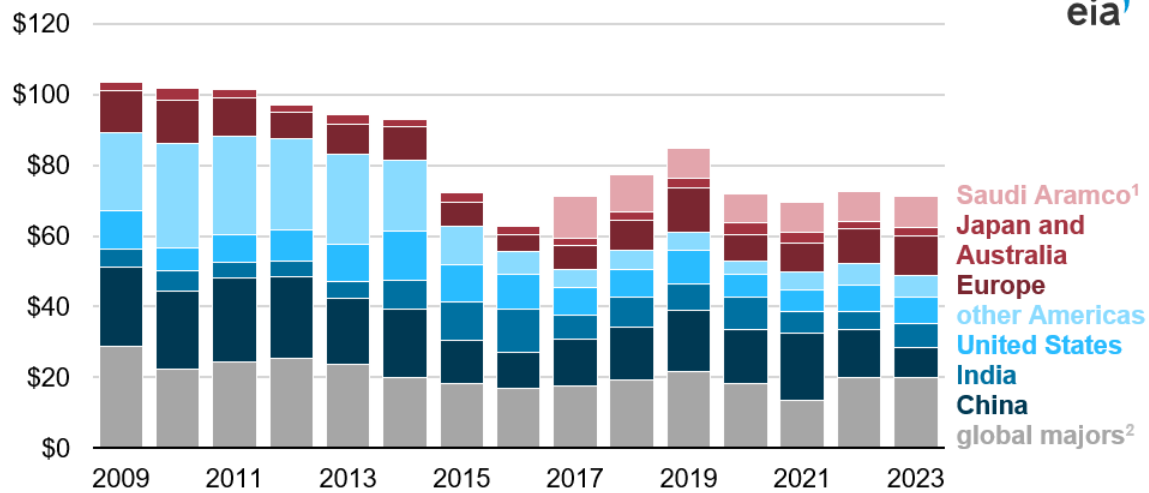
Based on published financial statements, refining capital expenditures from 39 global refiners totaled \$71 billion in 2023, down slightly from 2022 after adjusting for inflation². From 2009 to 2023, companies with global refining operations, called Global Majors, averaged about 25% of each year's total capital expenditures. Global Majors are companies with geographically diverse refining assets such as bp and ExxonMobil.

Saudi Aramco, which became public in 2019 but provides refining capital expenditure data back to 2017, has been the single-largest investing company in almost every year, averaging more than \$9 billion in refining capital expenditures after adjusting for inflation. The five refiners from China and India that publish financial statements collectively averaged 29% of total refining capital expenditures since 2009, averaging between \$15 billion to \$28 billion every year.

² Evaluate Energy

Figure 3

Refining capital expenditures, 39 publicly traded companies by operating country (2009–2023)
billion 2023 dollars



Data source: Evaluate Energy

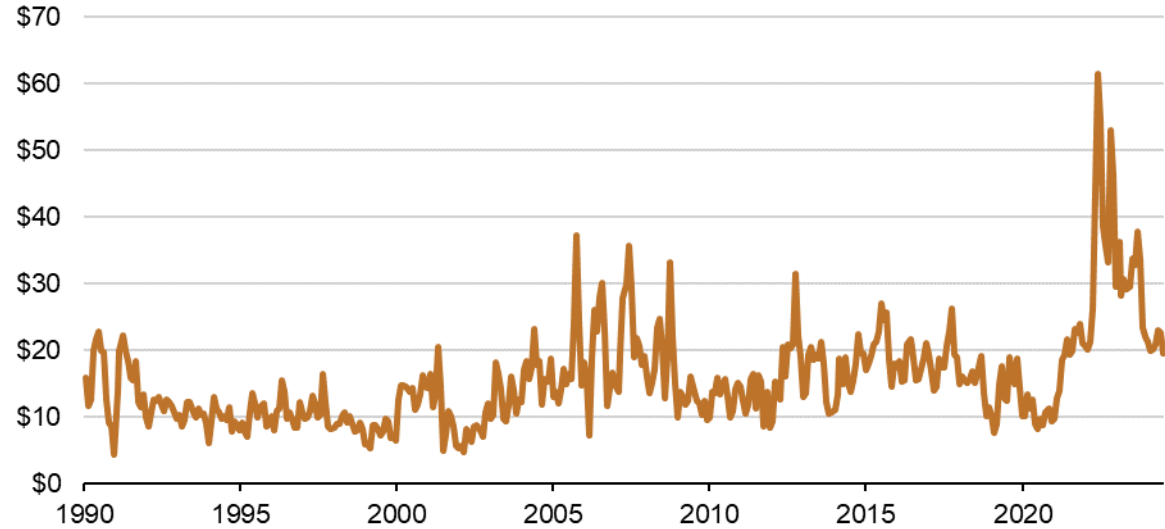
¹Saudi Aramco investment data begin in 2017.

²Global majors include companies with geographically diverse refining assets (bp, Chevron, ExxonMobil, Shell, and TotalEnergies)

Growing crack spreads—the difference between petroleum product prices and crude oil prices—can influence refinery investment. Strong global crack spreads in the mid-2000s drove much of the investment and refinery capacity expansions that have come online during the past 15 to 20 years. The financial effects of the COVID-19 pandemic resulted in several refinery [closures or conversions](#) to production of renewable fuels. Returning demand for transportation fuels as well as changes in global trade following Russia’s full-scale invasion of Ukraine widened crack spreads to record levels in 2022. High crack spreads led to some refiners delaying previously announced closure plans. Although crack spreads as of June 2024 remained historically strong, after adjusting for inflation, they have narrowed since 2022. Many of the projects that we expect to come online by 2028 were announced before the recent decrease in crack spreads.

