WHO WILL FEED CHINA’S HUNGER FOR PX?

PETROCHEMICAL SPECIAL REPORT

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With China’s massive production capacities and seemingly endless hunger for paraxylene imports, who will feed the Leviathan’s growing purified terephthalic acid industry in the years to come? Will it be South Korea and Japan due to their proximity, or will it be the Middle East due to its competitiveness on feedstock supply? India is expanding both in PX and PTA, so perhaps this growing tiger can make the leap to catch the dragon, or will Europe and the US conquer the throne?

Gustav Holmvik in Singapore and Yuriko Kato in London explore the outlook for the global PX and PTA industries, with additional reporting by John Calton in Houston.

**CHINA’S DEMAND REMAINS KEY**

The growing Chinese presence in the PX market has been extraordinary to say the least, as both demand and capacity have increased sharply in the past decade. PX demand increased more than fivefold in a decade from 3.6 million mt in 2005 to an estimated 18.5 million mt in 2014, according to annual forecasts by Japan’s Ministry of Economy, Trade and Industry. China has also invested in PX production facilities, increasing capacity fourfold from 2.9 million mt in 2005 to an estimated 11.3 million mt in 2014.

Globally, PX demand has increased 60% in the same period from 22.5 million mt in 2005 to 35.9 million mt in 2014. Yet China’s share of global demand has surged from 16% to 52% in that period, and that is not expected to wane in the next few years. Chinese consumption is forecast to continue growing to 27.2 million mt by 2019, putting its share of global demand at an estimated 57%.

The growth in China’s PX demand has been spurred by GDP growth, urbanization and the rise of middle income families in the past decade. PX is a feedstock for purified terephthalic acid (PTA), which is a key raw material for polyester fiber, polyethylene terephthalate (PET) bottle resin and film, as well as other plastic end uses.

Focusing on virgin bottle-grade PET, which we assess at Platts, demand and production of PET bottles have been supported by urbanization in China, defined by variables such as the percentage of total population in urban areas, rise of the middle class and GDP per capita. There are many variables affecting demand for PET bottles but, generally, a wealthier and urbanized population will consume more. Demand for beverages packaged in PET bottles will rise when individuals are able to look beyond immediate needs and buy soft drinks and teas in bottles.

GDP per capita in China has risen sharply from $1,740 in 2005 to $7,594 in 2014, according to World Bank data, pointing to a growth in individual incomes. The percentage of population living in urban areas has also increased from 43% to 54% during the same period -- representing 188 million more people in cities.

PET bottle production has increased in response to the higher consumption, generating higher demand for PET resin supply. PET resin facilities have been built quickly in the past decade and further investments are expected to follow.

This points to a bright future for PX and PTA demand in China. METI forecasts PX consumption in China to increase from 20.2 million mt in 2015 to 27.2 million mt in 2019. New PX capacity is being built to meet China’s needs, but domestic supply is not enough to meet the projected demand. China will remain in a large deficit in the next few years. In fact, demand growth is outpacing supply and China’s PX deficit is forecast to grow from 10.1 million mt in 2014 to 15.5 million mt in 2019.

This trend gives rise to two key questions: who will supply China and how will China’s growing presence in PX and PTA affect other regions in the world?

**SOURCES OF CHINA’S PX IMPORTS**

China is by far the largest consumer and importer of PX in the world due to its massive 45 million mt/year PTA capacity, which is still growing. In 2014, the country imported 9.9 million mt of PX, and for 2015, it’s on track to import more than 11 million
mt, based on the average monthly import quantity of nearly 960,000 mt until November.

In January-November, nearly three quarters of China's imports came from nearby markets: South Korea, Japan and Taiwan — accounting for roughly 8 million mt or 79%. The rest mainly came from other sources within Asia, such as Southeast Asia, India and the Middle East.

After South Korea’s substantial PX capacity expansions in 2014, this close neighbor of China is set to remain among its main sources of supply in the foreseeable future, having supplied about 45% of China’s PX imports in 2015.

But capacities are also being expanded in other parts of the world, such as the Middle East and India, as well as within China itself. With more downstream plants starting up in China -- while some are shutting down -- how will demand and supply balance in the near future?

**NEW PX PLANTS STARTING IN MID- TO LATE 2016**

Two new PX units are expected to start up outside of China in 2016: Reliance’s 2.2 million mt/year unit at Dahej, India, and PetroRabigh’s 1.3 million mt/year unit at Rabigh on the Red Sea coast in Saudi Arabia. Reliance is expected to export nearly 1 million mt/year of PX, while market sources said PetroRabigh may export nearly all of its PX output.

