



SENSIRION
connected solutions



IoT Reality Check

Do IoT solutions bring benefits to end-users?

Challenges and limitations?

SENSIRION
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nubo
methane leakage detection



AISIGHT
machine diagnostics

The challenge of methane emissions reduction



Methane is a powerful greenhouse gas. Measured over a 20-year period, it is **84 times more potent than CO₂**.



High loss of methane along complete oil & gas value chain is a well-known issue, but actionable. There are **~1 million oil & gas wells** in the US alone.



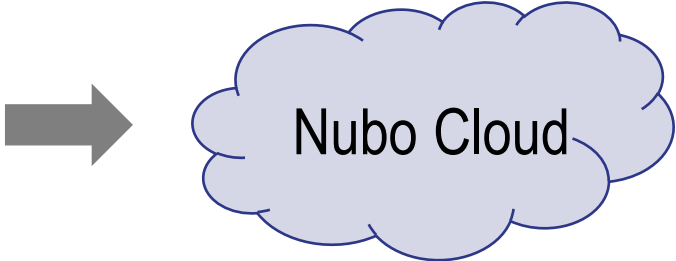
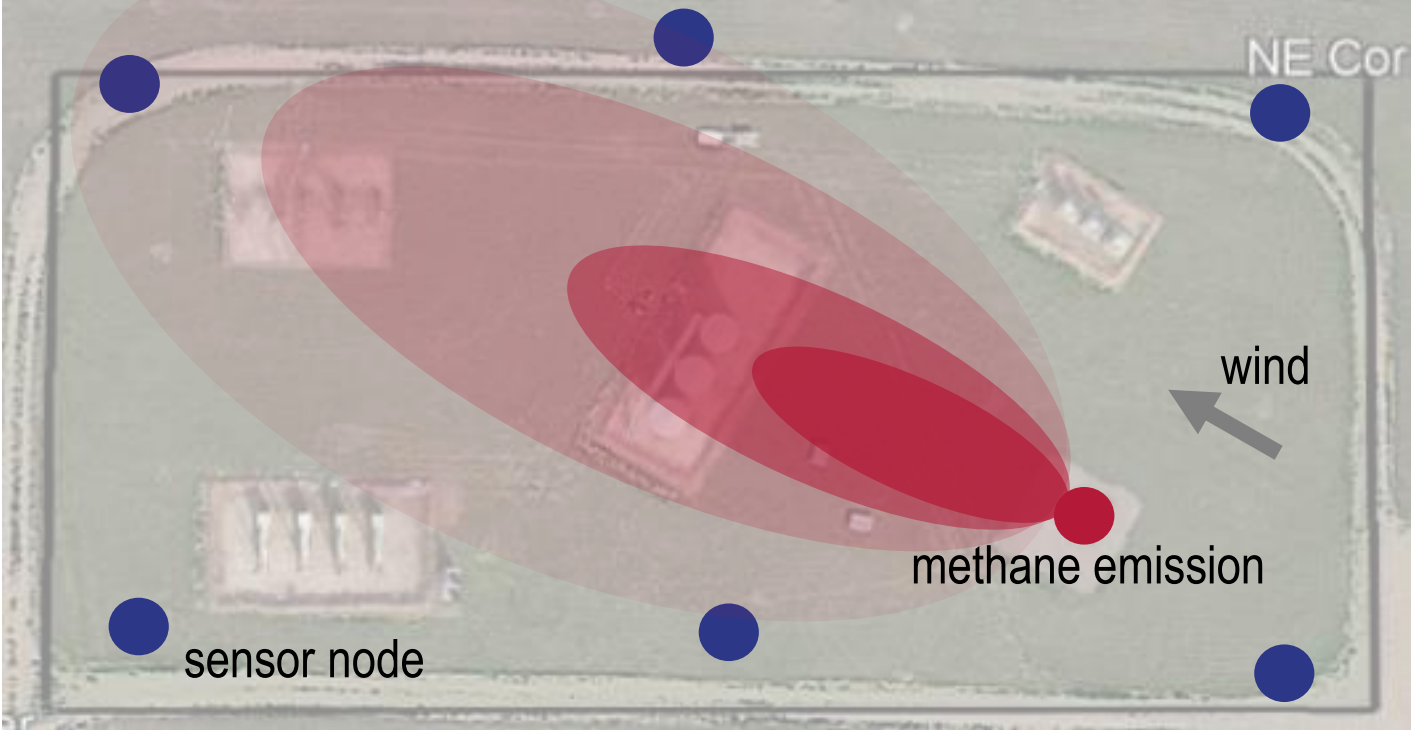
Reliable leak identification and fast repair is crucial. Yet, **manual leak identification is performed infrequent and labor intensive.**



Remote sensing solutions enabling the **continuous monitoring** of critical infrastructures can achieve large reductions in methane emissions at low costs.

