

Sustainable and innovative material cycles for a brighter, greener future



biwi

Landwirtschaft fürs Klima
Agricoltura per il clima



biwi

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.

biwi is continuing to fulfill its role as leader in this area and is strengthening its focus on sustainability and progress. With the current project, the name Biogas Wipptal was changed to biwi. With the production of organic LNG (Liquid Natural Gas) and liquid CO₂, biwi 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 CO₂ 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

100% RECYCLING

The goal of the European Commission is to reduce net greenhouse gas emissions by 55% in the areas of climate, energy, land use, and transportation by the year 2030. This is an enormous challenge for all areas of society. A biogas plant can make a large regional contribution to the achievement of these goals.

A facility of this kind – embedded in a regional recycling system – should contribute, inter alia, to the decarbonization of local dairy farms and the reduced contamination of the soil with nitrates. Additionally, the processing of the commercial goods should lead to 100% recycling.

biwi has achieved comprehensive benefits for both the agricultural sector and with regards to the use of CO₂-neutral fuels by society as a whole.



biwi 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.

REGIONAL EFFECTS

By processing solid livestock waste and liquid manure, associated greenhouse gas emissions (e.g., methane and CO₂) can be significantly lowered beginning right at the level of animal husbandry. The deposition of the fermented material onto meadows and fields reduces nitrate contamination and ammonia emissions.

The fermented material should be subjected to further processing for utilization as high-quality fertilizer in such areas as agriculture and fruit and vegetable growing. The resultant biogas is a regenerative energy medium which is purified in various stages so that, ultimately, organic methane and purified CO₂ are obtained. These two valuable gases represent CO₂-neutral products which can be re-introduced to the regional economy.



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**. Biogas Wipptal was supported by the EU through the LIFE OPTIMAL2012 program from 2013 to 2020.



Supported Project by EU Life+
LIFE12 ENV/IT/000671
OPTIMAL - OPTimized nutrients MAagement
from Livestock 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** system 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
KELLERER



UNIVERSITÀ
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DI TORINO


ZUNHAMMER
GÜLLETECHNIK

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**.



New water

50 million liters of water – the annual consumption of an entire village.



Organic fertilizers – derived from organic wastes

For roughly a third of the fruit orchards under cultivation in South Tyrol. Agriculture supporting agriculture.



Biogenic carbon dioxide

From the heart of the Alps – for a billion liters of mineral water.



Organic methane derived from regenerated waste

For 16 million kilometers of driving utility vehicles with a neutral CO₂ balance.

Technology

THE VALUE OF BIOGAS PLANTS

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 resources protected. In contrast to other biogas companies, biwi 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 (biwi bio-pellets). Another fraction is used to make liquid fertilizer (wicon Concentrate).



THIS IS HOW BIO-METHANE IS PRODUCED

The biogas derived from the fermentation of the raw materials is then sent to the “upgrading” plant. In the first stage of this facility, 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 (CH₄) and carbon dioxide (CO₂) – in a 3-stage process using special membranes.

