CMACC
DRAGOMAN

ETHYLENE RATIONALIZATION & THE CHINA FACTOR

PROSPECTUS | AVAILABLE: DECEMBER 2023

TOPIC 1

Olefins and polyolefins face the worst downturn the industry has ever experienced.

TOPIC 2

China's economic outlook is subdued because of changed fundamentals and is further handicapped by political priorities that make modeling difficult.

TOPIC 3

Energy transition adds the wildcards of NOCs investing to consume crude oil and other feedstocks, including China investing heavily in green chemicals.

OVERVIEW

In collaboration with Dragoman, a leading geopolitical risk consulting company with specific expertise in China, C-MACC has prepared a detailed study looking both at the supply/demand implications of recent and changing behavior and where we may see the much necessary consolidation required to repair what could be chronic oversupply.

This analysis moves well beyond a traditional cost analysis/cost curve approach as integration will be a gating factor in closure decisions, with upstream integration likely more important this time around.

The generic report will be ready by November 30th, 2023, with customized analysis prepared on a first come first served basis.

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Main Contributors

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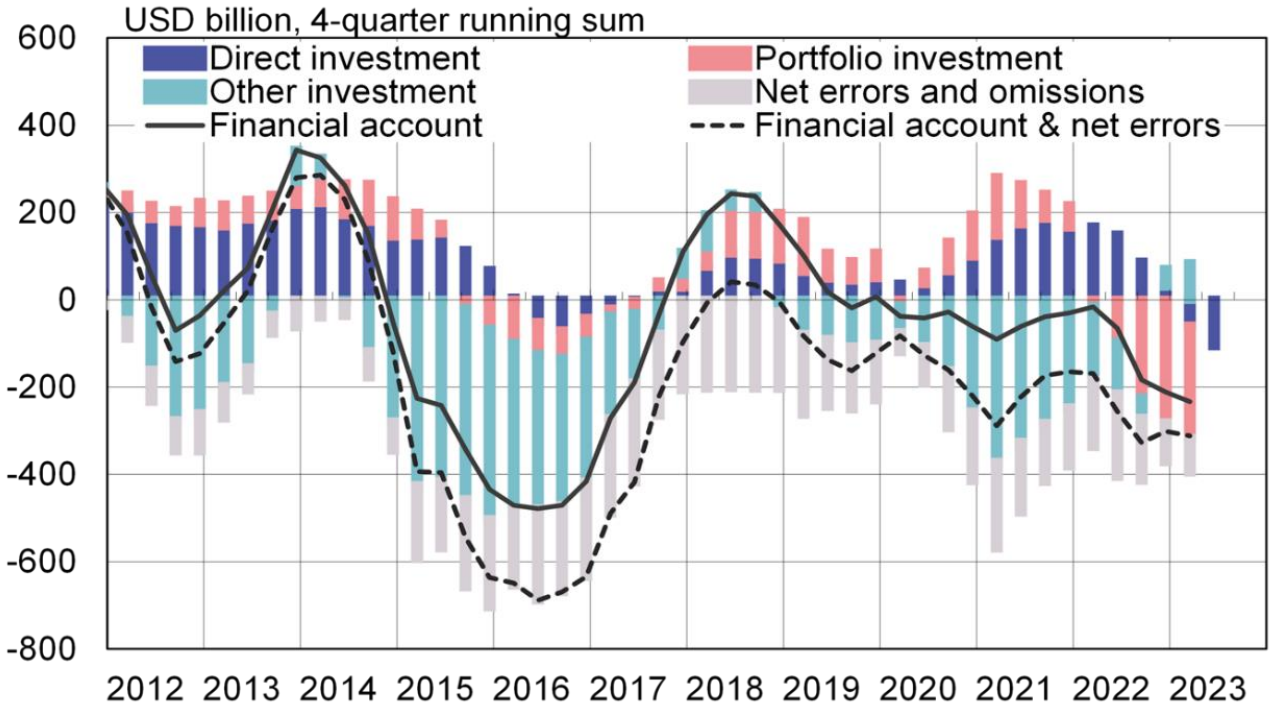
Co-Founding Partner

Graham has spent 40 years in and around the chemical sector. His depth of experience and breadth of industry qualifies him for a wide spectrum of consulting and advisory roles.

