

# RNG Raw Gas Analysis with Rosemount 470XA GC

## Application Note

RNG (Renewable natural gas) raw gas is produced by bacteria through anaerobic digestion (AD) of organic substrates in the absence of oxygen. It is used to produce biomethane (RNG product) as a clean, sustainable alternative energy to traditional fossil fuel based natural gas. RNG raw gas composition directly affects the quality of its end product. Measuring the raw gas composition is critical through out the waste to energy process to ensure product quality and environment safety.

### Process Overview

#### What is RNG Raw Gas

RNG raw gas is produced by bacteria through anaerobic digestion (AD) of organic substrates in the absence of oxygen. The chemical composition of raw gas includes 50%-75% methane (CH<sub>4</sub>), 25%-50% carbon dioxide (CO<sub>2</sub>); the rest is composed of water vapor (H<sub>2</sub>O), and traces of oxygen (O<sub>2</sub>), nitrogen (N<sub>2</sub>) and hydrogen sulphide (H<sub>2</sub>S).

RNG raw gas has high substrate flexibility as it can be sourced from all biogenic wastes such as, agricultural residues (straw, catch crops, manure etc.), energy crops, sewage sludge, separated household waste and organic industrial waste.

#### What is RNG Raw Gas for

It is mainly used to produce biomethane through a cleaning process to remove trace impurities components and an upgrading process to enrich its methane content and adjust its calorific value. Biomethane produced can be injected into the existing natural gas grid (including pipelines) and used interchangeably with conventional natural gas or used as vehicle fuel.

### Process Challenges

#### RNG Raw Gas Composition

To allow injection of RNG product into the natural gas grid or the use as a vehicle fuel, it must meet the quality standards for natural gas.

The production technology and RNG raw gas feedstock affect the composition of its product biomethane. The composition of the raw gas feedstock must be measured to ensure the quality of its end product.

The typical measurement point of raw gas is after the initial cleaning process where majority of the impurities are removed.

A common raw gas composition after the cleaning process looks like this:

Stream Components	Units	Range	
		Min	Max
H <sub>2</sub> S	ppm	100	20,000
N <sub>2</sub>	Mole%	0	10
CO <sub>2</sub>	Mole%	0	60
CH <sub>4</sub>	Mole%	0	100
H <sub>2</sub> O	Mole%	Saturated	
O <sub>2</sub>	ppm	0	100,000

## The Emerson Solution

There is a need for a robust analyzer capable of measuring H2S as well as heating value/BTU content in one single-analyzer solution.

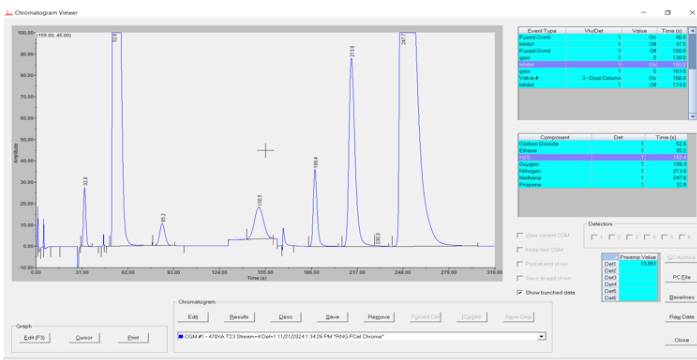
Emerson offers its award winning, cost-effective model 470XA on-line gas chromatograph solution to address RNG analysis needs. Model 470XA GCs are certified to industry and national metrology standards.

### Rosemount 470XA Gas Chromatograph

- Offers the unique capability of measuring both energy content (BTU analysis) and sulfur compounds in one single-analyzer solution, eliminating the need for two separate analyzers. This results in reduction of cost and footprint.
- Class 1, Division 1, explosion-proof, CSA/ATEX/IECEX certified field-mountable analyzer reduces the need for instrument air required for purging, ensuring safety and significantly reducing total cost of ownership.
- Economical, compact, and easy to use. Field-mountable and offers low installation and operational costs.
- A unique Maintainable/serviceable Module offers flexible option for replacing in the field to minimize process down time, and repair later to reduce operational cost.

### Standard Application on 470XA GC-RNG, 5 minutes cycle time

Stream Components	Units	Measured Range	
		Min.	Max.
Methane	Mole%	0	100
Carbon Dioxide	Mole%	0	50
Nitrogen	Mole%	0	10
Oxygen	Mole%	0	10
H2S	PPM	100	20000
Ethane	Mole%	0	10
Propane	Mole%	0	5



For more information, visit [Emerson.com/Rosemount470XA](https://www.emerson.com/Rosemount470XA)

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