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Best Practices in Managing Market Data for ETRM Solutions

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An Allegro White Paper
August 2010

www.allegrodev.com/market-data

Abstract:

This paper reviews the market data management process to gather, organize, and deliver market data into Energy Trading and Risk Management (ETRM) systems. The objectives are to identify market data management challenges and suggest a set of best practices in market data management that will benefit an organization's ETRM process and improve business performance.

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Table of Contents

Executive Summary	3
ETRM Overview	4
Section One – ETRM Business Process and Market Data Management Challenges	5
Capturing Infrastructure, Contracts and Counterparties.....	5
Pre-Deal Analysis	6
Deal Capture.....	6
Scheduling Operations and Logistics.....	7
Risk Management	7
Market Risk.....	7
Operational Risk.....	8
Counterparty Credit Risk	8
Regulatory Risk.....	9
Settlement and Invoicing.....	9
Section Two – Best Practices for Market Data Management	10
Use Straight Through Processing	10
Reduce Data Feeds to a Minimum	10
Ensure Timely Data Updates are Available.....	11
Pro-active Data Quality control.....	11
Maintain Audit Trails of Data Changes and Track Corrections	12
Manage Data Permissions.....	12
Conclusion	13
About LIM	13
About Allegro	13

Executive Summary

This paper reviews the market data management process to gather, organize, and deliver market data into Energy Trading and Risk Management (ETRM) systems. The objectives are to identify market data management challenges and suggest a set of best practices in market data management that will benefit an organization's ETRM process and improve business performance.

Section One steps the reader through the general ETRM business process and transaction lifecycle, beginning with initial data set up and ending with settlement and invoicing. At each stage of the transaction lifecycle, market data requirements are identified together with challenges in managing the data.

Section Two suggests how improved data management practices overcome the challenges identified in Section One. The conclusion summarizes improved data management practices and recommends using a market data aggregation service such as LIM to outsource market data management. Suggested best practices include:

- Use straight-throughput processing and automation to eliminate manual efforts
- Reduce data feeds to a minimum
- Ensure timely data updates
- Perform pro-active data quality control
- Maintain audit trails of data changes and track corrections
- Manage data permissions to ensure data integrity



ETRM Overview

Energy trading and risk management (ETRM) solutions are software applications that support the business processes associated with trading energy. Energy and commodity trading involves buying and selling power, fuel, and raw materials, managing and delivering these materials in raw or processed form, and associated risk management activities.

The ETRM solutions market is extensive and diverse. Commoditypoint's April 2010 directory of commodity trading and risk management (CTRM) systems identifies 31 companies offering CTRM solutions in the North American market. The ETRM market size is not publically known. Private estimates indicate that sector companies spend in excess of \$100 million a year on new licensed software in North America alone, with a total market of over \$250 million when combined with European and Asian markets. Further, annual spending on implementation services, support, and maintenance brings the total ETRM market size to more than \$1 billion annually, including software.

The ETRM system is a trading organization's scorecard. All changes to trading positions are recorded, and physical inventory volume, location, and movement are tracked. Purchase and supply transactions under long-term contracts are managed, and short-term product balancing is calculated. In addition, production and output from refining or processing are monitored and accounting cash flow from physical and financial transactions are managed.

The ETRM system delivers to management the following scorecard reports:

- Physical position reports for each location and commodity including long and short status. (Position reports may be for current and forward time periods.)
- Estimated profit and loss on completed transactions and processes
- Forecast present and future cash flows
- Price risk exposure associated with current and forward positions
- Credit risk exposure associated with current and forward positions
- Operational risk exposure
- Information required for regulatory compliance in areas such as financial accounting, futures exchange activity, price transaction reporting, and government reporting.

ETRM system effectiveness depends on accurate and timely reporting and market information. Successful ETRM utilization involves effective reporting and analysis to navigate and improve trading performance.