Nubo Sphere – The concept of continuous methane emission monitoring

Typical oil & gas site



- Detection of an emission (yes / no)
- Localization (coordinates)
- Quantification (kg/h)

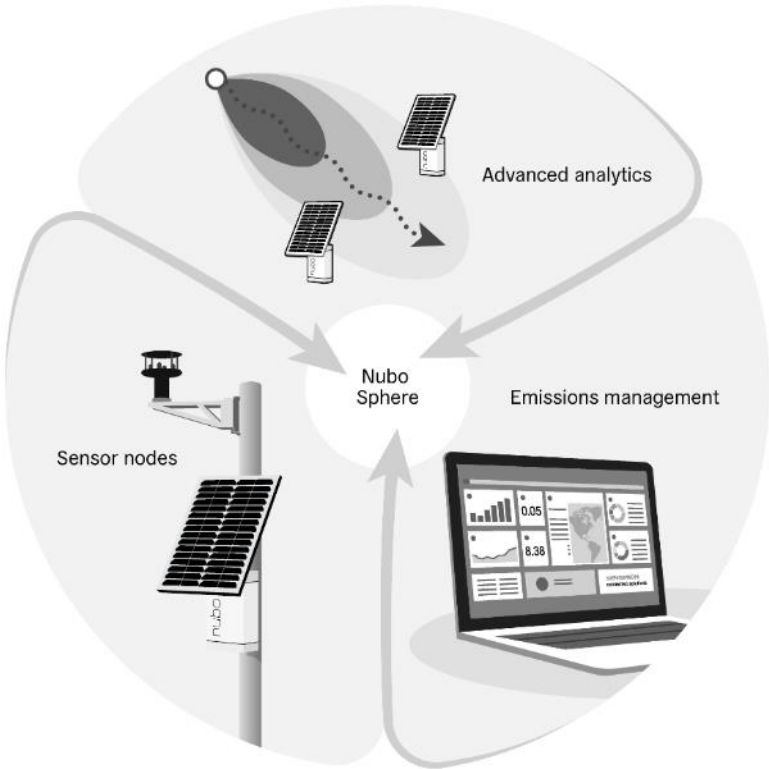
Nubo Sphere – A complete end-to-end IoT solution



