



Reverse is the new forward.

Renewable Energy & Negative Emissions

Industrial Scale Biochar Production

CHRISTOPH MIZELLI, CTO NAWARO ENERGIE Betrieb GmbH/
AUSTRIA



- **SYNCRAFT Company**
- **NAWARO Company**
- **Combating Climate Change**
- **SYNCRAFT Wood Power Plants**
- **Best Practice Powerplant Perg**
- **SYNCRAFT Technology**
- **SYNCRAFT Biochar**

NAWARO  **SYNCRAFT**[®]
ENERGIE

SYNCRAFT / NAWARO COMPANIES



COMPANY.

Facts & Figures



SynCraft

- Greentech company based in **Tyrol / Austria**
- Founded in 2009 as an **MCI university spin-off**
- Revenue 2023: **30 million euro**
- More than **50 employees** at **#teamSYNCRAFT**
- Our mutual goal: **combating climate change**

NAWARO ENERGIE Betrieb GmbH

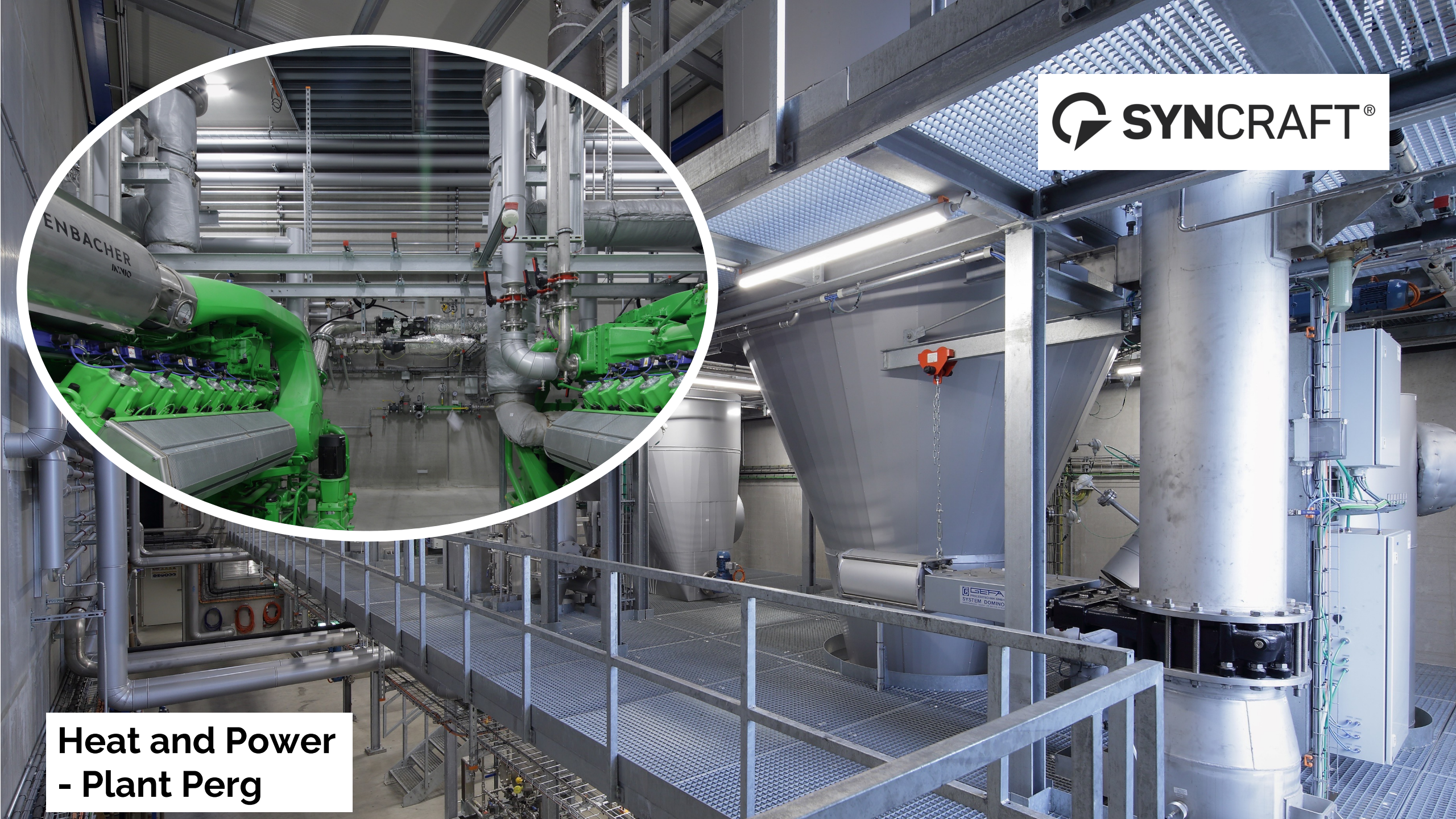
- Renewable energy producer based in **Lower Austria**
- Installed capacity **16.3 MWel, 1000t biochar/y**
- Invested over **30 million euro the last 3 years**
- More than **45 employees**



