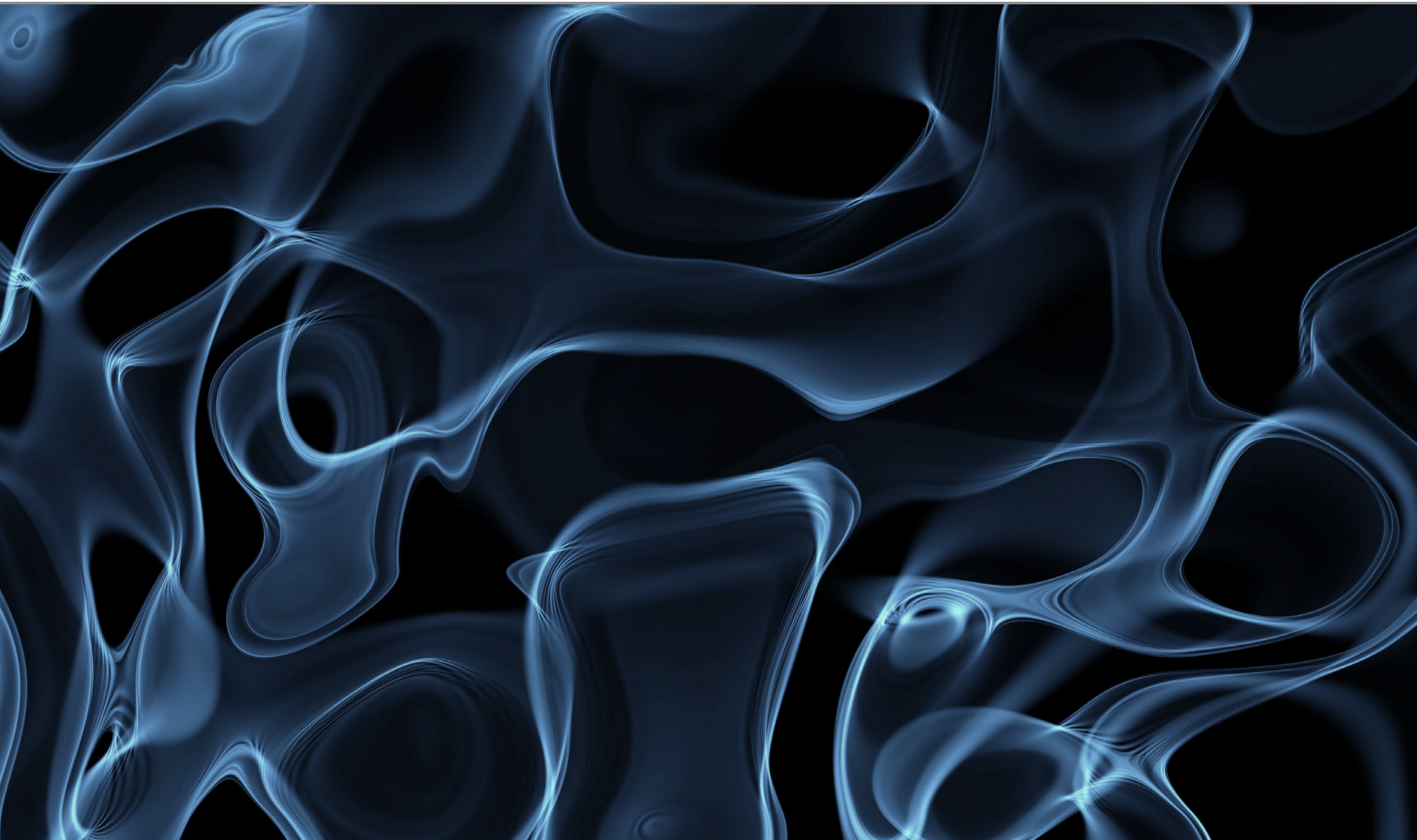


CAPCO

NATURAL GAS SCHEDULING

THE MOST CHALLENGING JOB IN ENERGY



INTRODUCTION

Calling any job “the most challenging” sounds a bit hyperbolic. However, when one looks across all positions that exist in the energy market, there is no other job in which a multitude of daily responsibilities, deadlines, and stresses all combine into a singular role like that of natural gas scheduler, particularly those who work for a Top 20 or 30 natural gas trading company. Though some employees may thrive in such an environment, experience has shown that even for the most highly motivated and skilled resources, the constant stresses of gas scheduling, combined with long working hours without any break, do take a toll; and emotional distress and job burnout is a real and constant risk.

