Yokogawa & eSimulation in the Midstream Industry
Natural Gas Gathering & Processing

eSimOptimizer™
Real-Time Optimization
Value Chain Excellence

Why Settle for Less?
Run your business optimally in real-time!

For shorter time horizon margin management, the eSimOptimizer™ economic/process optimization solution is used to maximize gas plant profitability. eSimOptimizer has been in use for over thirteen years to manage key energy and process tradeoffs at the plant level. The platform has evolved to take advantage of new technologies, with a continued focus on integrating the technology into client business processes.

eSimOptimizer™ is a web-hosted solution (SaaS) where the YCA/eSimulation team builds the model, hosts the optimization models on its servers at a co-location facility in Austin, maintains the model, and supports customer requests for clarification of optimization results on a daily basis. Optimal move guidance is updated every two hours on a secure web page. All monthly support services are included throughout the project term.

eSimOptimizer™ supports gas processing management by providing a comprehensive Data Acquisition and Plant Reporting platform, a rigorous process diagnostics and troubleshooting capability in the Process Engineer Support Package, and a rigorous Process Optimization capability which optimizes energy versus product recovery to maximize profitability on daily basis.

GAS PLANT DATA ACQUISITION AND REPORTING

An extensive data acquisition and reporting function that includes all the information required to run the gas plant including:
- Data Sheet / Charting
- Asset Summary
- Production Report
- Operations Comparison Report
- Production Summary Report
- Analysis / Composition Report
- Daily Emission Report
- Fuel Usage Report
- Flare Reports
- Download any and all values to Excel

PROCESS ENGINEER SUPPORT PACKAGE

The Process Engineer Support Package within eSimOptimizer™ provides rigorous process diagnostic information to help process engineers and operations personnel to more easily and effectively troubleshoot and support gas processing facilities. The Process Engineering Support Package is an online solution that helps client engineers and operations management personnel to analyze data quicker, to rate existing design models with online performance metrics, and to reduce process surprises.

The Process Engineer Support Package ties all degradation back to economic affects to allow for proactive planning of maintenance activities. The solution includes:
- PFD process representation to easily monitor plant and equipment performance. The above diagram shows how process data, and diagnostic information, can be compared directly between any two periods.
- Dedicated process comparison reports that allow management to compare process performance between any two periods (normalized pricing option provided):
  - Calculation, monitoring, and trending of Heat Exchanger duties / efficiencies.
  - Calculation, monitoring, and trending of Compressor efficiencies.
  - Calculation, monitoring, and trending of Turbo / Expander efficiency.
  - Identification of instrumentation and analyzer issues early to allow for proactive response.
  - Calculation and display of processing sensitivities such as the $/MMBtu increase in feed, $/psig increase in inlet feed pressure, $/C2 Recovery%, etc… given current processing conditions and economics.
  - Direct access to plant performance information for people both inside and outside the plant
  - Real-time web based data for gas scheduling/marketing.
PROCESS OPTIMIZATION

The eSimOptimizer system is a rigorous, non-linear first-principles optimization solution that manages key tradeoffs from plant inlet through residue and NGL product streams. Suggested optimization targets are updated on a secure web page every two hours. The web interface is easy to use and provides all the information the operator needs to understand what is driving the optimization move targets.

The operator entered the suggested optimization targets into the control system, the plant settles out, and the targets are updated two (2) hours later to reflect current inlet rate, inlet composition, ambient conditions, contract terms and gas/NGL prices. In this way, the operator is guided to make small moves towards a continuously moving optimum.

It is important to note that turbo / expander based cryogenic processes are highly non-linear. Also, the optimal targets aren’t always at high or low limits for each optimization variable. The eSimOptimizer solution is excellent at managing these non-linearities and determining where, within the ranges, each variable should be set to maximize process profitability.

The eSimOptimizer solution adds value by optimizing energy versus product recoveries, optimizing economic and operational tradeoffs across the complex, and managing changing processing constraints, to guide operators to maximize profitability on a 24/7 basis:

- In high NGL product margin environments, the optimizer will guide operators to maximize recoveries as inlet and ambient conditions change. The solution will identify what constraints are active, the value of relieving those constraints, and optimize response to changing processing conditions (excess gas to be processed, liquids takeaway constraints, etc…)
- In lower margin conditions, the optimizer often suggests backing off of ethane recovery slightly to save energy.
- In ethane rejection mode, the optimizer is continuously adjusting the ethane recovery, propane recovery, and energy consumption to optimize overall profitability. Efficiency gains are particularly dramatic in this mode.
- In very negative product margin environments, the optimizer may actually lower ethane recovery and slip propane to maximize plant profitability.