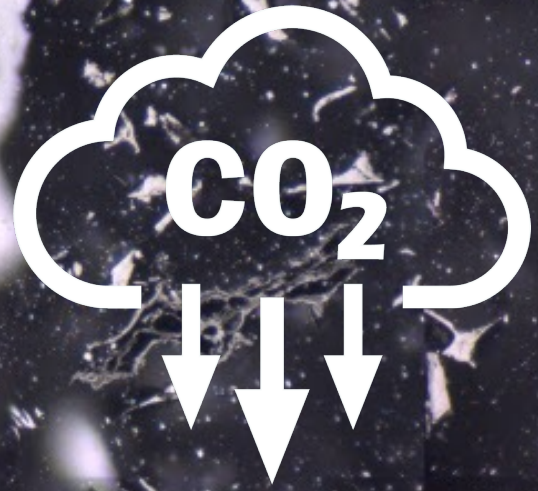
Forest Residues



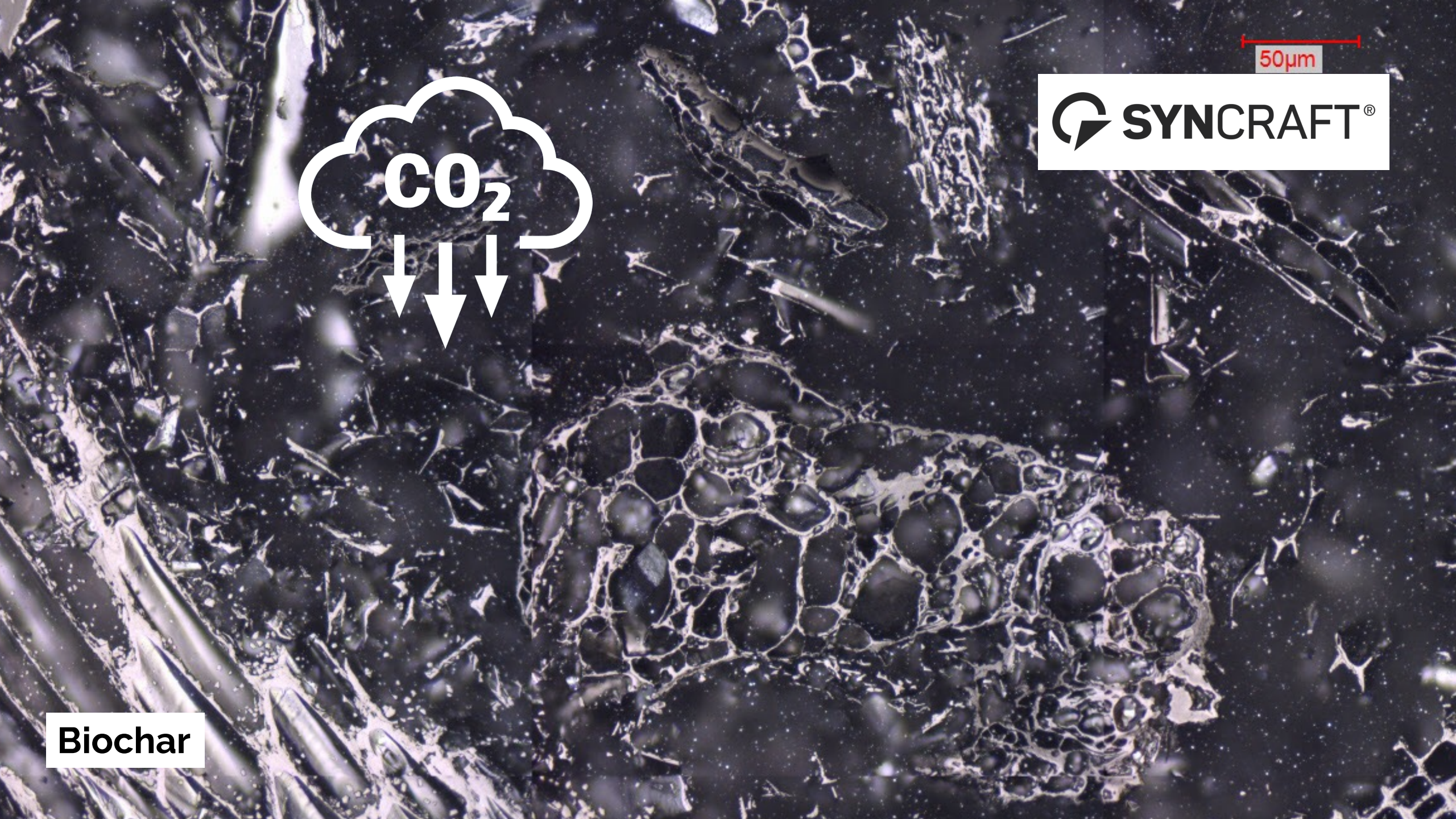
**Heat and Power
- Plant Perg**



50µm



Biochar





COMBATING CLIMATE CHANGE.



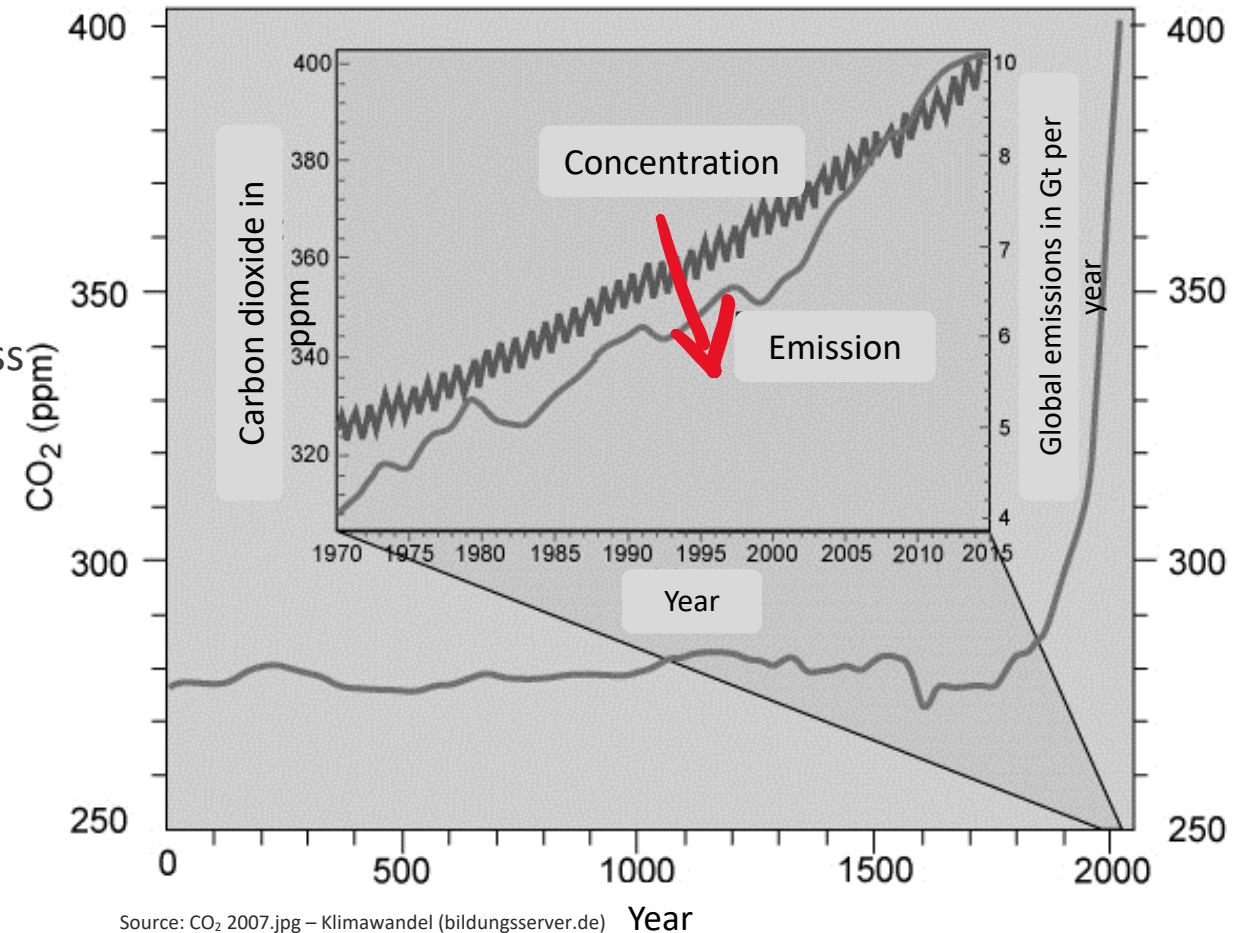
COMBATING CLIMATE CHANGE.

