

When Measurement Really Matters... Consider the Benefits of EGM Outsourcing

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Introduction

Natural gas measurement in the energy sector has evolved dramatically over the past few decades. By incorporating business process automation (BPA) technologies, measurement data management has been streamlined while substantially reducing costs. Once a highly labor-intensive operation, electronic gas measurement (EGM) data management can now be outsourced with a level of efficiency and automation comparable to other mainstream industries, such as banking, communications, and payroll pro-

cessing. Through automation as well as the use of sophisticated software and communications to integrate the core measurement functions (see Figure 1), accurate and fully accountable data is generated. This information may then be exported electronically to engineering, regulatory, and accounting departments with quality assurance which meets or exceeds internal measurement departments...and at much lower costs.

This whitepaper addresses key features and benefits of a fully integrated natural gas measurement

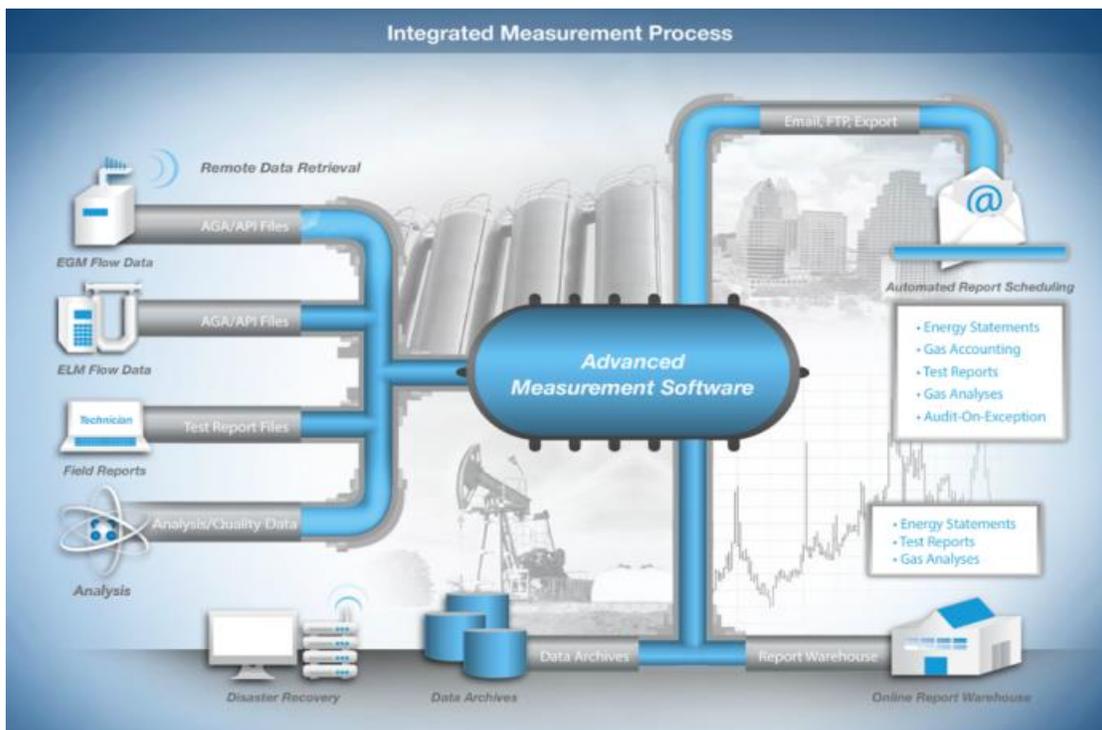


Figure 1: Integrated Measurement Service Model

Collected and processed raw flow data, meter inspection and calibration report information, laboratory analyses, and comprehensive data distributions are all seamlessly integrated and managed through an advanced measurement software system.

process that was once only affordable to Fortune 500 companies but is now available to energy companies of any size as an outsourced service option.

Reduce Operating Expenses by 50%

Figure 2 presents a comparison of operating expenses (OPEX) between traditional measurement and more advanced integrated-measurement processes. This financial analysis is based on the resources necessary to process 5,000 electronic gas measurement (EGM) orifice meter stations per month within a centralized EGM data management department. Capital expenditures (CAPEX) have been excluded.

EGM Department Operating Expense (OPEX) Comparison		
	Traditional Measurement Operation	Integrated Measurement Operation
Monthly Operating Expenses		
Payroll	\$525,809	\$281,775
Benefits (Insurance/Retirement)	\$97,279	\$47,176
Office	\$64,958	\$30,905
Rent / Utilities	\$39,983	\$19,022
Insurance	\$13,711	\$6,523
Auto	\$1,705	\$811
Training / T&E	\$10,599	\$5,042
Legal Fees / Interest	\$4,668	\$2,221
Indirect: Admin / IT / HR / Accounting	\$31,355	\$14,918
Total OPEX	\$790,067	\$408,393

Figure 2: EGM Data Management OPEX Comparison

While CAPEX monthly expenses for a system of this size may broadly range from \$150K to \$750K, this category was excluded from the analysis to provide a more direct comparison of only OPEX. On that basis, Figure 2 demonstrates the potential to reduce measurement OPEX by approximately 50% through fully integrated measurement operations. Outsourcing to a professional services firm with extensive integrated-measurement experience and economies of scale largely eliminates CAPEX while providing

the additional operational benefits that are described below.

