

NUTECH SOLUTIONS NEWSLETTER

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OIL AND TECHNOLOGY DO MIX: PETROLEUM & GAS OPTIMIZATION WITH NUTECH

AN INDUSTRY AT A CROSSROADS

In the aftermath of Hurricanes Katrina, Rita, and Wilma, the Energy Information Administration (EIA) recently published a detailed outlook of the U.S. domestic petroleum market, including such factors as drilling, infrastructure, production, pricing, and distribution. Hurricanes Katrina and Rita damaged, set adrift, or sunk 192 oil and natural gas drilling rigs and production platforms – the most significant blow to the U.S. petroleum and natural gas industries in recent memory. The EIA reports that as of November 1, 2005, more than 45% of oil and natural gas production in the Gulf of Mexico remained shut down. While recovery of production facilities and other infrastructure in the Gulf continues, a complete recovery will not occur before July 2006.

The affects of Mother Nature have been far-reaching – from the oil producer to the consumer. U.S. oil and gas companies, however, will recover from these natural disasters. But today these companies face even greater economic and operational challenges that could have lasting affects on their businesses and the marketplace. The basic complexity in finding and tapping new sources of oil, extracting more oil from existing underground reservoirs, operating more efficiently, responding to increasing energy demand, adapting to geopolitical

instability, and optimizing their product distribution have prompted many energy companies to reevaluate basic business practices.

How can they meet increasing energy demand if they use inefficient methods of finding, extracting, producing, and distributing their products? How can they operate under such market pressures, and deliver products to the marketplace cost-effectively?

The answer is to operate more efficiently than ever before.

OPTIMIZING AN INDUSTRY

The impact of technology on finding new sources of oil and on optimizing the recovery, production and distribution of oil is extraordinary. Sophisticated scientific models can help eliminate poor underground prospects and forecast high production prospects, thus considerably reducing the costs of drilling in “dry holes”. In addition, new drilling and production technologies make it possible to use new reservoirs that would formerly have been too costly to put into production, and to increase oil recovery from existing reservoirs. According to EIA statistics, the costs of producing oil can range from as little as \$2 per barrel in the Middle East to more than \$15 per barrel in some fields in the United States, including capital

recovery. Technological advances in finding and producing oil have made it possible to bring once-expensive deepwater Gulf of Mexico oil into production for less than \$10 per barrel.

Technology does not change geology, but by revolutionizing the methods used to determine relevant features of a geologic landscape, new scientific modeling techniques greatly enhance the likelihood of finding rich underground reservoirs and maximizing oil recovery in those reservoirs. In addition, the use of advanced simulation and optimization models has paved the way for unsurpassed efficiency in oil and gas distribution across an entire pipeline.

As one of the world’s leading technology innovators serving the energy industry, NuTech Solutions is proving that technology and oil do mix.

Chevron – Optimizing Cyclic-Steam Oil Production With Genetic Algorithms*

Chevron uses its patented cyclic-steam process to recover oil from the Antelope reservoir in the San Joaquin Valley. High-pressure steam is injected into the reservoir for a “soaking period”. The resulting pressure created by the cyclic-steam generates the energy to lift the oil to the surface. The wells flow for 20-25 days, and the



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total cycle length runs 26-30 days. Chevron's challenge was to identify the optimum cycle length for every well that would result in maximum oil production during the cycle. With more than 400 wells, and constraints on steam availability and distribution, facilities and communications, Chevron faced a significant scheduling problem. Using evolutionary optimization techniques known as genetic algorithms, NuTech Solutions developed a Scheduling Optimizer for Chevron that accounts for all components and constraints in the cyclic-steam process, including the complexities of cycle timing.

Chevron deployed Release 1 of the Scheduler for the entire field in January 2003. During the first two month period, production increased 6.4%, of which 1.4% was attributed directly to the Scheduler. Further examination of the project indicated a payout period of approximately 75 days. The Scheduler has been in daily use since August 2003, and has proven to be consistent and responsive.

** from the Journal of Petroleum Technology
June 2005*

Advanced Resources International (ARI): Maximizing Recovery

In some cases oil companies know very little about the subsurface formations of a reservoir, and thus may not apply the best techniques to extract the petroleum based on the anticipated fluid flow from underground materials and formations. To address the need for better forecasting, petroleum engineers use simulation models of reservoirs to predict fluid flow, and calibrate these models by matching simulation results with historically observed field performance. This technique,

known as "history-matching," is time and labor intensive, and involves a complex and multi-dimensional interplay of variables. Working with petroleum industry experts ARI, NuTech Solutions applied advanced scientific techniques, known as evolutionary strategies, to the problem of maximizing recovery and improving gas production forecasts. When applied to coalbed methane simulation models for history-matching, NuTech's Intelligent Business Engine™ for Optimization produced a more accurate model of the reservoir, resulting in a more accurate forecast of gas production and recovery.

