INNOVATION
FOR A GREEN FUTURE

BIOGAS WIPPTAL

Biogas Wipptal goes green

In 2017, Biogas Wipptal succeeded in implementing several innovative engineering steps in the biogas plant's processing sequence. This highly modern plant is thus now able to convert livestock wastes and a portion of the fermentation residues into high-quality organic fertilizers. It thus made an important contribution to solving the problem of the overabundance of nutrients.
Biogas Wipptal is continuing to fulfill its role as leader in this area and is strengthening its focus on sustainability and progress. In conducting its current project for the production of organic LNG (Liquid Natural Gas) and liquid CO_2, Biogas Wipptal is acting as a vanguard in the promotion of these developments. It is not only clearing the way for the use of modern and ecological forms of propulsion in the field of heavy goods transportation, but also helping to secure the reliable supply of food-grade liquid CO_2 for regional companies. For the first time, a highly modern biogas upgrade system is being established in the community of Pfitsch near Sterzing (South Tyrol). This allows the ecological cycle of the biogas installation to be intelligently completed and resources to be used in an optimal way.

"Nothing that is against Nature will endure."

Charles Darwin

VISION

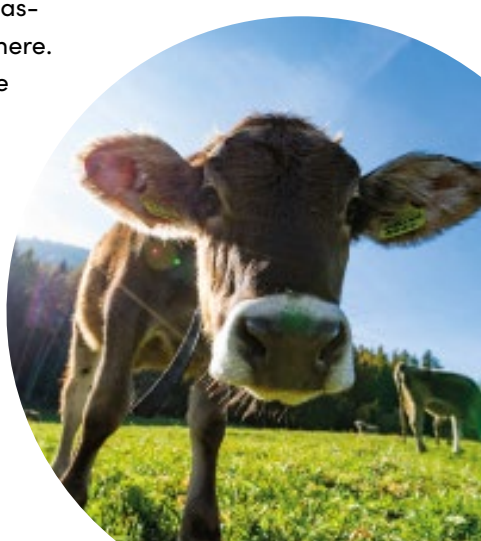
WHY BIOGAS PLANTS ARE IMPORTANT FOR OUR ENVIRONMENT

Statutory regulations establish the maximum number of animals (livestock units) allowed in a given operation. This clear limitation of mass animal husbandry is intended to prevent the over-fertilization of the soil. Especially in mountainous areas, steep slopes make it difficult to evenly distribute agricultural nutrients. The over-fertilization of steep pastureland can also increase the danger of landslides. Studies show that the nitrate contamination of land in the vicinity of farmsteads is higher than elsewhere. This leads to elevated nitrate concentrations in the groundwater and can present a hazard to human health.

Biogas Wipptal processes only farmyard wastes and liquid manure. No plant (e.g., grains) is processed here. Furthermore, throughout the biogas installation's service area, no preventative medicines or other substances having physiological effects are introduced into the livestock feed. Medicines are used only for therapeutic purposes and only by authorized veterinarians.

GASES FROM BOVINE MANURE AND THEIR UTILIZATION

Livestock waste and liquid manure generate such greenhouse gases as methane and CO_2; when the wastes are deposited on pastureland, these gases are allowed to escape into the atmosphere. Biogas plants can capture and utilize these gases to generate electrical and thermal energy in so-called modular cogeneration plants. Here, too, Biogas Wipptal is a technological trailblazer. Using the latest membrane technology, it extracts the methane and CO_2 from the biogas. These two highly pure gases then undergo complicated processing to produce liquefied methane (LNG) and carbon dioxide. The energy needed to do this can be obtained from the plant's own biogas generator in a CO_2-neutral fashion.



