



# BEST

Bioenergy and  
Sustainable Technologies



Federal Ministry  
Innovation, Mobility  
and Infrastructure  
Republic of Austria

Federal Ministry  
Economy, Energy  
and Tourism  
Republic of Austria



For the  
City of Vienna



Das Land  
Steiermark

Economy, Labour, Finance,  
Science and Research



# BEST in a nutshell

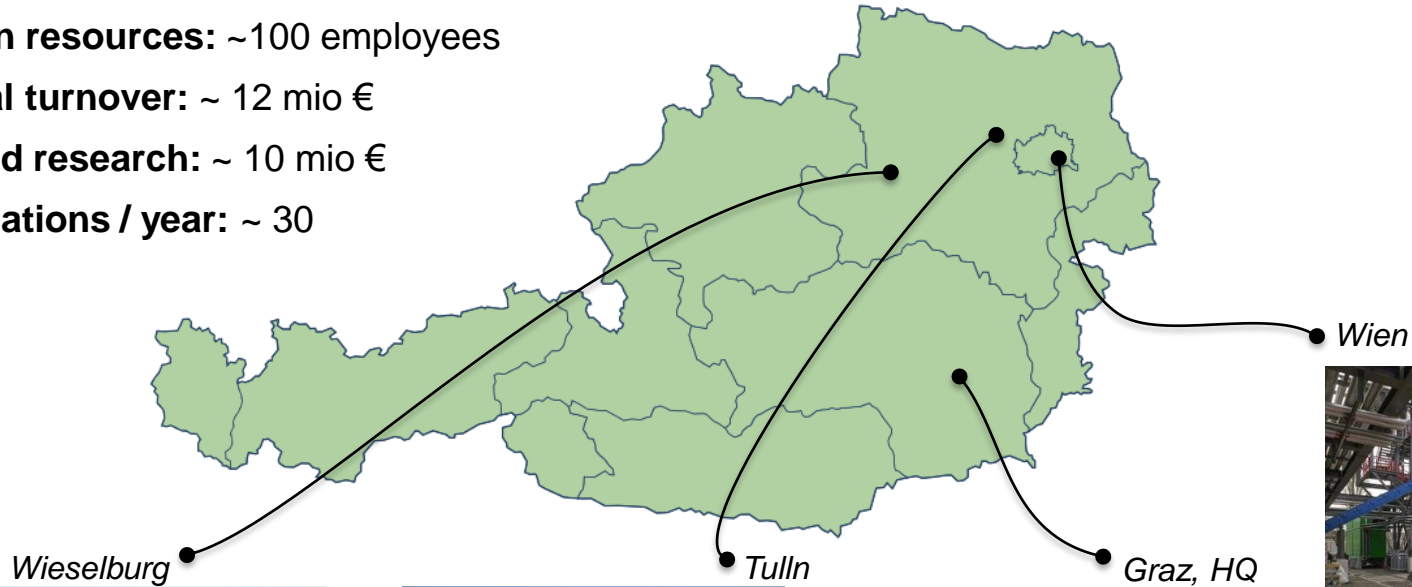


**Human resources:** ~100 employees

**Annual turnover:** ~ 12 mio €

**Funded research:** ~ 10 mio €

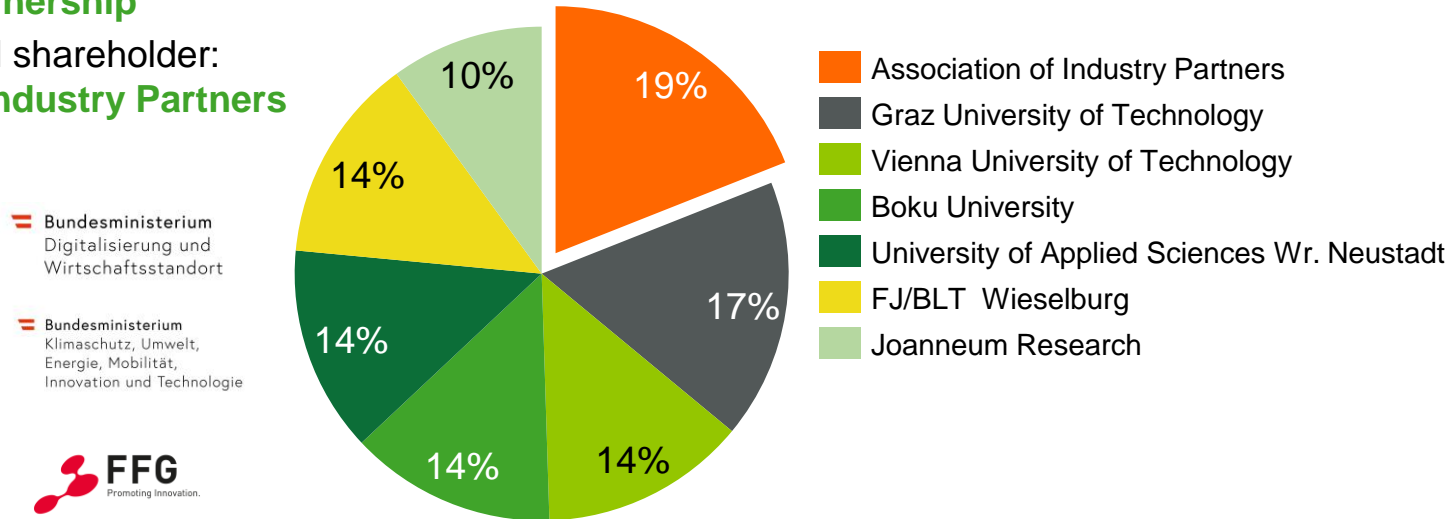
**Publications / year:** ~ 30



# BEST – Ownership



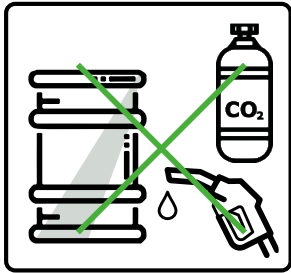
- BEST – Bioenergy and Sustainable Technologies **GmbH**
- Mostly **public ownership**
- Biggest individual shareholder:  
**Association of Industry Partners**





# Changing the Carbon game

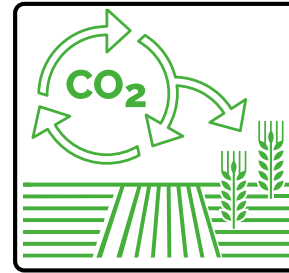
**SHAPING the TRANSITION to a SUSTAINABLE  
and CLIMATE FRIENDLY CIRCULAR ECONOMY**



fossil carbon free  
heat, power, gas and  
transportation fuels



low value feedstock  
to high value  
products



CO<sub>2</sub>-negative  
technologies



economic and  
efficient renewable  
energy systems



**Digitalization as enabling technology for competitiveness**



# Unique R&D infrastructure from lab to pilot and demonstration-scale

- **Green Carbon Lab**
  - Pyrolysis system from Lab to Pilot scale
  - Feedstock, process and product development and characterisation
- **Syngasplattform Vienna**
  - 1 MW Syngas producer for biomass, residues and waste fractions
  - Barrel / day Fischer-Tropsch Pilot (~ 250 kW)
  - Coupled synthesis technologies (FT, mixed alcohols, ...) in lab scale
