EXTENDING THE PROFITABILITY OF REFINERIES/PETROCHEMICALS OPERATIONS

UPDATED MULTI-CLIENT STUDY PROPOSAL

March 2016

TCGR THE CATALYST GROUP RESOURCES™

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I. INTRODUCTION

With the lower price of crude, downstream operations become profit centers and a main stay in earnings! Looking for value-added to sustain this profitability and even increase it is therefore paramount. Producing more value-added fuels components, as well as olefins and aromatics, is therefore a focus.

II. BACKGROUND

With lower cost crudes entering refineries during 2015 (and expected to continue in 2016), one of the brighter sides of the refining industry has been a substantial increase in downstream margins! Today on average about 60% of all integrated refining and energy companies' earnings are coming from downstream, not upstream, operations. EIA and other sources on majors' earnings reports have shown the following trends:

Figure 1: Regional Refinery Margins – Major Earnings from Downstream vs. Upstream Operations

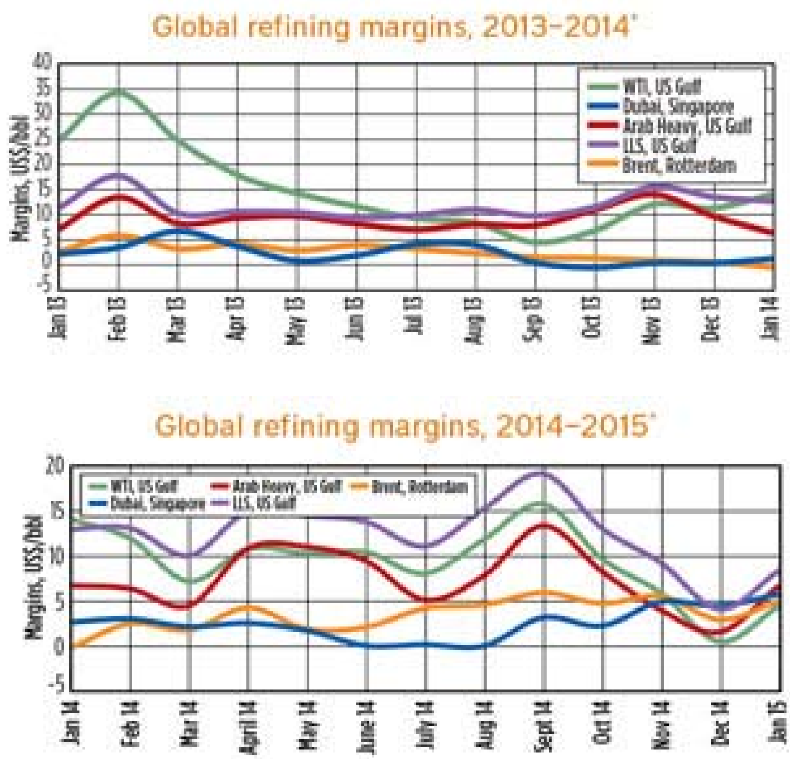

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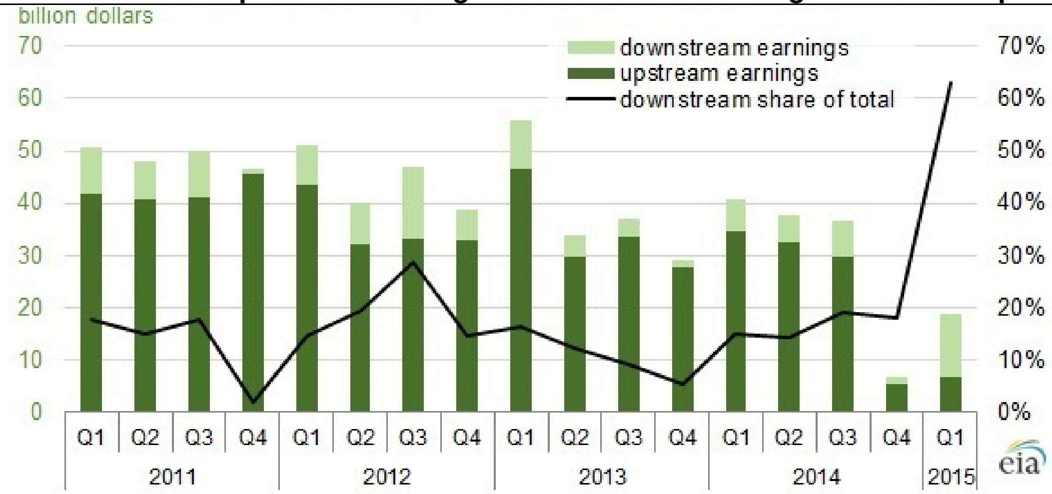
Figure 2
Downstream and Upstream Earnings for Select Global Integrated Oil Companies



