

# Preparing for Growth

Efficiency and Optimization Opportunities for Natural Gas Processing Plants



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## Gas Processing Industry Seeks Efficiencies

Estimates show that by 2040, the global energy mix will evolve dramatically, with the market for natural gas growing more than any other energy type and reaching a quarter of all demand.<sup>1</sup> With margins expected to remain tight, securing large investments for plant upgrades and expansions will be a challenge. Industry leaders are instead seeking new efficiencies to streamline production and increase throughput using existing equipment. Many are finding that integration of information technology (IT) and operations technology (OT) systems allows them to make the most of today's "smart" automation technologies with a relatively minimal investment.

**Connecting information across your entire gas processing facility allows for production visibility that can inform strategic operations decisions to:**



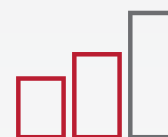
**Reduce**  
the risk of  
downtime



**Minimize**  
energy  
consumption



**Increase**  
efficiency and  
reliability of  
processes



**Achieve**  
greater throughput  
with existing  
equipment

**In addition to scaling up to meet future demand, gas processing facilities are facing a host of other issues that can impact profitability:**

### **Limited visibility into critical equipment health and performance | PG 3**

Your most poorly producing equipment sets the pace for your entire facility. Poor equipment performance and total equipment failure can cost you a lot of time and money. It can also result in downstream quality issues with your final sales product.

### **Skid integration is lacking, making it tough to see the big picture | PG 4**

Modular construction techniques common in the past decade have contributed to siloed control and reporting systems, and impeded the ability to gain plant-wide visibility into production.

### **Current production and output don't match what the plant was designed to support | PG 5**

You know your plant can do more. Close the gaps with advanced process control. Amine treatment, fractionation, and sulfur recovery are three areas of the process where you can realize quick wins by implementing MPC technology.

### **Ever-evolving cyber threats can make it difficult to keep the plant physically safe and virtually secure | PG 6**

Keeping up with changing cyber security best practices is a constant challenge, and cyber-attacks are growing in prevalence and severity. Developing strategic safety and security measures is key.

### **Diminishing Skilled Workforce | PG 7**

Gas processing facilities, especially remotely located ones, have always struggled to find and keep good talent. Advances in technology are creating additional possibilities to operate with a skeleton crew or operate completely remotely.

<sup>1</sup> ExxonMobil 2017 Outlook to Energy: A View to 2040 Highlights



## Get the Most Out of Your Existing Assets

### Tame Your Asset Maintenance Process

Many new plants are discovering a side-effect of enlisting multiple vendors to provide equipment during initial construction: gaps in documentation and implementation of asset management technology across assets. You can easily remedy this by implementing a centralized asset management tool that:



**Automatically** scans the network to discover connected devices and workstation computers



**Maintains** an inventory of all versions of hardware, firmware and software you need to run your plant



**Allows** for manual entry of additional data, as well as data from devices that are not available over the network



**Keeps** detailed records of users' actions to streamline auditing and reporting



**Helps** you manage instrumentation calibration schedules and certificates



**Offers** mobile access to real-time information



**Keeps** your data secure

The right asset management technology can provide a quick boost in your operations because it allows you to effectively track the health of assets you already own – regardless of the original manufacturer.

Additionally, effective asset management technology surfaces information about assets that was previously only available through employees who possessed equipment expertise. This allows employees across your organization – regardless of their level of experience with gas processing equipment – to easily access the information they need to keep your assets running well.

## FUTURIZE YOUR MAINTENANCE STRATEGY

A comprehensive, plant-wide equipment maintenance strategy can quickly lead to less unplanned downtime and significant financial savings. Many gas processing facilities are shifting away from 'run it until it dies' and calendar-based maintenance strategies and toward predictive and prescriptive maintenance strategies, even on their cheapest and most easily-replaceable equipment. Why? Downtime in one area of a plant has a ripple effect that can impact production output and final product specs across your operations.

Condition monitoring is a system or program designed to measure machine and process parameters. Alarms are raised if potential for a fault is detected, allowing operators to identify and remedy issues before they occur.

