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**In Depth**

**Shale Gas: More Complications for Price Forecast Developers – Part Two. LNG to Make It More Confusing**

The U.S. is boasting a somewhat intimidating supply of natural gas resources trapped in shale plays. With the boost in horizontal drilling and hydraulic fracturing technologies, these formerly untapped resources are now being unveiled. This offers new opportunities to a variety of industries; LNG is one of them. LNG markets, however, are driven by multiple factors; some of which have a reversal effect on natural gas expansion.
We continue exploring shale gas development and its impact on the overall natural gas outlook. Liquefied Natural Gas (LNG) is one of the drivers affecting demand for shale gas. However, LNG itself is affected by multiple factors.

In the 90s, as the U.S. started to demonstrate signs of imminent natural gas shortage, the idea of transporting natural gas in the liquefied form was picked up by the major global gas producers on a larger scale than before. Investments streamed into exporting facilities in the Middle East, while importing and regasification infrastructure was being developed in the U.S. Several years ago, LNG import terminals were constructed across North America in response to a dwindling domestic natural gas supply.

Many things have changed since then. The rise of unconventional gas production in North America and growing global demand for LNG support the construction of the U.S. exporting facilities and the conversion of pre-existing import infrastructure. Refer to page 18 to read our In-Depth article about global and domestic factors impacting the LNG markets and how they might influence natural gas prices and production.

LNG continues to gain more coverage from data providers. Last month, CME added East Asia Index swaps for LNG, while Platts expanded LNG assessments by including three more ports in China, and increasing the ship and cargo sizes by, thus reflecting the global trend of growing volumes of LNG trades.

The big news of the month from the emerging markets is the offer by the Hong Kong Stock Exchange, Hong Kong Exchanges and Clearing Ltd (HKEx), to pay 1.4 billion pounds (US$2.18-billion) to buy the London Metal Exchange (LME), yet to be voted on by LME by the end of July and approved by regulatory bodies. The contest started in September 2011 and drew interest from 15 parties. HKEx outbid InterContinental Exchange in the final stage. It has been speculated that the victory was mainly warranted by promising to preserve LME’s current business model and not to increase transaction fees for three years, which has been the main exchange’s mark for years. Likely the world’s largest marketplace for industrial metals, LME will now gain access to China, the biggest consumer of metals. Whether the acquisition by HKEx will lead to the major consumer taking over control of setting global prices for the same commodity is yet to be seen. The overall trend remains the same: emerging Asian markets are moving closer to the mark crossing which will move them into the camp of developed marketplaces.

Olga Gorstenko
BRIX Launches Futures Price Curve

On June 20, 2012, BRIX launched its Futures Price Curve relative to contracts for electric power from conventional sources for delivery to the Southeast and Center-West submarket. BRIX Futures Price Curve assessment is the same one used by its partner, IntercontinentalExchange (ICE), to establish similar curves in hundreds of commodity markets. BRIX Futures Price Curve is released on a daily basis in Reals per MWh.

EPA Launches First Waste-to-Biogas Mapping Tool

The introduction of an online waste-to-biogas mapping tool pioneered by the US Environmental Protection Agency’s Pacific Southwest Region was announced on June 7, 2012. The tool is an interactive map built to connect organic waste producers (restaurants, hotels, grease rendering facilities) and potential users (wastewater treatment facilities, dairies) for the purpose of biogas production through co-digestion. In this process food scraps, fats, oils and grease (FOG) are added to an anaerobic digester to produce a methane-rich biogas. Designed for decision-makers with expertise in the fields of waste management, wastewater management and renewable energy, the tool identifies facilities that exist in an area and the distance between the waste producer and an anaerobic digester.

Features include:
- FOG hauler information for California, Arizona and Nevada
- California landfill information
- On-site energy generation for California dairies with digesters (in kilowatt hours per year)
- Energy estimates for wastewater treatment facilities, with and without co-digesting FOG (in kilowatt hours per year for California, Arizona, Nevada and Hawaii).
- A “correct record” option that allows facilities to change information presented on the map.

Mapping tool can be accessed here
CME Lists LNG East Asia Index (ICIS Heren) Swap Futures

Effective July 15, 2012, CME listed LNG East Asia Index (ICIS Heren) Swap Futures for the next trade date. The trading venues are Open Outcry on the NYMEX Trading Floor and CME ClearPort.

<table>
<thead>
<tr>
<th>CME Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>LAI</td>
<td>Liquified Natural Gas swap futures contract based on South East Asian LNG prices from ICIS Heren</td>
</tr>
</tbody>
</table>

For contract specifications click here

CME Adds Asian Light End European-style Options

On July 1, 2012, CME listed two new Asian Light End European-style options for the following trade date. The trading venues are CME ClearPort and Open Outcry on the NYMEX trading floor. These contracts are listed with, and subject to, the rules and regulations of NYMEX.

<table>
<thead>
<tr>
<th>CME Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>JA5</td>
<td>Japan C&amp;F Naphtha (Platts) Average Price Option</td>
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<tr>
<td>1N5</td>
<td>Singapore Mogas 92 Unleaded (Platts) Average Price Option</td>
</tr>
</tbody>
</table>

For JA5 contract specifications click here
For 1N5 contract specifications click here

CME Lists East-West Fuel Oil Spread (Platts) BALMO Swap Futures

On July 1, 2012, CME listed East-West Fuel Oil Spread (Platts) BALMO Swap Futures for the next trade date. The trading venues are CME ClearPort and Open Outcry. These contracts are listed with, and subject to, the rules and regulations of NYMEX.

<table>
<thead>
<tr>
<th>CME Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>EWB</td>
<td>East-West Fuel Oil Spread (Platts) BALMO Swap Futures</td>
</tr>
</tbody>
</table>

For EWB contract specifications click here

Platts Plans to Add Three More China LNG Ports

On June 21, 2012, Platts announced its plan to include the Chinese ports of Shanghai, Dalian and Rudong in its LNG Japan/Korea Marker assessment in August. The three newly introduced ports will be added to the Chinese ports of Guangdong and Fujian which Platts currently considers in its assessment.

Deliveries to Chinese ports are normalized to a delivered ex-ship Japan/Korea basis.

*Graph created with ZEMA
ICE Brent NX (New Expiry) Crude Futures

On July 2, 2012, ICE announced Brent NX (New Expiry) Crude Futures TAS (Trade-at-Settlement) that allow market participants to enter an order to buy or sell an eligible ICE Brent NX Crude Futures contract during the course of the trading day at a price which will be equal to the settlement price for that contract month, or at a price that is up to 5 cents/barrel above or below the settlement price. This contract is cleared through ICE Clear Europe.

<table>
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<tr>
<th>ICE Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>IFEU</td>
<td>ICE Brent NX Crude Futures</td>
</tr>
</tbody>
</table>

For more information click here

See below two examples of Brent futures traded on ICE:

Argus Launches Iraqi Basrah Light Crude Assessment for Asia

On July 2, 2012, Argus launched a new price assessment for Asia-bound cargoes of Iraqi Basrah Light crude, the fastest-growing crude stream in the Mideast Gulf this year. Due to the growing importance of Iraqi crude in the Asia-Pacific market and increasing Iraqi crude production, Argus started to publish its new Basrah Light assessment. The assessment will be done by comparing Basrah Light’s value with the average of Dubai and Oman crudes, publishing a differential to the grade’s official formula price and an outright value. While Asia-Pacific consumers have significantly reduced crude imports from Iran, Basrah light crude has become more relevant than ever.

The new price assessment will be published in the daily Argus Crude market report from 2 July.

Platts to Launch Singapore Gasoil 500 ppm Swaps Assessment

On August 1, 2012, Platts launches new temporary assessments for FOB Singapore Gasoil 500ppm swaps called: “Interim Gasoil Swaps”. The new products cover the contract months of October, November and December. Platts’ transition from a high sulfur basis to a low sulfur basis for its flagship FOB Singapore Gasoil benchmark would support the continued creation of a MOPS Strip for the valuation of physical gasoil cargoes. The lower sulfur specifications reflect changing supply and demand trends across the regions. The new assessments will appear on Platts Global Alert, in APAG Marketscan and in the Platts price database.

Platts Plans to End UKC-Med 27.5kt Assessment

On June 18, 2012, Platts announced that will discontinue its fuel oil United Kingdom/Continent-Mediterranean 27.5kt dirty tanker freight assessment on November 1, 2012. These rates are published in the Platts dirty Tankerwire and on Platts Global Alert page 946. Platts intends to discontinue this assessment on November 1, 2012.

This covers assessment codes:
- AAKXD00 - 27.5kt UKC-Med Daily worldscale
- AAKXI00 - 27.5kt UKC-Med Monthly average worldscale
- AAKXT00 - 27.5kt UKC-Med Daily $/mt
- AAKXO00 - 27.5kt UKC-Med $/mt monthly average

Platts to Discontinue FOB NWE Gasoline Cargoes

Effective January 2, 2013, Platts will discontinue the FOB NWE Premium Gasoline Non-Oxy and Regular Unleaded Non-Oxy assessments due to the changes in trading patterns. The gasoline quality reflected in both assessments no longer reflects a liquidly traded grade in Northwest Europe.

