

ZERO₂



CASE STUDY

CATALYTIC OXYGEN REMOVAL TO
PRODUCE RENEWABLE NATURAL GAS
AT MAINE'S LARGEST DAIRY

April 2024

THE SITUATION

Peaks Renewables is focused on the renewable natural gas (RNG) market opportunity and led the effort to develop [Maine's first biogas-to-RNG project](#). Peaks Renewables worked closely with one of the area's largest dairies to host its manure-to-RNG project. The facility receives manure from six local Maine dairies and converts the waste into renewable natural gas, animal bedding, and agricultural fertilizer. RNG from dairy manure is one of the few sources of energy with a negative carbon footprint, reducing the release of methane (CH₄) into the environment.

The RNG plant was designed and constructed by **Regenis**, a leading designer, operator, and supplier of turnkey dairy digesters for biogas and RNG projects. Manure is fed to a mesophilic mixed plug-flow digester designed by **DVO Inc**, while produced biogas is scrubbed of impurities to produce the RNG by an amine system designed by **Ammongas**. The RNG production is sold to Summit Natural Gas of Maine (SNGME) for distribution to communities and businesses in the Waterville, ME area.

THE CHALLENGE

Raw biogas generated by the dairy digesters contains several contaminants, including oxygen, which reduces the quality of the biogas and is highly corrosive to equipment and downstream pipelines. The RNG buyer, Summit Natural Gas of Maine, imposes a stringent limit on oxygen content, making oxygen removal essential for commercial sales and injection into the natural gas pipeline system.

EcoVapor, a DNOW company, was engaged to design and supply an oxygen removal system to be placed within the overall Ammongas biogas-to-RNG upgrading process.

The EcoVapor ZerO₂[™] oxygen removal system was chosen as the deoxygenation ('deoxo') component in the plant's upgrading process. The ZerO₂ process uses a catalytic reactor along with temperature controls to purify the gas of oxygen to meet pipeline specification, the same proven technology used by leading oil and gas producers for over a decade.

EcoVapor was started by a father-son team in Denver, Colorado, in 2010. The company's initial focus was on the energy industry, helping producers recover and purify natural gas contaminated with oxygen so it could be sold to pipelines instead of being flared, wasting a valuable energy resource, and generating emissions.



THE SOLUTION

In collaboration with Regenis, EcoVapor engineers examined the Peaks Renewables RNG project and designed a flexible and scalable catalytic deoxo solution including these elements:

- Two ZerO₂ E300 units to eliminate oxygen contamination from the raw biogas stream. Each unit has nameplate flow capacity of 210 Standard Cubic Feet per Minute (SCFM).
- One water-cooled heat exchanger to reduce the temperature of the production stream for further upgrading.

The ZerO₂ catalytic deoxo solution has several key advantages, including scalability, reliability, high uptime, and produces no harmful byproducts.

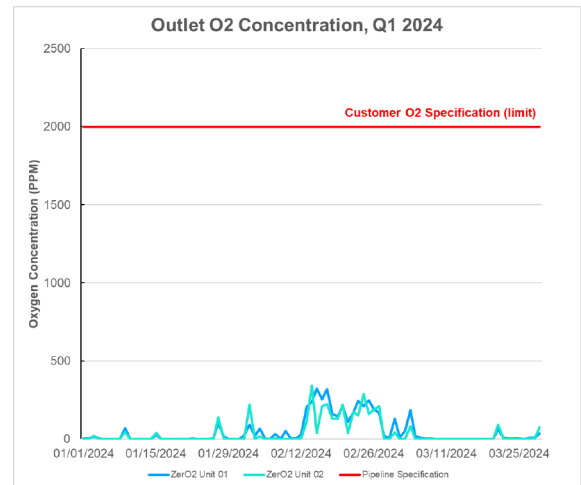
RESULTS

Gas upgrading operations successfully commenced at the RNG facility in September of 2023.

- The operation is expected to produce approximately 124 million cubic feet of clean, sustainable renewable natural gas annually.
- The ZerO₂ deoxo solution reliably reduces oxygen content to pipeline specification of 2,000 PPMV (0.2% by volume) or less.
- To date, mechanical availability of the deoxo system has been 100%.

SUMMARY

The Peaks Renewables dairy digester biogas-to-RNG plant is successfully converting a waste stream into useable products and revenue. The EcoVapor ZerO₂ catalytic deoxo solution contributes to high production uptime for reliable delivery of RNG that meets pipeline specifications. The ZerO₂'s modular design also "future proofs" the plant with its ability to easily scale up or down with project needs and budget.



This chart illustrates the oxygen (O₂) levels at the outlet of each ZerO₂ oxygen removal unit in operation at the Peaks Renewable RNG project during Q1 2024. In no case did the maximum O₂ level exceed 350 PPM, which is significantly below the pipeline specification of 2,000 PPM.



ABOUT ECOVAPOR

EcoVapor, a DNOW company, offers a suite of technology-based solutions for improving the sustainability of gas-powered energy systems by converting waste streams into revenue, which reduces emissions. Our flagship ZerO₂[™] removes oxygen from biogas (“deoxo”), landfill gas and tank vapors, allowing gas to meet pipeline specification and be sold instead of otherwise being flared. We serve the Oil and Gas and Renewable Natural Gas (RNG) markets.

Contact us today at 1-844-NO-FLARE (844-663-5273)
to see if ZerO₂ is right for your
agricultural biogas to RNG operation.