



IHS Chemical Training & Education Training Prospectus

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IHS Chemical Training & Education

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Training Courses and Workshops

Maximizing the value of scarce resources is job number one in business. Never has there been so much change. It is imperative to train industry newcomers as well as keep seasoned professionals up-to-date on the impact of the latest industry issues and trends. IHS Chemical Training & Education programs are designed to unlock and maximize the potential of human resources working in the oil and gas, petrochemical, polymers and plastics, and specialty chemical businesses as well as those involved in supporting allied industries.

IHS is the leading information company providing comprehensive content, insight and expertise in key areas shaping today's global landscape. Business and governments around the world use our products, services and solutions to make faster and more confident decisions.

IHS Chemical leverages the combined expertise of seasoned industry consultants from the former CMAI, SRI Consulting (SRIC) and Purvin & Gertz companies. IHS Chemical Training & Education courses and workshops cover the whole value chain, from refined products to petrochemical building blocks through to polymers and plastic processing spanning technology, markets and economics. The courses and workshops are continually evolving, ensuring the hottest topics are covered and workshop attendees are fully informed of the key issues facing the industry.

The courses and workshops are available either at open public events or on-site company training. IHS Chemical Training & Education uses only experienced consultants to provide the teaching. Our highly knowledgeable industry experts provide context to the material through real-world industry examples. Workshops are typically given to a group of 20 – 30 people.

Courses and workshops are designed to be of interest and value to new and experienced professionals from the chemical, energy, refining and renewables industries, or those in adjacent industries such as agriculture, oil and gas, manufacturing, automotive and financial services. These courses will benefit anyone who is looking to deepen their knowledge and understanding across chemical and energy value chains or those looking to gain strategic viewpoints on end-markets, processes and trends.

We invite you to browse this training prospectus and consider enrolling in one or more of our training programs. For dates of the various public training sessions visit www.ihs.com/chem-edu. Please keep in mind that in addition to the courses and workshops described in this prospectus, we would be happy to design a course curriculum tailored to your specific interests.

We look forward to seeing you at one of courses or workshops! For additional information please contact me directly or one of our regional training coordinators.

Thank you for your interest and happy training!

Dr. Jeffrey S. Plotkin

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PETROCHEMICAL WORKSHOPS

Understanding the Global Petrochemical Industry

Master Petrochemical Industry Fundamentals... Make Better Business Decisions

This 3-day in-depth course provides basic information and insights into the Petrochemical Industry. The course covers industry fundamentals, changing feedstock slates, process technology, marketing dynamics, and profitability drivers.

In addition to covering the basics, the course will discuss how the volatile oil prices are impacting decisions around the world, from shale gas in North America, to coal in China, to ethane imports in Europe.

It is important to understand the basic industry drivers and how they affect your business, so you can make better, more informed business decisions.

CPE credits available. For more information, visit: ihs.com/chem-edu

Who is it for?

This three-day educational course is designed to be of interest and value to both technical and non-technical industry participants. Attendees represent a wide range of job functions and types of companies.

Job function: Business managers, Process engineers, Financial analysts/accountants, R&D chemists, Licensing managers, Strategic planners, Purchasing agents, Sales and marketing executives, HR and legal managers.

Company types: Petrochemical companies, Oil and gas companies, Plastics Fabricators and Converters, Compounders and formulators, Specialty and performance chemical companies, Biotech start-ups, Industrial gas companies, Technology licensing companies, Commercial and investment banks, Private equity and venture capital firms, Law firms.

“Jeff, great job making a difficult subject simple to understand and interesting!”

– Paul Kanters, Regional Sales Manager, Vopak

Workshop Contents

Course participants will come away from the course with a deep understanding of how the industry works. Information to be covered will include:

- “Industry fundamentals: the industry may be evolving, but the key fundamentals remain the same.”
- “The impact of shifting feedstock slates. Shale gas and oil, coal, and bio-based feeds are significantly expanding feedstock options around the world.”
- Industry jargon, acronyms, and abbreviations explained
- “Regional differences: the focus on maximizing regional

advantages is reshaping the structure of the global industry.”

- “The benefits of refinery and petrochemical integration. Participants will learn how existing and new entrants are leveraging this advantage.”
- Value chains and their seven basic building blocks
- Petrochemical process technology and the expanding feedstock options that are driving changes in technology
- Industry economics, including cost of production methodologies, price-setting mechanisms, and profitability drivers
- Market dynamics, such as regional capacity and demand breakdowns, trade balances, logistics, and end-use profiles and applications

“Course is informative and useful, Jeff is a great speaker and can keep things fluid and interesting.”
– Emilio Planas Rego, Marketing Analyst, Braskem

2016 Course Schedule

Houston Feb. 23-25

London April 5-7

New York April 12-14

Jubail May 16-18

Houston June 21-23

Singapore July 12-14

Shanghai Aug. 10-12

New York Sept. 13-15

London Sept. 20-22

Houston Oct. 18-20

Frankfurt Nov. 8-10

Beijing Dec. 6-8

Course Contents - Day 1

Day 1 Morning Session

9:00 am Introduction to Petrochemicals

“This is the most exciting time to be in the industry as there is so much change. And with change comes opportunity - if we have a good understanding of the industry dynamics driving this change” – Dr. Jeff

Regional Overview – “A Trip Around the World”

- **North America** – Shale gas reinvigorating the industry, but will low oil prices put the brakes on this?
- **Western Europe** – Good food, good wine, good beer, but no cheap feedstocks!
- **Russia** – lots of oil and gas but lacking infrastructure
- **Middle East** – A region in transition - going downstream to create jobs, but coping with higher feedstock costs
- **Asia** – China the engine of growth, but slowing - Using coal to invent and re-invent the future
- **South America** – Industry is reorganizing – Brazil leading the way in “green” chemicals

Understanding Petrochemical Feedstocks

- **Natural gas** – including an extensive discussion of shale gas. Learn about the concept of “stranded” gas and how this has created pockets of regional advantage in the olefins business
- **Natural gas liquids (NGLs)** – ethane, propane, butanes, condensates – each with their own uses and price drivers – learn how all of this impacts the petrochemical industry
- **Oil** – naphtha, middle distillates, heavy oil – extensive discussion about how refining intersects with petrochemicals and the benefits of refinery/ petrochemical integration
- **Coal** – learn how China is leveraging cheap coal using old historical processes but also innovating new approaches as well
- **Renewables** – will bio-based routes to “petrochemicals” make an impact? Come find out about the opportunities and challenges

10:30 am Coffee Break

10:50 am Introduction to the Olefins Business

Introducing ethylene, propylene, and the C4 olefins (butadiene, n-butenes, isobutylene) – chemical structures, physical form, sources, logistic issues, trade balances, key players, and value chains

Ethylene – The Largest of the Building Blocks

- **Steam Cracking** – a detailed look at the “heart and soul” of the petrochemical industry. Learn how Carbon Petroleum Dubbs put the “steam into steam cracking”
- **Methanol to Olefins (MTO)** – Finally commercial! Is this a game-changer? Will MTO grow outside of China?
- **“Green” Ethylene from Bioethanol** – A great example of Dr. Jeff’s theory of “Reverse Process Economics”

12:30 pm Lunch

Day 1 Afternoon Session

1:30 pm Propylene – The Second Largest Building Block, but the Fastest Growing Olefin

