PENTAIR

CASE STUDY

BIOGAS UPGRADING SOLUTIONS

ECOFUELS TURNS CROP RESIDUES INTO SUSTAINABLE ENERGY

Dutch company, Ecofuels, wanted to turn biogas from organic waste into a sustainable energy source. With Pentair® Biogas Upgrading Solutions, Ecofuels realized their ambition.

THE STORY OF ECOFUELS

Founded in 2006, Ecofuels is an industrial, biochemical production company, originally initiated by Dutch company Laarakker Groenteverwerking B.V., a specialist in cultivating, processing and selling vegetables, and Indaver Nederland B.V., an industrial and household waste specialist.

Laarakker Groenteverwerking grows 110,000 tons of vegetables annually on 3,500 hectares (8,650 acres) and sells them to producers of canned, frozen and juice products. Indaver Nederland is a vegetable waste management specialist that processes 400,000 tons of vegetable waste to compost each year which is sold as fertilizer to agricultural and gardening enterprises.

In 2006, Ecofuels started two biogas fermenters at its premises in Well, Limburg, The Netherlands.

120.000 tons of vegetable-based material is used as a substrate to produce the biogas, which is then converted into on-site electricity. Part of this substrate comes from Laarakker's vegetable production and the rest from external suppliers.

CO_2 Storage at the Ecofuels Biogas Upgrading Plant in Well, The Netherlands

MAINTAINING SUSTAINABLE PRACTICES

Sustainable resource management and renewable energy are integral parts of Ecofuels' philosophy.

In 2011, Ecofuels decided to go one step further by expanding the capacity of their existing digesters to produce 650-700 m^3 of biogas per hour. They wanted to start converting this biogas into biomethane, which is compatible for use in the national grid network due to its near-pure methane composition [1].

When seeking a biogas upgrading partner, Ecofuels opted for Pentair Biogas Upgrading System, Pentair® BioComplet. The Biogas Upgrading System offers two distinct advantages:

- It provides a comprehensive approach for turning waste streams into sustainable energy solutions.
- The by-product, liquid CO_2, can be used as a commercially viable product rather than released into the atmosphere.

HOW PENTAIR AND ECOFUELS WORK TOGETHER

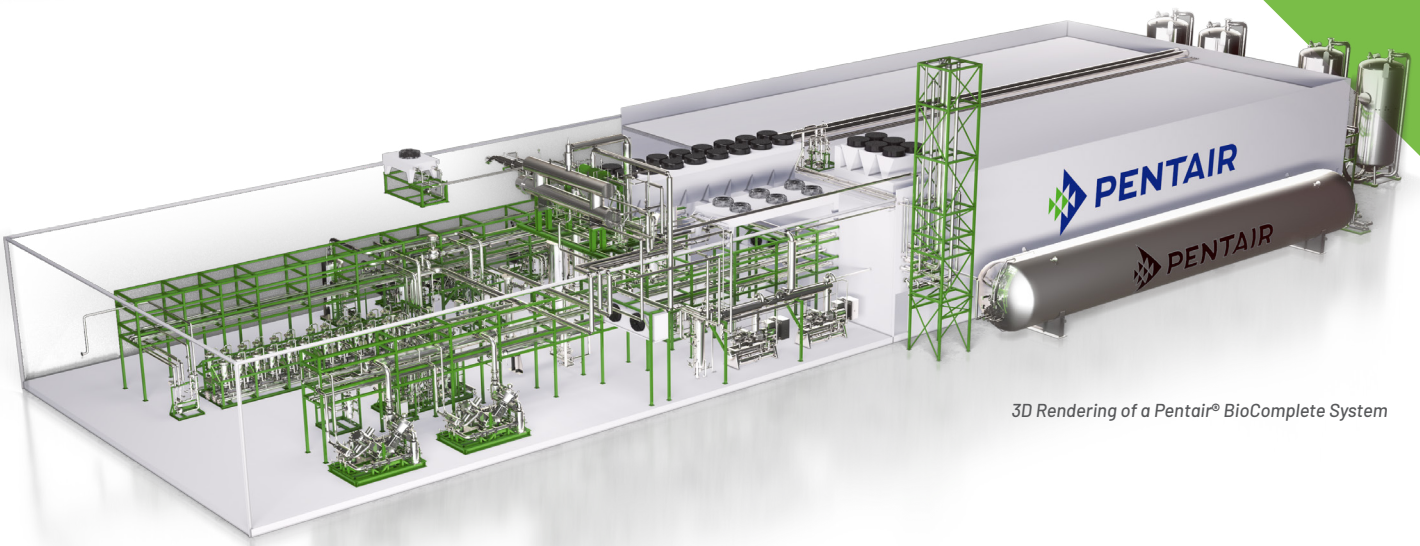
Pentair BioComplete splits Ecofuels' biogas into a methane stream and a CO_2 off-gas stream.

