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Introduction

Will the next decade see a revolution for the use of methanol in fuels? Energy-type applications for methanol accounted for only 23% of global demand in 2006, but now represent 36% of the methanol market. Catalyzed by the introduction of clean fuel mandates in the major demand regions, there is almost unlimited potential for methanol demand into fuels applications. Fuels applications present a significant upside for methanol demand, but prospects for growth depend on technological developments and regional regulatory environments.

From 2006 to present day, total global demand for methanol has increased from 39 to 64 million metric tons. Much of this growth has been driven by the increase in demand for fuels applications, which now reaches over 23 million metric tons.

The major methanol end-uses in fuels applications include:

1) **Gasoline Blendstock**: In some countries, methanol is blended directly with gasoline. Methanol has attractive properties as a fuel blending component – it has a high octane value, combusts efficiently, emits fewer harmful by-products than gasoline, and is relatively low-cost.

2) **Bunker Fuel for Ships**: As the shipping industry is facing strict regulations, especially for sulfur oxide emissions in Emission Control Areas (ECA zones), there will undoubtedly be far-reaching changes in the mix of bunker fuels that shipping companies use. Using methanol directly as a ship fuel has a number of environmental benefits. This application is still in its infancy.
3) **Dimethyl Ether (DME):** DME can be used to blend into LPG, as a replacement for LPG fuel in heating and cooking applications, as a transportation fuel in modified diesel engines, and for power generation.

4) **Methyl Tert-Butyl Ether (MTBE):** MTBE is an oxygenate added to gasoline to increase its octane rating. Use of MTBE in a gasoline blend also allows for a cleaner combustion process, emitting less pollution.

5) **Biodiesel:** Biodiesel is the product obtained when vegetable oil or animal fat is chemically reacted with an alcohol—methanol, for example—to produce a compound known as a fatty acid alkyl ester. When methanol is used, the product is fatty acid methyl ester (FAME).

6) **Methanol-to-Gasoline (MTG):** Methanol-to-Gasoline (MTG) refers to the process of making gasoline via a methanol route. In some ways, MTG is a misnomer, because methanol is often an intermediate in the process, and units are back-integrated to coal or natural gas. Some MTG units in China may run on merchant methanol.

7) **Others:** Methanol can also be used as a fuel in power generation plants and in methanol fuel cells.
Study Objective

Looking forward to 2024, the global methanol market may exceed 110 million metric tons. How will the continued development of fuel applications for methanol affect this growth?

Today, three end uses account for approximately 87% of methanol demand into fuels applications: MTBE production, DME production, and direct blending into gasoline. Biodiesel and merchant consumption of methanol for MTG units in China make up the remaining 13% of demand.

Over the next 10 years, the use of methanol in fuels applications will continue to grow. Use of MTBE as a gasoline additive will be particularly attractive for urban areas looking to reduce smog from a growing number of commercial and private vehicles. While methanol has many favorable properties as a blendstock with gasoline, it may be challenged by other gasoline additives and regulatory measures. The consumption of DME as a fuel either via blending with or as a replacement for LPG is largest in China – will other regions implement DME production for consumption as a fuel on a large scale?

Smaller volume applications for methanol in fuels will also see change in the next decade. Biodiesel production will be supported by continued incentives in Europe and other regions. Large capacity additions are planned in China methanol-to-gasoline processes, some of which will consume merchant market methanol. The use of methanol as a ship fuel is in its infancy, and could represents a significant upside for methanol demand with new environmental regulations motivating shipping companies to find alternative fuels.
Many governments have initiated programs designed to incorporate methanol as part of their national energy matrix. China has arguably invested the most here; as of today, China consumes more methanol for fuels applications than all other countries combined.

Long-term, will the consumption of methanol for use in fuels continue to be dominated by Northeast Asia, or will other regions similarly shift towards consumption of methanol for energy purposes?

