

# Waste gasification in Austria

November 2019



Photo: SYNCRAFT@Werk Beta /  
Vierschach / South Tyrol / Italy

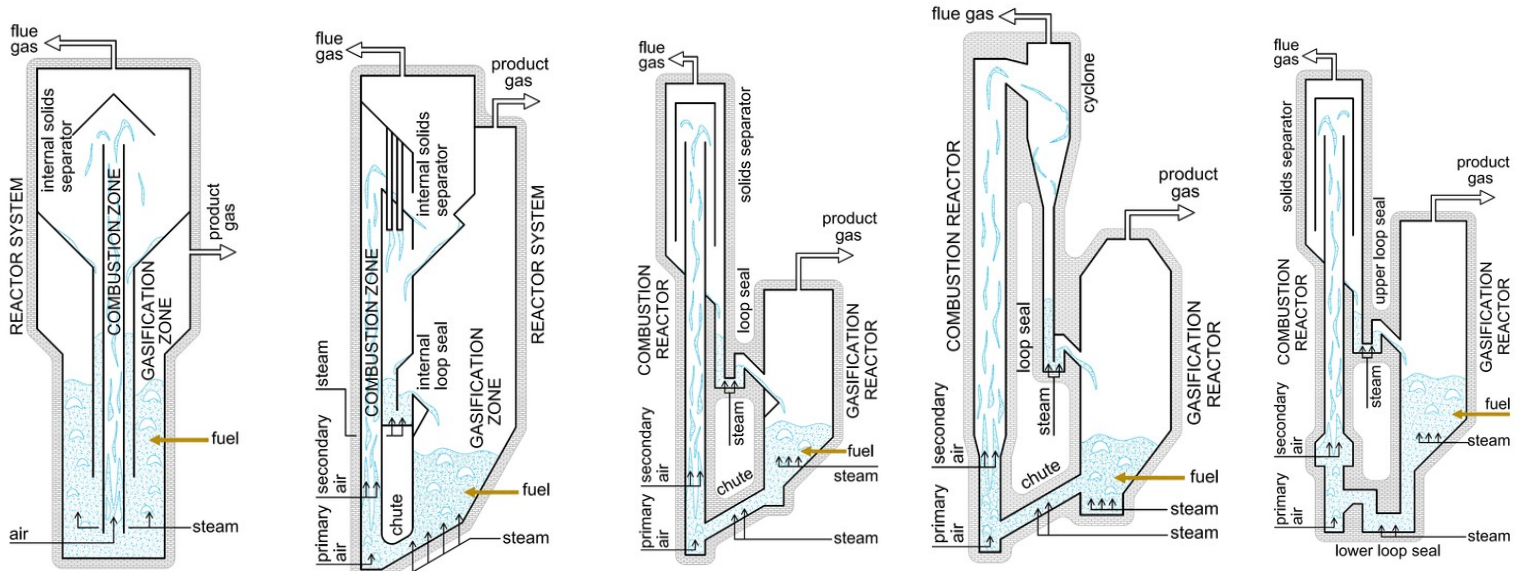
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University of Natural Resources and Life Sciences Vienna  
(BOKU)

# Content

- Research on gasification of waste in Austria (TU, BOKU)
- Waste wood operational tests (SynCraft)
- Municipal waste gasifier (GET)

