

Renderer Meets Anaerobic Digestion

By Brian Gannon, Biogas Energy, Inc.



Would an on-site wastewater treatment plant benefit a Northern California rendering company? That question is being answered by North State Rendering, who built an anaerobic digestion facility to process wastewater, grease trap material, food waste, and more.

The anaerobic digester acts as a private wastewater treatment plant that improves wastewater quality and generates significant renewable energy for use on-site. The idea is straightforward: divert wastewater and expensive-to-render waste material to anaerobic digestion for the creation of biogas. Biogas is used to generate electricity, fuel trucks, and run boilers. With fuel and energy counting as a significant operational cost for the business, North State Rendering is investing in a technology that eliminates electricity bills, slashes diesel costs, and reduces natural gas imports.

North State Rendering has been serving Northern California for over 75 years, processing dead stock, slaughterhouse waste, grease trap material, and food waste into tallow, yellow grease, and bone meal. Owners Chris and Pat Ottone were looking for ways to cut costs, secure new waste supply contracts, and improve wastewater treatment. With the help of a grant from the state of California, North State Rendering hired Biogas Energy to build an anaerobic digestion facility at the rendering plant. The facility does what most wastewater treatment plants do: uses naturally-occurring bacteria to “digest” the high chemical oxygen demand (COD) waste and improve the quality of the output. In addition, the digester is optimized for biogas production, adding a significant revenue stream to the renderer’s core business.

The anaerobic digestion facility consists of three main elements: (1) waste reception and pre-processing, (2) anaerobic digestion tanks, and (3) energy and fuel production.

Waste Reception and Pre-processing

The material going into the digester – grease trap and food waste from kitchens, restaurants, and food processors – is expensive to render. Wastewater from the rendering process is added to the mix as well. By diverting this material to the digester, North State Rendering cuts costs and frees up rendering capacity for higher-value materials. The improvement to the wastewater is also a significant benefit.

The waste reception equipment consists of a hopper where material is ground up and pumped to the digester, and a grease trap reception system that separates out contaminants (i.e., plastic, metals, etc.) prior to pumping the material into the digester. With this flexible reception facility configuration, the digester processes a wide variety of materials, from high-liquid grease trap material to dry food waste. North State Rendering also expects to add dead stock to the digester during warmer months when rendering can become problematic due to extreme degradation of the material.

Anaerobic Digester Tanks

From the reception area, the material is pumped into two tanks, where the first step of the biogas production process takes place. The heated tanks contain bacteria that break down the material and prepare it for the main digester tank. When the material is ready, it is pumped into the main digester for biogas-producing bacteria to get to work. The anaerobic digester is not only producing biogas, it is also processing

wastewater to improve water quality. The bacteria creating biogas digest is the material that causes elevated COD in wastewater. Hence, the digester is basically a small wastewater treatment plant, improving the quality of wastewater and enabling reductions in discharge fees.

Energy and Fuel Production

Biogas consists of almost equal parts methane (natural gas) and carbon dioxide (CO₂). Since it is produced from waste, biogas is a renewable energy source and is often eligible for various financial incentives and rewards like grants, tax credits, and loan guarantees.

The first use of the biogas is to generate electricity needed to run the rendering facility, thus eliminating or significantly reducing electricity costs. Heat from the generator is used to heat the digester facility and for other purposes (i.e., steam production, drying digestate, etc.). It is also possible to sell electricity to the local utility to earn additional revenue for the renewable power generated.

The next use of the biogas is as compressed natural gas (CNG) for truck fuel. A gas-cleaning skid removes the CO₂ and makes a pipeline-quality biomethane that is then compressed in a CNG fueling station. North State Rendering's truck fleet is being converted to a dual-fuel CNG/diesel operation. By converting the trucks, the renderer anticipates reducing its diesel costs by 75 percent. Since the biogas-to-CNG upgrade system produces pipeline-quality natural gas, producers can inject the gas into the pipeline to sell to other customers. Finally, any surplus biogas is fed to a boiler at the rendering plant to reduce the need to purchase natural gas.

With a diverse use for the biogas, North State Rendering will maximize revenue and hedge against price increases in electricity, diesel, and natural gas.

Sources of Facility Funding

There are many government financial incentives available to help fund these types of projects. For its new anaerobic digester, North State Rendering took advantage of available grants and loan guarantees, receiving a \$5.4 million matching grant from the California Energy Commission's Alternative and Renewable Fuel Vehicle Technology Program and another grant from the Department of Treasury. As a renewable energy

source, anaerobic digestion is most often eligible for funds that renderers can leverage. A good resource for federal and state-by-state incentives is www.dsireusa.org.

Federal incentives come in the form of grants, loan guarantees, tax credits, and accelerated depreciation of assets. State and local incentives can include sales tax exemption, grants for renewable energy project and truck conversion costs, and incentivized electricity production pricing. Talk to a digester firm for guidance.

Benefits to a Rendering Plant

Cut energy costs and generate revenue. Renderers are big energy consumers: electricity to operate the plant, diesel to fuel the trucks, and natural gas to run the boilers. Biogas reduces these energy costs with a renewable resource that is generated by unwanted waste. Along with surplus electricity or CNG to sell, the system will generate revenue from what was previously just a waste to be managed.

Reduce discharge fees. Wastewater treatment plant discharge fees can add up, especially for high-COD rendering wastewater. Anaerobic digestion not only generates biogas, it also processes wastewater to reduce COD prior to discharge. Lower COD means lower discharge fees.

Cut rendering costs. By diverting expensive-to-render waste material to anaerobic digestion, the business can focus on rendering higher-value material. Increased throughput, lower operating costs, and lower labor costs all come from diverting the expensive-to-render material.

Table 1 gives a hypothetical example of how a biogas plant can financially benefit a rendering company.

Integration into the Rendering Process

Integration of a digester facility into a rendering plant depends on site particulars, but the concept of waste processing is familiar to renderers. While the small footprint of the digester allows for site flexibility in positioning, truck access has to be planned carefully for waste product delivery. The biogas-CNG fueling station should be designed for ease of fleet access, either with slow or fast-fill fueling stations as needed.

Renderers have a significant advantage over other companies trying to develop new waste-to-biogas facilities.

Unlike newcomers, renderers have the permits needed to process waste material, the trucks necessary to collect the waste product, and the energy consumption that biogas facilities that can help fuel.

As energy and fuel prices climb and wastewater discharge fees escalate, renderers need to look at creative solutions that leverage their existing strengths. Integration of anaerobic digestion into the rendering process creates new value from challenging products and cuts costs across the board. The technology to create biogas from waste products is well on its way. **R**

Table 1. Benefits of hypothetical anaerobic digestion facility.

Assumes:	
<ul style="list-style-type: none"> • 100 tons per day input capacity • 500 kilowatt (kW) electricity production • 25,000 diesel-gallon equivalent per month compressed natural gas fuel production • 80 percent reduction of chemical oxygen demand in discharged wastewater 	
Fuel cost savings (96,000 gallons per year at \$3.50 per gallon)	\$336,000
Electricity savings (96,000 kW hours per month at \$0.15 per kW hour)	\$172,000
Revenue from electricity and CNG/renewable identification number/ low carbon fuel standard sales, additional tipping fees, rendering process costs savings	\$500,000
Savings in wastewater treatment plant discharge fees	\$250,000
Savings and revenue total	\$1,258,000
Less operating expenses	\$120,000
Total benefit	\$1,138,000