**High-performing,
compact end-to-end
solution**



**Easy-to-use in every
respect**

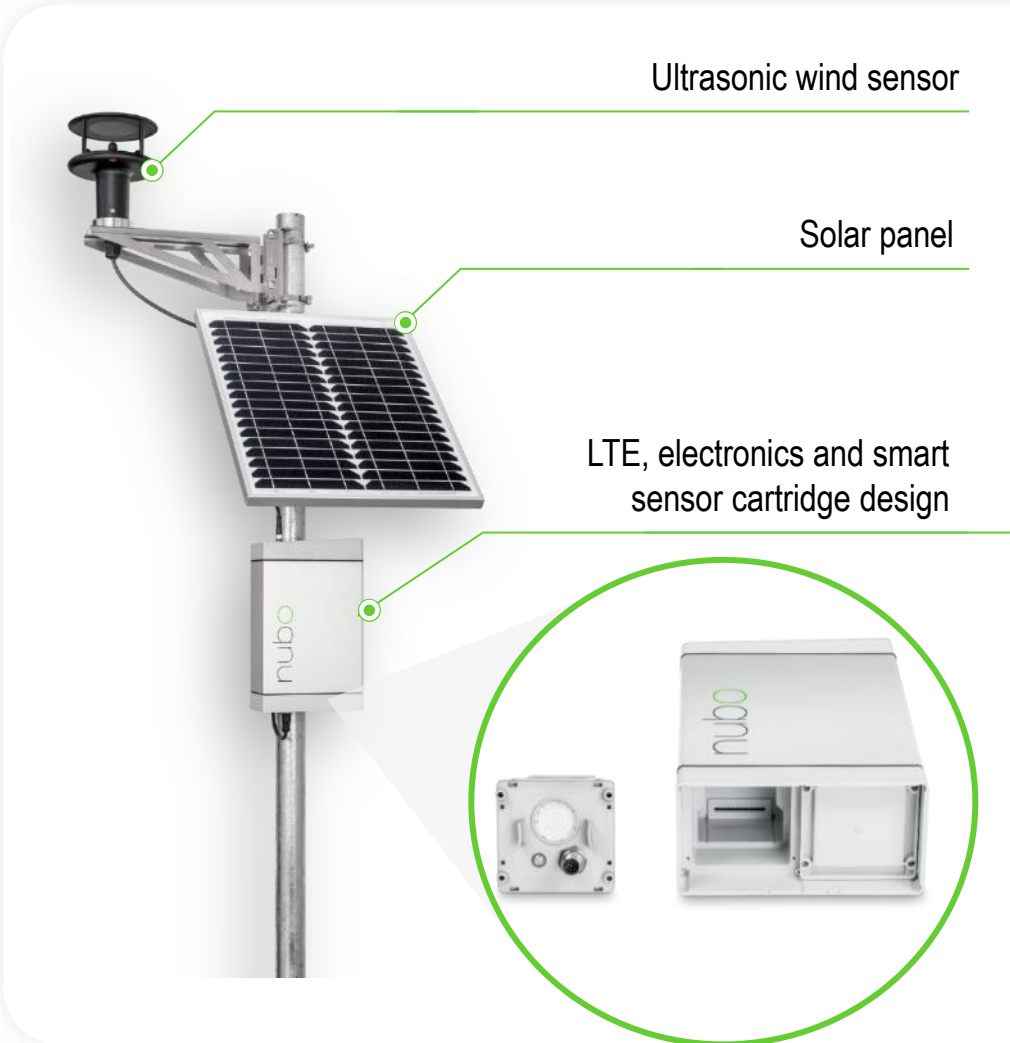


**Low total cost of
ownership**



**Future-proof design
equals sustainable
investment**

Nubo Sphere Sensor Node



A reliable and robust sensing system



Fast and easy installation:
3 steps, done in less than 10 minutes



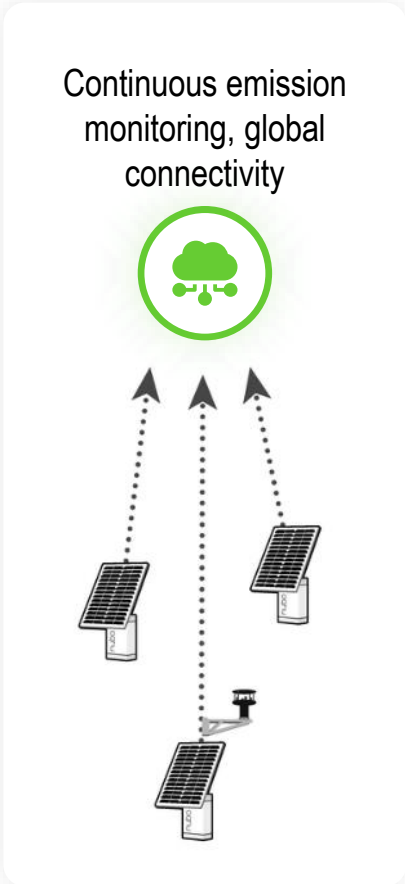
Plug and play with LTE connectivity and GPS positioning



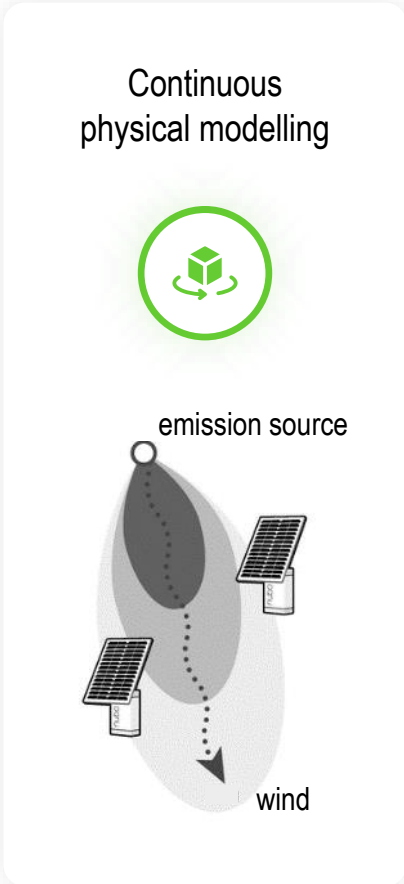
Designed for autonomous operation under harsh environmental conditions

...to deliver 24/7 actionable insights at low costs

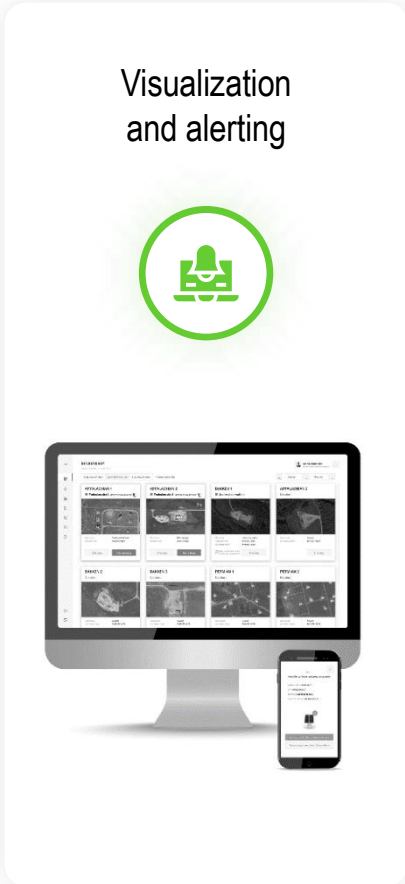
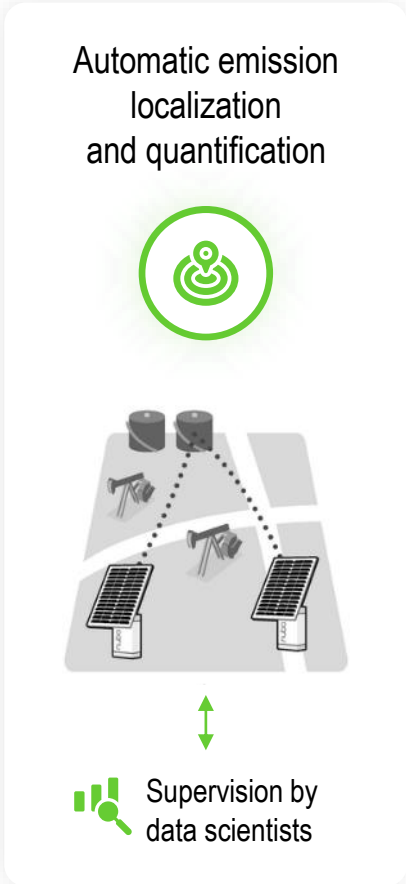
Advanced Analytics – detection, localization and quantification



Nubo Sphere **constantly and autonomously monitors your assets** without any need for human intervention. Sensirion's expertise ensures maximum data fidelity.

