

RENEWABLE NATURAL GAS QUALITY STANDARDS

The Renewable Natural Gas (RNG) quality standards below, provide the current actions and standards required for the initial and ongoing acceptance of RNG into CenterPoint Energy's gas distribution system. These RNG quality standards are in addition to any other requirements for gas services included in CenterPoint Energy's current Gas Service Tariff.

A customer using CenterPoint Energy's RNG Interconnect Tariff to deliver RNG to CenterPoint Energy's gas distribution system shall deliver RNG conforming to the following minimum standards. CenterPoint Energy may allow deviations from these standards on a case-by-case basis at its sole discretion. CenterPoint Energy will not allow deviations from these standards related to the health protective constituent levels or testing requirements.

General Specifications

CenterPoint Energy's Interconnection equipment will have automatic and remote shut off capabilities for quality standards measured at the receipt station. CenterPoint Energy may immediately shut-in an RNG Interconnect Customer not conforming to the following specifications:

1. Wobbe Index: The RNG shall have a minimum Wobbe Number of 1290 and shall not have a maximum Wobbe Number greater than 1400.
2. Heating Value: The RNG shall have a minimum higher heating value of nine hundred and seventy-five (975) Btu (gross) per standard cubic foot on a dry basis. The maximum heating value allowed is one thousand (1100) Btu (gross) per standard cubic foot on a dry basis.
3. Moisture Content or Water Content: The RNG shall have a water content less than or equal to seven (7) pounds per million standard cubic feet.
4. Total Sulfur: The RNG shall not contain more than 0.75 of a grain of total sulfur compounds, measured as sulfur, per one hundred (100) standard cubic feet (12.6 ppm).
5. Hydrogen Sulfide: The RNG shall not contain more than 0.25 grains / CCF, (4ppm), of H₂S
6. Carbon Dioxide: The RNG shall have a total carbon dioxide content less than or equal to three percent (3%) by volume.
7. Oxygen: The RNG shall not have an oxygen content in excess of four-tenths of one percent (0.4%) by volume for gas received into distribution class pipeline or not in excess of two tenths of one percent (0.2%) for gas received into transmission class pipeline.
8. Inerts: The RNG shall not contain in excess of four percent (4%) total inerts (the total combined carbon dioxide, nitrogen, oxygen and any other inert compound) by volume.
9. Hydrocarbons: The RNG hydrocarbon dew point is not to exceed 45 degrees F at the delivery pressure.
10. Merchantability: The RNG shall not contain dust, sand, dirt, gums, oils and other substances at levels that would be injurious to utility facilities or that would cause gas to be unmarketable.
11. Delivery Temperature: The RNG delivery temperature is not to be below 50 degrees F or above 115 degrees F.
12. Liquids: The RNG shall contain no liquids at or immediately downstream of the receipt point.

Constituent Laboratory Testing Based on Source for Health Protective and Pipeline Integrity Protective Constituent Levels

Depending on the source of the RNG, CenterPoint Energy will require an RNG Interconnect Customer to complete laboratory testing for some or all of the trace constituents listed in the following table.

Constituent	Trigger Level mg/m ³	Lower Action Level mg/m ³ (ppmv)	Upper Action Level mg/m ³ (ppmv)
<i>Health Protective Constituent Levels</i>			
Carcinogenic Constituents			
Arsenic	0.019 (0.006)	0.19 (0.06)	0.48 (0.15)
p-Dichlorobenzenes	5.7 (0.95)	57 (9.5)	140 (24)
Ethylbenzene	26 (6.0)	260 (60)	650 (150)
n-Nitroso-di-n-propylamine	0.033 (0.006)	0.33 (0.06)	0.81 (0.15)
Vinyl Chloride	0.84 (0.33)	8.4 (3.3)	21 (8.3)
Non-Carcinogenic Constituents			
Antimony	0.60 (0.12)	6.0 (1.2)	30 (6.1)
Copper	0.060 (0.02)	0.6 (0.23)	3 (1.2)
Lead	0.075 (0.009)	0.75 (0.09)	3.8 (0.44)
Methacrolein	1.1 (0.37)	11 (3.7)	53 (18)
Toluene	904 (240)	9000 (2400)	45000 (12000)
Alkyl Thiols (mercaptans)	(12)	(120)	(610)
<i>Pipeline Integrity Protective Constituent Levelsⁱⁱ</i>			
Siloxanes	0.01 mg Si/m ³	0.1 mg Si/m ³	-
Ammonia	0.001vol%	-	-
Hydrogen	0.1vol%	-	-
Mercury	0.08 mg/m ³	-	-
Biologicals	4 x 10 ⁴ /scf (qPCR per APB, SRB, IOB ⁱⁱⁱ group) and commercially free of bacteria of >0.2 microns	-	-

Notes: i) The first number in this table are in milligrams per cubic meter of air (mg/m³), while the second number () is in parts per million by volume (ppmv). ii) RNG supplies that contain Pipeline Integrity Protective Constituents exceeding the Trigger Level, but lacking a Lower or Upper Action Level, will be analyzed and addressed on a case-by-case basis based on the RNG’s potential impact on pipeline system integrity. iii) APB – Acid producing Bacteria; SRB – Sulfate-reducing Bacteria; IOB – Iron-oxidizing Bacteria