Unfortunately, often the job of the scheduler is poorly understood by those not directly involved in it and, all too often, ETRM technology improvements have rarely focused on the needs of this critical group of professionals. In this whitepaper, we will examine the daily challenges and commercial exposures inherent in the job and look at how technology and process changes can help reduce commercial risk and provide a greater opportunity for schedulers to focus more on optimization, and less on simply “trying to make the gas flow.”

As we visit with our clients, prospective clients, and industry peers, a common narrative runs through the North American natural gas markets – despite technology advances leading to process improvements in most of the industry, natural gas scheduling remains a critical choke point for most organizations. Marked by highly manual and usually spreadsheet-based processes, each scheduler is responsible for multiple pipelines and must deal with multiple nominations cycles on each pipe during the daily cycle, including day-ahead and intraday nominations. As it is the responsibility of these schedulers to ensure physical gas trades and contractual commitments of the trading group are fulfilled, if done incorrectly or inefficiently, gas trading and marketing companies can experience from hundreds of thousands to millions of dollars in lost revenues, crippling pipeline penalties and reputational damage.

MULTIPLE RESPONSIBILITIES AND NEVER-ENDING DEADLINES

Though scheduling has always been a difficult and high-pressure role, the work intensity for this group of professionals was made substantially worse on April 16, 2015, when the Federal Energy Regulatory Commission (FERC) issued Order 809. This new order substantially modified the scheduling processes used by interstate natural gas pipelines to force tighter coordination between the scheduling processes of the wholesale natural gas and electricity markets.

In summary, Order 809 extended the deadline for timely nominations from 11:30 a.m. Central time to 1 p.m. and added a third intraday nomination cycle. With these changes, gas schedulers are faced with five nomination cycles – Intraday 1 at 10 a.m., Timely Day Ahead at 1 p.m., Intraday 2 at 2:30 p.m., Evening Day Ahead at 6 p.m. and Intraday 3 at 7 p.m..

SCHEDULING CYCLE	ACTIVITY	DEADLINE (CENTRAL TIME ZONE)
Day Ahead Timely	Nomination Deadline	1 p.m.
	Confirmations Returned	4:30 p.m.
	Schedules Issued	5 p.m.
	Start of Gas Flow	9 a.m. next day
Day Ahead Evening	Nomination Deadline	6 p.m.
	Confirmations Returned	8:30 p.m.
	Schedules Issued	9 p.m.
	Start of Gas Flow	9 a.m. next day
Intraday 1	Nomination Deadline	10 a.m.
	Confirmations Returned	12:30 p.m.
	Schedules Issued	1 p.m.
	Start of Gas Flow	2 p.m.
Intraday 2	Nomination Deadline	2:30 p.m.
	Confirmations Returned	5 p.m.
	Schedules Issued	5:30 p.m.
	Start of Gas Flow	6 p.m.
Intraday 3	Nomination Deadline	7 p.m.
	Confirmations Returned	9:30 p.m.
	Schedules Issued	10 p.m.
	Start of Gas Flow	10 p.m.

Natural gas scheduling as a job title doesn't address the extremes one might find in the role, as the actual responsibilities of a scheduler can and will vary greatly depending on the type and scope of business activities in which the company is engaged. For instance, a small producer may employ a gas scheduler whose job is to ensure gas production is properly nominated from a fixed set of meters to one or more pipelines pools where it is made available for sale. In this mode, the daily routine of a scheduler rarely changes, and the stresses of the role, though occasionally intensifying at certain times (such as bid week or during times of freeze-offs or pipeline maintenance), are usually manageable.

However, for larger gas producers/traders/marketers whose commercial strategies include significant investments in multi-region firm transportation agreements on different pipelines, innovative gas product offerings, asset management agreements, and/or storage agreements, the dynamic nature of the North American gas markets, the role is significantly more difficult. In this type of environment, the gas scheduler must be both highly skilled and knowledgeable, in order to: 1) effectively manage five conflicting and overlapping deadlines during the day; 2) rapidly adjust to changing transportation conditions (constraints, unscheduled pipe maintenance and outages, including force majeure) and market/customer demands (including intraday no-notice purchases or turn-backs); and 3) optimize transportation paths to bring value to the company's bottom line. For this group of professionals, the daily nominations cycle offers no real break,

as the scheduler is usually forced to eat lunch at their desk, with one hand on their sandwich and the other on their keyboard.

