



## **Impact of Big Data Analysis on Strategic Business Planning for Liquid Natural Gas (LNG) and Methanol Pricing in Commodity Markets**

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Big data is fundamentally changing the way major Liquid Natural Gas (LNG) and Methanol producers are pricing their commodities and how their businesses can strategically compete and operate on very thin margins. They are successfully driving value and reaching a market equilibrium in the supply and demand for their commodities from the data they can obtain and analyze. This distinct advantage has become disruptive to the traditional monopolies and cartels over their competitors in these markets. — The result is a performance gap that continues to grow as more relevant upstream and downstream data is generated. There are emerging technologies, like the Internet of Things, real-time sensors, and high-speed digital communications offering better acquisition and analysis.

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The ability to capture and store vast amounts of data has rapidly grown but there is still some way to go in the technical capacity to aggregate and analyze these various volumes of information. A once impossible task of estimating end user/consumer demand for natural gas is now managed by data, which is automatically fed back to the local distribution supplier to be aggregated into the wholesaler's demand to an upstream supplier who places the order on delivery system (pipelines and shipping) to buy more or less natural gas. There is an impact on short- and long-term forecasting making for rapid adjustments in supply and demand which in turn affects pricing, and the length of time horizon of strategic business investment planning is reduced from the normal five-year plan to two or fewer years.

This is all possible because of the impact that Big Data Analysis and supporting a technological change in IT systems have on strategic business planning.

The most recent business transformation has been the move towards the application of Big Data and the supporting technological change in IT systems. We have Hammer's reengineering of 1990's impacting private sector, downsizing and rightsizing as more effective enterprise IT systems, and faster broadband communication has moved computing to virtual machines operating in a cloud using Big Data tools to crunch vast amounts of data into intelligent information. Where there was perceived monopoly in with inputs (i.e. unions and wages, commodities, and investment capital) have been eroded by Big Data.

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In the oil and gas industry we see how massive supercomputers used by Aramco influence the global supply and demand of oil and gas markets. Aramco computers do not monitor the size of the reserves in the Saudi Kingdom, but those of other places producing oil and gas. They are able to aggregate the demand to determine market share and what amount to supply the world markets. In the past, oil prices were determined more by the geopolitical influences of the Organization of the Petroleum Exporting Countries (OPEC) than genuine market demand. The price was set more on the basis of balancing the macroeconomic harm that higher prices might have on the cartel's customers versus the greed of its member nations.

All the while, new data computers are writing their own programs and performing analysis on ever larger data sets. The Canadian Oil Sands project and the United States natural gas fracking technologies were not possible without Big Data computation and supporting technologies. First, they were to determine feasibility prior to the development of strategic plan for the extraction of these commodities. The transformation in this industry has driven oil prices lower as more precise data is available, and market share has declined for OPEC as more oil and gas have come on stream. Commodity traders have access to better data, which means the pricing reaches the market's equilibrium faster to affect what consumers pay for natural gas and gasoline.

During a recent contract with a British Columbia LNG firm, I had the opportunity to examine the business transformation of the global supply chain for LNG and methanol. To be competitive in these commodity markets is very challenging as the price of LNG and methanol are often tied to the price of oil in most global markets. The input is natural gas to both LNG and methanol plants, and the profit margin is determined by the spread between what the price of natural gas is to the resulting LNG and

methanol prices. The supply chain management connects end user data to producers. Other factors are affecting price too, like tolls fees, export and import taxes, shipping and labor costs, and royalties. Where 25 years ago it would take several days to determine the impact of these factors, now it takes a fraction of a second with real-time updates of the accumulated data.

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The impact of rapid changes in data can cause many companies to review instantly which projects receive investment money. The Saudi attempts to drive American shale gas producers out of the market have not been as effective as it might have been 25 years ago. The reason is there is more Big Data available and tools for analysis which a producer can use to make their market supply and demand determinations. The design of today's supply chain incorporates consumer sensors aggregated by Big Data companies that resell the information collected and packaged as industry facts. An example is the Bloomberg Incorporated business data which, for a subscription fee, is supplied to any business with the kind of data and analysis it needs to develop a competitive edge.

