



SOLUTIONS

REFERENCES

PYREG

NET ZERO TECHNOLOGY



PYREG'S CARBON DIOXIDE REMOVAL TECHNOLOGY
NECESSARY TO ACHIEVE OUR CLIMATE GOALS

50+
systems worldwide



90,000 t
CARBON DIOXIDE
REMOVAL

7 million trees

up to now



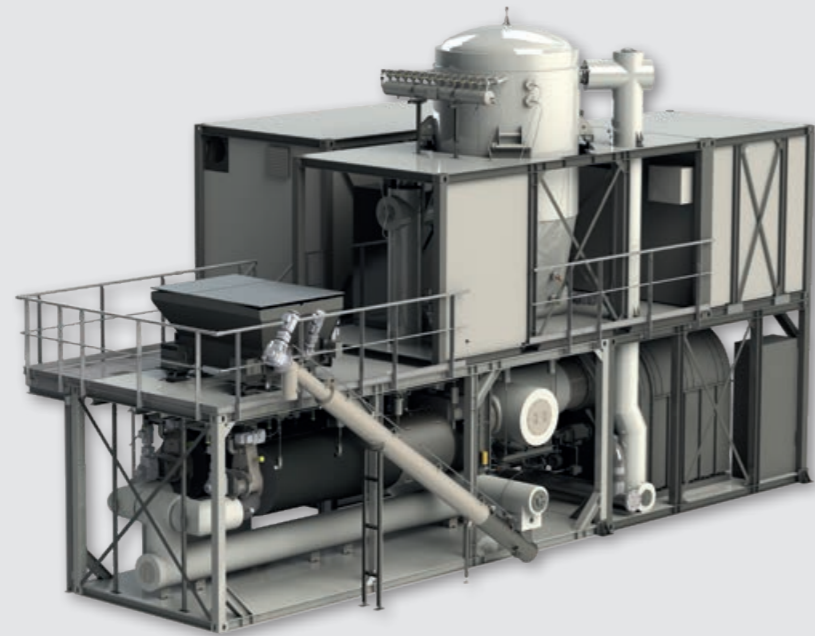
68 GWh
RENEWABLE
ENERGY

8,000 households

per year

PYREG SOLUTIONS
CARBONIZATION

RESIDUALS



BIOCHAR



PYREG SOLUTIONS
MULTI-MATERIAL CAPABILITY

BIOMASS



WASTE WOOD
GREEN WASTE
WOOD CHIPS
NUT SHELLS
FOOD WASTE
FRUIT PEELS & CORES

MIXED



RUBBER
VARIOUS PLASTICS
COMPOSITE
PACKAGING

**CARBONACEOUS
RESIDUES**



AGRICULTURAL FERTILIZER



SEWAGE SLUDGE
BIOSOLIDS
MANURE
STABLE BEDDING

INDUSTRY



INDUSTRIAL SLUDGES
ORGANICALLY POLLUTED RESIDUES
PRODUCTION RESIDUES

PYREG SOLUTIONS
WORLDWIDE

MARKET LEADER



PYREG SOLUTIONS
WORLDWIDE

IN DETAIL

<p>SEWAGE SLUDGE RECYCLING SILICON VALLEY</p>	<p>SUSTAINABLE PLANTING OF URBAN TREES SWEDEN</p>	<p>GREEN ENERGY PRODUCTION, LOCAL HEATING NETWORK SWITZERLAND</p>	<p>RECYCLE RESIDUAL MATERIALS AND IMPROVE CO₂ BALANCE GERMANY / USA</p>	<p>CLEANING OF MARINE LITTER INDIA</p>	<p>PRODUCTION OF SOIL AUSTRIA</p>	<p>DISPOSAL OF INDUSTRIAL SLUDGE CHINA</p>
--	--	--	---	---	--	---

During the carbonization process, the contained nutrients of the dried sewage sludge are conserved. The sewage sludge is sanitized on site and is completely recycled into a marketable (approved Europe-wide) phosphate fertilizer.

