



How bp reduced methane slip and improved flare efficiency with flare.IQ

At a glance

Problem

Inaccurate methane slip quantification from bp's flaring operations due to environmental and process-related challenges

Solution

Implementation of Panametrics' flare.IQ technology for real-time flare combustion efficiency monitoring

Outcome

- Achieved a consistent destruction and removal efficiency (DRE) value of 99.3% across most of its gas and oil production sites where gas heating values exceed 300 BTU/SCF
- Enabled real-time flare optimization across multiple oil and gas facilities using flare.IQ and System 1 integration
- Improved compliance with global methane regulations through continuous CE and DRE monitoring

Background

As the global energy sector pushes for lower emissions and improved sustainability, bp has been at the forefront of implementing advanced technologies to track and reduce methane emissions. Methane, a potent greenhouse gas, can be released during flaring operations in oil and gas facilities. Accurately quantifying these emissions has historically been a challenge due to process variations, environmental factors, and technological limitations.

Traditional approaches relied on static emission factors, which often resulted in inaccurate estimates, leading to potential regulatory risks and operational inefficiencies. Recognizing these challenges, bp sought a scalable and accurate solution for continuous flare efficiency monitoring. A collaboration with Panametrics allowed them to find a solution with the implementation of the innovative flare.IQ technology.



Methane slip emissions measurement challenges

Before adopting flare.IQ, bp faced obstacles in accurately measuring methane slip emissions from their flaring operations. The conventional methodology of using static CE and DRE values didn't account for fluctuations in flare operations, process conditions, and environmental variables, such as wind speeds. This could lead to imprecise emissions tracking, making it difficult for bp to optimize operations and meet stringent regulatory standards. Challenges around existing solutions included:

- **Optical LiDAR** provided accurate CE measurements but was complex and lacked automation, limiting its use to periodic spot checks
- **Infrared camera technology** offered continuous CE monitoring but was highly susceptible to adverse weather conditions
- **Satellite-based monitoring** was effective for regional assessments but lacked the necessary temporal and spatial resolution for continuous monitoring at individual flare sites

Without a reliable real-time monitoring solution, bp had to rely on experience-based operational adjustments, which could result in suboptimal flare performance, increased methane slip, and regulatory challenges.

Solving the challenges with flare.IQ

The collaboration between bp and Panametrics began in 2019 when bp recognized the potential of Panametrics' flare.IQ technology to improve flare efficiency and reduce methane emissions. Initially, bp tested an offline version of flare.IQ, which processed historical flare data, revealing opportunities for optimization. Encouraged by the results, bp partnered with Panametrics in 2020 to develop a specialized version of flare.IQ integrated with Bently Nevada System 1, a condition-monitoring software platform.

The deployment of flare.IQ involved multiple stages, including:

1. **Field testing:** A field test was deployed in 2019 on FPSO Glen Lyon to identify opportunities to improve flare efficiency.
2. **Performance testing:** Extensive validation of flare.IQ was conducted through full-scale experimental measurements at the John Zink flare testing facilities. Computational Fluid Dynamics modeling further assessed its effectiveness under varying conditions.
3. **Scalability and integration:** flare.IQ was integrated across bp's oil and gas processing facilities, leveraging the System 1 platform for centralized monitoring and analysis.
4. **Operational optimization:** bp's operators gained access to real-time flare performance data, enabling data-driven decisions to optimize flare operations.

flare.IQ's parametric modeling technique provided reliable real-time CE monitoring without requiring major hardware modifications. This ease of deployment made it a cost-effective and scalable solution compared to alternative technologies.

The results of real-time CE monitoring

The deployment of flare.IQ has led to measurable improvements in bp's methane emissions management and DRE, including:

- **Significant emission reduction:** Previously, flare emission was calculated using the static emission factor, or equivalent DRE value of 98%. With real-time monitoring, bp has achieved a consistent DRE value of 99.3% across most of its gas and oil production sites where gas heating values exceed 300 BTU/SCF. This improvement translates to a substantial methane emission reduction.

“Our collaboration with bp is an important landmark and a further illustration that technology is a key enabler for addressing the energy trilemma of security, sustainability, and affordability,” said Colin Hehir, President of Panametrics.



- **Operational efficiency gains:** Real-time data from flare.IQ have allowed bp to make immediate adjustments, such as optimizing nitrogen purge rates during low heating value conditions and increasing flare gas heating value by fuel injection during high wind conditions. These optimizations have directly contributed to improved flare efficiency and reduced methane slip.
- **Regulatory compliance and sustainability progress:** With increased precision in emissions tracking, bp has strengthened its compliance with global methane regulations and reinforced its commitment to achieving sustainability targets.

The company has expressed strong confidence in flare.IQ's performance with Fawaz Bitar, bp Senior Vice President of Health, Safety, Environment

& Carbon, noting: “Through our long-standing partnership with Panametrics, we have progressed technology and implemented methane quantification for oil and gas flares, helping us to achieve the first milestone of our Aim 4.”

Continuing the journey toward lower emissions

bp's collaboration with Panametrics goes beyond the initial deployment of flare.IQ. The company is also exploring ways to optimize air-assisted flare operations, reducing excessive assisted air flow rate based on flare.IQ results. The company's experience with the technology highlights the power of technology-driven solutions addressing some of the energy industry's toughest challenges.

For over 60 years, Panametrics has been at the forefront of advanced measurement solutions, specializing in high-precision instruments that ensure operational efficiency and regulatory compliance across various industries. As a pioneer in sensor technology, the company designs and manufactures innovative solutions for gas flow, liquid flow, moisture, and oxygen measurement.

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