
blueFLUX
H2
New level of natural circular economy
Creating value out of all kind of organic waste

ABOUT US …

Holzner Druckbehälter GmbH and PROEMTEC Behnke Präzisionstechnik GmbH developed the blueFLUX process from 2013 to 2020 and founded blueFLUX Energy AG in 2020 as a spin-off to create the right platform for this forward-looking technology.

Our technology is unique. It is currently the world's most efficient solution to produce green hydrogen from organic residues.

Whether sewage sludge, liquid manure, wood and green cuttings, fermentation residues or food waste with plastic packaging residues: Any type of organic residue, with a plastic content up to 30%, can be converted into synthetic coal, biochar, synthesis gas, green hydrogen, biomethanol and biomethane using our patented plant technology.

Our focus here is on the processing of organic residues into synthetic coal, synthesis gas and green hydrogen.

GREEN HYDROGEN OUT OF ORGANIC WASTE

blueFLUX H2 is a highly innovative new type of plant type developed and manufactured by blueFLUX Energy AG. The plants convert organic wastes from agriculture, municipalities and industry (with a plastic content of up to 30%) into the high-quality energy carriers synthetic coal, biochar, synthesis gas, green hydrogen, biomethanol and biomethane within a few hours and at competitive cost.

economical - sustainable – CO_2-neutral

COMPANY PURPOSE

MISSION

bring waste-to-value on a new level

produce green H_2 for less than 3 € / kg

reduce the CO_2 pollution

VISION

green H_2 energy affordable for EVERYONE

100 % replacement of fossil fuels

global market leader with a disruptive technology for production of green H_2

OUR VALUES – OUR MOTIVATION

blueFLUX® H_2

Synthetik char

Bio-char

Green Hydrogen

Green Syngas

Bio-methanol

Bio-methan

OPPORTUNITIES

German high-tech company

Decentralized approach

innovative H_2 production technology

2-4 € / kg green H_2

fast ROI

cost efficient

patented

game changing technology

conversion-rate of 65 % with hydrolysis

disposing of wet & dry materials

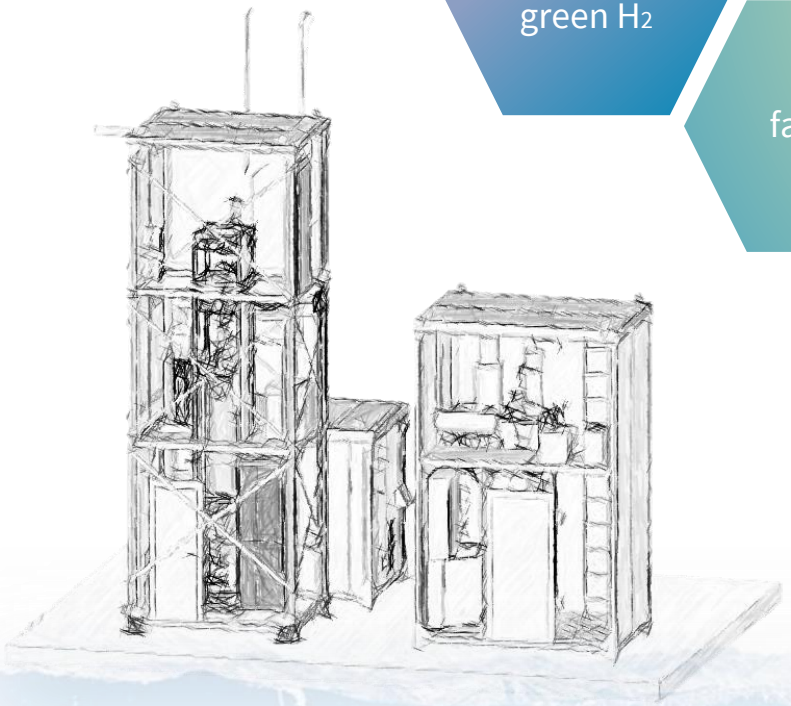
no presorting

solution for disposal problem

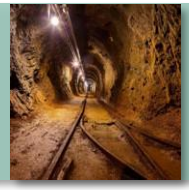
Waste-to-Value

Alternative to electrolysis

Our focus- we transform biological waste to H_2



WITH blueFLUX INTO THE FUTURE

	PREHISTORY		PRESENT TIME		FUTURE
Agriculture/ Nutrition		Hunting and farming on small farms. Regional and natural circular economy.		The intensive agriculture on large areas relies on maximum yield. The soil is leached out and harmful fertilizers are used.		Cyclical agriculture: soil improvement through the application of coal and phosphorus.
