White Paper

Re-engineering risk management for energy and commodity trading

Unlock scalability and resilience to handle the complexities of modern risk management

Executive summary

The energy and commodities markets are experiencing sustained volatility, driven by geopolitical tensions, regulatory shifts and operational disruptions. Legacy risk systems have proven inadequate in addressing the speed, complexity and scale of modern risk exposures. That's why FIS has re-engineered FIS® Enterprise Risk Suite to meet the specific needs of energy and commodity trading firms. **By integrating credit and market risk into a unified architecture, the platform delivers real-time insights, capital efficiency and operational resilience.**

Through collaboration with top-tier clients, the solution has been validated against diverse portfolios and extreme market conditions – making it a strategic asset for risk managers navigating today's unpredictable landscape.

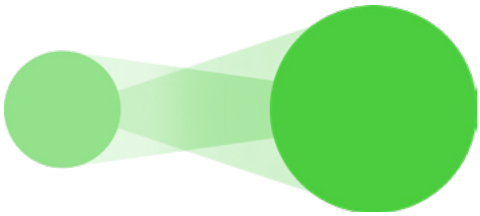
A volatile market

Over the past five years, global supply chains have faced sustained and multifaceted volatility. Geopolitical conflicts, tariffs, sanctions, pandemics, cyberattacks and other disruptive events have created a highly unstable environment for energy and commodity producers, as well as traders.

Commodity traders in particular operate in a volatile, high-stakes environment. Key challenges include margin overruns, extreme price volatility in markets (which can create both windfalls and big losses), swings in profitability tied to market cycles, and counterparty credit risk.

Leading traders have largely thrived amid recent upheavals – leveraging their expertise and financial heft to profit from dislocations and benefiting from supply chain disruptions by deftly re-routing flows and from price spikes by arbitraging regional differences.

However, **this turbulence has exposed the limitations of legacy risk systems, many of which have struggled to keep pace.** Issues such as delayed access to critical information, limited asset class coverage, cyber disruption and high maintenance costs have become increasingly problematic.



Margin overruns and liquidity

Surging prices force traders to post huge collateral. In late 2021, gas price spikes triggered unprecedented margin calls, tying up billions in cash.

Extreme price volatility

Wild market swings can threaten even large players. Volatility in energy and metals markets creates both outsized profit opportunities and risk of big losses.

Profitability swings

Commodity trading earnings can vary dramatically year to year. After thin margins in calm markets, traders saw record profit during the 2022 turmoil.

Counterparty credit risk

Traders face the risk of partners defaulting or even perpetrating fraud. A leading firm lost $577 million in 2023 due to fake nickel deals by a counterparty.

Increased regulatory oversight

Despite their enormous scale and market impact, commodity trading firms have historically operated in a relatively lightly regulated environment, especially compared to banks. **However, recent events and public pressure have prompted greater scrutiny.**

In the U.S., commodity trading firms operate under a framework of regulations that, while not as all-encompassing as banking rules, are still significant. Key aspects of the regulatory environment and challenges include derivatives oversight by the Commodity Futures Trading Commission, the SEC's Dodd-Frank (Volcker Rule), physical market regulation, international sanctions and trade policy, transparency and reporting initiatives (which can be pre-empted by good self-governance such as internal stress tests), and the generally litigious nature of the U.S., which creates legal and reputational risk.

With a trend toward greater scrutiny, especially when their activities intersect with public interest (e.g., extreme prices affecting consumers), firms have responded by bolstering compliance teams and systems; it's common now for a major trader to have a Chief Compliance Officer and automated trade surveillance to detect anomalies. They also engage with regulators via industry groups like the Commodity Markets Council to shape sensible rules. One can expect that as commodity markets evolve with new instruments, like carbon credits, or new tech, like crypto-based commodity tokens, regulators will adapt and likely expand oversight. U.S. commodity traders will need to remain agile in compliance, ensuring they can meet new requirements without stifling their trading ingenuity.

In contrast, regulators in Europe have been actively debating how to monitor trading firms more closely. While not subject to banking-level oversight yet, the combination of systemic importance and social impact (e.g., sharp commodity inflation) means European authorities are inching toward more stringent oversight of this industry. Trading firms that operate in Europe face the challenge of adapting to these changes – improving transparency, compliance, and possibly holding more capital – even as they try to remain agile and competitive.