- **Biotechlab**
  - Fermentation systems in variable scale (Gas- and electrofermentation)
  - Lab- and pilot systems for development of algal based biorefineries
- **Microgrid Lab**
  - Biomass boiler, heat pump, absorption cooling, buffer storage
  - PV and battery, charging station, (H<sub>2</sub> infrastructure currently in planning)
  - Testing environment for holistic controls



# Our USP



**> 20 years of experience**  
+ cooperation with shareholders



**Our most  
valuable resource ...**



**Flagship and unique R&D  
infrastructures**

(Syngas Platform Vienna,  
GreenCarbonLab, microgrid lab, ...)



**Timely and ambitious  
industry-driven research  
programme**



**Digitalization  
as enabling technology**



**Local, national and international  
network** with stakeholders from industry  
and science

**BEST 4.0  
builds on**

# BEST – Bioenergy and Sustainable Technologies



## Area 1: Biorefineries



- 1.1 Thermochemical Technologies
- 1.2 Biochemical Technologies
- 1.3 Syngas Platform Technologies

## Area 2: Digital Methods and Solutions



- 2.1 Process Analysis and Simulation
- 2.2 Automation and Control
- 2.3 Microgrids and Smart Energy Communities



## Area 3: Sustainable Supply and Value Cycles



## SA1.1 Thermochemical Technologies



# Thermochemical Processes & Technologies for decentralized applications

## Green gas technologies for decentralized applications



## Decentralized production of green carbon products & energy



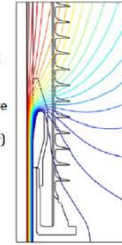
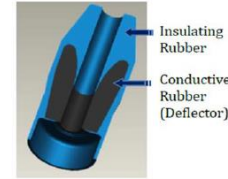
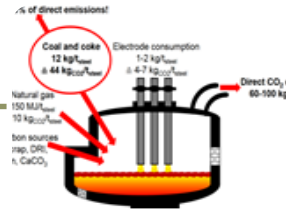
## Combustion 4.0