SECTION 1: ETRM Business Process and Market Data Management Challenges

This section describes an ETRM transaction lifecycle, beginning with initial data set up and ending with settlement and invoicing.

Accurate contract and counterparty information evolved in recent years from being important for logistical operations to becoming a central function in credit risk management.

Capturing Infrastructure, Contracts, and Counterparties

Before the ETRM system can capture a trade or transaction, external market data is entered to set up the trading infrastructure. Each commodity or product traded is entered into the system together with product quality details. Relationships between different product forms (gas, liquid, or energy) are stored, together with their quoted measurement units. For physical shipment activity, pickup location, delivery location, and transport information need to be entered into the system.

Every ETRM transaction is associated with a contract. Before a transaction is recorded, contract details are set up in the system. Contracts define trading counterparty relationships. Contracts control commodities traded, quantities, delivery periods, credit and payment terms, and the counterparties' legal responsibilities. Although contracts are negotiated individually, companies typically use standard terms such as those derived from the International Swaps and Derivatives Association (ISDA) or North America Energy Standards Board (NAESB) as a starting point. ETRM stores standard contract terms.

Each contract is associated with one or more counterparties. Counterparty contact and billing information is required. Counterparty creditworthiness and ownership information (parent company) are needed so that appropriate credit risk levels can be set and monitored. Counterparty collateral requirements are entered.

Where trading is conducted with an exchange rather than a company, exchange commodity details and contracts have to be captured. These include contract termination dates and delivery timing, as well as broker intermediary details.

The quantity of information to be captured and entered into the ETRM system before a transaction occurs varies widely with the business profile of the trading company. Electricity generators maintain several thousand source and sink points on the grid in regional transmission organizations. Oil and gas producers in the United States track tens of thousands of producing properties. Smaller companies trading financial instruments enter less data.

Although infrastructure information can be proprietary to a particular company, the majority is market data sourced outside the company. Maintaining up-to-date market data over time and adding to it when needed is a significant challenge for ETRM system administrators. The data first needs to be sourced. There are few consistent third-party infrastructure data sources, so companies have to scrape Web sites or assemble the data from counterparties. Updates occur inconsistently as operations dictate, rather than when the data changes.

Accurate contract and counterparty information evolved in recent years from being important for logistical operations to becoming a central function in credit risk management. In an environment where trading counterparties or their parent entities might declare bankruptcy and deny payment to creditors, the ETRM system has to monitor counterparty credit closely (see the section below on counterparty credit risk).

Pre-Deal Analysis



Before executing a trade and entering the transaction into the ETRM system, pre-deal analysis is usually performed. Traders analyze current market prices and fundamentals to identify optimal timing and pricing mechanisms for the trade. Data requirements for pre-deal analysis, in particular access to historical market prices and fundamental information such as storage and weather data, are not well served in ETRM systems. Instead, analysts typically use outside software tools that contain broader market information. Access to market data within ETRM systems is a challenge because the system tends to contain only the market data needed to manage existing trades.

Deal Capture

Every deal or transaction is entered (captured) quickly into the ETRM system to maintain scorecard accuracy. Depending on the trading organization, this amounts to a few transactions a day or thousands of transactions an hour. Many companies still transcribe deal details manually from tickets or hand written notes. However, electronic trading and automated scheduling systems provide an opportunity to automate deal capture into ETRM. This functionality is now available from commodity futures exchanges as well as over-the-counter electronic trading exchanges such as the ICE.

Deal capture includes all relevant transaction details. Typical details might include trade number, quantity, commodity, units of measure, counterparty, contract, delivery timing, buy or sell, location, financial or physical, trader name, price mechanism, transaction frequency, and link to other trades. Shortly after the transaction occurs (usually the same day), a trade confirmation is required. This is carried out directly with the counterparty through a broker intermediary or electronically via an exchange electronic confirmation.

Data management challenges arise when deal volume is high and errors in the details creep into the ETRM system, even with automation. Deal entry errors are time consuming to fix, render the scorecard inaccurate and threaten ETRM system integrity.