The purpose of this Special Report is to examine the status and forward expectation for fuel-related methanol demand segments and also to determine what this means for the global methanol industry. This Special Report provides a 10-year outlook, analyzing the key demand drivers for methanol use in the fuels applications detailed above. This study:

- Assesses the growth prospects for methanol demand
- Evaluates the technological and economic advantages and hurdles for methanol
- Discusses regional regulatory environments
- Provides global coverage, with a special emphasis on the China market

Please see the Table of Contents for a detailed description of report content.
Key Questions

• Which fuels applications offer the most significant growth prospects for methanol?
• How will regional regulatory environments influence the use of methanol as a fuel?
• In what geographies is large-scale use of methanol into fuels most likely to be adopted?
• How can methanol and fuels companies anticipate and take advantage of these market opportunities?
• What will the production, trade, and consumption of MTBE look like in each region over the next decade?
• How will the continued growth for gasoline demand in developing countries affect the market for MTBE?
• How will growth in biodiesel production affect methanol demand?
• What role will government mandates and incentives for biodiesel play in the next ten years?
• What effect will methanol-to-gasoline production have on the merchant methanol market in China?
• What is the most current status of other planned methanol-to-gasoline projects in North America and the rest of the world?
• How does the direct use of methanol to blend with gasoline compare with other alternative additives, such as ethanol?
• Will methanol blending in gasoline see large volumes of demand growth outside of China?
• What is the status of planned DME projects, and what are the prospects for DME as an alternative fuel over the next decade?
• Ship Fuel applications represent a new growth opportunity for methanol. What is the expected growth in demand in the next decade, and what upside potential might there be?
• Will other applications for methanol, such as the use in power plants and in fuel cells, grow to significant volumes in the next ten years?
Study Scope

This study is a deep-dive investigation of methanol use:

- As a direct blend in gasoline
- To produce fatty-acid methyl ether (FAME), a biodiesel material which can be either a drop-in replacement or a blendstock with conventional diesel
- To produce gasoline via the methanol to gasoline (MTG) process
- To produce MTBE, which is used as a gasoline additive
- To produce dimethyl ether (DME), used as a blendstock or replacement for LPGs
- For ship bunker fuel
- In other fuels applications (power plants and fuel cells)

This study investigates the technical requirements for using methanol and methanol derivatives in fuels applications and discusses the relevant regional regulatory environments. Also, this report discusses demand, competing products, and the outlook through 2024 for methanol use in each of these applications.

The study covers the years 2009-2024, inclusive.

Deliverables

In addition to the final report in narrative form (PDF), this report includes online access to study data files (Excel). Clients also receive access to IHS Chemical methanol experts, who can provide additional explanation about market fundamentals and trends discussed in the report.
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Appendix
Study Team

**Mike Nash – Global Director, Methanol and Syngas**

Mike manages methanol and acetyls insight for IHS Chemical, and contributes to a variety of acetyl and methanol-related weekly, monthly, and annual market reports. He joined IHS Chemical in August 2012, with over 21 years of experience in the chemical and commercial fuel industries. Mike has worked for companies such as BP Chemicals and Total UK in a variety of commercial management positions, including international business management, marketing, project management, and logistics.

Mike has a degree in English Language and Literature from the University of Edinburgh, UK, and an MBA from the University of Kingston, UK.

**Marc Laughlin – Director, Methanol and Acetone, Americas**

A frequent author and industry speaker, Marc is an expert on the costs, margins and supply and demand considerations for the methanol and acetone markets, and also covers short-term and long-term market drivers. He co-authored a paper for the Methanol Institute entitled, “Methanol to Olefins: A Potential Game Changer for Methanol.” Marc contributes to proprietary studies conducted by IHS Chemical on methanol, acetone and MMA. He joined IHS Chemical (formerly CMAI) in 2005, and has previously worked with the aromatics group covering the phenol chain. Prior to joining IHS Chemical, Marc was a lab chemist at an elastomers unit in Freeport, Texas.