Mobility		Getting around by horse, ox cart and on foot.		The fossil raw materials of our earth are massively mined and consumed by cars, trains and airplanes.		Mobility with green H_2 is environmentally neutral. Decentralized solutions for waste disposal – less transport traffic.
Climate		CO_2 is bound again. Climate improvement through decarbonization.		Life-threatening increase in CO_2 in the air ozone layer and oceans. Climate change is in full swing.		No CO_2 excess problem. Natural cycle through the utilization of organic material and plant growth.
Disposal		Organic waste from cities and agriculture is converted into energy in an environmentally friendly and emission-free manner, making it a new resource.		With industriialization, cities are getting bigger. Disposal of generated waste is becoming an increasing problem.		Organic waste is recycled and fed back into the natural cycle.
Energy		Energy sources are sun, wind, wood, fire and water.		The affluent society is rapidly consuming our planet´s resources.		Sustainable energy sources are obtained from organic residues. Waste-to-Value

WHAT MAKES US SPEZIAL

Anton Oswald
Farmer

“Of course, it would be ideal if I had such a recycling plant where I could turn the waste into electricity and gas. Simply get energy out of the company and give it back to nature. Combining tradition and innovation that doesn't stand still."

Rene Kircher
Head of hydrogen – Total Deutschland GmbH

“We have been building and operating hydrogen filling stations since 2002 and, of course, we are interested in the fact that hydrogen can be produced from renewable energy if possible, for example in the concept of the blueFLUX hydrogen system. It's an immense added value. In this way we are contributing to reducing CO2 and creating a WIN-WIN situation."

Josef Steigenberger
Mayor Bernried am Starnberger See (a.D.)

“If you look at other countries today, for example, a filling station network from Munich to Verona for hydrogen vehicles is already planned. So far there have only been large fossil fuel refineries. But green hydrogen can now be produced cheaply and in an environmentally friendly manner - that would have to be learned first."

Andrea Jochner-Weiß
Chief District Administrator – Landkreis Weilheim Schongau

“There must be more incentives in big politics to support these modern new innovative technologies. I am proud that we have such companies with us that give so much thought to it and develop such projects."

Dr.-Ing. Nina Thiel
Project Engineer - bifa Umweltinstitut GmbH

“Especially about the European waste hierarchy, the blueFlux process is to be classified as material recycling as a priority over energetic recycling and disposal, because green hydrogen is generated and can thus substitute other fossil fuels. Processes like blueFLUX save resources elsewhere, from which the fabrics would otherwise have to be made."