Scheduling Operations and Logistics

Deal capture is often simply the starting point for a commodity transaction in which the purchase or sale often requires subsequent scheduling to arrange pick up or product delivery. Purchased product might be subject to further processing such as refining or transformation from natural gas into electricity (generation). An oil transaction may require tanker shipment to another continent. Oil, gas, or coal producers use ETRM systems to record raw material production, gathering, and distribution. Storage facilities may be required in-transit to the final customer. Contractual supply chain delivery obligations involve inventory balancing and product exchanges. Electricity scheduling and transmission has to be flexible enough to react quickly to changing hourly load patterns.

Scheduling logistics require data interaction (often on paper) with third-party transportation systems. Transportation and processing costs have to be tracked and paid. In addition, the volumes transported together with gains and losses need to be monitored carefully. Where possible, system interfaces to pipeline systems and transmission control areas automate data capture. If necessary, the data is manually updated.

Without up-to-date scheduling and logistics information, the ETRM scorecard cannot present accurate position reports to management. The data management challenge in scheduling and logistics is capturing data from third-party transportation, processing, and scheduling systems. Data may not be available in a timely fashion, and changes or corrections to volumetric measures may occur without notice.

Risk Management



The Committee of Chief Risk Officers (CCRO) identifies four key risk exposures in energy trading operations. These key risk exposures are market risk, operational risk, counterparty credit risk, and regulatory risk. The following sections review each risk exposure to identify the market data management challenges for ETRM.

Market Risk: Trading positions exposed to market risk are commitments to buy or sell products today or in the future where the financial outcome is exposed to changes in market prices. Physical commodity trading firms use various financial instruments to hedge exposure to market price risk. These instruments include exchange traded futures and options contracts as well as derivatives. Derivatives are financial insurance instruments that generate cash flows to compensate for adverse market price movements. Financial derivatives increase trade valuation complexity in ETRM because they are custom products, which may not trade frequently enough to discover a price easily.

Market data to manage market risk is primarily pricing. Generating daily forward price curves from market data to identify market value for trading positions (a process known as mark-to-market) is critical to effective risk reporting. The forward curve is built using values that the market assigns today to a particular commodity delivered to a particular location at specified future time intervals. To value the trading portfolio, a forward curve is required for each forward position in the trading portfolio.

Accurate forward curve data collection presents a significant challenge for ETRM. For many commodities and in particular for periods further out into the future, no market data is available. If data is available, it hails from multiple sources, is often poorly organized, and typically requires “massaging” before input into the ETRM system. As a result, many implementations use forward curves built outside the system then import or paste them into the ETRM system.

Another challenge associated with market data for forward curves is data timeliness. Since forward curves are required inputs to risk reports, these reports cannot be run until curves are available. The market data providers that publish prices necessary to build curves usually publish their assessments late in the day. If curve data has to be collected from multiple market sources and then aggregated together before input to the ETRM system, risk managers are condemned to work late every evening.

In addition to daily forward curves, accurate risk valuations require periodically updated historical or calculated market data for volatility and correlation curves. Volatility and correlation are elements in value at risk (VaR) calculations to measure the extent to which market valuations for trading positions are vulnerable to a change in market conditions. Volatility and correlation data presents a challenge because it is difficult to calculate in-house and there are few outside providers.

Once forward curves, volatility, and correlation data are available to ETRM, trading positions can be valued and a daily VaR can be calculated. VaR is calculated using historical, analytic, or Monte Carlo simulation methods. Many VaR calculations are extremely data intensive, especially where simulation methods are used. It is not unusual for risk managers to use short cuts in VaR analysis in order to calculate the outcome in a timely manner. Many ETRM system architectures are not designed to handle a high volume of calculation, and the accuracy and quality of risk scorecard output suffers.

The challenge in collecting data for credit risk management is that credit rating information is not available for all companies, particularly if the company is not publicly listed.

