

Flare, vent monitoring and reduction Powered by flare.IQ

OGA February 2022
Panametrics, a Baker Hughes business

Summary

Recent publications on Methane reduction

- COP 26 [Presidency-Outcomes](#)
- OGA [Flaring-and-venting-guidance](#)
- Ipieca [Flare management guide](#)

What we believe will happen

- Increased legislation on monitoring, reporting & Combustion Efficiency next years;

What IQ can bring to you

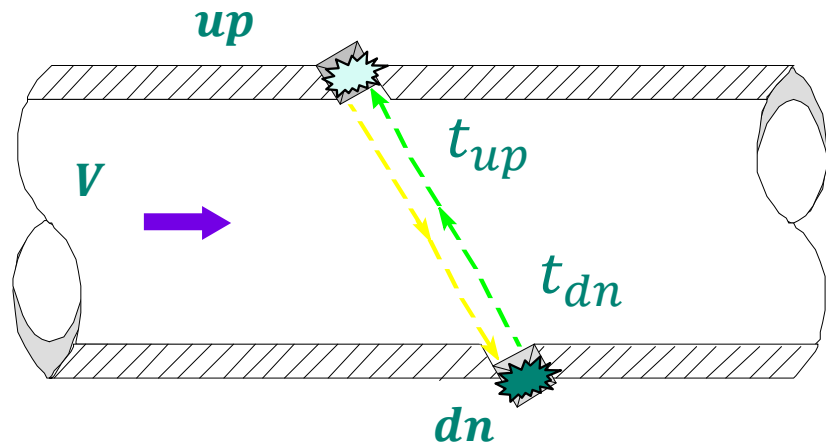
- An easy implementable solution for reporting;
- Avoids CE underreporting and CO2 overreporting;

Flare gas measurement



- How measure flow

Transit time



$$t_{up} > t_{dn}$$

$$V = f(t_{up}, t_{dn})$$

$$Q = V * A$$

$$SOS = f(t_{up}, t_{dn})$$

◆ = Transducer is both the transmitter and receiver

t = Transit time

– t_{dn} = Downstream direction signal *accelerated* by Flow

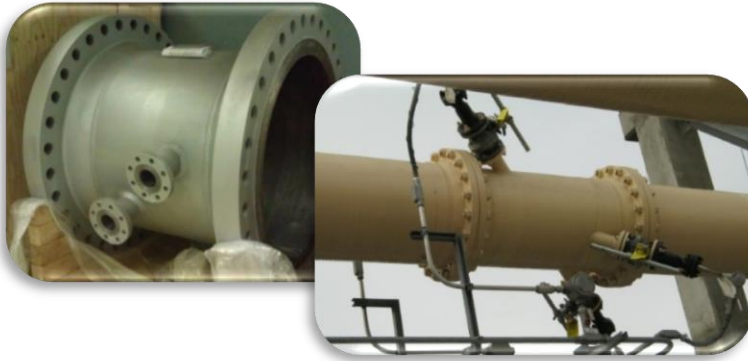
– t_{up} = Upstream direction, signal *decelerated* by flow

– V = Fluid velocity

– SOS = Fluid Sound Speed

Flare Gas Flowmeter exists in Multiple Configurations

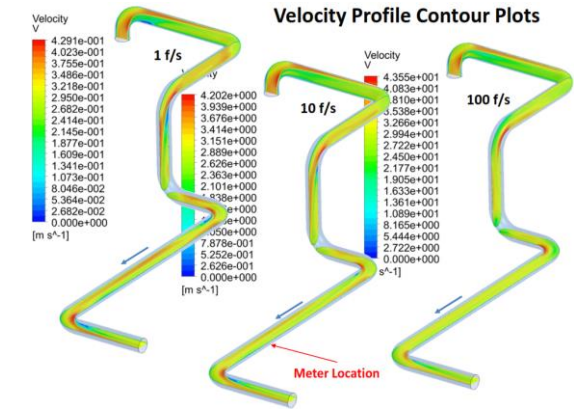
Spool-piece



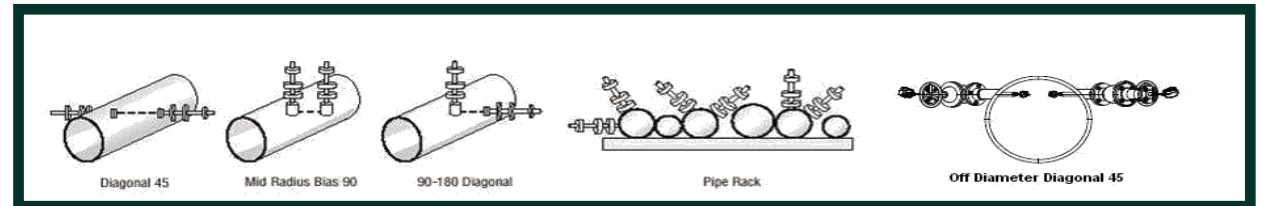
Hot-tap (or cold-tap)