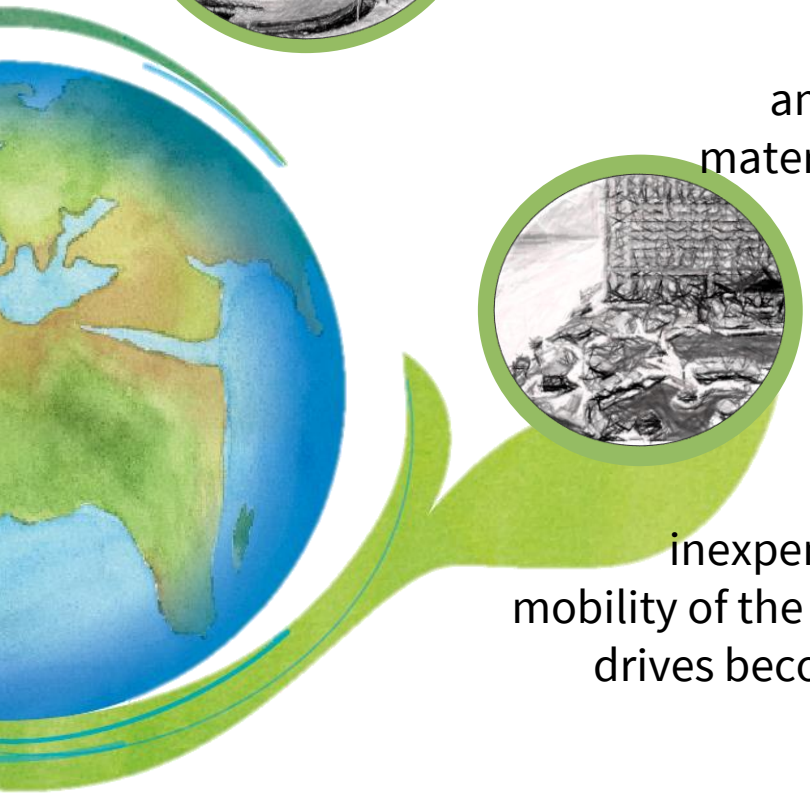
CHALLENGES OF THE APPLICATION AREAS

Political and economic framework conditions massively restrict **agriculture**, e.g., the European fertilizer ordinance, falling prices for their products or the ongoing discussion of EEG funding for biogas plants. Excess energy from photovoltaic systems can no longer be used profitably and soils are depleted through extensive cultivation over many years.

The **disposal** of organic waste is becoming more and more difficult due legal requirements. However, according to a report by the World Bank, this waste will increase by 70% by 2050 (from 884 million tons to 1,496 million tons per year).

The **pharmaceutical and chemical industry** needs hydrogen directly or indirectly as a raw material. The gray hydrogen is obtained from fossil fuels, which is not sustainable. Long-distance transport is costly and lossy. Contaminated sludge from the production processes must be disposed of in a laborious and expensive manner.

Municipalities must dispose of ever larger amounts of sewage sludge including microplastics and other biogenic waste. This requires a complex, costly and energy-intensive drying of the waste. In the medium term, mono-incineration will no longer receive any new approval.

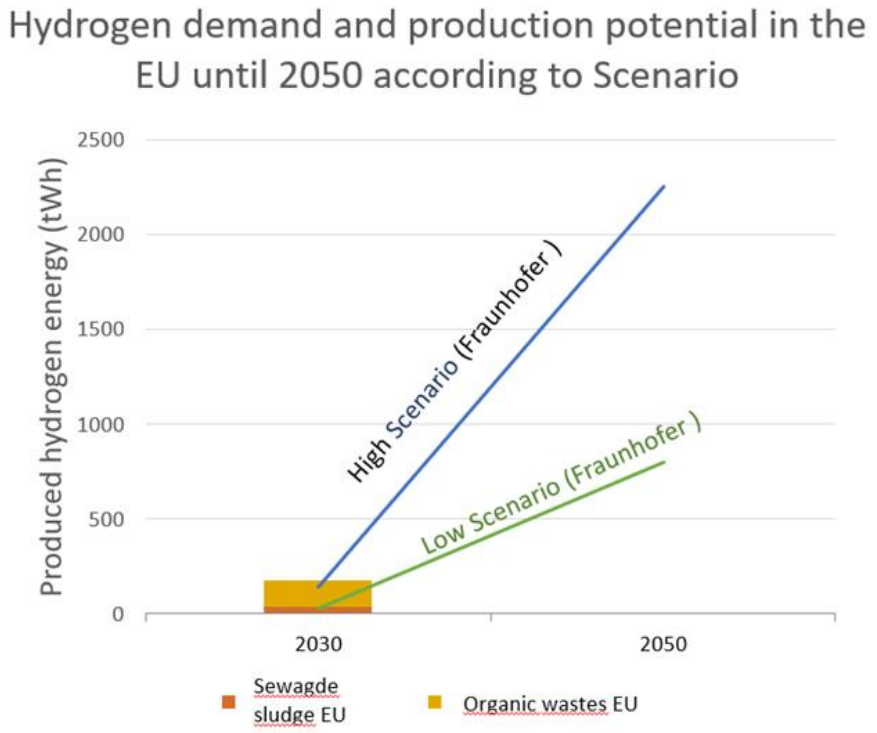


In **tourist centers** such as large hotel complexes or campsites, large amounts of biological waste are generated every day. Most of these raw materials are currently being burned around the world. In order to improve the calorific value, plastic waste is often added, which increases the environmental impact.

Transport: Individual, rail, shipping requires inexpensive and environmentally friendly energy sources. The mobility of the future must be achieved by switching to electric-based drives become CO2-free in order to avoid further high greenhouse emissions and to save our environment.

New legal requirements in Europe only permit the recycling of biogenic residues from **food productio**n to a limited extent. In future, it will have to be disposed at high costs and the amount of organic waste from private households is increasing steadily.

