

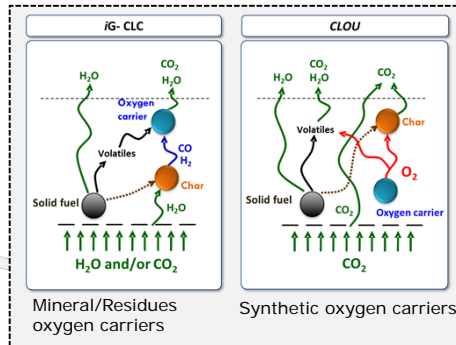
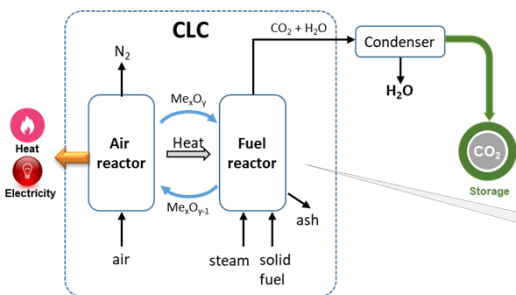
1.5 kW_{th} CL unit for SOLID fuels

The 1.5 kW_{th} unit was built in 2008 to test oxygen carriers with solid fuels including both fossil and renewable fuels. It has been used for the testing of oxygen carriers valid for three processes including *in situ* gasification-Chemical Looping Combustion (*ig*-CLC), Chemical Looping with Oxygen Uncoupling (CLOU) and Chemical Looping Gasification (CLG).



The fuel feed was carried out by means of a double screw-feeder. It is possible to control and measure the solids circulation rate. This unit is fully equipped to analyze tar production (tar protocol), as well as other impurities such as H₂S, NH₃, NO_x, Hg_x, etc

Chemical Looping Combustion

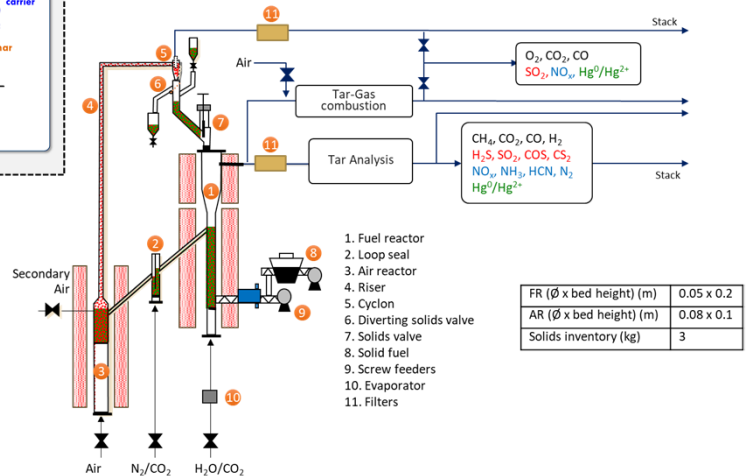
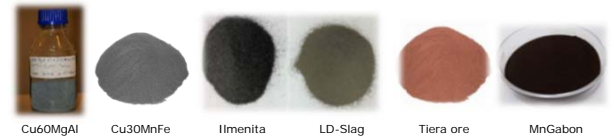
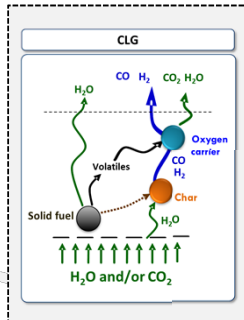
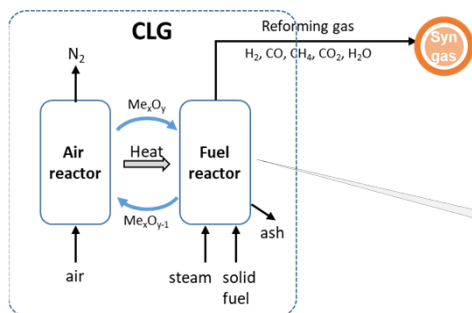


Fuels Coal, Pine, Olive stones, Almond shells



Oxygen carriers	
Synthetic	Low cost
Cu15, Cu60MgAl, Cu30MnFe	Ilmenite
CuMn	Tierga (iron ore)
Fe20Al	LD Slag
MnFeTi	MnGabon

Chemical Looping Gasification



► More than **2000 h** of operational experience (≈60% world hours)

FR (∅ x bed height) (m)	0.05 x 0.2
AR (∅ x bed height) (m)	0.08 x 0.1
Solids inventory (kg)	3

MILESTONES

Proof of concept of CLOU in fluidized beds

First CLG operation with oxygen supply control in AR

2000

2005

2010

2015

2020

2025

First biomass-fuelled CLOU in a continuous unit

NEGATIVE CO₂