CFD capability



Configurations to accommodate all piping set up



Capabilities to handle:

- 4000:1 turndown ratio
- Up to 100% CO2 content
- Extended temp. range (-190°C to 300°C or -310°F to 572°F)
- Local Field Service validation for compliance & reporting

Incomplete combustion

Flare Combustion: Methane

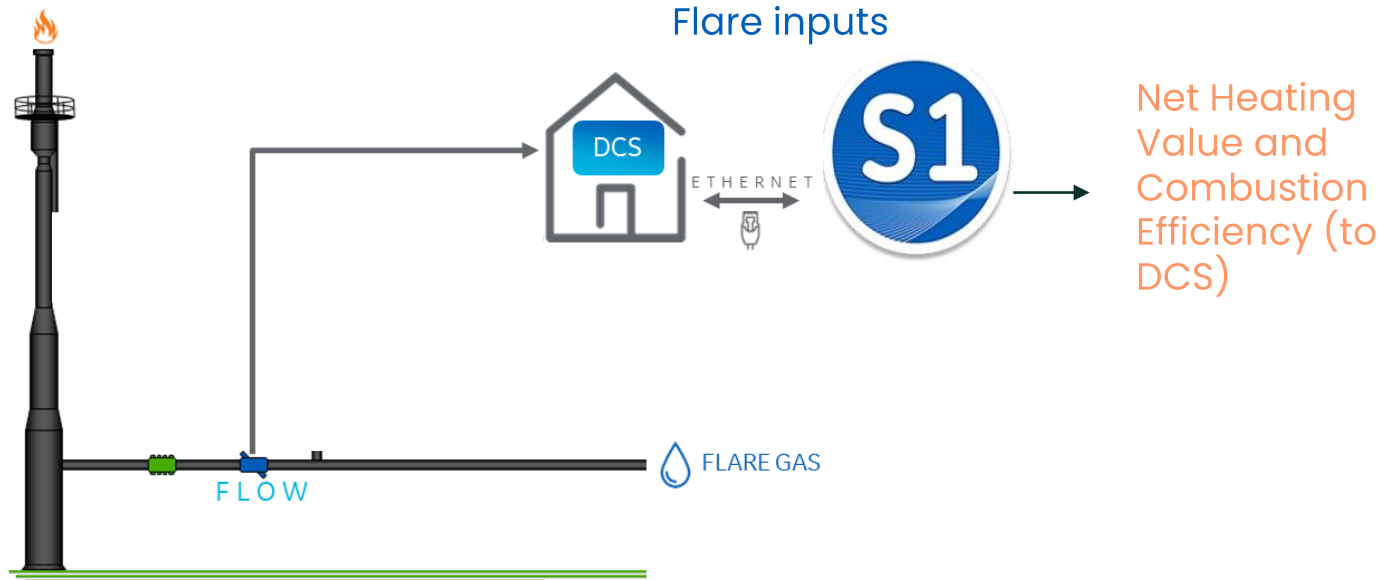
100% Combustion Efficiency



50% Combustion Efficiency, approx. 7 to 16 times larger CO₂_{eq}

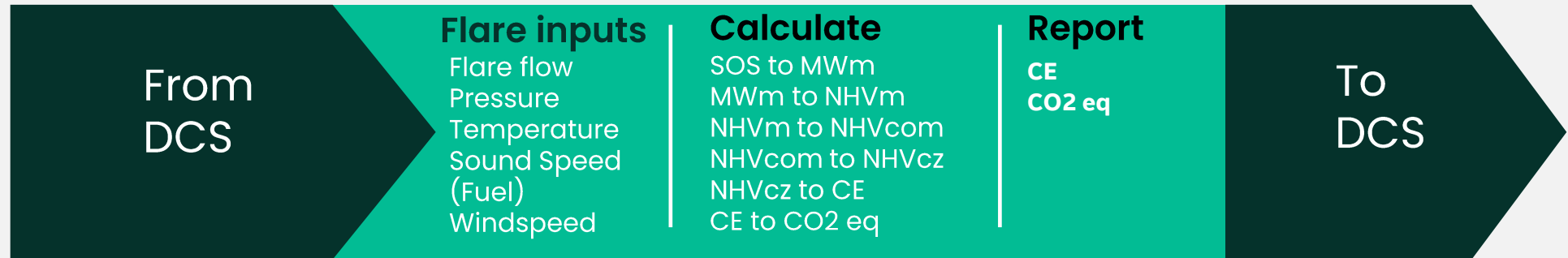
What can flare.IQ do for upstream (unassisted) flares?