Michael Gill
Executive Counsellor
Dragoman

Michael Gill heads Dragoman's Asia services where he led development of its China analysis. Michael has had direct exposure to China since the late 1970s and has worked on Asian business and trade issues for over 30 years.

China's economic engine has overheated. Heavy reliance on investment-driven growth and unsustainable accumulations of debt led to an inevitable decline in the quality of investment and, ultimately, to risk that could not be ignored. The need to renovate and rebalance the structure of the economy is recognized and has been pursued to a degree, but during the process, Beijing is having and will have a hard job to stabilize and deleverage. As it does so, CCP's political priorities appear to be in conflict with the need to promote growth through private enterprise and household consumption. Public efforts to talk up private investment and consumer confidence are contradicted – persistently – by reinforcement of an intrusive response to concerns about the security of the CCP. This does not drive confidence about a quick fix and even in a best case, demographics constrain by how much local GDP can grow.



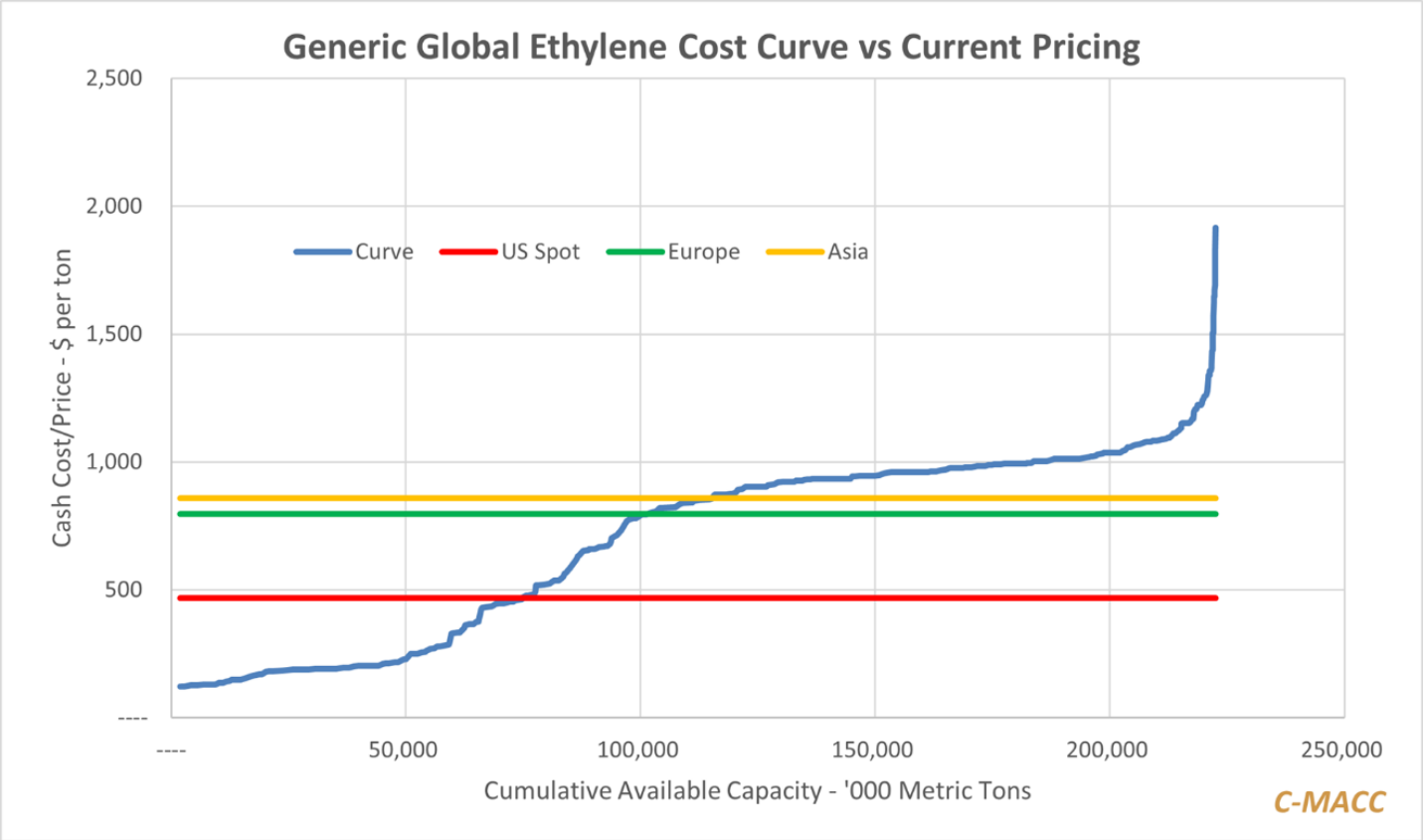
In all likelihood, the global olefins and polyolefins markets are in the early stage of what might be the worst down cycle the industry has experienced since the early 1980s, and it could be worse than at that time. This dramatic turn of events for the industry comes after years of relatively high profits, influenced more by moves and relative moves in feedstock costs than by global oversupply or chronic shortage.