Marc holds a Bachelor’s of Science in Chemistry from the University of Houston.

**John Bonarius – Consultant, Methanol and Derivatives**

John is a chemical industry consultant, specializing in the methanol and derivatives market. John previously spent 16 years with IHS Chemical (formerly CMAI) as a Senior Director of the European region, with extensive experience covering the aromatics and methanol markets. Prior to IHS Chemical, John worked as a Product Group Manager for Chemitrade and held trading and distribution positions with Brenntag and Petrochem. John began his career as a sales manager for BP Chemicals.

John holds a bachelor’s degree in Chemistry with Business Administration (Honors) from Kingston Polytechnic, United Kingdom.
Victoria Baghdjian – Principal Analyst, Methanol and Acetyls

Victoria’s current role in IHS Chemical is Principal Analyst for Methanol and Acetyls in Europe, the Middle East, Africa and the Indian Subcontinent. Her position follows over seven years’ experience in the commodities space, focusing on oil derivatives and the chemicals industry, namely methanol and MTBE. As the key resource within IHS for understanding and insight into the Europe and Middle East & ISC methanol and acetyls sector of the petrochemical industry, she works closely with the oil, gas and country risk departments, bringing support throughout the petrochemical chain.

Victoria holds an MA degree in Anglo-Saxon, Norse & Celtic and an MPhil in Old English Literature from Trinity College, University of Cambridge.

Olivier Maronneaud – Senior Research Analyst, Syngas Chemicals

Olivier currently works as the Research Analyst in the Syngas team covering methanol and acetyls derivatives. He is involved in a number of studies covering market dynamics, trade patterns and price evolutions using in-house models and analysis methodology. Olivier also supports regional Directors in their daily activities and actively contributes to the weekly and monthly market reports for methanol (WMR) and acetyls (GAMR). Prior to joining IHS, Olivier spent 2 years working at Arkema as a Junior Product Manager for Polyvinyl Chloride.

Olivier holds a degree in International Business from Grenoble School of Business, France.

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.
David Jiang – President of Sinodata Consulting, Alliance Partner of IHS

David Jiang is the President of Sinodata Consulting and the Alliance Partner of IHS in China. From 1994-2011, Mr. Jiang worked as the Chinese partner of Nexant Chem Systems, responsible for its energy, refining and chemical consulting business in China. In late 2011, Mr. Jiang became the Alliance Partner of IHS, supporting IHS Energy Insight and IHS Chemical businesses in China.

In the past two decades, Mr. Jiang managed numerous consulting engagements in China relating to the energy, refining and chemical industries, including policy and regulation analysis, market research, pricing mechanism analysis, techno-economic analysis, feasibility evaluation, competitiveness analysis, cost benchmarking, an strategy development. Mr. Jiang and his team provided consulting services to almost all major joint venture refining and petrochemical projects in China.
Qualifications

IHS Chemical publishes a wide range of multi-client products that provide chemical industry data insights, analytics, and solutions, including the World Analysis program, the Market Advisory Service, the Chemical Economics Handbook program, the Process Economics Program, and the Competitive Cost and Margin Analytics Program. In addition, the IHS Chemical Consulting team has conducted extensive single-client work in methanol markets, advising companies, governments, financial institutions, and technology providers operating at all point along the industry value chain.

Methanol World Analysis

IHS Chemical’s Methanol World Analysis is an annual study that covers historical trends and forecasts for methanol supply/demand fundamentals over a 16-year period (five-year history, base year, ten-year forecast). Clients receive detailed data on methanol and major derivatives in 10 geographic regions and for major countries within each region.

The Methanol World Analysis includes detailed plant capacities, comprehensive supply and demand data, trade grids, location maps, company ownership, and subsidiary capacity integration. This service provides clients with annual strategic planning information on methanol markets at both the regional and country level.