flare.IQ upstream solution

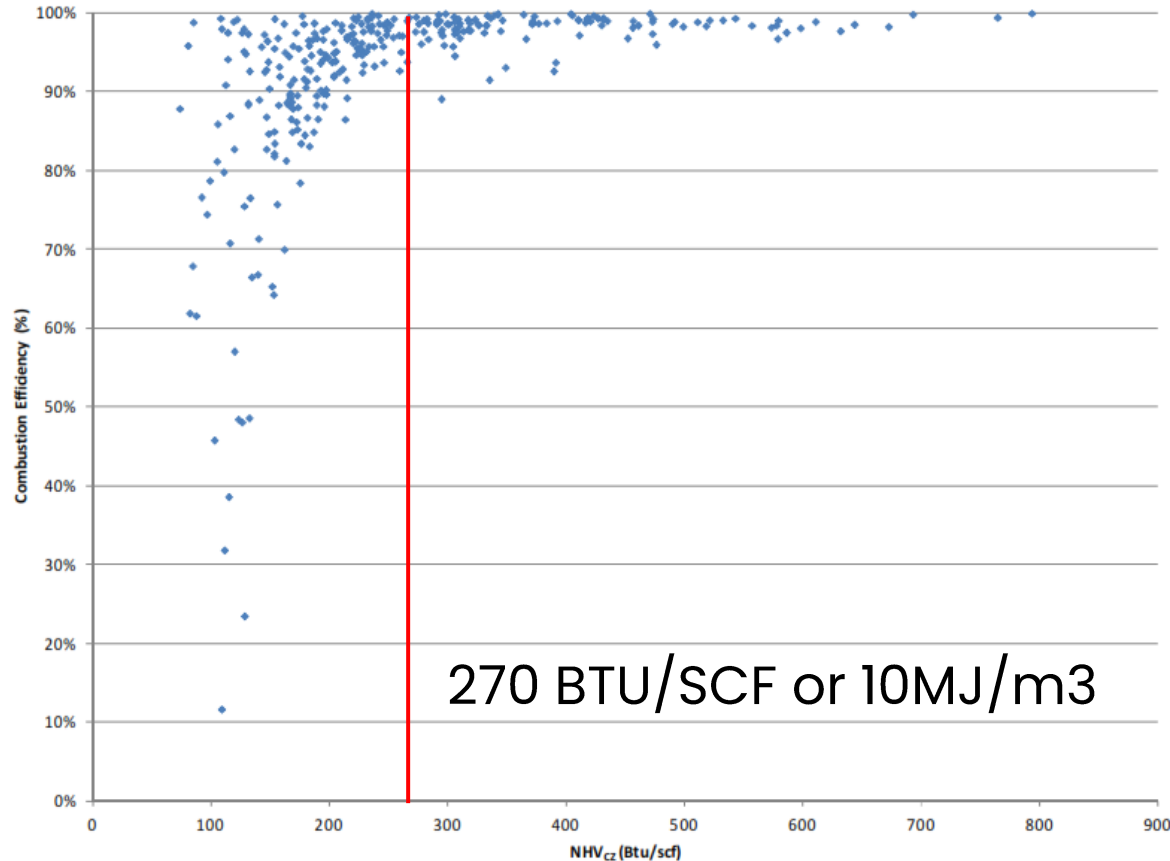


-  Increase transparency
Continuous online monitoring
-  Simple to install on any DCS
Unified approach
-  Use real time CE% and Total Hydrocarbon (THC) DE
Replace emissions factors with continuous analytics
-  Realistic Methane reporting

flare.IQ logic overview



Net heating value in the combustion zone



EPA Report

- EPA report compares tests with a wide range of compositions at different sites
- 270 BTU/SCF triggers Combustion Efficiency at 96.5%

[EPA 2012 flaretechreport.pdf](#)