Air Liquide Large Industries, L.P.: Pipeline Optimization

Air Liquide operates a large and complex dual-pipeline system of more than 1,800 miles on the Gulf Coast. These pipelines, the world's largest industrial gas pipeline network, consist of two separate pipes for transporting oxygen and nitrogen, which are produced together at their production facilities.

To help manage the pipeline, Air Liquide uses a pipeline simulation model that successfully addresses hydraulics, such as the volume, pressure and speed. However, the original model did not provide the economic optimization needed to give Air Liquide the valuable data and insight essential to reducing costs. Using its Intelligent Business Engine for Optimization, NuTech Solutions developed the Pipeline Optimizer for Air Liquide. This new optimization model takes into account the key components that drive efficiency – production, transport speed/pressure/volume, behavior of the products as they move through the pipe, human vs. automated management of the pipeline, fluctuating power costs, diverse customer demand, and a

complex dual system. Using the new model, Air Liquide identified opportunity savings of \$300 to \$750 every hour, due to inefficiencies and constraints across the pipeline. The company can now identify problem areas, and make critical adjustments at a lower cost and improved reliability.

Continuing their pipeline optimization deployment, NuTech Solutions is also working with a major natural gas transmission and storage company to explore a custom economic pipeline optimizer. And, a major liquid products pipeline company has engaged NuTech to execute a strategic technology assessment focused on energy optimization.

TRANSFORMING AN INDUSTRY

Through such scientific techniques as advanced history matching and cyclic-steam optimization, NuTech empowers clients to improve oil production by working more efficiently. For Air Liquide and various petroleum companies, NuTech has developed optimization models that significantly improve the transport of products across pipelines. In every case, these companies have transformed their business models and cultures, resulting in substantial annual cost savings.

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GAME THEORY IS ANYTHING BUT A GAME

GAME THEORY?

Perhaps it's the secret to winning at checkers or tic-tac-toe? Perhaps it's luck? No, we're not talking about luck here, as evidenced by the recent award of the Nobel Memorial Prize in Economic Sciences to Thomas Schelling, known as the "Father of Game Theory". The 84-year-old professor at the University of Maryland has used game theory, a branch of applied mathematics that uses models to study interactions between countries, businesses or people, to explain major political and economic conflicts. In the October 2005 issue of *Fortune Magazine*, Geoffrey Colvin writes in his article *Is Game Theory Real?* that according to Schelling, game theory demonstrates, among other things, that a party "can strengthen its position by overtly worsening its own options". He further explains Schelling's theory that one can vastly strengthen one's position in an interdependent situation by persuading the other side that you're slightly nuts. He cites the following example: If a hitchhiker pulls a gun on you, you step on the gas, head for a telephone pole, and tell him to throw the gun away or you both die.

While it is more complex than these simple statements convey, Game Theory has evolved over time into one of the most advanced scientific modeling techniques used by leading companies worldwide – Agent-Based Modeling (ABM). And with the award of this recent Nobel Prize to Thomas Schelling, the importance of such scientific techniques is clear. In recent years global companies Procter & Gamble (P&G) and the National Association of Securities Dealers (NASD) have used agent-based models to evaluate supply

chains, assembly lines, and other large, complex systems comprised of many interactive parts. P&G, NASD and many other leading organizations have turned to NuTech Solutions, a primary innovator in agent-based modeling, to merge science, business and technology to answer complex questions. Like the award-winning Schelling, NuTech Solutions embraces the importance of game theory, and builds on its value to develop agent-based models that have transformed many organizations.

A FEW EXAMPLES

Procter & Gamble (P&G)

P&G produces more than 300 branded products in nearly 50 categories, from toothpaste to bone disease therapies, and markets them in 140 countries worldwide. This enormous product family creates a large, complex, and expensive supply chain, with a typical inventory value of \$3 billion. NuTech used an agent-based modeling engine to construct what was coined as the "dirt-to-drain" model. This model simulated the operation of the entire supply chain-manufacturing-distribution system, from raw material sourcing ("dirt") all the way to product usage by the consumer (shampoo down the "drain"). The model was applied to the Pantene line of shampoo, conditioner, styling and related products. Procter & Gamble learned this improvement of the supply chain would result in an annual savings for of \$300 million annually on an investment of less than 1% of that amount.