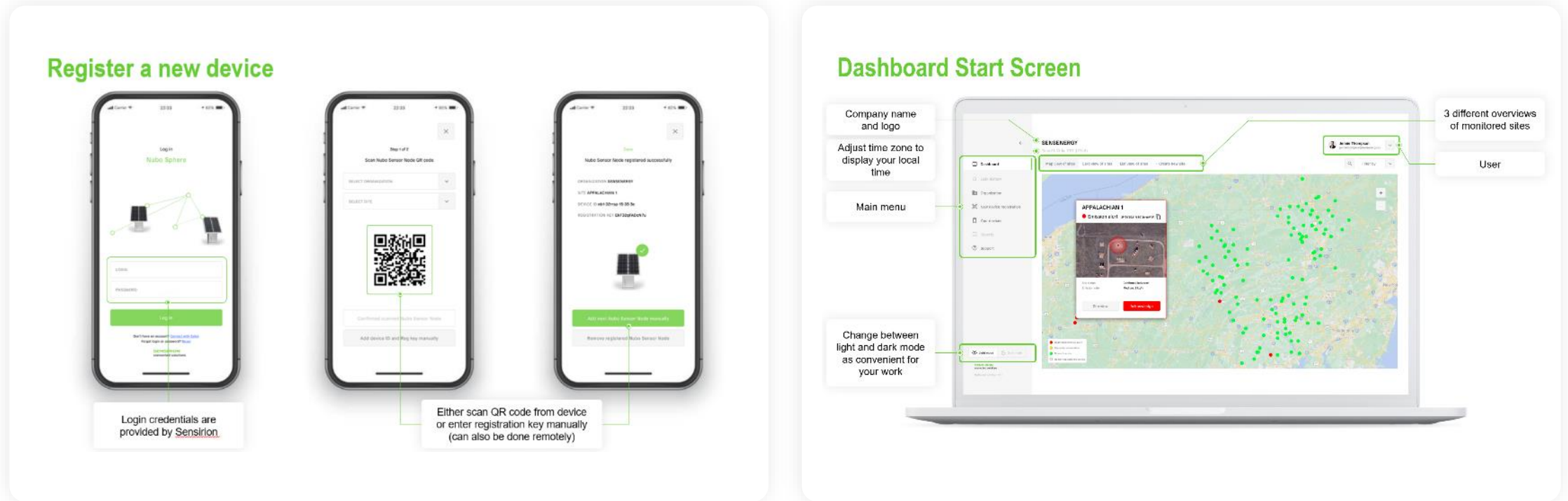


For any detected emission, our physics-based models determine the most likely **emission source location and emission rate**.



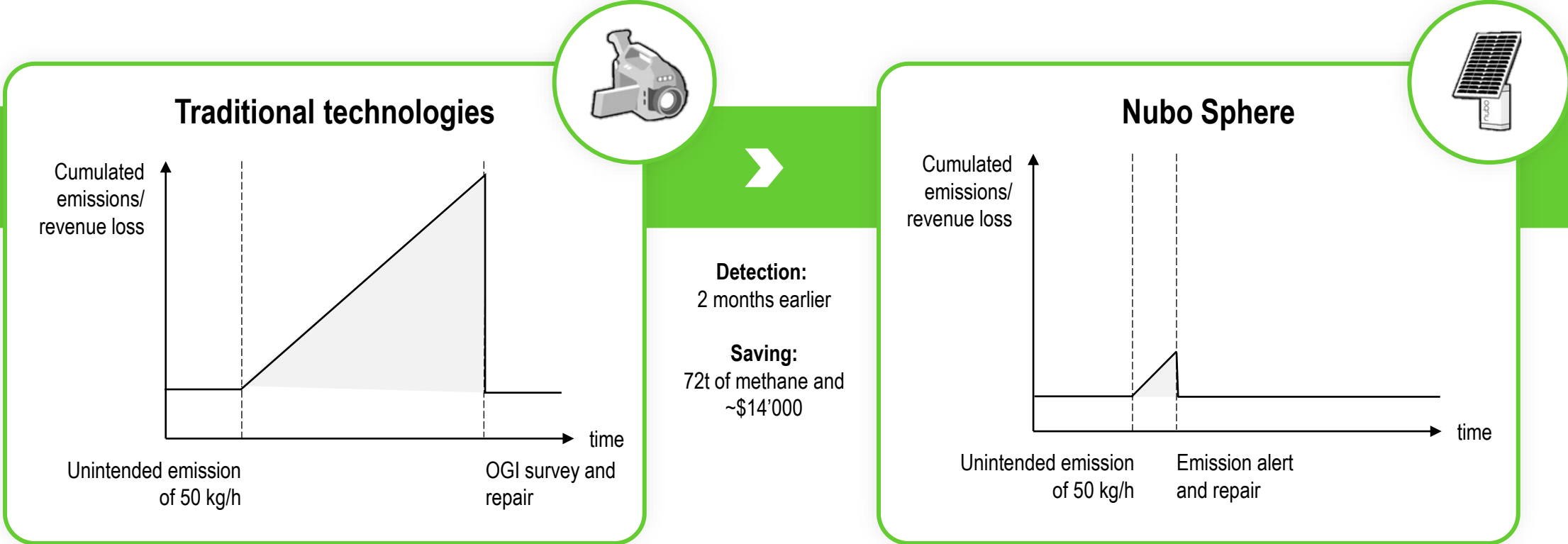
Receive **instant emission alerts** and quickly judge the situation to initiate countermeasures.

Emissions Management



- **Operational in no time:** From device registration to actionable insights in less than 15 minutes
- **All your sites at a glance:** The intuitive dashboard allows you to easily identify sites where action is required the most and track their status during the repair process.
- **Actionable emission insights:** Identify and visualize the location and size of the emission event on the dashboard to help determine the best mitigating actions.