Figure 4

Monthly inflation-adjusted 3–2–1 crack spread (Jan 1990–Jun 2024)
2023 dollars per barrel



Data source: U.S. Energy Information Administration, Refinitiv, an LSEG business

Note: 3–2–1 crack spread calculated as two barrels of conventional New York Harbor gasoline, plus one barrel of New York Harbor Ultra-Low Sulfur Diesel, less three barrels of Brent crude oil.

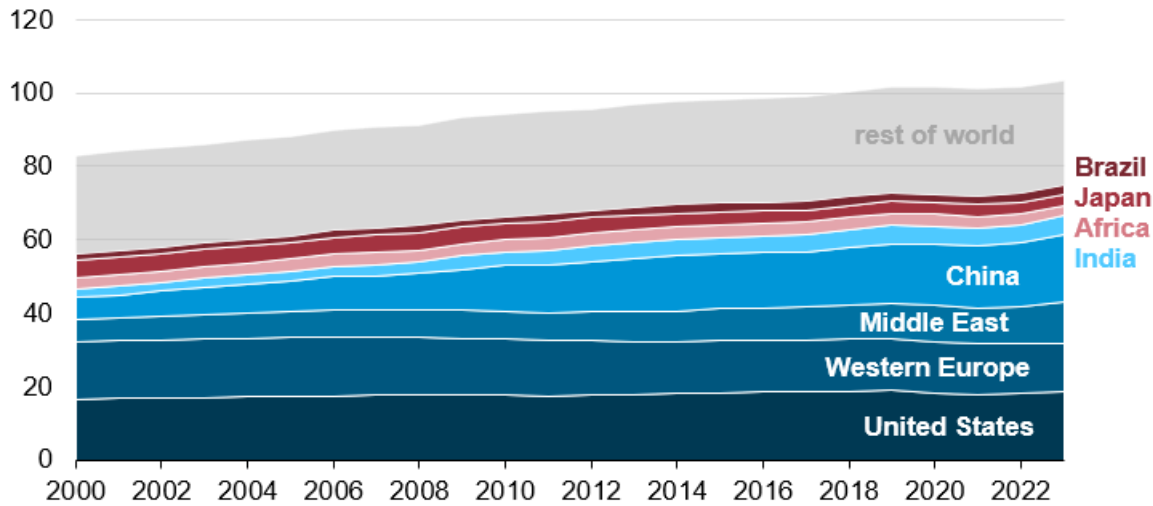
Global refining snapshot

Growth in refinery capacity has shifted to regions where growth in petroleum demand has been fastest. In 2000, world refinery capacity totaled 82.9 million b/d, of which nearly half (45%) was in the United States, Western Europe, and Japan.³ Refinery capacity in the Middle East, China, and India has been growing nearly every year and, by 2023, made up more than one-third (34%) of world capacity, matching the share held by the United States, Western Europe, and Japan. World refinery capacity contracted slightly in 2020 and 2021 following the COVID-19 pandemic but increased in 2023 from the prior year to 103.5 million b/d.

³ Energy Institute Statistical Review of World Energy 2024, accessed June 2024

Figure 5

Global refinery capacity (2000–2023)
million barrels per day



Data source: Energy Institute Statistical Review of World Energy 2024

China

Refineries in China added 5.5 million b/d of capacity from 2011–23, bringing the country’s capacity to 18.5 million b/d.⁴ The country has a mix of state-owned enterprises; large, private companies; and small, individual refiners. New refineries and expansions to existing refineries must be [approved](#) by China’s National Development and Reform Commission (NDRC). China’s government has [pursued](#) a policy of shutting down smaller and less efficient refiners, although this policy has received pushback from local governments.

We expect five refinery projects will be completed in China through 2028. These projects maximize naphtha and liquefied petroleum gas (LPG) production, which serve as feedstock for their integrated petrochemical facilities. Integrated petrochemical facilities can easily access refinery production of petrochemical feedstocks, such as naphtha and LPG, which allows the overall complex to pivot production from transportation fuels to petrochemicals as market conditions warrant.

One of the refineries planned for 2025, Yulong, will likely add a total of about 100,000 b/d of transportation fuels production, and the rest of their production will be geared toward naphtha and other petrochemical feedstocks.⁵ Nonetheless, the Yulong refinery will have a [hydrocracker](#), which can shift from maximizing naphtha output to diesel output quickly. This flexibility will allow the refinery to pivot from petrochemical feedstock to diesel fuel if market conditions warrant, thereby increasing the total transportation fuel output capacity from this refinery.

The timing and viability of these projects depend on many factors, including trends in the country’s domestic fuel consumption, capacity expansions from other petrochemical facilities, and China’s policy on imports and exports. China’s refiners need a crude oil import license, and companies receive a

⁴ Energy Institute Statistical Review of World Energy 2024, accessed June 2024

⁵ Facts Global Energy, Asia Pacific Databook 2, Refinery Configuration, Spring 2024, accessed March 2024

refined fuel [export quota](#). The NDRC, which regulates import licenses and export quotas, may reduce quotas to try to reduce domestic prices, reduce local pollution or CO₂ emissions, or for other reasons. Changes in the quotas issued can affect China's petroleum product exports within a given period.

Although some of these projects have been slated for start-up by 2026, we estimate that regular start-up delays could push some of these projects to 2028 or later. As a result, we estimate total refinery capacity in China will increase between 0.8 million b/d and 1.1 million b/d from 2023 to 2028. This range does not include estimates of refinery closures. New expansions will increase competition among China's smaller, independent refineries, some of which could close as a result of these capacity additions. Any such closures would offset capacity increases from larger refineries in China.

