

COLIN A. HOUSTON & ASSOCIATES, INC. ANNOUNCES
A NEW MULTICLIENT REPORT ENTITLED

NORMAL PARAFFINS - WORLD MARKETS, 2007-2017

The normal paraffin (n-paraffin) market is rebalancing after capacity rationalization and from cost issues. Earlier forecasts that gas-to-liquids (GTL) based n-paraffin plants would create a supply bubble in the 2010-2015 time frame have been derated with the cancelling of a number of Qatari GTL projects in 2005. In 2006, the heavy cut n-paraffin market tightened as prices rose dramatically. In 2007, Sasol closed over 200,000 tons of n-paraffin capacity in Italy. The light cut merchant market tightened in 2007 as output was affected by turnarounds and increasing kerosene costs. Demand for light cut has risen from heavy cut customers shifting to light cut materials in some applications.

Producers are concerned that future market requirements will not be met without difficulty. The steady, gradual decline in the availability of highly paraffinic kerosenes reduces n-paraffin capacity and raises the costs for n-paraffin as more material must be processed to maintain a steady flow of n-paraffin. The market appears headed into a supply "crunch" that could last a long time. Only one of several GTL projects will definitely include an n-paraffin plant, and although it will add 260,000 tons/year of new capacity in 2011-2012, much of its output could be absorbed in new LAB projects set up to feed off of it, and the tight supply situation would not be alleviated. CAHA's new study, *Normal Paraffins - World Markets, 2007-2017*, explores the scale of the looming shortage and determine the potential impact of this plant and other possible new plants after 2011.

CAHA has published studies of LAB markets for over 25 years, including the recently completed *Detergent Alkylates - World Markets, 2006-2016*. Our first normal paraffins multiclient study was completed in 2001. Since 2001 we have also published a bimonthly newsletter devoted to LAB markets. The following pages contain the table of contents, sample tables and other details of *Normal Paraffins - World Markets, 2007-2017*

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DESCRIPTION OF THE STUDY

KEY ISSUES

After several years of doom and gloom from a threatened surge of oleochemical-based surfactants, the n-paraffin market was awoken in 2007 to potential shortages due to strong demand following the failure of the oleochemical threat. Furthermore, the n-paraffin market is no longer facing overcapacity from associated gas-to-liquids (GTL) projects.

Dozens of GTL projects, using technology designed to produce liquid fuels from natural gas or coal via Fischer-Tropsch, were proposed over the past few years, and most have now been postponed or cancelled. These plants can potentially produce non-fuel hydrocarbon products including n-paraffins. The cancellations were due to the Qatar moratorium halting future GTL projects, paired with escalating costs of plant construction and the declining price advantage that materials produced via GTL once held over crude oil derived products. An expected flood of n-paraffin capacity from GTL has been reduced to one, potentially two plants going forward.

REPORT ORGANIZATION

The report provides a comprehensive view of n-paraffins today along with an analysis of the challenges this important intermediate market faces. The report is organized into the following sections.

Process Technology

This chapter describes commercial separation processes for the production of n-paraffins and discusses kerosene feedstock issues. The chapter also describes the chemistry of Fischer-Tropsch synthesis, including catalyst choice and hydrocarbon product selectivities, carbon distribution, iso-paraffin concentration and areas for future process research. Tables listing proposed GTL projects, including producers, locations, capacities, capital costs and status are also included.

Supply

This chapter begins with an overview of historical n-paraffin capacity,

production and operating rates by region, and forecasts capacity by region annually through 2012. It includes a longer range forecast to 2017, and a discussion of the outlook for GTL-based n-paraffins. Regional trade patterns are also discussed.

Profiles of individual n-paraffin producers are provided for each region, including proposed new producers. The profiles include announced capacity increases, a review of plant operations including process technology and carbon chain lengths produced; raw material sources; integration, including LAB capacity and expansion plans; and captive use versus merchant sales.