The causes of this downturn are what make it harder to model than many in the past as they involve factors that are yet unclear and for which several possible paths still exist.

- Demand in China, which has provided strong momentum for the industry for decades, is no longer assured, and forecasts range from concerning to very concerning, both short and medium term.
- Further chemical demand growth constraints globally, fueled by weak economic growth, net-zero goals, recycling, substitution from renewable-based polymers, and conservation of use of chemicals and polymers.
    - Increasing in importance through the decade will be the expansion of green chemical capacity, especially in China.
- Overbuilding in China – chasing a growth rate that has evaporated and chasing a national focus on self-sufficiency, suggesting that local production will quickly displace most remaining imports and push the oversupply elsewhere.
- Peak oil consumption concerns which are driving conclusions around the increasing importance of chemicals as a home for hydrocarbons and a possible building spree from the NOCs and some IOCs as they invest to consume captive hydrocarbons, with very different economic models than traditional.

Traditional cost curve models do not provide good guidance around where the necessary capacity rationalization will come from, and this drives a likelihood that prices and margins could surprise to the downside versus prior trough models as integration allows companies to support higher-cost ethylene facilities by taking profits elsewhere in the value chain. Today we are finding that ethylene producers are in general finding reasons why others should shut down before they do. as is generally the case early in a down cycle.

The current cost curve suggests that many facilities are underwater, and they operate either because money is being made elsewhere in the chain or because the owners would lose more if they shut them down.



STUDY OBJECTIVES

The analysis in this report gives strong guidance around how producers, feedstock suppliers, and customers should think about the short and longer-term risks to their businesses, by providing both a cost and integration framework that drives conclusions about the robustness of individual portfolios.

The analysis also provides unique insight into what is driving both the economy and policy within China, with a specific focus on the implications for the materials sectors. This analysis also looks at the ambitious green initiatives in China, which may provide a much needed (but likely small) boost to the economy, but have broader implications for chemicals and polymers and global competition.

The work includes several scenarios around both growth and relative oil and gas prices, which can materially impact conclusions, and the customizable version of this offering can assess the assumptions chosen by each client.

The challenges of a decarbonizing overlay. How and what to focus on given the parallel challenges of the rising costs of decarbonization and falling profits.

OPTIONS - The Report Is Being Offered In Three Forms:

01 GENERIC

As is, full of all the analysis and data but not customized in any way.

02 "COLD EYES CUSTOM"

We will take the models and conclusions of the generic study and prepare a specific review for the client – summarizing expected risks and opportunities – no data from the client, but possible alternative scenarios to review.

