

ЕНЕРГИЕН ФОРУМ 2024

ENTERPRISE EMISSIONS MANAGEMENT AN INTEGRATED HONEYWELL SOLUTION

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Honeywell

AGENDA

1. Emissions Introduction Overview
2. Wireless Methane Emission Sensing and Rebellion Overview
3. Honeywell Forge Sustainability+ For Industrial | Emissions Management
4. Methane Monitoring E360 Services
5. Wrap Up – Questions

17 GOALS FOR PEOPLE, FOR PLANET



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Source: <https://www.un.org/sustainabledevelopment/development-agenda/>

Emission Monitoring supports Environmental, Tax and Efficiency Goals

WHY EMISSION MONITORING?



TARGET CARBON EMISSION

Methane emissions account for about 25% of the warming experienced today¹

Methane has more than 80 times the climate-warming impact of CO₂ in the 20 years following its release¹



PLANT WORKER SAFETY

Continuous detection system improves worker safety



PLANT EFFICIENCY

Leaks mean lost product – In 2021 alone, the global oil and gas industry wasted \$19 billion of natural gas due to methane emissions¹

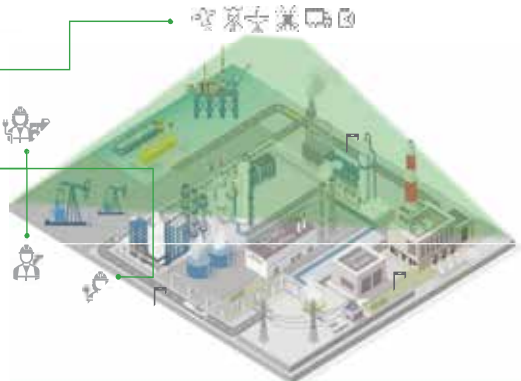
Reduce time spent on LDAR measurements and periodic EPA emission audits

Find problems faster

COMMON EXISTING CHALLENGE

TOP DOWN

BOTTOM UP
(most popular)

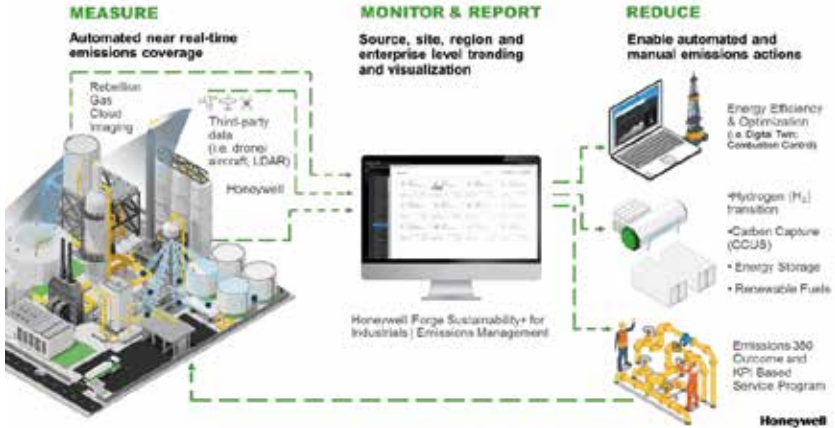


CHALLENGES

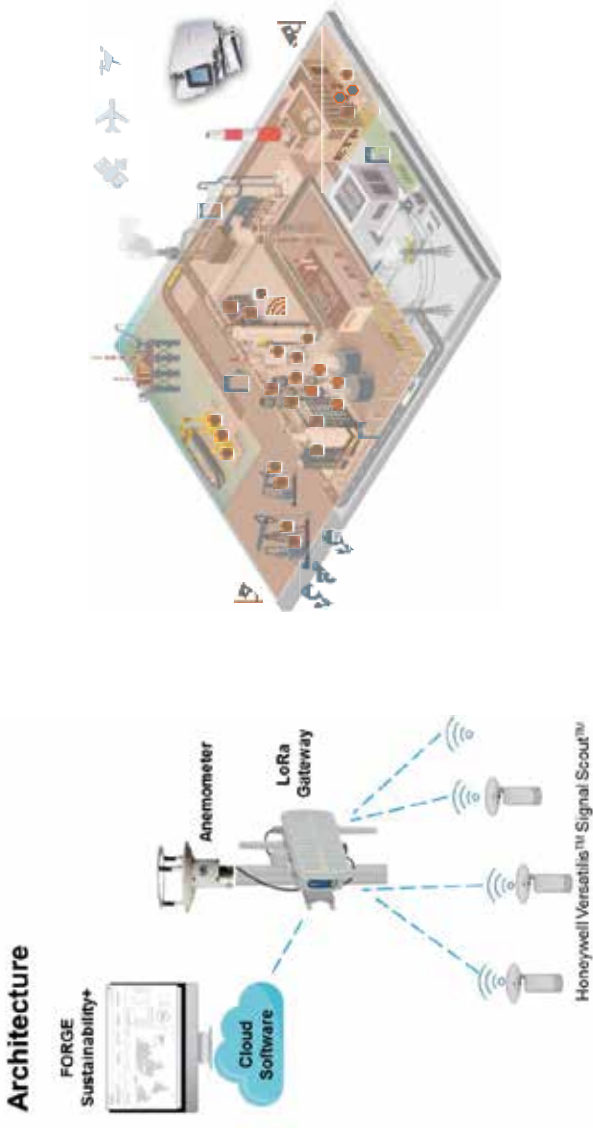
- Estimated inaccurate numbers only, retrospective
- Snapshot in time misses most intermittent emission events
- Labor & cost intensive to get any incremental improvement
- Limited ability to classify emission by type