Markets

The study also discusses market trends and issues, quantifies and forecasts n-paraffin consumption by chain length and end use. Linear alkylbenzene (LAB) is the most important outlet for normal paraffins, accounting for 74 percent of the world's total normal paraffin consumption. Other end uses include secondary alcohols, internal olefins, chlorinated paraffins, paraffin sulfonates, oilfield chemicals, rolling oils, and miscellaneous others. These are all detailed in CAHA's study, which also includes a listing of major customers by end use and by region.

Supply/Demand Balance

This chapter analyzes and forecasts the supply/demand picture to 2017 for North America, South America, West Europe, Asia, East Europe and Middle East/Africa. The impact of GTL paraffins are considered, and a discussion of pricing includes historical data and a price forecast.

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	2007	2012	2017	AAGR % 2007-2017
North America				
Latin America				
West Europe				
Asia				
East Europe				
Middle East/Africa				
TOTAL				

Table 2				
WORLD - NORMAL PARAFFIN CONSUMPTION BY MARKET, 2007-2017 (thousand tons)				
	2007	2012	2017	AAGR% 2007-2017
Linear Alkylbenzene				
Secondary Alcohols				
Internal Olefins				
Chlorinated Paraffins				
Paraffin Sulfonates				
Oilfield Chemicals				
Rolling Oils				
Solvents/Inks, Other				
TOTAL				

Table III-7

ASIA - NORMAL PARAFFIN PRODUCERS AND CAPACITIES, 2007-2017
(thousand tons)

Producer	Location	2007	2008	2009	2010	2011	2012	2017
CHINA								
TOTAL CHINA								
INDIA								
TOTAL INDIA								
JAPAN								
TOTAL JAPAN								
OTHER ASIA								
TOTAL OTHER ASIA								
TOTAL ASIA								

Table IV-4				
WEST EUROPE - NORMAL PARAFFIN CONSUMPTION BY MARKET, 2007-2017 (thousand tons)				
	2007	2012	2017	AAGR% 2007-2017
Linear Alkylbenzene				
Internal Olefins				
Chlorinated Paraffins				
Paraffin Sulfonates				
Rolling Oils				
Other				
TOTAL				

Table IV-31				
ASIA - NORMAL PARAFFIN CUTS REQUIRED FOR CHLORINATED PARAFFINS PRODUCTION, 2007-2017 (thousand tons)				
	2007	2012	2017	AAGR% 2007-2017
C ₁₀ -C ₁₃				
C ₁₄ -C ₁₇				
C ₁₈ -C ₂₀ , C ₂₀₊				
TOTAL				

Table V-14									
MIDDLE EAST/AFRICA - NORMAL PARAFFIN SUPPLY/DEMAND BALANCE, 2002-2017 (thousand tons)									
	2002	2007	2008	2009	2010	2011	2012	2017	AAGR % 2007-2017
Capacity									
Production									
Demand									
Net Imp./Exp.									
Op. Rate (%)									

QUALIFICATIONS AND PERSONNEL

Colin A. Houston & Associates Inc. was founded in 1971 to provide consulting services to the chemical industry worldwide. The primary area of expertise was and continues to be surfactants: raw materials, intermediates, major surfactants, and the surfactant-consuming industries. Other areas of activity include: a variety of industry studies on such topics as detergent builders, ingredients for personal care products, and bleaching agents; engineering studies such as a worldwide study of glycerine evaporation plants with recommendations for improved efficiency; a world study of the state of the art in spray-drying detergents; contracts with the U.S. Government to develop industry effluent guidelines; and business strategy and acquisition studies.

The reputation thus earned by CAHA for comprehensive, high quality techno-economic and market analyses has led to a variety of engineering, marketing, and strategic planning studies for individual clients in North America, West Europe, Asia/Pacific and Other regions.