Implications for crude oil imports

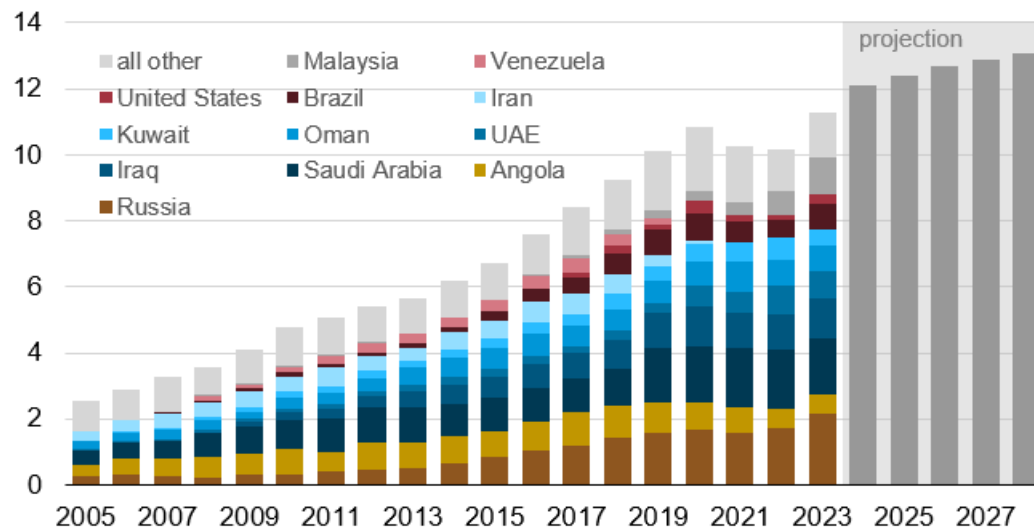
China imports crude oil from a variety of countries, the largest being Russia and Saudi Arabia. China's domestic consumption, projected to grow to 17.2 million b/d by 2028, will push crude oil imports higher because we expect the country's domestic crude oil production to stay relatively unchanged from 2023 (4.2 million b/d). China imported 11.3 million b/d of crude oil in 2023, a record. Crude oil imports will have to increase to about 13 million b/d to realize our projections of the country's consumption and production.⁶

The 300,000 b/d facility in Liaoning scheduled to be complete in 2027 is a joint venture among two Chinese companies (NORINCO Group and Panjin Xincheng Industrial Group) and Saudi Aramco. Because oil refineries and petrochemical plants built as joint ventures between Middle East and Chinese companies usually involve crude oil supply agreements, these ventures may increasingly source crude oil from Middle East countries. However, we project OPEC Middle East crude oil production to [decrease](#) in our [IEO 2023](#). OPEC production restraint will likely reduce crude oil exports because of increasing Middle Eastern refinery capacity, which implies China will need to access growing crude oil production in the Americas. Growing production in Brazil, Guyana, Canada, and the United States may increasingly become sources of crude oil imports into China.

⁶ U.S. Energy Information Administration, *International Energy Outlook 2023*, October 11, 2023.

Figure 6

China's crude oil imports by origin country (2005–2028)
million barrels per day



Data source: U.S. Energy Information Administration, *International Energy Outlook 2023*; China General Administration of Customs; and Bloomberg

Note: We projected crude oil imports from China's petroleum and liquid fuels consumption less China's crude oil production.

Petroleum product trade

Although China now imports more petroleum product than it exports, the country was a net exporter from 2016 to 2021.⁷ China's growing economy and fuel needs mean most refinery expansions have been absorbed by the domestic market. However, certain factors have led to instances where the country needed to export petroleum products to prevent oversupplying the domestic market. China's smaller, independent refiners were granted crude oil import licenses starting in 2015. These licenses allowed them to increase crude oil processing and run more efficiently, increasing production and competition in China's domestic fuels market. As a result, China's domestic petroleum product prices fell lower than regional export market prices, leading China's state-owned refiners to seek increased refined product export quotas to sell in higher-priced markets. Since 2022, a combination of growing LPG imports for China's growing petrochemical industry as well as limitations on China's export quotas contributed to making China a net importer of petroleum products in 2022 and 2023.

Most of China's petroleum product exports go to surrounding countries in Southeast Asia, including Singapore, Malaysia, and the Philippines. Gasoline, diesel, jet fuel, and fuel oil are the top exports.⁸ The refinery expansions planned through 2028 may not have a significant effect on China's petroleum product imports or exports. One reason is that some of the country's smaller, independent refiners may close in the coming years, which will offset some of the country's refinery expansions. In addition, the rate of growth in domestic consumption is likely to be matched by the net increase in refinery capacity. Also, because the new capacity is integrated with petrochemical facilities, growth in refined product output in China will be balanced between fuels production and petrochemical feedstocks, further