Using Nubo Sphere – Your benefits at a glance



- Reduce costs and total emissions
- Achieve OGMP Level 5
- Attract and retain investors
- Access new market opportunities
- Comply with evolving standards
- Demonstrate your ESG commitment

Nubo Sphere Field Testing – METEC (Methane Emissions Technology Evaluation Center)

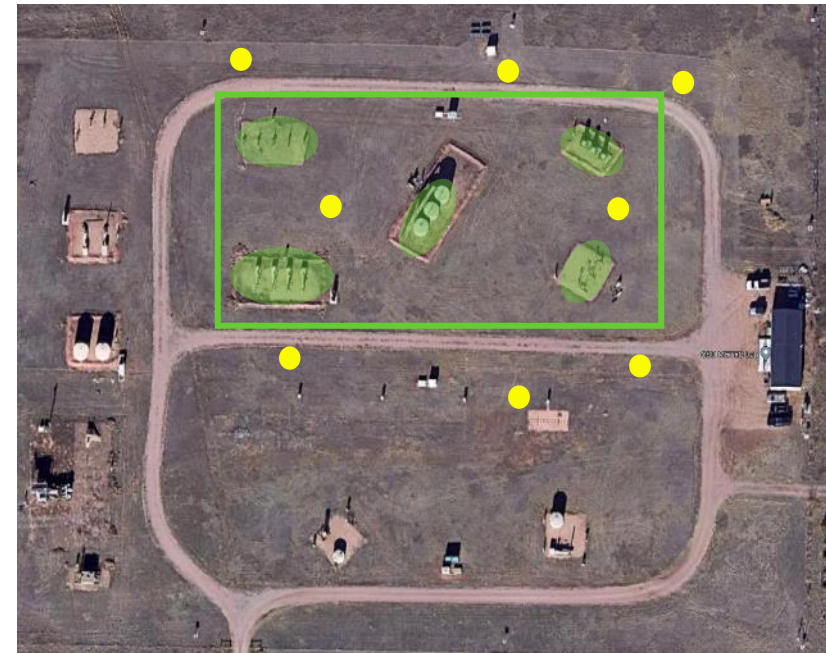
Scenario Test Data

Number of emissions included	27
Total methane emissions	249.7 kg
Emission rate range	0.6 – 7.7 kg/h
Average duration of an emission	2.4 hours
Maximum duration of an emission	3.5 hours

Results

Detected emissions	27/27
Average time to detection	31 minutes
Average time to confirmed detection	12.6 hours
Average emission localization accuracy	4 m
Average emission rate accuracy	- 34 %
Total emissions quantification accuracy	- 24 %

Sources (green) and Nubo Sphere Positions (yellow)



The Problem

Unplanned Downtime

20%

of total production cost is associated to downtime & inefficiencies

10%

of global productivity lost by machine failures

2.5M€

cost of 1 hour breakdown in the automotive sector

Our solution

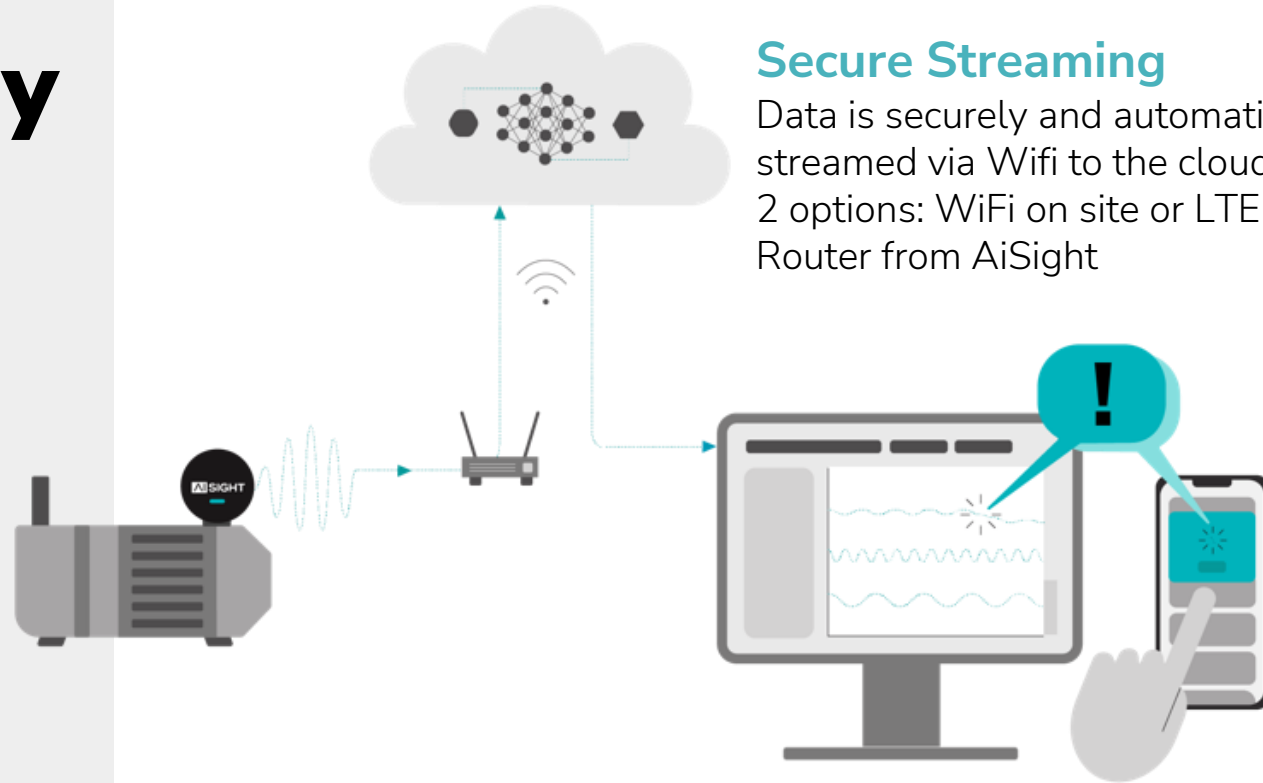
AlSight solves the problem of unplanned downtime in the production industry by providing AI powered sensors and software.



