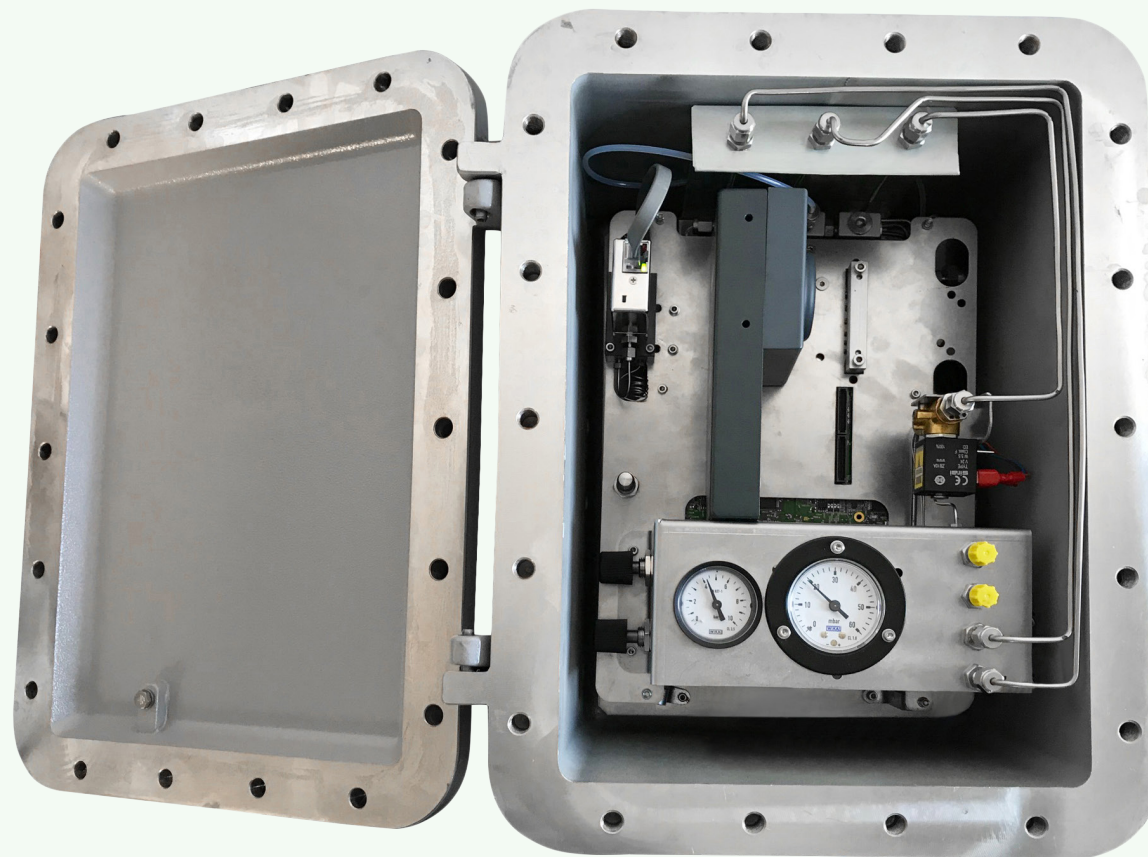


 **greta**

Analysis and advanced
management of natural gas
in real time



greta

Is it possible to make the natural gas transportation and distribution more efficient by reducing operating costs, exponentially increasing safety and continuing to guarantee a quality service?

With GRETA it's possible!

The real-time analysis carried out by **GRETA** allows data to be collected and processes can be managed automatically and remotely, intervening immediately on the network: **safe gas at all times and without waste.**

What is GRETA?

GRETA is an innovative and multi-purpose device capable of **accurately monitoring, in real time and remotely, the compounds present in natural gas**, allowing distribution companies to optimise gas processes in every point of the network, even in its most critical areas.



greta

GRETA incorporates one or more precision miniaturised gas chromatographs capable of reliably measuring the gas composition and of obtaining excellent quality chromatograms (high signal to noise ratio).