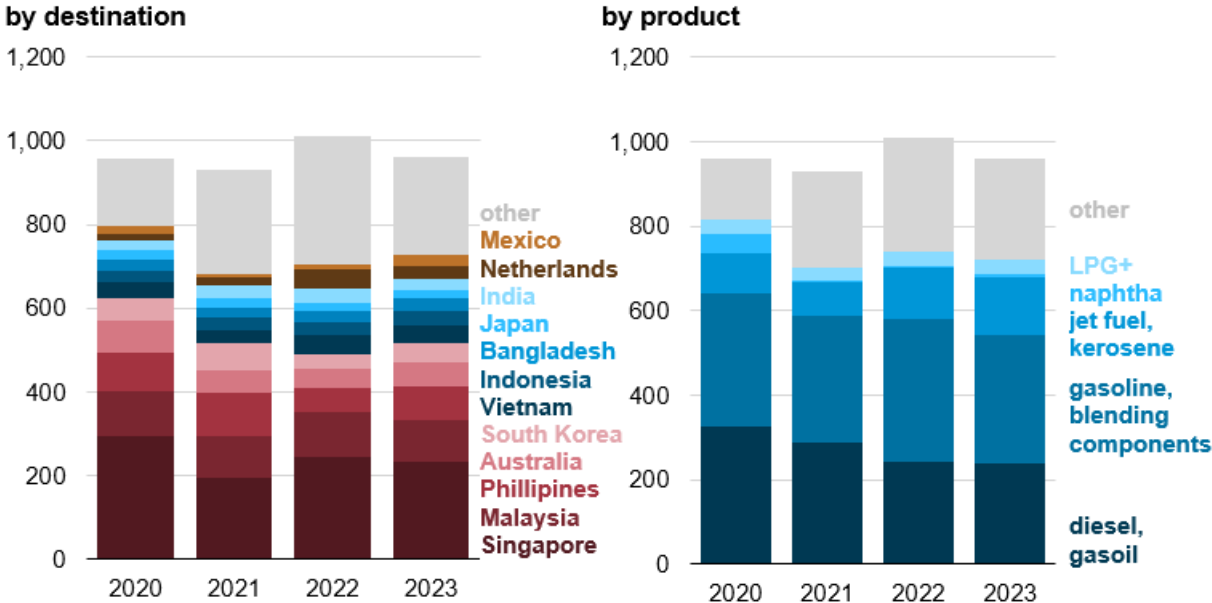
⁷ China General Administration of Customs, accessed February 2024.

⁸ Vortexa Analytics, accessed February 2024.

preventing any oversupply in fuels production and reducing pressure on China’s refiners to sell into export markets.

Figure 7

Annual petroleum product exports, China (2020–2023)
thousand barrels per day



Data source: Vortexa Analytics

India

India added 1.3 million b/d of refinery distillation capacity from 2011 to 2023. India’s total refinery capacity was 5.1 million b/d as of 2023.⁹ India’s refining fleet is primarily made up of government-owned refining corporations but also includes some privately owned refiners, most notably Reliance Industries, as well as other joint ventures. Indian government officials have indicated that expanding refining capacity to meet expected growth in domestic consumption remains a priority for the country and aligns with our expectations of significant increases in the consumption of liquid fuels in India. We expect annual growth in liquid fuels consumption in India to average between 4% and 5% every year until 2037.¹⁰

India may have as many as 11 crude oil capacity expansion projects come online through 2028.¹¹ Several projects in India have just been announced and are in early development—including the Ratnagiri mega-project with an estimated 1.2 million b/d of capacity—though the project may not be finished before 2028. We estimate between 0.5 million b/d and 2.4 million b/d of capacity could be online by 2028.

Many capacity addition projects in India involve expanding outright distillation capacity to meet liquids demand. In addition to these investments in conventional refining capacity, current projects in India are

⁹ Energy Institute Statistical Review of World Energy 2024, accessed June 2024.
¹⁰ U.S. Energy Information Administration, *International Energy Outlook 2023*, October 11, 2023.
¹¹ Based on EIA analysis and data from Facts Global Energy, BloombergNEF, and S&P Global Commodity Insights, accessed March 2024

also intended to increase production of low sulfur distillate fuel oil by expanding hydrocracking and hydrotreating units, as well as expand petrochemical integration with existing refinery production. Hydrocracking capacity expansions could total more than 200,000 b/d across multiple project proposals, and distillate hydrotreating capacity could total more than 600,000 b/d.¹² In 2023, distillate fuel oil made up, on average, 35% of all liquid fuels consumed in India, compared with 17% for motor gasoline.¹³

Fluid catalytic cracker (FCC) capacity expansions, which increase the output of lighter petroleum products, could total more than 200,000 b/d in India, reflecting investment in petrochemical integration.¹⁴ As with China, increasing petrochemical integration enables refiners in India to diversify their slate of products away from only transportation fuels, and this strategy can act as a hedge against periods of lower prices for products such as gasoline and diesel.

Implications for crude oil imports

Relative to its refining and domestic consumption needs, India produces little crude oil domestically; we estimate production in India supplied about 12% of domestic liquids consumption in 2023. Most of India's crude oil imports come from the Middle East, particularly Iraq, Saudi Arabia, Iran, and the United Arab Emirates. Outside of the Middle East, other noteworthy suppliers include Nigeria, Angola, Venezuela, Mexico, and the United States. Since Russia's full-scale invasion of Ukraine in 2022 and subsequent sanctions on Russia's crude oil exports by the United States and Europe, India emerged as a major importer of Russia's crude oil. Although imports from the Middle East remained the largest source, they declined from 2.6 million b/d in 2022 to 2.0 million b/d in 2023 as India increased imports from Russia significantly.

Rising domestic consumption in India will drive the need for increased crude oil imports alongside expanding refinery capacity. Based on underlying economic growth factors such as population growth, GDP growth, and rising GDP per capita, we expect consumption of liquid fuels to increase significantly in India in the medium term. We estimate India's liquid fuels consumption to increase from 5.3 million b/d in 2023 to 6.6 million b/d in 2028, up 26% over 5 years.¹⁵

Similar to China, decreasing Middle East crude oil exports because of OPEC+ production restraint may lead refiners in India to secure crude oil supplies from other sources, such as the Americas.