Legislation will require empirical and accurate data for total methane emissions

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METHANE EMISSIONS MANAGEMENT SOLUTION

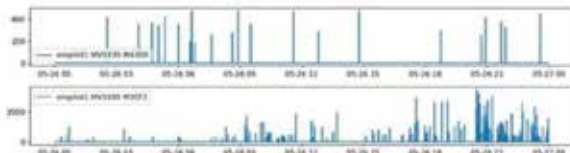
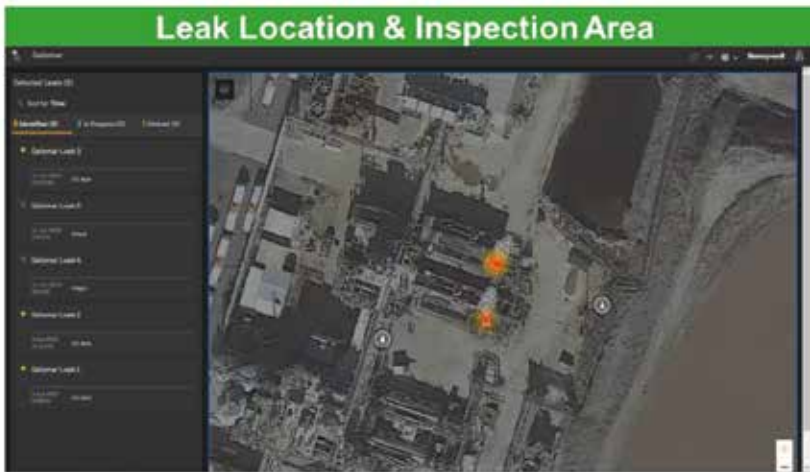


HONEYWELL VERSATILIS™ SIGNAL SCOUT™

- **Sensing parameters**
Methane (50-1M ppm), Temperature, Humidity, Pressure
- **Certified for Hazardous Area Operation**
Hazloc certs: IECEx, ATEX Exi-a and C1D1
- **Battery Operated**
Long battery life, no cables required for installation
- **IIoT Communications**
Utilizes LoRA for rapid and low-cost communications



LEAK DETECTION



Fugitive

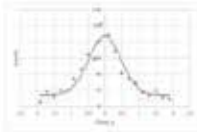
Process

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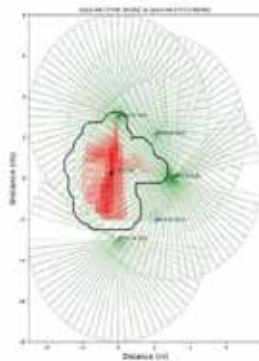
SENSING TECHNOLOGIES - PROACTIVE LEAK DETECTION



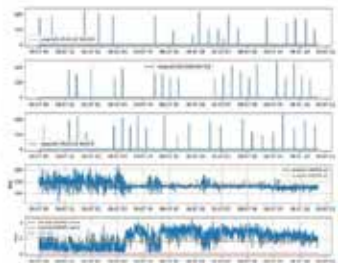
Honeywell Versatilis™ Signal Scout™



Source: Honeywell © 2023. Measurements in an open area.