The problem with CO₂

- 👍 The good news: In summer atmospheric CO₂ in the northern hemisphere is reduced despite anthropogenic CO₂ emissions of 50 Gt/a.
- 👎 The bad news: In winter atmospheric CO₂ levels increase.
 - If we prevented the re-release of CO₂ from biomass in winter, we could stop this increase today.
 - Our plants stabilize* and concentrate >30% biogenic CO₂ as biochar (in addition to providing renewable energy).
 - If we consistently scale up this technology, we can **combat climate change.**

*forever until burned

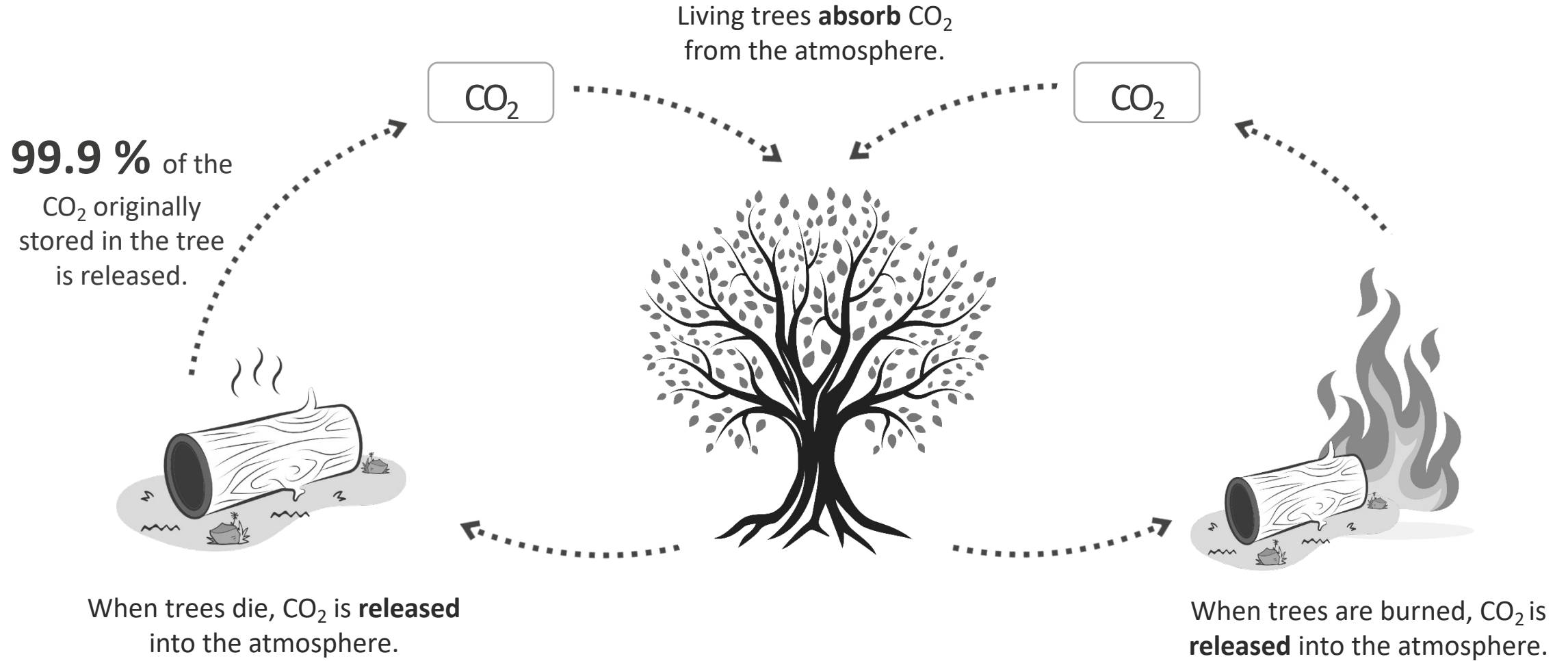
Atmospheric concentration of carbon dioxide 0 - 2015



Source: CO₂ 2007.jpg – Klimawandel (bildungserver.de) Year

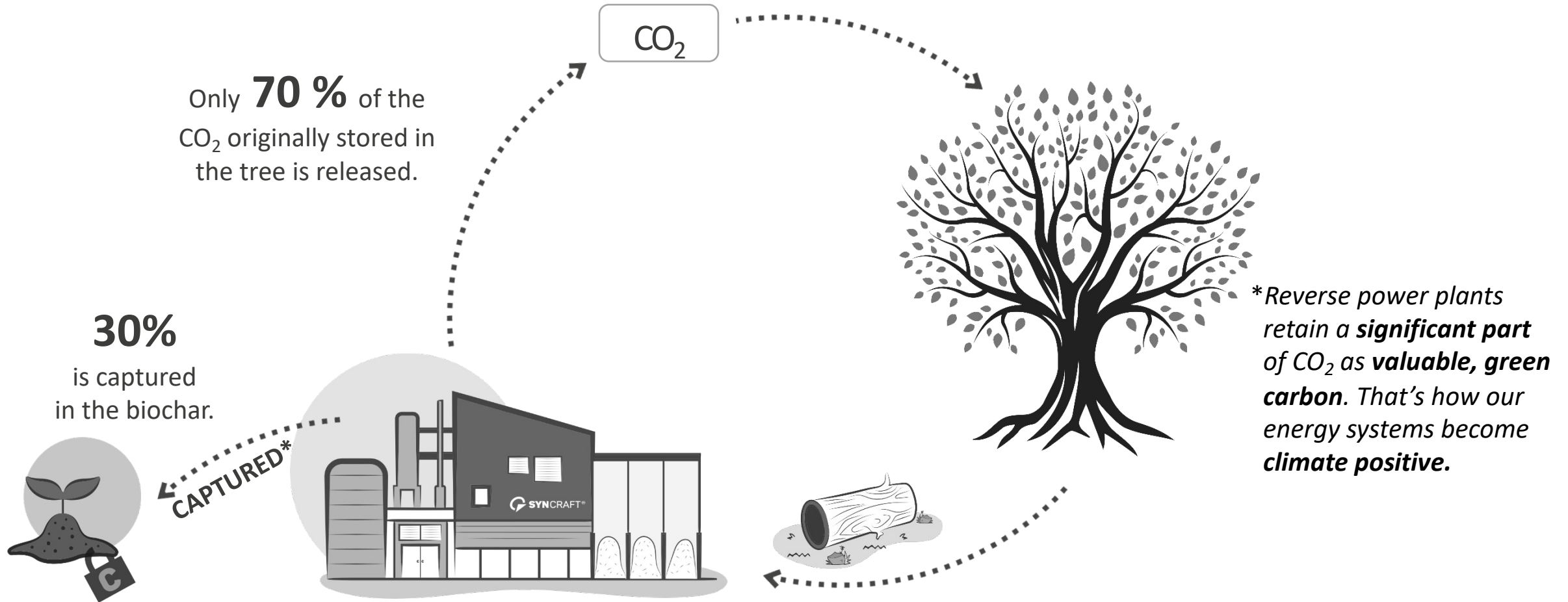
COMBATING CLIMATE CHANGE.