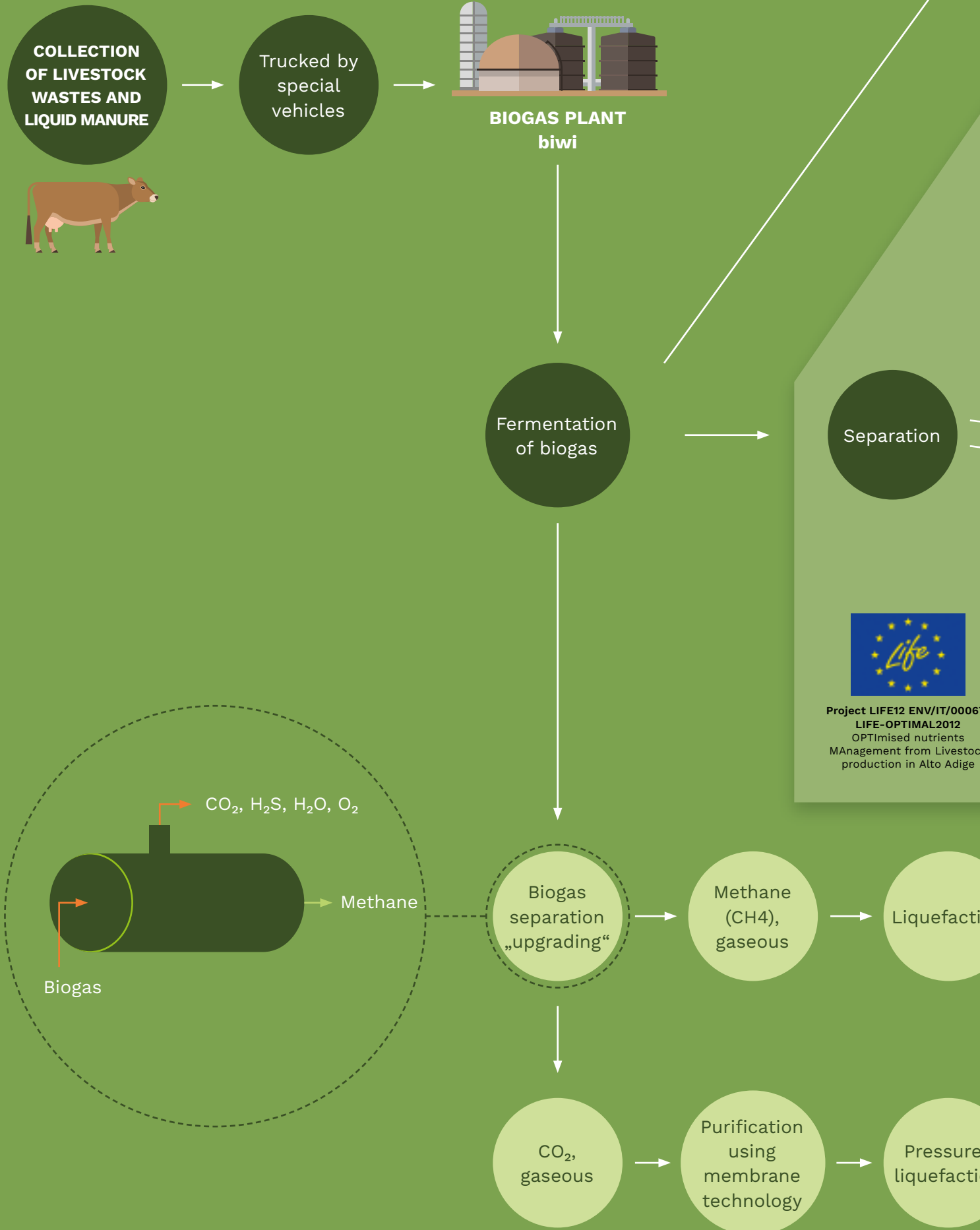
The methane thus obtained is then purified in a further process until a purity of more than 99% CH₄ is achieved. The bio-methane is then liquified. Using a 3-stage compressor, the

bio-methane is brought down to a temperature of -163 °C. The gas is thus converted into LNG (Liquefied Natural Gas) which requires only one six-hundredth the storage volume. This bio LNG is stored in special cryogenic storage tanks for later use in heavy truck transportation.

