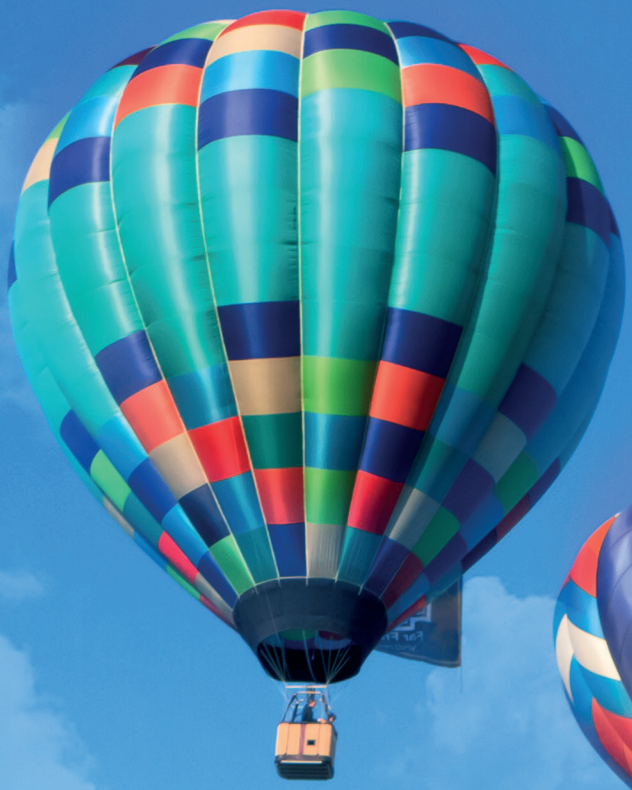
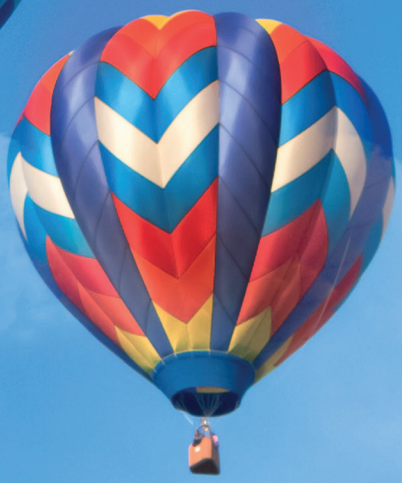
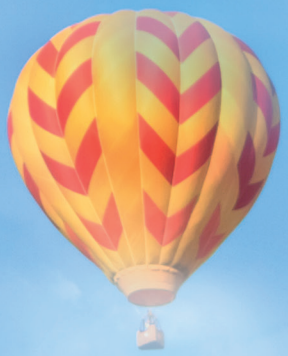


Benjamin Fuentes, Thermo Fisher Scientific, and Toby O'Brien, Enable Midstream Partners, discuss how advanced technology and innovative ideas help improve L&U gas levels.

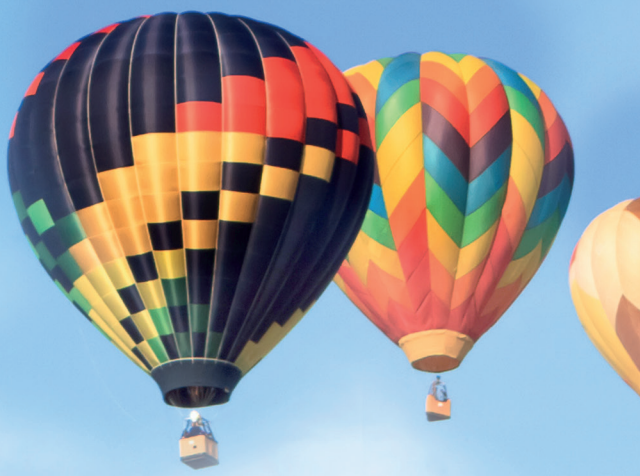


TRACKING LOST GAS LEVELS



Forecasting in the oil and gas industry is challenging, and for the midstream companies tasked with developing and maintaining transportation and delivery infrastructure, even minor process inefficiencies or issues can lead to major bottom-line impacts. But in one critical area of midstream operations – lost and unaccounted for (L&U) gas – there is an opportunity for organisations to use advanced monitoring technology to better understand their energy measurement, ensure accurate calculations and, as a result, achieve improvement, including higher levels of consistency.

An Oklahoma, USA, based midstream company, Enogex LLC, successfully used electronic flowmeters to better understand and manage its L&U gas levels. This approach, which will be outlined in this article, significantly boosts the company's overall performance, including its profits.



Embracing analytics

According to IDC Energy Insights, 50% of oil and gas companies will have advanced analytics capabilities in place by 2016. The consultancy believes analytics are one of the 10 most important issues for companies that seek emerging market opportunities and are planning for future growth.