The gaps in today's operations

Volatility management has become a top priority. Many trading firms have increased the frequency of risk monitoring from daily to hourly Value-at-Risk (VaR) checks, trimmed particularly volatile exposures (some exited lumber and other erratic markets), and invested in better data analytics to adjust hedges more quickly. They also benefited from the fact that being "asset-backed" (owning physical assets) provides a cushion – e.g., if oil prices skyrocket, refineries are profiting even if some pure trading bets lose money, offsetting the impact.

But **when markets move violently, maintaining cash liquidity becomes the top priority.** Failure to meet a margin call can be catastrophic, such as a forced liquidation of positions at a loss. Thus, margin and liquidity management is a constant pressure, especially in periods of extreme market stress.

Counterparty credit risk remains another concern. U.S. commodity firms leverage both internal risk frameworks and external tools (insurance, LCs, legal covenants) to manage it. The cost of diligence and protection is seen as worthwhile compared to the potentially huge losses from a default. Losing over half a billion dollars on a rogue counterparty can wipe out years of hard-earned profit. No trader wants to be in that position, so the mantra is stay cautious, spread risk, and monitor exposures relentlessly.

Unlocking scalability and resilience

In response to these challenges, FIS has collaborated with anchor clients – including top 10 energy and commodity traders and producers – to strategically re-engineer its enterprise risk platform to meet the evolving needs of the industry.

By integrating credit and market risk into a unified platform and redesigning the system architecture, Enterprise Risk Suite unlocks scalability and resilience, giving firms the ability to confidently handle the complexities of modern risk management.

The solution not only enhances your risk management capabilities but also contributes directly to profitability. More accurate VaR calculations, powered by improved modeling methodologies, lead to significant capital savings compared to legacy systems.

Time saved on manual tasks streamlines your business and allows you to spend more time using our advanced stress testing and scenario analysis tools to investigate where the vulnerabilities lie in your portfolio.

Best-in-class security and hosting infrastructure eliminates the need to waste time on technical processes and frees you to focus on your core business.

Modeling the commodity space: A solution that's designed for the job

Commodity and power markets present unique risk characteristics that distinguish them from traditional asset classes such as equities, fixed income and standard derivatives. While many core risk methodologies remain applicable, the structure of deals and the physical nature of delivery in these markets demand specialized modeling frameworks.

To accurately assess credit and market risk, systems must accommodate complex contract terms, non-standard pricing conventions, and delivery mechanisms that are often absent in financial-only instruments. Measures used specifically in the power sector, such as "Profit at Risk," must also be calculated alongside more generally applicable VaR measures.

Deal framework

Our risk modeling framework is purpose-built to reflect the complexity of energy and commodity derivatives. At its foundation is a powerful trade representation model that supports both high-level deal abstractions (Deal Skins) and fully explicit cash flow-level detail. This allows for the modeling of any cash flow structure, creating container deals that can encapsulate any number of legs within a single deal object. This flexibility is essential for accurately representing the diverse instruments in this market, such as swing products.

The framework also accommodates distinctive pricing and risk features common in commodity markets – such as averaging, cross-currency settlement and composite pricing (compo). For example, a typical compo structure may involve daily averaging of FX rates and delivery prices. Our container model integrates these elements seamlessly, allowing for the construction and valuation of sophisticated instruments like European or Asian options on averaged or compounded underlyings.

To ensure consistency and transparency, our valuation models have been benchmarked against leading front-office systems, meeting the stringent requirements of our anchor clients.

Power markets

Power and energy markets exhibit distinct characteristics that set them apart from other commodity sectors – particularly when contracts are physically settled. A key complexity is the sub-daily granularity of delivery periods, which can extend down to five-minute intervals. Market conventions typically include quoted baseload and peak prices, while off-peak prices are often implied rather than explicitly traded.

Additionally, certain locations operate under "grey market" conditions, where power is traded without direct price quotes. In these cases, pricing is inferred from nearby quoted hubs. Enterprise Risk Suite is designed to accommodate these nuances through a flexible rate-fixing mechanism that supports precise time-bucket definitions and "time-ahead" contracts, enabling accurate modeling of delivery and pricing structures across diverse market conditions.

Collateral modeling

Our collateral model is built to handle the unique complexities of energy and commodity markets, offering a highly sophisticated framework that distinguishes between certain and uncertain mark-to-market (MtM) exposures. For physical delivery contracts, MtM is considered certain once the commodity has been delivered and paid for, and uncertain when delivery or payment is still pending.

To capture short-term residual risk, we incorporate the concept of a grace period, and also momentum, extensions of risk to incorporate the contractual delay between delivery and payment. This is central to our modeling of Instantaneous Principal at Risk (IPR), which reflects the value of physical commodities delivered, but not yet paid for. In parallel, we account for Physical Uncertain MtM (PUC), representing the value of commodities not yet delivered. Depending on the contract structure, IPR and PUC can be cross-netted, separately netted or collateralized independently.