- **Unlike ethylene, three grades:** polymer grade, chemical grade, and refinery grade
- **Steam cracker co-product** – the largest source, but shale gas causing a reduction – learn why
- **Propylene from FCC units** – refineries coming to the rescue
- **On-purpose propylene** – Mind the gap! – Propane dehydrogenation (PDH), olefin metathesis, enhanced FCC, olefin cracking, methanol to propylene (MTP), and “green” propylene

The C4 Olefins – Butadiene, Butene-1, Butene-2, and Isobutylene

- **C4 disposition** – recycle co-crack or separate for chemical use
- **Separating the C4’s** – not straightforward, must use our “bag of tricks” – learn how and understand what raffinate-1 and raffinate-2 are all about
- **Butadiene** – steam cracker by-product, but once again shale gas is hurting this source. Will on-purpose butadiene technology proliferate?
- **n-Butenes (butene-1/butene-2) and isobutylene** – from both steam crackers and FCC units -competing with gasoline use

3:00 pm Coffee Break

3:20 pm Olefin Economics

Cost of production methodology – learn how costs are built-up in the petrochemical industry

- Capex versus opex
- Utility costs
- Cash costs
- Cash margins
- Variable or incremental costs
- Fixed costs – labor, maintenance, etc.
- Selling, general & administrative costs
- Raw material costs
- By-product credits
- ROI

Ethylene Economics – a case study comparing the costs of an ethane cracker versus a naphtha cracker. Regional costs are compared over the 20 years. Understand the huge Saudi advantage stemming from \$0.75/MM Btu gas. The concept of cost curves is introduced and a global cost curve for ethylene production is presented and discussed.

Propylene and Butadiene Economics – Both propylene and butadiene are for the most part by-products. This feature complicates the methodologies used to assign costs to these two important olefins. Various approaches will be discussed and illustrated.

Overview of the Olefin Markets – To close out Day 1, an overview of the markets and value chains of the ethylene, propylene, and C4 olefins will be presented. Detailed discussion of the individual olefin derivatives will be presented later in the course.

Course Contents - Day 2

Day 2 Morning Session

9:00 am **Introducing Benzene, Toluene and the Xylenes – Taking the Complexity out of Aromatics Complexes**

Chemical structures, physical form, logistic issues, trade balances, key players, and value chains.

Simplifying aromatics complexes – separations techniques, and rebalancing supply/demand via isomerization and interconversions

Benzene – The Largest of the Aromatics

- Learn how benzene limits in gasoline around the world are impacting benzene supply
- Understand how cheap shale gas negatively impacts benzene supply
- Coal-based benzene becoming more and more important in China
- Secondary sources – hydrodealkylation (HDA) and toluene disproportionation (TDP) fill in supply gaps

Toluene – Learn about the Magic of Toluene Transformations – Fooling Mother Nature!

Xylenes – para-Xylene Rules!

- Highlighting the role of refineries in the aromatics business
- How will huge Chinese investments in aromatics change global trade?
- Understand how the industry rebalances mixed xylenes distribution to match market demand

10:30 am **Coffee Break**

10:50 am **Petrochemical Value Chains – Understanding How the Industry Adds Value by Satisfying Market Demands**

For the remainder of the course, the derivatives of each of the seven building blocks will be discussed one by one. These discussions will include: historical origins, key players, trade, process technologies, and end-use applications. In many cases, end-use application discussions will be reinforced by many “colorful and interesting” graphics and “show and tell” demonstrations.

Exploring the Ethylene Value Chain – Dominated by Four Very Commoditized Businesses

- **Polyethylene – LDPE, LLDPE, HDPE** – Learn what polymers are and what the difference is between the three types of polyethylene. Tupperware and Hula Hoops start a new industry! “Green” polyethylene – what is it? What does “green” mean? Is it here to stay?
- **PVC and the Vinyls Chain** – Chlor/Alkali, EDC, VCM, PVC. Environmental, health & safety issues are always a consideration in this value chain. How can PVC be both rigid and flexible?
- **Ethylene Oxide (EO) and Monoethylene Glycol (MEG)** – Key to the polyester business, anti-freeze and a range of specialty uses. Learn why the Middle East players dominate trade in MEG?
- **Styrene** – Key monomer for polystyrene, ABS, SBR and UPR – this discussion will be held off until the discussion of the benzene value chain on Day 3.

12:30 pm **Lunch**

Day 2 Afternoon Session

1:30 pm **Exploring the Propylene Value Chain – Bringing Good Things to Life**

- **Polypropylene** – The most versatile and fastest growing of the polyolefins. Who invented PP? The most disputed story of invention in the entire industry!
- **Cumene/Phenol/Acetone** – “Tyranny of the Two for One Process”
- **Bisphenol A (BPA)** – Toxicity issues weighing on this industry segment.
- **Polycarbonate** – Strong, tough, glass-like clear – a wonderful plastic
- **Epoxy resins** – Super-tough thermoset

3:00 pm **Coffee Break**

- **Phenol Formaldehyde (PF Resins)** - The original thermoset molding resin
- **Methyl Methacrylate (MMA)/PMMA** – The other glass like plastic, competing with polycarbonate
- **Propylene Oxide (PO)** – Understanding the alphabet soup of process routes to PO: CHPO, PO/MTBE, PO/SM and more recently HPPO. Impacts the polyurethane business.
- **Oxo- Alcohols** – n-Butanol and 2-Ethylhexanol. Biotech and regulatory issues impacting business
- **Acrylic Acid** – Key monomer for Super Adsorbent Polymers (SAPs). Diaper demo not to be missed! Also impacts the coatings business – water based paint and UV- cured coatings
- **Acrylonitrile** - By-product hydrogen cyanide a barrier to entry. Acrylic fiber – synthetic wool and world’s second synthetic fiber. Also polyacrylonitrile is precursor to carbon fibers



Industry Presenter/ Subject Matter Expert

Dr. Jeffrey S. Plotkin
Vice President

Course Contents - Day 3

Day 3 Morning Session

9:00 am Exploring the C4 Olefins Value Chains – Key to the Synthetic Rubber Industry

- **Natural Rubber** - Fascinating tale of discovery, but importantly led to the development of the synthetic rubber industry
- **Polybutadiene Rubber (PBR) /Styrene Butadiene Rubber (SBR)** – Key to the development of synthetic tires. WW II spurs innovation.
- **Butyl Rubber (IIR)** – How we keep the air in tires
- **EPDM** - automotive hoses, gaskets, sealants, roofing, membranes
- **Butene -1** - Comonomer for LLDPE and HDPE
- **Butene-2** – Monomer for making methyl ether ketone (MEK)
- **Isobutene** – Butyl rubber, MMA, and MTBE production
- **MTBE** – The sad story of the demise of MTBE in the US
- **Maleic Anhydride (MAN)** – Exception to the rule. No need for a double bond, made direct from n-butane

10:30 am Coffee Break

10:50 am Exploring the Aromatics Value Chain

- **Styrene** – An interconnected story – conventional technology versus POSM technology
- **Polystyrene** – GPPS/HIPS/EPS – What are they and their different end-use applications
- **ABS** – High impact plastic. Key to Lego products
- **Nylon 6,6 and Nylon 6** - First well understood polymers and led to the development of the synthetic fiber industry
- **Cyclohexane/Adipic Acid** – Nylon 6,6 precursors
- **Caprolactam** – Nylon 6 precursor

12:30 pm Lunch

The three-day course has been developed and is presented by Dr. Jeffrey S. Plotkin. Dr. Plotkin is an internationally recognized gifted educator on the subjects of the technology and business of petrochemicals. He is particularly adept at breaking down at the complex petrochemical industry into simple and easy-to-understand terms. With a highly engaging speaking style, Dr. Plotkin has the unique ability to transform what could be a dry training course into a fast-paced, enjoyable three-day course.