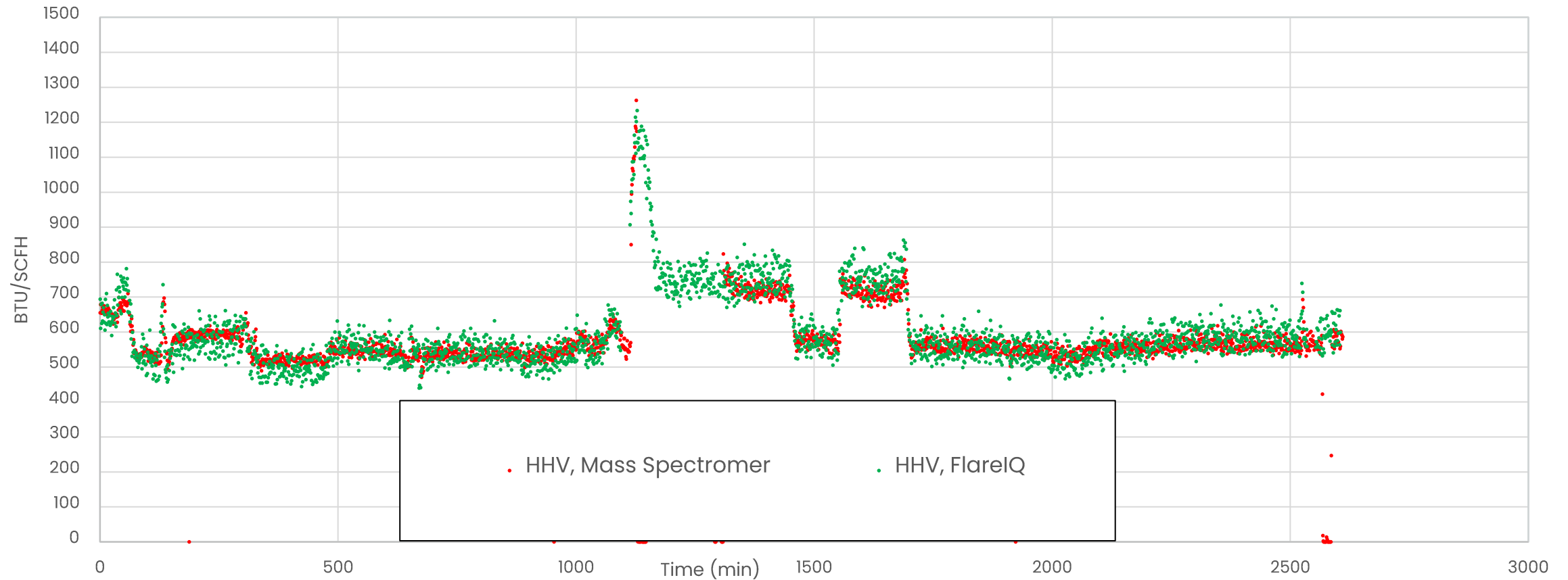
* "Parameters for Properly Designed and Operated Flares" prepared by the U.S. Environmental Protection Agency's (EPA's) Office of Air Quality Planning and Standards (OAQPS) dated April 2012 ("EPA Draft Report")

flare.IQ Field Validation Testing

DEMONSTRATED ACCURACY:

3-5%

against Mass Spectrometer
Reference





Emergency shutdown on the Diesel Hydrotreater, IQ is activated after 35 seconds

Shots [Youtube Video Lima, Ohio Husky flare](#)

Alternative options for reporting

Fixed CE of 98%

- The heat content plays an important roll and is not considered this way. Could work if composition were constant.

Gas Chromatograph

- NHV can be computed with high accuracy, but the system would be to slow to respond. Requires maintenance and calibration.