TASKS WE WANT TO FACE

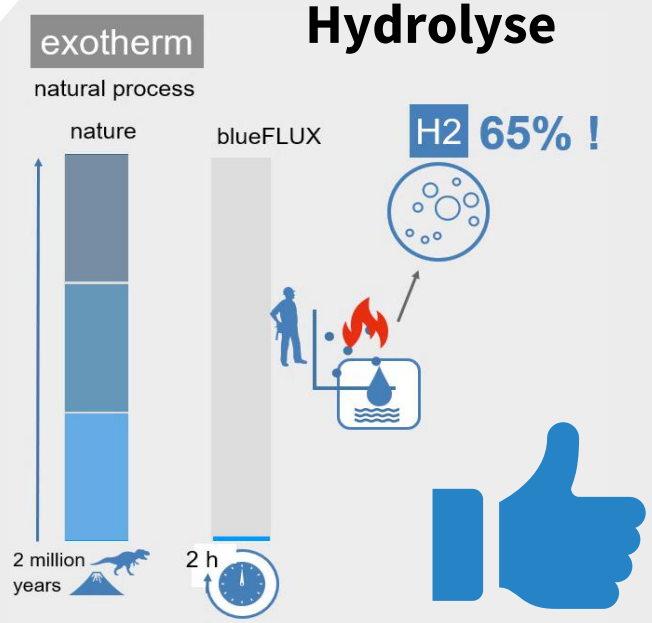


Categorie	Potential hydrogen energy production (tWh)
Sewage sludge EU	39,80
Organic wastes EU	138,89
Total EU	5540,32

Quelle(n): 9261_dena-Leitstudie_Integrierte_Energiewende_lang.pdf (Seite 230 TeilB) (2018)
Eine Wasserstoff-Roadmap für Deutschland (fraunhofer.de) (2019)
Klärschlammaufkommen nach Ländern in Europa 2019 | Statista
Bioabfälle | Umweltbundesamt (2019)
Bioabfallkomposte und -gärreste in der Landwirtschaft (umweltbundesamt.de) (2017)

Continuously increasing amount of biological/organic residues

SOLUTION & VALUE PROPOSITION



Combination of pressure and heat in water as solvent

Method for treating wet & dry organic residues

game changing technology

2-4 €/kg for green H_2 - standard size

conversion rate hydrolysis: 65 %

(vs. conversion rate pyrolysis: approx. 23 %)

less energy consumption than electrolysis by factor 3-4

disposal of wet & dry materials – no drying or pre-sorting necessary

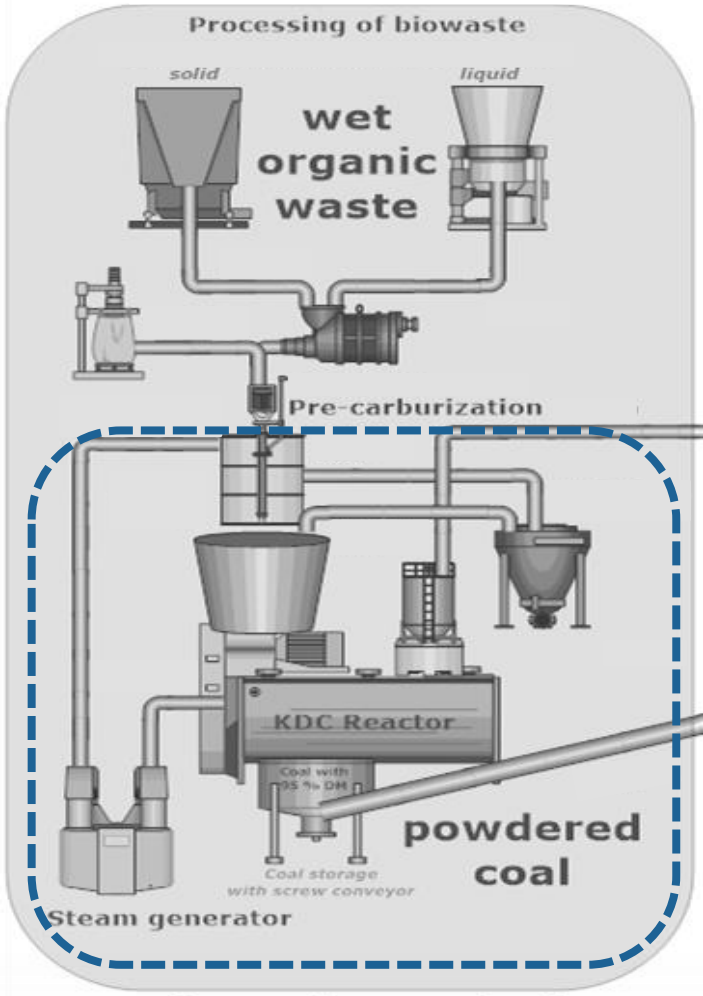
reduction of the environmental pollution by nitrate