# Research at Vienna University of Technology – Development of dual fluidized bed



1993

1995

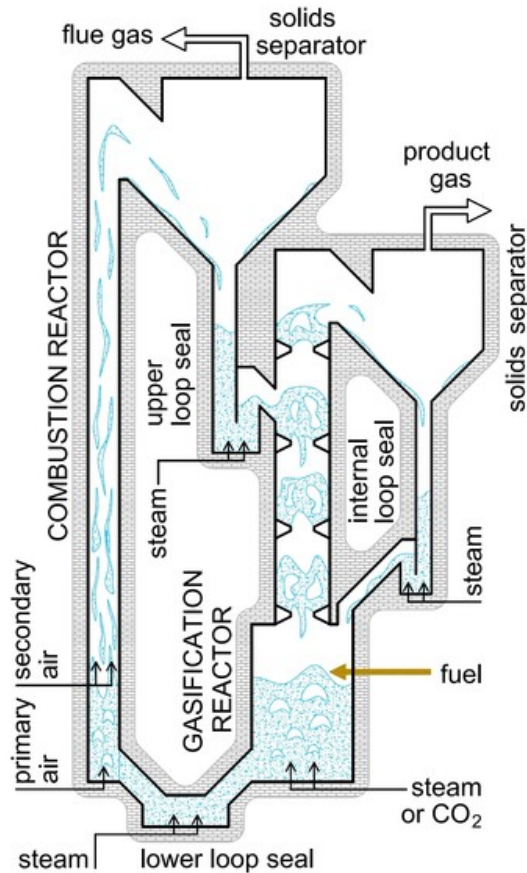
1999

2001

2003

Source: Schmid J.C. 2016

# Research at Vienna University of Technology – Development of dual fluidized bed



Source: Schmid J.C. 2016



## Results with the 100 kW test plant at TU Wien:

- Development and research on novel gasification processes
- Measurement results and data validation with simulation tool
- Detailed process knowledge with various fuel types and fuel mixtures
- Data for the design of gas cleaning equipment
- Scaling possibility to industrial sized plants, minimizing of technological risks

# Fuel flexibility



Source: Schmid J.C. 2015

# Project VergRestWert

- Within this project an alternative bed material should be found and tested in different pilot plant scales. A better understanding of ash related behavior in dual fluid gasification systems should be gathered. The utilization of low quality fuel with bad ash melting properties should be demonstrated by using chicken litter.
- Char-rich and nutrient rich biomass ash should be evaluated on the utilization as BioChar as a fertilizer. The economic efficiency for industrial scale plants considering the changes in operation, raw materials and products should be evaluated. An economic evaluation will underline the importance of this technology.

## Project partner and financial support:

- Bioenergy 2020+ GmbH
- REPOTEC GmbH & Co KG

bioenergy2020+

repotec  
renewable power technologies

# University of Natural Resources and Life Sciences

## Project: Flash

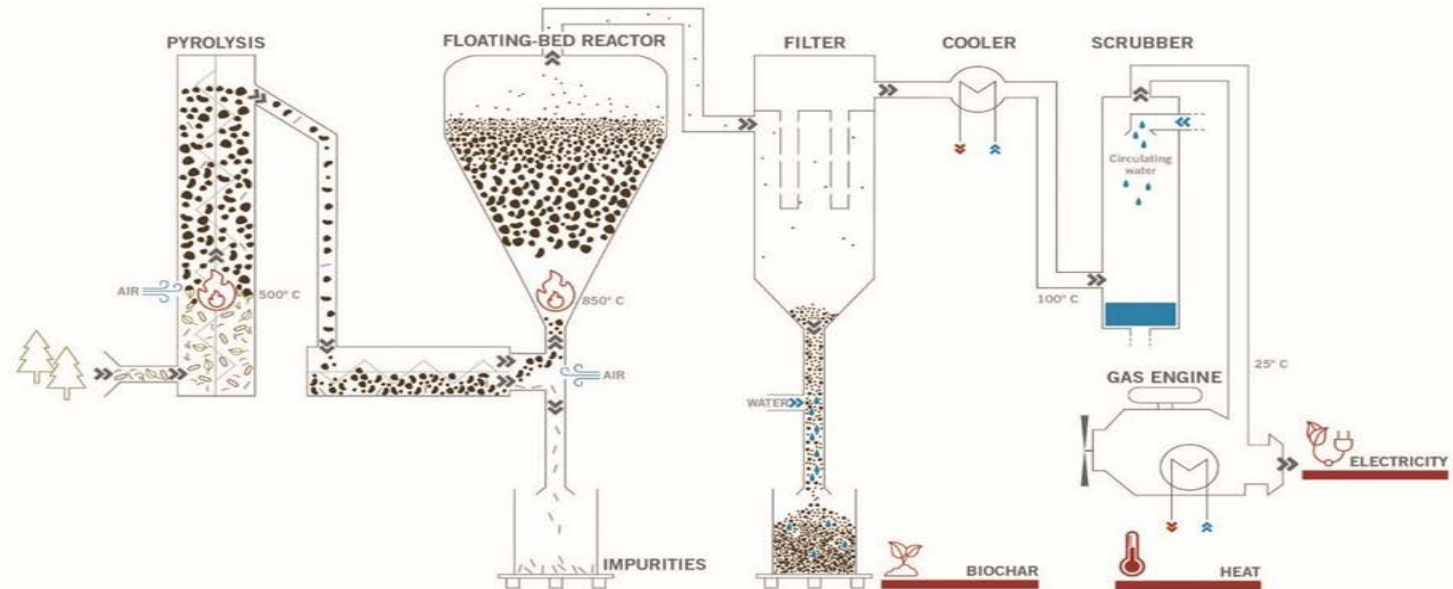
Determination of ash melting behavior (ash melting temperature, ash viscosity) for high temperature gasification.