National Association of Securities Dealers (NASD)

The National Association of Securities Dealers (NASD),

parent of the NASDAQ-Amex Market Group, is comprised of approximately 5,500 companies in the NASDAQ and 800 companies in the auction-based Amex exchange. The NASDAQ must carefully evaluate any potential changes in its trading policies. NuTech Solutions was charged with simulating the impact of proposed regulatory changes on the financial market under varying conditions – specifically the impact of decimalization on the NASDAQ. NuTech's agent-based model indicated that moving to decimals did not improve the quality of the market as a mechanism for price discovery. Further evidence indicated that decimalization in fact made it easier for parasitic trading strategies to take place. Equipped with the ability to explore the results of pending policy decisions, the NASDAQ was able to foresee the impact of these policy changes on the stability, nature, and volume of its business.

ANSWERS TO THE TOUGH QUESTIONS

In an October 2005 press release covered by the Associated Press – *Israeli, American Share Economics Nobel* – Thomas Schelling is quoted as saying, "I use game theory to help myself understand conflict situations and opportunities." Business and other leaders face conflict and opportunity every day. How they embrace both holds the key to success.

Agent-based modeling brings together business, science, and technology to answer many of the most complex problems. NuTech Solutions delivers real decision-making power to its clients.



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NUTECH AND MJF STRATEGIES WILL DEVELOP SYSTEM FOR FEDERAL AVIATION ADMINISTRATION



NuTech Solutions and MJF Strategies, L.L.C., a firm specializing in solutions that combine management, technical, operational, political and communications strategies for sustained business success, will develop an air transportation demand model for the Joint Program Development Office (JPDO) of the Federal Aviation Administration (FAA) and the National Air and Space Administration (NASA). The FAA has employed MJF Strategies, L.L.C. and NuTech Solutions to use an innovative approach to forecasting future demand in this complex, dynamic industry.

"NuTech Solutions has a strong reputation for delivering strategic insight using agent-based modeling solutions for both federal agencies and commercial endeavors."

*- Mike Neely
NuTech Solutions
Government Industry
Vice President*

The Department of Transportation plans to revolutionize the nation's air transportation management system to enable the 2-3-times growth in demand expected over the next 20 years. One key to success will be the ability to envision the future business and

technical environment and understand the nature of that future demand. To address this challenge, NuTech provides expertise in a unique agent-based modeling capability that will enable the FAA to identify and understand multidimensional interactions and patterns that exist in the complex air transportation system, and plan and deploy the most effective air transportation services capabilities possible.

Mike Neely, Government Industry Vice President at NuTech Solutions noted, "NuTech Solutions has a strong reputation for delivering strategic insight using agent-based modeling solutions for both federal agencies and commercial endeavors. We are pleased to combine our expertise with MJF's aviation domain expertise and comprehensive approach for this important FAA program."

"Most importantly this approach will provide insight not only into macro levels of demand but how that demand will be served by competing airline business interests as well as by other emerging air carriers," added Margaret T. Jenny, CEO of MJF Strategies.

Work on the FAA contract is slated to begin immediately, with NuTech Solutions and MJF scheduled to be involved for the next 12-24 months.

NUTECH SOLUTIONS RECEIVES FEDERAL RESEARCH CONTRACT



NuTech Solutions has been awarded a federal research contract to study industry dynamics and the growth of small firms, the Office of Advocacy has announced. The award will further Advocacy's core mission of understanding the role small business plays in the U.S. economy.

"Small business is the cornerstone of our economy," said Thomas M. Sullivan, Chief Counsel for Advocacy.

"Research studies like this will bring that role into clearer focus, and their results will help local, state, and federal policymakers make better decisions about economic policy that affects small business."

The Office of Advocacy, the "small business watchdog" of the government, examines the role and status of small business in the economy and independently represents the views of small business to federal agencies,

Congress, and the President. It is the source for small business statistics presented in user-friendly formats and it funds research into small business issues.

*- Office of Advocacy of the U.S.
Small Business Administration*



MERRICK SYSTEMS LEADS NEW ALLIANCE TO IMPROVE OIL & GAS RECOVERY IN DIFFICULT WELLS

Merrick Systems, a software innovator known for its upstream oil- and gas-production products, has formed an alliance with two other industry leaders: NuTech Solutions, a scientific-software company specializing in optimization solutions; and Advanced Resources International, a consultancy recognized for its expertise in non-conventional gas and enhanced-oil-recovery technologies.