The climate neutral circle



REVERSING CLIMATE CHANGE.

The climate positive circle





SYNCRAFT WOOD POWER PLANTS.



SYNCRAFT WOOD POWER PLANTS.

Systems

NAWARO
ENERGIE



CW1200-400



CW1800-500



CW1800x2-1000

Electrical power	400 kW	500 kW	1,000 kW
Thermal power 90 °C	572 kW	740 kW	1,404 kW
Thermal power ~50 °C	227 kW	250 kW	500 kW
Fuel heat capacity	1,429 kW	1,808 kW	3,527 kW
Fuel demand (dry)	286 kg/h	362 kg/h	705 kg/h
Specific fuel demand (dry)	0.71 kg/kWh el	0.72 kg/kWh el	0.71 kg/kWh el
Premium charcoal	3.5 m ³ /d	4.5 m ³ /d	9 m ³ /d
Space required by gas generator	ca. 120 m ²	ca. 120 m ²	145 m ²
Space required by engine	ca. 55 m ²	ca. 55 m ²	65 m ²
Space required for bunker (week's supply)	278 m ³	418 m ³	480 m ³

SYNCRAFT WOOD POWER PLANTS.

References

NAWARO
ENERGIE

SYNCRAFT[®]



2024

SALZWERKE HEILBRONN
Heilbronn / German

CW1800x2-1000
1,000kW
- 3,000 t/a CO2 eq.

SÜDWESTDEUTSCHE
SALZ
WERKE AG

SYNCRAFT WOOD POWER PLANTS.

References



2023

NAWARO ENERGIE

Perg / AUSTRIA

CW1800-500 x 2

1,000kW

- 3,000 t/a CO2 eq.



SYNCRAFT Wood Power Plants.

References

NAWARO
ENERGIE

SYNCRAFT[®]



2022

BIOENERGIE FRAUENFELD
Frauenfeld /CH

CW1800 x 2-1000x4
4 000kW
- 12 000 t/a CO2 eq.

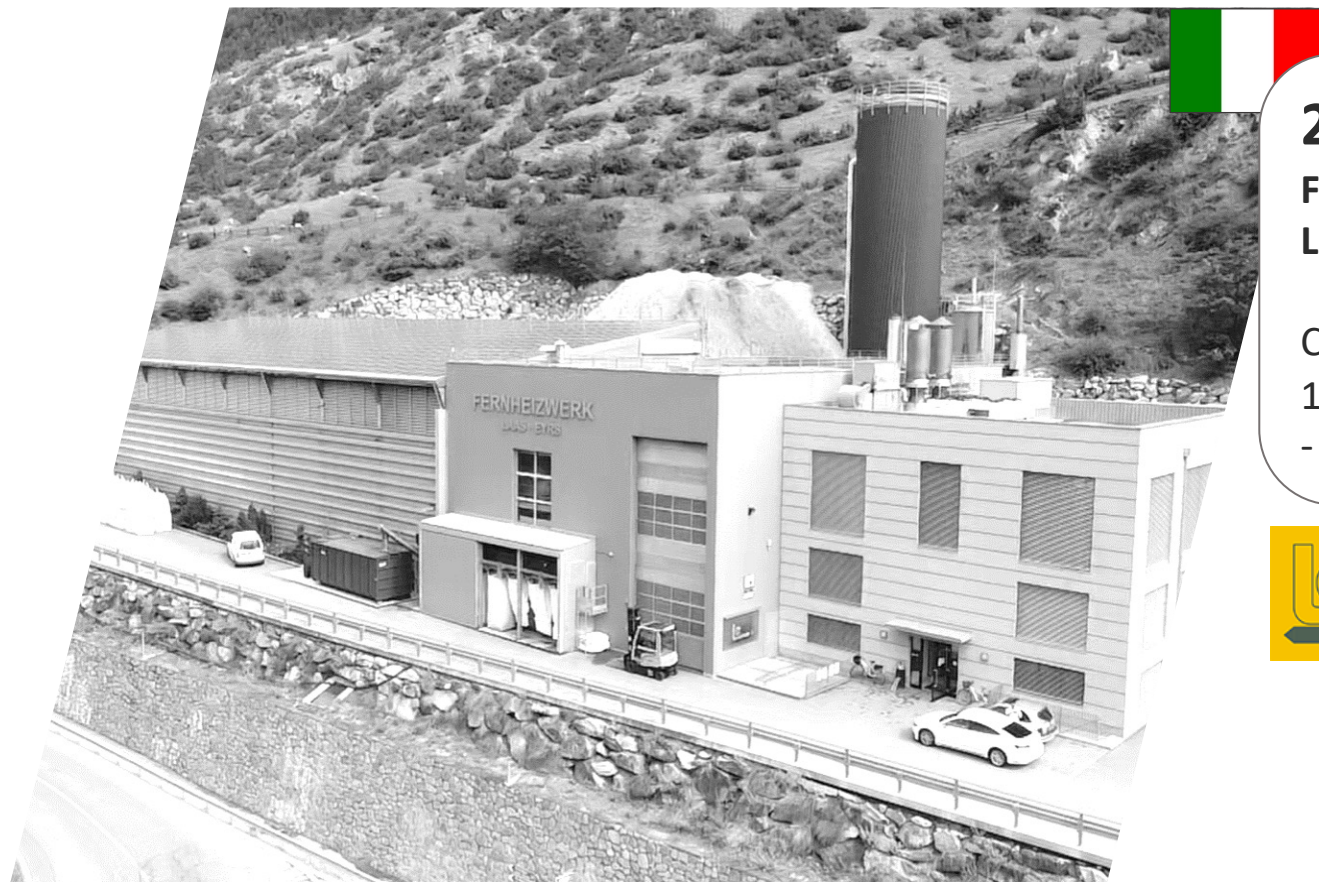


SYNCRAFT WOOD POWER PLANTS.

References

NAWARO
ENERGIE

SYNCRAFT[®]



2018

**Fernheizwerk Leeg
Laas / ITALY**

CW1800x2-1000

1000 kW

- 3,000 t/a CO2 eq.



BEST PRACTICE – PLANT PERG.



