

PETROCHEMICAL INDUSTRY



INDONESIA'S PETROCHEMICAL INDUSTRY

We are of the view that the outlook for the petrochemical industry is stable. Prospects for demand growth are positive in the medium term, although there are short-term risks from the slowdown in the production of plastic and rubber-based goods. Even low oil prices allow producers to maintain a stable level of profit. From the supply side, Indonesia needs new investment to reduce import dependency, especially for aromatic products.

DEMAND PROSPECTS ARE STILL POSITIVE

Demand prospects in Indonesia are still positive, along with the broad use of petrochemicals as raw materials in products such as plastic, vehicle tires, toys, and so on.

Two of the opportunities to grow strong are in ethylene and butadiene. According to Nexant, a professional consultant

in the field of chemicals, both have compound annual growth rates (CAGR) of 12.0% over the 2018-2024 period. Ethylene demand is expected to increase from 1.5 million tons in 2018 to 3.0 million tons in 2024. Butadiene demand is projected to increase from 115,000 tons in 2018 to 227,000 tons in 2024.

EXHIBIT 1. DOMESTIC DEMAND OF PETROCHEMICAL PRODUCTS (000 TONS)

Product	2018	2020	2024	CAGR
Ethylene	1,518	1,849	2,992	12.0%
Propylene	1,007	1,025	1,646	8.5%
Butadiene	115	135	227	12.0%
Polyethylene	1,596	1,777	2,120	4.8%
Polypropylene	1,752	1,962	2,396	5.4%

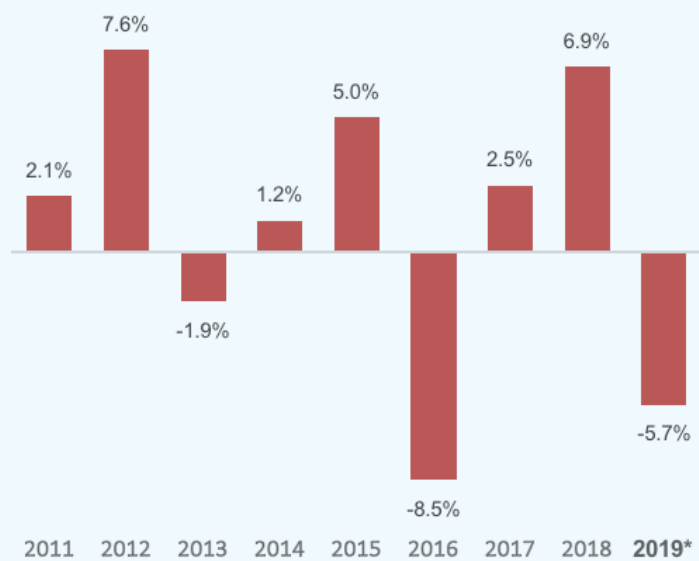
Source: Nexant, TPIA's expose



Ethylene is widely used in the chemical industry, with some converted to polyethylene which is a plastic raw material. Butadiene is applied primarily as a raw material for making tires, synthetic characters, gloves, and footwear.

For other major petrochemical products, the CAGR is estimated at 4%-8.5%. Demand for propylene will grow from 1.0 million tons in 2018 to 1.6 million tons in 2024. For the same period, demand for polyethylene and polypropylene will increase from 1.6 million tons and 1.8 million tons to 2.1 million tons and 2.4 million tons.

EXHIBIT 2. GROWTH IN OUTPUT OF PLASTIC AND RUBBER-BASED GOODS MANUFACTURING (% YOY)



*During 1Q-3Q2019
Source: Central Bureau of Statistics

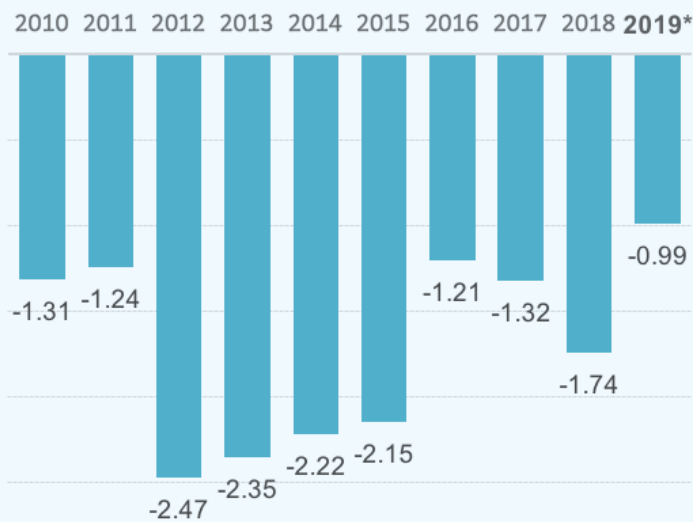
Despite the positive outlook in the medium term, in the short term the petrochemical industry faces slightly weak market demand. Demand from plastic-based goods manufacturing is expected to be softer. The output of rubber and plastic manufacturing contracted 5.7% YoY in the first three quarters of 2019, after growing 6.9% YoY in the previous year. Declining output reduces the demand for petrochemical products, which are the primary raw material in the industry.

