COMPETITIVE AND STRATEGIC “SHIFTS” IN POLYOLEFIN FEEDSTOCKS, CATALYSTS AND PROCESSES, 2013-2020

MULTI-CLIENT STUDY PROPOSAL

June 2013
COMPETITIVE AND STRATEGIC “SHIFTS” IN POLYOLEFIN FEEDSTOCKS, CATALYSTS AND PROCESSES, 2013-2020

I. BACKGROUND

The growth of the global polyolefins industry will continue to exceed GDP at +4-5% p.a. through 2020 and there is no debate about whether it pays to continue to invest! But this growth will be uneven regionally, with low growth within the OECD, and higher consumption and growth within Asia/Pacific, the Middle East and Africa.

The reasons for this are multiple, but the most important among them include: 1) changes in feedstock supplies by source and geographic location; 2) increasingly complex catalyst supplier and process technology licensor relationships being developed beyond the traditional industry leaders; and 3) the growing influence of newer market entrants in polyolefin catalyst and resin production. When considered separately or together, these factors have the potential to significantly alter the competitive landscape and effectively create a “shift” in the factors necessary for successful market participation going forward.

Many traditional market fundamentals are changing. As a result, there is a growing uncertainty because in the largest consuming markets like China, there has been both a slowdown in GDP and a softness in polyolefin demand. In China this is especially important because it is the destination market where both the Middle East and potentially North American polyolefin producers seek to ship products from future capacity expansions. The challenge is that the true Chinese domestic demand, by product type, is not transparent and because import/export statistics into warehouse inventories distort the true Chinese domestic resin demand “shifts”.

Polyolefin catalyst suppliers, process technology licensors and resin producers will need better clarity on commodity versus advanced resin demand types which are increasing due to application in automotive, packaging and medical markets. Indeed, the industry is in a “period of uncertainty” with numerous and complex factors affecting the strength of resin licensors’ and catalyst producers’ business competitiveness moving forward, for example:

- The U.S. unconventional feedstock advantage (via shale gas) and how this will be integrated into the global marketplace through exports to 2020.

- Increasingly influential resin producer and regional market defenders like Braskem, Reliance, SABIC, SINOPEC, etc.
• Changing catalyst supply relationships and competitive landscapes as witnessed in Dow Chemical’s announced divestiture of its UNIPOL PP catalyst and licensing business.

• The Middle East and the U.S. drive to export resins and the growing incongruence with China’s drive for domestic self-sufficiency.

A. Shifts in Traditional Market Fundamentals ... the “Drivers”

The first market fundamental “shift” affecting polyolefin production will be a result of the changes in feedstock supplies, based on both unconventional sources (e.g., shale gas) and geographic location. Supplies of both ethylene and propylene will be increasingly determined by unconventional sources which are located in geographies which, until recently, have been uncompetitive relative to conventional routes (see Figure 1). These trends are expected to intensify, upsetting well-established balances between \(C_2\) and \(C_3\) supplier locations and where the PE and PP resins are produced.

![Figure 1](image)

**Figure 1**

Olefin Supply/Demand: It Pays to Invest!

- \(C_2\) capacity/demand is expected to grow from 140 MIL MT/yr in 2011 to 157 MIL MT/yr in 2015.
- There is a fundamental shift in regional olefins production.
- There are questions arising about the true cost of olefin production due to \(C_3\) deficits and new alternative production methods.

Beyond feedstock shifts, the need for continuous product innovation in the polyolefins industry is clear. These are the keys to growth, value-added profitability and materials substitution, which lead to the enhancement of competitive strength. Growth in value-added markets like OECD will be slower, while outside of OECD increased market competition is anticipated as producers seek more advanced applications. Thus catalysts/processes will continue to play a vital role within all markets and will differentiate the leaders from the followers.
A recent TCGR evaluation of patents covering over 140 filings over the past five years in polyolefins depicts the areas of emphasis (see Figure 2):

**Figure 2**
Overlap in Primary Fields of Innovation within Patenting in Polyolefins

Beyond the technological developments captured above, the relationships between catalyst supplier, process licensor and resin producer are changing. The most advanced technologies, and access to the value-added markets these capabilities enable, are no longer restricted to a select few. Instead, catalyst production skills are broadening globally, as are capabilities required in their successful integration into process technologies. “Shifts” can be expected with regard to where influence resides and how much (and for how long) this influence continues.