Increase the fundamental understanding of ash properties and behavior in thermal systems and particularly under reducing conditions. Development of methods and models to predict ash behavior.

BOKU:

- Ash melting tests of artificial and real ash mixtures
- Measurement of ash viscosity and development of a model to predict ash viscosity based on ash composition

# Small scale gasification by Syncraft



- Floating fixed bed technology
- The charcoal makes the difference – considerable additional earnings due to valuable product
- Now 7 facilities in operation and
- 8 facilities under construction/commissioning



# Waste wood – operational tests by SynCraft

- Waste wood
  - Tar (no issue, less lignin than forest wood)
  - Impurities (high content of stones and nails)
- Pre-treatment (huge difference in pretreatment steps)
- Contaminants (heavy metals, Cl, S, N)
- Emissions (dust, NO<sub>x</sub>, S-desulfurization before engine)



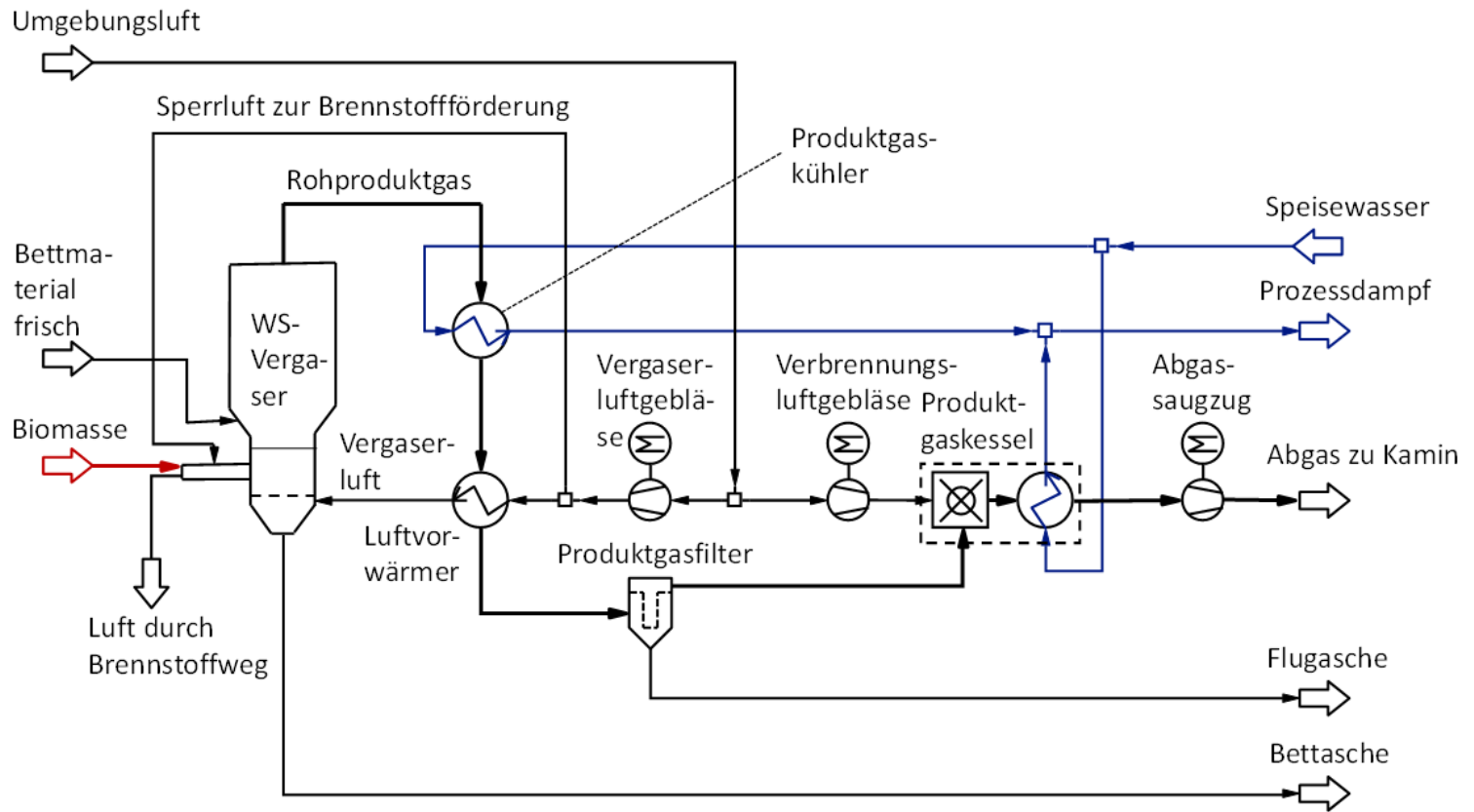
TEST RESULTS WITH BEGINNING 2020

# Municipal garbage gasification with Tough Gas Gasifier – Hebei Tianlang



\*) technology and economical feasibility of drying unit has to be evaluated within the feasibility study.

# Municipal garbage gasification with Tough Gas Gasifier – Hebei Tianlang



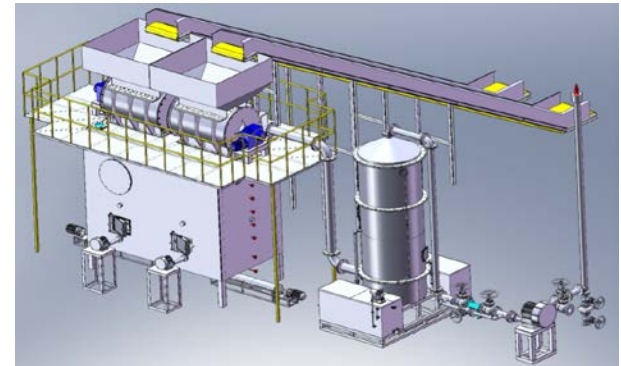
# Technical key figures

## Input Data:

- 50 t per day municipal garbage with 40% water content