Since the imposition of the additional intraday nom cycle, many scheduling groups have had to move to shift work (particularly those that operate in the western region), with one or more schedulers working to as late as 7 or 8 p.m. to address intraday cuts or confirm gas schedules – after having arrived at the office by 7 a.m. to prepare for the Day Ahead activities and review the prior evening's flows. As these same cycles apply on weekends, the scheduling staff may also be forced to work alternating weekend shifts.

Unfortunately, within most gas marketing/trading companies, scheduling is regarded as a cost center and, as such, they often try to limit expenditures within the group by only budgeting for the minimum staff they feel they need for the "average" day. This view often results in scheduling groups being understaffed, with schedulers enjoying no real breaks during the day, working multiple 12-to-14-hour days in a week and at least one or two weekends a month – meaning working as many as 12 to 14 consecutive days without any real relief from the stresses of the job. And, unfortunately, once a scheduler can take a day for vacation, comp time, or sick leave, the burden of their daily responsibilities is shifted to one or more of their fellow team members.

COMMERCIALIZING THE SCHEDULING GROUP

In line with the design of FERC Order 809, many natural gas trading companies have essentially commercialized their scheduling groups by offering highly flexible sales or purchase agreements to their generator or industrial customers that provide those customers on demand turn-backs or physical calls on their gas purchase agreements. Under these agreements, the purchaser can demand gas (at a predetermined price) or turn-off existing purchases with little or no notice prior to any of the scheduling deadlines. When this happens, it becomes the obligation of the seller's trading and scheduling groups to deliver incremental volumes to that buyer/facility or to find a home for turned-back gas with little time to spare prior to that cycle's nomination deadline.

Generator and industrial consumers have embraced these types of no-notice contracts as they provide the ultimate in operational and financial flexibility, and they will pay their suppliers a premium to have that capability. Unfortunately, the burden of these deals falls largely on the gas supplier's scheduling group, to which these no-notice transactions can create havoc if they occur near deadlines, forcing the rebalancing of some or all their transportation paths with just a few minutes, or even seconds, to spare.

Asset management deals have also grown in popularity in the market in recent years. With these types of deals, the gas supplier will effectively take responsibility for the operations of a generation facility, and as with no-notice commercial agreements, rely on their traders and schedulers to deliver the appropriate volumes of fuel to the facility throughout the day to meet the highly variable demands of the power market.

Unfortunately, even with the commercially leveraged use of their

scheduling teams as described above, many firms still view gas scheduling as an overhead/administrative cost of doing business, a view that misses the value in a well-staffed, well-trained, and highly experienced scheduling organization. Perhaps even more critically, it is a view that ignores the significant risks should their scheduling group become overwhelmed or over-stressed and not be able to perform effectively.

Gas traders are tasked with "growing the business" and generating positive returns, and the best traders are those who can create a distinctive product to address a unique and potentially lucrative opportunity. However, what is deemed creative for a trader usually translates into additional complexity and workload for schedulers, a burden that may not have been adequately included in the analysis of a complex deal. Without understanding and respecting these incremental burdens on the scheduling staff, these "innovative" transactions may overwhelm a scheduler who might have to deal with multi-leg transportation paths, displacements, and variable inter- or intraday deliveries due to constrained transport capacities on one or more legs of the transaction. These types of deals can also undercut the real value of an experienced gas scheduler – the ability to contribute significant financial value by routinely analyzing and determining the most reliable and cost-effective (optimized) paths from receipt to delivery point – when they become overwhelmed and have to "just try to get the gas there" prior to nom deadlines.

