China Increases Self-sufficiency in Commodity Plastics

Rising SOE-led domestic production could impact smaller local and Western companies

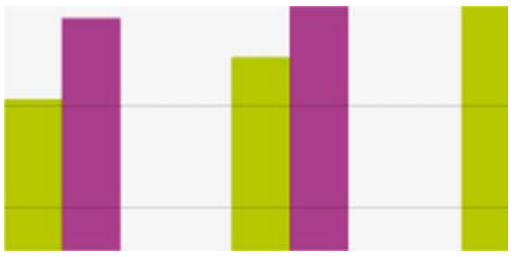
This is the first in a series of three articles on China's plastics sector. For the second article on the use of engineering plastics in China, click here.

The overall market for plastics can be divided into three different types: Commodity thermoplastics, thermosets, and engineering plastics. The features, applications, and values of those three groups vary from type to type. Commodity thermoplastics are basic high-volume, low-cost plastics that become soft upon heating – these are the workhorse plastics employed in common applications such as packaging and construction.

In China, the five commodity thermoplastics – polyethylene (PE), polypropylene (PP), polystyrene (PS), polyvinyl chloride (PVC), and acrylonitrile butadiene styrene (ABS) – account for more than 90 per cent of the total volume of plastics used. Among those five categories, PE and PP, also called polyolefins, are two fast-growing categories driven by a wide range of end applications.

Rising Domestic Production

In the past, for PE and PP, the majority of material was imported to China. However, more recently, domestic capacities for production of these thermoplastics have increased substantially and generally above the demand growth for these materials, leading to faster increases in self-sufficiency. The infographic below compares the self-sufficiency rates for individual plastics in 2006 and 2010.



This adds up to a total self-sufficiency rate of about 65 per cent for all polyolefins in 2010. The main driver for the increased rate in self-sufficiency was the expansion in polyolefin (PE and PP) production, particularly in 2010. Last year, several large-scale polyolefin plants were put into operation in China.

Tianjin Petrochemical's new one million tonnes-per-year (t/a) ethylene project came on line in January 2010, including a 300,000 t/a HDPE (high-density polyethylene) unit, a 300,000 t/a full-density PE unit, and a 450,000 t/a PP unit. Panjin Petrochemical's new 450,000 t/a ethylene project, started in February 2010, includes a 300,000 t/a HDPE unit and a 250,000 t/a PP unit.

Zhenhai Refining & Petrochemical's new one million t/a ethylene project was put into production, and includes a 450,000 t/a LLDPE (linear low density polyethylene) unit and a 300,000 t/a PP unit. In addition, some coal-to-olefins plants started up, including Shenhua Group's methanol-to-olefins project in Baotou, Inner Mongolia, with a 300,000 t/a HDPE unit and a 300,000 t/a PP unit.

In the next few years, more ethylene projects and matching units at Dushanzi Petrochemical, Fujian Refining & Petrochemical, Tianjin Ethylene, Zhenhai Refining & Petrochemical, Wuhan Petrochemical, and Sino-Kuwait Refinery & Petrochemical Complex will be put into operation, and several new coal-to-olefins and polyolefin projects will also get started.

Thus, by 2015, China's self-sufficiency rate of thermoplastics is expected to increase to 75 per cent, triggered by a slight decline in absolute import volume and a simultaneous domestic capacity build-up.

SOEs Dominate Polyolefin Production

In polyolefins (PP and PE), domestic production is dominated by Sinopec and PetroChina. Together they account for more than 90 per cent of the domestic production of polyethylene and 75 per cent of polypropylene capacity. This is quite different from the other thermoplastics, particularly PVC, which is a more fragmented segment with more than 100 players.

The reason is that in polyolefin production, integration and production size are much more important for overall competitiveness than in the other plastics. And integrated polyolefin production requires an ethylene cracker with an investment of upwards of USD 1 billion (RMB 1 = approx. 0.156 USD). Petrochemical companies with upstream oil and gas operations also find it easier to secure feedstock and, to some extent, buffer raw material price volatility. At the same time, it is important to note that for the leading Chinese polyolefin producers, this business is only a small part of their overall activities. In 2010, sales from polyolefins accounted for less than five per cent of Sinopec's sales and less than four per cent of Petrochina's sales. Both companies are at their core producers and refiners of oil, rather than pure chemical companies. However, their recent additional investments in downstream activities such as the production of commodity plastics show that they may seek a wider role in the long term. Petrol refining in China is a highly regulated business, and government regulation regarding petrol prices may limit the profitability of participating companies. This explains the movement towards other value-added activities such as the production of plastics from petrochemical raw materials. At the same time, the volume economics of polyolefin plastics are well-aligned with the core competencies of petrochemical companies, which lie in process and cost optimisation rather than in creating differentiated, market-oriented products.

Cost Disadvantages

However, in some way this capacity expansion in polyolefins is surprising as PetroChina and Sinopec are both quite aware of having cost disadvantages compared to the rapidly expanding Middle Eastern producers. According to Wang Zhengyuan, a senior engineer with PetroChina, if Chinese-made high density PE sells for USD 800 a metric ton in China, Middle Eastern material will sell for between USD 300 and USD 400 a metric ton as Middle Eastern

raw materials are 40 per cent cheaper than the world average. For PP, the price difference is not as big but still gives a competitive advantage to Middle Eastern producers.

In order to lessen the cost pressure from the Middle East, the Chinese producers are making some efforts to upgrade their production. For example, while Chinese producers only offer about 100 grades of PE, Japanese producers offer about 3,200. As a consequence, PetroChina aims to shift away from commodity offerings and focus on higher value-added products in areas including pipe, wire, and cable, biaxially-oriented PP film, and impact-modified PP for automotive and household appliances.

However, this will not be easy as the big state-owned chemical enterprises are so far much more focused on mass production rather than on smaller-scale production of more customised, more market-oriented and research-intensive plastic types. And given the relatively small share that polyolefins will have as part of their total sales, an adaptation of these companies to the requirements of customer-focused plastics varieties seems unlikely (though the participation of some foreign companies in big projects may add competencies in this regard).

Nevertheless, Sinopec and PetroChina will likely keep expanding their refining and cracking capacity in their role as the two major state-owned oil and gas companies responsible for China's downstream fuel distribution (the third-largest oil company, China National Offshore Oil Corporation (CNOOC), mainly focuses on offshore oil exploration). As part of their petrochemical activities, they will also expand their production of polyolefins.

The Coming Squeeze

For smaller polyolefin producers active in the Chinese market, the activities of Sinopec and PetroChina in polyolefins will also have profound effects. The ones most likely to suffer are the producers of commodity type polyolefins – both those producing from within China and countries near China without their own oil resources. Some South Korean PE and PP producers achieve one quarter or more of their sales with polyolefin exports to China, and these products are mainly basic types without major differentiation.

In the mid-term, it is hard to see how these companies can compete with the well-established domestic companies (with their advantages in distribution), and the low-cost producers in the Middle East. A more promising approach is to work together with one of the major state-owned enterprises, for example the co-operation between CNOOC and Shell in Fujian province.

For some other major Western polyolefin suppliers to China, such as Borouge or Sabic, the situation is somewhat less threatening as they have in the past already made strong efforts to differentiate their portfolios, and they are focusing on production in the Middle East with its raw materials cost advantages. Thus catching up with them will take much longer for both Sinopec and PetroChina.

However, they may still feel the impact of rising Chinese production in their traditional home markets – not so much because China will immediately export plastics, but rather that Middle Eastern capacity will push more strongly into Western markets once the Chinese markets are more and more saturated by local production.