Operational Risk: Operational risk is present for any transaction that involves transportation, processing, and storage. An example of operational risk is BP's liability following the Deepwater Horizon rig explosion in April 2010. However, only one exposure to operational risk is managed in the ETRM system. This is the risk resulting from inadequate corporate control over data security.

Operational data risk is flagged in ETRM exception reports that identify unexpected data changes. It is critical for risk managers to understand how a change to data impacts the risk scorecard. If a market price provider supplies a correction to a previously published price, the ETRM system has to recognize the change and generate an exception report. If corrections pass into ETRM unrecognized, they cause changes in the risk scorecard that materialize in reports a day later and require labor intensive troubleshooting to correct.

Counterparty Credit Risk: Counterparty credit risk is the risk that a credit event impacts a counterparty's ability to meet commitments to deliver product or pay debts. Credit risk reporting relies on access to market data from credit rating agencies and company financial reports. Credit ratings indicate a company's relative credit worthiness, and ratings change quickly if a company is in financial trouble. Counterparty contracts often contain collateral payment clauses that are linked to credit ratings. If a counterparty credit rating falls below a specified level, additional collateral is required or credit is denied. Accurate and timely credit rating data captured in the ETRM system is necessary to manage credit risk. Company financial report data is required to provide insight into the counterparty or parent company balance sheet to further understand creditworthiness.

The challenge in collecting data for credit risk management is that credit rating information is not available for all companies, particularly if the company is not publicly listed. Credit data may also only be available for the parent company. In this case, understanding corporate counterparty structure is necessary to identify credit risk. Company financial report data is publicly available, but credit data is generally not easy to identify and extract. Specific financial metrics are needed that have to be manually extracted from quarterly reports.

Since the 2007 financial crisis, trading companies have heightened credit risk awareness. Legislation currently planned in the United States requires all financial derivative transactions to pass through a clearinghouse. A clearinghouse is a regulated organization that assumes the counterparty

role for all submitted member transactions. In return for a clearing fee and a commitment to payments called margin calls that adjust clearinghouse reserves against changes in market prices, a clearinghouse guarantees counterparty payments. Clearing removes counterparty credit risk but incurs overhead costs to manage the clearing process and meet daily margin calls.



Regulatory Risk: Regulatory risk is the failure to comply with government or other jurisdictional regulations. The Financial Accounting Standards Board (FASB) that governs United States financial accounting and the International Accounting Standards organization (IAS) that regulates accounting outside the US mandate specific financial derivative treatment that the ETRM system has to accommodate. The 2002 Sarbanes Oxley Act (SOX) in the US holds company executives responsible for financial reports, internal controls, and document altering. The Commodities and Futures Trading Commission (CFTC) that regulates company positions in futures markets and the Federal Energy Regulatory Commission (FERC) that regulates US interstate gas and power transactions also require reporting on trading activity.

Regulatory risk creates market data management challenges for the ETRM system. The various FASB and IAS hedge accounting rules require hedge transactions to be separately monitored. Additional measures such as hedge effectiveness need to be calculated to comply with the regulations. The most recent regulation, FASB 157 that came into force in November 2007, requires company financial reports to identify the fair value of financial hedging instruments using a three level valuation hierarchy. The levels indicate the quality of the market price data in the valuation. Level one uses observable inputs from market prices, level two is derived from parallel market quotes, and level three is based on in-house assumptions. Valuations using higher level market prices increase investor confidence in the company's balance sheet. Researching data levels and identifying appropriate data sources are time consuming tasks often required at short notice as new transactions arrive into ETRM.

In general, increased market regulation requires more robust implementation of ETRM system controls. Managers require easily accessible audit trails and secure permission controls to comply with SOX legislation. To comply with regulations, it is necessary to understand where outside market data originates and to track any changes occurring en-route to ETRM. Access to the original source data is an important advantage in this process.

