WHAT'S NEW WITH FLARING IN 2023?

How improving flare accuracy can alleviate your reporting problems

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Introduction

Without exception, all industries are facing major challenges due to the volatile business environment in which we've all been operating since 2020. The energy industry is certainly no exception and may, arguably, perfectly characterize a "VUCA" industry (which stands for volatile, uncertain, complex, and ambiguous). These companies, vital to our national security, operate in a business environment of wildly fluctuating product prices, escalating raw material costs, supply chain barriers, and an exodus of experienced personnel.

Adding to this already pressurized environment, federal, state, and local regulators are implementing perpetually stricter rules on greenhouse gas emissions seriously impacting upstream operations, and corporate board rooms as well. In an article by The Motley Fool from early in 2022, the popular investor website guided clients on a new investment criteria called Environmental, Social, and corporate Governance (ESG).

The article states that "an ESG rating measures a company's exposure to long-term environmental, social, and corporate governance risks. These risks – involving issues such as energy efficiency, worker safety, and board independence -- have financial implications... A good ESG rating means a company is managing its environment, social, and governance risks well relative to its peers. A poor ESG rating is the opposite -- the company has relatively higher unmanaged exposure to ESG risks." ("What is an ESG Rating?" The Motley Fool, Mar. 2022)

So, in an already VUCA industry and in a highly competitive capital market, corporate boards of many of the largest, most powerful energy companies in the world, must now publicly vow new strategic goals such as "net zero emissions" across their operations by some set near future date. Such aggressive public strategies help boards maintain the interest of increasingly activist investors via potentially positive ESG Scores.

These boards turn to their operations for practical real-world solutions to the problem of emissions reduction and elimination. One of the most obvious processes upon which to focus is one of the most visible to the public, the bright torch-like flames illuminating the desert of many production fields/facilities: natural gas flares. Where once natural gas was flared indiscriminately due to an absence of market access via pipelines, now regulators demand, in increasingly harsher tones, to know exactly how much gas is being sent to the flare tip, and they're fining those operators accordingly

What is Flare Gas Measurement?

To take a step back, flare measurement refers to the process of determining the quantity and energy value of flare gas generated within chemical plants, refineries, power plants, and oil & gas fields. Flare gas measurement is subject to national and regional environmental regulations and is used for the assessment of environmental taxes and determining the quantity of hydrocarbons and other hazardous gases.

This measurement has been of high interest for decades for large chemical and petrochemical facility operators because of the larger volumes and the more complex gas emissions mixtures potential during an upset from petrochemical plants. However, far upstream of the plants, where the emitted gasses are fairly homogenous, there has historically been little attention. [3]

These hydrocarbons are primarily converted into CO_2, a less toxic gas with less of an impact on the environment, especially when compared to a gas like CH_4. Methane is shown to have 84 times the greenhouse effect than one single ton of Carbon over a period of 20 years; it is also a large by-product of the upstream industry. Because of this, Methane is often converted into CO2 using flare and that Carbon is then pulled out of the air and captured using Carbon Capture Utilization and Storage methods.

Measurement of flare gas emissions are subject to national, state, and sometimes local environmental regulations. This measurement is used to prove regulatory compliance. The responsible authorities assess fines to those facilities exceeding regulated volumes which vary widely across state and even sometimes county lines. Because of this new visibility and pressure, producers have a very practical incentive to measure flare emissions as demonstrably accurate as possible, across the volumetric range potential of their application, and being able to verifiably report those results to the appropriate authorities as required.

To meet these goals, many energy companies are turning to the same technology that had become the standard for large flare stack flare emissions measurement at their downstream chemical and petrochemical plants: ultrasonic flare meters from manufacturers such as SICK, Inc., a global flow and flare meter manufacturer.

Aid from Ultrasonic Technology

How can the SICK ultrasonic technology help the industry meet emissions targets in the current upstream regulatory environment? One big objective is to maximize flare measurement accuracy. More accurate and reliable flare measurement meets many of the increasingly aggressive targets established by such agencies as the EPA and state and local regulators, alleviates many reporting problems, and allows for a more efficient and profitable operation.

There are three main benefits to gain more accurate measurement and reporting of greenhouse gas emissions.

1. It allows for the identification and avoidance of process-related events.
2. The process to develop and implement of processes to reduce emissions becomes simpler.
3. It helps to avoid fines and penalties from exceeding state and federal allowable for emissions.

Ultrasonic technology aids with this as it provides a quality measurement that can differentiate between gas and liquid within a pipe. The benefit of this is to determine when measurement uncertainty is compromised, and steps can be made to clean up the measurement and improve processes. As a result, more accurate emissions numbers are reported to regulatory bodies.

The key to growing the understanding of flare lies in using technology that enables a more accurate and reliable measurement. In addition, understanding the performance of each flare is crucial to the success.[4]

Advantages of SICK Ultrasonic Flare Meters

SICK flare meters use very robust, ultrasonic sensors with state-of-the-art processors providing accuracy, rangeability (turndowns to 4000:1) and real-time predictive analytics and diagnostics. By utilizing this data, production operators can remotely monitor key gas measurement points, minimizing field-tech trips and having a positive impact to operational efficiency. Even federally or state mandated meter verification visits, can frequently be accomplished via remote one-click via the SICK FLOWGATE™ software.

With traditional flare measurement, the goal is to ensure it continues to operate well. In the world of refineries, the flare is often pulled out to check its performance, something that can be timely and costly. With one-click reporting via the SICK FLOWGATE™ software. It can review the history of the flare meter through information supported in the software. With this, it can be determined how well the meter is working, without having the pull the devices out of the pipe. It also provides a predictive maintenance schedule based on an analysis of historical data and a plan for possible conditions based on field service. This means that instead of waiting for it to fail because the flare is so dirty, SICK can provide a plan for maintenance before it becomes critical, and the flare is down.

Another major advantage to using ultrasonic technology is Active Sound Correlation™ technology. IT & OT pushes the limits of conventional flare gas measurements, providing an extended measuring range not provided with traditional methods. For example, if the flare is pushed to the limit that the soundwave is blown away, many other meters can no longer measure it because the soundwave is lost. With SICK's meters, there is an algorithm input in the meter that listens to noise provided by the flare and correlates velocity of the flare using this. There is still some measurement uncertainty associated with this, but some measurement is better than none.

Available Options for Flare Measurement from SICK

FLOWSIC100 Flare

- High-resolution measurement and short response time
- Innovative sensor design for very high gas velocities and gas temperatures up to 280°C
- Optimal signal transmission even under atmospheric pressure
- Detached installation of the control unit up to 1,000 meters away
- Single- and multi-path configuration, with an optional probe version
- Zero-point test in the field according to factory standard
- Control cycle for automatic self-diagnosis / signal optimization

FLOWSIC100 Flare-XT

- Measurement availability under all operating conditions, at high gas velocities and with changing gas compositions
- Intuitive FLOWGATE™ operating software
- I-diagnostics™ for self-monitoring, easy verification, and condition-based maintenance of the system
- Retrofit solutions for existing measurement systems

Conclusion

In conclusion, an ultrasonic flare meter manufactured by a well-known flow meter manufacturer like SICK, commonly installed for decades downstream in refineries, is now proving itself for the upstream industry. By removing the more complex algorithms required for downstream plant stack flaring, SICK product development engineers now offer a simpler, much more cost-effective flare meter. SICK has developed an emissions measurement device to help our production company partners tackle the regulators and prove emissions reductions is possible as we jointly work toward a NetZero energy industry.