waste-to-value without CO_2 -pollution

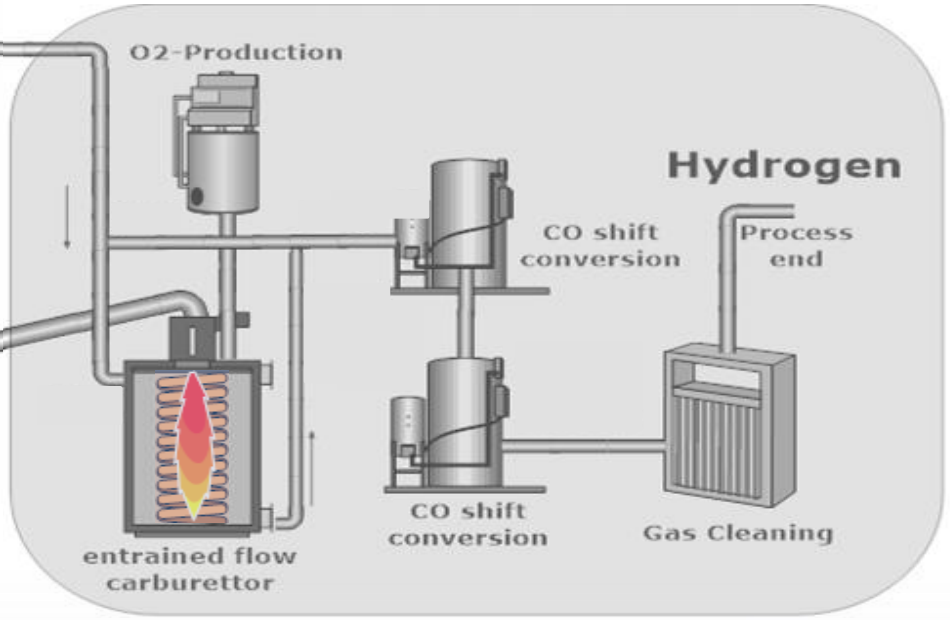
OUR TECHNICAL SOLUTION blueFLUX®

blueFLUX TECHNOLOGY

CARBONIZATION BY HYDROLYSIS



GASIFICATION AND STEAM REFORMING

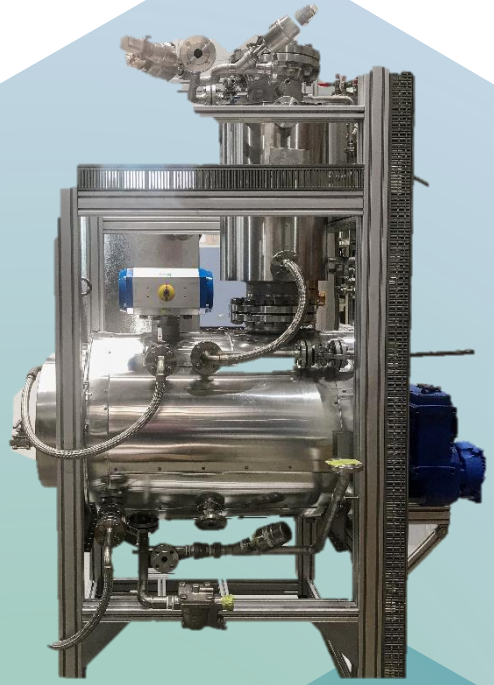


H_2

bF H_2 600
30 t/a H_2

bF H_2 10.000
480 t/a H_2

OUR SOLUTION FOR ALL APPLICATION AREAS



- Disposal of organic waste, sewage sludge and sterilization of waste with a plastic content of up to 30%.
- Production of green hydrogen by converting organic waste (without prior separation or drying) into synthetic coal, biochar, synthesis gas, green hydrogen, biomethanol, biomethane and heat.
- Decentralized production of green hydrogen at competitive prices for CO_2-free mobility.
- Agriculture as a circular economy. Liquid manure is processed into green hydrogen and biochar. Economically successful and ecologically valuable.
- The by-products nitrogen and phosphorus can be obtained and used as concentrated, high-quality fertilizers.

7 USE PATHS FOR ORGANIC RESIDUES

1. Production of green hydrogen by carbonization with subsequent gasification for direct use in fuel cells, combustion engines and raw gas. Alternatively, the use of synthesis gas.

