Market Structure and Technology Evolution Are Transforming the Modern E/CTRM Ecosystem

Executive summary

This paper examines the forces driving shifts in the energy trading and risk management and commodities trading and risk management (E/CTRM) environments, and their impact on E/CTRM technology. It also explores the principal strategies that institutions are adopting in the face of the inherent and irreducible diversity and variety that exist in this technology marketplace.

Diversity and variety notwithstanding, it is also important to consider the impact of evolving market structure in the E/CTRM technology environment, which is being driven by government policy, regulation and other exogenous geopolitical dynamics. The resulting increase in volatility has moved trading (and its associated technology capabilities) to the technological core of many energy/commodity firms.

This paper also analyzes the growing importance of key technical elements (such as analytics and curves) and their centrality in the trading process, while also considering their different configurations within corporate organizations.

Finally, we analyze the dramatic impact that evolving technology, particularly artificial intelligence (AI), is having on E/CTRM systems and institutional choices.

Analysis

Complexity is an irreducible part of E/CTRM

Complexity and variety characterize the E/CTRM ecosystem. Within energy markets alone, asset classes range from refinery products to power contracts, including long-term liquified natural gas (LNG) contracts and complex power purchase agreements (PPAs).

Beyond this, institutions operate across a diverse range of non-energy commodities, including soft, base and precious metals and ferrous products. In addition, there are several relatively minor commodities that may not be fully traded, and others that are now available on exchanges – plastics, for example, are now being traded on the London Metal Exchange (LME). Each market has a distinct set of processes, a deal capture framework and an operations infrastructure, creating major challenges for firms attempting to develop a single operational structure.

This diversity also introduces significant variability in contract structures, risk profiles and market data requirements. As a result, a wide range of tools, products and technologies have become available to manage them, fragmenting the technology market.

Just as the configuration of these technologies and the platforms themselves vary, so do the user interface (UI) and user experience (UX). This makes it more complicated to address underlying risk measures and handle not only the mechanics of generating cash flows and underlying contracts, but also processing, front-office data integration and P&L explain.

Modern technology is beginning to address these challenges, however, ensuring that we can communicate more easily, build different kinds of E/CTRM configurations and run market data differently. Increasingly, technology advances also enable firms to separate deal capture systems, document management and other processing infrastructure from the core E/CTRM framework.

Market structure affects the evolution of E/CTRM

Technology evolves as a response to business requirements, changes in the structure of the marketplace and overarching regulation. (After all, in some ways Federal Energy Regulatory Commission [FERC] Order 636 marked the beginning of the E/CTRM software category.) As the market structure of the commodities marketplace shifts again, the solutions that vendors are developing for the sector are changing too. Commodity markets are now at an important crossroads in their evolution. Always risky and intricate, the procuring, trading and selling of commodities are becoming more complex and even riskier. As commodity markets become increasingly dominated by large trading houses, the importance of the supply chain elements has risen significantly.

Equally, energy credit is becoming an important driver. There are two main sources of credit risk in the energy market: the supply chain of large energy firms and sources of counterparty credit (trading or procurement transactions can be hard to distinguish and can introduce significant counterparty risk to a system).

Supply chain and counterparty risk behave differently in response to shifts in the market. Supply chain risk resembles the credit risk a bank considers as part of working capital management, while counterparty credit risk, which is market-linked, is like that attached to over-the-counter (OTC) derivatives. One example of the latter is a PPA, a long-term commitment to buy power under a specific, and often highly detailed, set of terms.

As market volatility increases, the role of the E/CTRM solution expands dramatically in companies with commodities as core components of the business. Many long-tenor assets (such as energy PPAs and LNG contracts) have been impacted significantly by the rise (and increase in volatility) of interest rates.

Everything everywhere all at once: different institutions need different strategies

The nature of institutional arrangements drives the nature of the E/CTRM stack and its level of integration with inventory and other operational systems. For all but the very largest companies, the future of commodity trading and risk management is to incorporate and integrate the entire supply chain, optimizing distribution, supply chain and logistics in linked systems that are operated in the context of the market. Traditional logistics management systems focus on optimizing the supply chain in constant terms. Emerging solutions, by contrast, seek to manage a marketized supply chain with varying prices, different venues (including futures and options exchanges, B2B marketplaces and bilateral contract markets) and contracts and transactions across the supply chain.

A variety of market niches

There are many niches in the E/CTRM space, but Chartis believes that E/CTRM technology will begin to converge with the architecture of general financial markets. This will be caused by several ongoing developments:

- A move to the cloud.
- The growing use of workflow and automation tools (particularly in the middle and back offices).
- The use of more advanced data infrastructures, particularly in the risk analytics environment and in E/CTRM systems generally.

However, a distinction between the two sectors will continue to exist in the types of data and variety of analytics that firms need to manage. In the financial services sector, for example, most data structures are relatively simple, whereas energy systems deal with far more complex data. Physical systems will require datasets that are even more complex, and factors such as asset class, geography and business structure will need to be incorporated in unique ways.

Digitalization, operational analytics and AI: an ongoing impact across the value chain

The digitalization that has strongly influenced much of the financial and banking system continues to impact E/CTRM platforms. In the back office in particular, automation and digitalization have been applied with vigor, and in some cases have radically revamped traditional, spreadsheet-oriented processes. Risk management systems are becoming increasingly distinct, are being designed around standard risk frameworks, computational frameworks and standardized grids, and are even leveraging more advanced grid technology and graphics processing units (GPUs).

Chartis believes that the separation of risk management and pricing analytics technologies will continue to increase, and that the integration of E/CTRM into internal and third-party external systems will continue to define the E/CTRM technology environment. However, continued and considerable overlaps will compel vendors of market risk or credit risk systems to work with underlying pricing and analytics vendors.