Dr. Plotkin has over thirty years experience in the petrochemical industry working for both operating companies and consulting firms. Before joining IHS to head up the training and education, Dr. Plotkin was Vice

Day 3 Afternoon Session

1:30 pm Exploring the Aromatics Value Chain (continued)

- **Polyurethanes** – Very high value business
- **MDI/TDI** – The two large volume isocyanates for polyurethane production. Phosgene provides a barrier to entry
- **PTA/DMT** – Key monomers for polyester
- **Polyester (PET)** – The fastest growing polymer in the world. Fiber, film and bottle end-uses

300 pm Coffee Break

3:20 pm Exploring the C1 Value Chain – Cheap Shale Gas and Coal is Stimulating Interest

- **Synthesis gas (Syngas)** – what is it, how we make it and what we do with it
- **Ammonia** – The world's largest volume chemical
- **Methanol** – Who says you can't teach an old dog new tricks! - Increasing fuel uses and MTO
- **Acetic Acid/Acetic Anhydride** – Totally built up from C1 chemistry
- **VAM/PVAc/PVOH/PVB** – An extensive value chain into very specialized end-use applications

Wrap-up and Conclusion of Course

President of Nexant/Chem System's training programs. Dr. Plotkin is co-author of a recently published textbook, "Industrial Organic Chemicals, third edition" (Wiley Interscience, 2012) and contributing editor of the American Chemical Society's "Patent Watch" on www.chemistry.org. Dr. Plotkin is the holder of thirty US patents and is the author of over twenty-five publications in peer-reviewed journals. Dr. Plotkin has a PhD in organometallic chemistry from the University of Pennsylvania and an MBA from PACE University. He also was a post- doctoral research fellow at The Ohio State University.

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Petrochemical Industry Fundamentals

Workshop Overview

This full-day interactive workshop reviews the key feedstocks of the petrochemical industry right from crude oil through to naphtha to ethylene to polymers. Topics include chemistry, supply, demand and pricing. Value chains covered are aromatics, olefins, polyolefins, vinyls, and syngas with their chemistry and market fundamentals.

Who is it for?

Anyone new to the industry who wants an overview of the key elements of the petrochemical industry, from new graduates to business analysts to lawyers to professionals throughout the petrochemical value chain from feedstock suppliers to downstream processors and converters.

Workshop Contents

Introduction and Feedstocks

- Defining Hydrocarbons
- Defining Processes
- Oil
- Natural Gas
- Alternate Chemical Feedstocks
- Electricity
- Salt (NaCl)

Value Chains

- Aromatics (BTX)
- Olefins (Ethylene, Propylene, C4s)
- Chlor Alkali/Vinyls (Chlorine, Caustic, PVC)
- Syngas (Methanol, Ammonia)

Markets

- North America
- South America
- West Europe
- Central Europe & CIS
- The Middle East & Africa
- Northeast Asia
- Southeast Asia
- Indian Subcontinent

Industry Presenters / Subject Matter Experts



John Page

Vice President & Global Consulting Lead

Starting his career in the mid-80's as a chemical engineer for Imperial Chemical Industries (ICI), John joined IHS (formerly CMAI) in 2001 as the Director of Fibers & Fiber Intermediates. His role was to focus on CMAI's European Market Report for Aromatics and the Global Fibers & Feedstocks Market Report. In 2005 John transferred to single client consulting, where he was responsible for developing and executing single client studies within the European region. Today John is Vice President leading the global consulting team in IHS Chemical.



Chris Geisler

Vice President, North & South America

Chris joined IHS (formerly CMAI) in 1999 as Project Manager in the Business Advisory Services Group primarily responsible for proprietary studies. Chris' project focus is varied with expertise in olefins, aromatics and their derivatives. Chris has spent time in Asia involved in various technical and market due diligence projects. He has also been involved in due diligence projects in Europe and has acted as an Independent Engineer for a urea/ammonia facility in the Middle East. Chris has performed feasibility studies for multiple olefin & aromatics projects in the Middle East.



Sanjay Sharma

Vice President, Middle East & India

Sanjay has over 21 years of experience in the industry with extensive consulting, project management, commercial and manufacturing experience. He has actively participated in developing strategic direction, improving business performance, developing and managing joint ventures and alliances and engaging in mergers and acquisitions. Sanjay has managed assignments in Europe, Middle East, India and Asia covering wide range of products within Petrochemical, Chemical and Specialty sectors.

“John Page was brilliant, they were answering questions ensuring that you understand everything” – Technical Sales

“Great foundations for new people in the industry. Very nice, well designed slide deck with up-to-date graphs” - Bond Analyst

“Good overview of the industry. Appropriate and not digging into too much detail with a clear overall look at the industry and value chains” – Customer Service Adviser on Styrene

“The instructors are very willing to answer questions and use simply and easy understandable explanations for non-chemical background people to understand petrochemicals” – Director Business Development

Petrochemical Trading Workshop

Workshop Overview

This new full-day interactive workshop provides participants with a broad overview of how petrochemical products are commercially transacted / traded and taught through usage of multiple case examples.

The dynamics of the global petrochemical industry are changing rapidly and in profound ways. There is more volatility in the markets and many industry participants are adjusting towards J.I.T. sales and purchase agreements in this new paradigm. A good understanding of the petrochemical markets and how the various elements of feedstock, basic petrochemicals and derivatives interact and affect each other is essential for industry participants. This course puts all these in perspective and highlights contract structures and the commercial risk elements involved.

Participants will leave the workshop armed with the knowledge and insights to make good decisions and effectively equipped with the skills to mitigate their future commercial risk exposure to protect industry and/or trading margins.

Who is it for?

Course is designed to be of interest and value to technical, manufacturing, sales & marketing and trading industry participants. Attendees represent a wide range of job functions and types of companies.

Job Function: Business managers, technical and plant personnel, financial analysts, strategic planners, traders, purchasing agents, sales and marketing personnel, supply executives and legal managers.

Company Types: Petrochemical companies, oil and gas companies, plastic fabricators and converters, compounders and formulators, specialty and performance chemical companies, technology licensing firms, investment banks, private equity and venture capital firms, law firms, ship owners and brokers.

Workshop Contents

Primer

- Case study: *Tender time!*

Evolution of Trading Hubs – Oil & Petrochemical Trading

- A historical look back
- Differences between Oil and Petrochemical Trading
- When to trade and when to sell?

Trading Optimization along the Value Chain

- Case study: *I smell a trading opportunity!*

Trading for Netback Maximization

- Case study: Who should we sell the spot cargo to?

Profile of industry participants

Hedging Strategies in Trading

Trading Risks

- Market – Case study:
 - Sell at fixed or at formula prices?
- Counterparty
- Credit
- Operations - Case study:
 - Your vessel is going to miss the laycan!
- Regulatory
- Political
- Risk mitigation concepts

Industry Presenter / Subject Matter Expert



Larry Tan

Managing Director,
Chemicals Consulting
(Asia) IHS Chemical

Larry Tan has over 31
years' experience in
oil & petrochemicals

industries. His work spans refining operations, planning, oil & petrochemical supply chain, sales & marketing, commercial, commodity trading & general management. Larry worked for ExxonMobil in Singapore and US, and in European oil and petrochemical trading firms, trading fuels, aromatics and olefins within Asia markets. He is also an adjunct lecturer with Singapore Management University's International Trading Institute.