EEX Spins off Natural Gas Markets into a Separate Company

The Environmental Energy Exchange (EEX) set apart its Gas Spot and Derivatives Market into a company called EGEX European Gas Exchange, a hundred percent of which is owned by EEX. The spin-off was approved by the Exchange Supervisory Authority on June 21, 2012, during its general meeting in Leipzig. The company will commence operations retroactively, beginning January 1, 2012.

Natural Gas Spot and Derivatives Markets were launched in July 2007 and allowed market participants to trade in the German Gaspool and NCG market areas, as well as the Dutch TTF market around the clock. Additionally, the EEX established a reference price in short-term trading with the daily reference price, which is also used by German market area operators to settle control energy with all gas shippers, in accordance with requirements by the Federal Network Agency.

The volume traded has been increasing exponentially especially since the launch of the liquidity incentive model, doubling the volume in the first five months of the current year. In addition, 15.8 TWh have been traded from January until May 2012, compared to 7.7 TWh in the same period during the previous year. The liquid Spot Market forms the basis for the development of the Derivatives Market, in which traded volumes have risen by over 80 percent during the first five months in 2012.

(continued on the next page)
The significance of EEX prices in long-term natural gas trading will be supported further by the gas price index EGIX. This index is based on all exchange trades concluded in the coinciding current front month contracts of the NCG and GASPOOL market areas on the Derivatives Market.

With the company spin-off, natural gas trading will continue to be promoted in the existing and new market areas, as well as other European countries in the future. "We see great potential for cooperation with other exchanges and important players in the market also in the field of natural gas trading. The spin-off of the Spot and Derivatives Market to the new company facilitates the preconditions for a cooperation with other exchanges, trading platforms and market participants", explains Peter Reitz, Chief Executive Officer of EEX.

The graph below demonstrates natural gas products for different European hubs traded on EEX.

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Platts to Increase LNG Ship and Cargo Sizes

Effective August 1, 2012, Platts announced its plan to increase the standard ship and cargo size of 125,000-155,000 cubic meters (m³) to 135,000-175,000 m³ in its global LNG assessments. The larger cargo sizes are supposed to be reflected in Platts daily spot price assessments of the Japan/Korea Marker, Southwest Europe, Northwest Europe, DES West India, FOB Middle East and netback FOB Australia. Platts will normalize the assessments to reflect cargo sizes of 145,000 m³ in in the Asia Pacific, Atlantic day rate assessments and global freight costs. Platts will monitor changes in shipping practices to ensure its assessments are in line with shipping logistics.

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EEX Extends Incentive Model on Natural Derivatives Market

The liquidity incentive model was launched in August 2011 by the European Energy Exchange (EEX) and was initially scheduled to continue until the end of July 2012. On June 28, 2012, EEX announced that it will be extended three additional months. The model is based on the established volume for every market area (GASPOOL, NCG and TTF), and once thresholds are reached, participants will receive a certain bonus, which is paid out to the three most active trading participants in a specific market area on a monthly basis. The program includes all Day Ahead products for natural gas and automatically admits all trading participants in the Natural Gas Spot Market, with the exception of market area operators.

The incentive scheme resulted in a substantial boost in trading activities. During the first five months of 2012, 16.3 TWh were traded on the Natural Gas Derivatives Market, and compared with the same period in the previous year, corresponds to an 81-percent increase (January to May 2011: 9.0 TWh). Since the launch of the EEX incentive model for the Derivatives Market, the bonus has been paid out 19 times.

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ICE Extends Listing of Heating Oil Options Contract

Effective June 28, 2012, ICE extended its Heating Oil Options contract to include all contract months to December 2013 from the previous April 2013 contract month. It will also add an additional 12 months to the end of the series upon the expiry of the prompt December contract, so that up to 24 consecutive months will be listed.

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*Graph created with ZEMA
BM&FBOVESPA Launches Soybean Futures

On June 11, 2012, BM&FBOVESPA launched a new soybean futures contract available for trading. The new derivative is based on the settlement price of the Mini-Sized Soybean Futures Contract traded on the Chicago Board of Trade (CBOT), authorized for trading as of the August 2012 contract month, under the SJC ticker, from 9:00 a.m. to 3:15 p.m. The maximum daily price fluctuation is +/- USD 1.543 per 60-kilogram bag, from the previous day’s settlement price. The settlement prices of the Mini-Sized Soybean Futures Contract are calculated from the prices published on the CME Group website.

The soybean futures contract cash settled at the price of the product with the “transferred” status traded at the Paranaguá (Paraná) port, and settled in accordance with the ESALQ/BM&FBOVESPA Soybean Price Index, remains authorized for trading.

The launch of the new soybean contract is part of an agreement with CME Group aimed at promoting cross-listing of commodity futures and to meet demand from soybean market participants that face difficulty in trading on foreign exchanges. The new contract also facilitates hedging strategies through arbitrage between local and international prices.

Bursa Malaysia Lists Options on Crude Palm Oil Futures

Effective July 15, 2012, Bursa Malaysia Derivative listed options on Crude Palm Oil futures for the following trade date on CME Globex. The new product follows a new format for tag 107-SecurityDesc (OCPOJUL120335000C), as described below:

- Bytes 1-4 - product code
- Bytes 5-9 - instrument maturity in MMMYY
- Bytes 10-14 - strike price, left padded with 0 as needed
- Bytes 15-16 - 00 for non-fractional strike price; fractional part in two decimal places for fractional strike price
- Byte 17 - P for put option; C for call option

<table>
<thead>
<tr>
<th>CME Code</th>
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<tbody>
<tr>
<td>OCPO</td>
<td>Options on Crude Palm Oil Futures</td>
</tr>
</tbody>
</table>

CME to Launch Ferrous Scrap Futures

On June 20, 2012, CME announced its plans to introduce a new ferrous scrap futures product this fall based on AMM’s Midwest Ferrous Scrap Index that was launched last month. The new contract could provide hedging opportunities to scrap recyclers, mini mills and construction companies, who buy long steel products produced from steel scrap. As the price correlations between scrap, iron ore and steel are not high enough to manage risk in the scrap market, price volatility has become a major issue in that market. Trading volumes have totaled around 6,000 lots in January and February, but plunged to under 2,000 lots during the following two months.

SMX Launches E-Gold Futures

Effective June 13, 2012, the first E-Gold futures contract traded on the Singapore Mercantile Exchange (SMX) commenced and completed its first daily settlement. The contract, based on the Indian gold price, went live on June 1 and was settled following $16 million worth of trades.

India accounts for 27% of global consumer demand for gold, making it the largest physical market. By offering the E-Gold futures contract on the SMX and benchmarking it against one of the most liquid contracts from Asia, the market will become attractive for global members who want to hedge their price exposure to the Asian physical market represented by India.

TOCOM to Take Over Agricultural Market from TGE

In February 2013, the Tokyo Commodity Exchange (TOCOM) plans to launch an agricultural market that will accept the transfer of soybeans, azuki, corn and raw sugar contracts from the Tokyo Grain Exchange Inc. (TGE). Any open positions or orders remaining on the TGE market through the last trading session will continue to be traded on TOCOM’s new agricultural market, with TOCOM assuming responsibility for their management and seamless integration.

As shown in the example below, TOCOM is already trading energy, metals and other products like rubber.
HKEx Makes Acquisition Offer for LME

On June 15, 2012, The Hong Kong Exchanges & Clearing Ltd Investment UK (HKEx Investment) made a recommended cash offer to the London Metal Exchange (LME) to acquire 100% of LME’s issued and outstanding share capital, valued at GBP 1,388 million. The transaction will combine two leading global exchanges, enhancing HKEx’s position as an international exchange and facilitating their expansion strategy into commodity products. For the LME, leveraging the expertise of the HKEx and its track record in operating three clearing houses, it represents an opportunity for growth into Asia and the continued development of its own clearing house, LME Clear. This would enable the LME to launch new products and services more efficiently and reinforce its standing as the world’s price formation venue for base metals.

The LME board has until the end of July to accept the agreement, with the transaction closing in the fourth quarter of 2012.

HKMEx Signs MoU with Jiangxi Copper

June 10, 2012, a Memorandum of Understanding to jointly promote base metals trading was signed between the Hong Kong Mercantile Exchange (HKMEx) and Jiangxi Copper Corporation (Jiangzi Copper). The agreement means Jiangxi Copper can hedge and deliver their precious and base metals using HKMEx’s commodity futures trading platform, assisting the HKMEx with its strategic development by partnering with the leading mainland commodity producer. The partnership will focus on establishing benchmark pricing in Asia and seek out mutually advantageous business opportunities.
BM&FBOVESPA Launches New Exchange-Traded Fund

On June 15, 2012, BM&FBOVESPA launched a new exchange-traded fund (ETF) called Ishares Carbon Efficient Index with the ticker symbol ECOO11, and indexed to the Carbon Efficient Index (ICO2). ICO2 is comprised of shares of companies participating in the IBX-50 index that joined the initiative between BM&FBOVESPA and the Brazilian Development Bank (Banco Nacional de Desenvolvimento Econômico e Social/BNDES) through adoption of transparent practices related to their greenhouse gas emissions (GHGs).

