

IHS CHEMICAL

# China Coal Chemical Industry Analysis

Special Report Prospectus



IHS Chemical Prospectus

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## Introduction

Coal chemicals have not only ushered in a new era of chemical supply in China, but are also profoundly impacting the global petroleum-based and natural gas-based chemical industries. Non-traditional chemical producers who have coal resources are looking to forward-integrate into higher-value-added chemical businesses. Similarly, traditional chemical producers are eager to understand the impact of coal chemicals on local markets in Asia as well as in international markets via changes in various China trade balances.

However, the recent decline in crude oil pricing creates a less favorable industry dynamic for unconventional chemical producers in China. Coal-to-Olefins (CTO) remains profitable, but its margin has been severely reduced as international polyolefin prices have declined with the decline in crude oil/naphtha pricing. Returns on new CTO investments will be challenging if low crude oil pricing persists. The investment economics in China for Methanol-to-Olefins (MTO) and propane dehydrogenation (PDH) are unfavorable under current spreads between methanol, LPG and olefins. This study will examine the the outlook for the China coal chemical industry based on energy scenarios where crude oil prices trend well below \$100/bbl.

In May 2013, IHS Chemical published a comprehensive China Coal Chemical Industry Analysis report. Since that report was published, there have been many new developments and significant progress in the China coal chemical industry .

By end of 2014, eight CTO and four merchant methanol MTO plants are in commercial production, with total ethylene-plus-propylene capacity of 6.1 million metric tons. Another nine projects with total capacity of 5.4 million metric tons are currently under construction and many additional projects are under evaluation or in the detailed planning stage. In addition to CTO, a number of Coal-based-Monoethyleneglycol (CTMEG) projects were also developed. Currently, eight CTMEG plants are in commercial production, with total capacity of 1.35 million metric tons. An additional twelve projects with total capacity of 2.3 million metric tons are under construction.

Finally, in addition to the developments in MTO, CTO, Coal-to-Propylene (CTP), and CTMEG, China has made advances on the development of coal or methanol-to-aromatics (CTA or MTA) since the original report was published. Building upon the previous study, IHS Chemical will update the report with the latest information and analysis for MTO, CTO, CTP and CTMEG. In this update, IHS Chemical will also include a high-level analysis on CTA/MTA as well as the latest policy developments on coal chemicals with respect to environmental issues.

## Key Questions the Study Addresses

- **What is the driver for China's coal chemical development?** The study addresses the rationale behind the current coal chemical rush. It discusses the strategic drivers for the government's development of the coal chemical sector, and the main incentives for companies to invest in coal-based chemicals
- **What new technology developments have affected the China coal chemical industry?** CTM, CTO, and MTO are mature in China coal chemical industry. Additionally, MTA is believed to be one of the most promising ways to transfer coal to high value-added chemical in the future. The study provides an analysis on MTA technology, economics and its economic competitiveness with conventional naphtha reformer based process.
- **What is the government policy on coal chemicals?** Coal chemicals are a key sector that the Chinese government wants to develop. Nonetheless, policies are often unclear and difficult to interpret. In some cases and from time to time, the policies may even be inconsistent from the central government to local governments. This study provides a systematic and unbiased interpretation of recent government policies and adds discussion of how the Thirteenth Five-Year plan influences the coal chemical industry.
- **Are coal chemicals competitive?** The key question regarding the viability of coal chemicals is their economic competitiveness versus traditional petroleum-based chemical processes. This study will analyze the cost-competitiveness of the major coal chemical value chains at several key coal chemical locations based on actual cost inputs collected by the study team. Additionally, the study also provides competitiveness between coal-based and Naphtha-based chemicals.
- **What are the hurdles and limits for coal chemicals?** China released stricter regulations to reduce smog in cities and promoted carbon trade in several pilot cities. The study provides in-depth research on water supply issues, transportation issues, waste disposal issues, and carbon emission issues.
- **What is the current status and long-term outlook for coal chemicals?** Currently, many incomplete reports on China's coal chemical industry development are on the market. Unfortunately, almost all of these reports provide only fragmented and second-hand information on China coal chemicals. Our study team conducts site visits and interviews to identify the actual progress of ongoing and planned coal chemical projects. We provide our first-hand unbiased view on the status for those plants under operation, as well as the probability that announced (but not under construction) projects will actually be built.