“Global PX run rates are expected to be nearly stable at 79% in 2016, compared to 78% in 2015,” a Singapore-based trader said, based on his estimates. “PX demand is expected to grow at a modest rate of 5.6% in 2016, in tandem with polyester growth.”

**CHINA’S PX IMPORT SOURCES IN 2015* (million mt)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Import Quantity (million mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea</td>
<td>1.3</td>
</tr>
<tr>
<td>Japan</td>
<td>1.2</td>
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<tr>
<td>Taiwan</td>
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<td>Oman</td>
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<td>Iran</td>
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<tr>
<td>Singapore</td>
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</tr>
<tr>
<td>Kuwait</td>
<td>0.2</td>
</tr>
<tr>
<td>Europe/US</td>
<td>0.1</td>
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</tbody>
</table>

*Data does not include December
Source: China Customs

**PX-NAPHTHA SPREAD MOSTLY HEALTHY IN 2015 ($/mt)**

China's Sinopec is building a new 650,000 mt/year PX plant at Hainan that is expected to start production in late 2016 or early 2017.

Some existing PX plants remain idle and face an uncertain future. In China, Dragon Aromatics’ 800,000 mt/year plant in Xiamen remains shut since an explosion in April. Taiwan’s Xianglu Group, the plant’s owner, has been in talks with state-owned China Petroleum and Chemical Corp., or Sinopec, to sell its Dragon Aromatics and Xianglu Petrochemical divisions, which run several PTA plants. No startup timing has so far been announced for Dragon Aromatics.

In Singapore, Jurong Aromatics Corp. filed for receivership in September after debt-restructuring talks broke down. The startup timing for the 800,000 mt/year plant remains unclear at the moment. The company's condensate-based aromatics plant on Jurong Island has been offline since December 2014, just three months after it started commercial operations.

However, a new PX plant started production in August in China: Ningbo Zhongjin’s 1.6 million mt/year plant, which started supplying feedstock to its sister company, PTA producer Yisheng Petrochemical.

**CHINA PTA EXPANSIONS AND SHUTDOWNS**

Looking at the downstream sector in Asia, China stands out for its massive PTA capacity of nearly 45 million mt/year. In a market already known to be suffering from oversupply and low operating rates, Chinese producers -- as well as producers in other parts of Asia -- are still increasing their production capacities in a fierce race for market share and survival.

China Prosperity Jiangyin Petrochemical, also known as Hanbang Petrochemical in China, was targeting a December startup for its new 2.2 million mt/year PTA plant at Jiangyin in eastern Jiangsu province but now appears to be set for a January startup. The new mega-plant at Jiangyin is set to enhance the importance of this port in the coming years as PTA capacity increases from 1.8 million mt/year to 4 million mt/year as soon as the plant starts up.

Other PTA plants starting up in China are Sichuan Chengda’s 1 million mt/year PTA plant at Nanchong in southwestern China’s Sichuan province later in 2016 and Tongkun Group’s second 1.5 million mt/year plant at Zhapu in eastern China’s Zhejiang province sometime in 2017.

However, dark clouds hang over some other PTA makers. Shaxi Xingyu Petrochemical declared bankruptcy in mid-2015, idling 3.2 million mt/year of PTA capacity at Ningbo. Since April, Taiwanese owned Xianglu Petrochemical has kept its plants at China’s Fujian and Gulei shut after the explosion at its upstream Dragon Aromatics plant. It remains unclear when the plants, with a total capacity of 6.1 million mt/year, will restart.

Further expansions may happen but the shutdown of these capacities has led to much-needed improvement in margins for some of China’s other PTA producers as they expand market
share and run at higher operating rates, allowing for better economies of scale.

The two largest PTA producers in China, Yisheng and Hengli Petrochemical, have increased their combined share in the domestic market to more than 50% in 2015, filling the gaps left by Xianglu and Yuandong, according to market estimates.

In February, Hengli started its third 2.2 million mt/year PTA plant at Dalian, increasing the total PTA capacity at Dalian to more than 12.5 million mt/year -- the largest in China.

Despite their already massive capacities, Yisheng and Hengli are contemplating further expansions, with each potentially set to build at least one more 2 million mt/year plant tentatively for startup in 2017.

SOUTH KOREA AND TAIWAN: SUFFERING IN THE SHADOW OF CHINA?

Elsewhere in Asia, PTA producers have been struggling with oversupply and poor margins in 2015. Taiwanese producers are demolishing several plants and keeping others idle -- shrinking the country's PTA production capacity to 2.6 million mt in 2014, less than half its size in 2011, according to data from Taiwan's Petrochemical Industrial Association.