LARGE TRADE DEFICIT REMAINS AS NEW FACILITIES NOT YET OPERATIONAL

Indonesia relies on imported supplies to meet the demand for some petrochemical products. The deficit exceeded USD1.0 billion in the last few years, a large part of the aromatic petrochemical trade deficit.

The trade deficit value of petrochemical products reached USD821.7 million during January-October 2019, with exports of USD777.1 million and imports of USD1.6 billion. For the previous year, the deficit hit USD1.7 billion, the result of exports of USD685.4 million minus imports of USD2.4 billion.

EXHIBIT 3. TRADE BALANCE OF PETROCHEMICAL PRODUCTS (USD BILLION)



*As of January-October 2019
Source: UNComtrade, Central Bureau of Statistics

Xylenes, ethylene, and benzene are the products with the most significant deficits. The xylenes trade deficit figure reached USD901.1 million in 2018, and USD331.2 million for January-October 2019. For the same period, ethylene and benzene trade deficits reached USD626.9 million and USD202.9 million in 2018, and USD442.1 million and USD95.9 million in the first 10 months of 2019. Another aromatic product that represent a deficit is toluene, at USD92.4 million in January-October 2019.

EXHIBIT 4. TRADE BALANCE OF INDONESIA'S PETROCHEMICAL PRODUCTS (USD MILLION)

Products	Export					Trade balance				
	2015	2016	2017	2018	2019*	2015	2016	2017	2018	2019*
Xylenes	0.0	0.0	0.0	22.2	240.1	-803.2	-454.0	-732.1	-901.1	-331.2
Ethylene	22.3	115.3	132.3	130.6	62.9	-758.0	-557.8	-537.8	-626.9	-442.1
Benzene	0.9	4.3	0.0	15.9	13.4	-129.2	-132.3	-219.5	-202.9	-95.9
Propylene	-	9.6	32.9	4.8	0.0	-354.1	-123.2	-69.6	-107.9	-81.3
Toluene	-	-	-	-	-	-78.8	-76.6	-83.0	-92.4	-71.9
Cumene	-	-	-	-	-	-3.3	-2.8	-3.6	-3.9	-3.2
Cyclohexane	-	-	-	-	-	-0.2	-0.3	-0.3	-3.8	-1.6
Trichloroethylene	0.0	-	-	-	-	-1.8	-1.7	-2.1	-2.7	-2.2
Tetrachloroethylene	-	-	-	-	-	-1.3	-1.1	-1.2	-1.4	-0.6
Ethylbenzene	-	-	-	-	-	-4.7	0.0	-21.3	0.0	-18.4
Vinyl chloride	19.7	80.1	111.3	143.0	98.1	-61.9	12.6	27.1	34.9	20.1
1,2-Dichloroethane	52.0	58.5	69.2	53.6	78.8	52.0	51.3	66.4	49.0	74.2
Butadiene	61.9	125.4	230.2	178.9	62.6	16.2	81.3	158.3	105.2	40.8
Styrene	67.6	90.6	208.3	130.4	132.0	55.7	79.7	189.0	114.3	126.6
Other	7.4	2.3	1.1	6.0	89.2	-74.7	-80.9	-90.0	-101.0	-35.1
Total	231.9	486.0	785.3	685.4	777.1	-2,147.2	-1,205.8	-1,319.6	-1,740.7	-821.7

*As of January–October 2019
 Source: UNComtrade, Central Bureau of Statistics

GOVERNMENT ENCOURAGEMENT EXPECTED TO SPUR DOMESTIC PRODUCTION

In recent years, investment in the petrochemical industry has been quite intensive. We expect supply to increase significantly in the medium term. Propylene production capacity is projected to increase from 1.1 million tons in 2018 to 2.4 million tons in 2024. For the same period, the production capacity of butadiene and polyethylene is expected to increase from 119,000 tons and 786,000 tons to 425,000 tons and 2.2 million tons.