EU – PROGRAM FOR ENVIRONMENTAL AND CLIMATE PROTECTION

Life+ is a **program** of the European Union to support projects in the area of **environmental, nature, and climate protection**. The underlying environmental problem which led to the idea of the Wipptal Biogas Project was the **excessive emission of substances from animal husbandry** in the **soil** and **atmosphere** in the Wipp Valley. The Life+OPTIMAL Project implemented **innovative approaches** to solve this problem. The **excessive deposition of livestock waste and liquid manure**, deposition at **unsuitable times** and **near bodies of water**, and the use of **unsuitable vehicles** resulting in uneven distribution or excessive deposition likewise contribute to these **environmental problems.**

Supported Project by EU Life+
LIFE12 ENV/IT/000671
OPTIMAL - **OPTI**mized nutrients **MA**nagement from **L**ivestock production in Alto Adige

BIOGAS WIPPTAL AND THE LIFE+ PROGRAMM

The goals of the project funded by the E.U. in the framework of the LIFE+ Program were as follows:

- **Introduction** of an **environmentally compatible syste**m for the treatment of livestock waste and liquid manure from an anaerobic fermentation plant
- **Reduction** of the **nitrogen and nitrate pollution** per hectare of agricultural land
- **Reduction** of **greenhouse emissions** through the substitution of organic/mineral fertilizers for industrial fertilizers
- **Reduction** of **ammoniac emissions**

The following concrete measures were implemented in the framework of the LIFE+ Program:

- **Construction** and commissioning of the **treatment plant for fermentation residues**
- **Manufacture** of high-quality **fertilizer products**
- **Trial use** of the **products** in other parts of the region
- **Testing** to determine if the expected **results** are achieved
- **Realization** of the prototype of the **deposition system**
- **Dissemination** of the **findings** and **proof of the effectivity** of this innovative system

PARTNERS:

CANTINA TRAMIN KELLEREI

UNIVERSITÀ DEGLI STUDI DI TORINO

ZUNHAMMER GÜLLE-TECHNIK

unibz

FACTS

WHAT OUR BIOGAS PLANT CAN DO:

Annual **processed quantity** of **livestock waste** from dairy operations amounting to 150,000 tons, 40% **bovine waste** and 60% **bovine liquid manure**.

Organic Bio-fertilizers produced

30,000 tons in **liquid form** (concentrate).

5.000 tons in **solid / pelletized form** *(so-called "Biwi" bio-pellets)*

Natural carbon dioxide

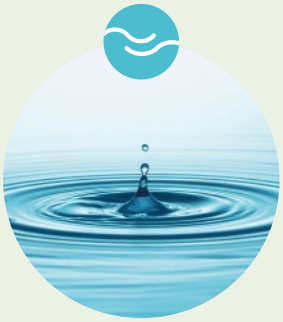
7,000 tons per year of food-grade liquid CO_2.

Green Bio-LNG Fuel

4,000 tons of liquefied organic methane (LNG) per year.

Purified, clean water

The extraction of water from the livestock waste yields 40,000 tons per year of pure water which is then discharged into the Pfitsch Brook.



TECHNOLOGY

BIOGAS WIPPTAL EMPLOYS UNIQUE TECHNOLOGY FOR THE MANUFACTURE OF ORGANIC FERTILIZER

Biogas plants are important for the local agricultural sector. They process livestock waste and liquid manure in a fermentation process to yield fertilizer. The over-fertilization of farmland can thus be avoided and precious groundwater protected. In contrast to other biogas companies, Biogas Wipptal purifies the water derived from the fermented liquid manure by means of a unique reverse-osmosis system; the resultant water is so pure that it can be safely discharged into a nearby stream. The resultant concentrate represents a valuable liquid fertilizer suitable for agricultural use. The solids derived from the fermented residues are used to produce certified organic fertilizer pellets (so-called “Biwi” bio-pellets). Another fraction is used to make liquid fertilizer (Wicon Concentrate).

FUTURE-ORIENTED PROCESSING OF THE BIOGAS TO YIELD BIO-LNG AND ECO-FRIENDLY CO_2

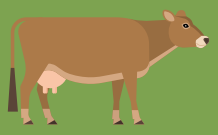
The biogas derived from the fermentation of the raw materials is then sent to the “upgrading” plant. In the first stage of this plant, the biogas is purified of contaminating particles and undesirable gases (e.g., sulfur compounds). In further processing stages, the pressure of the biogas is increased so that it can be separated into its chief components – methane (CH_4) and carbon dioxide (CO_2) – in a 3-stage process using special membranes.