Source: US Energy Information Administration, based on Evaluate Energy

With crude pricing for 2016 forecast to keep within its current trading range, refiners and petrochemical producers are now asking themselves what planning and operational changes should be implemented to maintain or increase the margins/profitability for 2016 and beyond as a corporate priority!

III. THE NEED FOR THE STUDY

Naturally, the answer(s) will vary depending on many regional, operational and technology factors which will be specific to each refinery site. However, there are many best practices and tools in the production arsenal, depending on major factors that can be implemented, to improve operating margins that are common to almost everyone. TCGR's new multi-client study will examine and document the top 5 to 10, in each of these categories:

A. Improved Catalyst and Process Practices to Improve Profits.

Catalyst producers are always developing new and improved catalysts for refinery and petrochemicals production; after all, it is what keeps them in business. Process licensors are always looking to improve the energy efficiency and re-engineer with an eye towards reduced CAPEX and OPEX to lower the production costs of fuels and petrochemicals. TCGR will examine and document the best 10 advances for 2016 and beyond for refiners/producers to implement.

B. Partnerships, Swaps and Consolidations.

Feedstock and product swaps, through production partnerships, also offer tremendous flexibility to avoid significant CAPEX investment if one or the other partner has existing operations that can benefit the other, even across regional borders. This can also occur frequently if different companies are close to one another, where existing infrastructure exists to pipeline products and feedstocks between sites, e.g. Gulf Coast, Rotterdam, Singapore and others. TCGR will look at existing refining Case Studies and provide directional examples, which are relevant to these sets of opportunities to arbitrage production costs.

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C. Capturing the Best in Renewables Fuels and Products.

While RFS regulations and the use of corn bioethanol have come under scrutiny involving the “blendwall,” development and use of “cellulosic bioethanol” is still growing as the preferential source. One apparent challenge is that the cost of “cellulosic bioethanol” is significantly more expensive (up to 30-40%) than corn derived product. This has also been challenged because the refining industry has grown accustomed to short term subsidies being dropped over time. The refining and chemical industry is now developing biochemical alternatives like biobutanol, mixed alcohols, bioalcohols and other denser, higher octane products which are more compatible with traditional blending. In addition, there is a growing worldwide trend toward biorefineries that deploy hydroprocessing of biofeedstocks, which along with pyrolysis of biofeedstocks, offer some lower costs methods of biofuels production at scale-to-traditional refinery operations. TOTAL has already announced it will entirely reconfigure one of its petroleum refineries in France into a biorefinery in the near future. Neste Oy has already taken steps and others are closely evaluating their options. TCGR’s study will examine and document the future profitability options in dealing with these sets of opportunities.

D. Regulatory and Environmental Compliances.

With environmental regulations becoming ever stricter on a global basis, air, water and discharge limits become an industry challenge. Whether spent catalysts, wastewater treatment, flaring or CO_2 emissions – a section in TCGR’s study will be devoted to revisiting opportunity solutions for refineries/petrochemical plants seeking to remain in compliance with the control of growing environmental costs.

By highlighting 20-25 enriched areas for profit improvement, including some combined and synergistic approaches TCGR will demonstrate some newer approaches being implemented that will provide refiners and petrochemical producers with returns via practical steps from profit improvements being implemented by both competitors and peers, globally.

This new report ***“Extending the Profitability of Refineries/Petrochemicals Operations”*** complements an ongoing portfolio of similarly well-received TCGR reports delivered to clients over recent years. This growing experience demonstrates TCGR’s unique capability, resources, and expertise to deliver exceptional insight.

Note: The style as proposed, is real Case Studies of implemented examples occurring during 2014-2015, with a closer examination of the benefits. The added value TCGR provides, is real world operating expertise on how to improve on these examples, from experienced Dialog Group® active industry consultants. TCGR will utilize numerous local, deeply experienced catalyst and process technology experts from the refining and petrochemicals production industries to assist us to provide insights beyond what other sources that do not have the reach and industrial experience can provide.