Against this background, the rationale is clear for new firms with AI-enabled analytics to target the energy markets. Given that energy markets are fundamentally non-linear, modeling them with standardized econometric models, or even partial derivative (PD)-type models, is extremely difficult. Forecasting electricity prices or creating price distributions, for example, is challenging without models that allow users to process the data appropriately. This challenge is replicated in many areas of the power markets, including portfolio optimization, the construction of virtual power plants and the consideration of physical dynamics such as fault tolerance and network congestion.

The complexity of relationships and curves, the non-linearity of the correlations found in energy markets and the creation of digital twins all provide a strong focus for neural network constructs. To take the construction of digital twins as an example, it is becoming easier to store vital data in a very large network now that many AI firms can construct multivariate relationships among different aspects of the power network.

The transformative impact of agentic AI and event-driven automation

Energy and commodity firms have not always been at the forefront of transformative software-led changes. However, we believe that they will be aggressive in their use of agentic AI to restructure the workflow in their organizations.

A variety of complex, multi-stage processes and complex contracts have been powerful impediments to this restructuring. Equally, institutional diversity and relatively small teams, often segmented by asset class, geography and the business structure of firms' subsidiaries, have kept energy and commodity firms from being at the cutting edge of software-led automation compared to their counterparts in financial markets.

New technologies, however, including agent-oriented automation, new data and contract analysis tools, and new orchestration and control technologies, are combining to make these characteristics advantageous. A smaller organizational footprint, lower legacy tech stack and greater B2B focus mean that for these firms, rewiring and restructuring the organization to take full advantage of the new elements of agentic AI can be easier, and can be accomplished at a more accelerated pace compared to other sectors.

UX and communication modernization are central

End users are increasingly asking why they cannot have a user experience that resembles that of their phone, with rapid access to information from a variety of frontier models. For consumers, large language models (LLMs) have radically redefined what it feels like to access information.

But technology now offers a variety of approaches that make it possible to have an intuitive, consumer-grade UX that can handle different asset classes and an array of distinct curves and graphical environments. However, this obscures the difficulty of handling the overarching structural complexity of the asset base, which requires an enormous range of analytical tools and capabilities.

Critical questions for any institution to consider include:

- Is the dashboard relatively unified?
- Can I access a broad range of functionality through one scheme?
- Is it possible to integrate the diverse workflow with risk measures in one environment?

Beyond UX: the importance of underlying architecture

It is critical to extend the core functionality of not just the dashboard itself but also the system as a whole. The entire E/CTRM system should be highly flexible and capable of handling different data types, curve construction methods and contract structures, while generating varied risk measures and displaying these risk measures in distinct ways. It is also critically important to consider the different types of trading instruments, features and options and physical assets, and to extend the core functionality of the trading infrastructure.

Chartis believes that flexibility, extendibility and integration in the access window are crucial, but the same capabilities and infrastructure should also lie within the overarching technology stack that supports that access window. E/CTRM systems need to have not only a flexible and intuitive access window but also the infrastructure and back end to support it.

ENTRADE®: a modern platform architecture

Chartis' analysis highlights a consistent theme: the modern E/CTRM environment is being reshaped by its irreducible complexity (across commodities, contracts and operational models) and by market structure shifts that are pushing trading, risk and supply chain execution closer together. As volatility increases and firms manage a broader range of instruments – including such long-tenor contracts as LNG agreements and PPAs – the E/CTRM platform is becoming part of the technological core of the institution, rather than a peripheral system.

In this context, Enuit's E/CTRM solution, ENTRADE®, is an example of the type of platform architecture Chartis describes as increasingly necessary: one that combines flexibility, extendibility and integration not only in the access window (UX), but across the underlying technology stack.

ENTRADE® supports multi-commodity trading and risk management while also incorporating the operational infrastructure required to manage a marketized supply chain – connecting trading activity to logistics, inventory, scheduling and invoicing in a single environment ('from done deal through sent bill'). This approach aligns with the broader direction of the market, in which institutions (outside the very largest firms) are seeking to optimize distribution, supply chain and logistics in linked systems that are operated in the context of the market.

Addressing the 'everything everywhere all at once' problem in E/CTRM requires more than functional breadth. It requires the ability to handle different data types, curve construction methods, contract structures and risk measures, while maintaining consistency across front-, middle- and back-office workflows. ENTRADE®'s positioning reflects this requirement by emphasizing:

- A unified platform model intended to reduce fragmentation created by multiple products, interfaces and spreadsheet-driven processes.
- An open, application programming interface (API)-driven framework that supports integration with enterprise resource planning (ERP) platforms, market data providers and exchanges while enabling institutions to configure and extend capabilities as requirements evolve.
- An architecture that supports performance and control requirements for intraday and end-of-day valuation, alongside auditability and operational transparency.

Chartis also notes the growing importance of analytics, curves and non-linear modeling in energy markets, and the increasing role of automation and AI across the value chain.

As firms adopt more workflow automation in the middle and back office, and as agentic AI and event-driven automation begin to reshape organizational structures, E/CTRM platforms that combine end-to-end process coverage with extensibility are likely to be advantaged. ENTRADE®'s breadth across trading, risk and operational execution is intended to provide a foundation for this shift, enabling institutions to reduce manual processing, improve P&L and risk explain, and accelerate decision-making without increasing operational risk.

Ultimately, the findings in this paper point toward a clear conclusion: as the E/CTRM market continues to evolve, institutions will increasingly favor platforms that can manage complexity at scale by combining a modern architecture, integrated workflows, strong analytics support and a unified user experience.

ENTRADE® is a platform aligned to these requirements, offering an integrated approach that helps energy and commodity firms modernize their operating model while maintaining the flexibility needed to compete in volatile, multi-commodity markets.