The project team approach utilized by CAHA includes a core of senior and technical professionals augmented by expert consultant associates. The following brief synopses present the staff and consultants who carried out the study, NORMAL PARAFFINS - WORLD MARKETS, 2007-2017.

Joel H. Houston, President,

was the project leader for DETERGENT ALKYLATES - WORLD MARKETS, 2006-2016 and numerous other multiclient studies including HIGHER ALCOHOLS: MARKET FORECAST TO 2020, OPPORTUNITIES IN PERFORMANCE SURFACTANTS IN WEST EUROPE, SURFACTANTS FOR EMERGING MARKETS IN ASIA/PACIFIC, 1996-2010, SURFACTANTS FOR CONSUMER PRODUCTS - NORTH AMERICAN FORECAST TO 2008, and DETERGENT ALKYLATE - WORLD MARKETS, 1995-2010. He has guided CAHA's research in oleochemicals since 1980, and in detergents since 1987. Mr. Houston has extensive experience in projects for consumer products, has presented papers at CMRA, ECMRA and CSMA meetings, and is the editor of CAHA's global detergent newsletter, AGGLOMERATIONS, THE LAB MARKET REPORT and SURFACTANT DEVELOPMENTS NEWSLETTER. He is a member of CDMA, AOCS and ASTM.

Marilyn L. Bradshaw, Vice President,

authored sections of DETERGENT ALKYLATES - WORLD MARKETS, 2006-2016. She was the project leader for ALPHA-OLEFINS - WORLD MARKETS 2000-2010, INDUSTRIAL APPLICATIONS OF SURFACTANTS - NORTH AMERICAN FORECAST TO 2010 and POLYOLEFIN COMONOMERS - WORLD MARKETS, 1995-2005. Other multiclient studies she has directed include THE U.S. METALWORKING INDUSTRY AND SURFACTANT

CONSUMPTION, 1995-2005, and U.S. I&I CLEANING PRODUCTS - SURFACTANT SUPPLIERS AND CUSTOMERS. She is the editor of CAHA's monthly alpha-olefin newsletter and provides consultation to clients on alpha-olefins. Since joining CAHA in 1980, she has also been the project leader for numerous proprietary projects such as an analysis of the growth prospects for 22 U.S. surfactant ethoxylators. Ms. Bradshaw has a B.A. from Finch College and an economics and management certificate from Manhattanville College.

H. James Bigalow, Senior Research Associate,

authored several sections of DETERGENT ALKYLATES - WORLD MARKETS, 2006-2016. In addition he has contributed to numerous multiclient studies including HIGHER ALCOHOLS - FORECAST TO 2020 and ALPHA-OLEFINS - WORLD MARKETS, 2000-2010, INDUSTRIAL APPLICATIONS OF SURFACTANTS - NORTH AMERICAN FORECAST TO 2010, SURFACTANTS FOR EMERGING MARKETS IN ASIA/PACIFIC, 1995-2010 and SURFACTANTS FOR CONSUMER PRODUCTS - NORTH AMERICAN FORECAST TO 2008. Mr. Bigalow has also worked on proprietary detergent and surfactant studies. Mr. Bigalow has over 20 years experience as a senior marketing research executive in the chemical industry. He has conducted successful business analysis projects which have included financial evaluations of businesses and acquisition candidates, identifying current and future markets for new and existing products, and product development and usage. Additional experience has included economic and sales forecasting, strategic planning, proprietary market research projects, benchmarking, and product safety. He is a member of the Society of Competitive Intelligence Professionals (SCIP), ACS and the Chemical Marketing and Economics Division of the ACS. Mr. Bigalow holds an M.S. Industrial Administration, Krannert School of Management, Purdue University and a B.S. degree in Chemistry, Denison University.