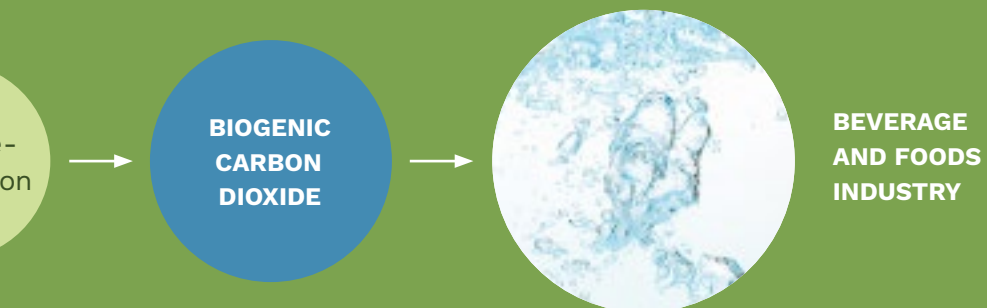
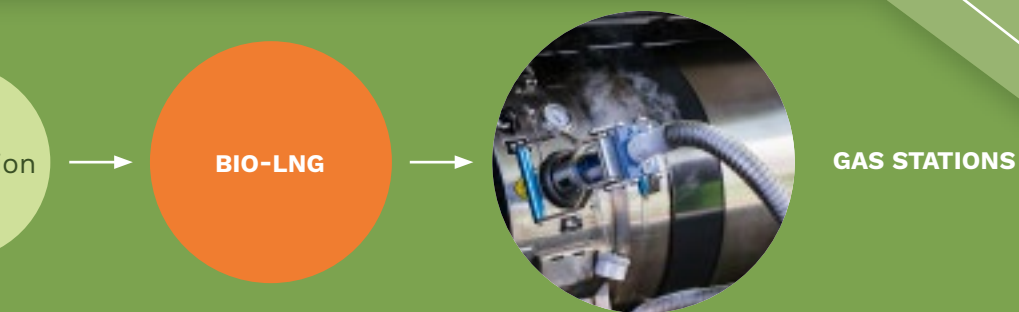
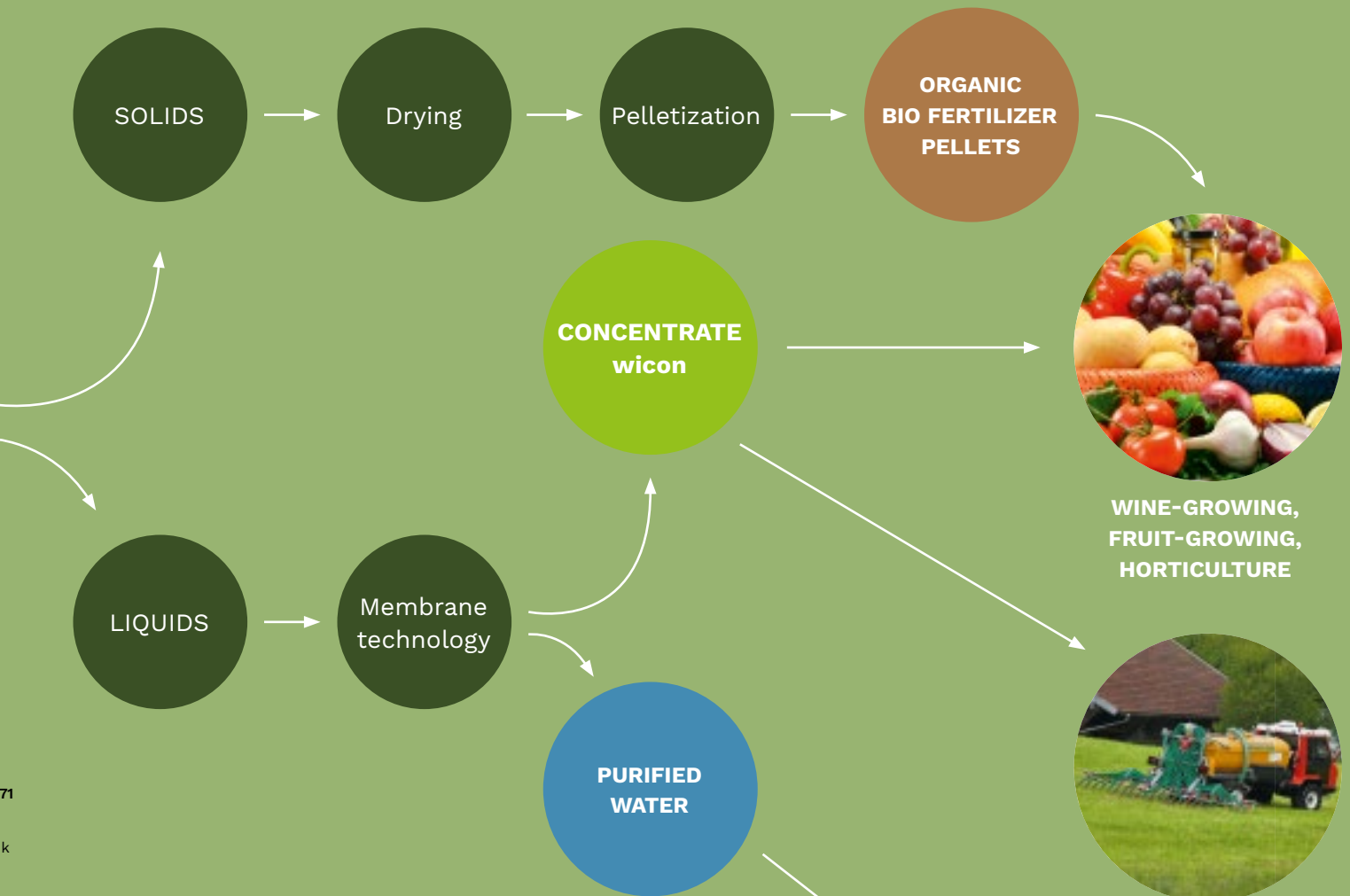
The CO₂ obtained from the “upgrading” process must likewise be purified so that it meets the requirements of the foods industry. To do this, a special analytical unit guarantees that the gas purity is under constant supervision. Using a compressor, the CO₂ is brought down to a temperature of -30 °C and thus liquefied, facilitating transport.