BM&FBOVESPA currently has 14 ETFs available for trading, including four broad-based index funds - BOVA11, BRAX11, PIBB11 and DIVO11, indexed to the Ibovespa, IBX-100, IBX-50 and Dividend indexes respectively; six sector index funds - CSMO11, MOBI11, MATB11, FIND11, ISUS11, UTIP11 and GOVE11, indexed to the Consumer Goods, Real Estate, Basic Materials, Financials, Corporate Sustainability, Public Utility and Corporate Governance indexes respectively; and, two market cap index funds - SMAL11, indexed to the small cap index, and MILA11, indexed to the large cap index.

<table>
<thead>
<tr>
<th>BM&amp;FBOVESPA Code</th>
<th>ISIN Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>BOVA11</td>
<td>BRBOVACTF003</td>
<td>Based on the Ibovespa index which is made up of shares issued by companies in which there is over 80% of trading and financial volume on the Exchange.</td>
</tr>
<tr>
<td>BRAX11</td>
<td>BRBRAXCTF002</td>
<td>Based on the Brazil Index (IBX 100), which measures the return on investment in a theoretical portfolio made up of the 100 most traded shares on BM&amp;FBOVESPA in terms of number of transactions and financial volume.</td>
</tr>
<tr>
<td>CSMO11</td>
<td>BRCSMOCTF002</td>
<td>Consumption Index, which measures the return on investment in a theoretical portfolio made up of stocks issued by companies representing the cyclical and non-cyclical consumption sectors.</td>
</tr>
<tr>
<td>ECOO11</td>
<td>BRECOCCTF008</td>
<td>Obtains returns on investments that correspond, in general, to the performance, before fees and expenses, of the Carbon Efficient Index. The stocks are weighted in the Index portfolio based on the GHG emissions efficiency levels of the companies as well as on the free float (total shares outstanding) of each company.</td>
</tr>
<tr>
<td>MILA11</td>
<td>BRMILACTF003</td>
<td>Based on the BM&amp;FBOVESPA MidLarge Cap Index, which measures the return on investment in a theoretical portfolio of the large and mid-market capitalization companies listed on the Exchange.</td>
</tr>
<tr>
<td>MOBI11</td>
<td>BRMOBICTF005</td>
<td>Based on the BM&amp;FBOVESPA Real Estate Index, which measures the return on investment in a theoretical portfolio made up of shares issued by companies representing the real estate sectors comprised of civil construction, property agency and real estate investment.</td>
</tr>
<tr>
<td>SMAL11</td>
<td>BRSMALCTF002</td>
<td>Based on the BM&amp;FBOVESPA Small Cap Index, which measures the return on investment in a theoretical portfolio made up of shares in Small Capitalization companies on the Exchange.</td>
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<tr>
<th>Code</th>
<th>ISIN Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>DIVO11</td>
<td>BRDIVOCTF002</td>
<td>N/A</td>
</tr>
<tr>
<td>FIND11</td>
<td>BRFINDCTF007</td>
<td>Based on the Financial Index (IFNC), which is comprised of stocks issued by companies that represent financial intermediary, diversified financial services, and life and multi-line insurance sectors.</td>
</tr>
<tr>
<td>GOVE11</td>
<td>BRGOVECTF004</td>
<td>Based on the Corporate Governance Trade Index (IGCT), which is comprised of stocks issued by companies that compose the IGC, and simultaneously meet liquidity criteria.</td>
</tr>
<tr>
<td>MATB11</td>
<td>BRMATBCTF001</td>
<td>N/A</td>
</tr>
<tr>
<td>ISUS11</td>
<td>BRISUSCTF003</td>
<td>Based on the Corporate Sustainability Index (ISE), which is designed to measure the return on a portfolio comprised of stocks issued by companies that are highly committed to social responsibility and corporate sustainability, and to the induction of good practices in the Brazilian corporate environment.</td>
</tr>
<tr>
<td>PIBB11</td>
<td>BRPIBBCTF005</td>
<td>Based on the Brazil Index 50 (IBX-50), Index, which measures the return on investment in a theoretical portfolio made up of the 50 most traded shares on BM&amp;FBOVESPA in terms of liquidity.</td>
</tr>
</tbody>
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EPA Online Tool for Global Urban Infrastructure Investments

On June 20, 2012, details of a new online tool developed by the US-Brazil Joint Initiative on Urban Sustainability (JIUS) were announced at the Rio+20 conference in Rio de Janeiro by the US Environmental Protection Agency and the Brazilian Minister for the Environment. The interactive web platform contains a collection of policy instruments, financial mechanisms and project examples which have been assembled from a range of public and private-sector experts from Rio de Janeiro and Philadelphia, and features the best strategies for driving urban sustainability investment. Local officials, communities, developers and investors can use this website to identify the barriers to sustainable investment and ways to overcome them.

NOAA/NASA Implement Data from New Satellite

Effective June 26, 2012, data from the Suomi NPP Satellite, the joint mission between NASA and NOAA which observes the earth’s land, oceans and atmosphere, is being implemented in operational weather models only seven months after launch. The Suomi NPP satellite circles the Earth every 102 minutes, flying 512 miles above the surface, capturing data from the land, oceans and atmosphere and securing data using five state-of-the-art instruments on board that transmit information on atmospheric temperature and water vapor. This data is used to predict short-term and long-term weather forecasts. The pace at which information has become available and operational reveals the strength of the partnership and its commitment to enhancing future forecasts.

Suomi NPP Mission
WSI and Onsemble Launch WindCast RT for ERCOT

Effective June 28, 2012, WindCast RT, a new decision support tool designed to improve bal-day trading decisions was announced by Weather Services International (WSI) and Onsemble. Onsemble’s real-time hub-height observations from their network of sensors combined with WSI’s hourly-updating RPM forecasts of regional and ERCOT wind generation are presented graphically to facilitate monitoring and forecasting of wind fluctuations affecting trading decisions. Using WindCast RT, which provides more proficient forecasts than any other ERCOT updates currently available, traders can spot trends early, benchmark performance and capitalize on wind-based opportunities. Forecasts are issued every hour, out to 12-hours on the basis of wind data collected near the exact points of energy generation and at hub height.

WindCast RT is available here

MDA to Provide Settlement Values for CME Hurricane Index

Effective June 18, 2012, CME Group has selected MDA EarthSat Weather Group to provide weather settlement data for its hurricane products. MDA already collects weather settlement data for the CME Hurricane Index (CHI), which was developed to provide an estimate of hurricane damage. The risk of storms making landfall along the mainland of the US will be managed by this new CHI Contract.

Argus Expands Coverage of California, US RECs

On June 7, 2012, Argus launched a series of new market assessments for renewable energy certificates (RECs) and carbon markets in California, the western US and elsewhere. Expanding its California coverage, Argus enhanced its coverage of carbon allowances, including daily volume-weighted average date for December 2012 delivery. The new data will be published in Argus Air Daily. Also, the new California and additional Green-e instruments will make available key market data for power generators in California and throughout the western US. Argus added these assessments due to the increased trading and interest in the North American markets and to increase transparency.

BlueNext Spot Market Reopens and Launches EUAA Contracts

On June 21, 2012, BlueNext, the international exchange for environmental organized markets, specializing in CO2 emission allowances and credits, reopened its Spot Market. This move followed the June 20, 2012, migration to the single European Union Registry that was driven by implementation of security measures provided by the Union Registry, making BlueNext’s Safe Harbour Initiative and OTC Open Gate redundant. As of June, 964kt were delivered with 1.639 million tonnes traded since BlueNext Spot reopened. Subsequently, BlueNext launched an Aviation Allowance contract on its OTC registration system.

Argus Added Green-e Instruments Will Make Available Key Market Data for Power

The new data will be published in Argus Air Daily. Also, the new California and additional Green-e instruments will make available key market data for power generators in California and throughout the western US and elsewhere. Expanding its California coverage, Argus enhanced its coverage of carbon allowances, including daily volume-weighted average date for December 2012 delivery. The new data will be published in Argus Air Daily. Also, the new California and additional Green-e instruments will make available key market data for power generators in California and throughout the western US. Argus added these assessments due to the increased trading and interest in the North American markets and to increase transparency.

*Graph created with ZEMA

Environmental Markets and Weather Services

BM&FBOVESPA and São Paulo Government Develop Environmental Market

On June 5, 2012, BM&FBOVESPA, along with the São Paulo State Government’s Environment Secretariat and the Environmental Agency of São Paulo State, signed a protocol of intent that aims to study institutional and regulatory measures for the development of the environmental assets market. The initial focus of the protocol is on the Greenhouse Gas Emissions (GHG) and Legal Reserve Compensation segments.

The agreement includes creation of a technical proposal that describes the Environmental Market’s general characteristics, as well as the key aspects of the institutional and operational structure required for its implementation, including assets that may be used in transactions, their issue, registration, and trading.

In addition, the GHG segment requires determination of targets by relevant bodies, the creation of rules for emission reduction criteria and monitoring and double checking of corporate inventories. Meanwhile, prerequisites for the Legal Reserve Compensation segment include creation of rules for emission reduction criteria, and checking legal reserves along with approval by the state government. Other items on the agenda include the implementation of an operational structure, including registration system and trading platform for environmental assets to be in line with state and federal legislation.