## Estimated performance of the gasifier:

- Gas amount: 1500 – 2000 Nm<sup>3</sup>/h with a heating value of about 6 MJ/Nm<sup>3</sup>
- Heat capacity of the fuel: 4 MW
- Electrical Output: 1 MW
- Thermal Output: 2-2,5 MW



# Estimated investment costs

**Tough Gas gasifier** (incl. primary gas cleaning unit and burning in combustion chamber – without heat utilization!):

- About 7-9 Mio. EUR

**Gas utilization with CHP - gas engine** (incl. advanced gas cleaning unit):

- About 2-3 Mio. EUR

Remarks:

- Estimated investment costs are based on West-European suppliers
- Costs for engineering aren't included within this figures



bioenergy2020+ Changed name to

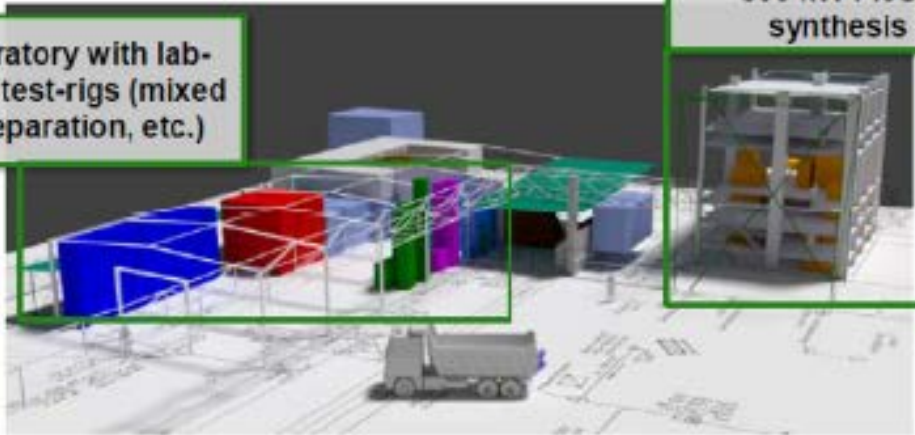


## 1 MW DFB gasification + synthesis: Waste2Value

New research location at industrial site *Simmeringer Halde*

1 MW DFB gasification demonstration plant (improved reactor design) + 300 kW Fischer-Tropsch synthesis pilot plant

Research laboratory with lab-scale synthesis test-rigs (mixed alcohols, H<sub>2</sub> separation, etc.)



## Waste2Value development at industrial-site

Waste sorting/  
waste recovery



**Waste2Value demonstration:**

- DFB gasification of waste and residues
- Fischer-Tropsch
- H<sub>2</sub> production
- Methanation
- Mixed alcohols
- Burnable gas for direct substitution of fossil fuels
- etc.

*Thank you for  
your attention*

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