## Scope of Work

### China Coal 2013 Study

The 2013 report covers the following value chains:

- Coal-to-Methanol (CTM) Chain Analysis
- Coal-to-Olefins (CTO) Analysis
- Coal-based PVC Chain Analysis
- Coal-to-MEG (CTMEG) Chain Analysis
- Coal-to-Ethanol (CTE) Chain Analysis
- Coal demand into chemicals and synthetic fuels

For each value chain, the study provides:

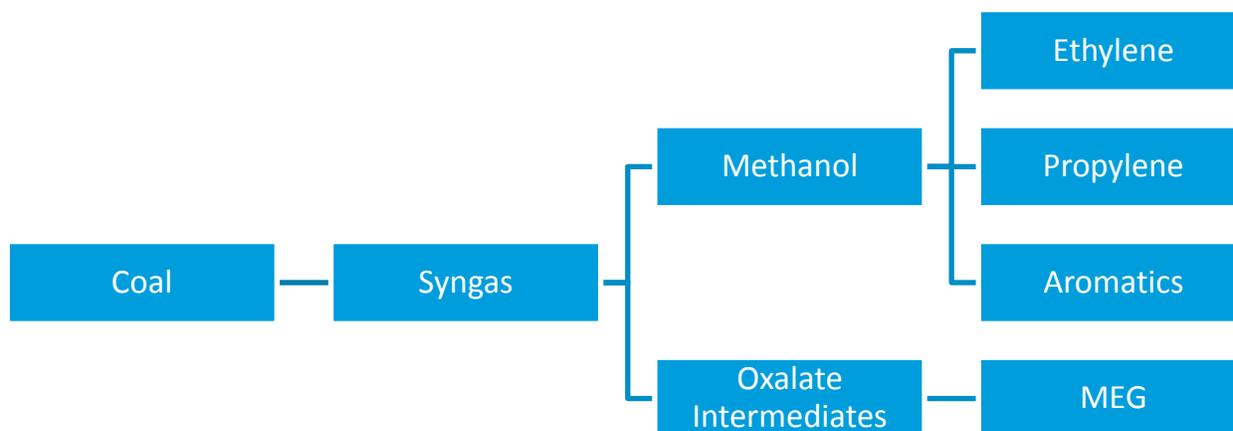
- **Market outlook:** The study includes annual market outlooks to 2030 for each chemical and its derivatives where applicable. The market analysis will address the market potential for coal chemicals.
- **Technology:** The study includes a technology analysis on the currently available technologies that are either already being implemented or planned for implementation in China. The comparison of different technologies will also be provided.
- **Economics:** The study provides economic snapshots for the years 2012 and 2016 under several different integration scenarios for three locations in China (East China, Northwest China, Inner Mongolia). It also compares coal-based economics with competing naphtha-based technologies where applicable
- **Producers and project review:** This study provides a full list of all the coal-based producers as well as projects currently in construction and planned. The study team conducts site visits and interviews to identify the actual progress of ongoing and planned coal chemical projects. IHS Chemical provides an unbiased view on the status for those plants under operation, as well as the probability that announced (but not under construction) projects will actually be built. The project list is provided in Excel format with detailed project status and project probability.

In addition, the study provides a China Economy Review and China Coal Market Overview, both of which will impact China coal chemical supply and demand.

The detailed content for the 2013 study can be found in the Table of Contents.

## China Coal Update

The update to the 2013 study will focus on the following chemical value chains: methanol, ethylene, propylene, MEG, and aromatics.



For each value chain, the study provides:

- **Economics:** The study will update the economic analysis for merchant MTO, CTO, and CTMEG. The study will add an analysis on CTA/MTA economics and its economic competitiveness with conventional naphtha reformer-based process. The update also provides an economic competitive analysis with conventional processes under different crude oil price scenarios.
- **Producers and Project Review:** The study will update the project list, including Coal-to-Methanol (CTM), MTO, CTO and CTMEG projects. We will also add CTA and MTA projects to the project list. Our study team will again conduct site visits and interviews to identify the actual progress of ongoing and planned coal chemical projects and provide our unbiased view on the status for those plants under operation, as well as the probability that announced (but not under construction) projects will actually be built. A project list will be provided in Excel format with a detailed project status and project probability assessed by IHS Chemical.