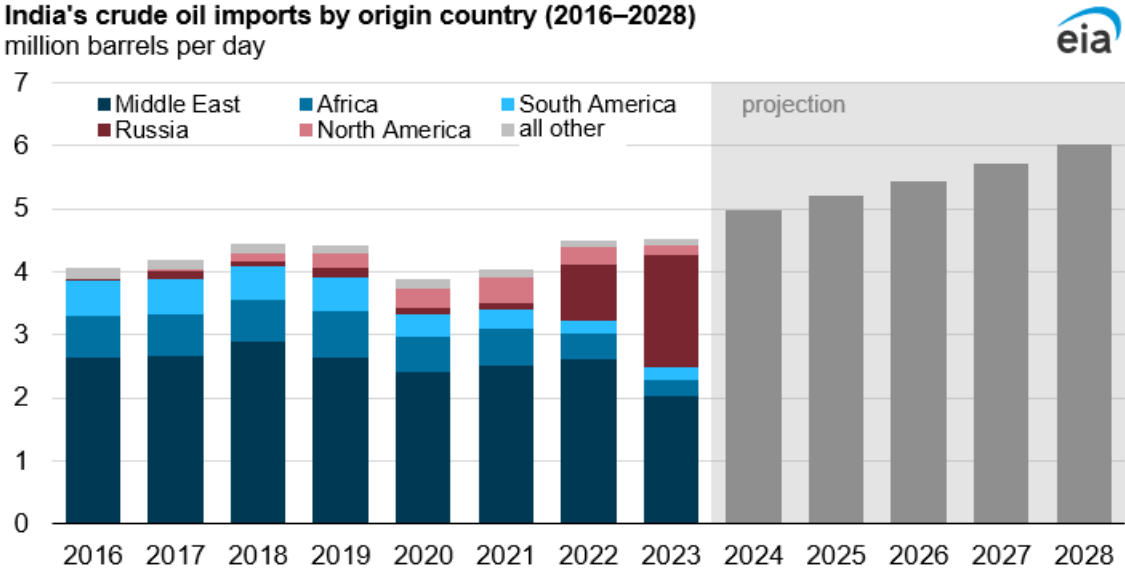
¹² Facts Global Energy, Asia Pacific Databook 2, Refinery Configuration, Spring 2024, accessed March 2024

¹³ Based on data from Bloomberg and Petroleum Planning & Analysis Cell, Ministry of Petroleum & Natural Gas, Government of India, accessed March 2024

¹⁴ Facts Global Energy, Asia Pacific Databook 2, Refinery Configuration, Spring 2024, accessed March 2024

¹⁵ U.S. Energy Information Administration, *International Energy Outlook 2023*, October 11, 2023.

Figure 8



Data source: U.S. Energy Information Administration, *International Energy Outlook 2023*, and Vortexa Analytics

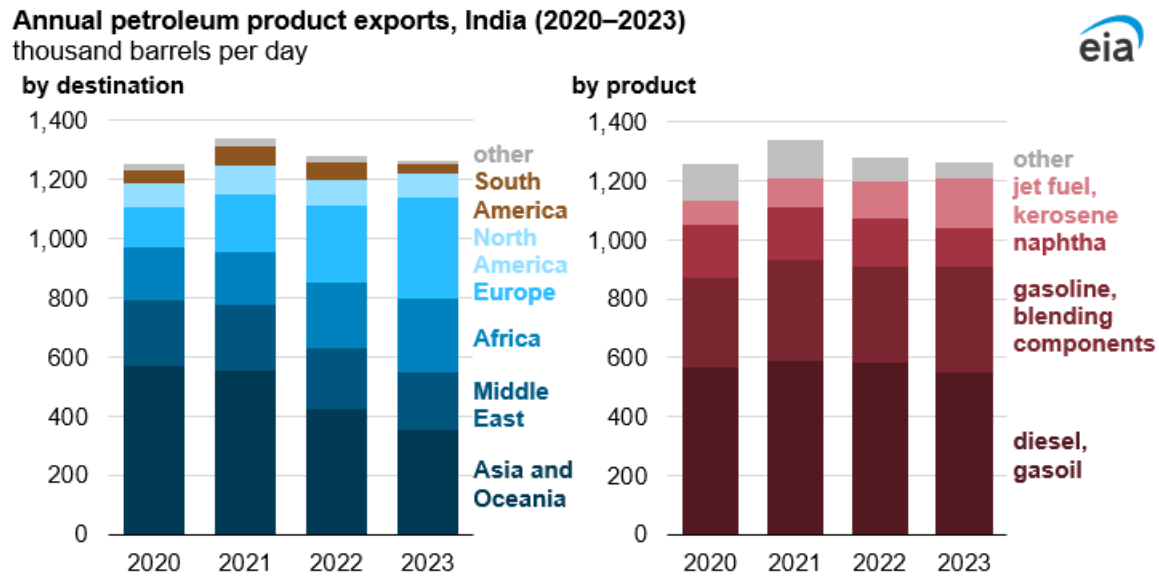
Note: The IEO crude oil import projection is determined from India’s petroleum and liquid fuels consumption less India’s crude oil production.

Petroleum product trade

Similar to China, India imports more petroleum product than it exports, although it has exported over 1.2 million b/d of refined petroleum products each year since 2020. Refiners in India benefit from close geographic access to major Middle Eastern crude oil producers as well as strong domestic demand, but coastal refiners can serve as key marginal suppliers in world markets, responding to supply shortfalls and arbitrage opportunities that emerge in the Pacific and Indian Ocean basin markets. Before 2022, India’s petroleum product exports mostly went to surrounding countries in Southeast Asia. After the EU’s ban on petroleum product imports from Russia, exports from India to Europe increased and Europe became the largest destination for India’s petroleum product exports in 2023.¹⁶ The highest single-country destinations for maritime petroleum product exports from India include the United Arab Emirates, Singapore, and South Korea. India also exports noteworthy volumes to the United States, particularly to the U.S. West Coast, where it competes with exports from other Pacific countries to supply marginal petroleum products beyond what U.S. West Coast refiners produce. Diesel and gasoline make up most petroleum product exports followed by naphtha, which is likely consumed as a petrochemical feedstock in destination countries. Attempting to shift naphtha exports into domestic industry is likely a motivating factor behind several petrochemical capacity expansion and integration projects in India.