The added value of **GRETA** lies in its sturdiness and compact design that allows **installation directly at the gas decompression stations (ATEX zone 1 certified)** and **continuous monitoring of**

the gas in transit without the need to go to the field, with obvious reduction in operating times and costs and a significant increase in the level of safety.

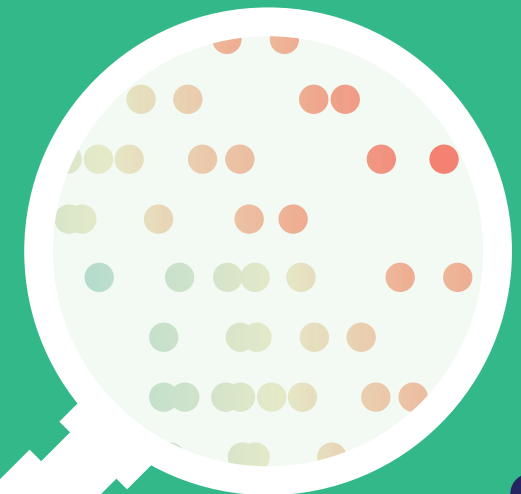
The data is then sent to the operator's SCADA or to a proprietary WebApp, where **intelligent processes** are analysed and activated. For example, it can be used to monitor the concentration of the odorant introduced into the network and to

send commands to the odorising systems already present in the field in order to guarantee a constant odorization in any operating condition, even in the most problematic points of the gas network.

With a view to network digitalisation, **GRETA** complies with the latest IoT communication standards and can be integrated into the most common data acquisition platforms.

In-line measurement of:

- 1 – Odorization rate
- 2 – Calorific power
- 3 – Sulphur compounds
- 4 – Hydrogen concentration
- 5 – Any application that requires a high level of accuracy and reliability for the in-line concentration measurement of compounds of gas flows.



key-points

1

Analysis of gas compounds in line and sending data to the SCADA in real time

2

GC technique that guarantees high accuracy (excellent limit of quantification on the analysed compounds)

3

Extreme compactness and possibility of field installation

4

ATEX zone 1 certification

5

Modular architecture: possibility of multi-component analysis

6

Low maintenance costs: Time Between Maintenance > 1 year

7

User-friendly

8

Low electrical absorption, possible integration with photovoltaic system for off-grid installations

9

Intelligence on the edge: possibility of integration with other sensors and local data processing