For Coal-to-Aromatics (CTA), the study will additionally analyze:

- **Technology:** The study includes a technology analysis on the currently available technologies either already being implemented or to be implemented in China for Coal-to-Methanol-to-Aromatics (CTM, CTA, MTA). A technology comparison will also be provided.

In addition, the study will interpret recent changes in government regulations on coal chemicals, and the implications for the coal chemical industry. The report will also analyze water availability issues for the short-term and the long-term, carbon taxes, and other environmental issues.

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## Deliverables

The deliverables for the existing China Coal to Chemical Analysis report published in 2013 include the book in electronic form and project assessment in Excel.

The deliverable for China Coal to Chemical Analysis update will consist of one optional interactive workshop/webinar, a PowerPoint presentation, and project assessment file in Excel.

## Study Team

The study team primarily consists of the team that performed the 2013 China Chemical Industry Analysis. In addition to the core chemical team based in China, IHS Chemical will draw expertise from IHS China Energy team and IHS Economics and Country Risk team to contribute to various aspects of the study.



### **Paul Pang – Vice President IHS Chemical China**

Paul leads IHS Chemical in China with over 25 years of experience in the petrochemical industry in various areas, including technology, operation, process engineering, business planning and consultancy.

Prior to this role, Paul served as Managing Director of CMAI China, and Director of Aromatics – Asia in CMAI's Singapore office. He joined CMAI in April of 2003. Before joining CMAI, he worked in various job functions and locations with ExxonMobil Chemicals. While he was with ExxonMobil Chemicals, he spent most of his time in Singapore and Houston, TX working in operation, technology, and business planning. Before moving to overseas, Paul worked for SINOPEC as a Research and Technical Support Engineer in Beijing, China, spending the bulk of his time in aromatic technology development.

Paul graduated from South China University of Technology with a Bachelor of Chemical Engineering degree in 1988. He received his Master degree in Chemical Engineering at National University of Singapore in 1995. He also received his Master of Business Administration from University of Houston in 2001.



### **Bingli Wang – Director, Polyolefins**

Bingli Wang has acquired more than 30 years of experience in the petrochemical industry. He joined CMAI as Director Polyolefin China in April 2006 one year after Hansol began a strategic cooperation with CMAI. Now he is responsible for Polyolefin market (weekly and monthly) reports in China market. He also was instrumental in previous special projects such as China Coal Industry Analysis in 2012 and China PDH in 2014.

Prior to joining CMAI, He was managing director of Hansol Information Consulting (Shanghai) Co., Ltd. In October 2003, Bingli established Hansol Plastics Consulting Company with his partners and introduced Polyolefin and PVC market reports (weekly and monthly). He created and developed Hansol's database and market analysis model for forecasting the market trend and its turning points. Besides the periodical reports, he was in charge of making market investigation and analysis of MEG, PTA, ABS and aromatics projects put forward by his clients.



### William Chen – Senior Analyst, Olefins

William Chen has around 10 years of experience in the chemical industry in a technical, commercial or analytical role. William covers the Olefins (ethylene, propylene and butadiene) and Elastomers Market Advisory Services for IHS Chemical. His primary focus has been in the areas of olefins and derivatives, including the analysis of the ethylene, propylene, butadiene and synthetic rubber markets for clients. William has a good knowledge of commodity product behaviors, and a strong capability to identify key drivers (such as macroeconomic indicators, industrial/consumer activities, domestic prices, etc.) so that their effects on production, demand and trade flows are quantified in a model per each product and sector.

Prior to joining IHS, William worked for Chemchina/Bluestar as an engineer, technical manager and sales manager. Chen received his bachelor's and master's degrees in Polymer Chemistry and Physics from Beijing University of Chemical Technology, and earned Ph.D. from Chinese Academy of Sciences.



### Xiaomeng Ma – Principal Analyst, Methanol

Xiaomeng Ma is principal analyst at IHS Chemical, where she covers the Asian methanol and derivatives market. She has worked for IHS Chemical since 2007. She has about ten years of experience in the petrochemical and fine chemicals industry in terms of market analysis, business modeling, operations, and consulting. Before covering methanol and its derivatives, Xiaomeng's research focused on specialty chemicals, especially surfactants, processing additives and intermediates.

Xiaomeng Ma received her master's degree in food science and engineering from Wageningen University in the Netherlands.