MDA EarthSat Weather Enhances Dynacast 2.0 Product

Dynacast 2.0, the interactive analog mapping tool from MDA EarthSat Weather, has recently been upgraded to include a number of wind and data sets. Daily hub-height data-sets from 1950 onwards are available, and together with the enhanced features of the improved mapping tool, allow for the following:
- mapping anomalies of 80 meter wind speed averaged over selected dates in a set of years;
- 80 meter winds derived from the Climate Forecast System Reanalysis, and are tuned for best agreement with wind generation data from ERCOT and MISO;
- analysis of 80 m wind speed anomalies associated with global climate variability modes like El Niño and the North Atlantic Oscillation.

Vancouver temperature, % of humidity, % of sunlight and wind speed are shown in the following MDA Earthsat products example:

Data Source - MDA Earthsat*

*Graph created with ZEMA
CBOE Launches First Interest Rate-Based Volatility Index

On June 18, 2012, the Chicago Board Options Exchange (CBOE) began publishing values for Interest Rate Volatility Index (ticker: SRVX), created to offer a standardized and transparent measure of interest rate swap volatility to fixed income options traders and portfolio managers. The new index measures expected basis-point volatility in the interest rate swap market and is based on one-year/ten-year U.S. dollar-denominated swap options (swaptions). These swap options are one of the most actively traded contracts in the over-the-counter (OTC) U.S. dollar interest rate option market.

The SRVX index is derived using data provided by major interdealer brokers in the swapoten market, applied to a formula similar to the methodology for the CBOE Volatility Index (the VIX Index). CBOE initially will disseminate the index value once a day after 3 p.m. Central Time. The index value will be available from quote data vendors and on CBOE’s website.

NASDAQ OMX Plans to Launch NASDAQ OMX NLX

On June 22, 2012, NASDAQ OMX announced its plan to launch a new London-based trading venue, NLX, to offer a range of both short-term interest rate and long-term interest rate euro- and sterling-based listed derivative products. The new trading venue set to be launched by Spring 2013 aims to enhance the competitive landscape by providing highly competitive execution and clearing fees and significant margin efficiencies. In Europe, the introduction of new rules which standardize swaps so they are suitable for trading on exchange-like platforms and central clearing has presented new opportunities for European derivatives trading venues. It is interesting to note that the United States plans to adopt similar reforms as part of the Dodd-Frank Act.

NLX is partnering with LCH.Clearnet to provide all post-trade services. Having a single platform for both short-term interest rate and long-term interest rate euro- and sterling-based listed derivative products would have the potential to save costs significantly for market participants. In particular, users will benefit from collateral efficiencies, with listed products across the yield curve cross-margined within a single clearing risk pool using LCH.Clearnet’s proprietary value-at-risk-based margining methodology.

Currently, derivative trading in Europe is dominated by Deutsche Börse-owned Eurex and NYSE Euronext’s Liffe markets. Some subject matter experts like Richard Perrott, exchange analyst at private German bank Berenberg, believe NLX’s move may pose a “moderate threat” to the dominance of Eurex and Liffe. However, competing in this market is challenging as investors are likely to stick to platforms where they already have collateral posted without new and innovative offerings.

Deutsche Börse and GreTai Securities Market Sign MoU

On June 25, 2012, Deutsche Börse signed a Memorandum of Understanding (MoU) with the Taiwanese GreTai Securities Market (GTSM) to exchange information in order to facilitate the further development of both financial markets. Based on this agreement, the two partners are to share knowledge and information on various business areas and regulatory developments and to assess potentials for cooperation in trading and listing. Gordon Shuh Chen, Chairman of GTSM expressed his opinion in an interview: “While continuing our efforts to deliver transparent, secure and efficient trading services, we are pursuing opportunities for learning and cooperation with Deutsche Börse. The GTSM would like to explore diversity and innovation of services and products and trading momentum that would mutually benefit both markets.”

MOF and HKEx Sign MoU

On June 22, 2012, a Memorandum of Understanding (MoU) between the Ministry of Finance of the People’s Republic of China (MOF) and the Hong Kong Exchanges and Clearing Ltd (HKEx) was signed, permitting the MOF to list and trade RMB-denominated sovereign bonds on HKEx. The MOF plans to list the first batch of sovereign bonds of RMB233 billion on HKEx’s securities market, aiding the economic development of Hong Kong and cementing its position as an international financial center.

Hong Kong Exchanges and Clearing Limited (HKEx), Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) signed an agreement to establish a joint venture (JV) in Hong Kong within the next three months, aimed at developing financial products and related services. Its focal business involves the development and franchising of index-linked and other equity derivatives products - the compilation of cross-border indices based on products traded on the three exchanges. In addition, the Joint Venture will develop industry classifications for listed companies, information standards and information products, as well as market promotion, customer services, technical services and infrastructure.

The initial phase involves development of a series of cross-border indices in which a family of index products will be introduced. This series of indices will include a benchmark cross-border index that comprises large Mainland enterprises listed on HKEx’s wholly-owned subsidiary. The Stock Exchange of Hong Kong Limited, SHSE and SZSE, and two indices based on this cross-border index - an index comprising A-share constituents and an index comprising Hong Kong market constituents. The index products will include equity index futures and options based on these indices, and they will be traded on HKEx’s derivatives market.

The Joint Venture’s board consists of nine members, three of which are nominated by each of the exchanges. In addition, SHSE and SZSE will propose a Joint Chairman from their representatives on the board, similarly to HKEx nominating the Chief Executive from its elected directors. The initial paid-up capital for JV is $300 million, with an equal contribution from the three exchanges, as well as equal shareholding interests.

SPX Variance Strips to be Traded in a Single Transaction

On June 19, 2012, the Chicago Board Options Exchange (CBOE) announced its plans to introduce a new process for trading SPX variance strips in a single, fully electronic transaction, aimed at qualified professional investors. Trading in SPX Variance Strips (ticker: VSTRP) employs a quoting convention similar to the over-the-counter method of variance strips quotation with the following specifications:

- Prices will be quoted in volatility points.
- Trade quantities will be expressed in contracts; each variance strip “contract” features a multiplier (for example: $25,000, $50,000, and so on) that reflects the aggregate vega exposure—sensitivity to the underlying instrument’s volatility—of the SPX options comprising the variance strip.
- The expiration date of the SPX variance strip will correspond to the expiration date of the SPX options series.

The SPX Variance Strip will be broken up into separate transactions in several SPX options series, as soon as the trade is executed. The conversion process employs the formula for the CBOE Volatility Index (VIX) and calculates the quantity and price for each SPX option comprising the matched variance strip. The Options Clearing Corporation (OCC) will be used for clearing process.

For more information on SPX Variance Strips click here
**CME Introduces Options Open Interest Profile Tool**

On June 12, 2012, CME introduced graphic representations of open interest and strike prices for Metals, Energy, and Agriculture options on the CME Group Options Open Interest Profile tool. This will allow better price discovery by providing users with the ability to monitor open interest trends and tendencies. This new functionality offers more flexibility and visibility based on product specifications, trade date, contract month, and put/call open interest across the strike range.

**NASDQ OMX Commodities Introduces New Products**

On June 18, 2012, NASDAQ OMX Commodities introduced new trade types of UK Spark Spreads and extension of CO2 curve. The new order types introduced are Stop Loss orders and Linked Orders. Linked Orders allow traders to specify either-or conditions for trading in instruments, whereas Stop Loss functionality features both regular Stop Order and Market if Touched Stop Order. The UK market offering has been further extended with Spark Spreads to combine products including UK Power futures and UK Gas futures with nomination in MW/GBP. Also, the European Union Allowance futures curve has now been expanded to include the December contracts for the years 2015 to 2020 inclusive, and the Certified Emission Reduction futures curve has been extended to include the December contracts for years 2013 to 2020 inclusive.

**Platts Delists NWE PS Gross Prices**

Effective June 27, 2012, Platts decided to delist its European gross contract price assessments for general purpose polystyrene (GPPS) and high-impact polystyrene (HIPS). The FD NWE contract price assessments that reflected a conversion from FD Germany gross GPPS and HIPS prices will now reflect a conversion from net prices.

The following assessments are affected:
- GPPS Currency Oracle codes
- FD Germany Eur/mt HPAMO00
- FD Holland Eur/mt HPAMP00
- FD Italy Eur/mt HPAM000
- FD France Eur/mt HPAMR00
- FD Britain Eur/mt PHAMS00
- FD Spain Eur/mt HPAWL04
- HIPS Currency Oracle codes
- FD Germany Eur/mt HPAMT00
- FD Holland Eur/mt HPAMU00
- FD Italy Eur/mt HPAMV00
- FD France Eur/mt HPAMW00
- FD Britain Eur/mt PHAMX00
- FD Spain Eur/mt HPAWN04

The discontinuation follows the introduction of the free-delivered net contract price assessments for Northwest Europe GPPS and HIPS on September 1, 2010.

**LIFFE Terminates Clearing by LCH.Clearnet LTD**

June 29, 2012, LIFFE Administration and Management (LIFFE), the international derivatives business of NYSE Euronext (NYX), formally gave notice to terminate its services agreement with LCH. Clearnet, favoring to support NYSE Liffe Clearing, NYX's derivatives clearing service based in London. NYSE Liffe Clearing devises to operate as a fully integrated Central Counterparty (CCP) from the end of June 2013, subject to regulatory approval, and intends to deliver substantial operational and marginal efficiencies for its clients. Depending on further regulatory approval, NYX proposes that NYSE Liffe continental derivatives markets in Amsterdam, Brussels, Lisbon and Paris are all migrated to NYSE Clearing in London following commencement of operation of NYSE Clearing as a fully integrated CCP. In doing so, NYX shareholders benefit from further synergies and customers benefit from the capital and operational savings.