Settlement and Invoicing

Settlement is transaction completion. Final delivered quantity and price are confirmed with the counterparty. Invoicing is handled in the ETRM system or in the company's accounting system. In either case, invoice information is transferred to the accounting system to be entered into accounts payable or accounts receivable ledgers.

The principal challenge in market data management for settlement and invoicing is accurate price data for invoicing. Commodity transaction pricing is generally linked to third-party market prices. The invoice is a formula based on average prices over the delivery period. Market prices are only quoted on business days (not weekends or holidays). The price formula contains rules about missing data treatment in the price average. Correct invoice calculation requires access to market data provider quote calendars, because the provider determines the holidays. Price formulas generally refer to prices published in hard copy publications, so that even when data is captured in the ETRM system electronically, the published price takes precedence for invoicing. If data corrections are published after the event, invoices need to be adjusted accordingly.



SECTION TWO: Best Practices for Market Data Management

This section contains suggested best practices to overcome the market data challenges identified in the prior review of the ETRM business process.

Use Straight-Through Processing

The term “straight-through processing” describes automated data flow into the ETRM system and how data entered into the system once is never re-keyed again elsewhere. Straight-through processing overcomes the following data management challenges:

- Manual data entry and human keyboard errors
- Failure to update the ETRM system as soon as new information is available
- Duplicate data entry

Where possible, straight-through processing should be practiced. Build an automated interface to market exchanges, scheduling organizations, and market data suppliers. Straight-through processing is easiest if trading companies use standard industry terms for commodities and locations instead of in-house conventions.

Reduce Data Feeds to a Minimum

Data management challenges increase with the number of data sources or feeds into the ETRM system. Where possible, use a third-party data aggregator to gather and redistribute market data to the ETRM system. The market leader in providing data aggregation services for ETRM is LIM, a Morningstar Company. A data aggregation service provides the following benefits:

- The service provides support for the data and an easy requests path to add new data sources. Data support is particularly important for day-to-day ETRM operation to ensure that market curve data arrives in a timely manner and that a human can help answer questions late at night.

- The third-party aggregator assumes responsibility for managing data collection and maintaining an interface with the original data source. They perform this task for many end users and their clients all benefit when new data sources are added.
- An automated interface to the data aggregator delivers data in a consistent form and is flexible to new additions.
- If the ETRM system loses market data accidentally, it should be possible to quickly restore the data including history from the data aggregator (as well as any changes that occurred since the data was collected originally).
- If internal data fed to ETRM is required to be adjusted or used in a calculation outside the system, the task is typically performed in a spreadsheet. Many forward curves are assembled in this manner, using market data and an internal adjustment. In this case, consider outsourcing the calculation or adjustment to the third-party data aggregator. The advantages to this approach are that the aggregator receives the required market data inputs earlier than the client and can perform calculations as soon as possible instead of waiting for data to migrate to a spreadsheet in-house.
- Avoid scraping Web sites to collect data. Outsource the task to an aggregator.

Ensure Timely Data Updates are Available



When market data is input to the ETRM system, it is important to understand how updates flow. If the data is time critical, understand when updates will be available from the source. Sometimes several updates may be available during the trading day.

If market price data is required for risk calculations to be performed at a certain time, access to similar alternative data sources should be considered. A mechanism to track missing data from a particular data set is extremely useful for troubleshooting late arrivals.

If the data interface is a “pull update” mechanism (where the ETRM system requests the data from an external program interface), the task to request data should be automated using scheduling software to set the time interval correctly.

If the data interface is a “push” mechanism (e.g., real-time data), then data updates should flow automatically into the ETRM system. Real-time transactions such as deal capture should be updated immediately into the ETRM system. Be sure that the feed interface supports reprocessing transactions or alternative methods to capture resubmissions and errors. It is also necessary to provide for capture of real-time updates that are sent when the ETRM system is down for maintenance.