¹⁶ Vortexa Analytics, accessed March 2024.

Figure 9



Data source: Vortexa Analytics

Middle East

Distillation capacity totaled 10.8 million b/d in the Middle East as of August 2023.¹⁷ Several refineries have come online in the Middle East within the past year, and the impact of these refineries on global markets is still evolving. In addition to the recent expansions, we identified 11 refinery projects, including new refineries and expansions to existing refineries, that are likely to be completed by the end of 2028. If all 11 projects are completed, crude oil and condensate processing in the Middle East would increase by approximately 0.4 million b/d, with an additional expansion of 0.9 million b/d from other refinery units (such as coking units and fluid catalytic crackers) over the next four years.

Recent expansions

In early February 2024, the 230,000-b/d [Duqm refinery](#) in Oman (a [joint venture](#) between Oman’s OQ Group and Kuwait Petroleum International) and the 615,000-b/d [Al Zour refinery](#) in Kuwait (operated by the Kuwait Integrated Petroleum Industries Company, or KIPIC) began operating at full capacity. The addition of these refineries may already be affecting petroleum trade flows. Since February, ship tracking data indicate that petroleum product shipments from the Middle East have increased and crude oil and condensate shipments have decreased.¹⁸ In addition to increased refinery throughput (which is increasing product exports and decreasing crude oil and condensate exports), OPEC+ production agreements are limiting crude oil production and, consequently, crude oil exports from member countries.

In addition to the new Duqm and Al Zour refineries, the Ruwais refinery in the United Arab Emirates recently completed upgrades as part of the [Crude Flexibility Project](#). The upgrades allow the Abu Dhabi National Oil Company (ADNOC) refinery in Ruwais to process heavier, sour crude oil grades, such as

¹⁷ FACTS Global Energy, Middle East Oil Databook Middle East Refining Configurations, Fall 2023, accessed March 2024

¹⁸ Vortexa Analytics, accessed March 2024.

Upper Zakum, and export more of its lighter, sweeter grades, such as Murban. In March 2024, ADNOC increased its [Murban crude oil export availability](#) slightly from the prior month.

Three refinery capacity expansions recently came online in Iraq: the Basrah refinery (Shuaibah), the North Refinery (Shamal), and the Karbala Refinery. In January 2024, the Basrah refinery completed construction of a long-delayed crude oil distillation unit (CDU) with a [capacity of 70,000 b/d](#). The unit was initially scheduled for start-up in 2018 but was [delayed after financial disputes](#) with the contractor.

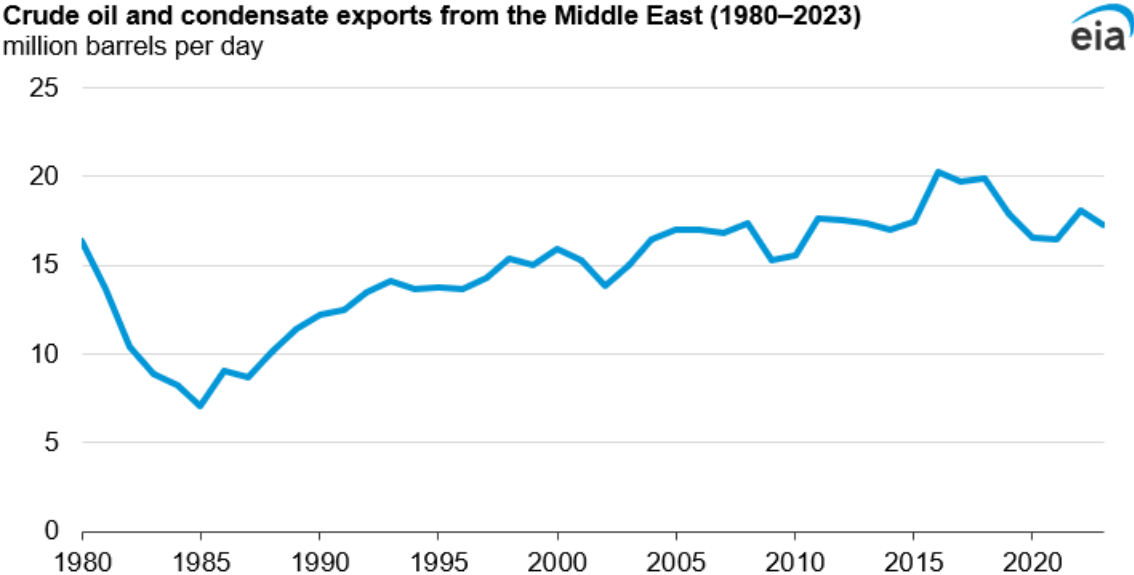
In February 2024, Iraq re-opened the North Refinery in Baji. The refinery was damaged by violence and shut down in 2014 after [Iraqi forces reclaimed control](#) of the refinery from the Islamic State terrorist group. The refinery recently [underwent repairs and reopened](#) with a capacity of 150,000 b/d. The North Refinery is part of the Baiji refining complex (al Sumood) and has a [total capacity of 290,000 b/d](#).