Measurement Policy

A comprehensive corporate natural gas measurement policy (see Figure 3), often provided by a full-service outsource provider, offers a framework for

Natural Gas Measurement Policy
Typical Elements

Gas Measurement Policy

- Measurement Objectives
- Definitions
- Policy Review
- Regulatory and Contractual Requirements
- Scheduling
- Meter Inspection and Calibration
- Gas Quality Determinations
- Data Validation and Editing
- Volume and Energy Determinations
- Data Collection
- Data Retention
- Communications Between the Office and Field
- Gas Sales Verifications

Measurement Mission Statement

To ensure that a hydrocarbon measurement program is developed, deployed, and maintained to achieve established corporate objectives and standards for measurement comprehensiveness and accuracy.

Figure 3: Natural Gas Measurement Policy

producing accurate and accountable measurement data which is consistent with industry standards and best practices. One of the most important provisions of a formal measurement policy defines the data validation and editing requirements which are fundamental to the integrity of the finalized measurement data. Raw measurement data can be impacted by a wide range of potential error sources. Establishing error recognition parameters and defining how qualified analysts will evaluate suspect and missing data should always be a measurement policy requirement. Another valuable feature of a comprehensive measurement policy is that it provides a means to hold service providers accountable for meeting regulatory requirements (e.g., Sarbanes-Oxley, BLM, etc.), contractual obligations, and similar corporate objectives.

Certified Measurement Analysts

Certified Measurement Analysts working for an outsourced measurement service provider should have expertise and comprehensive experience with, at a minimum, the following:

- Fundamentals of gas measurement;
- Measurement policies;
- Effective use of leading-edge hydrocarbon measurement software;
- Meter station design and operation;
- System balancing;
- Natural gas sampling and the basics of chromatographic analysis;
- Identification and editing methods for the 50 most common sources of measurement error;
- Productivity software suites, such as Microsoft Office, Google Docs, OpenOffice, LibreOffice, etc.; and
- Excellent oral and written communications skills.

Analysts have an extremely important role in preparing volume and energy information for financial, regulatory, and engineering purposes, often within a very short time frame and set deadlines (e.g., “closeout”). While the job duties vary somewhat from company to company, this position is integral to the verification of billions of dollars in natural gas deliveries each month just within the U.S. The decisions for which Certified Measurement Analysts are accountable can have a tremendous impact on the bottom-line of companies which produce, process, and/or transport natural gas. Accordingly, the hiring, training, and retention of highly capable analysts should be a staffing priority.

Senior-level Hydrocarbon Measurement Subject Matter Experts (SMEs)

While SMEs possess all of the qualifications of Certified Measurement Analysts, generally they should have a bachelor of science degree in an academic discipline such as engineering, physics, math, or science; a minimum of 10 years of related industry

experience; and the ability to provide broad technical support, including design, training, “Lost and Un-Accounted For” (LUAF) reviews, sales (i.e., custody transfer) verification, and troubleshooting. In addition, SMEs should be up-to-date on all industry standards, routinely verifying that those standards and best practices are applied to the measurement and analytical processes performed by the Certified Measurement Analysts.

Electronic Gas Measurement Department Typical High-Level Organizational Chart

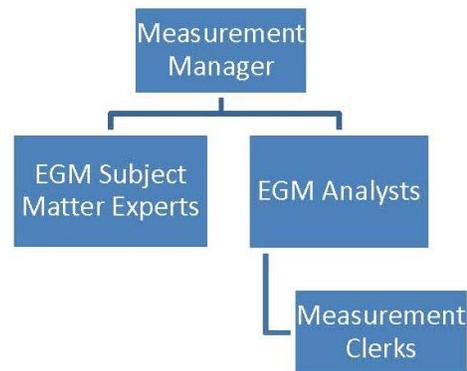


Figure 4: EGM Department Organization

Figure 4 depicts a typical high-level organizational chart for an EGM department. When outsourcing is employed, some (or most) of these positions will reside with the outsourced service provider, with internal management and staff providing liaison between the organizations...especially for information dissemination to the required recipients.