2. Production of biomethane by microbiological methanation for energy supply, for fuels or as a preliminary product for the chemical industry. CO2 and H2 become CH4.

3. Inexpensive production of methanol from biological materials and sewage sludge.

4. Material use for soil improvement by introducing biochar into agriculture areas for decarbonization of the environment.

5. Useable thermal energy through superheated steam for heating and process heat.

6. Recycling of difficult waste materials by gasifying them at the highest temperatures and breaking them down into useable components.

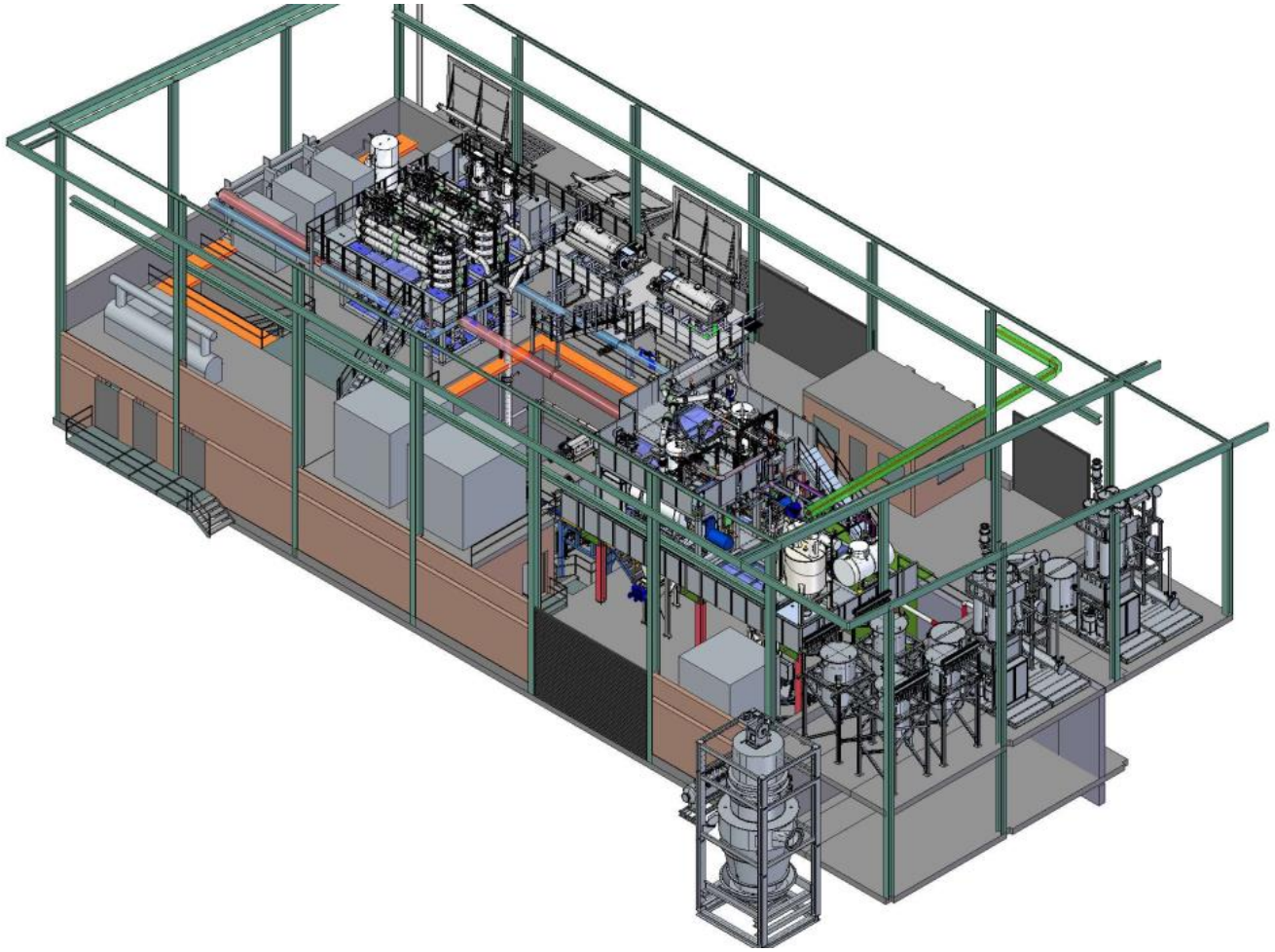
7. Storage of valuable materials through storable slag in which phosphorus and heavy metals are bound. In the future, the separation of phosphorus, sulfur and nitrogen is planned in a separate pre-treatment step.

