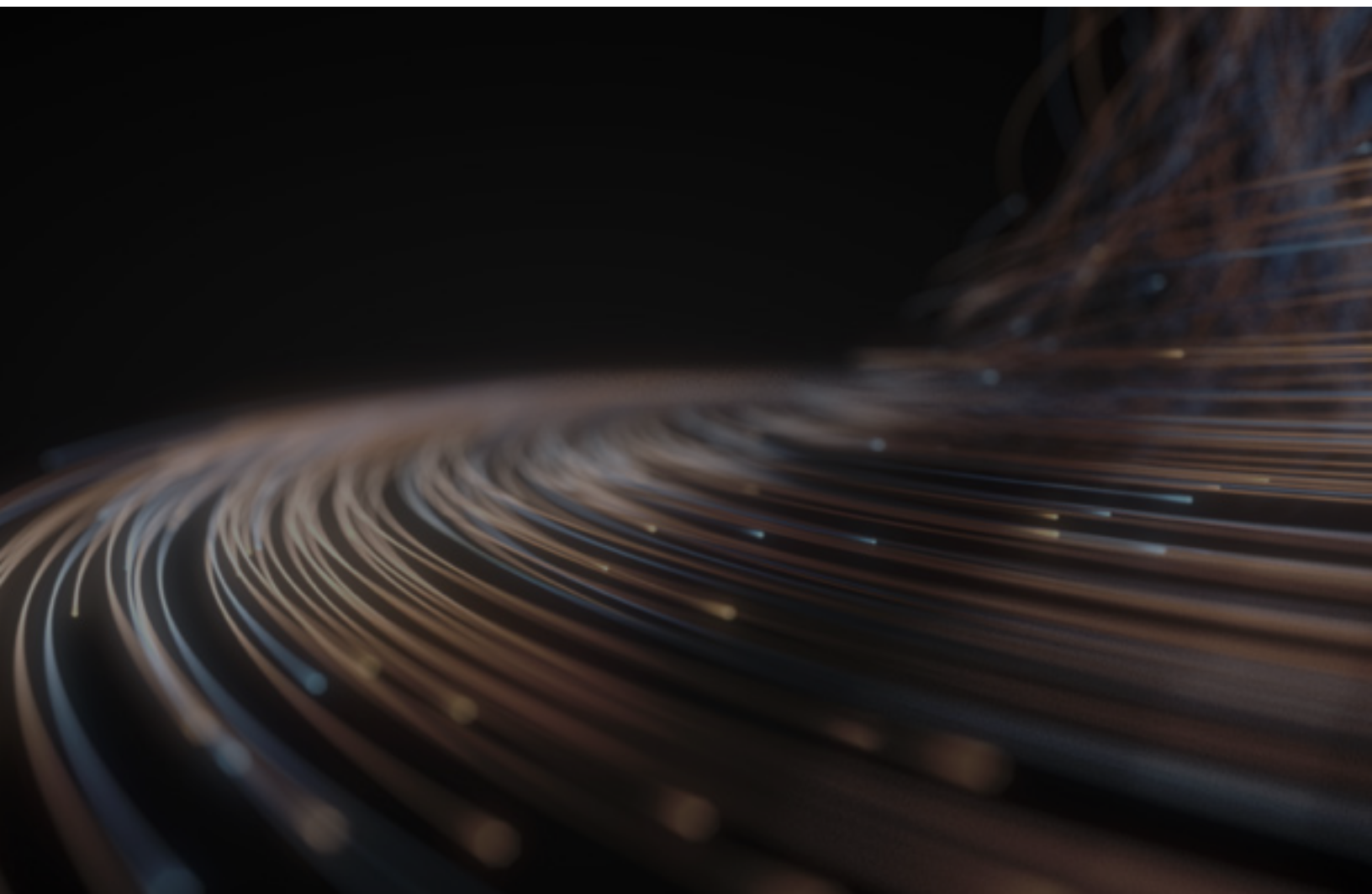


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COMMODITY TRADING RISK MANAGEMENT (CTRM) FOR LIQUEFIED NATURAL GAS (LNG)