**Tocom to Delist Nikkei-TOCOM Commodity Index Futures**

The Nikkei-TOCOM Commodity Index Futures Contract (TOCOM NEXT) will be delisted from the Tokyo Commodity Exchange, Inc. (TOCOM), effective September 28, 2012, with no new contract months listed for TOCOM NEXT. TOCOM lists precious metals, aluminum, oil and rubber on its exchange. Publicizing of the Nikkei-TOCOM Commodity Index and the Nikkei-TOMCOM Sub Commodity Index will continue to only deliver benchmarks for the evaluation of various financial instruments. The Minister of Economy, Trade and Industry will verify the schedule for the delisting process.

For contract specifications click here

**BVC, TSX and TSX Venture Exchange Sign MoU**

On June 7, 2012, a Memorandum of Understanding (MoU) endorsing cooperation and collaboration among the securities markets of Colombia and Canada was signed by Bolsa de Valores de Colombia (BVC), Toronto Stock Exchange (TSX) and TSX Venture Exchange. The MoU seeks to bring both markets together and facilitate the dual-listing of companies in each other’s territory, adding liquidity to shares and allowing investors greater choice in where they can trade.

As of April 30, 2012, there are five dual listings between TSX and BVC, 19 companies listed on TSX and 43 companies listed on TSX Venture Exchange with operations in Colombia.
New York electricity day ahead prices increased significantly in July as compared with June, in line with warm weather seasonal demand. NEPOOL electricity prices remain steady, as August NYMEX gas price drops and plateauing demand curtailed price increases. California electricity prices ticked up, pushed by increased demand.

Average daily temperatures increased in July compared with temperatures in June. Chicago, New York and Boston all experienced short temperature spikes, with Chicago spiking above 90°F during the first week of July.

Electricity futures continued following trends described in June 2012 DataWatch. Long-term trends remain consistent, with price per megawatt hours in all three observed regions increasing incrementally from 2013-2016.

European carbon reduction programs traded on ICE have not changed significantly compared with prior months. Prices still expected to increase sharply in future years as regulatory requirements tighten.
ICE Henry Hub natural gas futures edged up in July as compared with June, due mostly to hot seasonal weather along the US Gulf Coast, with no other significant news affecting the supply development or demand.

Algonquin gas transmission constraints caused by government mandated inspections in the New York area during mid-June were resolved, resulting in a decline of natural gas spot prices in the New York area. High seasonal temperatures failed to drive demand at Henry Hub or at Chicago CityGate.

WTI and Brent Crude Oil futures ticked upwards slightly in July, balanced between two diverging drivers: the continued weaknesses in the Chinese and European economies and the geopolitical uncertainties caused by the Obama administration’s expanded sanctions on Iran.
Argus Acquires DeWitt, Expands into Petrochemical Reporting

Houston, 15 July 2012
Global energy and commodity price reporting agency Argus Media Inc today announced the acquisition of DeWitt & Company Inc (DeWitt), a provider of market assessments and business intelligence to the petrochemical industries.

DeWitt provides valuable and unique intelligence on the global petrochemicals market. DeWitt’s reports cover global trade and pricing for aromatics, olefins, butadiene, methanol, MTBE, hydrocarbon resins and other petrochemicals. Founded in 1973, DeWitt publishes nearly 200 price references, which are widely used for benchmark pricing and analytical purposes. DeWitt also performs bespoke consulting services and publishes multi-client studies.

Argus Media chairman and chief executive Adrian Binks said: “We are delighted to welcome DeWitt to Argus. DeWitt is a well known and respected brand within the petrochemicals sector and is a natural complement to Argus’ existing strength in crude oil, refined petroleum products and LPG. DeWitt has an excellent reputation for providing intelligent and detailed analysis to its impressive range of customers. We look forward to working with DeWitt to develop our combined product offering further.”

DeWitt senior vice president Edgar Acosta said: “We are very pleased to be joining Argus and benefiting from Argus’ international reach and wide product range. We will be able to offer enhanced services to our customers and we will be developing new products together to meet the needs of our combined customer base.”

Terms of the acquisition were not disclosed.

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Argus Launches World’s First Composite Nitrogen Fertilizer Index

London, 12 July 2012
Global energy and fertilizer price reporting agency Argus has introduced a new global composite nitrogen fertilizer index in today’s Argus FMB Nitrogen report. The new index includes prices for ammonia, urea, UAN solutions, ammonium nitrate and ammonium sulphate. The Argus Nitrogen Index is constructed using 11 pricing points for the Black Sea, the Baltic, the US Gulf, Egypt and the Middle East.

The Argus Nitrogen Index will provide a weekly snapshot of the global nitrogen market, smoothing out product and geographical volatility to present an easily understood composite and representative price. Argus has introduced the new index in response to industry requests.

Argus indexes are widely used across international energy markets for physical and derivative trading. They include the Argus Euro-Bob price, which is the benchmark for northwest European gasoline trading, the ASCI benchmark, which is the reference price used by Saudi Arabia, Kuwait and Iraq to sell sour crude into the US, and the AFEI, ANSI and cif ARA indexes, which are used for pricing LPG in Europe and Asia Pacific.

“We hope that the new Argus Nitrogen Index will offer the fertilizer industry a useful price reference and potential hedging tool,” Argus Media chairman and chief executive Adrian Binks said. “We are always happy to develop new instruments to meet the needs of our customers and the wider fertilizer and energy markets.”

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Argus Launches Iraqi Basrah Light Crude Assessment for Asia

Singapore, 2 July 2012
Leading energy and commodity price reporting agency Argus today announced the launch of a new price assessment for Asia-bound cargoes of Iraqi Basrah Light crude, the fastest-growing crude stream in the Mideast Gulf this year. The new price assessment will be published in the daily Argus Crude market report from 2 July.

Argus has launched its new Basrah Light assessment in response to industry requests to reflect the growing importance of Iraqi crude in the Asia-Pacific market. The assessment will be done by comparing Basrah Light’s value with the average of Dubai and Oman crudes, publishing a differential to the grade’s official formula price and an outright value.

Increasing Iraqi crude production has helped refiners to compensate for declining supplies from Iran, the second-biggest crude producer in the Mideast. The installation of two single-point mooring platforms off Iraq’s southern coast has buoyed Basrah Light exports to about 2.2mn b/d since April from an average 1.6mn b/d in the previous two years, boosting the liquidity of spot trade.

Producers of Iraqi crude have sold most of the incremental Basrah Light shipments to Asia-Pacific, particularly to India and China, where complex refining capacity is expanding. Rising demand from major Asia-Pacific consumers and reduced crude exports from Iran make Basrah Light more relevant as a base-load crude, enhancing its potential as a future Mideast Gulf benchmark.

LNG Price

London, 11 July 2012
Leading energy and commodities price reporting organisation Argus has launched the LNG industry’s first west Africa fob (free-on-board) spot price assessment, called the AWAF price. Spot LNG volumes in west Africa are increasing and will soon be augmented by exports from Angola’s new LNG facility, which should enable a further expansion of the region’s spot market.

The new Argus west Africa fob (AWAF) price assessment is designed to capture LNG trade at export facilities in Angola, Equatorial Guinea and Nigeria. The assessment windows cover cargoes for loading within two forward half-month periods, taking into account loadings for the second and third full half-month periods from the date of assessment.

Argus’ west African market coverage complements the Argus LNG Daily report’s existing suite of Asia-Pacific and European spot price assessments, market commentary and global netback pricing.

“LNG trade is expected to grow in the coming years, as an influx of newly built LNG carriers will increase shipping flexibility, enabling more companies to buy cargoes on a fob basis,” Argus Media chairman and chief executive Adrian Binks said. “The launch of the AWAF price assessment in the Argus LNG Daily report marks a new chapter for the LNG industry, as Argus becomes the first price reporting organisation to assess trades at loading ports in west Africa.”

The Argus LNG Daily report provides spot price assessments for Asia-Pacific, the Middle East and Europe, information about shipping movements, market-moving news and analysis. The report has been carefully designed to provide global LNG market participants with the critical insights and key LNG statistics and data needed to stay ahead of market developments, as well as to help shape commercial strategies.

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MDA EarthSat Weather

MDA EarthSat Weather offers a variety of data and reports used throughout the energy, agriculture, and weather markets. In addition to providing the basic data products used by traders worldwide throughout these industries (historic, ongoing, and forecast temperatures, precipitation, wind, etc.), EarthSat goes beyond the numbers to provide unique datasets tailored for traders in each industry.

2012 U.S Drought Data and Information

With a historic drought currently impacting more than half of the nation, many comparisons are being made to the Dust Bowl era of the ’30s. In response to the drought, we have compiled precipitation data from across the Plains and Midwest from the ’30s and issued a special report on our findings comparing it to the current event. We have also produced special satellite assessments that provide an overview on the vegetative health of the region. Furthermore, two members of the EarthSat Weather team will be embarking on a Crop Tour during the week of July 23rd, assessing the damage that the heat and drought has done to the agriculture from Nebraska to Ohio.