The Thermoplastics Industry – Understanding Feedstocks, Building Blocks and Polymers

Workshop Overview

This full-day interactive workshop offers a high level overview of the thermoplastics' markets, covering the historic development of the polymers as well as their chemistry, production processes, end uses, costs, trade patterns and renewables.

Who is it for?

Those new to the plastics industry, throughout the value chain from producers to converters, as well as those wishing to expand their knowledge of the petrochemical industry, perhaps building on an earlier attendance of the Petrochemical Industry Fundamentals workshop.

Workshop Contents

Introduction & Feedstocks

- Definitions
- Oil
- Natural Gas
- Alternate Chemical Feedstocks

Polymers

- Polyethylene
- Polypropylene
- PVC
- Polystyrene
- EPS, PET, ABS
- Polycarbonate
- Nylon and PBT, overview of engineering plastics

Inter-material Competition

Recycling

Fabrication Processes

- Extrusion
- Molding

Industry Presenters / Subject Matter Experts



Nick Vafiadis

Senior Director

Nick is a twenty-five year veteran of the chemical industry and joined IHS (formerly CMAI) in 2002.

Nick was responsible for

consulting duties for the Chlor-Alkali and Vinyls product chain. In 2007, Nick was named CMAI's Business Director for Polyolefins, and Service Leader for the Global Plastics and Polymers Report. In 2012, Nick was promoted to Senior Director, Polyolefins and Plastics and took responsibility for IHS's global plastics and contributed to single client projects and studies relating to the polyolefins industry.



Rina Quijada, Ph. D.

Senior Director

Latin America

Rina Quijada was the CEO of IntelliChem, Inc., which was acquired in June, 2013 by IHS. As

CEO, Rina was a market consultant to the petrochemical industry, specializing in Latin American markets. She also worked for CMAI and PDVSA's petrochemical subsidiary, Pequiven. Dr. Quijada has a PhD in Economics, a Master's degree in International Management from the Thunderbird School of Global Management; attended the Oxford Graduate Program, and earned a B.S. in Organic Chemistry.



Joel Morales

Director, Polyolefins North America

Joel Morales joined IHS in 2013 as Director of Polyolefins. Prior to IHS, he managed resin

procurement for Silgan Plastics. Joel began his career at Solvay Polymers, which later became Ineos, in technical services supporting Mexico and Latin America before moving to sales. After 5 years at Solvay Polymers, Joel moved into resin distribution sales as a Product Manager, managing and selling polyethylene and polypropylene resins. He graduated from The Massachusetts Institute of Technology with a Bachelors of Science in Chemical Engineering and a minor in psychology.

“Very good and interesting presentation, close to the market, good examples” – Operational Purchases Director

“Broad coverage with right level of details in the presentation and a book to take with you with all information inside: ideal!” – Procurement

“You have struck a good balance between market situation and theory” – Sales Manager

“Workshop helped me to understand thermoplastic products with supply/demand and costs dynamics. Very complete and competent” – Trader

Understanding Petrochemicals made from Biomass

Workshop Overview

In most regions of the world today biomass is already being converted into standard chemicals and fuels. The past five years have seen amazing growth in this industry's development with new technology providing cost-competitive processes to manufacture solvents, chemical intermediates and plastics made from biomass. IHS forecasts that within the next 10-12 years a further \$45 billion of new investment in this industry worldwide with feedstock moving to non- food-based biomass and the exploitation of municipal solid waste. This provides investors and chemical producers the opportunity to solve some of the most critical supply challenges for products like butadiene and isoprene and at the same time add value to low cost biomass.

In this full-day IHS interactive workshop you will learn about the existing biomass based chemical business, how it is developing across the commodity and specialty chemical industries, and how these standard chemical products can be made from biomass. Importantly you will learn about what it needs to be successful in this business from feedstock procurement through to the end-use customer.

Who is it for?

Financial community/investors and chemical industry participants operating throughout the chemical value chain from petrochemical feedstock suppliers, through production and conversion as well as biotechnology developers and agricultural feedstock suppliers.

Industry Presenter / Subject Matter Expert



Mark Morgan

Managing Director

Mark brings over 16 years of experience in Consulting across many sectors covering chemicals, energy and renewables. He joined IHS in 2011 as a Global Director and today works as a Global Managing Director for Renewables responsible for all Business Advisory (single client) engagements in the sector as well as multiclient programs under development. Prior to joining IHS Mark developed an extensive capability in the renewables sector focused on chemicals and biofuels. Part of this time was spent on secondment to Novozymes A/S, the world-leading enzymes producer as Bio-business Development Director and Advisor. Mark has a strong track record in commercial and technical due diligence in the sector, project feasibility studies, technology evaluation and strategic planning.

“Very interesting open conversation that covered most of the unknown areas to us regarding renewable energy” – Business Development Engineer

“Right level of technology and Dr Morgan seemed to be very well prepared” – Research and Development

“Dr Morgan has showed many different aspects of the complex theme” – Sales Manager

Fundamentals of Renewables

Workshop Overview

The term “Renewables” covers three main sectors, energy, fuels and chemicals, three core business where IHS has a global leading position in terms of up to date business information and insight supported by a world class consulting organization. Around the world, investment in Renewable Energy continues apace with major developments in China, India, etc, outstripping developments in the West. Wind, solar, geothermal (where practical), small scale hydroelectric, biomass co-firing etc, whilst small overall, are becoming an important component of the energy supply mix for many countries. At the same time, given that these sources are generally intermittent, there is increased focus on technology solutions for cost-effective energy storage both large and small scale.

Biofuels, too are becoming an increasing proportion of the transportation fuels mix, mainly in developed economies, driven by legislation to reduce greenhouse gas emissions and support energy security needs. The industry today is established on a feedstock platform exploiting starch-based sources, sugars and certain natural oils that compete directly or indirectly with the food chain. The industry is moving to alternative feedstocks based on cellulose, industrial and municipal waste whilst developing performance blending components to serve gasoline, diesel and even jet fuel markets.

Renewable or “**Bio-based**” chemicals in the form of biobased plastics, biodegradable materials, green solvents, intermediates, etc, are now commercial serving all manner of industries, e.g. food packaging, beverages through to appliances, construction and even automotive sectors. Technology also continues to evolve in this industry improving product performance and exploiting new feedstocks. In this full-day IHS interactive workshop you will learn about the exciting world of renewable and how this is developing across the energy, transportation fuel and chemical industries. You will learn about markets, technology solutions, industry challenges and importantly you will learn about what it needs to be successful in these businesses from feedstock procurement through technology development through to the end-use customer.

Who is it for?

Financial community/investors and energy/chemical industry participants operating throughout the energy, fuels and chemicals value chain from feedstock suppliers, through production and conversion as well as bio-based and conventional technology developers and agricultural feedstock suppliers.

Industry Presenter / Subject Matter Expert



Mark Morgan

Managing Director

Mark brings over 16 years of experience in Consulting across many sectors covering chemicals, energy and renewables. He joined IHS in 2011 as a Global Director and today works as a Global Managing Director for Renewables responsible for all Business Advisory (single client) engagements in the sector as well as multiclient programs under development. Prior to joining IHS Mark developed an extensive capability in the renewables sector focused on chemicals and biofuels. Part of this time was spent on secondment to Novozymes A/S, the world-leading enzymes producer as Bio-business Development Director and Advisor. Mark has a strong track record in commercial and technical due diligence in the sector, project feasibility studies, technology evaluation and strategic planning.