**B. Shifts in Resin, Catalyst/Process and Producer Competitiveness ... the “Impacts”**

In polyolefins, the molecular structure of the resin is directly tied to the final physical and performance properties. Therefore, demand “shifts” dictate the need for specific catalyst types, affecting competition in catalyst supply and related process licensing pull. These shifts will have profound commercial impacts and staying ahead of this movement will be critical.

As an example, shifts in process licensing reflect changes in demand for both resins and catalysts. Between 2012 and 2016 in China, 4.3 MIL mt/yr of new PE capacity and 7.4 MIL mt/yr of new PP capacity will come on-stream (see Figure 3). New licensed units require the catalyst to maintain guarantees.
Beyond China, over 19.7 MIL mt/yr of PP and +18.2 MIL mt/yr of PE have been licensed worldwide between 2012 and 2016. Understanding the licensed catalyst product portfolios is critical to sales and marketing strengths. How will this affect other markets?

II. THE NEED FOR THIS STUDY

These combined shifts in fundamentals have prompted TCGR to propose an updated analysis of key parameters affecting catalyst suppliers, process licensors and resin producers within the polyolefins industry.

These shifts and changes will be used to gain competitive strategic insight into commercial impacts on different suppliers and resin producers. The positioning of advantages and disadvantages based on field conditions will be assessed.

The following “shifts” are critical to the planning and competitiveness of all industry participants:

- All this planned capacity and production cannot be absorbed in Asia/Pacific, notably China! No doubt there will be growth in South America, but Braskem has already planned capacity increases and along with partners (with JV plants in Mexico, Venezuela and Peru) intends to capture this market. The Middle East continues to invest in export capacity and is set to increase by more than 4 MIL mt/yr of polyolefin capacity by 2015. Where does this leave Europe, Eastern Europe and Russia?
• **It is also a question of product line complexity!** Production today outside of OECD is mainly commodity orientated, with the higher value-added applications within OECD, where slower growth and recovery is anticipated. In the next 5-7 years, it can be expected that more advanced product lines will be produced in Asia/Pacific and China, where they will be needed to service automotive, packaging and medical applications. Whether licensed or not, these newer plants will play a vital role in determining the product mix of future imports, even if local capacity is not available to meet domestic demands.

• **The supply of catalysts, from advanced Ziegler-Natta to leading-edge metallocene systems, will be impacted by the demand for specific resin types and will affect which grades are produced and where they are made.** In addition, the traditional linkage between catalyst supplier and process licensor will reflect an increasing level of sophistication, and independence, of resin producers in the regions with the fastest growth.

Thus, it is both timely and imperative that players have the information at hand to determine production strategies, the correct technologies and the targeted markets **before embarking on detailed investments.** TCGR’s study will reexamine the fundamentals in Asia/Pacific, with specific attention on China, with detailed product line demand forecasts in polyolefins, that are tied to local enduser domestic demand forecasts. Other country-by-country key markets in Asia/Pacific will also be highlighted.

**This TCGR study is unique!** By engaging TCGR’s alliance partner in China, CNCIC, we will obtain and compile historical, current and forecasted domestic supply/demand detail by product line from qualified government sources and interviews in the field, that have not as yet been independently sourced and analyzed to date. This perspective is a critical component to the strategic examination of both resin producer success, as well as to technology providers. The outcome will be a highly valuable tool to understanding both the competitive landscape and therefore highly value-added to your business decisions.

### III. SCOPE AND METHODOLOGY

For details on the report’s scope, refer to the Proposed Table of Contents which follows this section.

Beyond the study’s Background and Executive Summary, there are four (4) key sections, addressing different aspects affecting the study’s strategic and competitive conclusions and recommendations. They are:
• **Section III – Shifts in Feedstock and Olefins Supply/Demand by Region** – will analyze unconventional U.S. and other feedstock utilization impacts, likely scenarios to the announced industry capacity expansions in olefins and polyolefins production, pricing advantages, and scenario outcomes.