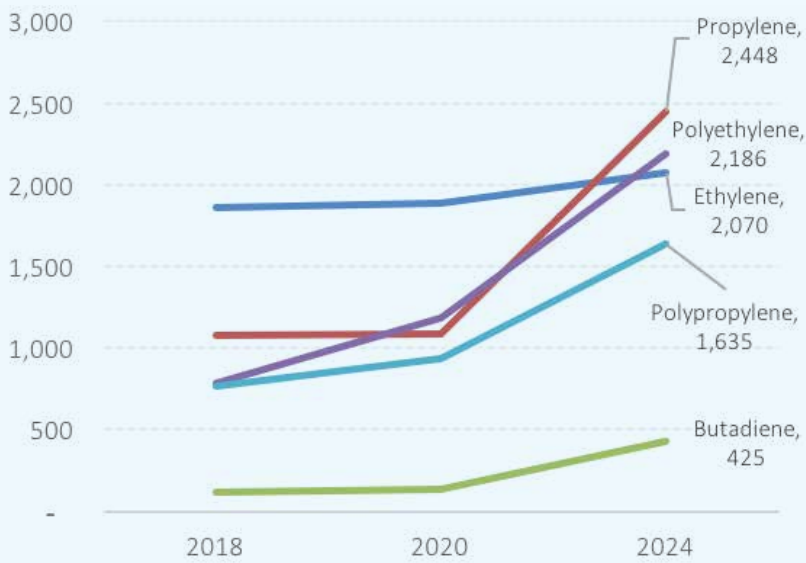
The additional supply comes mainly from Pertamina's petrochemical manufacturing facilities, Chandra Asri Petrochemical Tbk (TPIA), and Lotte Chemical. After completing the Butadiene capacity increase to 199,000 tons in mid-June 2018, Chandra Asri Tbk is developing another petrochemical project and targeting its capacity rising to 135,000 tons by 2020. The company has built a polyethylene factory facility worth USD380 million, producing various

polyethylene derivatives such as LLDPE, HDPE, and Metallocene LLDPE.

It also increased the capacity of its polypropylene facilities, from 110,000 tons to 408,000 tons, and ethylene facilities from 860,000 to 900,000 tons. Investment in both projects reached USD87.5 million.



EXHIBIT 5. PROJECTED CAPACITY FOR SIGNIFICANT PETROCHEMICAL PRODUCTS (000 TONS PER ANNUM)