INPUT & OUTPUT

System size	bFK00600	bFH00600	bFK10000	bFS10000	bFH10000
Organic residue with 30% dry matter [t/a]	1,200	1,200	18,500	18,500	18,500
Electrical energy [GWh/a]	3	2.5	15,3	14.7	13.1
HTC coal* [t/a]	300	-	5,300	-	-
Synthesis gas* [GWh/a]	-	-	-	16.4	-
Hydrogen* [GWh/a]	-	1.1	-	-	18.7
Residual process heat* [GWh/a]	0.25	0.23	12	11	11.5

*Output depending on system configuration (guide values)

Implementation project: blueFLUX integrated into brick production bFS10000

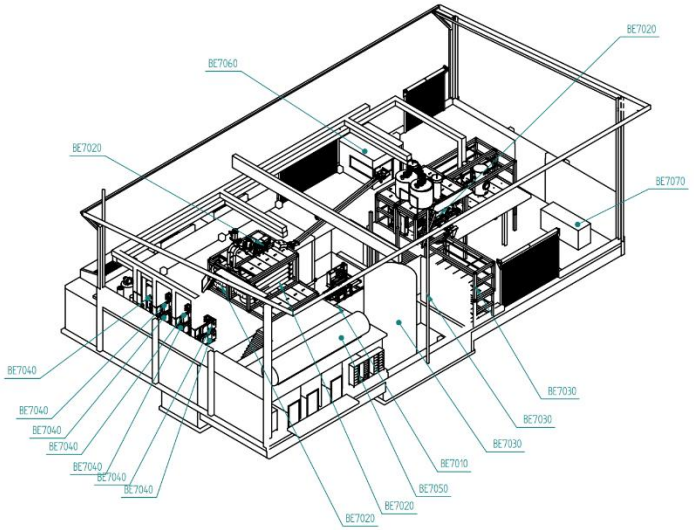


- Commissioning in September 2021
- Construction in progress
- Construction of the plant from Q4/2023
- Commissioning in stages Q3/2024
- 16,500 tonnes of municipal sewage sludge + 2,000 tonnes of wood chips
- Substitution of 16.4 million kWh of natural gas per year
- Utilisation of residual process heat
- Utilisation of water from organics

Bayerisches Staatsministerium für Wirtschaft, Landesentwicklung und Energie

* Funding project Hörl & Hartmann Ziegeltechnik GmbH & Co. KG

Implementation project: blueFLUX integrated into brick production bFS10000



The climate-neutral synthesis gas is produced in two process steps: carbonization by hydrolysis and subsequent gasification.

Implementation project: blueFLUX integrated in agriculture bFH00900

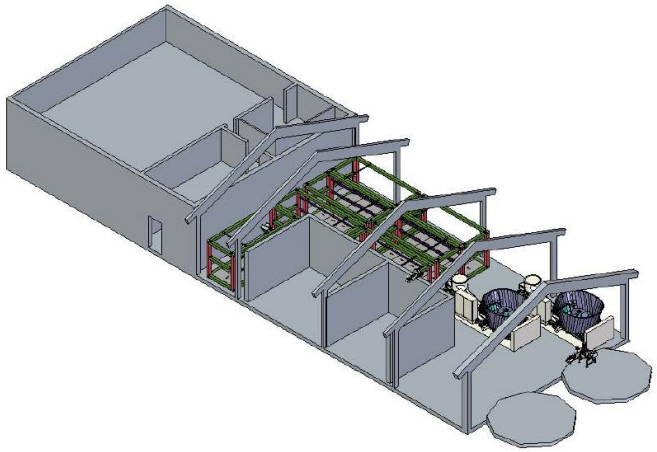
Integration of blueFLUX into agriculture*.