**“Very well prepared discussion” -
Business Development Engineer**

Workshop Contents

Introduction

• Workshop Aims and Objectives

• The Renewables Industry

- Industry size and composition • Energy Overview
- Transportation Fuels
- Chemicals
- Historical development of the industry
- Industry drivers, sustainability factors and globalization
- The concept of biomass-derived building blocks
- Key success factors

• Feedstocks Review for energy and Chemicals

- Major characteristics of agricultural feedstocks
- Price and availability
- Characteristics of cellulosic feedstocks and availability
- Characteristics of natural oils destined for chemical use
- Biomass feedstock economics – the farming perspective
- Feedstocks of the future

Renewable Energy

• Developments in Wind, Solar and Alternatives

- Review of industry issues
- Review of current and emerging markets
- Review of technology developments
- Comparative production economics
- Strategies for success
- Energy Storage
- Review of the market opportunity
- Approaches to energy storage
- Efficiency and cost effectiveness – what needs to change?
- Comparative economics
- Strategies for success

Renewable Transportation Fuels – “Biofuels”

• Market Overview

- Industry drivers and legislation review
- Gasoline developments
- Diesel developments
- Jet fuel developments
- The role of exploiting municipal waste

• The Gasoline Opportunity

- Specification needs
- Technology solutions – current and emerging
- Biomass-derived oxygenates and hydrocarbons
- Comparative production economics
- Strategies for success

• The Diesel and Jet Fuel Opportunity

- Specification needs
- Technology solutions – current and emerging
- Comparative production economics
- Strategies for success

Renewable or Bio-based Chemicals

• The Concept of Platform Chemicals

- Development history
- Relationship with conventional petrochemical building blocks
- Review of conventional approaches to chemicals production
- Biomass and the casualties of shale gas development

• Olefins and Derivatives

- Ethylene
- Propylene
- Butadiene, butylenes and isoprene

• Aromatics and Derivatives

- Benzene and toluene
- Xylenes and para-xylene

• Intermediates and Novel Building Blocks

- Specialties
- New materials and applications

Summary

• Revisit Workshop Aims and Objectives

- Industry developments review to date
- What it takes to be successful

“The structure was effective and great material was handed out” – Business Development Engineer

Introduction to Monetizing Shale Gas, Natural Gas and Coal in Petrochemicals

Workshop Overview

This interactive workshop will discuss the technology and markets of the burgeoning Shale, Natural Gas and Coal via Syn Gas to chemicals sector. Topics include a review of the main hydrocarbon fractions from Natural Gas and typical main uses for those hydrocarbon fractions as well as the sources and technology of Syn Gas production such as coal. The workshop will cover starting from Natural Gas and Syn Gas the production of olefins, methanol, methanol to olefins, ammonia, fertilizers and PVC.

Who is it for?

The financial community and chemical industry participants throughout the value chain from feedstock supplier, through production to conversion, who are interested in understanding this rapidly developing sector of the petrochemical industry.

Workshop Contents

Introduction

- Shale Gas
- Natural Gas
- Valuation and use of the different NGL components
- Coal

Methane

- Introduction to Syngas
- Syngas to Methanol
- Methanol to Olefins
- Syngas to Ammonia
- Ammonia to Fertilisers: Urea and Ammonium Nitrate

Ethane

- Steam Cracking
- The Vinyls Chain

Propane

- Steam Cracking
- Domestic Fuel
- Trade

Butanes

- Differences between the isomers
- Major End Uses of Butanes

Summary

- Valuation of Typical Gas Composition
- Wrap Up

Industry Presenters / Subject Matter Experts



Mark Wegenka

Managing Director

Mark has over 30 years experience in the chemical area, primarily in olefins and agricultural products.

The majority of his experience has centered on strategic financial planning with a solid background in corporate finance, strategic decision analysis, business cash flow modeling, price/volume forecasting, statistical risk analysis, Mergers and Acquisition (M&A) analysis, new product development and capital planning & authorizations. Today, working as a Director, Mark is responsible for single client studies, dealing primarily with nitrogen fertilizers, such as ammonia, urea, ammonium nitrate and ammonium sulfate, as well as with olefins such as ethylene, propylene, butadiene and linear alpha olefins.



Sean Stevenson

Managing Director

Bringing 24 years of experience in the petrochemicals Sean works as a Director in IHS Chemical's

single client consultancy business. Prior to joining IHS (CMAI) in 2010, Sean worked for Nexant, responsible for selling and executing single and multi-client consulting services where he led market and feasibility studies, major company strategy engagements, numerous lenders' independent engineer assignments and multiclient studies. He has also prepared and delivered keynote papers at major petrochemicals conferences. Prior to working in chemicals consultancy, Sean worked for almost 20 years for BP's Chemicals division in roles covering process design, operations management, HSE, logistics and business development.

Supply/Demand and Price Forecasting

Workshop Overview

This interactive workshop outlines the fundamentals of how demand growth and supply of commodity chemicals can be forecast. The principles of forecasting price based on cost of production and margin are also included.

Who is it for?

Business development and business intelligence professionals in the chemicals industry who want to gain an insight into the methodologies employed in forecasting demand for commodity products and an appreciation of how costs and margin over the petrochemical cycle affect product pricing in commodity markets.

Workshop Contents

Supply and Demand

- Demand Growth-Relationship to GDP
- The Operating Rate Concept
- Capacity Growth
- The Investment Cycle and Cyclicity • Trade
- Sources of Data

Price Forecasting

- Fundamentals of Price Forecasting-Margin and Cost
- Short/Medium Long Term Price Forecasts
- Production Cost Analysis
- Cost Curves
- Margin Analysis
- Inter-Regional Pricing and Arbitrage

Industry Presenters / Subject Matter Experts



John Page

Vice President &
Global Consulting Lead

Starting his career in the mid-80's as a chemical engineer for Imperial Chemical Industries

(ICI), John joined IHS (formerly CMAI) in 2001 as the Director of Fibers & Fiber Intermediates. His role was to focus on CMAI's European Market Report for Aromatics and the Global Fibers & Feedstocks Market Report. In 2005 John transferred to single client consulting, where he was responsible for developing and executing single client studies within the European region. Today John is Vice President leading the global consulting team in IHS Chemical.



Sean Stevenson Managing Director

Bringing 24 years of experience in the petrochemicals Sean works as a Director in IHS Chemical's

single client consultancy business. Prior to joining IHS (CMAI) in 2010, Sean worked for Nexant, responsible for selling and executing single and multi-client consulting services where he led market and feasibility studies, major company strategy engagements, numerous lenders' independent engineer assignments and multiclient studies. He has also prepared and delivered keynote papers at major petrochemicals conferences. Prior to working in chemicals consultancy, Sean worked for almost 20 years for BP's Chemicals division in roles covering process design, operations management, HSE, logistics and business development.

