



Understanding Laboratory Testing for Biogas and Renewable Natural Gas (RNG)



Agenda

- Is RNG the future?
- Biogas vs. RNG
- Why lab testing matters
- Compliance and interconnection testing
- Core testing parameters and methods
- ALS capabilities and project support

Is RNG The Future?



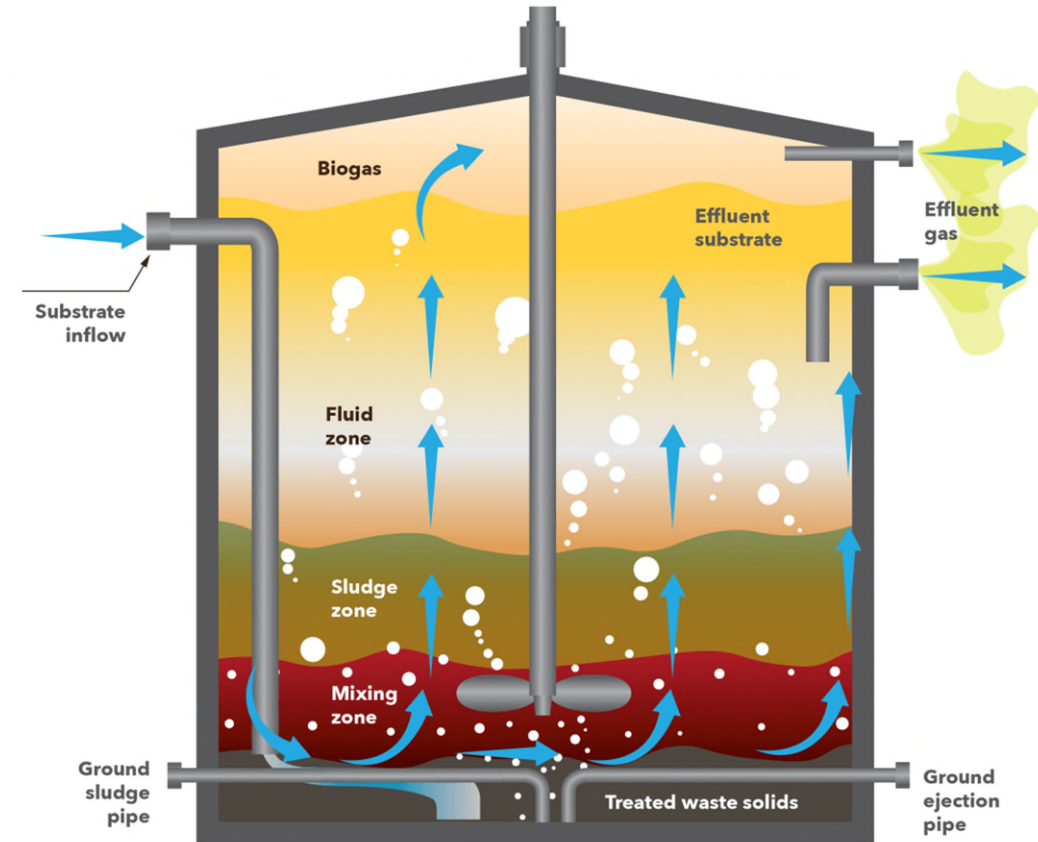
- Cleaner more sustainable alternative to traditional natural gas
 - Produced from organic waste like landfills, food scraps, waste treatment plants and farm waste
 - Rapidly growing industry
 - RNG Coalition (as of June 2025)
 - 505 operational facilities
 - 153 under construction
 - 293 planned
- (rngcoalition.com)



Biogas vs. RNG

- Biogas (unrefined, anaerobic digestion):
 - 50–70% methane (CH₄)
 - 30–50% carbon dioxide (CO₂)
 - Trace contaminants: H₂S, siloxanes, ammonia
- RNG (product gas):
 - Purified/updated to >96% methane
 - Meets natural gas pipeline specifications

Anaerobic Digestion Process



Why Lab Testing Matters



- Certifies gas quality for pipeline interconnection
- Supports environmental permit compliance
- Detects low-level contaminants that pose long-term risks
- Certified lab = accurate, traceable, defensible data





