



Oxyfuel Combustion for Sustainable Waste-to-Energy Applications: Pilot Testing at 1 MW_{th} Scale

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Accelerating Energy Sector Decarbonization through Waste-Derived Fuels and CCS Technology

> **LBUISE REBECCA**



PILOT PLANT @ EST



- **1 MW_{th} Combustion Reactor**
- Inner diameter: 600 mm
- Outer diameter:
- Height:

1300 mm 8600 mm

- Fuel feed:
- Solid inventory: ~ 130 kg
- Superficial velocity: 3 – 7 m/s



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1. Investigation of Co-Combustion







Decrease of bed pressure

Shift of combustion zone

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3. Investigation of Oxyfuel-Combustion



EXPERIMENTAL SET-UP: MATERIALS







RESULTS: HYDRO- & THERMODYNAMICS



Grace Diagram (acc. to Kunii & Levenspiel²)



RESULTS: FLUE GAS COMPOSITION



CO₂ and O₂ measurements



CO and CH₄ measurements

Regression, Slope = -0.08, $R^2 = 0.42$ CO in flue gas 0.9 CH, in flue gas Regression, Slope = -0.00, R² = 0.270.8 CO / CH⁴ [Vol.-%] 0.6 0.4 0.5 0.4 0.3 0.2 0.1 27 28 29 30 31 25 26 32 24 O₂ inlet [Vol.-%]

NO_x and SO₂ measurements



- Increase of CO₂
- Increase of O₂

- Decrease of CO
- Low CH₄

- Slight increase of NO_x
- Constant SO₂

SUMMARY & OUTLOOK





Successful pilot tests of Oxyfuel combustion with SRF were conducted at 1 MW_{th} scale



Proof of possibility for transition from air to oxyfuel combustion in an exisiting plant



Valuable results regarding fouling and corrosion gathered (Presentation V. Barisic)

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THANK YOU FOR YOUR ATTENTION

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