Technology

Edge Processing

Data is processed on the edge and automatically sent to the cloud.



Secure Streaming

Data is securely and automatically streamed via Wifi to the cloud
2 options: WiFi on site or LTE Router from AiSight

Visualization

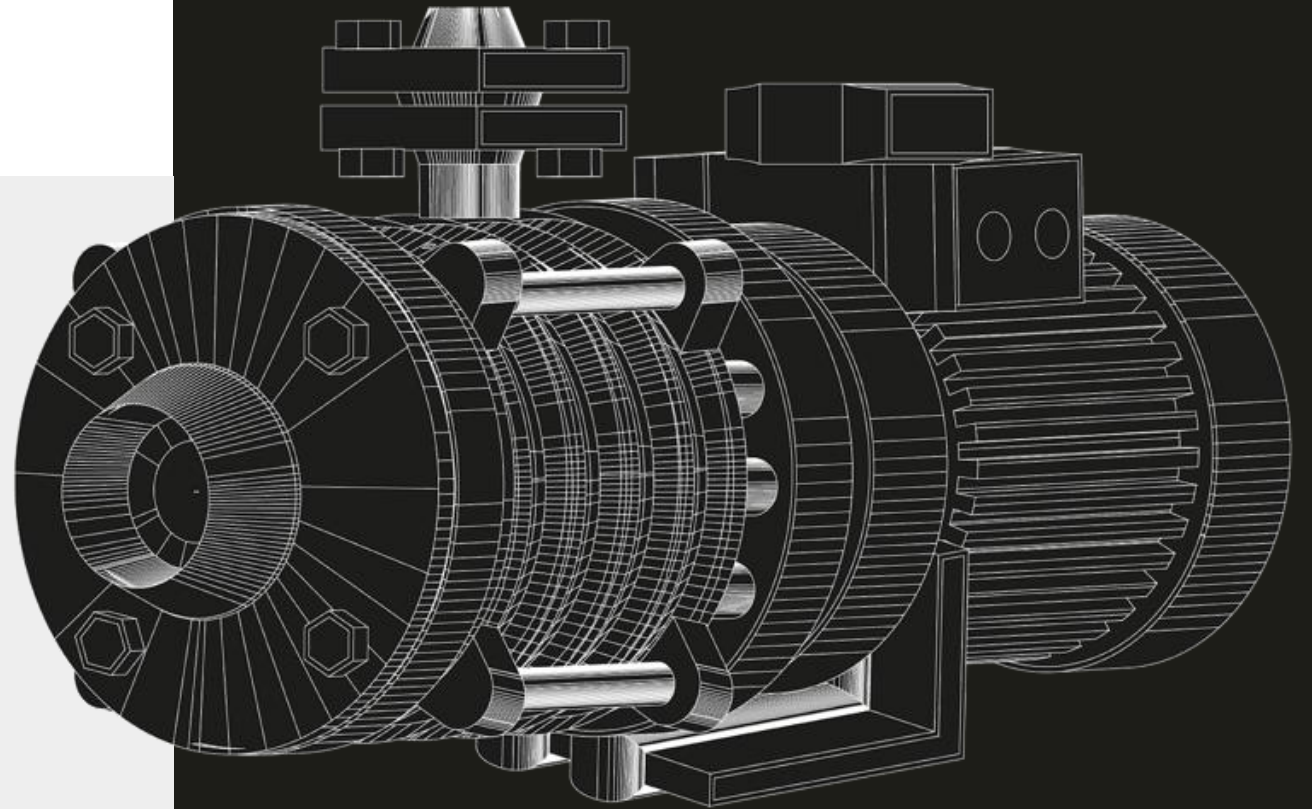
All insights are centrally displayed on our dashboard to enable maintenance teams to resolve issues early and prevent breakdowns.