REVERSE POWER PLANT PERG

Technical implementation and Hard-Facts

- Start of building: **October 2021**
- Completion: **December 2022**
- Electrical Power: **1.000 kW**
- Thermal Power (90°C): **1.540 kW**
- Biochar production capacity: **~1.000 t/y**
- Installed PV on roof: **104 kWp**

- Feedstock: **wood residues**
- Regional feedstock sourcing



REVERSE POWER PLANT PERG

District heating capabilities

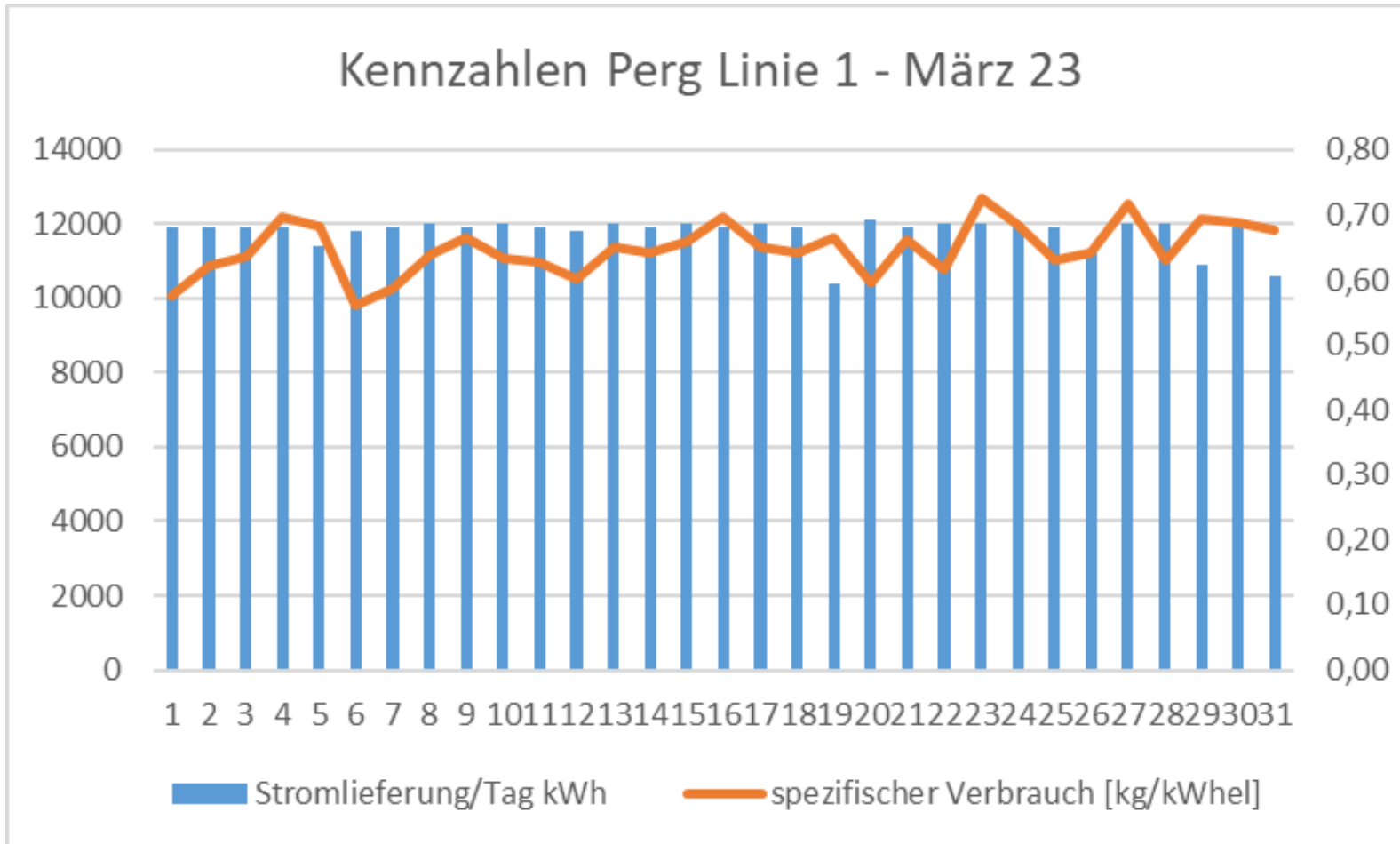


- District heating grid Perg → 25 km
- Covering base load during the whole year
- During winter time: additional 9 MW biomass heating plant from our local partner



RERVERSE POWER PLANT PERG

Performance during the first year



- Availability: >94%
- Electricity: 8.130 MWh
- Heat sold: 10.300 MWh
- Biochar: ~1.000 tons

SYNCRAFT WOOD POWER PLANTS.

References



**MORE
TO
COME**

SYNCRAFT Wood Power Plants.