10

Continuous monitoring to support ongoing process optimisation

11

Reduction of CO₂ emissions, sulphur compounds and other pollutants

12

Exponential increase in safety and reduction of operating costs

where to install Greta

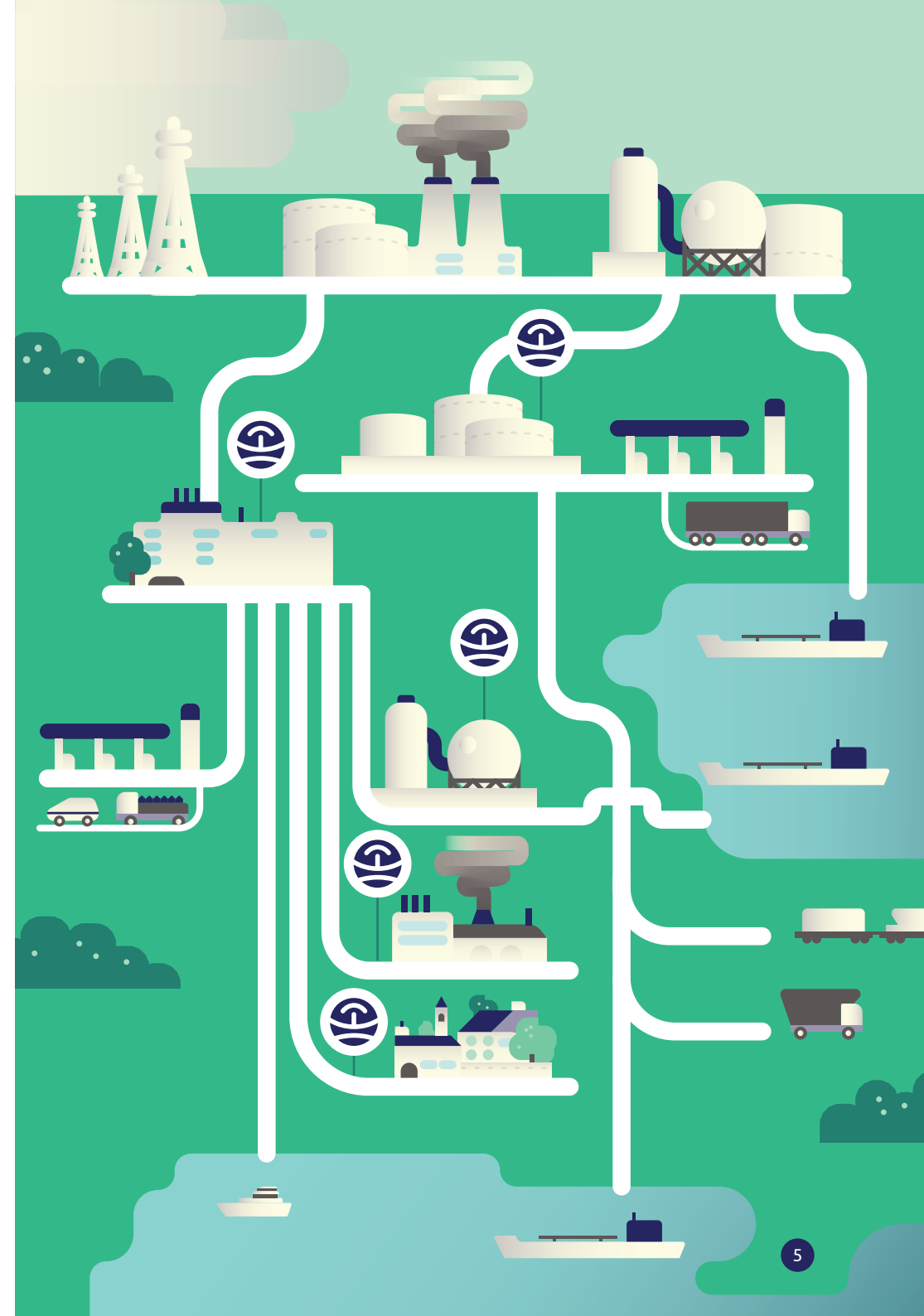
GRETA, thanks to its versatility of use, can be positioned at various levels of the natural gas value chain:

1 – Upstream

to analyse the composition of imported or produced gas and the presence of contaminants

2 – Midstream e Downstream

To measure the concentration of various compounds such as odorants, natural mercaptans, sulphur, hydrocarbons and determine the heating value of natural gas