Pro-active Data Quality Control

Data quality is the most difficult challenge in managing market data for ETRM. Where suitable comparison data is not available, quality is difficult to measure. Mistakes occur even if a data vendor has quality control procedures in place. Some data vendors provide lower quality data because they lack resources to address the issue prior to publication. When data quality is needed in con-

junction with timely delivery, these two goals are often not compatible!

The best way to be sure that data quality meets the standards that the company expects is to define data quality metrics internally. When well thought out data quality metrics are used to perform checks on sensitive data, a company regains control over data quality. Defined quality metrics can be used internally to generate exception reports or they can be passed to a third-party data aggregator. A third-party aggregator can highlight quality issues in the data feed immediately and then issue corrections as data providers are informed of concerns.

The best way to be sure that data quality meets the standards that the company expects is to define data quality metrics internally.

Maintain Audit Trails of Data Changes and Track Corrections

As a consequence of regulations to increase trading scrutiny, particularly for financial derivatives, it is necessary to maintain a data change audit trail in the ETRM system to identify actions that might later be construed as attempts to falsify records to conceal criminal behavior.

When changes are made to market data, it is important to know the source of the change. An employee may alter data, or a data feed may send a correction. Understanding whether the data change is accurate or final requires confirmation from the source. When the data concerned is critical to ETRM scorecard reports, a timely confirmation response is required from the data source, but is often hard to find late in the evening. This is another challenge that a data aggregation company can meet because of their relationships with data vendors.

Understanding the details of price corrections is also important for invoicing. Either the trading company or the counterparty can identify data errors in formula and averaging invoice calculations. If the internal estimated price calculation contradicts the external invoice, then detective work is required to resolve the dispute. In this case, a support service that can supply accurate calendar information as well as communicate with the original data vendor is extremely helpful.

Manage Data Permissions

Limiting the ability to change data in the ETRM system to selected administrative personnel is a common sense precaution. Only a few individuals should possess rights to change data. Control over which users are able to view data is also important. Restrict access to sensitive data in ETRM reports. If data is purchased from an external vendor, there may be costs for each user that views the data. Hence, control over ETRM user access may reduce data costs.

Conclusion

This white paper reviews the market data management process to gather, organize, and deliver market data into Energy Trading and Risk Management (ETRM) systems. The objectives are to identify market data management challenges and to suggest how improved data management practices benefit ETRM implementation.

In reviewing ETRM processes and transaction lifecycle, challenges associated with managing market data are identified. Improved data management practices are suggested to overcome market data management challenges. In summary, these suggestions include using straight-through processing, reducing data feeds to a minimum, ensuring timely data updates, acting proactively on data quality, maintaining change and correction audit trails, and managing data permissions.

Outsourcing to a third-party data aggregator results in considerable improvement in market data management. Benefits of the use of a data aggregator are identified here. The market leader offering a service providing these benefits is LIM, a Morningstar company.

About LIM

LIM, a Morningstar company is a leading provider of data, analytics and research, using proprietary technology and data management solutions to provide its customers with actionable information primarily in the energy, commodities and financial sectors. LIM offers a world-class data warehouse which gathers and distributes data from over 200 different feeds in the power, oil, gas, commodities, equities, futures and weather markets.

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About Allegro

Allegro is a global leader in commodity trading and risk management solutions for power and gas utilities, refiners, producers, commodity traders, and commodity consumers. With more than 26 years of deep industry expertise, our enterprise platform drives profitability and efficiency across front, middle, and back offices, while managing the complex logistics associated with physical commodities. Allegro provides customers with superior solutions to manage risk across gas, power, coal, crude, petroleum, agricultural, emissions, and other commodity markets, allowing decision makers to hedge and execute with confidence. Allegro has recently been recognized as the Energy Risk Software House of the Year and received The Energy Business Awards Gold Award for Excellence. Headquartered in Dallas, Texas, Allegro has offices in Calgary, Houston, London, Singapore and Zurich, along with a global network of partners.

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