The methane thus obtained is then purified in a further process until a purity of more than 99% CH4 is achieved. The bio-methane is then liquified. Using a 3-stage compressor, the bio-methane is brought down to a temperature of -163 °C. The gas is thus converted into LNG (Liquified Natural Gas) which requires only one six-hundredth the storage volume. This bio LNG is storage in special cryogenic storage tanks for later use in heavy truck transportation. For this purpose, Biogas Wipptal maintains a filling station directly on its premises. Alternatively, the bio LNG can also be sent by tank truck to other filling stations.

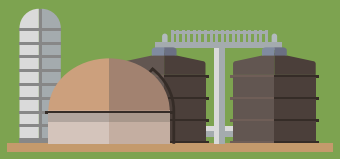
The CO_2 obtained from the “upgrading” process must likewise be purified so that it meets the requirements of the foods industry. To do this, a special analytical unit guarantees that the gas purity is under constant supervision. Using a compressor, the CO_2 is brought down to a temperature of -80 °C and thus liquified, facilitating transport.

How the Wipptal biogas plant works

COLLECTION OF LIVESTOCK WASTES AND LIQUID MANURE



Trucked by special vehicles

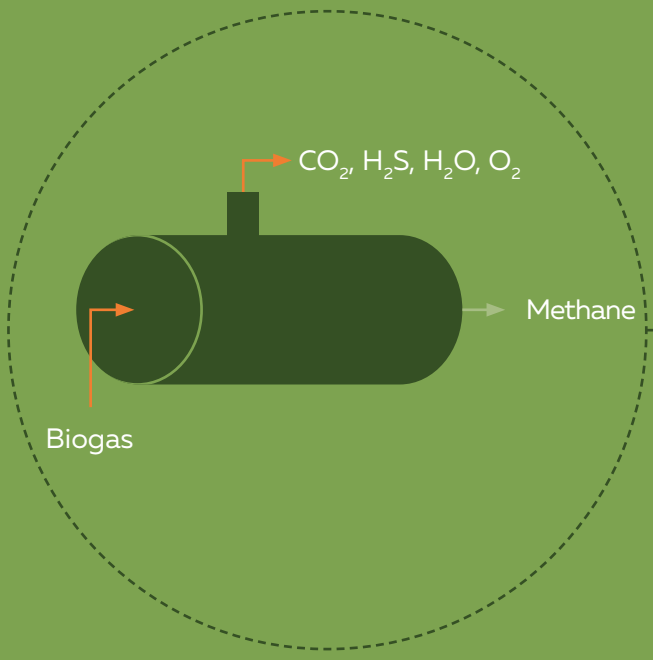


WIPPTAL BIOGAS PLANT

Fermentation of biogas

Separation

Project LIFE12 ENV/IT/000067
LIFE-OPTIMAL2012
OPTImised nutrients
MAnagement from Livestock
production in Alto Adige



Biogas separation „upgrading"

Methane (CH4), gaseous

Liquefacti

CO_2, gaseous

Purification using membrane technology

Pressure liquefacti

Returned to suppliers

PASTURELAND AND MEADOWS

SOLIDS → Drying → Pelletization → ORGANIC BIO FERTILIZER PELLETS

Concentrate

WINE-GROWING, FRUIT-GROWING, HORTICULTURE

LIQUIDS → Membrane technology

PURIFIED WATER

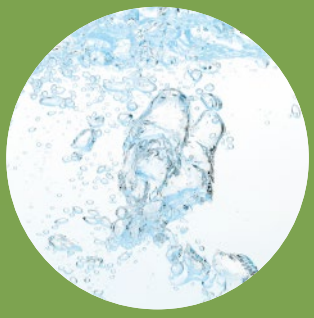
RETURNED TO SUPPLIERS

on → BIO-LNG

GAS STATIONS

PFITSCH BROOK

on → NATURAL CARBON DIOXIDE



BEVERAGE AND FOODS INDUSTRY, DRY ICE

EXEMPLARY ENVIRONMENTAL PROTECTION

HOW WE WILL HELP LOWER GLOBAL CO_2 EMISSIONS

In order to limit the global increase in temperature to 1.5 °C, no more than 355 gigatons of CO_2 can be allowed to enter the atmosphere on a worldwide basis. That is an ambitious goal. At present rates, this CO_2 budget will be exhausted in only eight years. The European Union has clearly announced its goal to promote decarbonization and supports Biogas Wipptal in its battle against CO_2 released due to the burning of fossil fuels.