They will be providing exclusive updates during their travels on a daily basis, giving a first-hand account of how things look from the ground.

We have plenty of other tools that can be used to track the drought such as our Ag On-Demand global weather interface that has access to over 900 domestic stations. A screen shot from Ag On-Demand of the percentage of normal precipitation across the Corn Belt since June 1 is seen in the image below. Daily previous day data and forecast feeds are also available for numerous weather stations throughout the drought-affected regions. These MDA EarthSat products work together to help decision-makers stay ahead of the curve on global weather conditions that have critical impact on the commodities markets.

ZEMA Adds New Data Reports

ZE is continuously growing its data coverage. Our highly flexible data parsers can collect information in any electronic format, from any source and at any frequency. Since the DataWatch June 2012 issue, ZEMA has added the following data reports to its collection:

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<td>Reuters</td>
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Platts Biofuels Alert Service and Market Data Launching September 1st

Platts Biofuels Alert (PBF) service launching Sept 1st is new real time product dedicated to the growing Biofuels industry. Global biofuels content will include US-Europe-Asia-South America ethanol and biodiesel price assessments and commentaries, regional plant operating and production rates, crushing rates, plant projects pages, biofuels and soft commodities news and analysis, among others. The four distinct content areas will include:

1. MTBE
2. ETBE
3. Ethanol
4. Biodiesel

Whilst Platts has covered biofuels previously in Platts Global Alert and Platts Petrochemical Alert, the new PBF alert will offer customers complete coverage of Platts biofuels price assessments including our ethanol benchmarks, along with market leading news and commentary in one package. Market Data – Biofuels will consolidate data from 11 former categories to BF.

For any further information regarding the Biofuels launch please email biofuels@platts.com

WAPA Chooses EOX Holdings' Natural Gas and Power Forward Curves

June 26, 2012 - EOX Holdings, a wholly owned subsidiary of OTC Global Holdings LP (OTCGH), formally announced today that the U.S. Department of energy’s Western Area Power Administration (WAPA) will use its natural gas and power forward curves for its Risk Management Program.

Providing internal price validation and highly accurate mark-to-market results in addition to price discovery, the forward curves leverage OTCGH’s breadth of brokerages. They are derived from the leading independent interdealer broker’s EOXLive broking/trading platform, which is well-known in the commodities sector for its ability to combine the convenience of electronic trading with voice broking’s unique ability to provide market color and create bespoke transactions.

To learn more about EOX Holdings’ end-of-day forward curve products and other data offerings, visit our website at www.eoxlive.com.
In this article, we continue to discuss how shale gas expansion in the U.S. affects natural gas price projections and what factors influence its supply and demand (Part One in the May 2012 DataWatch). Liquefied natural gas (LNG) is frequently quoted as a major factor driving demand for this expansion. LNG has its own multiple influencers and we decided that it deserves a separate chapter. LNG prices, when they drop to low levels, may have a damping effect on the development of shale gas plays. The appearance of new LNG producing nations and shifts in global import patterns will have a direct impact on U.S. exports. Other factors, like new commercial uses of LNG as an independent fuel for ships and heavy duty machinery, bring another perspective to the argument, and affect demand for LNG in domestic and international markets.

LNG as an Alternative Fuel

An abundance of LNG is inspiring ideas for new applications for its use. LNG is no longer viewed solely as a state of gas that is convenient for transportation over large distances, but also as an independent fuel that has many benefits compared to gasoline and diesel. Compared with other fuels, LNG is cheaper per British thermal unit, and it burns cleaner than other fuel types, which makes it a reasonable solution for jurisdictions with strict emission reduction targets; for example, a truck powered by a duel fuel LNG-diesel engine emits 75% less NOx and about 13% less CO2 compared to diesel-only powered trucks.

LNG has already been used as an alternative vehicle fuel in heavy-duty trucks, buses, waste collection trucks, locomotives, and other vehicles in the U.S. for more than 15 years. According to the EIA, the U.S. already boasts a number of LNG stations, the majority of which are located in California and Texas. There are plans to open a large network of these stations along major highways, as shown in Figure 1.

Aside from state incentives supporting expansion of an alternative fueling infrastructure (for example, Natural Gas Vehicle and Fueling Infrastructure Grants in Texas that offer $250,000 for an LNG station), private businesses also make a contribution to this trend. The Clean Energy California LNG Plant began operations on November 11, 2008 intending to be the major supplier for the Clean Truck Program for the ports of Los Angeles and Long Beach. Chesapeake Energy committed $150 million to help build a network of fueling facilities along major U.S. interstates from Los Angeles to Houston to Chicago. UPS has a fleet of heavy tractor trucks running on LNG, and is building LNG fuel stations along the route linking Ontario, California and Las Vegas. Volvo Trucks announced plans to launch an LNG engine for North America in 2014.

LNG has been considered as an alternative fuel for road transportation in other countries, with more than 4,000 LNG-fuelled vehicles used globally. Australia has been using LNG as an alternative fuel to diesel since 2001, and the Chinese government will release “fuel to gas” regulations for vehicles to support an already existing fleet of LNG-run transportation.

Road transportation is not the only industry targeted by LNG producers. The use of LNG to power car and passenger ferries was implemented in Norway in the year 2000. Short distance sea traffic accounts for about one-third of all marine transports in the world, and LNG is being considered by Europe, the U.S. and Canada as an alternative fuel for ferries.

Mining, which consumes significant quantities of diesel, is already undergoing the conversion of onsite hauling vehicles to the use of LNG. Railroads have started replacing diesel with LNG to power locomotive engines. Combined heat and power technologies, which produce electricity or mechanical power and recover waste heat for process use, is another target for LNG producers, especially in remote areas where LNG can be delivered without electricity, natural gas or oil transmission systems.

LNG is natural gas cooled to about -260°F (-160°C) to a liquid form; this allows it to be stored in amounts about 600 times smaller than in its gaseous form. In this compact state, natural gas can be shipped in special tankers to receiving terminals in importing countries. At these terminals, LNG is vaporized to its gas phase and transported by pipeline to consumers.
As with any emerging technology or energy source, such as LNG uses as an alternative or even primary fuel, there is often uncertainty about its future. Add to that government policy that oversees often complicated environmental incentives, and you have a direct impact on demand for LNG and how it will play out.

The progress of the LNG market is driven by technological advancements, which in turn are impacted by changing economic conditions, requirements for energy-consuming economies and natural gas demand, and more importantly, profit margins.

**Economic Incentives: Cost vs. Price**

### LNG Costs

LNG costs can have a weighty impact on LNG development. If they rise considerably, all positive backing of the LNG expansion can be diminished or even eliminated. When added to the fuel cost, they can be justified only when LNG market prices are sufficiently high.

LNG costs comprise the cost of transportation of the gas to a gas liquefaction facility, liquefaction, shipping, storage and regasification, as shown in Figure 2. LNG infrastructure is expensive; its construction and operation is heavily regulated and complex.

Regasification and storage costs have not been a topic of any serious discussion; typically, a minimum storage and regasification cost is accepted at $0.20/MMBtu.

The cost-competitiveness of the U.S. liquefaction projects relative to those at other locations has an impact on prospects for U.S. LNG exports. Infrastructure costs are significant, and the upward trend of the liquefaction cost prompts developers to concentrate on expansion of already existing facilities to make use of present natural gas processing plants, pipelines, and storage and loading facilities. This allows reduced costs relative to those that would be incurred by “greenfield” projects.

Meanwhile, rising global LNG prices continue to provide encouragement for the development of gas resources. Given the natural gas price forecasts do not drop from current levels, project developers will continue building terminals and sending shipments to more profitable markets.

### LNG Global Prices

Demand for LNG in the U.S. is driven mainly by economic factors—very low domestic natural gas prices exceeding those in global markets.

The cost of delivery to a liquefaction facility varies substantially depending on the location of LNG facilities, their distance from the production region and availability of the pipeline system. While LNG facilities are located along ocean shoreline to ensure easy access to international waterways, their proximity to gas-bearing plays is crucial in setting transportation costs.

The cost of liquefaction is most contentious and disputable, and is usually referred to as a metric when comparing LNG projects. Liquefaction is typically the most expensive element in any LNG project. Newer LNG plants are usually designed to benefit from economies of scale; hence, they are larger, have more efficient trains, and in the case of adjoining plants, have shared facilities, thus minimizing unit costs. However, the long-term declining cost trend seems to have been recently reversed. In 2010, Cheniere Energy said it would charge between $1.40-1.75/MMBtu for liquefaction. In 2012, Dominion estimated liquefaction fees at Cove Point of $4/MMBtu. Woodside’s Pluto project announced costs five times greater than plants built a few years ago.

As shown in Figure 3, the spread increased in 2012, when Henry Hub prices reached levels not seen since 2002. The price of LNG in Japan has moved even higher than European prices.

In 2007-2009 the difference between spot natural gas prices in the U.S. and Europe was negligible. It changed with rapid shale gas development in the U.S. in 2010 and rapid growth in LNG trading around the world. Since that time, U.S. and European prices of natural gas have diverged. U.S. prices have been moving lower while European prices have been constantly increasing.