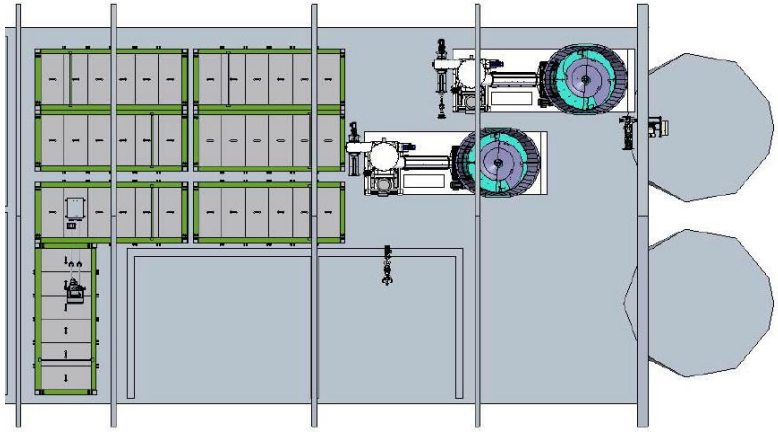
Construction commissioned in October 2021Mechanical construction in progressProduction of bio-hydrogen, biochar and utilization of process heatGoal: "From the cow to the hydrogen car"

Bayerisches Staatsministerium für Wirtschaft, Landesentwicklung und Energie

* Funding project Holzner Druckbehälter GmbH

Implementation project: blueFLUX integrated in agriculture bFH00900





WE DELIVER WITH OUR PARTNERS…

- Site qualification and approval support
- Plants to produce synthetic coal, biochar, synthesis gas, green hydrogen, biomethanol, biomethanincluding planning, construction, operation and maintenance
- Compact and modular blueFLUX systems with small component sizes
- Filling stations for hydrogen

Awards

Picture from Lukas Barth

SEAL OF EXCELLENCE

European Commission

Certificate delivered by the European Commission,
as the institution managing Horizon 2020,
the EU Framework Programme for Research and Innovation 2014-2020

The project proposal
101009955, blueFLUX
Creating value out of all kind of biowaste

submitted under the Horizon 2020's **SME Instrument (grant only and blended finance)**
call **H2020-EIC-SMEInst-2018-2020 (H2020-EIC-SMEInst-2018-2020-4)** of **19 May 2020**
in the area of **H2020-EIC-SMEInst-2020-4**

H2020-EIC Accelerator pilot –SME Instrument - Green Deal

by
Holzner Druckbehälter GmbH
Bergwerkstr 14
82380 Peißenberg
Germany

following evaluation by an international panel of independent experts

WAS SCORED AS A HIGH-QUALITY PROJECT PROPOSAL
IN A HIGHLY COMPETITIVE EVALUATION PROCESS*

This proposal is recommended for funding by other sources, since Horizon 2020 resources available for this specific Call were already allocated following a competitive ranking.

* This means passing all stringent Horizon 2020 assessment thresholds for the 3 award criteria (excellence, impact, quality and efficiency of implementation) required to receive funding from the EU budget Horizon 2020.

Elisa Ferreira,
Commissioner for
Cohesion and Reforms

Mariya Gabriel,
Commissioner for Innovation, Research,
Culture, Education and Youth

Brussels, 22/07/2020

Our YouTube Video:
[blueFLUX H2 2021 – Auf dem Weg zur H2-Modellregion blueFLUX H2 /// 2021 - YouTube]

blueFLUX Energy AG

Bergwerkstraße 14
82380 Peißenberg, Germany

Tel: +49 (0) 8803 90071-0

info@bluefluxenergy.de
www.bluefluxenergy.de

"The water is the coal of the future. Tomorrow's energy is water that has been decomposed. The elements of water that have been decomposed in this way, hydrogen and oxygen, will provide the earth's energy supply for the unforeseeable future."

Jules Verne (1870)

Hubert Kohler

blueFLUX Energy AG
Bergwerkstraße 14
82380 Peißenberg
Deutschland / Germany
eMail: hubert.kohler@bluefluxenergy.de
Phone: +49 8803/900 71 01
www.bluefluxenergy.de

Dr.-Ing. Ulrich Mach

blueFLUX Energy AG
Bergwerkstraße 14
82380 Peißenberg
Deutschland / Germany
eMail: ulrich.mach@bluefluxenergy.de
Phone: +49 8803/900 71 03
www.bluefluxenergy.de

WASSERSTOFF BÜNDNIS BAYERN

UNTERSTÜTZER TEAM ENERGIEWENDE BAYERN

Ein Tochterunternehmen von:

Holzner Druckbehälter

Gefördert durch:

Bayerisches Staatsministerium für Wirtschaft, Landesentwicklung und Energie

Bundesministerium für Wirtschaft und Energie

ZIM Zentrales Innovationsprogramm Mittelstand

aufgrund eines Beschlusses des Deutschen Bundestages