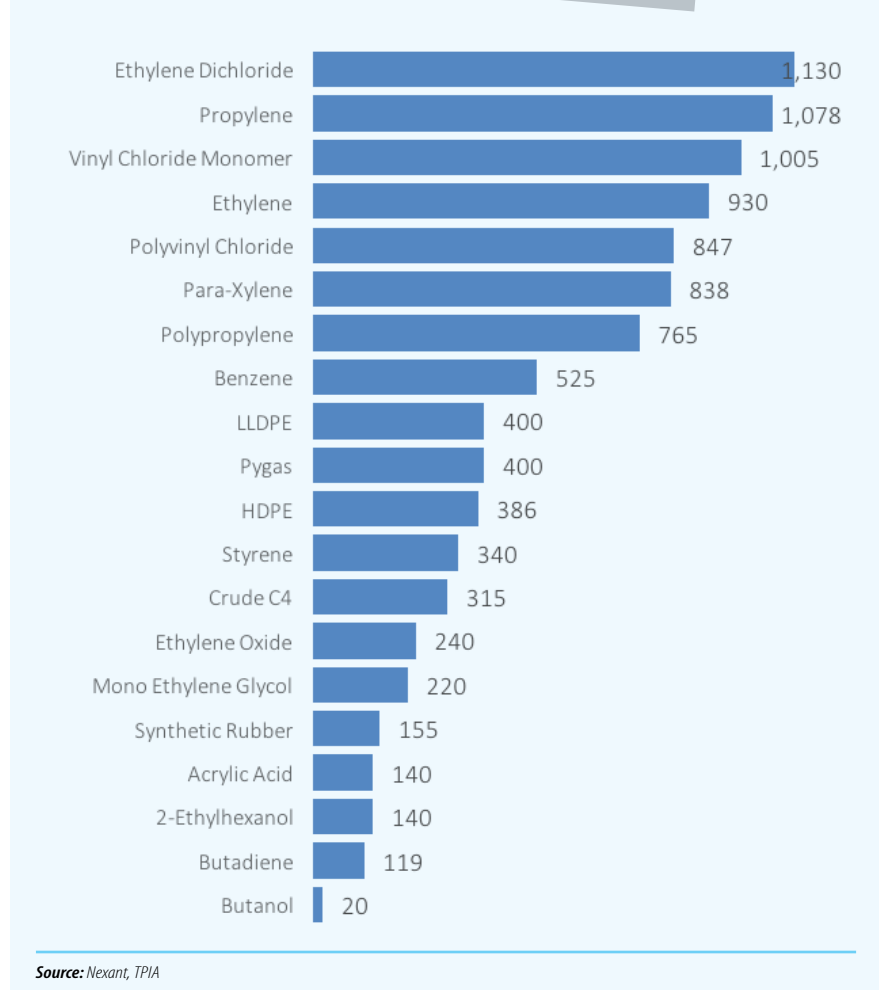


Source: Bloomberg

PT Pertamina (Persero) is also quite intensively entering the petrochemical market, collaborating with China Petroleum Corporation (CPC) on a petrochemical project in the Balongan refinery area, West Java. With the value of the project reaching USD6.5 billion, the facility will have a capacity of around 1 million tons and operate in 2026.

Pertamina is also developing a refinery development master plan (RDMP) and grass roots refinery (GRR) project. Through these projects, it will have polypropylene production facilities of 1.2 million tons of polypropylene per year, 1.3 million paraxylene per year, and 750,000 polyethylene per year. The total investment value is USD16 billion.

EXHIBIT 6. EXISTING PETROCHEMICAL PRODUCTION CAPACITY (000 TONS PER ANNUM)



Korean company Lotte Chemical Titan has also invested USD3-USD4 billion to build a production facility with a capacity of 2 million tons per year for naphtha crackers, raw materials to produce ethylene, propylene and other derivative products.

GLOBAL PRICES FALL IN LINE WITH DECLINE IN ENERGY PRICES

On the international market, prices for petrochemical products are tending to fall, thanks to falling raw material prices. According to World Bank data, the average oil price for 2019 weakened from USD68.3 per barrel to USD61.4 per barrel. Likewise, natural gas prices also declined. On the Henry Hub spot market in the United States, the price of natural gas fell 18.5%, from USD3.2 per million British thermal units (MMBtu) to USD2.6 per MMBtu.

The pressure on the two commodities is projected to continue in 2020, making the prices of petrochemical raw materials remain cheap. However, the risk of an escalation in geopolitical tensions has recently led to soaring oil prices. The risk will worsen if the pressure drags on and moves in an adverse direction.

EXHIBIT 7. FEEDSTOCK PRICE OF HYDROCARBON-BASED CHEMICALS

Product	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020f
Crude oil	USD/barrel	79.0	104.0	105.0	104.1	96.2	50.8	42.8	52.8	68.3	61.4	58.0
Natural gas, Europe	USD/mmbtu	8.3	10.5	11.5	11.8	10.1	6.8	4.6	5.7	7.7	4.8	4.5
Natural gas, US	USD/mmbtu	4.4	4.0	2.8	3.7	4.4	2.6	2.5	3.0	3.2	2.6	2.7
Natural gas LNG, Japan	USD/mmbtu	10.8	14.7	16.6	16.0	16.0	10.9	7.4	8.6	10.7	10.6	10.0

Source: World Bank

BUTADIENE AND PARAXYLENE EXPERIENCED SHARPEST FALLS

With the price of raw materials continuing to decline, the prices of petrochemical commodities have also fallen. Butadiene recorded the most significant decline at 23.5% YoY to USD1,064 per ton in 2019. Paraxylene saw a decrease of 23.4% YoY to USD793 per ton in 2019.