Compliance and Interconnection Testing

- Common requirements:
 - Methane purity: >96%
 - Total sulfur: <20 ppm; H₂S: <4 ppm
 - Oxygen: 0.5–1%
 - Siloxanes and ammonia: below pipeline limits
 - Heating Value: within pipeline-specified limits
- Specs vary by pipeline and the reason for testing (interconnection vs. compliance) - additional testing may be required



Core Testing Parameters Requiring Lab Analysis

ALS Simi Valley
ALS Salt Lake City



USA
environmental

Gas Composition



- Why: Determines energy content and process efficiency; required for interconnection and ongoing compliance
- Methods:
 - Fixed gases (O₂, H₂, N₂, CO, CO₂, CH₄): EPA 3C or ASTM D1946
 - BTU/Heating Value/Wobbe Index: ASTM D3588
 - Reduced sulfur & mercaptans: ASTM D5504



Sulfur Compounds

- Why: Corrosive; harmful to engines and catalysts; tied to pipeline limits
- Methods:
 - H₂S, Total Sulfur, Mercaptans: ASTM D5504



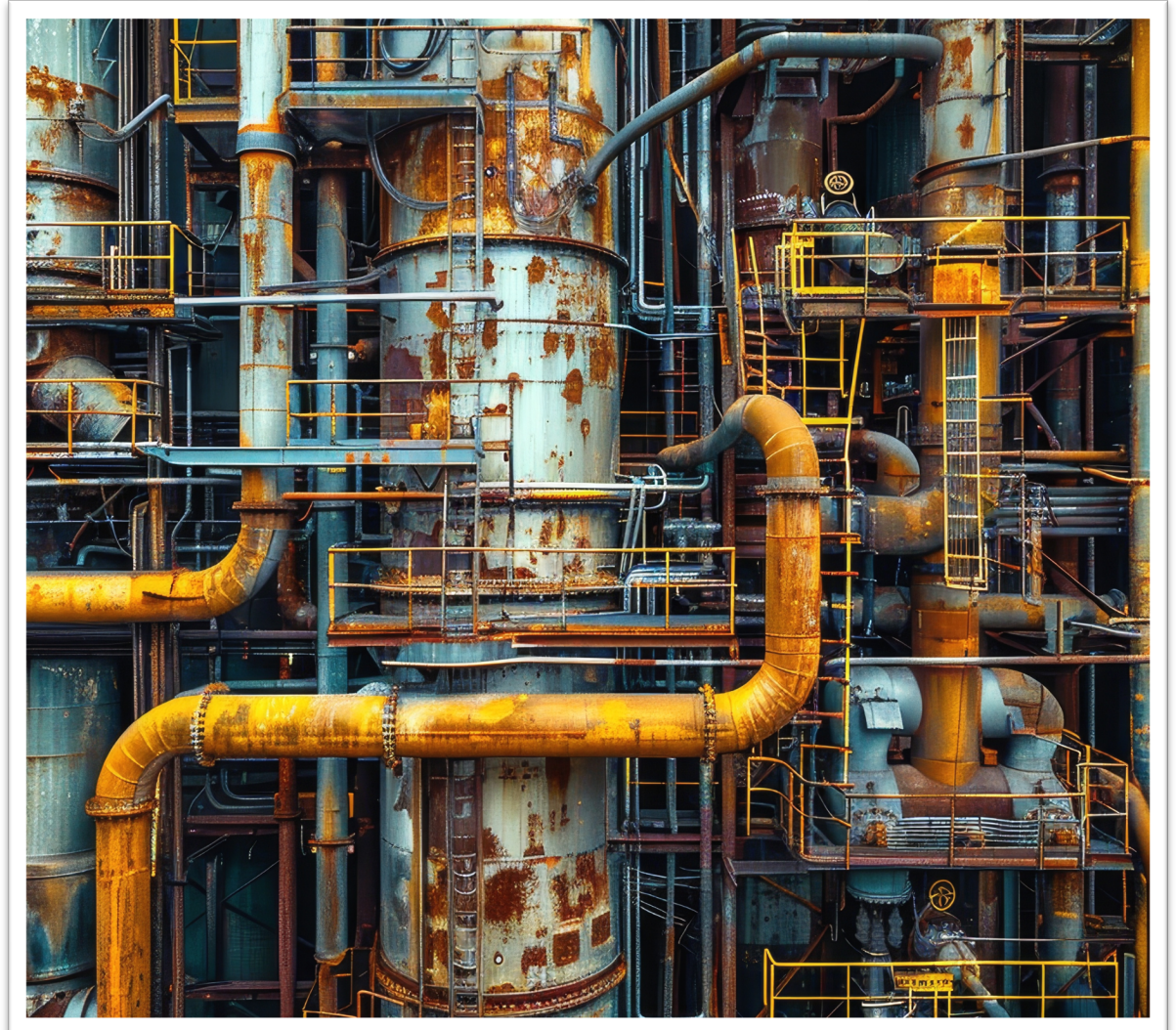
Siloxanes



- Why: Found in landfill and food waste sources, siloxanes can damage turbines and engines. During combustion, they thermally decompose and oxidize to form hard, glass-like inorganic solids that pose a risk to mechanical equipment.
- Test methods:
 - Siloxanes compounds and Total Silicon by ASTM D8230

Ammonia

- Why: Corrosive to metal parts and surfaces, and a concern for air permits and pipeline specs.
- Test methods:
 - Ammonia by NIOSH 6015 (performed by ALS Salt Lake City)



Volatiles Organic Compounds



- Why: many VOCs are regulated air toxics that impact compliance, odor, and health/safety. Measuring VOCs also detects treatment breakthrough to help protect equipment
- Test methods:
 - VOCs by EPA TO-15 Modified
 - Total Chlorine & Total Fluorine by EPA TO-15 Modified



Halogenated Compounds & Metals



- Why: halogenated compounds like Chlorine & Fluorine and metals compounds contribute to corrosion of equipment
- Test Methods:
 - Total Chlorine & Total Fluorine calculated via a list of 56 Halogenated compounds via EPA TO-15
 - Metals by NIOSH 7300 (performed by ALS Salt Lake City)
 - Mercury by NIOSH 6009 (performed by ALS Salt Lake City) or
 - Mercury by NIOSH ASTM D6350 (performed by an external subcontract lab)