SCHEDULING IS NOT FOR THE WEAK

If one looks at the various tasks for which gas schedulers are responsible, it becomes more understandable why schedulers within larger organizations suffer from high levels of stress and job burnout. As shown in the chart below, the litany of tasks,

responsibilities and deadlines they face is daunting (Note: Keep in mind the daily scheduling responsibilities shown can apply to dozens of transactions on each of multiple pipelines, often interconnected, and managed by a single scheduler):

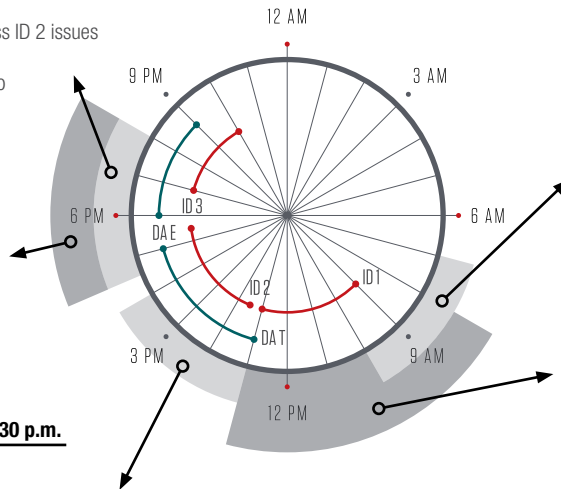
DAILY ROUTINE RESPONSIBILITIES	BID-WEEK RESPONSIBILITIES	END OF MONTH SETTLEMENT RESPONSIBILITIES
<ul style="list-style-type: none"> Update ETRM for counterparties, contracts, paths, nominations and scheduled volumes Negotiate with pipeline representatives to address/negotiate nomination issues, park and loan agreements, late nom submissions, etc. Coordinate with counterparties to ensure accuracy of upstream/downstream contract details, or to resolve nomination issues 	<ul style="list-style-type: none"> Review pipeline notices/capacities for next month activities Participate in Bid-Week trading floor briefing Coordinate Bid-Week Plan with Trading Desk Monitor trading activities and continuously update paths/nomination plans Finalize and submit nominations prior to deadline for month ahead activities Update ETRM for counterparties, contracts, paths, nominations and scheduled volumes for Bid-Week deals Negotiate with pipeline representatives to address nomination issues, park and loan agreements, late nomination submissions, etc. Coordinate with counterparties to ensure accuracy of up/downstream contract details 	<ul style="list-style-type: none"> Ensure ETRM is fully updated and correct for prior month business Review/approve pipeline statements Answer inquires from accounting group

- Review ID 2 results
- Review pipeline notices relative to current day flow
- Coordinate ID 3 plan with Trading Desk
- Update paths/nominations plans to address ID 2 issues and capture intraday trades
- Finalize & Submit ID 3 nominations prior to deadline at 7 p.m.

- Review pipeline notices for next day activities
- Review DA T scheduled results
- Coordinate DA E Plan with Trading Desk
- Update paths/nominations plans to address DA timely issues
- Finalize and submit DA evening nominations prior to deadline at 6 p.m.

Evening shift begins at approx. 4:30 p.m.

- Review ID 1 results
- Review pipeline notices relative to current day flow
- Coordinate ID 2 plan with Trading Desk
- Update paths/nominations plans to address ID 1 issues and capture intraday trades
- Finalize and submit ID 2 nominations prior to deadline at 2:30 p.m.



- Review previous day's DA E cycle flow/cuts
- Review pipeline notices relative to current day flow
- Coordinate ID 1 plan with Trading Desk
- Update paths/nominations plans to address prior day's Evening Cycle issues and capture intraday trades
- Finalize and submit ID 1 nominations prior to deadline at 10 a.m.

Arrive in office at 7 a.m.

- Review pipeline notices/capacities for next-day activities
- Participate in daily trading floor briefing
- Coordinate DA T plan with Trading Desk
- Monitor trading activities and continuously update paths/nomination plans
- Finalize and submit DA T nominations prior to deadline at 1 p.m.

- DA T** - Day Ahead Timely Cycle (aka "Timely")
- DA E** - Day Ahead Evening Cycle (aka "Evening")
- ID 1** - Intraday Cycle 1 (aka "Cycle3")
- ID 2** - Intraday Cycle 2 (aka "Cycle4")
- ID 3** - Intraday Cycle 3 (aka "Cycle5")

Trading organizations must recognize that even the absolute best scheduling groups have limited bandwidth. With each scheduler having responsibility for multiple pipelines, there are only so many transactions they can manage on those pipes given the time windows in which they have to operate. With overlapping intraday and day-ahead (timely) nomination and confirmation cycles/ deadlines, last-minute changes (such as no-notice transactions or deals added near deadlines) will create additional stresses on the scheduler and increase risks that a deal is not properly nominated and scheduled. These errors can expose the company to commercial penalties for gas that doesn't flow, reputational damage, or inefficient use of firm transport agreements (and potentially higher transport fees) as the scheduler struggles at the last minute to find available routes from receipt to delivery.