**“The workshop was very informative and well presented.
Thank you!” – Senior Analyst**

Commercial Impact of Olefins and Polyolefins Technologies Workshop

Cost Competitiveness, Market Dynamics and Trade

Workshop Overview

This new, full day workshop will examine the commercial impact of olefins and polyolefins technologies on cost competitiveness, market dynamics and trade. The workshop will begin with a thorough assessment of the global light olefins (ethylene and propylene) business including process technologies, impact of shale gas, key players, demand drivers and regional strength and weaknesses. Following this discussion the polyethylene (LDPE/LLDPE/HDPE) and polypropylene businesses will be examined including advantages/disadvantages of polyolefin process technologies, demand drivers, key producers, and inter-regional trade. Capping off the workshop will be an analysis of the competitiveness of both olefins and polyolefins including a discussion of cost of production methodologies, definition of terms (variable costs, fixed costs, cash costs), and comparative regional economics. Finally, the economics will be put into context by presentation of global cost curves for both olefins and polyolefins.

Who is it for?

Those new to the polyolefins business, as well as experienced professionals, wishing to expand and update their knowledge and understanding of how the latest “hot topic” issues are driving change along the entire polyolefins value chain — from feedstocks through to the basic olefins and plastics. The workshop is designed to be of interest and value to both technical and commercially oriented participants.

Industry Presenters / Subject Matter Experts



Remko Koster
Director

Remko Koster was born in Groningen, the Netherlands in 1972. After finishing his master's degree

in Chemistry at the RUL University of Leiden, he obtained his PhD at the UvA University of Amsterdam in the Department of Chemical Engineering. In 2000, Remko joined DSM as research scientist for caprolactam, but soon moved on to become R&D project manager for the cracker co-products. In 2002, he joined SABIC as a result of the acquisition of DSM petrochemicals by SABIC. In the nine years Remko worked for SABIC, he has had many different responsibilities in the commercial and business intelligence departments, e.g. as European sales manager for butadiene & heavy aromatics, benzene & derivatives immediately prior to joining IHS in February 2011 as global polypropylene market intelligence manager. At IHS, Remko is responsible for polyolefins services in Europe and Africa.



Michael D. Smith
Vice President

Michael joined IHS (formerly CMAI) in 2006 as a Service Leader for Plastics & Polymers for Europe with a primary

focus on market advisory polyolefins services. Prior to joining CMAI in 2006, Michael was with LVM NV, a member of the Tessenderlo Group, located in Tessenderlo, Belgium, where he served as commercial director for the company's PVC business. Altogether, Michael has 32 years of experience in the chemicals industry having started his chemicals career at BASF in Ludwigshafen, Germany in 1980. For several of those years he served as BASF's cracker products business manager, giving him a deep understanding of polymer feedstocks. Today Michael is Director - Chlor-Alkali & PVC, EMEA and is the Global Service Leader for the IHS Chemical Global Vinyls Report market advisory service.



Roger Green
Vice President,
Europe, CIS & Africa

Roger Green is a Vice President with IHS Chemical, based in London, and leads the

European consulting business. Roger has over thirty years' experience in the industry and seventeen years in management consulting from IHS, CMAI, Chem Systems, IBM and Nexant. Roger has led client engagements for a range of regional and international industry corporations as well as financial institutions. He managed a Polyolefins multiclient program and has deep technical and market analysis skills within the polymer and petrochemicals arena, specializing in technology and market developments. Roger is an honors graduate in Chemical Engineering from the University of Nottingham in the UK.

Introduction to the Methanol Business

Workshop Overview

This is a new, full day workshop. The methanol industry is undergoing a significant market shift with the U.S. industry making a comeback owing to the availability of cheap shale gas and the proliferation of methanol to olefin technology in China and potentially coming to the U.S. with BASF's recent announcement of developing a methanol to propylene project. In addition, methanol is increasingly being used more and more in a variety of fuel applications which is also contributing to significant market change. The Methanol Learning Workshop will offer a broad understanding of all major aspects of the global methanol market. The course will include production capacities, key market players, technologies and feedstocks, supply-demand, trade patterns, market demand by derivative, price-setting mechanism, historical and forecast prices and possible future market developments. Developments in traditional methanol derivatives such as formaldehyde and acetyls will be covered as well as new, potentially very large volume applications such as MTO, DME and direct gasoline blending.

Who is it for?

The Methanol Learning Workshop is designed to be of interest to those new to the methanol business as well as experienced personnel wishing to refresh and update their understanding of the current methanol business climate as well as future market developments.

Industry Presenters / Subject Matter Experts



Mike Nash

Global Director

Mike Nash's current role in IHS Chemical is Global Business Director for Syngas Chemicals, which currently includes

the methanol and Acetyls practices. A global team of regional consultants, based in China, the US and Europe, provide input and Mike ultimately overlays this with a global perspective. Key responsibilities include the weekly World Methanol Report and monthly World Methanol Analysis, as well as the weekly and monthly Global Acetyls Market Report and the related World Analyses for Methanol, Acetyls and Formaldehyde. Before joining IHS Chemical in September 2012, Mike worked for BP's petrochemicals division for 19 years before a two-year stint in Total's UK fuels business. He performed a variety of commercial roles within BP, in international business management, marketing, project management and Logistics, based in London, Duesseldorf and Kuala Lumpur. His last role in Total UK was Logistics Director, Specialities. Mike has a MA in English Language and Literature, Edinburgh University, UK, 1990 and an MBA from Kingston University, UK, 2001.



Marc Alvarado

Associate Director

Marc Alvarado is Associate Director of Methanol - Americas managing research, and consulting in

the Americas. He joined CMAI, now IHS Chemical in 2005 as a research associate in the aromatics group. Shortly after, he took on consulting for North America Acetone Market Advisory Service. He assumed full responsibility for the phenol chain within the Aromatics Market Advisory Service to cover cumene, phenol, acetone and bisphenol A. In 2010, he became a member of the Methanol Market Advisory Service and then assumed full consulting duties for the methanol group in the Americas, while maintaining his role in the Acetone Market Advisory Service. Laughlin contributes to proprietary studies for methanol, acetone and MMA; and also supports cumene, phenol and bisphenol A research and analysis efforts. Marc co-authored a paper for the Methanol Institute entitled, "Methanol to Olefins: A Potential Game Changer for Methanol" and received his bachelor's degree in chemistry from University of Houston.



Xiaomeng Ma

Associate Director, IHS Chemical

Xiaomeng Ma is principal analyst at IHS Chemical, where she covers the Asian

methanol and derivatives market. She has been with IHS Chemical and the legacy company since 2007. Xiaomeng has about 10 years of experience in petrochemical and fine chemical industry in terms of market analysis, business modeling, operations and consulting. Before moving to methanol and its derivatives studies, Xiaomeng's research covered specialty chemicals by means of surfactants, processing additives and intermedia. Xiaomeng Ma received her master's degree in food science and engineering from Wageningen University in the Netherlands.

Commercial Impacts of Soda Ash Technologies

Market Dynamics, Energy, Cost Competitiveness, and Trade

Workshop Overview

This IHS interactive workshop will provide a broad understanding of soda ash technologies and their commercial impact on the global soda ash industry. The course will include reviews of technologies, product quality, sources of competitive advantage, and discussion of global and regional technological trends and discontinuities that are impacting trade and profitability. A particular focus will be the recent fluctuations in crude oil prices and their impact on energy costs in the various processes. The course will have four main sections:

- Industry Overview, to set the commercial scene
- Process Technologies, covering Solvay, Hou, and natural
- Competitiveness, at the cash cost level
- Techno Commercial Interactions, especially as revealed in trade patterns

Who is it for?