Global Methanol Market Advisory Service

IHS Chemical dedicates a team of industry-experienced researchers to the complex tasks of tracking, evaluating and forecasting change in the methanol industry. In the Global Methanol Market Advisory Service clients receive an integrated analysis of the entire methanol value chain, from upstream feedstocks to downstream derivatives.

Clients receive a balance of weekly market updates and monthly price forecasting, along with critical market analysis, for methanol and derivatives in the United States, Western Europe and Asia. The weekly market update provides near-term price discovery and market analysis for major methanol markets around the globe.

The monthly data supplement includes quarterly price forecasts, quarterly supply/demand balances and other supporting data, such as operating schedules, production economics and regional margin analysis. At the month’s end, IHS Chemical delivers the Global Economy and Energy report, which contains economic updates and valuable crude oil and natural gas data. Clients also gain entry to a weekly updated Pricing and Economics Database and enjoy direct access to IHS Chemical researchers.
Chemical Economics Handbook

The Chemical Economics Handbook (CEH) is a core market research program. It provides accurate and timely information on the history, status, and projected trends of hundreds of raw materials, primary and intermediate chemicals, and end products of the commercial chemical industry. Published continuously since 1954 and now more than 20,000 pages in length, CEH is supported by more than 250 sponsors in over 35 countries.

CEH reports typically include a global summary and regional coverage of chemical markets, listing the producers and annual capacities in each region. The studies also include production and consumption volumes by region and end-use application for each chemical product. Both trade imports and exports by region are also estimated in CEH reports.

Related CEH reports include:
- Methanol by Preeti Sriram, Mike Nash, and Olivier Maronneaud (2014)
- Gasoline Octane Improvers by Eric Linak, Hossein Janshekar, and Masahiro Yoneyama (2012)
- Butylenes by Sean Davis, Masahiro Yoneyama, and William Chen (2014)

Process Economics Program

The Process Economics Program (PEP) is the core technology and cost analysis program for the chemical and related industries at IHS Chemical. PEP provides thorough and up-to-date technical and economic evaluations of both state-of-the-art commercial processes and potentially promising processes under development. PEP is sponsored by more than 100 companies, many of which have been subscribers since the program began in 1963. The program’s evaluations cover both commodity and specialty chemicals and polymers. Within the PEP program olefin processes, naphtha, gas and fuel oil cracking processes, polymer processes, and almost all process for major derivatives of cracker complexes have been evaluated on many occasions.

Related PEP reports include:
- MTG Technology: “Methanol to Gasoline,” “Gasoline from Natural Gas via Methanol/Mobil”
- DME Production: “Dimethyl Ether (DME) from Coal,” “DME,” “Dimethyl Ether an Alternate Fuel”
- Biodiesel: “Biodiesel Production,” “Impact of Biodiesel Growth: A Strategic Assessment,” “Advances in Biodiesel Production”
- MTBE: “ETBE Versus MTBE,” “MTBE & Tert-Butyl Alcohol,” “Octane Improvers,” “Oxygenate Economics”
Competitive Cost and Margin Analytics Program

IHS Chemical’s Competitive Cost and Margin Analytics (CCMA) program provides detailed country-level economics for the world’s major chemicals. This data is based on an analysis of the cost structure of each individual production unit around the globe and spans a 10-year timeframe, with 5 years of history and a 5-year forecast. With this information, clients can examine how variations in capacity, feedstocks, and process technologies are impacting plant economics at the country level to:

- Analyze across value chains
- Identify lowest-cost regions, countries, and plants
- Gain insight into which technologies and feedstocks are advantaged
- See how planned capacity additions will change relative economics
- Understand the feedstock cost advantage from integrated producers
- Explore how economics shift under different future price scenarios

Understanding the structure of chemical production costs requires detailed and complex calculations and an in-depth base load of knowledge and insight. The IHS Chemical Competitive Cost and Margin Analytics service applies our deep understanding of the chemical industry and extensive databases to examine relative production costs in the major producing regions—down to the plant level—over an extended period of time.