LNG is typically transported in refrigerated, insulated tanks in ships. On a typical trip, about 0.1%–0.25% of the cargo converts to a gaseous phase daily, which some ships use as a fuel. Most LNG plants have their own fleet of LNG ships. With the development of LNG markets and an increase in LNG short-term and spot trades, ships are discharging their cargoes wherever the prices are best, making it a bit more complicated to develop price forecasts.

The availability of the operating vessels at each particular point in time becomes of the utmost importance for producers to who want to exercise arbitrage opportunities. According to various sources, the unit cost of LNG shipping varies from $0.2/MMBtu to $1/MMBtu. LNG receiving terminals, or regasification facilities (located onshore or offshore) receive LNG, store it, vaporize it and send the gas into a pipeline.

Figure 2: LNG Cost Components

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As shown in Figure 3, the spread increased in 2012, when Henry Hub prices reached levels not seen since 2002. The price of LNG in Japan has moved even higher than European prices.
Shale Gas: More Complications for Price Forecast Developers – Part Two

Pricing Mechanisms of LNG Contracts

The basis on which natural gas is sold and priced varies dramatically between global markets. There are four pricing mechanisms applied in different parts of the world.

1. So-called “gas-on-gas pricing” prevailing in North America and the UK is set in liquid gas markets with a large number of buyer and sellers and limited governmental intervention. There are multiple pricing points with benchmarks set by market mechanisms; in the United States, this is Henry Hub; in the UK, it is NBP. These markets have extensive pipeline and gas storage systems, allowing gas to be traded on spot and future contracts. In such conditions, market power is difficult to exercise leading to efficient markets and lower prices.

2. Another pricing mechanism is present when gas is priced in relation to other fuels - usually crude oil - and is quoted by a formula indexed to oil prices. This is typical for regions such as Europe and Southeast Asia, regions that have historically been strongly affected by oil prices. This gas market is relatively weak, and price is directly correlated to the price movements of oil.

3. Japan, Korea and Taiwan have limited resources and the majority of their gas is delivered as LNG from the Middle East, Southeast Asia, South America and Africa. Prior to LNG, power utilities relied on imported crude oil and coal. After the oil crisis of the 70s, LNG came into the play; however, prices remained linked to oil. The LNG price is calculated on the basis of the weighted average of Japan crude oil import price, known as the Japan Crude Cocktail price. The “S” curve concept includes a ceiling ensuring that oil shocks would not translate into higher gas prices, and a floor guarantees the seller a minimum price irrespective of a drop in oil prices.

4. The last pricing mechanism exists in heavily regulated non-transparent markets, where the gas markets are controlled by the state, such as Russia. The gas prices are set on a state level and all supply is entered into a gas pool.

As shown in Figure 5, gas price movements have historically been following crude oil prices. However, in the U.S., oil and gas prices ceased tracking each other in 2008 as oil prices continued to rise and gas prices dropped because of a growing supply.

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<table>
<thead>
<tr>
<th>Figure 4: Global LNG Estimated August 2012 Landed Prices</th>
<th>Figure 5: WTI Crude Oil Prices vs. Henry Hub Natural Gas Prices</th>
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<td>The price disparity is significant and is a critical driver of U.S. developers’ interest in investing in liquefaction projects. That interest relies on a natural gas price forecast that supports a sustained price gap. Liquefaction projects take up to four years to permit and build, and are intended to run 15-20 years or more. To support investment decisions, it is very important to foresee market conditions and market prices over this period of time. The current wide disparity in natural gas prices is likely to narrow as natural gas markets become more globally integrated. The question is how quickly this convergence occurs and to what extent. It is not clear how prices will be affected in regions with different pricing mechanisms that are under “gas on gas” competition versus indexed to crude oil prices.</td>
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*Graph created with ZEMA*
An increasing and sustained gap encouraged buyers of oil-linked gas contracts to question the value of linking the price of the commodities. As the number of buyers and sellers of gas in these markets has been increasing, the link to oil prices started weakening.

In particular, pricing for Sabine Pass Liquefaction’s LNG sales contracts is based on Henry Hub pricing. The 20 year agreement between Cheniere Energy, Inc. and BG Group to begin shipping gas is likely starting in 2015. The contract calls for BG to purchase 3.5 million tons a year at 115% of the Henry Hub price plus a fixed fee of $2.25/MMBtu.

Currently, Asian markets remain supportive of the oil-linked pricing. Peter Cleary, Vice President of Strategy and Corporate Development at Santos (developer of the Gladstone project), stated that Asian LNG long-term contracts will remain linked to the price of oil for the foreseeable future, as "oil-linked pricing has worked in Asia because buyers are comfortable that oil is an established, well-understood and globally traded commodity...Producers also support oil-indexed pricing, (because) strong prices are required to underpin new projects."10

Nevertheless, signs of change in perception of the oil-indexed mechanism validity have been noted. Thus, while Australian LNG projects continue selling their LNG for a Japan Crude Cocktail price, their pricing curves are lower than those that existed in 200811.

In Europe, natural gas prices have been dependent on non-flexible contractual structures and pricing mechanisms for long-term Russian gas export contracts with oil indexation. Figure 6 displays Gazprom’s gas export contract price stepped mechanism, which clearly follows the level of the Brent price.

![Figure 6: Gazprom Oil-Indexed Gas Contract Prices vs Natural Gas and Crude Prices](image)

The widening spread between natural gas spot markets and oil-linked contract prices is putting pressure on the oil indexation mechanism. European utilities are likely to either break the existing contracts with Gazprom, challenge provisions in arbitration, or at least not extend contracts expiring in the near term, as the European utilities are currently losing money on power produced from Russian gas. European customers, such as RWE Group, E.ON-UK or Polish PGNiG, are now challenging the oil link. Turkey’s Botas was the first customer that decided not to extend a 6 bcm contract expiring in 201212. European customers will continue to minimize imports from Gazprom.

Russia, however, started to accept lower prices for its natural gas and is now allowing a portion of its sales in Europe to be indexed to natural gas spot markets, or regional market hubs, rather than oil prices13. It’s possible that Gazprom just applies temporary discounts with the expectation that the tightening market will make oil and gas prices recoup in Europe. Meanwhile, potential Asian buyers may either try to negotiate an LNG sales price that is delinked from oil, or at least push for a lower indexed price due to the perceived market effects of North American priced gas.

It is a commonly held expectation that in time, continued globalization of markets will support switching to ‘gas-on-gas’ markets. The LNG pricing mechanism, if revised, may have a substantial impact on market prices by putting a downward pressure on the overall LNG price level for Japan and Asia.

**Global LNG Trade: More Opportunities and More Confusion**

Ever since the world’s first commercial LNG plant in the Algerian port city of Arzew started delivering to the United Kingdom in 1964 under a 15-year contract, the pattern of the LNG trade has been shifting and changing. Figure 7 demonstrates how LNG global trade flows changed between 2005 and 2011.

![Figure 7: LNG Trade Flows](image)

Changes take place in the importing as well as exporting camps. The number of LNG producing countries steadily continues to grow, from 8 in 199614 to 15 in 2012, with 26 existing terminals and approximately 65 liquefaction terminal projects either proposed or under construction.15

Indonesia has remained a leading LNG producer since its first shipment in 1977, until recently. In 2011, three importing terminals were built in the country. Indonesia, once the world’s largest LNG exporter, now imports from the Middle East to support areas with dense population, while maintaining liquefaction terminals located in more remote areas.

Malaysia and Brunei have been producing LNG from offshore gas reserves since 1972 and 1983, respectively. Most of Malaysia’s output, and nearly all of Brunei’s output, are sold to Japan. Malaysia, once the world’s second largest LNG exporter, plans to receive its first LNG imports in 2013. Europe ceased to be a pure importer when its first LNG export facility started operation in 2007 in Northern Norway. That was when Statoil’s Snøhvit project began recovering gas from the offshore Barents Sea gas field. South America is experiencing growth in its exporting capacity. Argentina recently built two export terminals. Bahía Blanca, built in 2008, was the first of its kind in South America, with a capacity of 400 million cubic feet of natural gas per day. Escobar, with a capacity of 500 million cubic feet, entered service in 2011. In 2010, the first Peruvian LNG came to life in Pampa Melchorita.

(continued on the next page)
Papua New Guinea is likely to build an exporting terminal (a joint venture between ExxonMobil, Oil Search, Santos, AGL, Nippon Oil and Mineral Resource Development Corporation) in Port Moresby in 2013. New gas discoveries in East Africa may put Mozambique and Tanzania into the top ranks of the world's LNG exporters.

Russia is sending ships from Sakhalin and is building a terminal on Yamburg. A Murmansk project has also been approved, and five more facilities are being considered.

The U.S. is the most impressive case, as it has switched from being an importer to an exporter of LNG. Import LNG terminals are now barely used. Existing importing facilities are being converted to export terminals and new export terminals are emerging, including the Sabine Pass and Freeport LNG facilities on the US Gulf Coast. In fact, the Sabine Pass liquefaction facility has recently entered into four LNG sale agreements for exports.

Shifts in U.S. supply are influencing global changes. Thus, those LNG supplies that were developed for the U.S. are now being diverted to other regions, specifically Europe and Asia. This dilutes the dominance of the Russian pipeline gas in Europe.