37

Energy Systems
worldwide

90 %

Average fleet
uptime

123 kt

CO₂
captured

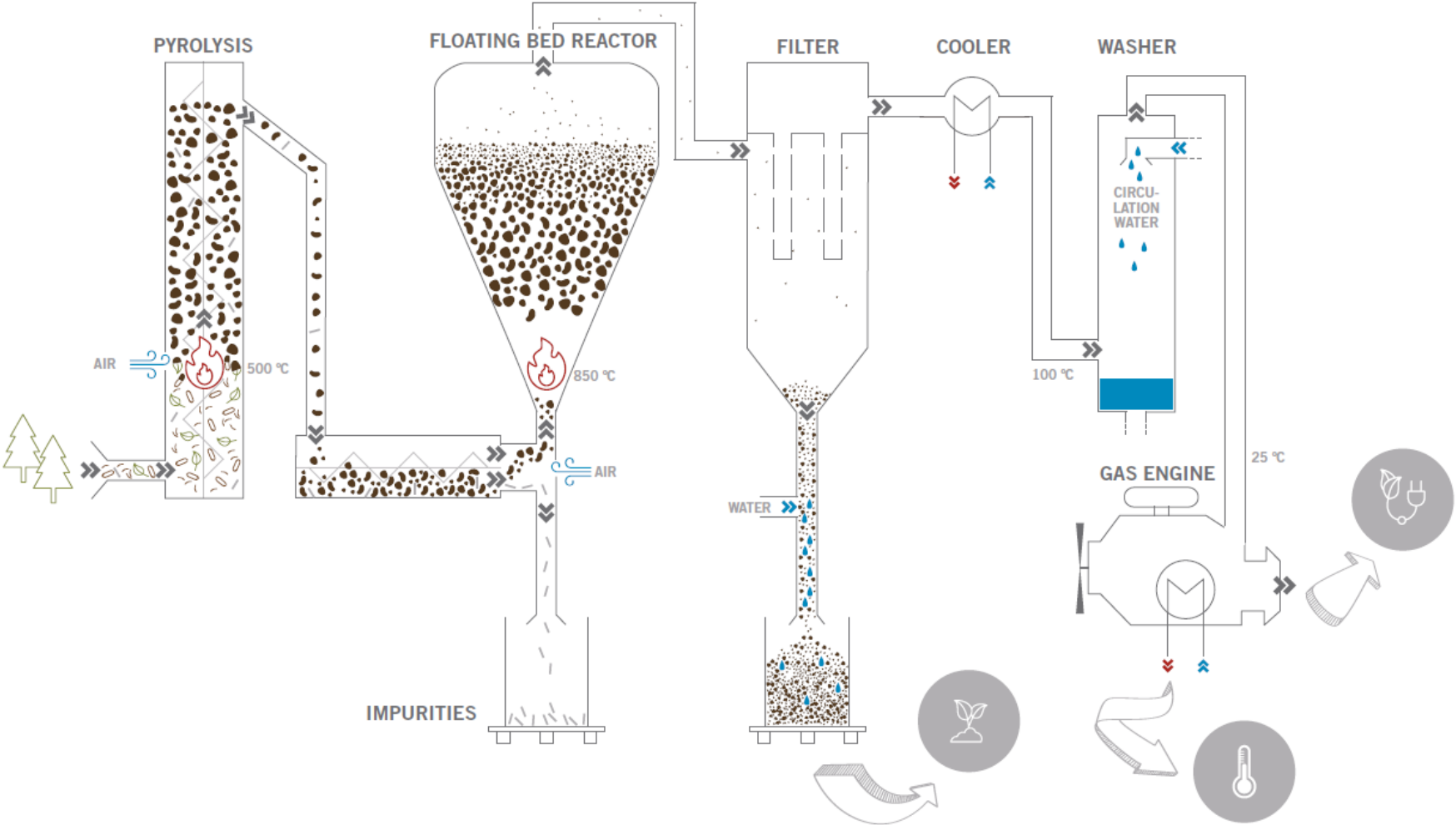
17,4 MW

Electric power
generated



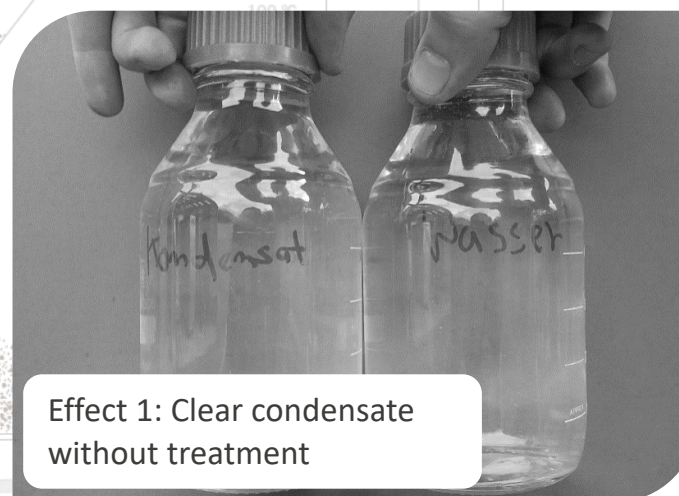
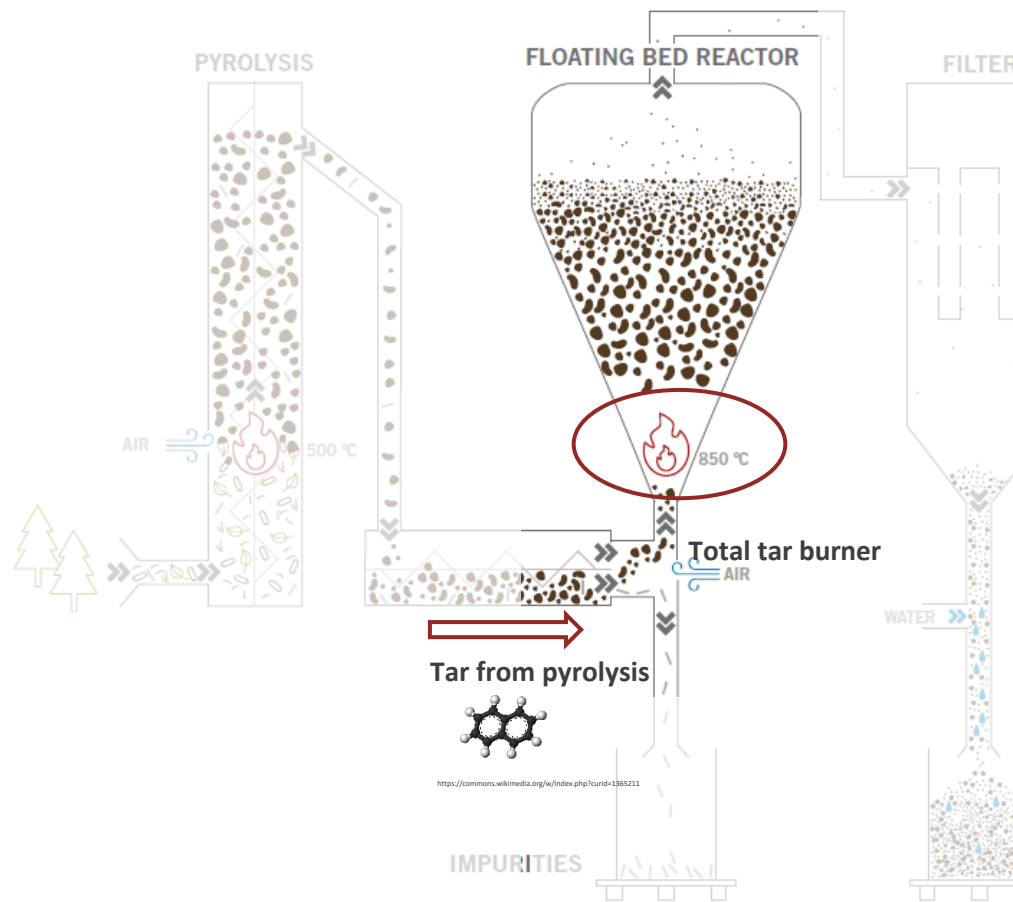
SYNCRAFT TECHNOLOGY.

How does it work?