To support unified collateral treatment across mixed portfolios, we've also developed Energy Netting-Collateral Pools (ENCPs). These pools are compatible with both physical and financial energy products and operate under our Cross Product Master Agreements (CPMA). The framework also supports multiple variation margin (VM) and initial margin (IM) agreements per netting set, enabling precise and flexible collateralization tailored to the risk profile of each portfolio.

Credit and market risk framework: Unlocking real value

The sophisticated modeling and deal infrastructure developed for energy and commodity markets requires a robust and scalable platform to operate effectively. Enterprise Risk Suite unlocks real business value by combining flexibility, performance and integration capabilities. We've re-engineered our platform to support the full spectrum of traded risk – offering a future-proof solution that's trusted by many of the world's largest institutions.

Credit risk

Enterprise RIsk Suite delivers a cutting-edge Monte Carlo simulation framework for counterparty credit risk (CCR), with real-time updates, pre-deal checks and high-performance exposure calculations. With the ability to perform billions of valuations per second and deliver pre-deal checks in under 10 milliseconds, the system supports advanced metrics such as Potential Future Exposure (PFE) and Credit Valuation Adjustment (CVA), under both stressed and unstressed scenarios. Cash flow analysis (Stressed, Risk Neutral and Monte Carlo) is available, and simulated. Wrong Way Risk helps to identify hidden vulnerabilities in portfolio positions.

Sensitivities for PFE and CVA are accelerated using Adjoint Algorithmic Differentiation (AAD). This allows portfolio sensitivities to be generated hundreds of times faster than with industry standard finite-difference techniques, speeding up hedging decisions and keeping portfolio risk more consistently within its budget.

Also included are SACCR and CEM support, with parameterization for regulatory jurisdiction flexibility and pro-rata EAD allocation across products, desks and business units.

Market risk

Enterprise Risk Suite offers a comprehensive suite of VaR-based analytics, including Parametric, Historical and Monte Carlo VaR, as well as Expected Shortfall, Incremental VaR and Marginal VaR.

It is ISDA-licensed for SIMM, supports reconciliation and benchmarking, and has passed P&L attribution tests for major front-office systems.

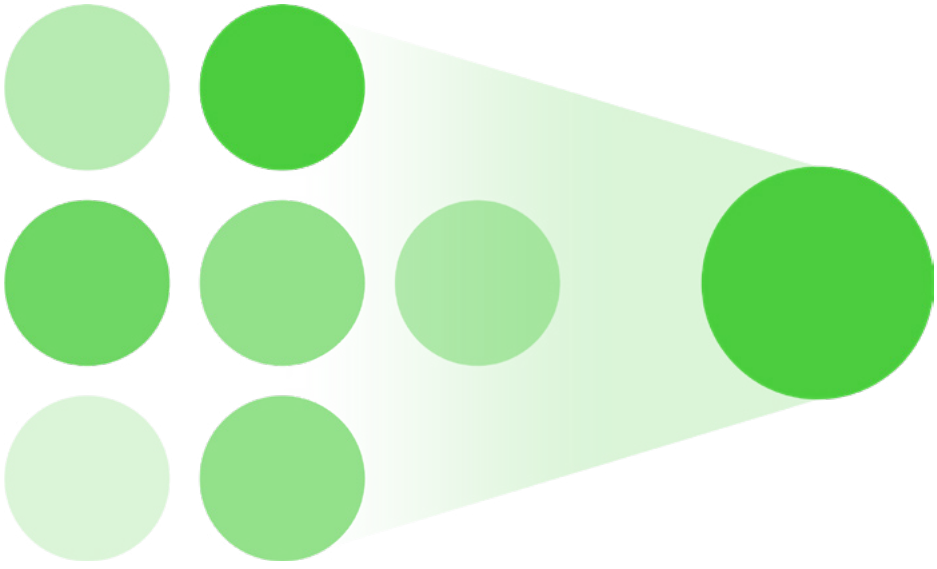
Stress testing and scenario analysis

The solution includes a comprehensive suite for stress testing and scenario analysis, designed to support a wide range of methodologies and regulatory frameworks. Scenarios can be constructed using additive, multiplicative or standard deviation-based stresses applied to risk factors, curve shifts, spread shocks, and structural changes such as twists and flatteners.

