



Evan Dell'Olio <evan.dellolio@synergy-ne.com>

VEPPI Farm Methane Application Copy

Meghan vonBallmoos <meghan@veppi.org>
To: Evan Dell'Olio <evan.dellolio@synergy-ne.com>
Cc: Carolyn Alderman <carolyn@veppi.org>, Ioana Drew <idrew@veppi.org>

Tue, Jul 25, 2023 at 2:23 PM

Evan,

We have reviewed your application. Can you please send us a project description that details the process you will use to generate methane?

Best regards,

Meghan von Ballmoos
Renewable Energy Specialist
VEPP Inc.
860-605-5041 (mobile)
www.vermontstandardoffer.com

SIGNATURE_1700000764

Correspondence sent and received is subject to Vermont's Access to Public Records Law, 1 V.S.A. § 315 et seq. Please refrain from sending any information that is confidential, privileged, subject to copyright or constitutes a trade secret.



Evan Dell'Olio <evan.dellolio@synergy-ne.com>

VEPPI Farm Methane Application Copy

Evan Dell'Olio <evan.dellolio@synergy-ne.com>

Thu, Jul 27, 2023 at 10:56 AM

To: Meghan vonBallmoos <meghan@veppi.org>

Cc: Carolyn Alderman <carolyn@veppi.org>, Ioana Drew <idrew@veppi.org>, Kam Mahdi <kmahdi@cetyinc.com>, Alp Kaplan <akaplan@cetyinc.com>

Good Morning Meghan,

I hope that all is well. Please find a process description for our project attached to this email.

We will look forward to hearing more from you soon. Have a great day!

Best Regards,

Evan

[Quoted text hidden]

[Quoted text hidden]