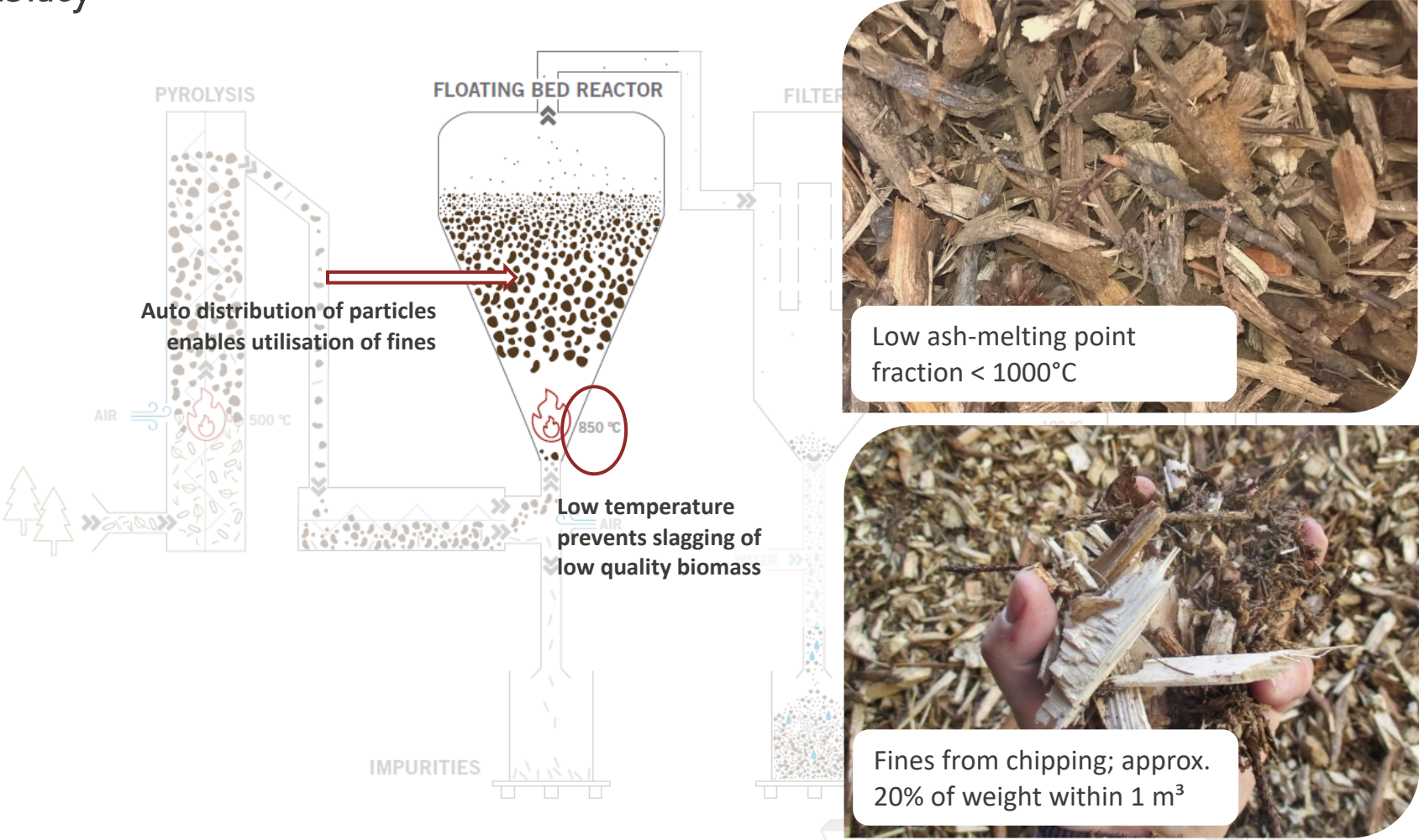
SYNCRAFT TECHNOLOGY.

Tar elimination



SYNCRAFT TECHNOLOGY.

Fuel flexibility

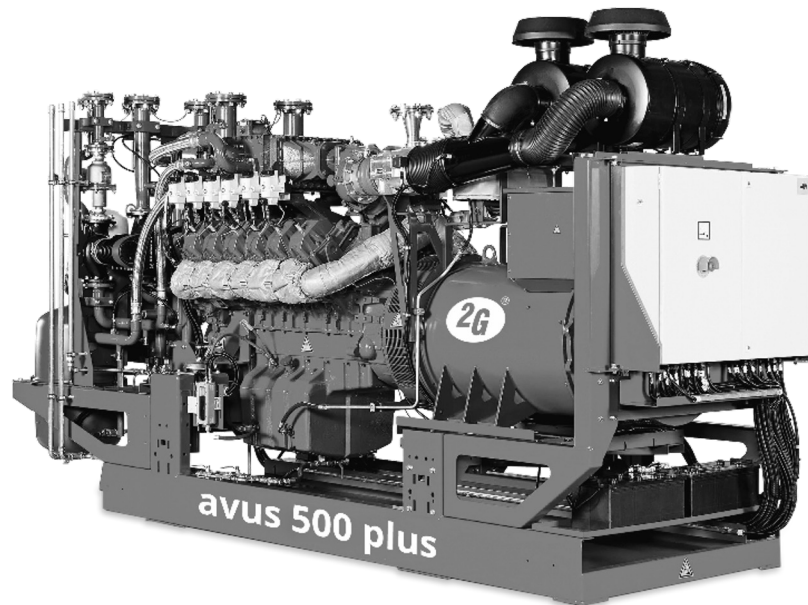


SYNCRAFT TECHNOLOGY.

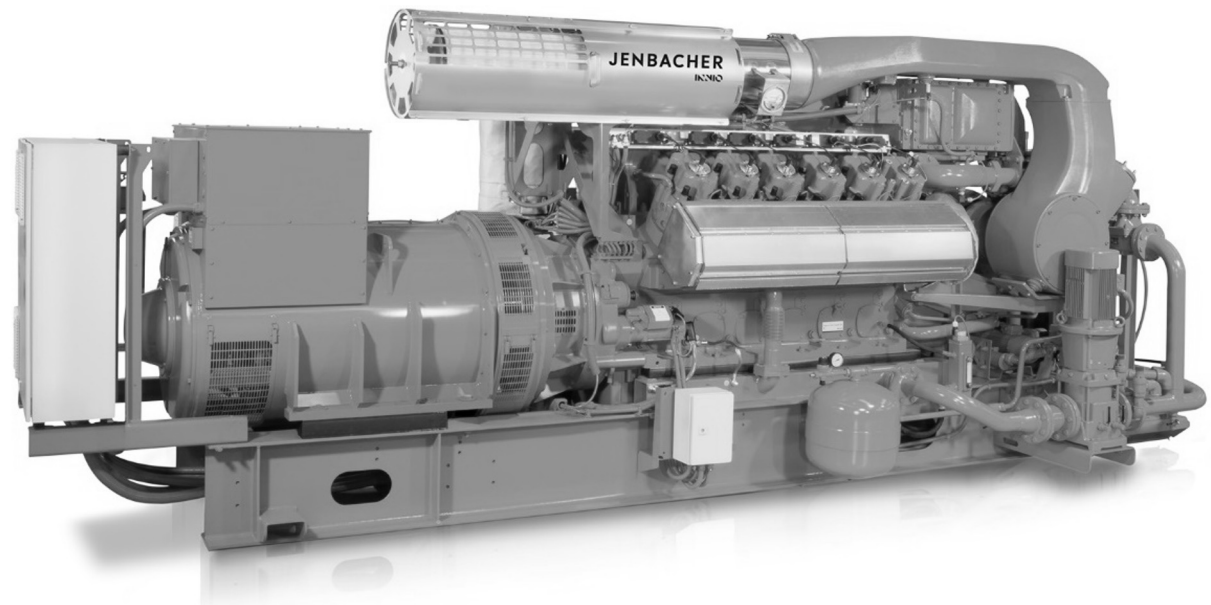
With highly efficient wood gas engines



2G* engines up to 400 kW



INNIO Jenbacher* engines from 400 kW



*Leading gas-engine manufacturers recommend our power plants.
The engines are provided with full manufacturer warranty.