However, Taiwan's Oriental Petrochemical (Taiwan) Corp. is expected to complete its new 1.5 million mt/year PTA plant at Taoyuan by the third quarter of 2016 and begin commercial production by early 2017.

India's Reliance started up two new 1.12 million mt/year PTA plants at Dahej in Gujarat -- one in February and one in September. Since then, the producer has been fighting for a larger market share within India and in the Middle East and Africa, putting increased pressure on other PTA exporters such as South Korea.

South Korea's PTA exports slumped 21.8% year on year to 141,663 mt in November, the lowest in two years, as it faces stiffer competition from other markets. Some sources expect consolidations to happen within South Korea's PTA industry soon, but no concrete restructuring plans have emerged so far.

Competition for market share in the Middle East and other regions will increase further when India's JBF Industries starts its 1.25 million mt/year PTA plant, most recently targeted for the first half of 2016. PTA from JBF’s Mangalore plant will be used in the company’s downstream PET plant in the UAE. The PET plant in Ras Al Khaimah, UAE, has a capacity of 400,000 mt/year. JBF also operates another 150,000 mt/year PET plant in Sarigram, Gujarat, India. When the Mangalore PTA plant is complete, JBF will source feedstock from ONGC Mangalore Petrochemicals’ 920,000 mt/year PX plant, also in Mangalore.

PX SUPPLY OUTLOOK FOR 2016

Asian PX supply is expected to remain stable from 2015 until some of the new PX and downstream plants start up, with the first one up being China Prosperity's 2.2 million mt/year PTA plant at Jiangyin in January-February. More downstream demand would naturally tighten the supply balance, until Reliance starts its new 2.2 million mt/year PX plant in the middle of the year.

Although the Asian PX market has been in a contango for much of the second half of 2015, following the startup of Ningbo Zhongjin's PX plant in late August, some market sources expect that to change in 2016.

"The PX price curve is likely to stay backwardated because [Chinese] end-users prefer to keep stocks low and buy prompt when they can to produce PTA," a trader said.

GLOBAL ARBITRAGE FLOWS CHANGING

A factor that could also tighten PX supply in Asia is the possibility of long-term contract shipments as well as seasonal spot cargoes from Asian producers and traders heading to the Americas, a reversal of the usual cargo flows in the past.
In Q2 and Q3 2015, an arbitrage opened up for shipments of PX from Asia to the US and Mexico, with about 20,000 mt shipped from South Korea to these destinations over August and September, according to South Korean customs data. Sources also said shipments had been booked from the Middle East to the US at that time.

“The relative value of US aromatics feedstocks, especially through the summer, has been very high as lower oil prices have encouraged gasoline consumption and blending economics have put significant premiums on mixed xylene and toluene,” an Asian trader said. “Many traders and producers are looking at supplying the US on term basis, but the price negotiations are still difficult.”

In the wake of lower crude oil prices, gasoline demand from several regions was stronger than expected in 2015, resulting in refiners channeling more feedstocks to produce gasoline, thereby lowering PX output. Market sources have said this may happen again in 2016, especially if crude prices remain around the current levels. And to avoid being squeezed during the peak gasoline demand season, US end-users may be willing to sign long term contracts, Asian suppliers have said.

**WHY THE US NEEDS TO IMPORT PX**

In the US, production economics for PX and mixed xylenes were unattractive for most of 2015, which supported US demand for PX imports from Asia. PX prices need to be at least a $150/mt premium to MX for PX producers to break even. However, more integrated refineries can profit from lower premiums. The MX-PX spread averaged $90/mt in 2015 as of December 3, and it was only positive for 18% of last year’s assessments, based on Platts data.

US Mobil’s selective toluene disproportionation units were idle or operating at low rates for most of 2015 because of poor margins. MSTDP margins, which measure the profitability of using toluene as a feedstock to produce benzene and xylenes, with an option to convert up to 90% of xylenes to PX, averaged around minus $11/mt in 2015 through December 3, not including unit operating costs.

“At certain parts of the year, producers were running these units at minimal rates only to meet contract obligations,” a trader source said. These margins have been mostly positive since August 13, and there has been more US PX production during Q4 as a result.

US PX capacity will fall in 2016 when the 260,000 mt/year PX-1 unit at BP’s chemicals plant in Texas City, Texas, permanently shuts. But this might not make much of an impact, a source said, as the unit had already been idled for more than a year due to uneconomic market conditions.

**ASIA’S IMPACT ON EUROPE**

How will Asian expansions influence the European PX and PTA markets?