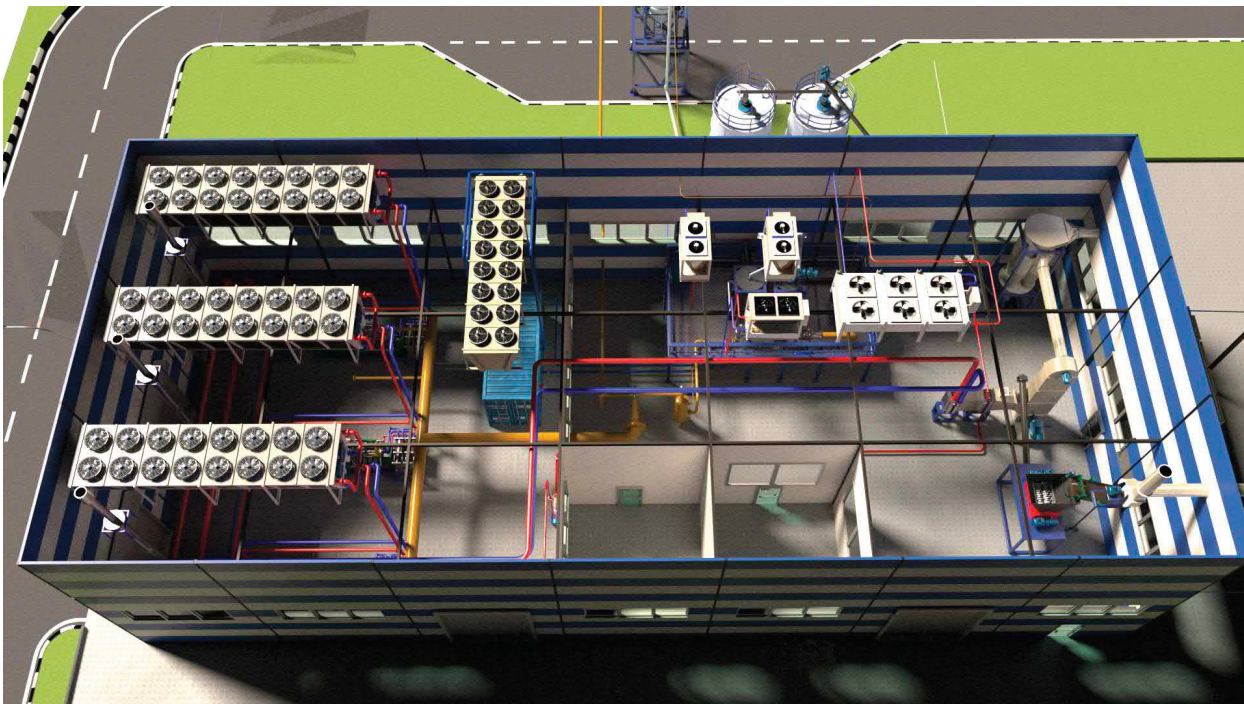
**VRG - VEPPI Process Description.pdf**

3173K

Vermont Renewable Gas – Lyndon Process Description

This Agricultural Methane project produces high-quality fuel gas for combustion in 3 biogas engine/generator units. The technology for producing the fuel gas is an HTAP (high temperature ablative pyrolysis) reactor system. This system utilizes thermochemical decomposition of organic matter (rather than bacteria) into clean, fuel gas with a high volume of methane in an exclusively anaerobic environment.

The VRG project implements dual organics to energy reactor vessels. In the first vessel, the self-sustained high temperature occurring in the reactor vessel extracts volatiles in an anaerobic environment from the organic matter. Moving into the second reactor vessel, thermos-catalytic cracking of the volatiles occurs, creating a tar free, high heating value fuel gas. Both the extraction and cracking stages take place within a self-contained, high-temperature anaerobic environment. The entire process in each vessel takes about 5 seconds. The remaining waste from the process, a carbon-rich biochar is then extracted and conveyed to a holding silo.



Farmers will be able to directly load trucks from this silo to remove biochar from the facility.

To decompose organic material within short periods of time within the system, VRG will perform preliminary treatment of organic material to reduce to 1-3 mm in size and remove moisture down to 5%. This pre-treatment will occur within the building housing the plant equipment, employing a small hammer mill system. Low temperature waste heat from the biogas generator sets (operating in CHP mode) and some residual heat from the HTAP system will be used to conduct this process by passing air through the material as it is processed in the hammer mill.

The fuel gas is then conditioned for use in the biogas engines through cooling, compression, and separation of the gas. (At this stage, an operator could elect to process the gas into pipeline renewable natural gas (RNG); However, as VRG is pursuing an Agricultural Methane to power project, we will not be upgrading the gas for pipeline use.) The gas is then received in a gas receiver and distributed to the biogas engines with a plant capacity of 2,200 Kwh/hr. In the event of a shutdown of the engines due to an emergency situation, VRG will employ the use of an emergency flare. This emergency flare will also be used during startup of the facility during initial commissioning and for planned maintenance events on a limited basis.

At the gas to power generation stage, the gas is fed into cylinders within the engines. Spark plugs will ignite the gas. Combustion releases the energy in the gas which is converted into heat and mechanical force to drive the engines' crank shafts. The crank shafts in turn rotate alternators to produce electricity. The electricity will be exported directly through an interconnection point within the Village of Lyndonville Electric Department's electric distribution system.

The engines chosen for this project are Guascor biogas engines manufactured by Dresser Rand, a division of Siemens Corporation. These engines are specifically manufactured to operate on biogas. VRG will operate the engines in combined heat and power (CHP) mode. As aforementioned, waste heat will be recovered for pre-treatment of the incoming organic material.

This process is modular, highly efficient, and simple to install. As an Agricultural Methane facility, the only outside emissions associated with the process are from the biogas engines. Selective catalytic reduction (SCR) technology will be incorporated on each engine to bring carbon monoxide and nitric oxides into line with state emissions limitations. No emissions will be emitted from production of the fuel gas itself. Any emissions (at low levels) associated with the pre-processing of incoming organic material will be captured through a filtration system.