Those new to the polyolefins business, as well as experienced professionals, wishing to expand and update their knowledge and understanding of how the latest “hot topic” issues are driving change along the entire polyolefins value chain — from feedstocks through to the basic olefins and plastics. The workshop is designed to be of interest and value to both technical and commercially oriented participants.

Industry Presenters / Subject Matter Experts



Andrew Swanson

Managing Director

Andrew is a Director in IHS Chemical's single client consultancy business with a geographic focus on the Americas and Asia. In his current role, he carries out strategy,

feasibility, technology selection, and market studies for clients in the inorganic (including soda ash) and petrochemical industries. Before becoming a consultant in 1992, Andrew was with Nalco Chemical and the ICI Group. For the latter, he was General Manager of the business which became Penrice Soda Holdings Limited, Osborne, South Australia, a recently closed manufacturer of soda ash and sodium bicarbonate (Solvay process).



Marguerite Morrin

Senior Director

Marguerite is the lead consultant for IHS Chemical in soda ash and has presented many conference papers on the subject. She launched IHS Chemical's Global Soda Ash Service in

2008. Since 1994 she was involved in the chlor-alkali product area and helped to build and develop this sector within CMAI and more recently IHS. Marguerite has covered all chlor-alkali, vinyls and related products in her career with a primary focus initially on the European/Middle East and African regions and more recently globally for soda ash. She has also participated in many single client consulting studies in chlor-alkali/vinyls and soda ash. Marguerite joined CMAI in 1990 as an analyst in olefins.

Engineering Resins: From Feedstocks to the Marketplace

Workshop Overview

The Engineering Resins workshop is the best way to get acquainted with the most relevant concepts for the Nylon, ABS, Polycarbonate, POM, and PBT market sectors. The curriculum will examine how the global market and production dynamics of these engineering polymers are connected to the petrochemical industry as well as major end-use applications from a raw material, supply/demand and investment point of view.

Who is it for?

Those involved with producers or converters of engineering resins, as well as those wishing to expand their knowledge of the petrochemical industry, perhaps building on an earlier attendance of the Petrochemical Industry Fundamentals workshop.

Industry Presenters / Subject Matter Experts



Paul Blanchard

Senior Director

Paul brings with him over 30 years of experience in the plastics business. He joined IHS (formerly CMAI) in 2007 as a Senior Consultant focused on expanding CMAI's engineering plastics practice area

and the launch of the Global Engineering Resins Report market advisory service and today is Director Engineering Plastics. Prior to joining CMAI, Paul's earlier positions include: Product Manager, Compounds at Albis Plastics, Product Marketing Manager at LNP Engineering Plastics, Inc. Paul began his career with GE in Finance where he held multiple positions, the last of which was Manager Finance, Composite Polymers Operation.



Brendan Dooley

Director

Brendan Dooley is Director of Engineering Resins based in Houston, TX, USA. He joined IHS Chemical in 2015 and has 30 years of plastics industry experience, most recently as Director of Sales for

North America for a globally integrated nylon producer and previously held commercial positions with integrated, global producers of thermoplastics in The Netherlands, the United Kingdom, Mexico and the US including global responsibilities in the automotive market. Brendan holds degrees in Polymer Engineering and a Master's Degree in Business Administration from Case Western Reserve University in the United States.

“Engineering Resins Workshop was excellent! Presenter was very knowledgeable and dynamic. I would recommend this to my colleagues” – Business Development Manager

Fundamentals of the Specialty Chemical Industry

Workshop Overview

This is a new, half-day workshop. With the ongoing transformation of the chemical industry into commodity and specialty oriented enterprises, it is imperative to have a good understanding of key industry fundamentals of the specialty chemical industry. This workshop reviews these fundamentals, starting with the definition and differences of specialties versus commodities and fine chemicals, and how specialty chemicals impact our daily lives. Other topics to be covered include key market players, market segmentation by functionality, application areas and regions, necessity of having a strong service component, and key factors to be successful in the specialty chemicals business. Especially important for industry newcomers is that our instructors will clarify the technical jargon commonly used in the specialty-chemical industry.

As illustration of the above scope topics, various specialty chemical sectors with their markets and players will be presented. Demand drivers in the different regions will be compared and their outlook discussed.

Who is it for?

Anyone who wants an overview of the key elements and profitability drivers of the specialty chemical industry, including industry newcomers and experienced workers needing a refresher or update should take this course. The course is designed to be of interest to both technical and non-technical people including business analysts, purchasing agents, sales & marketing personnel, researchers, process engineers, bankers and finance professionals, HR staff, as well as downstream processors.

Industry Presenters / Subject Matter Experts



Stefan Schlag, Ph.D.

Senior Director,
Inorganic Chemicals, Minerals,
Mining Chemicals, IHS Chemical

Stefan has more than 20 years of experience in the chemical industry.

Before joining IHS, formerly SRI

Consulting, in 2001, he held positions in R&D and production in the chemical industry. Dr. Schlag's university degrees include a diploma degree in chemistry from University of Freiburg, Germany and a Doctor of Phil. II, Natural Sciences from the University of Basel, Switzerland.



Marifaieth Hackett

Director, Specialty Chemicals

Marifaieth Hackett has more than 25 years of experience in the global chemicals industry. As a Director at IHS Chemical, she plays a key role in the company's renewables and specialty chemicals practices.

She is the author of Chemical Building Blocks from Renewables, IHS Chemical's comprehensive report on renewably sourced chemicals. Before joining IHS, Marifaieth worked as a consultant and analyst at Strategic Business Insights, a technology consulting firm. Prior to that, she held business and technical positions at Membrane Technology and Research, ChemConnect, SRI Consulting (a precursor of IHS Chemical) and Amoco Chemical. Marifaieth has a Bachelor of Arts in chemistry from Bradley University, a Ph.D. in organic chemistry from Harvard University, and an M.B.A. from the University of Chicago.

Understanding NGL Feedstock Economics

**Industry Presenter /
Subject Matter Expert**

Workshop Overview

This half-day interactive workshop provides a numerical approach to understanding the value of natural gas liquids with respect to competing fuels, gas processing recovery economics, refining and use as a petrochemical feedstock. Utilizing Purvin & Gertz methodologies, each class member will be given problems to solve and gain hands-on experience in calculating the value of NGLs for various fuel, refining and feedstock applications.

Who is it for?

The workshop is designed for those wishing to understand how natural gas liquids are valued by the refining, natural gas and petrochemical industries. Typical participants range from business analysts, business development managers and commercial managers to traders, risk managers and lawyers.

Workshop Contents

Basic Definitions and Jargon

Natural Gas Processing Plant NGL Recovery Economics

Competing Fuel Values

Refining Values

- LPG in Refineries
- Gasoline Blending Values
- Value as a Refinery Feedstock (Alkylation and Isomerization)

Petrochemical Values

- Feedstock Value in Propane Dehydrogenation
- Use of LPG as an Olefins Feedstock
- Value of LPG as an Olefins Feedstock



Walt Hart

Vice President

Dr. Walt Hart, P.E., is a Vice President in the Houston office of Purvin & Gertz, an IHS company.

Walt has managed

proprietary studies involving business analysis and strategy, market studies, forecasting, valuations, and legal support on projects around the world. He works primarily in the area of natural gas liquids, but also has experience in alternative fuels, light naphtha and chemicals. He has also authored portions of Purvin & Gertz's worldwide multi-client studies, taught workshops, given seminars, and conducted training workshops. Prior to joining Purvin & Gertz in 2006, Walt spent 16 years at Union Carbide Corporation, The Dow Chemical Company and Owens Corning Fiberglass. He has held positions in process engineering, technical sales, research & development, finance, and strategic planning. He has also taught at the undergraduate level.