HOW biwi WORKS



Project LIFE12 ENV/IT/0006
LIFE-OPTIMAL2012
OPTImised nutrients
MANagement from Livestoc
production in Alto Adige

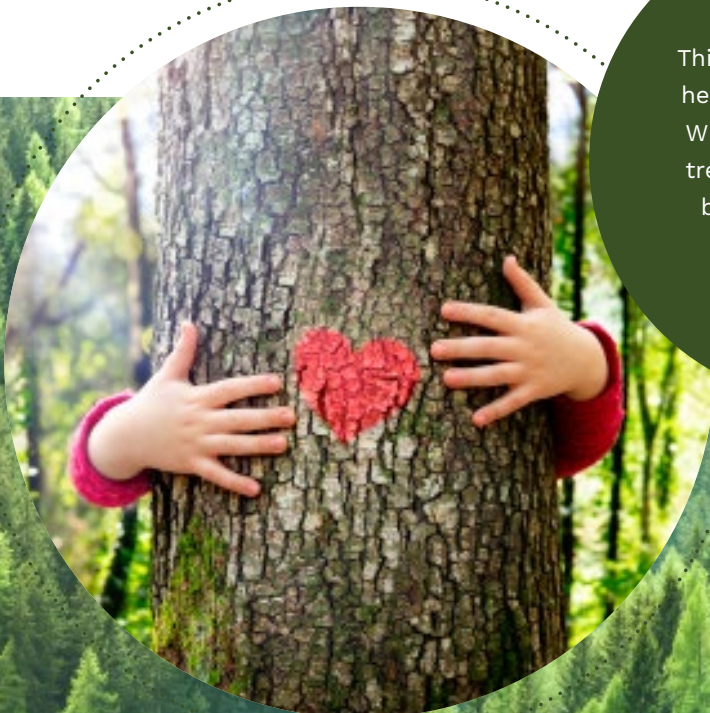


Exemplary environmental protection

HOW WE WILL HELP LOWER GLOBAL CO₂ EMISSIONS

In order to limit the global increase in temperature to 1.5 °C, no more than 355 gigatons of CO₂ can be allowed to enter the atmosphere on a worldwide basis. That is an ambitious goal. At present rates, this CO₂ budget will be exhausted in only eight years. The European Union has clearly announced its goal to promote decarbonization and supports biwi in its battle against CO₂ released due to the burning of fossil fuels.