applications

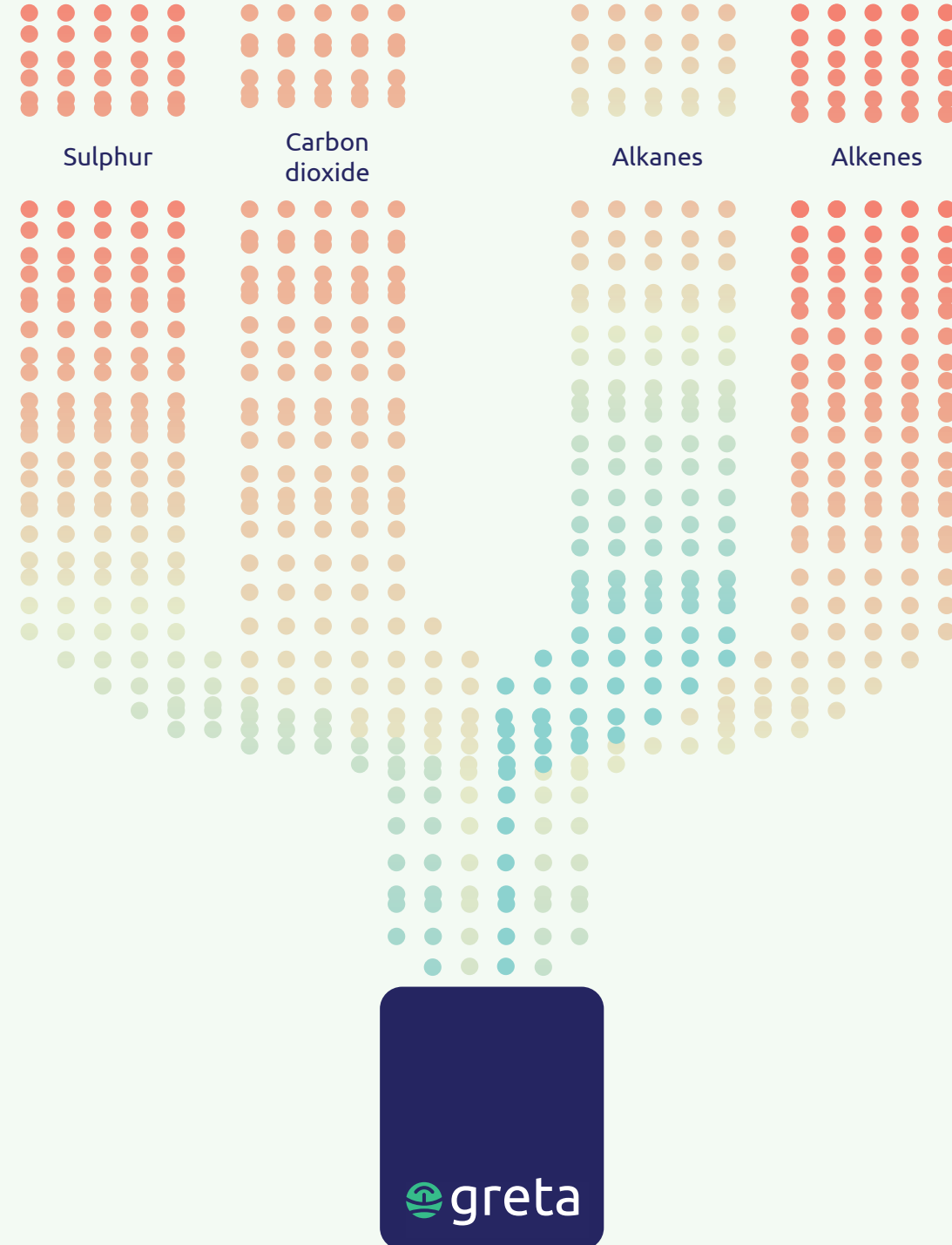
GRETA allows the transition from a passive management of the natural gas network to an **intelligent, automatically controlled and effective** one, laying the foundations for a SMART network digitalisation that generates significant returns on the investment.

GRETA allows the monitoring of substances that are difficult to measure with normal instruments and allows a **continuous and optimised management** of the odorization process, limiting the operating costs connected to the consumption of odorants by the distribution companies and limiting the risk of intervention requests by end users due to the usual over-odorization practices.

The processed data can also be used for the supervision of more complex processes in the context of activities related to smart grids: one example is the possibility of monitoring the **level of hydrogen in Power-to-Gas applications**.

Furthermore, **GRETA** can be effectively used at the **biomethane** input points in the network in order to monitor that the evolution of the gaseous mixture always complies with the regulations in force.

GRETA also allows the monitoring of infinitesimal percentages of sulphur compounds present in the network, of permanent gases such as oxygen, carbon dioxide and gas belonging to the group of alkanes and alkenes. **There are many possible applications, GRETA is ready to be put to the test!**



advanced control

GRETA can be immediately integrated into a state-of-the-art system that uses mathematical models, predictive analysis, artificial intelligence and IoT sensors allowing the activation of advanced processes for controlling the level of odorant, or any other compound, at each point of the network.