The European contract price for PX is influenced by trends in contract and spot prices in Asia. The Asian contract price settles at the end of the previous month, while the European contract price settles at the beginning of the current month. This means that the Asian contract price sets the scene for negotiations in Europe. Although there have been only three settlements in Asia for PX in 2015, and thus the influence of the Asian contract price on Europe has been less prevalent, market fundamentals and spot prices in Asia have influenced the European contract price.

In addition, the main outlet for spot PX in Europe is the export market. PX exports from the EU have strengthened in the past few years. January-September exports nearly doubled year on year to 298,907 mt, according to Eurostat data. Although spot and contract PX exports to Asia were lower in terms of volume, spot pricing in Europe has been driven by Asia, as the region with the most consumption in terms of volume and liquidity. The large investments in Asia will change trade dynamics and influence both seller and buyer decisions on the spot market in the coming years.

In 2015, exports were supported by the weak euro. The euro’s value dropped from $1.20 at the beginning of 2015 to $1.06 by the end of November. US PX supply tightened as a result of low run rates at TDP units amid high MX demand from gasoline blenders in the early summer months, which meant that extraction of PX from MX was limited. This attracted European cargoes to the US. EU PX exports to the US surged 150% year on year to 186,872 mt in January-September, according to Eurostat data.

Exports to Asia rose more than fivefold during the same period to 50,191 mt. Within Asia, the largest volumes were exported to China in 2015, approximately 80% of total exports to Asia.
Despite the Asia PX market remaining in deficit and requiring supplies from outside the region, Europe will face fierce competition from domestic Chinese producers and other Asian producers such as in South Korea, India and the Middle East, who are ramping up investment and looking to supply neighboring countries in Asia.

With export competition expected to strengthen in PX, what are the sources of PX demand within Europe that will provide support to the market in the next few years?

The much-anticipated restart of Artlant’s PTA plant in 2015 was a welcome source of demand. Artlant’s 700,000 mt/year PTA facility located in Sines, Portugal, was closed in mid-April 2014, due to weak demand and after La Seda de Barcelona, Artlant’s major shareholder, filed for bankruptcy. The plant restarted in October, but stopped production in November. Although Artlant was targeting production to restart by mid-December, the restart date was pushed back as Artlant searched for an investment partner or a buyer. As a result, it suspended contractual feedstock negotiations for PX and acetic acid. Although a source close to the company said that it hoped that a deal will be struck by the beginning of 2016, it is unknown when the plant will be able to begin full operations. Previously, the plant was expected to operate at 70%-80% utilization rate in 2016, providing support to PX demand. However, with production delayed, there are concerns over one key source of PX demand in Europe in 2016.

Another development expected in the PTA market in 2016 is the completion of Indorama’s PTA expansion in Rotterdam, the Netherlands. Indorama’s brownfield expansion is expected to add 250,000 mt/year of new capacity to bring total capacity at its site to 600,000 mt/year. The work is expected to finish by Q2 2016.

ASIAN PTA OVERSUPPLY TO TARGET EUROPE

In spite of new sources of PTA production providing support for European PX demand in 2016, the sharp increases in PTA capacity in Asia will pressure the European PTA market. PTA overcapacity in Asia is likely to pressure both utilization rates at European PTA plants and prices.

In 2015, the EU had sharp growth in PTA imports as it faced a shortage due to the shutdown of Artlant’s PTA facility in April 2014 and the closure of Lotte Chemical’s 500,000 mt/year PTA plant in December 2013. Eurostat figures show PTA imports rising 63% year on year in January-September. South Korea stepped up its exports to the EU.

With new PTA capacity in Asia pressuring an already well-supplied market, Asian producers will want to retain its presence in the European market. Industry sources have said that some PTA consumers in Europe will want to maintain business with Asian suppliers, due to contractual obligations and familiarity with their products.

While Indorama’s PTA expansion in 2016 will likely feed its PET plant at the same location, Artlant is currently only selling PTA in the spot market, as it had been out of the market for a year. It is yet to fully penetrate the European PTA contract market which is significantly bigger than the spot market.

In the wake of PTA capacity expansions in Asia, European producers will face stronger competition from Asia to gain market share.

GLOBAL PX DYNAMICS HINGE ON CHINA

Growing PTA capacity in China will boost PX demand in the coming years. Its neighbors in Asia will support Chinese consumption through large-scale PX expansion projects. Export competition with Asia will pressure European and US PX suppliers.

While huge investments in PTA capacity in Asia will drive PX demand, further PTA capacity growth will pressure a market already in oversupply. The potential for an Asian flood in PTA to the rest of the world will shift global trade dynamics in the coming years.

China’s presence in the global PX and PTA markets is undeniable, and its hunger for PX through its aggressive PTA expansions will be the focal point for the market in the future.
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