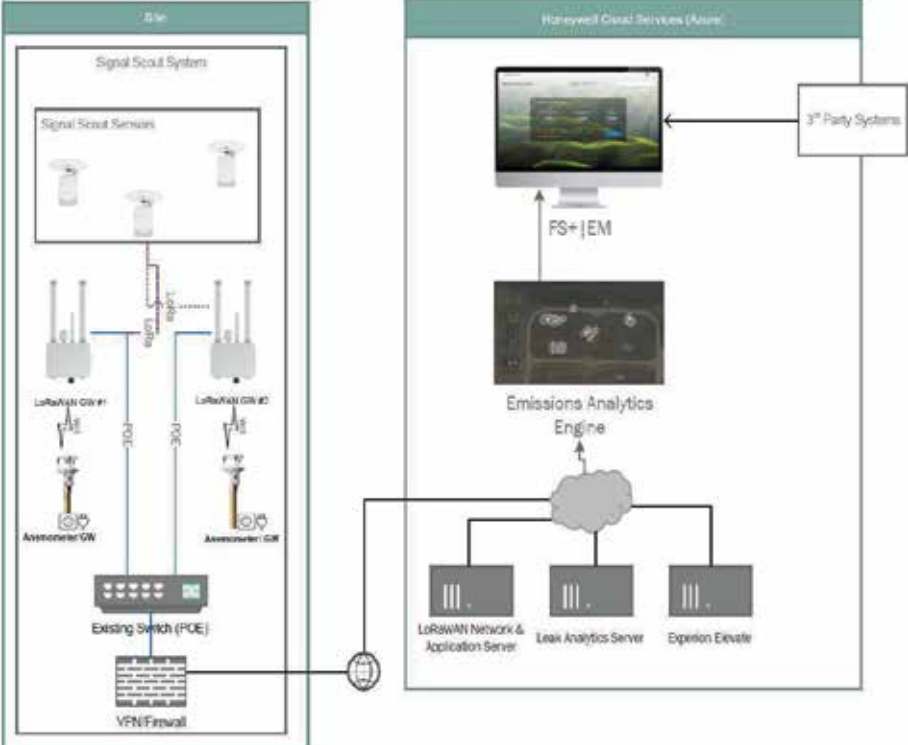


Detect a leak of 100 l/h at 10 m distance



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SOLUTIONSAMPLEARCHITECTUREDIAGRAM



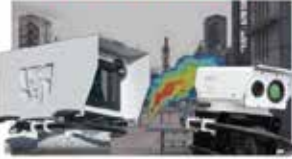
Deployment diagram with Switch Connection.

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EMISSIONS WIDE AREA OVERVIEW

HARDWARE



Two model options based on end use requirements with patented Hyperspectral Gas Cloud Imaging (Long Range or Mini)

SOFTWARE



VideoAlarm Management Software (Spectra) with Physics enhanced Artificial Intelligence based analytics (40+ gases)

SERVICES



Site Survey, Installation & Commissioning, Preventive Maintenance Programs, Training, Software Upgrades, Performance Tuning & Optimization

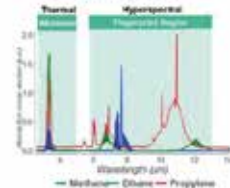
Rebellion GCI to oversee large areas visually

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REBELLION GAS CLOUD IMAGING CAMERA

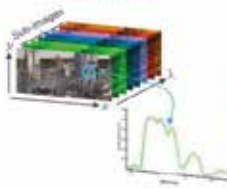
Physics of the GCI System

GAS FINGERPRINT IDENTIFICATION



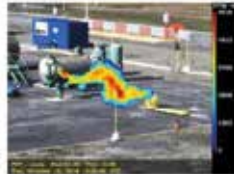
Rebellion utilizes the **fingerprint region** to identify gases and **minimize false alarms** unlike conventional thermal imaging cameras which cannot identify gas signatures

HYPER SPECTRAL ACCURACY



Full **anechoic** hyperspectral data designed to be continuously collected for each pixel in field of view for greater accuracy

PROPRIETARY ALGORITHMS



Proprietary algorithms convert hyperspectral data to a visual gas cloud display and then overlay on a **live video feed** for **remote diagnosis**

Proprietary Hyperspectral Technology Enables Continuous Monitoring

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CONTINUOUS VISUAL EMISSIONS MONITORING - REBELLION



CH4 EMISSION EVENT AT TANK BATTERY

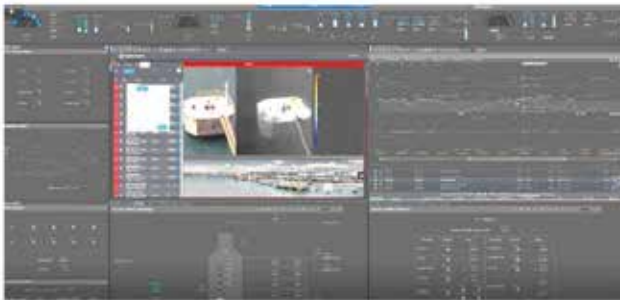
- Rebellion capturing a storage tank emission during METEC study in Colorado.
- The leak source, size and direction is detected for the operator to diagnose remotely via the live dashboard

H2S+CH4 EMISSION DURING ROUTINE MAINTENANCE

- Rebellion capturing an emission during routine maintenance
- Point sensors were located lower than the gas plume but Rebellion Gas Imaging System was able to pick it up

Identify Problems Operators Don't Even Know Exist

REBELLION | EXPERION INTEGRATION



Experion Example Dashboard with Rebellion GUI Interface



Typical Architecture Required for Experion PKS integration

Example Integration with Experion

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REBELLION GAS CLOUD IMAGING CAMERA

Standard Gases in The Rebellion GCI Solutions Library

Supported Gases		
Acetone	Ethylene	Natural Gas
Acetylene	Ethylene Oxide	N-Butane
Ammonia	Iso-butane	Propylene
Butadiene	Isobutylene	Propylene Oxide
Difluoroethane (1.1)	Methane	Toluene
Ethane	Methanol	Xylene

Note:

1. Standard analytics are developed for pure gas components in the lab.
2. Due to the varied chemical signature, gas mixtures require additional evaluation and tuning.
3. Other gases have been lab tested but not released in field applications.