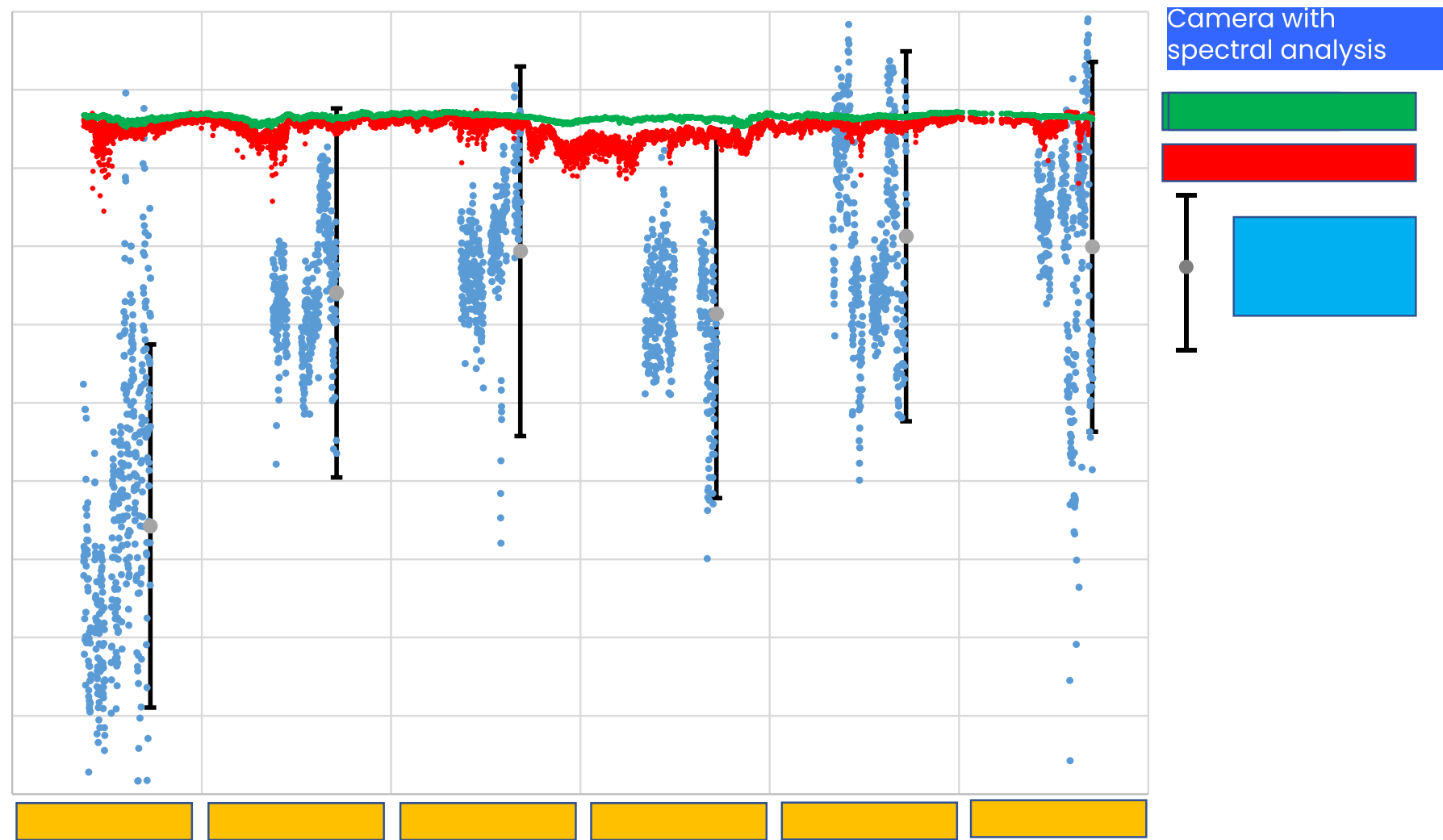
Camera with spectrum analysis

- Potentially works. Requires a position + cabling nearby the flare in the safe zone that is not always possible. Impacted by weather conditions like fog, rain, sun.

None of the above option can quantify the amount of CO2 equivalent.