EXHIBIT 8. PRICE OF HYDROCARBON-BASED CHEMICALS (USD PER TONS)

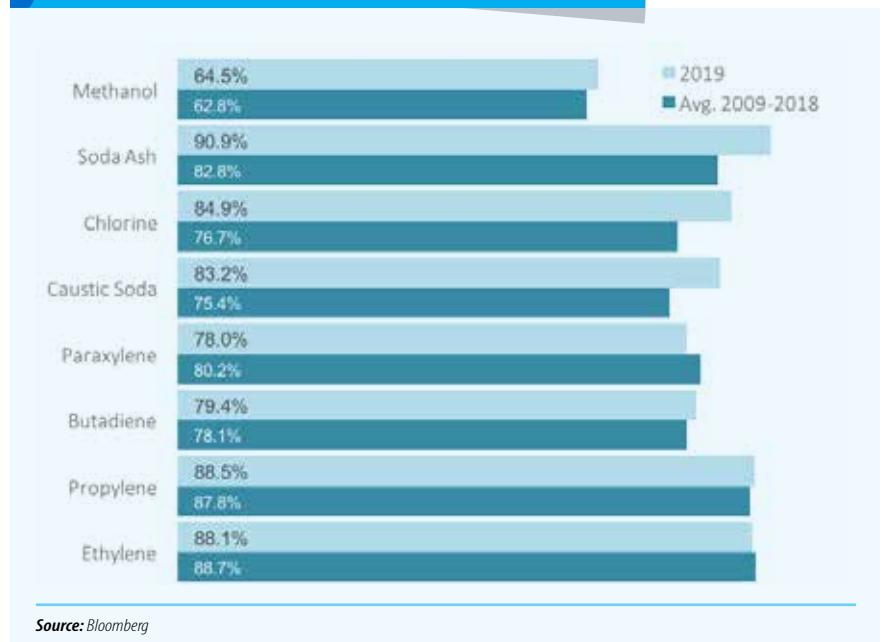
Product	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*
Ethylene	1,012	1,205	1,064	1,029	1,058	698	676	719	643	577
Propylene	1,239	1,518	1,439	1,450	1,481	943	726	948	1,169	1,053
Butadiene	1,010	1,636	2,444	1,466	1,293	724	1,114	1,487	1,390	1,064
Benzene	980	1,097	1,262	1,324	1,341	705	659	860	852	691
Mixed Xylenes	892	1,234	1,270	1,259	1,037	722	671	681	813	689
Paraxylene	1,275	1,390	1,550	1,470	875	713	818	910	1,035	793

Source: Bloomberg

Considering the weakened price of raw materials, low petrochemical product prices should continue in the short-term. The pressure is quite significant, especially for butadiene and paraxylene products. Understandably, their production capacity is quite large, with a low level of capacity utilization.

Butadiene capacity in 2019 reached 15.8 million tons with a capacity utilization rate of 79.4%. Of the total capacity of 59.5 million in 2019, the utilization rate of its production capacity was only 78.0%. To accommodate the growing demand, we believe both producers will likely increase their utilization rate to 81%-83%.

EXHIBIT 9. THE CAPACITY UTILIZATION RATE OF GLOBAL PETROCHEMICAL PRODUCTION



SLOWER OPERATION OF NEW FACILITIES

With current low prices, the operation of new facilities is relatively unprofitable in the short term, because it will lead to excess supply and a further drop in selling prices. Investment in the petrochemical sector is likely to proceed slowly in the next few years. Petrochemical projects are very capital intensive and require high economies of scale to achieve efficient production. Also, the construction of facilities can take quite a long time at three to seven years.

Investment also depends on the outlook for global economic growth. Petrochemical derivative products are widely applied in various manufacturing products. Thus, indirectly the demand for petrochemical products is sensitive to the global economic cycle. In a report in October 2019, the International Monetary Fund revised downward global economic growth in 2020 to 3.4 percent, 0.2 percent below the previous report in April 2019.

In the past five years, 2015-2019 CAGRs for petrochemical products averaged under 5%, except for methanol. Four main products — ethylene, propylene, butadiene, and paraxylene — recorded CAGR of 3.8%, 4.7%, 3.1%, and 4.6%, respectively. Most of the demand came from packaging usage (28% of global petrochemical product output), electronics (19%), construction (14%), and automotive manufacturing (12%).