Iraq’s Karbala refinery was initially reported to have reached full capacity in September 2023; however, the refinery has since been taken offline several times because of technical issues. The Karbala refinery was reported to be [running at full capacity](#) earlier in 2024 but recent reports indicate that at least part of [the refinery was offline](#) for 12 days between February and March.

Implications for crude oil trade

The Middle East produces more crude oil than it needs, exporting significant quantities of crude oil and condensate while importing very little. Crude oil and condensate exports from the Middle East in 2023 averaged 17.3 million b/d compared with 0.4 million b/d of imports into the region.¹⁹ With expanded refinery capacity in the Middle East, crude oil exports may decline, and product exports may increase. In addition, future production curtailments from OPEC+ may contribute to less crude oil exports.

Figure 10



Data source: U.S. Energy Information Administration, *International Energy Statistics 2023*, and Vortexa Analytics

¹⁹ Vortexa Analytics, accessed March 2024.

Note: Data between 1980 and 2018 are from the U.S. Energy Information Administration's *International Energy Statistics*, and data between 2019 and 2023 are from Vortexa Analytics.

In our IEO2023, we assumed that OPEC Middle East producers will aim to keep global crude oil markets relatively balanced between now and 2028. In our projection, oil production in countries outside of OPEC+ increases faster than global oil demand, which we believe will prompt OPEC+ to continue restricting output. We project that OPEC Middle East crude oil production will fall by 4.5 million b/d between 2023 and 2028.²⁰ As a result of the projected decline in crude oil production and the increasing refinery capacity, crude oil exports from the Middle East will likely decline during this period.

Implications for petroleum product trade

The Middle East region exports more petroleum products than it imports. In 2023, product imports into the Middle East from other global regions averaged 1.1 million b/d, while petroleum product exports from the Middle East averaged 6.3 million b/d.²¹ Product exports will likely increase and imports will likely fall as regional refining runs increase following maintenance and startups.

Most petroleum product exports from the Middle East go to destinations in Asia. In 2023, exports from the Middle East to Asia made up 62% of all product exports from the Middle East. China and India were the two largest recipients of petroleum products from the Middle East in 2022 and 2023. Of the 6.3 million b/d of products exported in 2023, 1.0 million b/d went to China and 0.9 million b/d went to India. Both countries are expanding refining capacity between now and 2028, which may decrease their product imports from the Middle East.

However, several factors may limit the impact of capacity expansions in China and India on petroleum product exports from the Middle East. First, demand for liquid fuels is increasing in both countries, and the pace of growth may require petroleum product imports from the Middle East to meet demand. Second, older, less sophisticated refineries may close, particularly in China where the government has closed smaller, less efficient refiners in the past. Third, some new refineries in both China and India are increasingly integrated with the petrochemical industry and have a planned capability to shift production between transportation fuels and petrochemical feedstock.

Despite the capacity expansions, Asia is likely to remain the top destination for petroleum product exports from the Middle East. China and India are also likely to continue to import significant volumes, especially if capacity expansions in those countries are delayed or if the factors discussed above limit the impact of the capacity expansions.

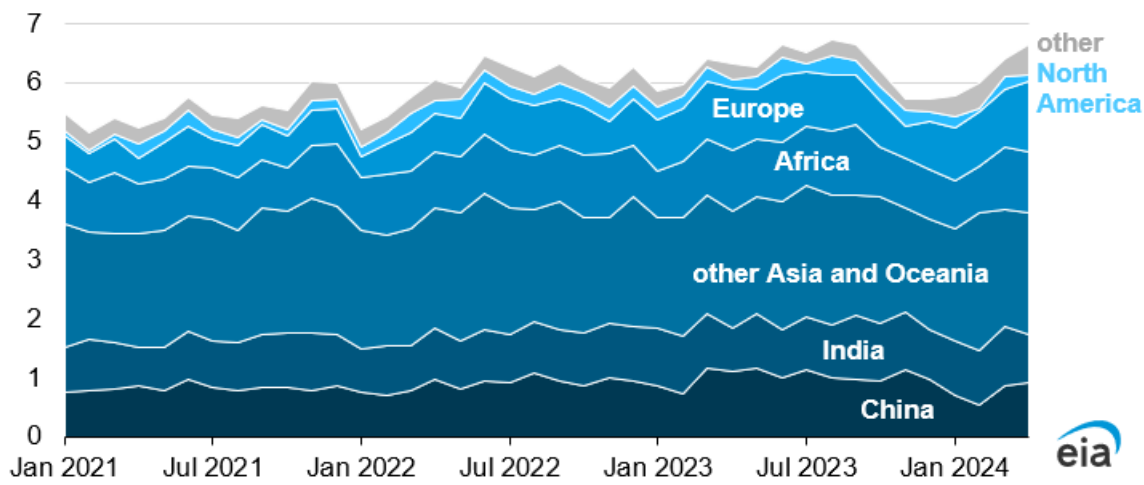
[Exports from the Middle East to Europe](#) have increased since Russia's full-scale invasion of Ukraine in 2022. However, with significant existing refinery capacity in the Atlantic Basin, additional capacity coming online in Mexico and Nigeria, and slowing petroleum product consumption growth, exports from the Middle East to destinations in the Atlantic Basin will face increasing competition. Potential [refinery closures in Europe, however, suggests that region](#) may continue to maintain imports from the Middle East.

²⁰ U.S. Energy Information Administration, *International Energy Outlook 2023*, October 11, 2023.