Biochar obtained by carbonization, becomes an important component of planting substrate, in which water and nutrients are stored, specially adapted to the needs of urban trees. As a consequence, the life expectancy of the trees is extended and the risk to lose new plantings is reduced.

The PYREG system works autothermally. Beyond that the system generates an energy surplus of up to 600 kW_{th}, which is used either directly for neighboring processes (drying, local heating network), or can be converted into electricity.

The PYREG system enables upcycling of different residuals into clean biochar. Through closed-loop material cycles, the sustainable and climate-friendly carbonization-technology contributes to the reduction of CO₂ emissions.

Mixed green and municipal waste from rivers and canals can be carbonized on site and thus be sustainably disposed of before they reach the oceans.

The biomass-obtained biochar, together with compost, is processed to a high-quality plant soil, which improves the growth of plants in a sustainable and 100 % natural way.

Industrial waste materials can be carbonized without prior sorting. The resulting homogeneous biochar can, e.g. be used as a filler in further integrated processes.

PYREG

CUSTOMERS & PARTNERS

REFERENCES SOIL PRODUCTION



In 2011, we opted for PYREG technology because only it could meet the strict limits of the Waste Incineration Ordinance. As we now know, this was absolutely the right decision.



GERALD DUNST
MANAGING DIRECTOR

Sonnererde has built the first biochar production plant in Europe in 2012! The plant operates 24 hours a day and produces about 1,000 kg of high-quality biochar per day. This biochar pioneer feeds the energy, released during the carbonization process, into its heat network - for heating and drying the feed material.

www.sonnererde.at



Gentle carbonization of the residual materials is the basis of our valuable potting soil. We have chosen PYREG because their many years of scientific support and practical experience give us great security regarding our sustainable product quality.



AARON SASSMANNSHAUSEN
MANAGING DIRECTOR

In close cooperation with the University of Halle-Wittenberg, Bionero GmbH has developed a Terra Preta made of unused biological materials. This plant soil, produced from vegetable charcoal and compost, improves the growth of plants in a sustainable and 100% natural way.

www.bionero.de





REFERENCES

BIOCHAR PRODUCTION & CARBON DIOXIDE REMOVAL



As the leading marketer of EBC certified biochar, we invest heavily in applied research and in the certifiability of carbon sinks. In order to be able to guarantee our quality promise on a long-term basis, we have been successfully cooperating with PYREG from the very beginning. We currently have three PYREG plants in operation and will expand our capacity with two new systems at a new location in north Germany.



CASPAR VON ZIEGNER
MANAGING DIRECTOR

www.novocarbo.com



Our customers actively contribute to climate protection, as carbon remains contained in the soil for hundreds of years (carbon sink). Over the course of time we have put three PYREG plants into operation – what better proof can there be that we stand by our ecologically and economically sensible decision?

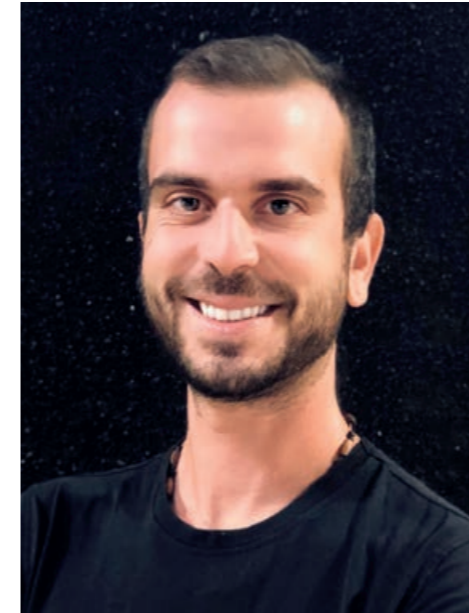


CHRISTOPH ZIMMERMANN
MANAGING DIRECTOR

www.du-gut-pflanzenkohle.de

REFERENCE

SEWAGE SLUDGE RECYCLING



The treatment of biosolids from sewage sludge to biochar with high nutritional value is not only cost efficient, but also a sustainable solution to locally transform organic streams into renewable energy and biochar. Once used as a phosphate fertilizer in the ground, it helps to improve the environmental footprint by sequestering CO₂ for centuries. By reducing the waste volume by 90%, the PYREG technology offers a great cost saving.