# Challenges on the path to a Circular Carbon Economy

C-Substitution



C-Recycling



© iStock / Getty Images Plus / Roman Mykhalchuk

C-Management & Removal



Quelle: Freepik.com



Quelle: <https://www.syncraft.at>

+ Energy Recovery



# Core Competences and R&D-Topics



## Product design Biochar & Bio-Oil

- Specific properties / Functionalisation / basic chemicals / tailored fractionation

## Feedstock-flexible Technologies

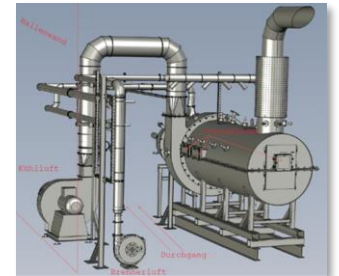
- Modular components, innovative sensors and advanced control strategies

## Recycling / Separation / Purification

- Separating organic/inorganic compounds / removing PFAS etc., standard products from diverse feedstocks

## Combination & Integration

- Electricity / HT-Heat / Downstream Synthesis & Conversion (thermal, chemical, microbiological, ...)

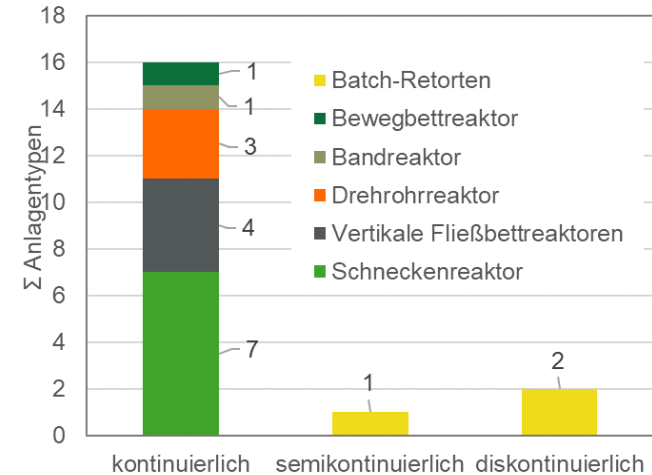


**Technology overview** on pyrolysis and gasification |  
Industry Knowledge – Developments, Challenges, Policy & Standards |  
Conversion properties of variable feedstocks | **Basis-Know-how** Reaktionen & Mechanismen

# Market survey on pyrolysis technologies



- Factsheets for each technology
- Joint data evaluation
- Economic analysis



# Residue pyrolysis in circular economy concepts



**Wood chips from driftwood**  
combustion / waste



**Walnut shells**  
100 t / a  
combustion



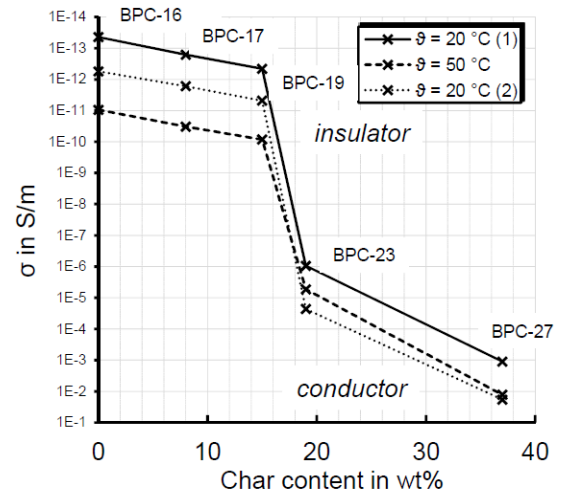
**Screen overflow from composting**  
10.000 t / a  
combustion / waste



**NATIONAL INSTITUTE OF CHEMISTRY**  
**BEST** Bioenergy and Sustainable Technologies  
**BioBASE**  
**unibz** Freie Universität Bozen Libera Università di Bolzano Università Liedia de Bulsan  
**ŠTAJERSKA GOSPODARSKA ZBORNICA**  
**AIEL** ASSOCIAZIONE ITALIANA ENERGIE AGROFORESTALI  
**EFRE** Europäische Union. Investitionen in Wachstum & Beschäftigung. Österreich.  
**Interreg** Co-funded by the European Union  
**Alpine Space**  
**Alps4GreenC**