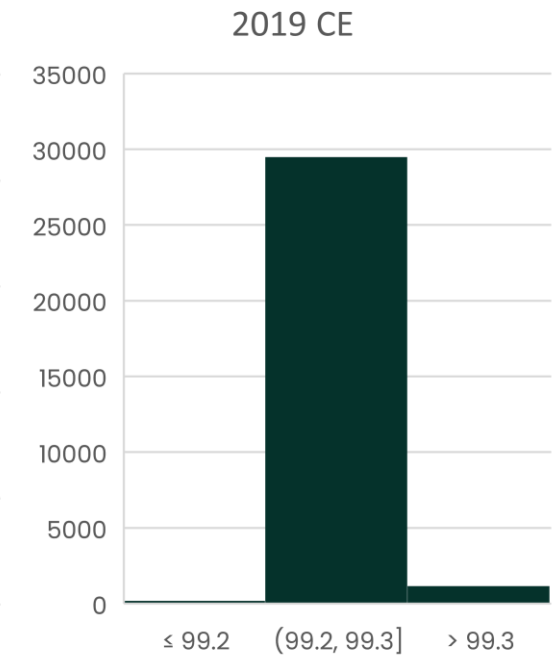
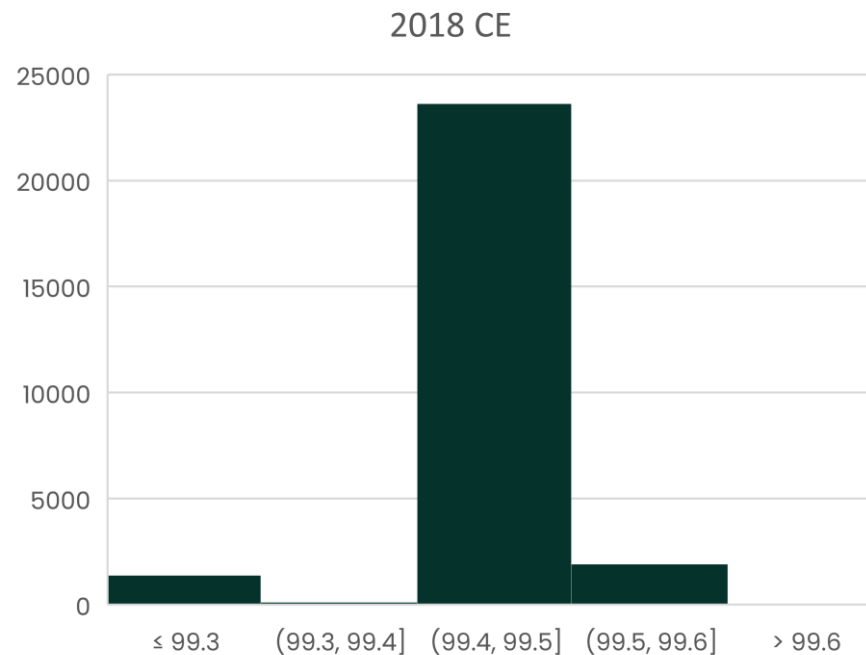
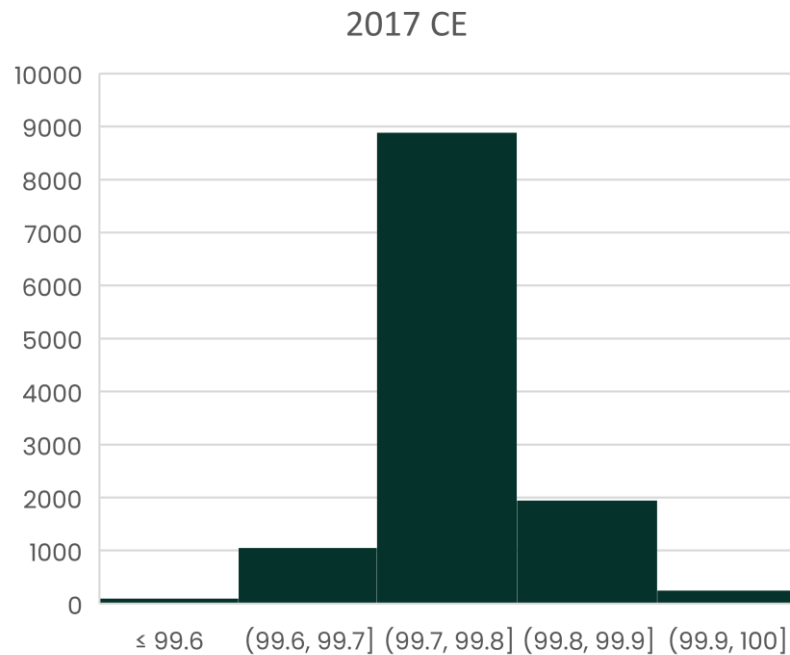
IQ can and is ready to comply future reporting on emissions.

flare.IQ and Reference measurements on Glen Lyon in 2020



Analysis based on offshore real data

- Flare flow
- N2 and CO2%
- Fuel gas flow
- Assumed windspeed 8m/s
- Consistent data, low dispersion
- Systematically >> 98%



Summary

What IQ can bring to you

- An easy implementable solution for reporting;
- Avoids CE underreporting and CO2 overreporting;

Questions

Contact

Mackie.Gordon@bakerhughes.com
dorus.bertels@bakerhughes.com

Regional Sales Manager
Ultrasonic flow specialist –Europe