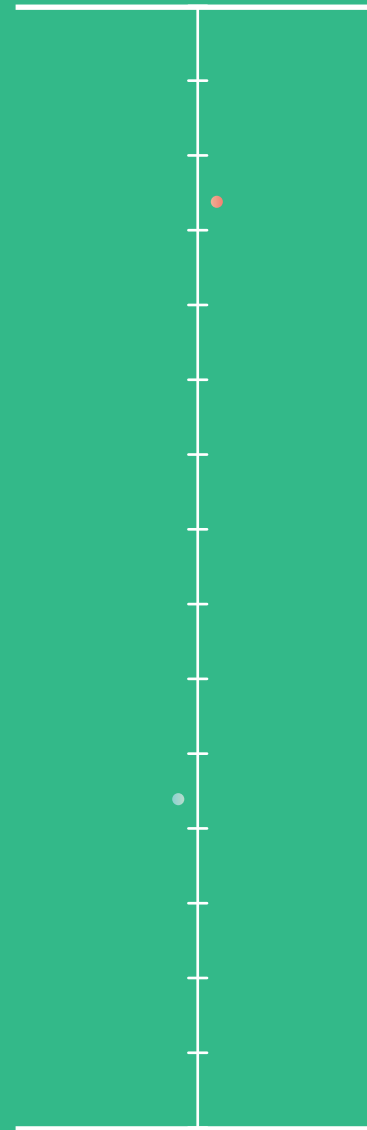
New Paradigm of Safety: Lower the odorization rate up to the minimum value imposed by law, guaranteeing its concentration in every point of the network.

In fact, **GRETA** allows **an exponential increase in the safety of the gas network users, allowing operators to drastically reduce operating costs and reduce sulphur consumption**, relying on continuous measurement in its most critical points compared to common over-odorization practices.

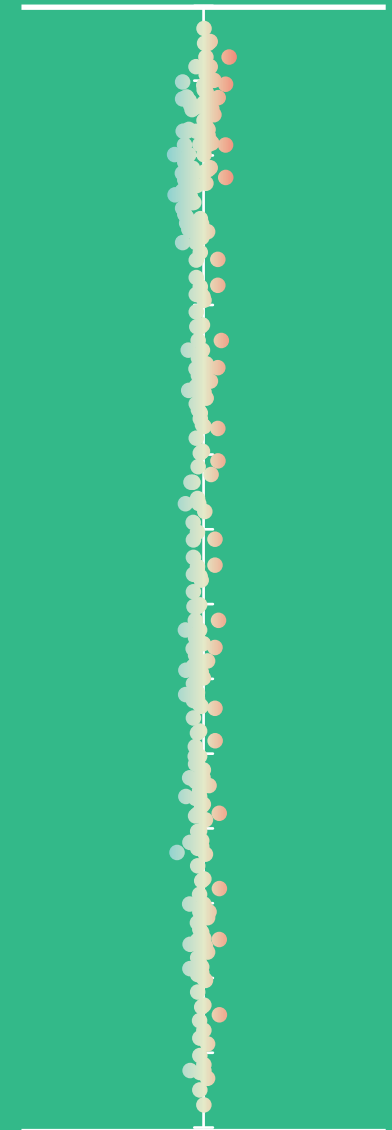
This translates into a paradigm shift to ensure maximum safety.

- Before **GRETA** 2 manual measurements per year per point: low safety level
- After **GRETA** more than 4300 measurements per year per point: total network safety

Without **GRETA**:
2 manual measurements
per year per point



With **GRETA**:
more than 4300
measurements per year
per point



main technical characteristics

Modularity

Possibility to install two different analytical modules. Each module contains the dedicated capillary column and the TCD detector.

Each module is easily accessible and can be removed in just a few simple steps.

The modules have a wide life cycle (more than ten years) and guarantee a very low consumption of calibration gas and carrier gas. Management costs are therefore minimal compared to any other analytical device capable of ensuring the same performance.