My client for LNG and methanol has a strategic option to arbitrage between the pricing for LNG and methanol based on careful management of the cost of the inputs, like natural gas and logistics. LNG demand might increase demand for natural gas for heating. But this changes with seasons in each hemisphere. This change can cause natural gas prices to rise, but increased natural gas prices can reduce the margin for methanol. Methanol is used as fuel and turned into plastics.

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The customers will supply the data that will be used to determine the just-in-time delivery to minimize inventory storage and shipping delays. This means the agility to respond to change by smaller producers can give the same return or better on invested capital as those with larger operations. Previous economies of scale that once assured the large producer of monopolistic competitive position to set the price others had to follow will be eroded with the help of Big Data. It is occurring in the taxi industry with the impact UBER has had in reducing the cost of a fare and it will happen to the resource industry too. When a client wants a ride the price is not fixed and those with a mobile phone application

are no longer price takers. The taxi cartel is broken and the only way to survive is to join the application and offer a better service. The quality of service and timely delivery are now universal factors in pricing when amount data available to the client allows them to make the selection.

To understand how natural gas is priced at the well head, processed, and distributed is beyond this paper, but a good explanation is found in the Oil and Gas Investment Bulletin, "[What is the Break-Even Price for Natural Gas Producers?](#)" by KEITH SCHAEFER on APRIL 28, 2009.

Let us consider the case where one pipeline's capacity to supply natural gas at the daily price is \$2.00 per million cubic feet (mcf). The plant conversion and efficiency factors of LNG and methanol are the secret knowledge and critical input to the business formula to maintain a constant return on investment (ROI) and generation of cash flow. Therefore, if LNG is priced at \$2.08 per mcf and methanol is priced at the 6:1 rule of thumb for oil to gas price, natural gas prices in North America should be around \$12.50/MMBtu. Thus making methanol more expensive to produce than LNG. The global equilibrium price setting mechanism for Methanol is driven by Middle East producers seeking the optimum netback value for their natural gas. Regional adjustments in methanol prices may occur due to fluctuations in various regional Supply and Demand imbalances.

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As every new contract is entered into the system in real-time, the plant adjusts its production scheduling to match shipping dates. Over the last few years, there has been a shift away from long-term contracts of 5 and 10 years to less than 3 years as excess supply of natural gas has come on stream. Clients are seeking the lowest cost and to not be locked into a long-term contract. Big Data tells them there is an oversupply of natural gas, because prior to the rapid development of big data analysis tools in last five years, much of the analysis was done manually or computer assisted. Oil and Gas producers started projects based on the anticipation that large economies like China and India would continue to grow and demand significant quantities of LNG and methanol forever.

However, Big Data has an impact on short- and long-term forecasting, making for rapid adjustments in supply and demand, which in turn affects pricing and the length of time horizon of strategic business investment planning that did not happen all that long ago. The expected recovery in the resource sector and sky high pricing is not likely to return as more data is accumulated. Those who expect a return to high wages and more employment will find this to be tempered by the impact of Big Data as more global inputs are applied to investment and operational models. There will be temporary shocks to the system (i.e., climate change, wars, investment liquidity shortages, credit defaults, and severe government cuts

in spending), but Big Data Analysis will take this all into account for companies determining what investments to make.

Where is the data being held and analyzed? The answer is in private clouds, such that those companies with best data quality and faster computing capabilities will take market share while their customers will be setting the price for the amount where either commodity can be delivered when needed. Big Data Analysis will end the cartels and monopolies of the past for commodities and services that become commoditized. This means employment in middle management jobs, and the relatively more secure public service work will be eliminated by evermore intelligent computers crunching larger amounts of Big Data. Hence, organizations can operate with fewer employees and projects will get faster approvals. While governments will look to Big Data Analysis as a way to reduce operating deficits, private sector resource companies will operate with fewer employees to increase profit margins.