All in all, **Biogas Wipptal** has the capacity to **reduce CO_2 emissions** by about **19,700,000 kg per year** – chiefly in the agricultural sector and in transport.

This corresponds to 6,350 hectares of forests in the Wipp Valley or 3,500,000 trees that would have to be planted in order to absorb this quantity of carbon dioxide.

5,000,000 KG LESS CO_2

Emissions thanks to reduced **DEPOSITION** of livestock waste and liquid manure on fields

The reduced deposition of livestock waste and liquid manure on fields avoids about five million kg of CO_2 emissions per year.

+

3,500,000 KG LESS CO_2

Emissions through the use of **ORGANIC FERTILIZER**

With its ORGANIC FERTILIZERS derived from natural sources, Biogas Wipptal can help reduce the need for synthetic fertilizers produced from ammonia. This yields a potential savings of up to 3,500,000 kg of CO_2 annually.

+

11,200,000 KG LESS CO_2

Emissions from the burning of fossil fuels thanks to **ORGANIC LNG**

The production of approx. 11,000 kg of ORGANIC LNG per day makes it possible to fuel about 130 trucks in a CO_2-neutral fashion. The average truck is responsible for emissions of about 718 grams per km. Given a mean mileage of 120,000 km per year, this means that roughly 86,160 kg/year of CO_2 are released into the atmosphere by each truck fueled with fossil energy sources. Assuming that 130 trucks switch to the use of organic LNG, this can avoid about 11,200,000 kg of fossil CO_2 emissions annually.

MINUS 19,700,000 OF KG CO_2 PER YEAR

All in all, **Biogas Wipptal** has the capacity to **reduce CO_2 emissions** by about **19,700,000 kg** per year – chiefly in the agricultural sector and in transport.

BIWI BIO-PELLETS

Biwi Bio-Pellets are rich in plant nutrients. Fermented cattle manure is hence extremely well-suited for use as a fertilizer. Our grandparents knew this. Because of the pungent odor of this fertilizer, many farmers have foregone the use of this valuable source of plant nutrients. Now we have the solution!
On the basis of their origin and the sustainable production process, Biwi Bio-Pellets are officially certified organic fertilizers. More information at: www.biwi.it

Areas of use:
Biwi Bio-Pellets are especially well-suited for use in specific applications, e.g., for balcony flower boxes, in public green areas, flower beds, vegetable gardens, horticultural undertakings, and in large-scale fruit orchards and vineyards.

SUITABLE FOR BIO AGRICULTURE
REG. NO. 0029096/20

VEGETARIAN COMPLIANT PRODUCT

The name BayWa stands for innovation and sustainability. Our commitment to regenerative energies and the protection of natural resources underscores this fundamental idea. And that's why we evaluate our suppliers not only on the basis of the quality of their products, but also upon the way they manufacture them. With its organic fertilizer and an especially future-oriented concept, Biogas Wipptal fulfills all of these prerequisites.

Biwi Bio-Pellets made by Biogas Wipptal result in no leaching of nutrients (e.g., nitrates), and thus protect the groundwater and also the quality of bodies of water like streams and rivers. Besides this valuable contribution to environmental protection, Biwi Bio-Pellets also enhance the humus content of the soil and thus promote the soil's own ability to store CO2 and vitalize soil organisms. Biwi Bio-Pellets are extremely well-suited for use in the areas of viticulture (wine-growing), fruit-growing, and horticulture.