Advanced techniques are also supported, including “pull-to-one” or “pull-to-zero” simulations that mimic flight-to-quality dynamics during market crises, as well as historical and path-dependent stress testing aligned with frameworks like CCAR.

A broad set of metrics can be stressed, including collateral amounts, thresholds, minimum transfer amounts and closeout periods. The system also enables jump-to-default simulations at any level of the corporate hierarchy, allowing for granular issuer-level stress scenarios.

These techniques can be combined and customized to produce virtually any stress or scenario configuration. Full output measures – including PFE, CVA and EAD – are generated for each scenario, with detailed factor-level attribution to identify the sources of risk and their impact across the portfolio.



Core architecture

At the heart of the platform is the Enterprise Risk Cube: an in-memory data aggregation and reporting engine that's designed to handle terabyte-scale data feeds with speed and precision. It enables real-time slicing, dicing and analysis of results down to the trade and tenor level, supported by user-customizable dashboards, drill-down capabilities and pivoting tools.

Results can be accessed directly through the Cube or pulled via API into widely used business intelligence platforms, allowing seamless integration with broader organizational reporting infrastructures.

The Cube also supports:

- Role-based data visibility to ensure secure and tailored access.
- Comprehensive audit trails for transparency and compliance.
- A limit management framework with real-time breach detection, approval workflows and automated notifications. Limits can be applied to any metric and configured across any time horizon within the client's data model.

With flexible deployment options – including on-premise, FIS cloud or public cloud – combined with a microservices architecture and automated scalability, **Enterprise Risk Suite is an award-winning credit and market risk management solution that's built to adapt and grow with your evolving business needs.**

Security

Data protection is a foundational element of the platform's design and operations. The application undergoes continuous vulnerability assessments by the FIS security team and is developed with a strong emphasis on secure coding practices, endpoint protection and rigorous access controls.

For clients hosting on the FIS cloud, we implement a multilayered security strategy that combines resilient infrastructure, advanced technologies and expert oversight. Our Managed Services secure over 28 petabytes of data and process 4.5 billion data points daily, supported by a global network of data centers and 24/7 Security Operations Centers (SOCs) located in the U.S., India and the U.K. These centers are staffed by more than 1,000 cybersecurity professionals.

Our "Defense in Depth" approach integrates preventive, detective and responsive controls – including network segmentation, firewalls, intrusion detection systems, penetration testing and data loss prevention. This layered model ensures a robust and resilient environment that protects client data across all dimensions of risk.

Putting your capital to work

In today's volatile and interconnected markets, the risks associated with trading energy, commodities and capital instruments have grown significantly in scale and complexity. To navigate this environment effectively and put your finances to work, you require flexible, scalable and real-time risk systems that can quantify exposures instantly and support rapid decision-making.

Enterprise Risk Suite integrates all critical metrics for enterprise-level risk management into a single, intuitive interface – delivering a solution that can manage large, diverse portfolios through periods of extreme market stress and provide a consolidated, accurate and actionable view of risk.

The solution does more than safeguard profitability – it actively enables it. By delivering deeper insight into portfolio risks, we help energy and commodities firms unlock capital previously held in reserve and redeploy it toward strategic opportunities, rather than leaving it siloed to guard against poorly quantified threats.

In a world defined by uncertainty, advanced risk management is no longer optional; it's mission critical. Discover how Enterprise Risk Suite can unlock scalability, visibility and control and put your organization's capital to work.

Money at rest Money in motion Money at work™

Enterprise Risk Suite delivers real-time insights, capital efficiency and operational resilience for energy and commodity trading firms.

Our technology powers the global economy across the money lifecycle.

Money at rest

Unlock seamless integration and human-centric digital experiences while ensuring efficiency, stability, and compliance as your business grows.

Money in motion

Unlock liquidity and flow of funds by synchronizing transactions, payment systems, and financial networks without compromising speed or security.

Money at work

Unlock a cohesive financial ecosystem and insights for strategic decisions to expand operations while optimizing performance.

About FIS

FIS is a financial technology company providing solutions to financial institutions, businesses and developers. We unlock financial technology that underpins the world's financial system. Our people are dedicated to advancing the way the world pays, banks and invests, by helping our clients confidently run, grow and protect their businesses. Our expertise comes from decades of experience helping financial institutions and businesses adapt to meet the needs of their customers by harnessing the power that comes when reliability meets innovation in financial technology. Headquartered in Jacksonville, Florida, FIS is a member of the Fortune 500® and the Standard & Poor's 500® Index. To learn more, visit FISGLOBAL.COM. Follow FIS on LinkedIn, Facebook and X (@FISglobal).

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