Moisture Content / Dew Point



- Why: Excess water leads to corrosion and operational issues.
- Test methods:
 - ALS offer supplies to perform a field test via ASTM D4888 with a colorimetric determination of moisture content

Biologicals



- Why: Bacteria can accelerate corrosion or can create a biofilm that could lead to flow restriction.
- Test methods:
 - Total Bacteria in RNG, Biogas and landfill gas for
 - Total bacteria, Sulfate-reducing bacteria (SRB) , Acid-producing bacteria (APB), Iron-oxidizing bacteria (IOB)
 - This testing is performed by a qualified subcontract laboratory

Conclusion



- No, conventional natural gas is not renewable; it is a fossil fuel that formed over millions of years and is a finite resource. However, Renewable Natural Gas (RNG), also known as biomethane, is a renewable alternative made from the decomposition of organic matter like landfill waste, animal manure, and food scraps. RNG is purified to pipeline quality, making it interchangeable with conventional natural gas for use in everything from heating and cooking to powering vehicles.

Conventional natural gas

- Formation: Created from organic material over geological time scales (millions of years) under heat and pressure.
- Source: Extracted from underground deposits.
- Nature: Finite and non-renewable, meaning it cannot be replenished in a human lifetime.

Renewable Natural Gas (RNG)

- Formation: Produced from organic waste that decomposes naturally.
- Sources:
 - Includes methane captured from livestock farms, municipal solid waste landfills, wastewater treatment plants, and food production waste.
- Nature:
 - Renewable because it is made from a continuously replenished supply of organic waste.
- Use:
 - The biogas is purified to meet the quality standards of conventional natural gas, allowing it to be used in existing infrastructure for electricity, heating, and transportation.

ALS Support



- Sarah Mock – ALS Simi Valley - Project Manager: Sarah.mock@alsglobal.com
- Bevin Meade – ALS Salt Lake City – Technical Lead: bevin.meade@alsglobal.com
- Ron Martino – ALS Laboratories – National Account Manager: ron.martino@alsglobal.com