ONLINE MODEL SUPPORT

eSimOptimizer™ is a fully supported offering with eSimulation being responsible for all maintenance and for publishing of valid results. eSimulation has found that things change in cryogenic facilities and model based solutions can help clients address those changes. However, the online models do require maintenance to keep the solution functioning properly, to keep the models properly constrained, and to keep the models matching the plant. This is eSimulation’s role – to provide a platform that delivers actionable information on a sustained basis.

The eSimOptimizer solution includes all the engineering services required to keep the system functioning properly. This includes:

- Maintain data flow and history
- Re-tune model to better fit plant as needed
- Add optimization variables and constraints
- Respond to operator and management questions
- Value Capture Program

VALUE CAPTURE PROGRAM

The Value Capture Program provides the methodology necessary to sustain optimization initiatives, and to capture optimization value, over the long term. The Value Capture Program includes the following components:

Operations Report - Operations Report includes a summary of previous week’s performance and a process plan for current week’s operation. The following is an example of the main page of a Value Capture Report that is issued every two weeks.

Operations Conference Calls - Operations management arranges a standing 15 minute conference call to review the Operations Report and outline process diagnostic issues that should be considered. The conference calls provide the opportunity for operators and engineers to ask questions. As importantly, it provides eSimulation with the feedback needed to be sure the eSimOptimizer system is configured properly to reflect current operational constraints and objectives. eSimulation finds these calls are a great tool to bridge communication / technical gaps between the engineers, operations management, the operators and eSimulation engineers.
eSimOptimizer™
Esimulation began in 2000 by offering its eSimOptimizer rigorous, gas plant optimization solution. The solution bundles innovative, web-based process optimization software with strong chemical engineering services, to maximize asset value under all NGL margin conditions. The solution provides direct operator setpoint guidance every two hours on a web page (SaaS).

eSimEvaluator™
EsimEvaluator is used by midstream companies to manage their gross margin positions from wellhead to sales points. eSimEvaluator is used for what-if scenario analyses, operational performance optimization, budgeting, forecasting, variance analyses, commercial planning, and project justification. Its unique margin analyzer identifies changes between periods and quantifies the impact of those changes on gross margin deltas.

Oil and Gas Volume Tracker
The Oil and Gas Volume Tracker captures data from multiple data sources (SCADA, measurement, 3rd party custody transfer meters, etc.), each with its own time horizon, and stores it into a large-scale data warehouse repository. The data is then available for detailed measurement analyses, balances, and loss identification.

Operator Competency Improvement
The midstream industry is challenged with determining the best way to improve operator competency, and maintain operator competency, for a small number of operators, working in remote locations, and on shifts. eSimulation offers its eSimTrainer solution and Yokogawa offers dynamic training simulators used in refining and petrochemical applications.

Modular Procedural Automation
Modular Procedural Automation combines consulting expertise with world class procedure control capabilities to capture, optimize, and retain, procedural knowledge in a process plant. The solution integrates procedures into the operator interface and alarm system for improved situational awareness. Modular Procedural Automation can be used to automate, or guide operators through, startup and shutdown for gas plants and compression stations. Can also be used to help operators to implement eSimOptimizer optimization targets.

Automation Platforms and Services
Yokogawa offers multiple automation and control strategies, architectures, and solutions for every application size and complexity. Our distributed control systems (DCS) - fully scalable for midstream applications - are renowned for their reliability which translates into increased process uptime.

 ➞ Advanced Process Control strategies can serve to stabilize cryogenic processes and help the operator to achieve the eSimOptimizer optimization targets.
 ➞ Yokogawa’s multivariable control solution is ideal for reducing standard deviation in fractionation trains which results in better product splits and increased production.
 ➞ Yokogawa offers sophisticated SCADA solutions which can be used to manage gathering and suprasystem interactions

Analytical
Yokogawa is recognized as a world leader in the field of analytical equipment. Yokogawa's chromatograph line is of particular interest for midstream applications.

Field Instrumentation
Yokogawa field instrument products includes a complete line of flow meters, pressure transmitters, differential pressure transmitters, temperature transmitters, level transmitters, Fieldbus instruments and safety measurement instrumentation.

Main Automation Contractor
Yokogawa is particularly adept at implementing large control system projects as the Main Automation Contractor (MAC). The MAC approach was developed in the refining and petrochemical industries whereby the automation supplier provides a complete automation solution - control rooms, wiring, field instruments, control systems, PLC's, analyzers, etc.