All in all, **biwi** has the capacity to **reduce CO₂ 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 CO₂**

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 CO₂ emissions per year.



**3,500,000 KG
LESS CO₂**

Emissions through
the use of
**ORGANIC
FERTILIZER**

With its organic fertilizers derived from natural sources, biwi can help reduce the need for synthetic fertilizers produced from ammonia. This yields a potential savings of up to 3,500,000 kg of CO₂ annually.



**11,200,000 KG
LESS CO₂**

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 CO₂-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 CO₂ 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 CO₂ emissions annually.

**MINUS 19,700,000
OF KG CO₂ PER YEAR**



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.





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, biwi fulfills all of these prerequisites.

biwi Bio-Pellets 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



wicon Concentrate

wicon Concentrate is a quick-acting fertilizer which is worked into the soil using special agricultural 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.





Innovative water treatment

Farmyard waste and liquid manure have a high water content. biwi 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 new water that is suitable for discharging into surface waters.

By draining the cattle
manure, 50,000
tons of pure water
are returned to the
Pfifischer Bach
every year.





The Italian Biogas Consortium recommends that its members rely upon natural and environmentally safe production processes. The project of biwi 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.

The fermentation of livestock waste and liquid waste in the biwi plant yields biogas. In a purification process, the biogas is then separated into bio methane (CH₄) and carbon dioxide (CO₂). In a subsequent step, the bio-methane is then liquefied at a temperature of -163 °C. This is done in a 3-stage compressor, thus obviating the need for additional refrigerant. The resultant bio LNG is stored in special cryogenic storage tanks for later use in heavy truck transportation.

Areas of use: Fuel in heavy transport (3.5 tons and more) and in transportation by ship.



Improved air quality by means of virtually zero emissions.



The emission balance and the resultant CO₂ footprint for the production of LNG is often underestimated. That's because it is possible to actually achieve a virtually CO₂-neutral fuel only by means of ecological production.



Positive influence on global warming by the considerable reduction of CO₂ emissions. Thus, a truck fuelled with LNG of fossil origin releases approx. 15% less CO₂ than a truck with a comparable diesel engine. And when using bio LNG, CO₂ emissions can be reduced by up to 95%.



Enormous noise reduction for the delivery of goods in urban centers and at night.



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. biwi'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 biwi 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 sec-

tor and especially the area of heavy freight) as a sustainable fuel, either as liquefied biogas (LNG) or as “green” hydrogen. This enables emissions of pollutants and CO₂ to be minimized, and fulfills all the requirements of climate protection. CO₂ from biogas is climate-neutral since it is derived from renewable sources and not from fossil fuels.