Data Validation and Editing

Sophisticated algorithms should be incorporated into the foundational hydrocarbon measurement software which are capable of detecting upset conditions or erroneous flow data by autonomously performing up to 350 validations on each flow record imported into the system. These expert systems allow analysts more time to concentrate on highly suspect data without having to manually scrutinize each record, and are key to the ability to automate and optimize the entire measurement

process. Additional validation routines, parameters, and benchmarks that are used to identify suspect data and confirm the integrity of flow data include:

- Missing Data;
- Duplicate Data;
- Expert Systems;
- Meter Setup;
- Gas Quality;
- Meter Inspection & Calibration; and
- System Balances.

Upon completion of the data validation and editing process, the original flow data, detailed edit logs, and finalized volume statements should be archived in accordance with industry standards for each station processed.

Automated Report Scheduling

A Report Scheduler allows standard or custom reports and/or data extracts to be created and distributed on a user-specified interval which may include daily, weekly, and monthly options. When outsourcing EGM, a professional integrated measurement service should provide seamless electronic exports of accountable data into, at minimum, financial, regulatory, and engineering departments.

Web Access to Data & Reports

Outsourced EGM service providers should allow for secure, flexible Internet-based access to current and historical report data on a 24x7 basis, including gas volume statements, lab analyses, system balances (where appropriate), as well as meter inspection and calibration reports. This offers a readily available, convenient means for sharing information with coworkers and entitled third-parties, while providing another resource for business continuity and disaster recovery processes.

Measurement Data Archiving

Electronic gas measurement data should be archived according to API Chapter 21 Audit Trail requirements, providing assurance that flow data is

stored in compliance with recommended industry standards in the event of an audit. Records are typically stored for a minimum of 7 years and full-service outsource providers should offer this important capability.

Disaster Recovery and Business Continuity

Disaster Recovery and Business Continuity (DR/BC) resources in support of EGM data processing must include redundancy as well as backups of critical systems and data. DR/BC systems must be fully synchronized with the exact software versions, service packs, and patches used in the production environment, and comprehensive disaster recovery testing must be conducted at least annually, and preferably multiple times every year. For EGM outsourcing service providers, effective DR/BC resources should be designed to protect client data while ensuring minimal systems downtime even in the event of a major outage or business disruption.

Cybersecurity

Cybersecurity, including network security, is the function within information technologies (IT) that is responsible for monitoring and protecting network infrastructures and connected devices. Comprehensive provisions include protection for traditional networks, servers, and computers. And with the unbridled growth of the Industrial Internet of Things (IIoT) as well as myriad smart devices, cybersecurity must be a proactive, continuous process to defend against many attack vectors, including denial of service (DoS/DDoS), phishing/pharming, application-layer attacks, and unauthorized access.

Cybersecurity is maintained through a variety of means, including network access control to prevent intrusion to physical and virtual devices and the theft or destruction of company information.

Data is one of the most important business assets and the lack of data or network security leaves company and individual information at risk. Cybersecurity is a critical component of any system or

service that is responsible for managing sensitive or confidential information.

When EGM Outsourcing is a Good Option

In simplest terms, the outsourcing of EGM data management and processing is a viable option anytime that there is an opportunity to improve the process and/or substantially reduce costs. As an example, the author's company has been able to provide substantial cost savings for clients through an integrated measurement service model by utilizing advanced hydrocarbon measurement software as the foundation for the entire process.

This whitepaper has been largely focused on the benefits of integrated EGM data management and processing for *production allocation measurement*. However, nearly identical operational advantages are available for *custody transfer measurement* even though costs may be somewhat higher due to earlier close-out dates and more rigid contractual obligations. The cost-benefits associated with outsourcing, as a percentage, are approximately the same for both custody transfer and allocation measurement. As shown in Figure 2, the operational cost savings associated with fully integrated EGM data management and processing can be of an order-of-magnitude of approximately 50%.

When Measurement Really Matters

Throughout the energy industry, the quality control requirements for hydrocarbon measurement range from accepting raw, unedited flow data for regulatory and accounting purposes, to using data that has been processed through a sophisticated measurement validation process that is more typical for custody transfer measurement. This whitepaper has addressed many of the features and benefits of fully integrated EGM data management and processing, through outsourcing, in which accurate and accountable flow data are required and transparent to all other business operations...for production allocation and/or custody transfer measurement.

For large producers and midstream operators, there historically has been a culture of maintaining an in-

ternal measurement staff. With the advent of business process automation, outsourcing the data validation and editing functions of the electronic flow measurement (EFM) process is now an extremely reliable, cost-effective alternative in much the same way as in other major industries.

Through outsourcing, measurement leaders now have more time to better manage the entire process, are able to focus on maintaining acceptable "Lost and Un-Accounted For" (LUAF) balances, and can spend less time recruiting and training. Another important benefit of outsourcing is that the OPEX is always proportional to the required amount of work. In an industry where asset sales and acquisitions can dramatically alter staff and overhead requirements, maintaining scalability and cost control in the measurement process may be one of the greatest benefits of outsourcing this critically important business function.

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