RNG Constituent Testing shall be based on the RNG source

1. RNG from landfills shall be tested for all Health Protective and Pipeline Integrity Protective Constituent Levels.
2. RNG from dairies shall be tested for Ethylbenzene, Hydrogen Sulfide, n-Nitroso-di-n-propylamine, Mercaptans, Toluene, and the Pipeline Integrity Protective Constituent Levels.
3. Other organic waste sources, including RNG from publicly owned treatment works (i.e., water treatment and sewage treatment plants) shall be tested for p-Dichlorobenzene, Ethylbenzene, Hydrogen Sulfide, Mercaptans, Toluene, Vinyl Chloride, and the Pipeline Integrity Protective Constituent Levels.

Testing to Be Completed By Certified Labs

Testing required by this tariff will be performed by the RNG Interconnect Customer or CenterPoint Energy, using independent certified third-party laboratories (Environmental Laboratory Accreditation Program (ELAP) certified, where applicable). CenterPoint Energy shall be notified of the RNG sampling and tests and have the option to observe the samples being taken. Test results will be shared with CenterPoint Energy within five calendar days of the test results being received by the RNG Interconnect Customer.

In its discretion, CenterPoint Energy may collect samples for testing at the receipt point utility meter.

Re-testing shall be allowed to verify and validate the results of any test. The cost of retesting shall be borne by the entity requesting the re-test.

RNG Pre-Interconnection Testing

1. Prior to the injection of RNG into CenterPoint Energy's distribution system, the RNG Interconnect Customer shall conduct two tests over a two- to four-week period for the Health Protective and Pipeline Integrity Protective Constituent Levels identified for that RNG source.
2. If during pre-injection testing, the RNG is found to contain Health Protective or Pipeline Integrity Protective Constituent Levels above the Lower Action Level, the RNG will not be accepted or transported by CenterPoint Energy. The RNG Interconnect Customer shall make necessary modifications to reduce constituent levels below the Lower Action Level and restart pre-injection testing.

RNG Periodic Testing

CenterPoint Energy will require periodic testing for Health Protective or Pipeline Integrity Protective Constituent Levels as follows:

1. If a Health Protective or Pipeline Integrity Protective Constituent Level has never been found at or above the Trigger Level or the most recent four periodic tests for that Constituent have shown concentrations below the Trigger Level, the RNG Interconnect Customer will retest for the Constituent at least once in every twelve-month period.
2. If a Health Protective or Pipeline Integrity Protective Constituent Level has been found above the Trigger Level in one of the four most recent tests for the Constituent, the RNG Interconnect Customer shall retest for that Constituent quarterly (at least once in every three-month period).

RNG Shut-Off and Restart Procedures

The RNG Interconnect Customer may be shut-off at CenterPoint Energy's sole discretion if any of the following occurs:

- RNG is found to be not in compliance with any of the General Specifications.
- CNP determines that a change in the biogas source at the facility or the upgrading equipment will potentially increase the level of any constituent over the previously measured baseline levels.
- Testing indicates that Health Protective or Pipeline Integrity Protective Constituent Levels are exceeding allowable concentration levels:
 - Any Health Protective Constituent Level is found at or above the Lower Action Level three times in a 12-month period.
 - Any Health Protective Constituent Level is found at or above the Upper Action Level.
 - Any Pipeline Integrity Protective Constituent Level is found at or above the Lower Action Level three times in a 12-month period.
- The RNG contains constituents at concentrations which prevent or restrict the normal marketing of RNG, are at levels that are injurious to pipeline facilities, or are at levels that present a health and/or safety hazard to CenterPoint Energy employees and/or the general public.
- Any other issue that CenterPoint Energy determines may jeopardize the safety or reliability of its employees, customers, service, or systems.

In the event that CenterPoint Energy rejects RNG for being outside of any specified gas quality range, it is the RNG Interconnect Customer's responsibility to accept the rejected RNG from the point of interconnection. In order to restart injection after an RNG Interconnect Customer has been shut-in due out of specification on to lab tested criteria, the RNG Interconnect Customer shall repeat Pre-Injection Testing procedures.

Notice of Change in Feedstock or Conditioning Process

Customer shall provide thirty (30) days advance notice to CenterPoint Energy before changing its RNG feedstock, feedstock source, or RNG conditioning process.

Gas from Hazardous Waste Landfills

RNG Sourced from Hazardous Waste Landfills will not be knowingly purchased, accepted, or transported on CenterPoint Energy's system. Customer must certify and provide documentation or other suitable proof that the RNG feedstock is not derived or collected from a hazardous waste landfill prior to interconnection and whenever there is a change in feedstock.

General Notes

CenterPoint Energy shall have the right to share test results taken by CenterPoint Energy or provided by the RNG supplier with appropriate parties.

These RNG Gas Quality Standards may be revised from time-to-time at CenterPoint Energy's sole discretion.