Condition monitoring solutions can range from simple sensors and handheld data collectors to comprehensive systems that integrate machine protection with your standard control system.



## Gain Plant-wide Visibility into Performance

### Package Build Strategy Impacts Integration

The shale boom gave rise to a flurry of construction in the gas processing industry as companies raced to take advantage of high oil prices and new production technologies like hydraulic fracking and horizontal drilling. For the past five to 10 years, everyone was searching for faster, cheaper ways to get a new plant online.

As a result, the traditional stick-build design approach for new plants was in many cases tossed to the wayside in favor of a more modular approach: integrating multiple skids from multiple vendors. This new design strategy is referred to as a modular build, modular skid design, and/or package build. While this new strategy offers flexibility, scalability and quicker time to project completion – it can also lead to serious integration challenges. And with large plant builds often requiring services from as many as 30 skid builders, it's crucial to develop a plan for skid integration.

Rockwell Automation works with engineering firms, OEMs, and skid builders to establish functional specifications that drive down costs by improving project schedule and ease of integration with Rockwell Automation control systems. The PlantPAx® modern distributed control system (DCS) offers a scalable and flexible platform capable of controlling the entire range of process equipment, including power equipment like the Rockwell Automation CENTERLINE® MCCs and PowerFlex®. Rockwell Automation is uniquely positioned to manage process, power, and edge device data from both the DCS as well as power management systems like variable frequency drives (VFDs) and motor control centers. Integrating protocols like EtherNet/IP™ and 61850 enables operators to gain access to a whole new level of data which can help inform optimization efforts and allow for better operational decision-making.

## TAKE THE COST OUT OF CONNECTIVITY

FactoryTalk® VantagePoint® EMI takes much of the cost out of the data gathering already occurring by automating data collection across multiple systems and platforms. Connectors are included for out-of-the-box connections to Rockwell Automation Integrated Architecture® sources. Connectors to other systems are available as options.

In addition to gathering real-time, live data, FactoryTalk VantagePoint EMI can provide trending context by using information from FactoryTalk Historian or a third-party historian.

## CONSIDERATIONS FOR OPTIMAL DATA INTEGRATION:

- Common Network Protocol: EtherNet/IP
- Alarming: determining what and when to alarm – and also deciding what not to alarm
- Standardized HMI security and visualization
- Documentation standards



## Optimize Your Gas Processing Operation

### Work Smarter, Not Harder With Model Predictive Control

Model Predictive Control (MPC) technology, a technique for advanced process control, continuously assesses current and predicted operational data, compares that data to the desired results and computes and downloads real-time supervisory setpoint targets.

If your current production and output doesn't match what your plant was originally designed to support, MPC can help you close the gaps. Effective use of MPC can lead to increased process stability and reduced variation for all the distillation towers, increased yield, increased production capacity, reduced energy consumption and reduced emissions.

Amine treatment, fractionation, and sulfur recovery are three steps in your production process where you can realize quick wins by implementing MPC technology. To find more information about MPC for gas processing facilities, visit our Gas Processing web page.

#### Amine Treatment

##### Customer Challenges:

- Unit appears constrained in summer
- Inefficient energy usage
- Unit holds back maximum potential production rate

##### MPC Benefits:

- Increase plant throughput by up to 4%
- Reduce energy in the amine treatment plant up to 20%
- Stabilize Pipeline Gas quality to help prevent shutdown to sales pipeline
- Reduce acid gas fluctuation feed to the Claus Reactor that could result in emission violations

#### Fractionation

##### Customer Challenges:

- Off-spec fractionation production
- Reduced production rates in summer
- Equipment upsets when feed compositions change
- Loss of opportunity to maximize NGL operation margins

##### MPC Benefits:

- Increase yield of the most valuable NGL components up to 3%
- Increase production during summer season
- Reduce reboil energy consumption up to 10%
- Increase production capacity up to 5%

#### Sulfur Recovery

##### Customer Challenges:

- Higher SO<sub>2</sub> emissions
- Difficult to respond to acid gas composition changes
- Hard to respond to ambient temperature changes

##### MPC Benefits:

- Reduce SO<sub>2</sub> emissions for environmental compliance
- Increase sulfur recovery up to 4%



## Reduce Safety, Compliance and Cyber Security Risks

### Safety

Functional safety in the gas processing industry can be challenging, especially with constant standards updates and technology advances. Whether building a greenfield facility or modernizing your existing facility, understanding safety risk mitigation is critical.

