

# ) SINTEF

#### Chemical-Looping Combustion for Sustainable Waste-to-Energy Applications: Pilot Testing at 150 kW<sub>th</sub> and 1 MW<sub>th</sub> Scale

Philipp MOHN

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

> **LBUISE REBECCA**



Technische Universität Darmstadt | Energy Systems & Technology | Prof. Dr.-Ing. B. Epple

## SCALING CLC OF WASTE





TECHNISCHE UNIVERSITÄT DARMSTADT



#### **EXPERIMENTAL SET-UP: PILOT PLANTS**







#### **EXPERIMENTAL SET-UP: PILOT PLANTS**







#### **EXPERIMENTAL SET-UP:** MATERIALS







Accelerating Energy Sector Decarbonization through Waste-Derived Fuels and CCS Technology / P. Mohn Technische Universität Darmstadt | Energy Systems & Technology | Prof. Dr.-Ing. B. Epple

6

### **RESULTS: HYDRO- & THERMODYNAMICS**





#### **RESULTS: OXYGEN DEMAND FOR ALL CONDUCTED EXP.**





Oxygen demand: Fraction of fuel combustion in the post-oxidation step



#### **RESULTS: CARBON CAPTURE EFFICIENCY**



Carbon capture efficiency: Fraction of fuel carbon captured



## **SUMMARY & OUTLOOK**







Aligned pilot tests of CLC with waste were conducted at 150 kW<sub>th</sub> and 1 MW<sub>th</sub> scale



Process showed consistent behavior across these scales, which supports the reliability of pilot data for further scale-up



As main performance driver, fuel reactor temperature was observed