John Rapko, Senior Research Associate

authored section of DETERGENT ALKYLATES - WORLD MARKETS, 2006-2016, contributes to the LAB Market Report, authored the Higher Alcohols Technology section of HIGHER ALCOHOLS - FORECAST TO 2020 and has also assisted on numerous proprietary reports. In Dr. Rapko's 32 years of professional experience he has directed the work of professional chemists and chemical engineers at all degree levels in the areas of process development, chemistry, engineering and assessment of a range of technologies related to areas such as the manufacture of detergent alkylate, detergent builders and dehydrogenation catalysts. He holds a Ph.D. and B.S. in Chemistry (ACS Certified) from St. Louis University.

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MARKET TRENDS

Rationalisation of n-paraffin capacity to keep supply tight for next two years

The global market for normal paraffin (n-paraffin) is realigning in a period of consolidation, according to a new study from Colin A. Houston & Associates, Inc. (CAHA), a US-based consulting firm.

n-Paraffins are produced and consumed in all main regions of the world, and most of the producers are either back-integrated, with captive kerosene, or forward-integrated into the production of linear alkylbenzene (LAB) or other derivatives. Leading players include Sasol and CEPISA in West Europe; ExxonMobil in the US; and Isu in Asia.

Consumption trends

n-Paraffins are the major feedstock for LAB, a surfactant intermediate used in the manufacture of detergents, which consumed over 76% of the world's n-paraffin production in 2008. Other important end-uses include oilfield chemicals, rolling oils, chlorinated paraffins and solvents. CAHA expects consumption of n-paraffins to grow at an average annual rate of 1.1%, from 3.1-mt in 2007 to 3.4-mt in 2017.

According to the new multi-client study, strong growth in East Europe and



the Middle East/Africa regions will balance out declining demand in mature regions. Global n-paraffin consumption is forecast to grow at an average of just 0.5% per year from 2007 to 2012, but CAHA expects growth to pick up to 1.7% per year from 2012 to 2017. Demand peaked in 2007 after a period of healthy growth from 2002. Usage in some applications has currently plateaued, but declined in others over the past two years.

Capacity rationalisation

Overcapacity has driven rationalisation in n-paraffin outlets and production. The closure of 220,000-tpa of n-paraffin capacity in West Europe by Sasol at the end of 2007 is expected to be followed by an even larger capacity

rationalisation in North America, as US-based ExxonMobil exits the n-paraffin business by the end of 2009.

n-Paraffins are primarily extracted from kerosene, but can also be produced from Fischer-Tropsch derived product streams at gas-to-liquids (GTL) plants. Shell's massive Pearl GTL project in Qatar, will include two 130,000-tpa n-paraffin units, one due on stream by 2011 and the second a year later. Earlier in this decade, a number of other GTL projects were under consideration, and several were expected to include n-paraffin production. But most of these GTL projects have been postponed or cancelled, and GTL paraffins are no longer expected to flood the market.

"Capacity for n-paraffin production isn't expected to recover from ExxonMobil's closure in 2009 until Shell opens its new GTL plant in Qatar," said Mr. Joel Houston, CAHA President. "As one of the world's largest producers and the only merchant supplier in North America exits the business, supply options will remain tight over the next two years, until the market can become balanced again," he added.

PROJECT UPDATE

LyondellBasell completes feasibility study for Kazakh petrochemical complex

LyondellBasell Industries in association with partners SAT & Co and KMGEP of Kazakhstan Petrochemical Industries Ltd (KPI) have successfully completed the feasibility study for a large greenfield project involving an integrated petrochemical complex and a gas separation unit in the Atyrau region of Kazakhstan.

The petrochemical complex will include a world-scale ethane cracker, a propane dehydrogenation unit, a polypropylene plant and two polyethylene production facilities using LyondellBasell's latest polyethylene and polypropylene process technologies. The three

world-scale plants are scheduled to begin operations in 2014. "I am truly impressed by the progress made by KPI on the project, in spite of recent difficulties facing the global petrochemicals industry," said Mr. Just Jansz, President of LyondellBasell's Technology Business.