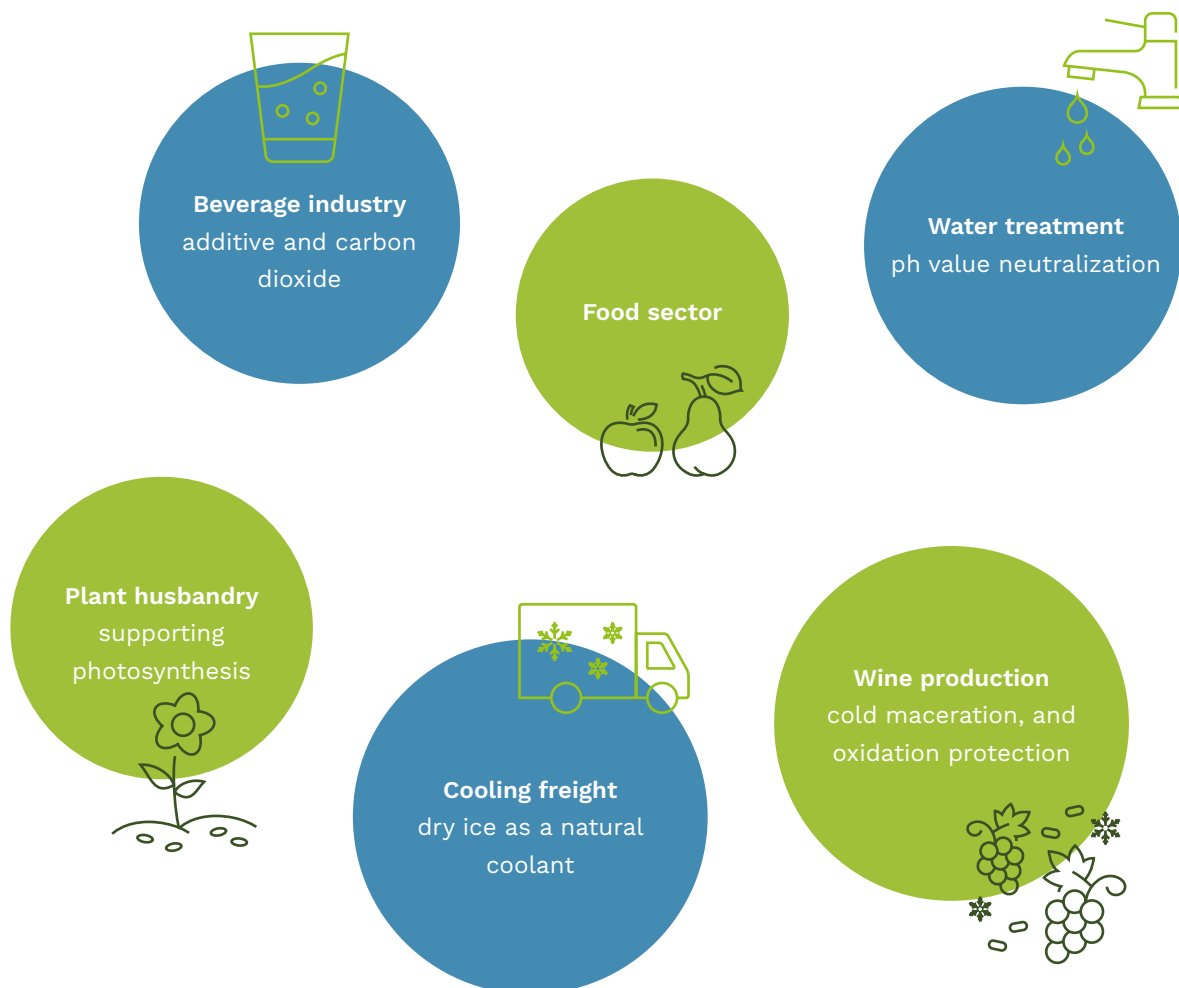
Dr. Walter Huber

Environmental and hydrogen expert

Biogenic 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 CO₂ 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.





Nowadays, the term “CO₂” is familiar to all, but not chiefly in a positive sense. We here at Tyrol Ice GmbH use highly pure CO₂ 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 CO₂ from Italy or natural CO₂ from distant Hungary. With its first natural CO₂ source in the Alpine region, biwi released us from this conundrum. In the future, we will now be able to forego the use of CO₂ from ammonia production or lengthy, environmentally unsound transports. biwi has thus not only given all CO₂-processing companies in the region a competitive advantage, it has also made an important contribution for a healthy environment.

So close in the heart of Europe

biwi 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, biwi 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.