Canada, relying on the U.S. as its main customer for natural gas until recently, is looking for other avenues. The Canadian province of British Columbia, with its beneficial location close to Asian markets, is developing LNG facilities to ship natural gas that is no longer needed by the U.S. In October 2011, KM LNG Operating General Partnership received approval from the National Energy Board (NEB) for a licence to export 200 million tonnes of LNG over a 20 year period15. In February 2012, NEB approved another application, this time by CC LNG Export Co-operative LLC, for a licence to export 36 million tonnes of LNG (47.9 billion m³ of natural gas), primarily to Asian markets, over a 20 year period17. More LNG terminals are being considered for construction in Western Canada by such companies as Shell, BG Group, Nexen, and Petronas.

Australia is another rising star aiming to become a leader in global LNG supply. The Australian government, encouraged by the rapid development of coals Seam gas (CSG)16, has announced its intention to increase LNG production to more than 50 MTA by 2016 to become the world's largest LNG exporter, surpassing Qatar, by 2020. Currently, three existing terminals, North West Shelf, ConocoPhillips' Bayu-Undan, and Woodside's Pluto LNG are exporting mostly to Japan. Gorgon Australia is under construction in Western Australia and is expected to start delivering to China, India, Japan and South Korea in 2014. There are a number of projects that may be built; Gladstone LNG was announced in 2007 to be built in Queensland, and Chevron proposes to build a terminal on Barrow Island, Western Australia, as part of its Gorgon facilities. As mentioned earlier, Shell is to develop a floating LNG facility 200 km off Australia's Northwest coast16.

Despite the ambitious Australian goals, there is no certainty of success. Many planned projects are based on CSG reserves, which have not yet proved to be technologically viable to support such expansive exports. Costs are expected to increase even more with the Australian government tightening environmental scrutiny of CSG projects, and a carbon tax that was passed just recently. Australia’s unprecedented expansion may start to slow due to dampening by environmental factors and rising costs.

New LNG projects in Australia, as well as in other producing nations, target demand from Asian markets, particularly from China. China operates three LNG importing terminals, has three under construction, one approved and twelve proposed. However, it's not that simple; China has its own agenda, and is focusing on developing its own substantial coal bed methane and shale resources, as well as increasing gas imports through pipelines from Russia and from Central Asian producers20. China may need to buy an additional 37 million tons of LNG by 2030, of which 68 billion cubic meters will be delivered through pipelines from Russia21. While being the world’s leading consumer with an aggressive plan to increase the role of natural gas for electricity production and transportation, China’s own program might just create a serious impediment to plans on LNG exports from Australia, as well as other producers.

At the same time, the number of importing countries is also growing. Singapore and Poland are currently constructing import terminals. Vietnam is developing plans to construct import capacity, and other potential LNG importers in the coming years include Pakistan, El Salvador, Uruguay, South Africa, Bahrain, Croatia, the Philippines, Abu Dhabi, Jamaica, Lithuania and perhaps Israel.

Japan is a major exporter representing almost 50% of global trade. The Fukushima Daichi nuclear disaster prompted the nation to suspend all nuclear generation and replace it with power fueled by natural gas, which is derived from LNG imports, making it the most attractive target for exporters.

The South Korean market is the second largest in the Pacific region, accounting for 15% of the world LNG trade. Since South Korea began importing LNG in 1986, gas consumption has grown annually by 19%.

India's LNG imports began in 2004 and are driven by its growth in gas demand, increasing annually by 5%, twice the rate of coal or oil. India has two operating terminals and one under construction. India has an LNG import capacity of about 13.5 million tons, which is estimated to reach 50 million tons by 201722. At the same time, India is considering developing its own shale resource, with exploration rules to be released by the end of 2013. While serious concerns over water and land ownership create impediments, the government aims at becoming the world’s fifth-largest shale gas producer by 2035.

Europe, relying on imports, receives most of its supply of natural gas from pipelines from Russia, Norway, Denmark, and some onshore Netherlands. LNG supplements pipeline imports, accounting for a rather small fraction of the supply. France started importing the first LNG cargoes in the late 1960s, and now LNG accounts for 30% of France’s gas requirements, coming mainly from Algeria and Nigeria. Most of the European countries, like Spain, Italy, Belgium, Greece, and the UK import mainly from Qatar, Algeria, and Nigeria. While Europe relies heavily on imports, its trading agreements have been developed and settled over a long period of time, and with slowed economic growth, do not create an attractive case for new LNG exporters.

There are 60 operating import terminals in 18 different countries, and 181 regasification projects to be built. Seemingly unlimited opportunities, in reality, have their own restrictions. For instance, not all of the proposed terminals will be constructed; and nations’ internal energy and environmental policies, as well as improved production technologies, will limit need. Furthermore, new producers entering the mix might create roadblocks to the seemingly unrestricted banquet of the U.S. LNG expansion. Meanwhile, internal controls might be put in place to reduce exporting capacity.

Control of the U.S. Export Volumes

Concerns have been raised by U.S. energy experts and lawmakers that an immense expansion of natural gas drilling won’t serve to improve the nation’s energy security, but will only assist gas companies to profit from global markets, while leading to higher domestic natural gas prices. The Natural Gas Act (NGA) grants applications to export to non-free trade agreement countries unless a proposed export is inconsistent with the public interest. Applications involving trade with any FTA country are deemed to be in the public interest and shall be granted without modification or delay. Hence, the main concern and potential limitation on export licenses can be put on non-FTA countries.

The U.S. has 12 FTAs in force with 17 countries (Australia, Bahrain, Chile, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Israel, Jordan, Morocco, Canada, Mexico, Oman, Peru and Singapore). The U.S. has negotiated FTAs with Korea, Panama and Colombia, but these agreements have yet to come into force23. Major LNG importers (except for Korea, pending clearing of their FTA through both countries’ legislatures) are not on the list, and their LNG contracts with the U.S. have to go through the government approval process.

Some claim that increases in exports will boost domestic prices to international parity, so limitations should be put on the number of export terminals being built in the country; others find this interference unacceptable.
Shale Gas: More Complications for Price Forecast Developers – Part Two

In fact, according to a Navigant Consulting report24 that supported Cheniere’s application for permission to build the terminal and export LNG, the equivalent of 1 Bcf/d of natural gas from Henry Hub could boost prices by $0.20/MMBtu or 2 Bcf/d by $0.35/MMBtu in 2015. However, how serious could the impact be in the long-term?

In November 2011, the U.S Senate held hearing proceedings on market developments for U.S. natural gas, including the approval process and potential for LNG exports25. The hearing was held in response to an $8 billion deal between BG Group and Cheniere Energy, from the Sabine Pass LNG terminal to non-FTA countries for a 20-year term, beginning on the earlier of the date of first export, or May 20, 201626 in the amount of LNG representing 3.3% of all current U.S. natural gas consumption.

According to testimony by Chris Smith, a Deputy Assistant Secretary of Oil & Gas at the DoE27, in the case of exports of LNG to FTA countries, “DoE is without any authority to deny, condition, or otherwise limit such exports. Mindful of the growing interest in exporting domestically produced LNG, DoE recognized in the Sabine Pass order that the cumulative impact of Sabine Pass and additional future LNG export authorizations could pose a threat to the public interest. DoE stated that it would monitor the cumulative impact and take such action as necessary in future orders.” DoE will determine whether the export projects are in the “national interest” during the approval process.

Another testimony, by Mr. Kenneth B. Medlock III, was an economic analysis28 concluding that LNG exports would both increase the domestic price and decrease the foreign price. However, the degree of each price movement will depend on the relative elasticity of supply in each market. The long run elasticity of supply is relatively high both domestically and internationally, which suggests that “prices in the U.S. if exports are allowed will not likely increase much.”

As part of the hearing, the DoE commissioned a study from the EIA on the Effect of Increased Natural Gas Exports on Domestic Energy Markets, which was published in January 201229. The EIA concluded that export increase will inevitably have an upward effect on prices; however, the intensity differs for each case, as shown in Figure 8.

According to the EIA report, more rapid increases in export levels will lead to large initial price increases that will moderate somewhat in a few years. Slower increases in export levels lead to more gradual price increases but eventually produce higher average prices during the decade between 2025 and 2035. As the LNG industry grows and links more and more markets, there may be some convergence; however, since a large majority of gas will continue to be transported by pipeline, the overall impact of this will be limited.

While opponents of the U.S. LNG export expansion received reassurance and confirmation of a mild impact on domestic gas prices, there might be another wave of resistance to any new exporting license targeting non-FTA countries. On the other hand, the U.S. might just move ahead a bit swifter in accepting new FTA members.

There are expectations for LNG expansion; however, unclear economic and political drivers might restrain major changes. Technological improvements driving costs down and increasing processing capacities are directly correlated to a demand for LNG and global prices. LNG trading patterns are influenced by multiple global factors and are difficult to predict; regulatory risks can be rather high for projects proposed in countries in the Middle East, South America and Africa. LNG shipped from the U.S. might have a disadvantage in terms of shipping time and costs compared to other exporters, which are located closer to major consuming markets. Adding LNG to other transportation fuels has its own roadblocks, such as available distribution infrastructure and nearby LNG ports. Finally, increased natural gas exports might lead to higher domestic natural gas prices and lower domestic demand, ultimately suppressing shale gas production. The mutual impact between LNG and shale gas exploration increases complexity.

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