Figure 1. Enogex in the field. Photo courtesy of Enable Midstream Partners.

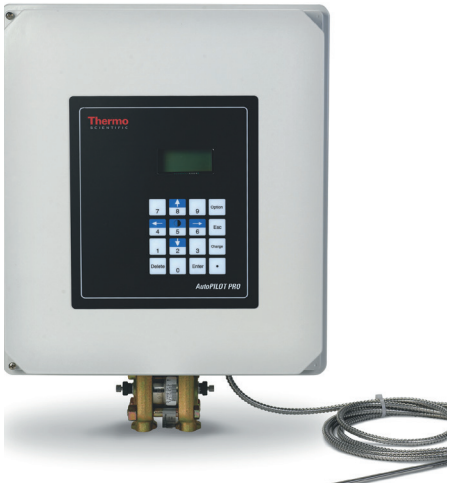


Figure 2. Thermo Fisher's AutoPILOT PRO. Photo courtesy of Thermo Fisher Scientific.

"Rapid and radical changes in energy supply and demand require gas companies to be more agile, resilient and innovative to retain a competitive edge," said Jill Feblowitz, Vice President of IDC Energy Insights, who helped develop the set of predictions for the oil and gas industry. "These decision imperatives will help oil and gas companies focus their efforts and deploy technology wisely to meet those ends."

Midstream companies are not immune to these challenges. To overcome them, these companies must look to better understand data and how it can inform their ongoing efforts to maintain pipelines efficiently while properly distributing and tracking the flow of product. Enogex LLC made innovation in analytics a central part of its new approach.

Enogex's path

The story behind Enogex's improved L&U levels started with a willingness to take a long-range view of its processes in the early 2000s. (Enogex was previously a subsidiary of OGE Energy Corp before joining CenterPoint Energy in May 2013 to form a master limited partnership, Enable Midstream. Enable Midstream is a natural gas pipeline company based in Oklahoma City that manages more than 12 000 miles of gathering pipelines and nearly 8000 miles of interstate pipelines as part of its operation).

For Enogex, significant swings in L&U levels, specifically from the winter to summer months, initially prompted executives to audit operations. While levels were well within the 2% threshold the industry accepts as reasonable, Enogex's own 12 month study of data found a difference of more than 1% in L&U gas levels from mid winter to mid summer. At its summer peak, Enogex charted L&U levels of approximately 0.85%, while in the winter they recorded levels closer to -0.40%. A loss or negative L&U has a financial impact in two ways – at the customer level by paying for gas not actually received, and then purchasing replacement gas on the spot market at possibly elevated prices.

The company initially struggled to understand the fluctuations, which altered the accuracy of the data that feeds into the electronic flowmeter (EFM) while impacting its customer service and its ability to set appropriate transportation and fractionation rates for customers. While there were potential explanations for those fluctuations – including seasonal changes in both gas temperature and ground temperature affecting the physical characteristics of the gas – Enogex executives wanted to pinpoint the specific causes and effects of the swings to establish a precise relationship between the work performed by their field technicians and subsequent L&U gas levels.

The company engaged a third party to assess its meter sites, and this included physical meter tube inspections, review of calibration equipment and EFM configurations. The consultants concluded that Enogex's technicians required a more thorough understanding of American Gas Association (AGA) flowrate equations. Although the introduction of electronic flow computers helped the process, Enogex and its field technicians still needed to understand flow equations so that they could conceptualise the resulting measurement numbers.

Enogex purchased a gas orifice flow (GOF) program in 2002 and installed it on the laptops of all measurement technicians. The new procedures required technicians to run the program, as an independent calculation, when arriving onsite and before leaving a site after calibration. This process verified that the EFM was calculating data correctly based on AGA flow equation factors. The technicians began to understand the environmental parameters that affect the flow equation factors, as well as how those factors influence the overall L&U calculation.

Enogex began to see vast improvements: a new 12 month study, from 2006 into 2007, displayed a less than 0.7% swing from mid winter to mid summer. The data made it clear that the operation was headed in the right direction. This provided incentive to keep going: executives opted to examine the data to identify opportunities for more enhancements to their services and bottom-line benefits, and they determined that a realistic goal for overall L&U was at or around 0.2%.

In 2007, the company chose to standardise its measurement protocols on one EFM platform, which included the Thermo Scientific AutoPILOT and Thermo Scientific AutoMATE flow computers. In fact, over the course of three years, Enogex gradually replaced all of its non-Thermo Scientific EFMs. (In

2008, Thermo Fisher launched a new platform, the Thermo Scientific AutoPILOT PRO, which combined the capabilities of the AutoPILOT and AutoMATE.) The GOF program provided the calculation factors that were easily compared to the calculations made by the EFM and on one screen. The goal for standardisation was to simplify calculation verification, troubleshooting and training with the expectation that it could maintain consistent L&U levels over any 12 month period.