The alliance, which will formally be known as the Intelligent Production-Optimization Alliance, promises to help oil and gas companies tackle one of the toughest problems in the petroleum business: efficiently extracting fuels from heavy-oil fields, watered-out oil fields, and non-conventional gas sources.

To achieve this goal, the alliance will provide what it calls field-wide production optimization – holistic programs that use data-based systems to improve the extraction of oil and gas from difficult wells.

“This alliance offers what amounts to a turn-key solution to help oil and gas companies satisfy growing industry pressure to increase the yield from hard-to-lift reserves,” says Kemal Farid, president and CEO of Houston-based Merrick Systems. “It’s the only one of its kind in the market, and far surpasses anything else available for improving such operations.”

The alliance will draw upon the complementary services and products provided by its

member companies – all of which have strong track records in the upstream oil and gas industry. Merrick Systems, for example, has spent more than a decade developing and implementing systems to collect and organize field data from gas wells and oil fields, while NuTech Solutions has used its Intelligent Business Engines™ to optimize just this kind of field data. Advanced Resources International, for its part, has worked closely with companies like NuTech Solutions to develop customer-focused analytic and optimization systems that improve and manage steaming, CO2 injection and non-conventional gas operations.

“The net result,” concludes Farid, “is a service that provides real-time optimization of heavy-oil and non-conventional gas extraction.”

Scott Reeves, executive vice president of Advanced Resources International, echoes this sentiment: “The combination of experience and advanced technology represented by this alliance is unprecedented in the complex-recovery market; technologies that have previously been limited to deepwater and other high-cost environments are now available to operators of non-conventional gas and enhanced-oil-recovery assets.”

Meanwhile, Kevin Kostuik, Vice President of Petroleum Industry Solutions at NuTech Solutions, points to his company’s previous optimization successes as proof that the alliance will provide dramatic benefits to its

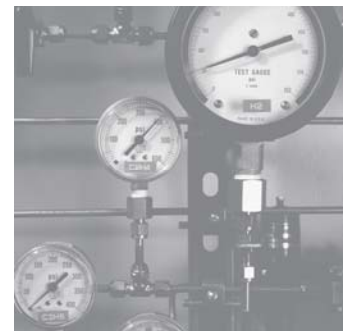
customers. “A leading oil producer has already used our engines to enjoy production increases between 1.4 percent and 6.4 percent, while also capturing best practices in a field-level tool,” he says. “With the addition of Merrick and ARI to the mix, oil and gas companies can expect to see even more dramatic improvements in their numbers, making their lives easier and adding real dollars to the bottom line.”

“This alliance is the perfect three-punch combination,” summarizes Farid. “We expect to make a major difference for any company interested in optimizing its complex-extraction operations.”



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*- Kemal Farid
Merrick Systems
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GÉANT CHOOSES NUTECH SOLUTIONS TO ANALYZE HYPERMARKET CUSTOMER BEHAVIOR

NuTech Solutions will work with Géant Polska Sp. z o. o. to help Géant improve marketing and promotional effectiveness.

customer surveys. Using NuTech's modeling software, Géant's enhanced understanding of customer behavior will enable the company to modify marketing tactics and promotional campaigns to improve effectiveness, resulting in stronger customer loyalty and increased sales.

software will contribute to achieving measurable marketing improvement results for Géant, as was the case for petroleum retailer PKN Orlen, where customer loyalty was significantly improved by altering promotional strategies."



Casino Guichard-Perrachon Group operates over 9,000 food retailing outlets in 15 countries, including Cash & Carry in the US. In 1996 the French company expanded its European presence, introducing their chain of hypermarkets, known as Géant, into the Polish market. Currently there are 18 Géant hypermarkets, located in the largest cities in Poland. Using software from NuTech Solutions, Géant plans to identify consumer behavior dependencies and shopping patterns across these hypermarket locations.

"Géant is devoted to satisfying customers' needs, by offering them high quality products at an affordable price," said Géant's Marketing Research Manager Marek Kempka. "NuTech Solutions' analytic software will enable us to accurately adjust our promotional campaigns, to better address the specific characteristics of our customers."

NuTech Solutions' Intelligent Business Engines™ for Data Mining will help Géant analyze store purchase transactional data, as well as feedback from

Maciej Michalewicz, President of NuTech Solutions, Poland noted, "We are very pleased to add one of the largest hypermarket chains to our growing list of customers worldwide. We anticipate our



*Wishing you every happiness
 this holiday season and
 throughout the Coming Year,*

NuTech Solutions