SYNCRAFT BIOCHAR.



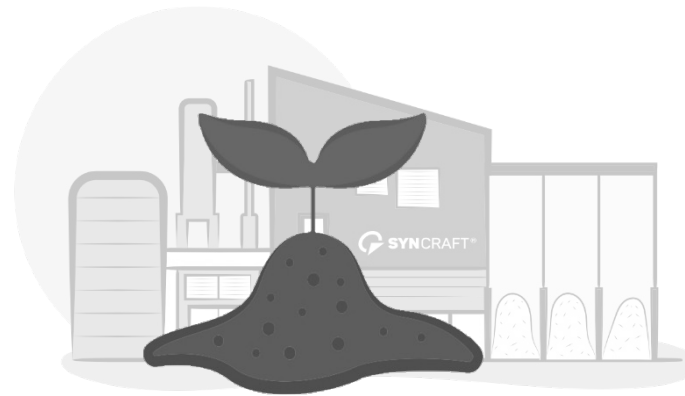
SYNCRAFT BIOCHAR.

High quality raw material



SYNCRAFT Biochar

Biochar generated by our power plants is certified, of high quality, rich in carbon, free of impurities and **inert**.



Soil Additive

Feed Additive

New BCR Applications

SIØTUU

CO₂ SOLUTIONS GROUP





charline

Futterkohle für gesunde Tiere



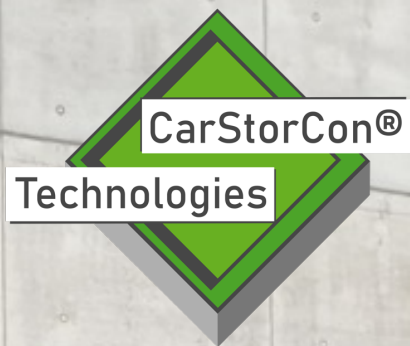


Made of Air



CARBOGANIC

biocarbon compounding concentrates



NEW SYNCRAFT HQ WITH CLIMATE CONCRETE

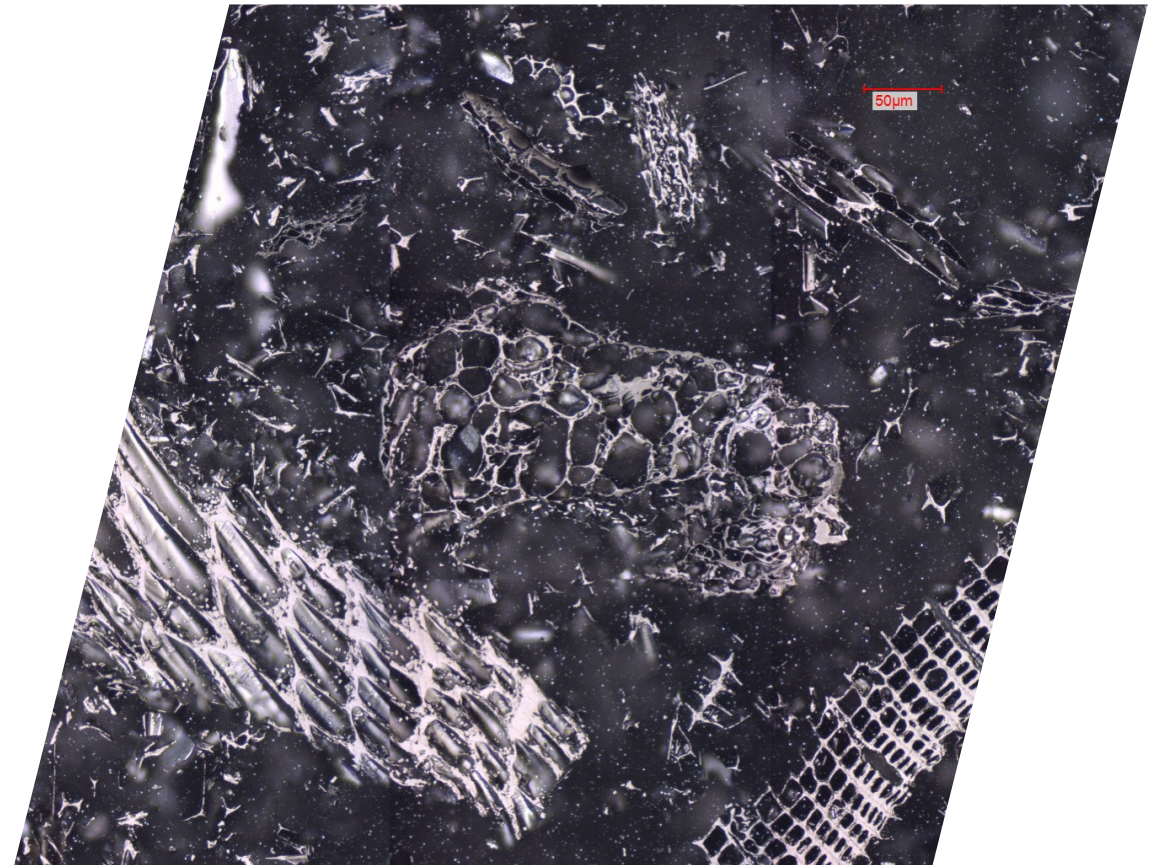
 SYNCRAFT®



SYNCRAFT BIOCHAR.

Inertinite

- **Inertinite** is carbon found in the lithosphere of earth's crust.
- It has been derived from biomass over ages and describes carbon at its most stable form.
- Organic geochemists determine the maturity (inertness) of organic carbon by measuring its reflectance (more reflective = more structured/aromatic = more inert). At a reflectance of 2%, organic carbon is considered chemically inert (geologically stable).
- With an average reflectance of almost **4%**, **SYNCRAFT generated biochar** is among the most stable forms of carbon currently existing.





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