The Liquefied Natural Gas (LNG) supply chain involves pipeline, gas storage, liquefaction facilities, LNG storage, transportation and logistics/shipping, regasification, backed by suppliers, owners, producers, operators, investors, and purchasers. All of which require an array of software systems to ensure efficient, safe, and profitable

operations. A critical component of this software portfolio is the Commodity Trading and Risk Management (CTRM) system that can capture, manage, and value the commodity-related revenues, costs and financial risks of producing LNG.

For companies investing in the LNG markets, the selection and implementation of a CTRM system is a critical decision that requires careful consideration as few, if any, of the commercially provided systems will meet the entirety of their needs “out of the box.” Having access to a custom-designed solution that is a perfect fit for any LNG supply chain participant would be ideal. However, the costs and risks of developing and maintaining a custom solution are generally higher than deploying a commercially provided CTRM system even if that system requires the development of workarounds or custom modules to address any gaps.

When selecting a new CTRM solution, it is necessary to understand the mix of assets, commercial operating agreements, and the supporting business processes to identify the best-fit software solution.

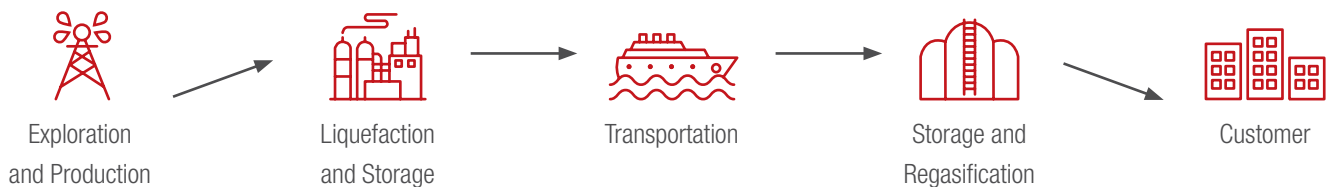
The mix of assets associated with any individual LNG facility will vary. The commercial structuring and operating agreements of those various facilities will affect how the assets are captured,

tracked and/or allocated within the parties’ financial systems, including their respective CTRM system. For example, are the individual facilities owned by a single commercial entity, or are they owned/operated by subsidiaries? Other considerations are costs for any of those facilities charged directly to tollees, or are they bundled as part of a singular monthly operating fee, do the operating agreements with, and charge-backs to, the tollees differ from train to train?

All LNG facilities consume natural gas as a feedstock. Most natural gas capable CTRM systems can address the complexities of capturing, managing, and valuing origination and trading of that feedstock; however, many of these systems will fall short in managing the other inputs and costs associated with the facility.

North American LNG plants consume gas primarily from interstate and intrastate pipelines. Though pipeline grade gas is suitable for direct use by most consumers, efficient LNG production generally requires a higher-spec natural gas, necessitating pretreatment

LNG Supply Chain



before liquefaction. Pretreatment may affect the value of the LNG, and often produces saleable natural gas liquids as a by-product, the marketing and value of which, if included in the commercial operating agreement(s), may need to be included as an additional commodity capability when selecting CTRM solution(s). In addition, depending on the quality of the natural gas feedstock, pretreatment cost as well as ongoing maintenance and operating cost can be affected, which you will need to reflect in the P&L accurately.

When you look at physical natural gas CTRM capabilities, there is a need to acquire natural gas feedstocks in the wholesale markets. Though some volumes may be purchased at the inlet to the facility, further gas purchases will seek to find the cheapest sources of natural gas. The farther afield from the plant and transport that gas to its inlet, it requires the origination and trading personnel to schedule gas flows on one or more pipes. Tracking and valuing these volumes from source to plant inlet will require their CTRM system to be capable of capturing pipeline transport agreements and associated costs to ensure accurate costing of gas supplies.