Natural gas trading companies should recognize both the value these employees bring to their commercial operations, as well as the risks should their scheduling groups become overwhelmed by this high-pressure routine and suffer emotional or physical issues (which is, unfortunately, not uncommon in this industry). Commercial success in the physical natural gas market depends on schedulers being able to operate at a high level of performance and, as with any role, if they are over-burdened or excessively stressed for long periods, their job performance will suffer, and potentially expensive and damaging errors will result.



SCHEDULERS AND ETRM

Given the time constraints and conflicting deadlines during the daily business cycle, it's common that schedulers rely on spreadsheets to manage their pipelines balances and nomination plans, updating their ETRM during whatever breaks they can find during the day. In fact, on particularly hectic days, the ETRM system may not be updated for that day's activities, limiting daily P&L visibility, and creating a backlog of work that must be completed the next day.

ETRM applications are highly structured systems that require complete and correct deal information to be input (including upstream and downstream contracts for each of the dozens of transactions that must be managed) and transport data updated prior to the scheduler being able to path and generate schedules and/or nominations from that system. Given the tenor of the workflow on the trading floor, it's little wonder that almost all schedulers will rely on their spreadsheets for most or all their immediate scheduling needs and treat the ETRM system as an "after-the-fact" overhead burden to be addressed only after they submit their nominations.

The complexity of any software product is a direct reflection of the complexity of the processes and business it is attempting to model. ETRM solutions are designed to address the breadth of potential capabilities required by the vendor's current and prospective customers and, as such, they rarely provide an optimal solution for an individual use case, such as a pipeline with specific and unique processes or a particular type of contract structure.

While some gas trading companies have mandated the real-time use of their ETRM system to generate and transmit nominations via EDI, those firms also acknowledge they are surrendering the value that is inherent in trading up to the deadline, or in providing some premium services to buyers, such as no-notice physical calls and puts. Relying on the ETRM system to manage all activities in "real-time" will usually imply that trading must be

cut-off well in advance of the nominations deadline in order for the scheduling group to get that cycle's business pathed within the system, run the nominations generation process, review for errors, and then transmit to the pipeline in advance of the deadline.

Though no current ETRM offering has truly and effectively solved the usability issues for gas schedulers, some are better at capturing and maintaining complex transportation paths (either via spreadsheet like grids or graphical drag and drop screens). They may also provide better workflow for schedulers, such as the ability to template screens for "single screen" pathing, defaulting of commonly used data fields, "auto-rolling" paths from month-to-month, "auto-scheduling" of commonly used paths, etc. That said, true innovation in natural gas scheduling software capabilities will likely only come once ETRM vendors invest in and deploy some form of an AI-based application or other innovative technology that not only relieves the scheduler from much of the data input and manual processes on which current systems rely, but also provides optimized pathing solutions that incorporate the multitude of variables that schedulers must consider when manually optimizing.

Bringing these types of new capabilities to the natural gas scheduling arena will require a cooperative effort between the software vendor, the gas trading firm or firms, and industry experts, like Capco, that can not only help interpret the needs of that client, but also help the vendor(s) understand the sometimes specific requirements needed to model and create appropriate nominations for each pipeline (including interstate, intrastate, and gathering systems) or facility, such as a city gate or gas storage facility. Without this broad view of this complex market, investments made by the ETRM vendor and/or the client will have limited value should that client grow their market reach or the vendor pursue prospects operating in different regions or on different pipelines

Until these new innovations arrive on the market, gas marketing companies should ensure their scheduling groups are adequately staffed, trained, and supported to ensure this critical function does not become an operational and financial chokepoint and source of significant commercial, operational, and reputational risk.

Given that virtually every physical natural gas transaction must pass through the hands of the scheduler, it is also critical that scheduling personnel are actively involved in any ETRM selection process, and that they have an equal (or even positively weighted) say in which system to select. As schedulers are usually the group most burdened with maintaining data and activity in the system, and in light of their critical role in the operational and financial success of the trading organization, deploying an ETRM system with the capabilities to shave even a few minutes of effort from their daily workload will pay dividends for the entire organization... and perhaps even start to elevate the role of scheduler from being the most challenging job in the energy industry.



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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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