### Will Xu – Senior Analyst, Polyolefins

Will Xu joined IHS Chemical Shanghai in 2011 as a Senior Analyst. Currently, he provided the much-needed support to Polyolefin group in China. Will made contribution to publish weekly/monthly China polyolefin market report and maintain IHS Chemical internal economic models such as plants' capacity, price forecasting, cost analysis, and supply/demand analysis. In 2012, Will played key role in China Coal Chemical Study. He made research on coal chemical projects through site visit and supported to analyse economic model and S/D balance.

He graduated from East China University of Science and Technology with Bachelor degree in Chemical Engineering in 2005. He worked for Norway Jotun Paint Co. in Shanghai as a Sales Engineer from July 2005 to July 2007. Will received his Master Degree in Financial Engineering from Polytechnic Institute of New York University in September 2010.

## About IHS Chemical

### Best-in-Class Brands

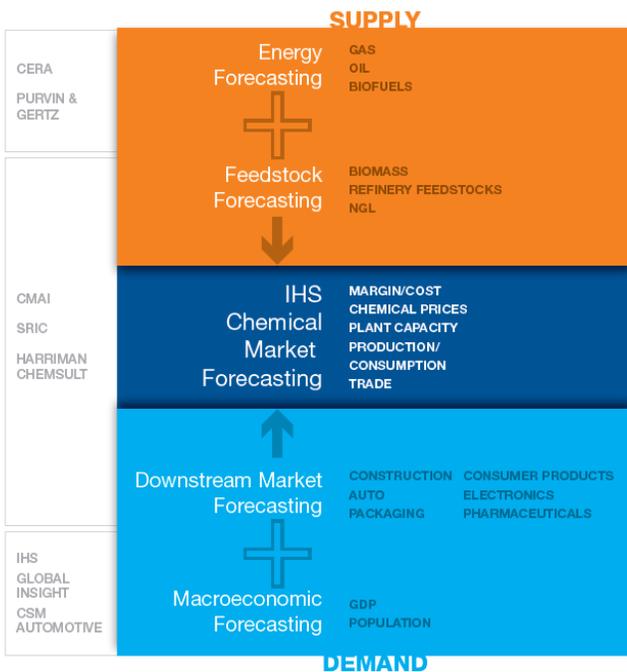
IHS Chemical now combines the former CMAI and SRI Consulting groups together with Chemical Week Magazine, Harriman Chemsult, IntelliChem and PCI Acrylonitrile into one integrated business unit comprising its multiclient and single client services. IHS Chemical's experts, analysts and researchers who are well respected throughout the industry for their deep-rooted analysis and forecasts, extends the value that IHS can now offer by connecting clients with the vast resource of insight and expertise that exists across IHS including energy, supply chain and economics.



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IHS Chemical provides the most comprehensive chemical market content and industry expertise in the world. The company has more than 200 dedicated chemical experts working together to create a consistent and integrated view across more than 300 industrial chemical markets and 2,000 chemical processes for 95 industries. Ensure that your decisions are based on broad, comprehensive information, forecasts, intelligence, and analysis.

IHS has assembled a team of chemical experts that offers an unprecedented coverage level for core chemical markets and technologies. Backing them is a larger IHS community of experts covering related markets, from energy and the macro economy to the world's largest chemical-using industries, such as automotive, construction and others. IHS Chemical's intellectual capital is built on an operating model that utilizes over 1,800 consultants, researchers and economists to advance cross-disciplinary collaboration and analysis.



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- Energy Technical: Exploration-Production, Geoscience, Engineering, Commercial Development
- Product Design: Engineering Design, Research and Development
- Supply Chain: Procurement, Logistics, Operations, Manufacturing
- Environmental Health, Safety & Sustainability: Sustainability, Regulatory, Environment Health and Safety

This interconnected information, expertise, and analytics across industries and workflows allows IHS to provide best-in-class solutions that power growth and value for our customers.

## Contact Information

To make an inquiry about this study, please reach out to the IHS Chemical Special Reports team at [ChemicalSpecialReports@ihs.com](mailto:ChemicalSpecialReports@ihs.com).

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North America Propylene Supply Study  
Chemical Building Blocks from Renewables  
Ammonia Value Chain  
Global Solvents: Opportunities for Greener Solvents  
Lubricants in Brazil