DARIO PRESEZZI
MANAGING DIRECTOR

www.bioforcetech.com





REFERENCES

DISPOSAL OF INDUSTRIAL SLUDGE, RESIDUALS



Our goal is to provide our customers with a complete, efficient and cost-effective solution which continually creates an add value. By integrating PYREG technology at the respective sites and making additional use of the bioenergy generated, we have achieved this in a sustainable manner.



PENG JIANG
MANAGING DIRECTOR

Henotec GmbH, founded in 2012 in Munich, helps European environmental technology companies enter the Chinese market. Henotec Qingdao specializes in solutions for the recycling of bio-waste, henotec Shanghai in solutions for the recycling of hazardous waste.

www.henotech.com



Critical, difficult to dispose of and cost-intensive industrial waste is not only a problem in the Asian region. PYREG plants enable our customers to recycle them in a sustainable way - directly at their site. In addition to enormous cost savings, the use of this technology also improves the waste balance, which makes it possible to expand the site.



WEIRONG CHEN
MANAGING DIRECTOR

Meiho is an environmental service provider for automation and environmental technology in the field of industrial production- and painting-lines. The primary task is to offer solutions for a sustainable emission control and waste treatment.

www.shmeiho.com

REFERENCE

ACADEMICS



"This exciting and highly topical subject focuses, among other things, on the fact that the biochar introduced into the soil not only serves as a long-term CO₂ sink, but also makes the soil more fertile and less susceptible to the negative consequences of intensive use and climate change," says Bruno Glaser.

"I have been working successfully with PYREG for more than 10 years, as their technology enables the use of this natural problem solver."



PROF. DR. HABIL. RER. NAT. BRUNO GLASER
SOIL BIOGEOCHEMISTS AND UNIVERSITY LECTURER AT THE UNIVERSITY OF HALLE (SAALE)

Our cooperation partner Professor Dr. Bruno Glaser, a German soil biogeochemist and lecturer at the University of Halle (Saale), with a research focus on Terra Preta and biochar, is considered a luminary in the field of biochar.

www.landw.uni-halle.de/prof/bodenbiogeochemie





REFERENCE

CARBON DIOXIDE REMOVAL & RENEWABLE ENERGY



Maine is the place to deploy, state of the art carbonization technology and the time is now! Our vision is to co-locate biochar production at large sources of biomass feedstock (byproducts from Maine's vast working forests), thereby driving a true circular economy, through the application of innovative NetZero technology.

Using a proven process, we will use these forestry byproducts to produce an end product that nourishes soils, cleans water and removes carbon dioxide from the atmosphere, while simultaneously generating renewable energy.

To make this vision a reality, we have chosen PYREG as our strategic partner. We are thrilled to be walking this path together and doing good – not only for the region, but also for the world.



FRED HORTON
CEO STANDARD BIOCARBON

Standard Biocarbon has a mission to lead the creation of a modern North American biochar industry as part of a global climate solution.. The company will manufacture high quality European standard biochar with Pyreg machines from forest waste which have traditionally been used for paper or power generation, both in decline. Our goal is to create a new growth industry, leveraging the infrastructure of the forest products industry in our region to serve growing demand for better soil, cleaner water and less CO₂ in the air.



www.standardbiocarbon.com



PYREG

SELECTED REFERENCES

REFERENCES BIOMASS



P1500, P500

		SITE	SYSTEM	COMMISSIONING	
1	Sonnenerde Gerald Dunst Kulturerden GmbH	Riedlingsdorf AUT	P500	2011	 Green waste Grain husks Woodchips Green waste Woodchips Forestry and agricultural residues Woodchips Screenings Production residues Woodchips Various biomass Woodchips Various biomass Straw Coconut fiber Woodchips Green waste 
2	Verora GmbH	Edlibach SUI	P500	2012	
3	Fetzer Rohstoffe und Recycling GmbH	Eislingen GER	P500 P500 P500	2013 2018 2018	
4	NovoCarbo GmbH	Dörth GER	P500 P500	2014/18 2018	
5	Finzelberg GmbH & Co.KG	Andernach GER	P500	2015	
6	Abfallwirtschaft und Stadtreinigung Freiburg (ASF) GmbH	Freiburg GER	P500	2016	
7	Abfallwirtschaftsgesellschaft des Neckar-Odenwald-Kreises (AWN) mbH	Buchen GER	P500	2016	
8	AH Meyer (Roess Nature Group)	Tianjin CHN	P500	2016	
9	Greenpoch s.a.	Wagnelée BEL	P500	2016	