# BioPolyComp

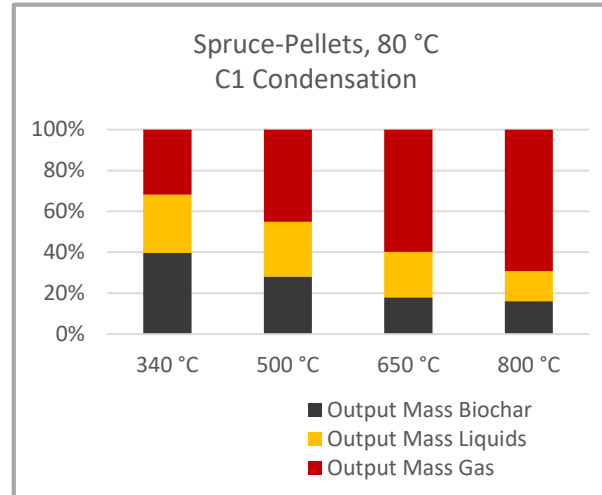
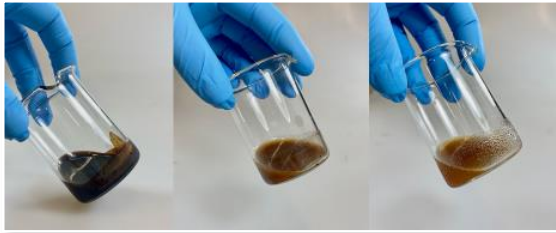
## Biochar-Application in polymers



# Methods4GCliquids

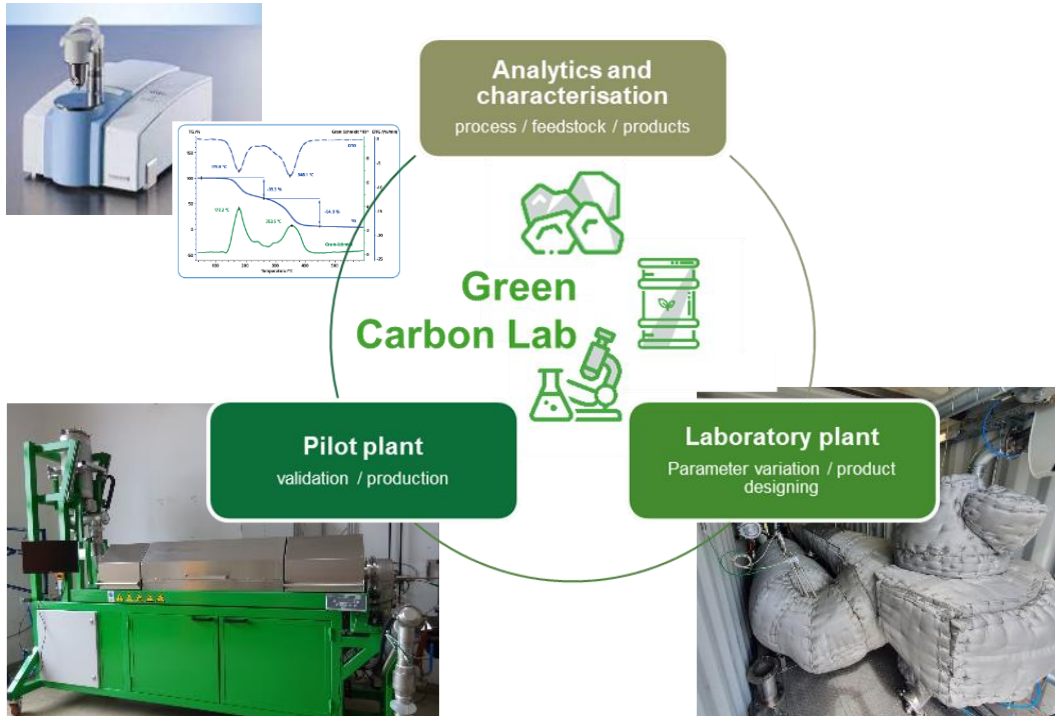


- Method development for **fractionation and staged condensation** of Bio-Oil fractions
- Further development for Bio-Oil **characterisation**





# Hands-on GreenCarbon & Energy in the *GreenCarbon-Lab*



- Feedstock tests
- Pilot Production for application tests
- Technology development
- Energy integration
- Demonstration
- Monitoring



# Our Team

## A1.1 – Thermochemical Technologies



v.l.n.r.: Stefan Martini, Markus Schwarz, Jakob Sarsteiner, Konstantin Moser, Irene Sedlmayer, Franziska Klauser, Elisabeth Wopienka, Manuel Schwabl. Nicht am Bild: Elisa Carlon