JOSEF MARTIN BAUER
Head of Horticultural Consulting
BayWa AG

BIO ORGANIC FERTILIZERS

Organic fertilizer pellets and liquid fertilizers are rich in plant nutrients. Fermented cattle manure is extremely well-suited for use as a fertilizer. Our grandparents knew this. Because of the pungent odor of this fertilizer, many farmers have foregone the use of this valuable source of plant nutrients. Now we have the solution!
On the basis of their origin and the sustainable production process, the pellets of fertilizer that BIWI makes are officially certified organic fertilizers. More information at: www.Biwi.it

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JOSEF MARTIN BAUER
Head of Horticultural Consulting
BayWa AG

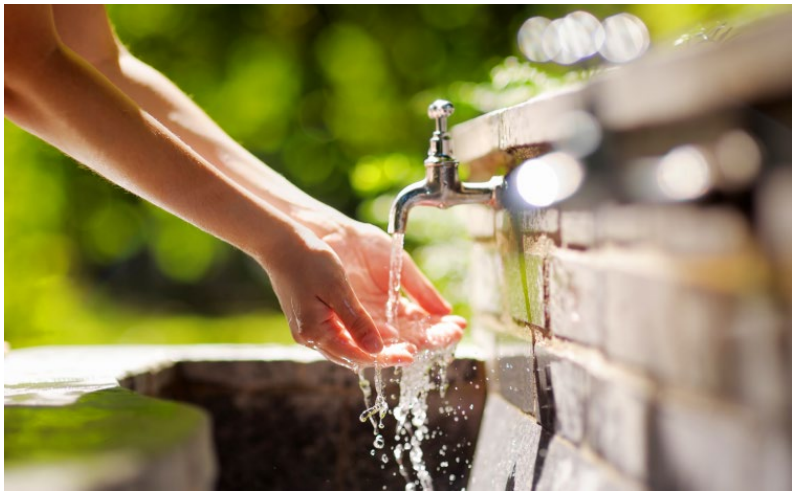
WICON CON-CENTRATE

Wicon Concentrate is a quick-acting fertilizer which is worked into the soil using special agri-cultural equipment. It is odorless, does not burn the turf, and is entirely free of viscous components. The low water content of this liquid fertilizer has a favorable impact on the cost of shipping it to distant locations. Because it is worked into the soil using special equipment, none of the valuable nutrients are lost to wind.


UNHAMMER
HAMMER
LLE-TECHNIK

INNOVATIVE WATER TREATMENT

Farmyard waste and liquid manure have a high water content. Biogas Wipptal has integrated an innovative system capable of extracting this water and purifying it. SLURLESS 100 is an innovative installation capable of treating both direct and also modified livestock waste and contaminated water. The method is based on a series of mechanical separation and concentration steps involving solids separation and reverse osmosis. The result is clean water that is suitable for discharging into surface waters.



The Italian Biogas Consortium recommends that its members rely upon natural and environmentally safe production processes. The project of Biogas Wipptal fulfills this recommendation insofar as it takes ecological concerns into consideration down to the last detail. The integration of a water treatment plant for the purification of the permeate extracted from the barnyard wastes and liquid manure is so effective that the resultant water can be safely discharged into surface waters. As an agronomist, I can only emphasize the commitment of the plant operators to find and use innovative and integrated environmental protection technologies.

GUIDO BEZZI
Head of the Agricultural Activities Division of the Italian Biogas Plant Consortium (CIB)

BIO-LNG

THE ECO-FUEL WITH A HIGH POTENTIAL

Air pollution and greenhouse gas emissions are global problems which can be solved through the use of new, sustainable technologies to make freight shipment more ecologically compatible. With organic LNG (Liquefied Natural Gas), we can now optimally exploit the ecological advantages of methane gas, the environmentally safest fuel for internal combustion engines:

1. Improved air quality by means of virtually zero emissions (70% less nitrous oxides, 99% lower air-borne soot, 90% lower methane-free HC than demanded by the Euro VINorm)
2. Positive influence on global warming by the considerable reduction of CO_2 emissions (about 15% lower than a comparable diesel vehicle, up to 95% lower when fuelled with organic methane)
3. Enormous noise reduction for the delivery of goods in urban centers and at night

The emission balance and the resultant CO_2 footprint for the production of LNG is often underestimated. That's because it is possible to actually achieve a virtually CO_2-neutral fuel only by means of ecological production.
The bio-methane is brought down to a temperature of -164 °C and thus liquified using a 3-stage compressor. This makes it possible to forego the use of any additional refrigerants.