The raw biogas first goes through a scrubber and an activated carbon filter to remove impurities. Then a compressor provides the pressure needed to push the biogas through the membrane unit, where the primary separation process occurs. The off gas from the first membrane step goes to the CO_2 recovery plant, which is pressurized to 17.5 bar and cleaned in an activated carbon filter/dryer. The gas is stripped and liquefied by cooling to -24°C, while methane is fed back to the membrane unit.

The Pentair BioComplete plant at Ecofuels comprises of membrane and cryogenic technology. It produces 650-700 Nm^3/h of biogas which is processed into 340-360 Nm^3/h of biomethane or 2.800.000 m^3 of biomethane per year [2]. Furthermore, 2.000 tons of renewable liquid CO_2 are recovered per year.

[1] Gotz, Manuel, "Biogas Upgrading for Injection into the Gas Grid Quality aspects, technological and ecological consideration". *Research Gate*, Date Accessed December 1st, 2021, Date Published, January 2009, Page 5 Table 2. https://www.researchgate.net/publication/271073651

[2] Based on the Pentair BioComplete Biogas Upgrading System installed at Ecofuels which produces 340-365 m^3 of biomethane per hour. Information provided by Ecofuels.



3D Rendering of a Pentair® BioComplete System

THE FUTURE FOR ECOFUELS

The resulting biomethane is fed into the national grid. Ecofuels receives the feed-in remuneration that is prescribed in the Dutch Renewable Energy Regulation.

The CO_2 by-product is used across a variety of applications such as gaseous fertilizer in greenhouses, as a cooling agent in industrial applications and to produce dry ice which Ecofuels can use as an additional revenue stream.

ABOUT THE PROJECT

Product
Pentair BioComplete
Technology
Membrane/Cryogenic
Plant Capacity
650-700 Nm^3/h Biogas
340-365 Nm^3/h Biomethane (2.800.000 m^3/a)
2.000 tons per year CO_2
Methane Usage
Injection into gas grid according to Dutch specifications
CO_2 Usage
Yes
Biogas Source
Vegetable-based material
Benefits
- Full process control without methane slip
- CO_2 as a profitable product

KEY FACTS

LOCATION:
WELL, LIMBURG
THE NETHERLANDS

START-UP:
2011

CAPACITY:
2.800.000 m^3
OF BIOMETHANE
AND 2.000 TONS
OF CO_2 PER YEAR

APPLICATION:
BIOGAS UPGRADING
SYSTEM TO CREATE A
METHANE STREAM AND
A CO_2 OFF-GAS STREAM.

FOR MORE INFORMATION:
CONTACT US OR VISIT BIOGAS.PENTAIR.COM

PENTAIR

Marinus Dammeweg 30 | 5928 PW, Venlo | The Netherlands

Snaremosevej 27 | 7000 Fredericia | Denmark

2361 Mason Ave | Daytona Beach, Fl 32117 | United States