EXHIBIT 10. GLOBAL DEMAND OF PETROCHEMICAL PRODUCTS (000 TONS)

	2015	2016	2017	2018	2019	CAGR
Ethylene	141,455	145,761	153,098	159,414	164,468	3.8%
Propylene	94,758	99,579	103,587	106,596	114,080	4.7%
Butadiene	11,108	11,356	11,917	12,152	12,556	3.1%
Paraxylene	38,740	39,242	41,837	44,015	46,398	4.6%
Caustic soda	72,726	74,468	76,315	78,394	80,738	2.6%
Chlorine	68,705	70,348	72,594	73,879	75,692	2.5%
Soda ash	56,484	58,349	60,292	62,233	64,187	3.2%
Methanol	68,391	78,710	86,250	88,344	95,304	8.6%

Source: Bloomberg, Nexant ChemSystems, Tecnon Orbichem

PETROCHEMICAL INDUSTRY COMPETITION IN INDONESIA

Competition in the petrochemical industry has led to an oligopoly. Several players compete in the industry, and some of them are vertically integrated, like Chandra Asri Petrochemical Tbk (TPIA). Compared to other players, TPIA has the most diversified products.

EXHIBIT 11. KEY PLAYERS IN INDONESIA'S PETROCHEMICAL INDUSTRY

Players	Product and installed capacity (000 tons)
Chandra Asri Petrochemical Tbk (TPIA)	<ul style="list-style-type: none"> • Ethylene (860) • Propylene (470) • LLDPE (200) • HDPE (136) • Polypropylene (480) • Pygas (400) • Crude C4 (315) • Butadiene (119) • Styrene (340) • Synthetic rubber (80)
Lotte Chemical Titan Nusantara	<ul style="list-style-type: none"> • LLDPE (200) • HDPE (250)



Players	Product and installed capacity (000 tons)
Pertamina	<ul style="list-style-type: none"> Ethylene (70) Propylene (608) Polypropylene (45) Benzene (125) Para-xylene (298)
Polytama Propindo Asahimas Chemical	<ul style="list-style-type: none"> Polypropylene (240) Ethylene dichloride (760) Vinyl chloride monomer (875) Polyvinyl chloride (550)
Sulfindo Adiusaha	<ul style="list-style-type: none"> Ethylene dichloride (370) Vinyl chloride monomer (130) Polyvinyl chloride (95)
Trans Pasific Petrochemical Indotama	<ul style="list-style-type: none"> Benzene (400) Para-xylene (540)

Source: TPIA's expose

Competition is also not only domestic, but also from imports. Local supply is mostly in the form of olefins, where some products are dependent on imports. For example, for polyethylene and polypropylene products, half of the domestic supply of 1.7 million tons comes from imports, at 53% and 57%, respectively, based on a TPIA presentation. For polyethylene, the remaining amount comes from TPIA at 20% and Lotte Chemical Titan Nusantara at 27%. For polypropylene products, aside from imports, supplies also came from Pertamina (3%) and Polytama Propindo (13%).

Indonesia imports most of its aromatic-based petrochemical supply needs, such as benzene, toluene, and xylenes. The most significant deficit was for xylene products, which reached 440,117 tons during January-October 2019. In the same period, the trade deficits for benzene and toluene were 151,152 tons and 105,853 tons, respectively.

EXHIBIT 12. TRADE BALANCE OF AROMATIC PRODUCTS (000 TONS)

Indicator	2015	2016	2017	2018	2019*
Export					
Benzene	179.8	216.5	261.7	251.8	174.5
Toluene	108.3	119.9	120.7	117.1	105.9
Xylenes	957.8	595.2	875.4	875.1	676.4
Import					
Benzene	2.9	5.7	0.0	23.5	23.4
Toluene	-	-	-	-	-
Xylenes	0.0	0.0	0.0	20.4	236.3
Net trade					
Benzene	176.9	210.8	261.7	228.3	151.2
Toluene	108.3	119.9	120.7	117.1	105.9
Xylenes	957.8	595.2	875.4	854.8	440.1

*Annualized for data of January–October 2019, Xylenes comprises of o-Xylene, m-Xylene, p-Xylene, and mixed xylene isomers
Source: Central Bureau of Statistics, UN Comtrade

Compared to olefins, investment in aromatic production is relatively limited, but the need for these products in the future is still evident. Benzene, for example, is a raw material for synthetic dyes and detergents, and xylene is widely used to produce plastics and synthetic fibers.

Among the producers of aromatics are Pertamina and Trans Pacific Petrochemical Indotama. Pertamina has an annual production capacity of 125,000 tons for benzene and 298,000 tons for paraxylene. Trans Pacific Petrochemical Indotama has an annual production capacity of 400,000 tons of benzene and 540,000 tons of paraxylene. Thus, the successful restructuring of Indotama's Trans Pacific Petrochemical by Pertamina is expected to reduce the aromatic petrochemical trade deficit.