10	Stockholm Vatten	Stockholm SWE	P500	2016	 Woodchips Green waste Agricultural residues (Pallets) Various biomass Woodchips Green waste Various biomass Woodchips Forestry and agricultural residues Woodchips Green waste Woodchips Green waste Woodchips Waste Wood Woodchips Screenings Woodchips Green waste 
11	Skanefro AB	Hammenhög SWE	P1500	2018	
12	Bionereo GmbH	Thurnau GER	P500	2018	
13	AS Rohstoffe GmbH	Lohsa GER	P500	2020	
14	Jordpro AS	Trondheim NOR	P500	2020	
15	Industrielle Werke Basel (iwb)	Basel SUI	PX1500	2021	
16	Standard Biocarbon	Maine USA	2 x PX1500	2022	
17	thyssenkrupp rothe erde Germany GmbH	Lippstadt GER	PX1500	2022	
18	NovoCarbo	Grevesmühlen GER	2 x PX1500	2022	

REFERENCES SEWAGE SLUDGE P500

		SITE	SYSTEM	COMMISSIONING	
19	Zweckverband Abwasserbeseitigung Linz-Unkel	Unkel GER	P500	2015	Dried sewage sludge
20	Entsorgungsverband Saar (EVS)	Homburg GER	P500	2016	Dried sewage sludge
21	Bioforcetech Corporation	Redwood, California USA	P500	2017	Dried sewage sludge
22	Skanefro AB	Hammenhög SWE	P500	2019	Dried sewage sludge
23	Trutnov	Trutnov CZE	P500	2020	Dried sewage sludge
24	Lorsbach	Lorsbach GER	PX750	2021	Dried sewage sludge
25	Umweltbetrieb (USK)	Kleve Germany	PX750	2022	Dried sewage sludge
26	Bioforcetech Corporation	Ephrata, Pennsylvania USA	PX500	2022	Dried sewage sludge
27	Bioforcetech Corporation	California USA	PX500	2022	Dried sewage sludge



REFERENCES INDUSTRIAL RESIDUALS / DISPOSAL P1500, P500

		SITE	SYSTEM	COMMISSIONING	
28	Shanghai Meiho International Logistics Co., Ltd.	Shanghai CHN	P500	2020	Paint waste
29	DESMI	Hyderabad IND	P500	2020	Mixed municipal waste




REFERENCES RESEARCH SYSTEMS BIOMASS A500

		SITE	SYSTEM	COMMISSIONING	
30	Eigenbetrieb Umwelttechnik Baden-Baden	Baden-Baden GER	A500	2019	Various regional biomass
31	NovoCarbo GmbH	Dörth GER	A500	2019	Various regional biomass

REFERENCES PYREKA LABORATORY SCALE UNIT OF PYREG SYSTEM

		SITE	SYSTEM	COMMISSIONING
32	Agroscope, Bundesamt für Landwirtschaft (BLW)	Zürich SUI	PYREKA	2014
33	Austrian Institute of Technology (AIT)	Tulln AUT	PYREKA	2016
34	Zürcher Hochschule für Angewandte Wissenschaften (ZHAW)	Zürich SUI	PYREKA	2017
35	FH Burgenland	Pinkafeld AUT	PYREKA	2020
36	Universität Kassel	Kassel GER	PYREKA	2020

GERMAN  ENGINEERING

PYREG GmbH
Trinkbornstr. 15-17
56281 Dörth
Germany

Telefon +49.6747.9 53 88 0
info@pyreg.com

pyreg.com