Most LNG facilities will also maintain underground natural gas storage capacity, either their own or contracted from third parties. If the gas storage is within the bounds of the facility, tracking of volumes may not need to be captured within the CTRM system. However, if the plant relies on third-party storage, that agreement and associated costs and volumes injected or withdrawn will need to be managed in the system. That system will need to ensure proper tracking of inventory values.

Inventory tracking of produced LNG is a critical requirement for LNG operators, as each interest holder will have lifts scheduled on a semi-regular basis. Maintaining an accurate accounting of physical inventory volumes with their associated ownership can be problematic for many CTRM systems and may require additional capabilities outside the system. Also, if the LNG operator maintains inventory for their account, they will need to ensure an accurate accounting of the value of inventory for P&L purposes.

Should the LNG operator and/or the tollees load LNG on ships for their account to deliver to a buyer, they will require additional capabilities in vessel logistics and tracking. The ability to manage shipping operations are rudimentary at best in most CTRM systems because they typically only capture costs. Additionally, they provide little to nothing in terms of ship tracking, and forecasting/estimation of voyage costs, including factors such as fuel/boil-off, port fees, demurrage, day rates, etc. Addressing these capabilities will require additional systems (with the associated integration needs) or other workarounds.

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Aside from natural gas, the other significant input and cost for LNG production is electric power, particularly for those plants sited in areas where emissions regulations prevent or limit the use of natural gas-fueled compressors and turbines. Given the quantity and costs of power required by these facilities, LNG operators will seek to minimize their power expenses either by purchasing power in the wholesale markets or by financial hedging. Should the plant wish to actively manage costs by purchasing and/or trading wholesale physical power supplies, their CTRM system would need to be power-capable to manage those purchases and/or trading activities.

For LNG purchasers, many of the same considerations apply when seeking a CTRM solution to manage their commercial operations. Should the buyer take title to the LNG at the plant loading arm, shipping/freight management will be a critical capability that will require additional capabilities beyond those offered by CTRM solutions. In fact, should the LNG purchaser trade cargos at sea or sell that cargo once it arrives in port, some CTRM systems may provide little advantage over spreadsheets or a more simplified system that can capture value, calculate and apply costs (boil-off, day rates, etc.), and manage financial positions.

Though selecting the right CTRM product is always a difficult decision, the complexity of operations associated with LNG creates additional challenges. For LNG producers and facility interest holders that are in the process of developing LNG production facilities, the mix of assets, the commercial agreements governing their operations, and the business strategies and processes involved in managing the facility must be fully understood and mapped out before beginning the selection process to identify the capabilities they will need in a CTRM system. Selecting a system without a clear understanding and elaboration of those requirements will likely yield a choice that is either overly complex and difficult to maintain or one that falls short - requiring costly and time-consuming workarounds and custom code.

In the intersection of our more than twenty years of experience in innovative solutions and services in commodities trading and a variety of LNG models, Capco

has the expertise to help you define the questions to ask, the tools to evaluate and the implementation experience to satisfy our clients' needs and objectives.

AUTHORS

Glen Ragland, Partner

Karen Goode, Managing Principal

If you would like to hear more, please reach out to us at CapcoEnergy@capco.com.

ABOUT CAPCO

Capco is a global technology and management consultancy dedicated to the financial services industry. Our professionals combine innovative thinking with unrivalled industry knowledge to offer our clients consulting expertise, complex technology and package integration, transformation delivery, and managed services, to move their organizations forward.

Through our collaborative and efficient approach, we help our clients successfully innovate, increase revenue, manage risk and regulatory change, reduce costs, and enhance controls. We specialize primarily in banking, capital markets, wealth and asset management and insurance. We also have an energy consulting practice in the US. We serve our clients from offices in leading financial centers across the Americas, Europe, and Asia Pacific.

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