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SOLUTION SAMPLE ARCHITECTURE DIAGRAM

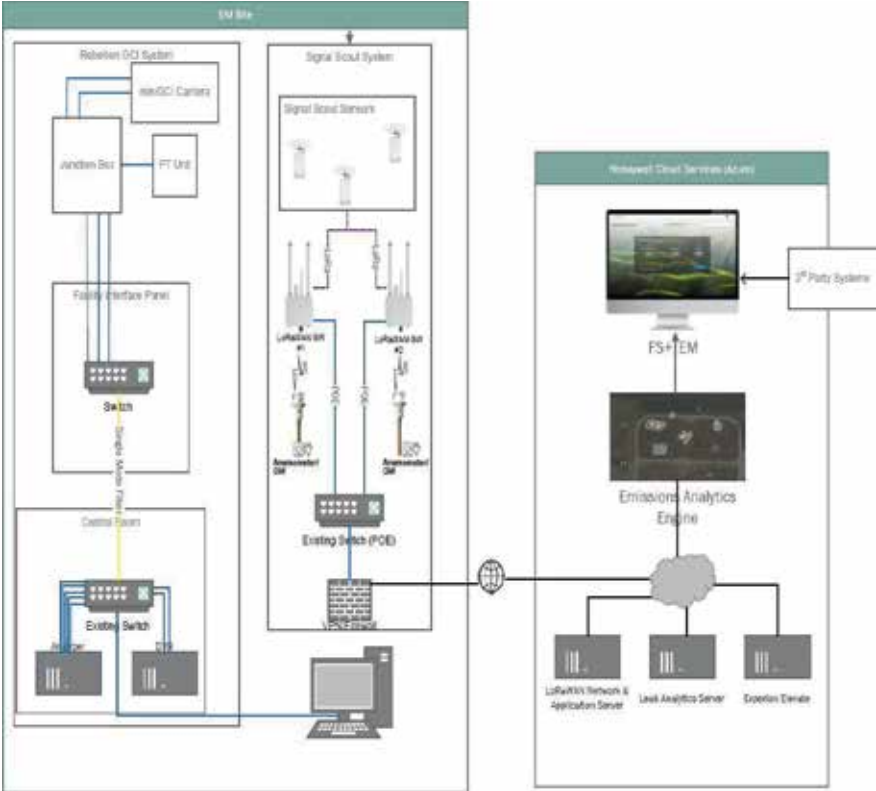


Figure 2: The sample picture above depicts a standard Rebellion GCI Camera, Signal Scout and Forge Sustainability+ | EM deployment diagram with Switch Connection.

HONEYWELL FORGE SUSTAINABILITY+

FOR INDUSTRIAL | EMISSIONS MANAGEMENT

Honeywell Forge Sustainability+ Energy & Emissions Management



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HONEYWELL EMISSIONS 360 SERVICES

End-to-end services driving actionable insights to reduce GHG emissions

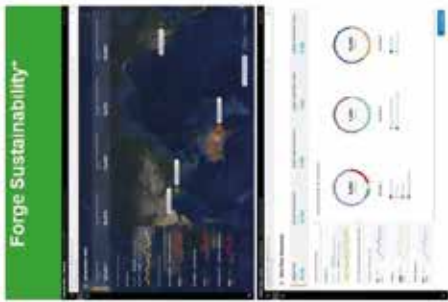
Premium Support Center & Performance Manager



**Signal Scout
Rebellion GCI**

**Emission Alerts
System Health
Alerts**

**Emission Reports
and Trends**



Business Results - Program KPIs

- Performance Manager
- Premium Support Center
 - Real Time Leak Monitoring Alerting
 - System Health Monitoring and Alerting
 - Emission Summary Reporting Assigned to Site Asset Names (102-Tank-ID)
- Emission Categorization
- KPI's Driven Outcomes - Examples
 - GHG Emissions (Methane) Baselineing
 - Focus on most significant sources
 - Track and Report Progress to GHG Emissions Target
- Compliance Reporting
- Benchmarking
 - W, R, T OGMP & EPA Standards

Services Enabling a Lower Emissions Future