Carrier gas

Helium

Carrier gas flow rate

3 mL/min

Gas flow rate analysed

20 mL/min

Analysable compounds

Permanent gases:

Hydrogen, Oxygen, Nitrogen, Carbon Monoxide, Carbon Dioxide

Sulphur compounds:

Hydrogen Sulphide, Carbonyl Sulphide, Thiols

Odorants:

Tetrahydrothiophene (THT), Tert-butylmercaptan (TBM)

Alkanes:

Methane, Ethane, Propane, Butane, Pentane, Hexane, Cyclohexane, Heptane, Octane, Nonane, Decane, Undecane, Dodecane

Alkenes:

Ethylene, Propylene, Trans-2-Butene, 1-Butene, Isobutene

Alcohol:

Methanol, Ethanol, Isopropanol, Isobutanol

Chlorine compounds:

Methyl chloride, vinyl chloride, ethylene dichloride, DCM, chloroform, dichloroethane, carbon tetrachloride, trichloroethylene, tetrachloroethylene

Terpenes:

Limonene, α -Pinene

Ketones and polar compounds:

Acetone, 2,3-Butanedione, Methyl-ethylacetone, Acetonitrile, Ethylacetate

Aromatics:

Benzene, Toluene, Ethylbenzene, Xylene, Styrene, Indene, Propylbenzene, Methylstyrene, Diethylbenzene

main technical characteristics

Available Columns

For measurements of compounds listed above, up to 9 different types of columns are available below:

- **PPU**
- **MS5A**
- **PDMS-2**
- **PDMS-5**
- **PDMS-10**
- **PDMSCP**
- **PDMSP**
- **ALOX**
- **STWAX**

Column characteristics

Accuracy for the following groups of compounds:

- **Sulphur compounds:** LOQ (*) =5 mg/Sm³
- **Odorants:** LOQ (*) =5 mg/Sm³
- **Alkanes:** LOQ (*) =5 mg/Sm³
- **Alkenes:** LOQ (*) =5 mg/Sm³
- **Alcohol:** LOQ (*) =5 mg/Sm³
- **Chlorine compounds:** LOQ (*) =5 mg/Sm³
- **Terpenes:** LOQ (*) =5 mg/Sm³
- **Ketones and polar compounds:** LOQ (*) =5 mg/Sm³

- **Aromatics:** LOQ (*) =5 mg/Sm³
- **Relative humidity in operating conditions and in the absence of condensation:** up to 75%
- **Analytical methods:**
 - Adjustable column temperature
 - Adjustable TCD temperature
 - Adjustable TCD pressures

(*) The LOQ (Quantification Limit) index determines the limit below which the sample cannot be quantified with a relative standard deviation greater than 10%.

- **Gas chromatograph module size:**
174 mm x 94 mm x 54 mm
- **GRETA device size with case:**
400 mm x 350 mm x 300 mm
- **Weight of the gas chromatograph module:**
1 kg
- **GRETA device weight with case:** 27 kg
- **Carrier gas:** Helium 5.5
- **TCD Thermal Conductivity detection technology**
- **Accuracy:** LOD ppb for THT, TBM, H₂S, COS, COMPOUNDS TABLE

Certifications

- ATEX:II 2G Ex db IIA T1 Gb
- CSA: classes C2258-02 C2258-82
- Ex db IIA T1 Gb (under approval)

External Temperature

- from -10°C to +55°C

Electrical Power

- Power supply 24V DC, Max 2 A
- **Power consumption:**
 - 50 Watts (Startup)
 - < 20 Watts (steady state)

Communication

- IAnalogue, digital and A/V inputs
- Local:Wired Ethernet
- Remote: 4G modem

User Interface

- WebApp or SCADA



REGAS provides state-of-the-art solutions expressly designed to support companies operating in the natural gas transmission and distribution sector

Our flagship products

EMMA, which optimizes the preheating process by reducing gas consumption

INGRID, which injects odorant into the grid in an accurate, precise and innovative way

GRETA, which provides gas-chromatographic analysis in real time and an advanced management of gas processes remotely

Our Goal

Our goal is to promote disruptive innovation in the natural gas industry and to develop advanced technologies that maximize efficiency in its entire value chain

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