



# BEST


Bioenergy and  
Sustainable Technologies



 Bundesministerium  
Innovation, Mobilität  
und Infrastruktur

 Bundesministerium  
Wirtschaft, Energie  
und Tourismus



 Für die  
Stadt Wien



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# GCL Pyro 90: Commissioning of a pilot-scale pyrolysis unit Technology challenges and solutions

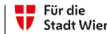
BEST-Wieselburg, 09/23/2025

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# Parties and Interests



## Authority

- Plant should be save, no risk for employees and environment
- Legal requirements are fulfilled



## Operator

- Short time to production
- No additional work or costs
- Few restrictions



## Manufacturer

- Few additional work
- Proud to have new plant delivered and running
- Additional reference plant





# Plant operation and safety documents



- Full documentation of pyrolysis plant
  - Instruction and operation manual including potential failure
  - Technical data
  - List of substances
  - Technical description of plant
  - Piping and Instrumentation diagram
  - Emission of air pollutants and noise
  - Electrical engineering plans
  - ...
- CE Label according to Machinery Directive
  - Coverage whole plant or only single machine
  - Range has to be clear
- explosion protection documents (HAZOP)
  - Pyrolysis plant
  - Raw Material handling
  - Biochar handling

**Don't forget auxiliary units**



# Commissioning efforts and Timeline



- Operation description
  - Machine installation plan
  - Ex- and protection zones
  - Fire safety and escape plan
- Waste management concept
- Approach for energy usage
  
- Operating time
- Selection of raw material
  - natural biogenic substances
  - Waste
- Civil engineer support recommended
  
- Preliminary meeting with district government
- 2 additional meetings with public authorized experts
- Public hearing
  
- Overall 20 documents ~250 pages
  
- Manufacturer had to prepare additional documents on explosion protection



# Additional expenses Emissions of Pollutants

- Impact on air quality has to be neglectable
- Emission measurement
  - 1 or more reference feedstocks
  - reference pyrolysis conditions
  - Typical load
- Dispersion calculation
- Additional costs for operator





# To be considered beyond commissioning...



## Requirements, Standards & Regulations

- VDI 3933:2019 - Emission control  
Production of biochar
- ÖNorm S2211 Plant biochar –  
Source material, quality  
requirements and test methods.
- Technical Committee ISO/TC 238,  
Solid Biofuels and Pyrogenic  
Biocarbon is developing new  
standards
- European Biochar Certificate
- Regulation (EC) No 1907/2006  
REACH
- Transport: UN 1361 CARBON,  
animal or vegetable origin
- ...



# Conclusion & Outlook

- Public authorized experts hesitant because they have no experience with modern pyrolysis plants and traditional plants are well known for high emissions
- Good communication between all parties is necessary
- Young market, level of documentation differs between manufacturer
- We support operators, manufacturer, authority and trade associations to improve commissioning of pyrolysis plants





I'd like to thank you all for your collaboration.