Those expectations were met: a third study, conducted from February 2009 to February 2010, presented data showing less than a 0.2% swing from mid winter to mid summer, a significant improvement upon the 2006 - 2007 analysis. Goals were lowered to a conservative 0.16% to emphasise the importance and continued focus on the key behaviors that drive low L&U.

Behind the technology

The latest generation of EFMs are designed with long-term hardware and software reliability in mind. With optimal power, accuracy and ease-of-use, an effectively deployed system of EFMs enhances flow measurement and enables faster calculations. But any midstream company seeking efficiency and maximisation of resources must also be cognisant of their instrument durability as well; state-of-the-art EFM processors can withstand extreme environmental conditions, including 6000 volts of lightning and temperature cycling from -40°C to 85°C.

The EFM is in many ways the lifeblood of a midstream company, and essentially serves as its cash register; technicians are tasked with ensuring that customers pay for gas received at the wellhead and tracking gas sold to downstream users or transporters. Even small measurement errors can equate to millions of dollars per year.

For Enogex, the AutoPILOT Pro system delivered high performance as well as peace of mind and confidence in the gathering and calculation of valuable data. Today, the system enables per-second flow calculation on up to six meter runs simultaneously, and it interfaces with both differential signal devices and linear signal devices. It also features a simplified configuration that prevents personnel from spending valuable time on setup and programming.

Technological advancements have brought more precision and greater accuracy to applications in the oil and gas industry, and those benefits – directly or indirectly – have led to critical cost-savings and more streamlined operations for Enable Midstream.

Long-lasting impact

More than five years after its initial internal study, which led to standardising on the AutoPILOT Pro, Enogex has a significant sample size that can assess its performance, and it is still maintaining the consistent levels of L&U gas it charted in 2009 - 2010. By that measure alone the program is a success.

Giving field technicians a greater role in understanding gas measurement calculations and in the decision-making process is a major reason for the success of the program. Before standardising on the Thermo Scientific flow computer platforms, Enogex field personnel could see flow measurement

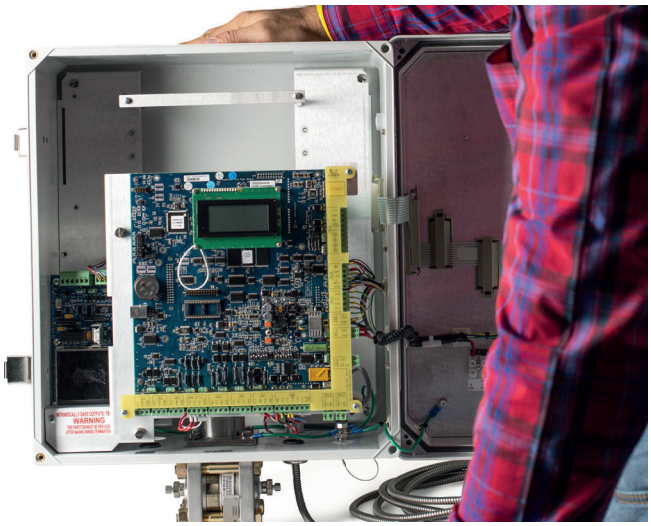


Figure 3. Thermo Fisher EFM. Photo courtesy of Thermo Fisher Scientific.

statistics, but they did not understand where the data came from or how it impacted L&U results. Once they understood both the problem and the opportunity in the larger context, they were much more effective at helping to achieve the overall goals and objectives of the program.

Now, Enogex technicians use the information displayed by the EFMs to understand how each data point fits into an overall flow equation. Seeing the data this way lets technicians proactively track L&U levels and avoid issues before they escalate. This has led to long-lasting impacts for Enogex because now its technicians are an integral part of a solution for efficient operations and bottom-line accountability.

The impact of having consistency in L&U levels cannot be overstated for midstream companies and their bottom line. Maintaining low levels – and keeping them consistent through changing seasons – allow companies like Enogex to drop their rates, set up more beneficial commercial deals, and gain and retain more customers. In the case of Enogex, the success of the L&U improvements and the positive impact on commercial and financial gains can be attributed to its attractiveness as a merger candidate and the eventual formation of Enable Midstream in 2013.

Conclusion

To be an industry leader and enhance service to its customers, Enogex officials made the decision to take the long view, and its planning and patience paid off. A focus on improving the understanding of L&U gas levels came at a time when technological innovation was starting to transform the industry. The companies that adopted such innovation quickly and correctly thrived. The lesson here for others in the industry is that small problems can indeed have a major cumulative impact on operations, but if someone cannot measure and analyse them, then they cannot fix them either. Enogex recognised an opportunity to elevate its business to a new level. The Enogex case study shows that even the smallest of percentage gains or losses are meaningful and that attention to detail – fuelled by access to and the mastery of hard data – is smart business indeed.