Renewable Natural Gas: Facility Operation Best Practices to Create a

More Climate-Friendly Project

Methane leakage across the entire renewable natural gas (**RNG**) production and supply chain are an important source of greenhouse gas (GHG) emissions. Methane is a powerful GHG that contributes to climate change, but if recovered and used for energy, its climate impact is reduced. The GHG emissions from projects that convert waste biogas from landfills or anaerobic digester systems to **RNG** vary greatly based on project-specific details: the biogas feedstocks used, electricity generation method employed, gas collection efficiencies, **RNG** upgrading technologies used, baseline biogas treatment intensities, and whether energy sources are offset using **RNG** or **non-RNG** biogas end-use alternatives. Fugitive emissions of methane, depending upon their magnitude, can negate the climate and environmental benefits of **RNG** projects.

Through experiences with partners in the Landfill Methane Outreach Program and the AgSTAR program, EPA has identified best practices to reduce methane leakage from **RNG** projects to emit fewer GHGs at landfills and anaerobic digester systems.

Landfills

Gas Collection & Control

- Install gas collection system to reduce GHG emissions earlier than required by regulations.
- Optimize wellfield tuning to pull best-quality gas to reduce the need for or amount of processing after extraction.
- Ensure gas collection pumps are correctly sized to minimize leakage of uncaptured gas.
- Consider installing separate gas collection and flaring systems from less productive areas of the landfill to minimize the amount of gas impurities.
- Where possible, minimize the distance (i.e., length of conveyance piping) to the upgrading plant.

Flaring & Operations

- Flare excess collected gas rather than venting it to the atmosphere.
- Minimize fugitive losses and leakage from the collection system.
 - Use proper inspection and maintenance practices to identify collection system components in need of repair, including components that have become pressurized due to loss of vacuum which results in methane leakage to the atmosphere. For example, a crushed vacuum header can cut off vacuum to a well that then becomes pressurized, causing a flexible connection to leak methane.
- Use optical hydrocarbon detection equipment for RNG system components under pressure to inspect compressors, connections, piping, equipment, and identify leaks at fittings, seals, bearings, valves, and other components.



Anaerobic Digesters (AD)

Siting

 Minimize the distance that the raw material and digestate must travel by locating the AD system as close as possible to collection points to reduce impacts from transportation.

Flaring & Operations

- Install a properly sized flare based on best available technology.
- Minimize or avoid digester gas emissions from overpressurized valves or leaks by flaring biogas during facility power outages.
- Use highly efficient gas upgrading technologies that require little electricity and produce low methane losses in the off-gas.
- Use gas-tight equipment and monitor diffuse methane losses in plant piping, valves, and

equipment. Minimize methane losses at blowers or from the valve packing by using high-quality seals.

- Cover digestate storage tanks and collect the residual biogas production, sending it to a flare or a thermal oxidizer.
- Minimize the parasitic electricity demand of the biogas plant and supply it from low-emission sources (where applicable). Design the facility to run electric systems only when they are needed.
- Maximize the heat output from the combined heat and power unit (CHPU) to minimize fossil fuel use (where applicable).
- Employ high efficiency CHPUs, preferably with additional exhaust gas treatment.
- Develop and implement a maintenance plan that regularly checks the biogas plant, upgrading unit, and inter-connections for leakage, including use of optical hydrocarbon detection equipment.

Daily Operations & Technology (Landfills and AD Systems)

- Install monitoring and leak prevention throughout the facility.
- Utilize automated leak detection systems that notify the operator automatically when a leak occurs.
- Employ two or more different types of leak detection systems to improve the effectiveness of the leak detection program.
- Whenever possible, use renewable energy to power the RNG upgrading process equipment.

Landfills Anaerobic Digestion

EPA RNG Resources

- For more information, please visit
 <u>EPA's Landfill Gas Energy Project Development Handbook.</u>
- For more information, please visit
 <u>EPA's Anaerobic Digester/Biogas System Operator Guidebook.</u>