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Recent multi-client reports and limited-client reports include:

- ***The Intelligence Report: Business Shifts in the Global Catalytic Process Industries, 2015-2021*** (for delivery May 2016)
- ***Natural Gas Conversion vs. Syngas Routes: A Future of Convergence***
  Vol. 1: Natural Gas to Intermediates and Feedstocks to Syngas (October 2014)
  Vol. 2: Syngas and Natural Gas Conversion to Products (November 2014)
- ***Specialty Zeolites in Catalysis, 2002-2020: International, Commercial and Technical Progress – A New Era!*** (March 2014)
- ***The Catalytic Process Industries in China: Markets, Technologies & Strategic Implications*** (4 part Series – 2013)
- ***The Industrial Adsorbents Business: Commercial Strategy, Technical and R&D Assessment in Refining, Chemicals/Syngas, Natural Gas and Industrial Gases*** (July 2013)
- ***FCC Additives: Meeting Refiners' Environmental, Performance & Product Slate Flexibility Requirements 2013-2018*** (June 2013)
- ***Unconventional Catalytic Olefins Production: Commercial Vision and Breakout?*** (January 2013)

IV. SCOPE AND METHODOLOGY

The purpose of this multi-client study is to provide subscribers with a check list of tools and Case Studies for comparative purposes to stimulate best practices within the context of each refinery or petrochemical production's site restrictions that will better obtain improved profitability, without significant CAPEX, while also respecting changing (moving) environmental and quality standards for product specifications and as well as refinery/production site compliance.

An example might be: using a Case Study where a Korean chemical company hired the simulation company Profimatics to evaluate the optimization of heat energy balances within the refinery gate and with improved process controllers configuration in specific locations, were able to save 3% in yearly costs, along with a reduction in GHG footprint.

Through a collection of carefully obtained screened and real world cases, TCGR will provide a best real world set of current and relevant histories, capable of short term implementation. Any of these, will provide more than sufficient justification for the investment in this multi-client approach!

There are certain to be different interests by different refiners and petrochemical (olefins, aromatics) producers interested in becoming "charter subscribers" to TCGR's multi-client report. TCGR always seeks the input of "charter subscribers" prior to the finalization of the study Table of Contents (TOC) before proceeding. This enhances both the quality and value of each of the studies it performs.

The Proposed Table of Contents appears on page 5.

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Proposed Table of Contents

Charter subscribers (those who sign up for the study before April 15, 2016) will have the opportunity to work with TCGR to have their feedback on the TofC incorporated into the study's final scope by delineating areas of particular interest for inclusion in the assessment.

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V. 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:
  - World-class seminars, conferences and courses
  - Timely technical publications

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

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VI. DELIVERABLES AND PRICING

This report is timely and strategically important to those industry participants and observers both monitoring and investing in refining and petrochemicals operations with a focus on improving and/or extending profitability margins. TCGR's report, based on technology evaluations, market assessments and interviews with key players will go 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, ***"Extending the Profitability of Refineries/Petrochemicals Operations"*** is expected to be available in July/August 2016.

Participation	Deadline	Price
"Charter" subscribers	before April 15, 2016	$15,500
Extending the Profitability of Refineries/Petrochemicals Operations		
Post-launch subscribers	after April 15, 2016	$17,500
Extending the Profitability of Refineries/Petrochemicals Operations		
Report in PDF format, in addition to subscription price		$1,000

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ORDER FORM AND SECRECY AGREEMENT

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Please enter our order for "**Extending the Profitability of Refineries/Petrochemicals Operations"** to be completed in July/August 2016, as follows:

____ **Extending the Profitability of Refineries/Petrochemicals Operations** for $15,500 ($17,500 after April 15, 2016 - post-launch)

____ Please enter our order for the study to be delivered in PDF (Adobe Acrobat) format for use across our sites/locations (i.e., site license) for an additional $1,000.

____ Please send us ______ additional printed copies @ $250 each.

In signing this order form, our company agrees to hold this report confidential and not make it available to subsidiaries unless a controlling interest (>50%) exists.

Signature:____ Date: ________________________

Name: ____ Title: ________________________

Company:____

Billing Address: ____

Shipping Address (no P.O. Boxes): ____

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Express delivery services will not deliver to P.O. Boxes

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Zip/Postal Code: ___________________________________ Phone: ______________________

E-mail: ____ Fax: ________________________