03 "FULLY CUSTOMIZED AND COLLABORATIVE"

Most likely under NDA – deep dive into options for the business overall and for individual facilities.

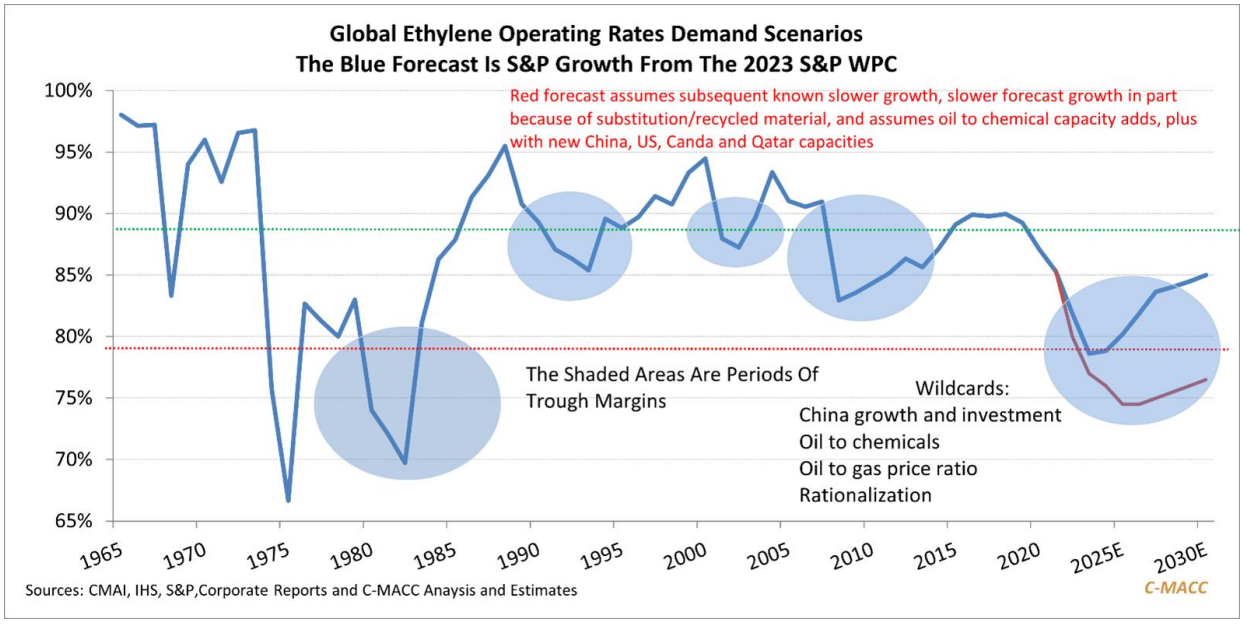
+ BOTH CUSTOM OPTIONS WILL INCLUDE

Analysis around how decarbonization costs could impact decision making.