- **Scalable safety instrumented systems (SIS)** allow gas processing facilities to apply different levels of risk mitigation as required by their specific needs. The systems are ideal for applications that need distributed safety, a flexible architecture and mixed safety integrity levels.
- **Pre-engineered SIS** solutions also are available to fix capability gaps and address specific business challenges in older plants. These systems can help reduce lead times and ease deployments when replacing aging or noncompliant safety systems.

### Compliance

In addition to complying with safety standards and regulations, gas processing facilities must meet stringent environmental regulations. With a modern DCS, virtual sensors and visualization software, operators can track the flow of gas and monitor emissions, even in areas where measurements are challenging. This information can be used to create automation compliance reports and review-by-exception procedures to speed time-to-market. It can also be used to notify regulatory agencies of potential hazardous releases.

### Security

More connected operations create new opportunities to improve asset utilization, but they also bring greater security risks. Gas processing facilities must deploy a comprehensive security approach to help protect their intellectual property, people and assets. A defense-in-depth approach assumes that any one security measure can and likely will be defeated, and therefore uses multiple fronts of protection.

Cisco and Rockwell Automation have collaborated to provide a common network and security environment on a single united network infrastructure for gas processing facilities. Learn more about our strategic alliance with Cisco on our website.

## DEFENSE-IN-DEPTH SECURITY

Targets risk at six levels:



Policy



Physical



Network



Computer



Application



Device



## Simplify Maintenance and Support

### Simplified Maintenance

Operators, especially new hires, are challenged to support the mix of automation technologies that comprise today's gas processing plant. Standardizing or consolidating these technologies by creating a Connected Enterprise environment can help reduce the number of systems with which maintenance technicians and support teams must be familiar.

This can help speed up troubleshooting and repairs, and reduce support costs. The ability to capture and maintain maintenance information also can help companies retain critical "tribal knowledge" before it walks out the door with retiring workers. Today, machine learning and data analytics help inform operators and better understand the gas processes they supervise.

### Remote Operations

Gas processing plants can fundamentally rethink goals around worker safety, plant uptime, and equipment maintenance by implementing remote support.

Instead of staffing specialists on-site or sending them to a plant following a failure, plant managers can use remote access to provide support from a centralized location. Or, if they're struggling to hire or retain internal specialists, they can use third-party remote-monitoring and support services to track production performance in real time and alert on-site staff if any issues arise.

## POHOKURA SETS THE STANDARD FOR REMOTE OPERATION

Pohokura produces over 45% of New Zealand's natural gas which is reticulated around the North Island to industry and domestic consumption.

### GOAL:



Establish a completely unmanned site: plant operation to be performed off-site from a remote control room using a **DCS**

### SOLUTION:



**MCCs** were integrated into the main plant control system on an intelligent network so information from the gas station could be fed back to the control room.



**Power switchgear** at the 400V MCCs and the plant 11kV main switchboard was made operable from the remote control room.

The success of the remotely operated Pohokura plant has led to plans to build another plant using the same, easily extendable solution provided by Rockwell Automation.



## Transforming Gas Processing

Data transformation helps connect gas processing operations to experts across the company and opens the door to an entirely new way of doing business. It can give gas processing companies immediate relief from the constraints of obsolete equipment. It can also provide connectivity between skids that allows for a big-picture view of operations. Benefits of implementing a Connected Enterprise:



**Real-time insights** into asset utilization, downtime and product quality to drive continuous-improvement efforts



**More strategic opportunities** to address skills shortages, such as by using remote monitoring and support



**A better understanding** of safety, environmental, and security risks



**New insights** into energy consumption to drive better energy-usage strategies



**Simplified** troubleshooting and maintenance to help reduce downtime and lower support costs



**More opportunities** for optimization and improved efficiencies through data integration and analysis



# Resources

To learn more about how implementing a Connected Enterprise can help improve your gas processing operations, visit this web page.

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