“Workshop was very good. All was very informative and pertinent to my business” – Marketing Manager, Gas & Power

“The most effective part was to know the relationship among the different feedstocks that exist” – Manager, Engineering & Technology

Fundamentals of LPG Markets Workshop

**Industry Presenter /
Subject Matter Expert**

Workshop Overview

This full-day workshop provides a thorough overview of the important commercial aspects of the global LPG industry. The workshop covers supply, demand, trade and pricing, including drivers. The competition with other fuels and feedstocks within the various end use markets are explored. The impact of logistics such as transportation and storage are related to the location of regional trading hubs and arbitrage. The trends in the regional markets are explained.

Who is it for?

The workshop is designed for anyone requiring a thorough overview of the global markets and infrastructure for liquid petroleum gases. Workshop attendees have diverse backgrounds, but typical participants include business development managers for midstream companies, natural gas liquids traders and shippers, high-level managers assuming commercial responsibility for natural gas liquids, project managers for NGL infrastructure projects, business analysts for petrochemical, petroleum and natural gas companies, and new professionals entering the NGL industry.

Workshop Contents

LPG Terminology and Properties

Production and Supply Drivers

Demand Drivers and End Use Markets

Competing Fuels and Feedstocks

Transportation, Shipping and Storage

Regional Pricing, Trading Hubs and Specifications Hedging and Liquidity

Price Drivers

Global Trade and Arbitrage

LPG Markets – Countries and Trends

- Residential/ Commercial
- Autogas
- Petrochemicals

Regional Market Trends

Qualitative Overview of LPG Fuel and Feedstock Economics



Walt Hart

Vice President

Dr. Walt Hart, P.E., is a Vice President in the Houston office of Purvin & Gertz, an IHS company.

Walt has managed proprietary studies involving business analysis and strategy, market studies, forecasting, valuations, and legal support on projects around the world. He works primarily in the area of natural gas liquids, but also has experience in alternative fuels, light naphtha and chemicals. He has also authored portions of Purvin & Gertz's worldwide multi-client studies, taught workshops, given seminars, and conducted training workshops. Prior to joining Purvin & Gertz in 2006, Walt spent 16 years at Union Carbide Corporation, The Dow Chemical Company and Owens Corning Fiberglass. He has held positions in process engineering, technical sales, research & development, finance, and strategic planning. He has also taught at the undergraduate level.

**“Up-to-date statistics and analysis of LPG – very impressive” –
Business Development Manager**

**“Excellent workshop – a simple explanation of complex issues” –
CEO, Oil & Energy Division**

Fundamentals of Refining Economics

**Industry Presenter /
Subject Matter Expert**

Workshop Overview

This two-day workshop is designed to teach the fundamentals of refining economics to non-refiners or to those newly introduced to refining. Attendees gain valuable industry insight to successfully:

- Understand how refineries' profit depends on location, configuration, and crude feedstock
- Evaluate the economic strength of competing refinery installations
- Understand what governs the success or failure of new refinery ventures
- Find out how refinery configurations affect petroleum product prices worldwide
- Improve your perceptiveness of the value of refinery investments
- Learn how to interpret published information on the refining industry and refining companies
- Understand how obvious technology differences affect refinery strength
- Discover how refineries can be modified to become more profitable
- Learn why refineries prefer different types of crude oils
- Find out how trends in petroleum demand force refineries to invest in upgrading capacity

Who is it for?

The workshop should be useful to financing or marketing individuals who have some involvement with refining or petroleum products. The workshop may be helpful to refinery engineers who would like to understand how world markets affect their refineries and why other types of refineries exist. Technical or marketing background is not necessary to benefit from the workshop. Some typical attendees have included business analysts, bankers, crude oil marketers, government / regulators, project developers, insurers, logistics managers and managers in industries impacted by refined products.

Workshop Contents

Introduction to Refining

Crude and Products Pricing

Refinery Margin Calculations

Nature of Crude Oils

Refined Products Quality and Specifications Refining Technology

Refining Complexity

Simple and Complex Refineries

Refining Yields

Operating Costs

Refined Products Supply / Demand

Market Setting Configuration

Light / Heavy Differential

Refined Products Trade and Transport

Value of Refining Assets

Global Petroleum Market Outlook



Mark Chevalier

Director

Mark Chevalier is a Director in the Houston office of Purvin & Gertz, an IHS company. His experience includes

U. S. and international market studies, competitive benchmarking studies, and crude oil valuation. He also currently manages the company's refinery capacity database and administers several Gulf of Mexico crude oil quality banks. Prior to joining Purvin & Gertz in late 2007, Mark had experience in various treasury-related functions at a commercial bank and in process engineering and planning/economics at Flint Hills Resources.

Naphtha and Condensates Workshop

Workshop Overview

Naphthas, condensates and liquefied petroleum gases are at the interface between oil and natural gas. This one-day workshop is designed to give attendees an understanding of the fundamentals of condensate and naphtha markets, and how they interact with the markets for natural gas, oil and petrochemicals. The workshop will cover supply, demand and trade. The workshop will distinguish among the different grades of naphthas and condensates, and it will explain why different sources produce the different grades. There will be a discussion on pricing and on how the differences in the qualities of naphthas and condensates influence their market values, and why different grades are preferred for the various end use markets. We will also cover midstream infrastructure and logistics, and their influence on arbitrage and interregional price differentials. There will be a discussion of industry trends.

Who is it for?

The workshop is designed for individuals who need to understand the naphtha and condensate markets and the competition among the various end uses such as for petrochemical feedstock. The workshop will be invaluable for new managers with commercial hydrocarbon responsibilities, the financial community, business planners, commercial traders or marketers, technical employees, and finance and accounting personnel.

Workshop Contents

Definitions and Properties

Sources of Condensates and Naphtha

- Field Condensates
- Plant Condensates
- Refinery Naphthas

Demand and End Uses

Infrastructure and Logistics

Quality and Specifications

Pricing and Regional Differentials

Trade and Arbitrage

Competing Petrochemical Feedstocks

Regional Markets and Trends

Industry Presenters / Subject Matter Experts



Thomas J. Manning Senior Director

Thomas J. Manning is a Senior Director of IHS. He has a BS degree in Chemical Engineering from Louisiana Tech

University and a MBA degree from the University of Houston. He has over 50 years experience in the oil and gas and petrochemical industries. As a consultant, he has directed a number of single client, as well as multiclient studies on supply, demand, pricing and marketing of petrochemicals, refined products, crude oil and natural gas. He is responsible for directing many of the company's long range studies which investigate future trends in the industry including the annual World LPG Market Outlook.



Ravi Narayanaswamy Senior Director

Mr. Ravi Narayanaswamy is a Senior Director in the IHS Singapore office.

Ravi joined Purvin & Gertz in 2005, and currently serves as the Research Leader for IHS Asia / Middle East crude oil, refined products and natural gas liquids markets. Ravi provides technical, commercial and strategic advice to a wide range of clients. Prior to joining Purvin & Gertz, Ravi held numerous positions at ExxonMobil's Singapore complex in refining, supply and petrochemicals. Prior to his employment at ExxonMobil, Ravi held various positions at Hindustan Petroleum Corporation Limited including field, process control, and shift supervisory roles.

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