²¹ Vortexa Analytics, accessed March 2024

Figure 11

Monthly Middle East petroleum product exports, by destination (Jan 2021–Apr 2024)
million barrels per day



Data source: Vortexa Analytics

Atlantic Basin Refinery Expansions

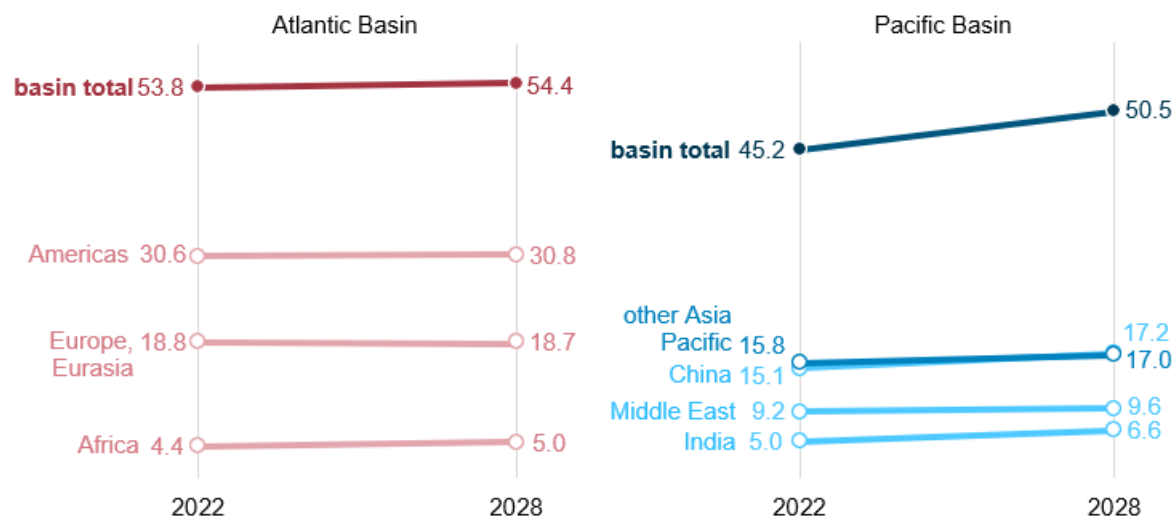
In the United States and Western Europe, we expect liquid fuels consumption to decrease by 2028. Combined with slower growth in liquid fuels consumption in Africa, Eastern Europe, and the Americas, we expect slower liquid fuels demand growth in the broader Atlantic Basin compared to growth rates in the Pacific Basin during this period. Between 2022 and 2028, we estimate Pacific Basin consumption growth (including the Middle East and Asia Pacific) of 11.6%, or 5.3 million b/d.²² We estimate Atlantic Basin consumption growth (including the Americas, Europe, and Africa) to rise by 1.1%, or 0.6 million b/d over the same period.

²² U.S. Energy Information Administration, *International Energy Outlook 2023*, October 11, 2023.

Figure 12

Liquid fuels consumption comparison, Atlantic Basin versus Pacific Basin

Liquid fuels consumption (2022–2028), million barrels per day



Data source: U.S. Energy Information Administration, *International Energy Outlook 2023*

The Atlantic Basin is already home to significant refinery capacity. Across the Americas, Europe (including Russia), and Africa, the region already hosts over 54 million b/d of refining capacity, compared with just under 49 million b/d for the Middle East and Asia Pacific.²³ Increased refinery capacity and slowing consumption growth mean new refinery capacity in the Atlantic Basin faces increasing competitive pressures. As consumption decreases in the United States and Western Europe, many refineries primarily supplying those regions will face pressures to pivot toward additional exports into other regions in the Atlantic Basin with stronger demand growth, such as Africa.

Nigeria

The recently online 650,000-b/d Dangote refinery in Nigeria remains a source of uncertainty for the global refining outlook. Historically, refineries in Nigeria have struggled to **remain operational** despite the country’s economic and population growth. So far in 2024, the refinery has primarily exported straight-run fuel oil and naphtha but **announced** it had started supplying distillate to retail stations in local markets in April. Nigeria is a significant crude oil producer, 1.4 million b/d in 2023, and exports significant light, sweet crude oil to other refiners in the Atlantic Basin.²⁴ However, the country regularly imports refined fuels because of insufficient domestic refinery capacity and utilization. Combined with expectations for economic growth, the additional refining capacity is well positioned to reduce Nigeria’s imports of petroleum fuels. At the same time, refiners in the U.S. Gulf Coast as well as some in Europe present a source of competitive pressure as foreign sources of supply.

Mexico

In Mexico, state refiner Petróleos Mexicanos (Pemex) has made significant efforts to increase domestic refinery processing and expand refining capacity. Most notably, the construction of its 340,000-b/d

²³ Energy Institute Statistical Review of World Energy 2024, accessed June 2024.

²⁴ U.S. Energy Information Administration, *Country Analysis Brief: Nigeria*, April 26, 2023.

Olmecca (or Dos Bocas) refinery has been underway since 2019. The facility has faced multiple delays but was formally inaugurated in 2022, and although Pemex currently expects it to begin regular operations by the end of 2024, we estimate starting operations could slip into 2025.

Mexico's domestic crude oil production tends toward heavy, sour crude oil grades, such as Maya, that require more complex refineries to process. Pemex's refinery fleet processed just over 1 million b/d of crude oil in March—the first time it processed so much in nearly eight years.²⁵ Expansions in coking capacity to process additional heavy, sour crude oil are also [underway](#) at Pemex's Tula and Salina Cruz refineries. As with Nigeria, refiners in Mexico face a more competitive market environment in the Atlantic Basin, and the country has historically imported significant gasoline volumes from the United States. Even after these refinery expansions come online, refiners in Mexico are likely to face continuing competitive pressure from the U.S. Gulf Coast.

²⁵ Petróleos Mexicanos (PEMEX), "Preliminary Results at March 31, 2024," April 26, 2024