Applications

Rotating equipment

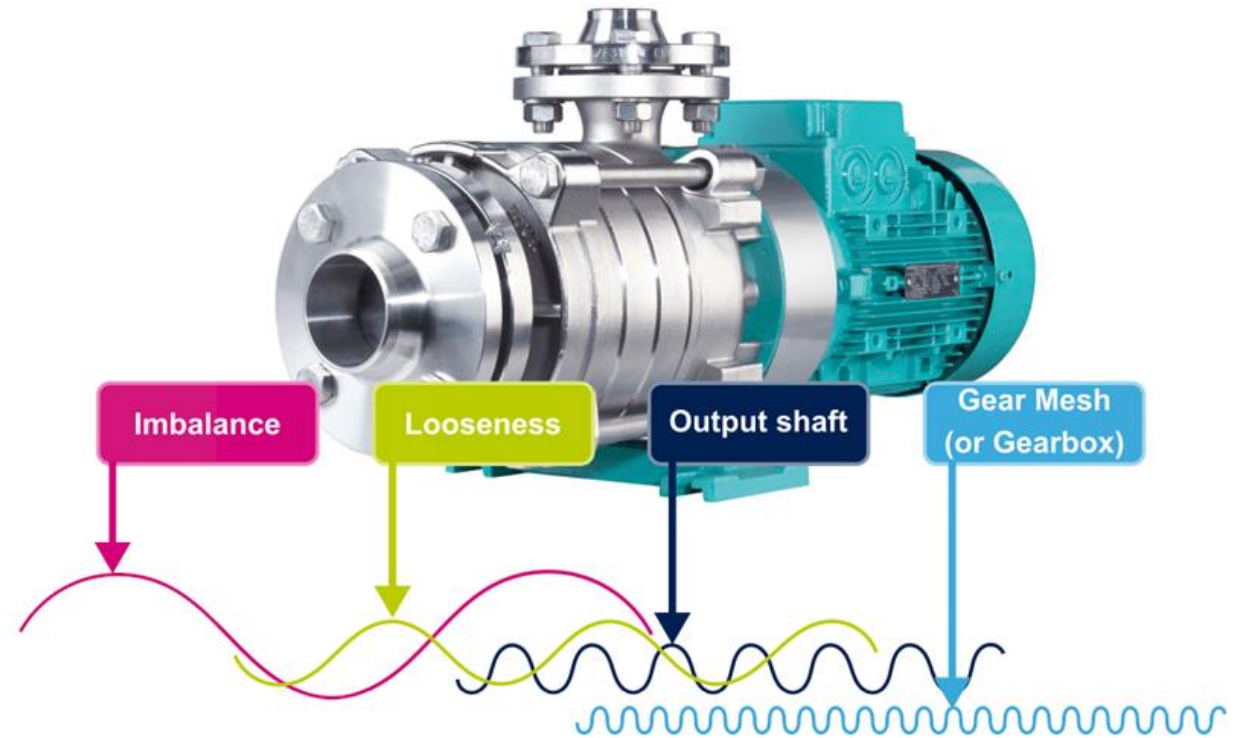
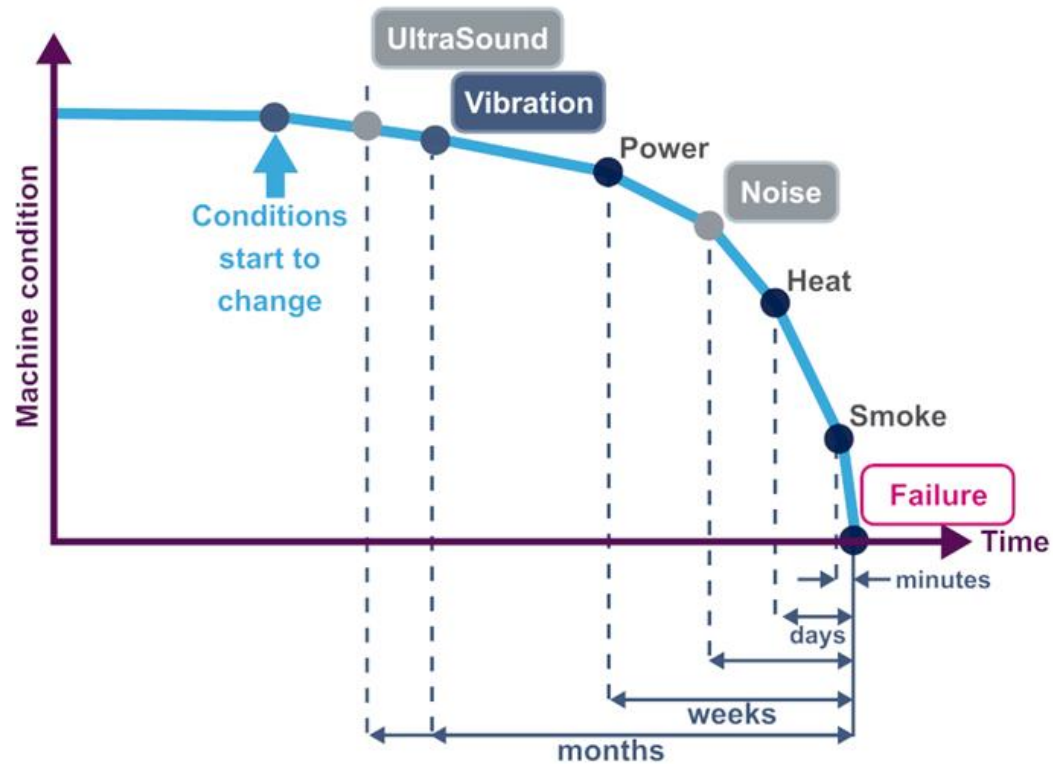
Machines

- Motors
- Pumps
- Gearboxes
- Fans
- Compressors



The innovation

Vibration based sensor kit leverages AI and predicts failures months in advance



How are we different?



High Accuracy

Vibration analysis + AI



Plug & Play

Setup takes only minutes per sensor



Value from day 1

Instant ROI



Cost effective

Simple monthly fee, no upfront costs



Case Study

FMCG



Total number of installed sensors:

96



Equipment:

Bottling lines, Case Packer, Case Erector, Bottle Unscrambler, Motors, Pumps, Gearboxes, Fans und Bearings.