TABLE OF CONTENTS

Ethylene Supply and Demand

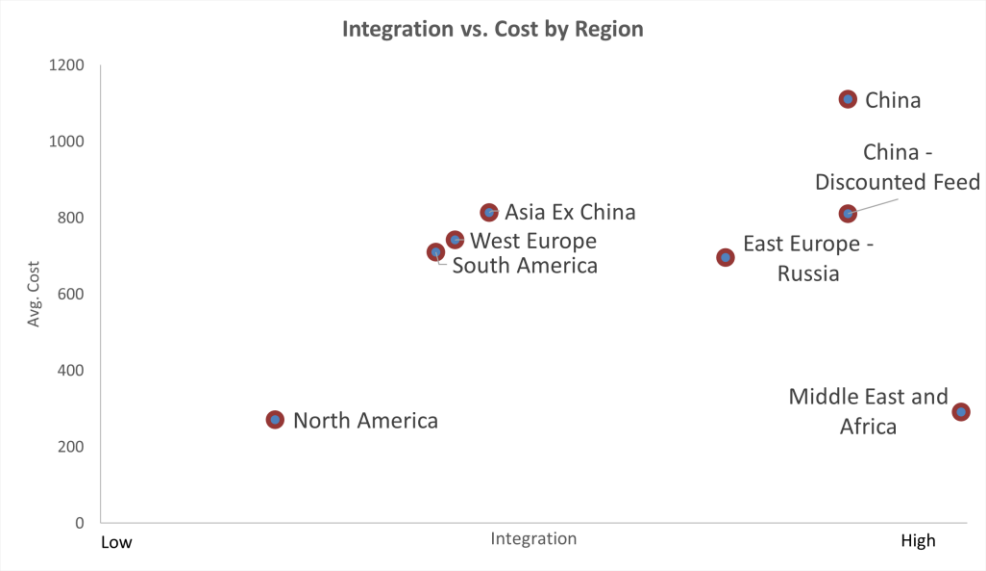
- **How bad is it today** – lots of debate about the accuracy of recently published opinions – note that in the chart below the two different scenarios are from analyses that are only 6 months apart.
    - The analysis below does not assume any industry rationalization.
    - The assumptions on substitution from recycled materials and alternatives are conservative.
    - Demand growth slowing meaningfully in China.
- **We look at different possible demand scenarios and discuss supply in depth**.
    - What still gets built – new plant announcements continue?
    - How big a push into oil to chemicals will we see from NOCs and **possibly** IOCs?
    - Will capacity close or will it just change hands – at least initially?
        - Early examples in China already.
    - How low do prices and margins need to go to drive rationalization?
- **The analysis is complicated by possible movements in co-product values and energy assumptions, and we address this through steep and flat cost curve scenarios.**
- **We show regional cost differences and the ranges within regions and countries and look at these in the context of plant-by-plant integration for those countries and facilities where some of the tough choices will need to be made.**



Pricing and Margins

- **Integrated with the scenario work and the supply/demand implications of the need to close capacity.**

- **We look at the cost and price implication of the feedstock discounts that China and India may be enjoying and the point in the chart below is an average Chinese impact – those best positions will be doing better.**



The Decarbonization Overlay

- **Where will costs be most challenging and what are the best routes region by region and the ranges within regions?**
    - Note that the early mover advantage in China is real and could be a headache for other regions.

- **Could they inform shutdown decisions more than current relative costs?**
    - Do companies elect to close entire sites to focus decarbonizing efforts where the costs are most manageable?
    - What does this then mean for trade?

Customized Options

- **Where do your facilities fit in different cost scenarios and under different demand assumptions?**
    - Are there scenarios under which your facilities sit close to the top of a cost curve?

- **Where do you benefit from or where are you at risk from integration or lack thereof – upstream and downstream?**

- **How should your strategies change under different demand scenarios, different decarbonizing cost scenarios, and different energy cost assumptions?**

    - What circumstances would drive you to:
        a. Exit specific locations or the entire business. Options to exit.
        b. Hunker down and wait. How long and how much could you lose while you wait?
        c. Expand through M&A of through new capital investment, who to buy and when?

COSTS AND DELIVERABLES

The Generic Work

A written report including all the analysis covered in the scope above through the decarbonizing piece. Available December 1st 2023. A one-hour video discussion with the team.

- ***Contact Graham to receive a quote***

The "Cold Eyes" Custom

The same written report as above but with the customized piece – mostly directed by the client in terms of scenarios to be evaluated beyond what we have.

Overall strategy suggestions under different scenarios.

Focus on each producing location – list of recommendations per location.

Opportunity to direct the custom work at the start of the process.

Written generic report – December 1st.

One-hour prep call for custom work – or more if needed – or face-to-face.

Custom report timing will depend on custom backlog, and will be agreed on contract signing.

- ***Contact Graham to receive a quote***

Fully customized and collaborative analysis

All the above but full scope, price and delivery will be agreed on an individual basis.