

SIERRA NEVADA BREWING CO.



BIOGAS GENERATION AND USE AT SIERRA NEVADA'S MILLS RIVER BREWERY

Jeff Muston

Utilities Supervisor

Sierra Nevada Brewing Co.

Mills River, NC

jeffrey.muston@sierranevada.com

BIOGAS GENERATION: WASTEWATER TREATMENT

- Process wastewater and spent yeast are pretreated prior to discharge to municipal works.
- Chemical energy is converted to biogas via anaerobic digestion.
- SNBCo Mills River uses a two-phase anaerobic sequencing batch reactor (ASBR) designed and built by Symbiont.

WASTEWATER TREATMENT



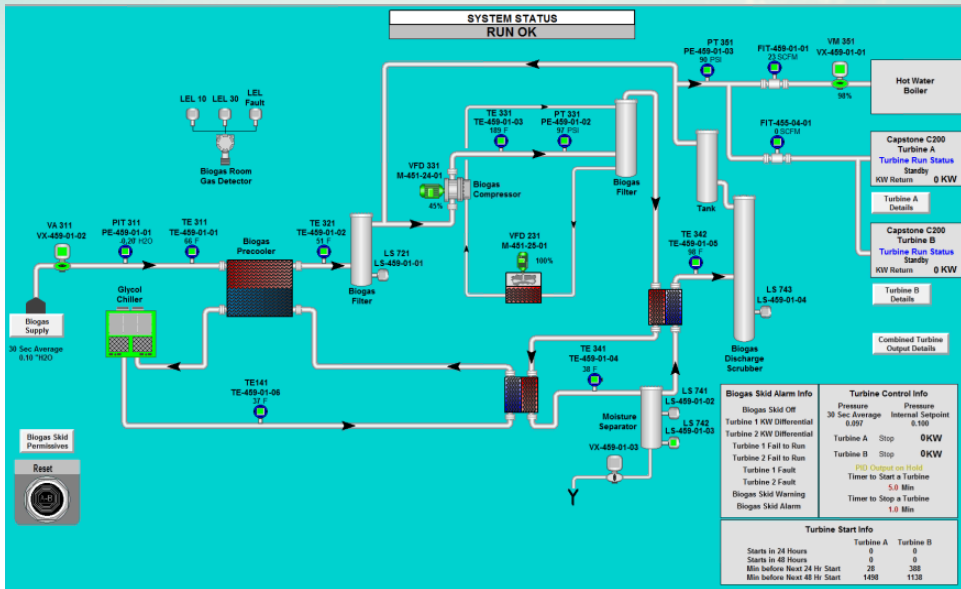
- First vessel (mid) is a 325,000 gal. equalization tank, where a mixed population of microbes hydrolyzes and acidifies influent, producing acetate.
- Second vessel (left) is a 1.5 MM gal. anaerobic bioreactor. Anaerobes ferment acetate to biogas.
- Final vessel (right) is a 155,000 gal aeration tank for final polish before discharge to MSD-BC.

ODOROUS AIR TREATMENT AND BIOGAS COLLECTION



Odorous air bed under construction, to be filled with iron sponge woodchip media for hydrogen sulfide mitigation.





BIOGAS CONDITIONING

- Biogas is filtered, compressed to 90 psi, and cooled on a Unison Solutions 250 scfm skid.
- Particulate matter and water are removed, giving medium BTU biogas.
75% methane, 35 ppmv H₂S
- CO₂, H₂S, and siloxane removal not needed due to biogas quality/uses.
- In an ASBR, most H₂S is generated in EQ tank. H₂S generated in the reactor is precipitated by addition of ferric chloride coagulant.



BIOGAS USE AT MICROTURBINES

- Biogas is supplied to two Capstone C200 microturbines, each capable of 200 kWh.
- Turbines can operate from 100 kW - 200 kW, depending on biogas availability. Throttling minimizes start/stop cycles.
- Up to 135,000 scf biogas/day
- Turbines are configured for medium BTU biogas; that's why we don't scrub out CO₂.



BIOGAS USE AT BOILERS



- Two 300 HP, 10,000 lb./hr fire-tube boilers blend biogas into natural gas feed at 1:8 ratio when biogas is available.
- Up to 35,000 scf biogas/day
- CO₂ content of biogas is limiting; can cause corrosion of boiler tubes.

SUMMARY - BIOGAS AT SNBCO

- Sustainability is a core company value.
 - SNBCo is Zero Waste Platinum certified
 - Mills River brewery is LEED Platinum certified
- Sierra Nevada Mills River uses an ASBR-style anaerobic digester to pretreat process wastewater and generate biogas.
 - Minimizes impact to public treatment works and environment.
 - Generates a sustainable energy source that would otherwise go to waste.
- For 2019, our wastewater treatment process generated:
 - 1.2 MM kWh, ~10% of power consumed at the brewery.
 - 3000 dTh biogas to boilers
- Wastewater treatment is responsible for <1% of net power consumption at the brewery; 10:1 return!



SIERRA NEVADA BREWING CO.

THANK YOU

jeffrey.muston@sierranevada.com

<https://sierranevada.com/about/sustainability/>

<https://sustainability.sierranevada.com/mills-river/>