• **Section IV - Shifts in Process Licensing and Catalyst Technologies** – will provide an update of recent patent trends, 2010-2013, but the key subsections involve closer and more in-depth examination of technology changes being implemented by processes and catalysts in both PE and PP. To capture this, global Case Examples will be highlighted depicting how adoption of more advanced technologies and catalysts are penetrating markets by producers on a regional market basis, i.e. the purpose is to obtain a measure of how fast value-added resin adoption rates are occurring in different markets.

• **Section V - Shifts in Geographic and Competitive Impacts** – will take a broader Asia/Pacific look at regional import/export statistics and domestic demands by country, with highlights on key country changes. Cameos will assess key aspects. This section also examines the production plans for key new entrants both in Asia/Pacific but also globally. Changes in catalyst supply demand (open vs. captive) will be assessed, along with an overall examination of what this may mean to any competitive mix.

• **Section VI - Special Feature: China** – will serve as a key unique analysis to be completed with TCGR’s partner CNCIC on the outcome of product line imports(exports) of resin into China, as well as domestic supply/demand for them. This may seem straightforward but as producers are keenly aware, bonded warehouse inventories are not necessarily a direct reflection of domestic supply/demand and future shifts. Therefore, just taking import/export data historical measures are not always a good measure of the future demand patterns. TCGR/CNCIC’s methodology therefore employs field interviews with key industry endusers in China to develop its longer term outlook of anticipated “shifts” in domestic demand.

• The final **Conclusions and Recommendations** section – will allow TCGR to distill key facts, observations and trends into a single chapter to compare and contrast the findings, in such a way as to provide executive insights into the study.
# Competitive and Strategic “Shifts” in Polyolefin Feedstocks, Catalysts and Processes, 2013-2020

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   A. Commercial History and Key Issues  
   B. Players and Drivers  
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VI. Special Feature: How Will China’s Self-Sufficiency Affect Resin Trade?  
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VII. Conclusions and Recommendations  
   A. Changed Competitive Landscape  
   B. Who Leads Today and Why? Who Will Lead Tomorrow?  
   C. Challenges vs. Opportunities  
   D. Strategies for Commercial Success

* Charter members (those who sign up for the study before August 2, 2013) will have the opportunity to work with TCGR in defining the scope of the report by delineating areas of particular interest for inclusion in the assessment.
IV. QUALIFICATIONS

The Catalyst Group Resources, a member of The Catalyst Group, works with clients to develop sustainable competitive advantage in technology-driven industries such as chemicals, refining, petrochemicals, polymers, specialty/fine chemicals, biotechnology, pharmaceuticals, and environmental protection. We provide concrete proven solutions based on our understanding of how technology impacts business.

Using our in-depth knowledge of molecular structures, process systems, and commercial applications, we offer a unique combination of business solutions and technology skills through a range of client-focused services. Often working as a member of our clients' planning teams, we combine our knowledge of cutting-edge technology with commercial expertise to:

- Define the business and commercial impacts of leading-edge technologies
- Develop technology strategies that support business objectives
- Assess technology options through strategy development, including:
  - Independent appraisals and valuations of technology/potential
  - Acquisition consulting, planning and due diligence
- Provide leading-edge financial methodology for shareholder value creation
- Lead and/or manage client-sponsored R&D programs targeted through our opportunity identification process.
- Provide leading information and knowledge through:
  - Timely technical publications
  - Exclusive membership programs

The client-confidential assignments conducted by The Catalyst Group include projects in:

- Reinventing R&D pipelines
- Technology alliances
- Technology acquisition
- Market strategy

We have built our consulting practice on long-term client relationships, dedication, and integrity. Our philosophy is clear and focused:

We Provide the "Catalysts" for Business Growth by Linking Technology and Leading-Edge Business Practices to Market Opportunities
V. DELIVERABLES AND PRICING

This report is timely and strategically important to industry participants in PE and PP resin production, polyolefin catalyst development and supply, and process technology licensing who are evaluating technical, commercial and strategic opportunities. TCGR’s report, based on technology evaluations, market assessments and interviews with key players goes beyond public domain information. As a result, subscribers are requested to complete and sign the “Order Form and Secrecy Agreement” on the following page.

The study, *Competitive and Strategic “Shifts” in Polyolefin Feedstocks, Catalysts and Processes, 2013-2020* will be available in October/November, 2013.

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