Areas of use:

- Fuel in heavy transport (3.5 tons and more) and in transportation by ship

In the coming years, environmentally compatible mobility will play an ever greater role throughout the country. For individual mobility, gaseous organic methane represents an ecological "bridge technology" to reduce air pollution in urban areas. But for heavy transportation, the fuel of the future – as an alternative to diesel – will be liquefied biogas (LNG) and renewable liquid organic methane. Biogas Wipptal's project, which targets the production of 11 tons of liquefied biogas per day, is totally in keeping with that, and can make a significant contribution towards the decarbonization of the transport sector.

LORENZO MAGGIONI
Head of the R&S Division of the Italian Biogas Plant Consortium (CIB)

Climate change demands that we go new ways economically to attain sustainable operating methods and conform to climate policies. With regards to economic activities in mountainous areas, this means closing the fertilizer management cycle. The processing of agricultural wastes to produce sustainable fertilizer products as Biogas Wipptal is doing it represents a major contribution.
The resultant biogas – a sustainable, renewable source of raw materials – can also be efficiently used (with new technologies in the transportation sector and especially the area of heavy freight) as a sustainable fuel, either as liquefied biogas (LNG) or as "green" hydrogen. The enables emissions of pollutants and CO_2 to be minimized, and fulfills all the requirements of climate protection. CO_2 from biogas is climate-neutral since it is derived from renewable sources and not from fossil fuels.

DR. WALTER HUBER
Environmental and hydrogen expert

NATURAL CARBON DIOXIDE

IN FOOD GRADE

This gas is colorless, odorless, tasteless, and non-flammable but is employed in environmentally neutral ways in the most-varied industrial areas and in households. Thanks to the use of the latest technologies, the highly purified liquefied carbon dioxide derived from the biogas fulfills the quality standards of international beverage and food manufacturers. The possible applications of highly purified, liquefied CO_2 range from the production of carbonated soft drinks, the enrichment of the air in greenhouses to accelerate photosynthesis, all the way up to the production of dry ice.

Areas of use:

- **Beverage industry:** additive and carbon dioxide
- **Food sector:** Antiseptic effect
- **Water treatment:** pH value neutralization
- **Plant husbandry:** Supporting photosynthesis
- **Cooling freight:** Dry ice as a natural coolant
- **Wine production:** cold maceration, and oxidation protection

Nowadays, the term "CO_2" is familiar to all, but not chiefly in a positive sense. We here at Tyrol Ice GmbH use highly pure CO_2 in liquid form on a daily basis for our customers in wine production and the foods sector.

Up until now, we were forced to choose between environmentally questionable, chemically produced CO_2 from Italy or natural CO_2 from distant Hungary. With its first natural CO_2 source in the Alpine region, Biogas Wipptal released us from this conundrum. In the future, we will now be able to forego the use of CO_2 from ammonia production or lengthy, environmentally unsound transports. Biogas Wipptal has thus not only given all CO_2-processing companies in the region a competitive advantage, it has also made an important contribution for a healthy environment.


ECOMAX
linea BIO


BIOGAS
WIPPTAL

SO CLOSE – IN THE HEART OF EUROPE

Biogas Wipptal is located near Sterzing in the Wipp Valley, not far from the Brenner Pass and the Austrian-Italian border. The direct connection to the main traffic arteries between Germany, Austria, and Italy permits short shipping times and allows such cities as Munich, Zurich, Milan, and Bologna to be reached in less than 3 hours by car. In keeping with its commitment to environmental protection, Biogas Wipptal will soon be operating its own LNG fuelling station and expanding its motor pool with LNG-fuelled trucks. The nearby ROLA charging station offers additional incentives for sustainable freight transport from and to Sterzing.

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