Time to install:

9 minutes average per Sensor and 2 days for the whole factory



Failure Identification:

3 days after installation → Bearing and gearbox failure on 2 machines





Example: Bottle Unscrambler



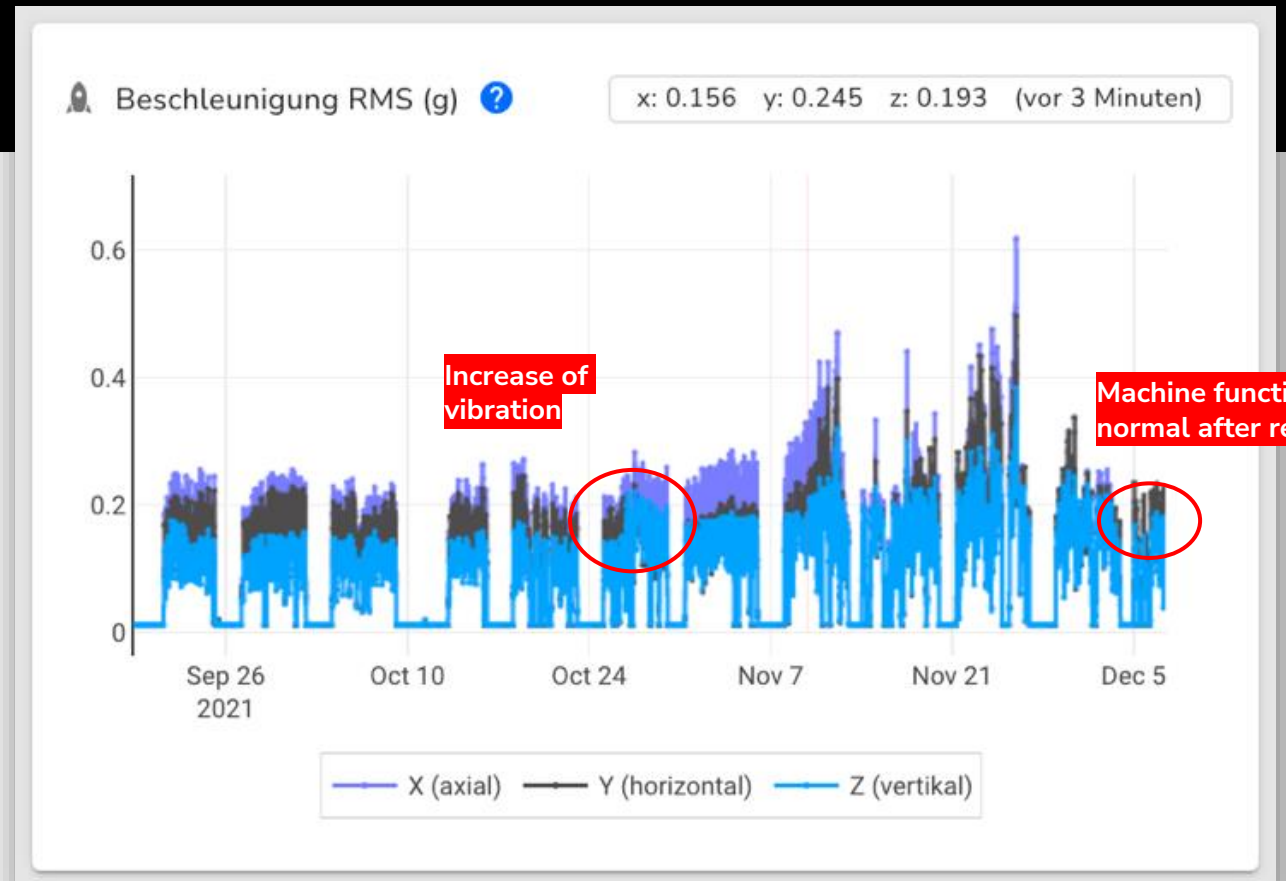
Diagnose: Broken Gearbox



Gearbox was replaced during planned maintenance



Total savings: **5.000€** (incl. Production loss)





ROI

Benefits from monitoring with AiSight:

- Improved maintenance intervals
- Increased efficiency
- No production loss

15

Number of failures in 12 months

Early replacement of the bearings prevents damage and loss of production.

€40,000

Savings from production loss

By avoiding unplanned downtime, machine availability has increased.

6

Months until positive ROI

Savings have exceeded costs within 6 months.

IoT Reality Check

Do IoT solutions bring benefits to end-users?

- **easier-to-use**
fast setup, remote operation,...
- **improved performance:**
continuous monitoring, data from large # of assets,...
- **upgradable & integrable**
continuous improvements of analytics, APIs,...

Challenges and limitations?

- availability of reliable **connectivity**
- **integration** into customer processes
- **change management** of customer processes





SENSIRION
connected solutions



Sensirion Connected Solutions

Sensirion Connected Solutions, a part of Sensirion Holding, combines sensor technology know-how with advanced data analytics, connectivity and cloud technology to offer easy-to-use and scalable products for emissions monitoring and predictive maintenance.

**Our heritage, your advantage:
innovative, scalable, global.**



Sensor expert: more than 25 years experience, innovation pioneer, globally leading sensor manufacturer



Manufacturing prowess: scalable solutions, industry best lead times and supply capability



Global: Worldwide subsidiaries, state-of-the art production facilities, fast and agile support