Single-Client Consulting Work

IHS Chemical’s talented industry veterans collaborate with our clients leveraging IHS’ unparalleled industry knowledge, rigorous proprietary analytical techniques, and years of hands-on experience. The following projects are a few examples of the methanol-related single client work that IHS Chemical has conducted in the last couple years.

Methanol Scenario Feasibility Study (Middle East)

A fuel additives company specializing in the production of methanol and MTBE established in the Middle East requested the assistance of IHS to provide a methanol scenario prefeasibility study. The study included analyzing a variety of build scenarios for both stand-alone methanol plants of varying capacities and an integrated facility involving both methanol and MTBE production.

IHS’ overall objective with this engagement was to assist the client in understanding the monetization of natural gas to either methanol or ammonia. As part of this overarching study, IHS recommended the best option for the client to monetize a quantity of gas that would be used to make a gas-based petrochemical that would generate the most profits and returns for a 25-year period.
Market Advisor for Methanol and Dimethyl Ether Production Project (Americas)

IHS Chemical carried out multiple analyses of global markets to support the due diligence initiatives of a client looking into a methanol and DME project in the Americas. The final reports assessed the current and future methanol and DME markets, and analyzed the competitive viability of the planned project. Specifically, the IHS Chemical team provided the current status of global and regional markets, market size and demand outlook, capacity and capacity outlook, producers, and competitiveness, and profiled key players in the industry that serve the target markets. Dynamics of the global legal and regulatory environment, as well as takes on methanol infrastructure, were important aspects of these studies.

Methanol Market Study (North America)

A company based in North America sought the assistance of IHS Chemical to develop a high-level analysis of the methanol market sector in order to understand the North American methanol market. Specifically, this project looked at methanol projected capacity, production and costs, as well as economics and profitability, and to provide additional services as mutually agreed upon from time to time. The client announced plans to build a methanol plant in North America.

Methanol Market Study (Asia)

A company with main business activities focused on exploration, development and extraction of oil and natural gas intended to develop, construct, own and operate a world-scale methanol plant in Asia that will convert natural gas to methanol for sale on the global markets. The company appointed financial advisors for the project and intended to finance part of the capital costs of the project using non-recourse project finance. IHS’ overall objective in this engagement was to assist the client with understanding the markets for methanol and the risks and issues arising from transporting it from a landlocked region to global markets.

Competitive Economics for Alternative Fuels (Americas and Asia)

IHS conducted a technology due diligence to assist a client in understanding selected fuels technologies as an alternative to petroleum diesel. The final results addressed the operational savings in switching from petroleum diesel to alternative fuels derived from natural gas and coal.
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, extend 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.

Comprehensive Coverage
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.
About IHS

IHS is the leading source of information, insight and analytics in critical areas that shape today’s business landscape. Businesses and governments in more than 165 countries around the globe rely on the comprehensive content, expert independent analysis and flexible delivery methods of IHS to make high-impact decisions and develop strategies with speed and confidence.

IHS has been in business since 1959 and became a publicly traded company on the New York Stock Exchange in 2005. Headquartered in Englewood, Colorado, USA, IHS is committed to sustainable, profitable growth and employs more than 8,000 people in 31 countries speaking 50 languages around the world.

IHS serves businesses and all levels of governments worldwide ranging from 85% of Global Fortune 500 to small businesses. IHS provides comprehensive content, software and expert analysis and forecasts to more customers in more than 180 countries worldwide.

Information, analytics, and expertise

IHS offers must-have business information, advanced research and analytics, and deep expertise in core industry sectors, such as energy and natural resources, chemicals, electronics, and transportation. We focus on business-critical workflows that support our customers’ needs, including:

- 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.

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Chemical Building Blocks from Renewables
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Lubricants in Brazil