Panametrics

Application note

Major European refinery improves flare performance and reduces steam consumption by adopting Panametrics' flare.IQ emissions abatement solution

Summary

As part of its decarbonisation strategy, a European refinery required an accurate, reliable and robust emissions monitoring and reporting solution to comply with local regulatory requirements, including reporting net heating value and CO_2-equivalent emissions, among other parameters.

However, identifying a solution that met the required monitoring and reporting criteria—while integrating seamlessly into day-to-day operations—proved challenging. The complexity increases further for assisted flares, which combine multiple supply lines at the flare tip (flare gas, supplemental fuel gas to enrich lean flare gas, and steam) to achieve and maintain acceptable flare-tip temperatures for stable combustion.

Application

Purpose:	Automated flare optimization and emissions reporting
Considerations:	Compliance with environmental regulations and methane slip reduction

Benefits:

- Compliance with environmental regulations
- Integral solution
- Proven flare emissions abatement technology
- 24/7/365 monitoring
- CE/DRE optimization for emissions mitigation

Fig. 1: Methane Reduction

Challenges

As per all oil & gas refineries, at the customer's site flares serve as safety devices that combust excess gas released from process units. Because the flare system is routinely used as a relief pathway during unexpected or hazardous operating conditions, the customer faced flare-related emissions that could occur at any time.

As a result, the customer required an emissions monitoring and reporting system capable of operating **24/7 in real time**, irrespective of conditions such as mist, cloud cover, fog, rain, high winds, poor visibility, or periods of very low flaring and blowdown. Without continuous live monitoring, the customer risked missing high-release flaring events and operating with sub-optimised destruction and removal efficiency (DRE).

In addition, the customer faced a direct cost impact from emissions through **ETS allowances** in Europe. Improving combustion performance—targeting **>98–99%** combustion/destruction efficiency—was therefore a priority to reduce compliance costs. The customer also identified further savings opportunities through optimisation, including reduced **steam consumption** and **supplemental fuel gas usage.**

During the initial evaluation, the customer found that steaming costs were significantly higher than necessary, highlighting the need for improved flare optimisation.

Solution

Panametrics offered a turnkey solution tailored to the customer's requirements including:

- **Ultrasonic steam flowmeters** (XGS868i with T5 transducers) to extend measurement capability down to the minimum steam flow rates that the existing meter could not reliably capture
- **Ultrasonic fuel-gas flowmeters** (PanaFlow Z1G) to improve measurement at low-flow conditions for the same reason
- **flare.IQ flare control and emissions abatement system** for three flares, customised and programmed for the site-specific flare configurations, including integrated flow data reconciliation and a user-friendly Human Machine Interface (HMI)
- **Masoneilan control valves** sized to cover the full operating range and enable stable control across low to high flows

This combination of flow measurement, control valves, and software functionality enabled the customer to:

- **Measure and monitor all required variables** with improved accuracy and reliability
- **Monitor and report emissions accurately**, including **DCS trending** for operations and compliance
- **Optimise the steam-to-flare-gas ratio** based on the flared gas **net heating value**
- **Optimise flare-gas enrichment** by controlling the **fuel-gas-to-flare-gas** ratio
- Provide **24/7 monitoring and emissions mitigation** across operating scenarios
- **Actively reduce emissions** through real-time control of the combustion mixture

The customer was highly satisfied with the Panametrics' solution. Adopting flare.IQ the customer confirmed **over 40,000 mT/year of steam savings** from optimising three flares, alongside reduced fuel gas usage. The solution also provided real-time **combustion efficiency (CE)** and **destruction and removal efficiency (DRE)** monitoring, consistently exceeding **98%** for regulatory reporting.

Fig. 2: CO2 and $CO2_{eq}$ reduction

Fig. 3: flare.IQ

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