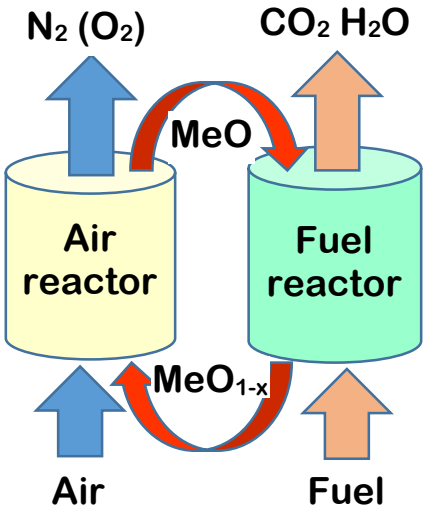
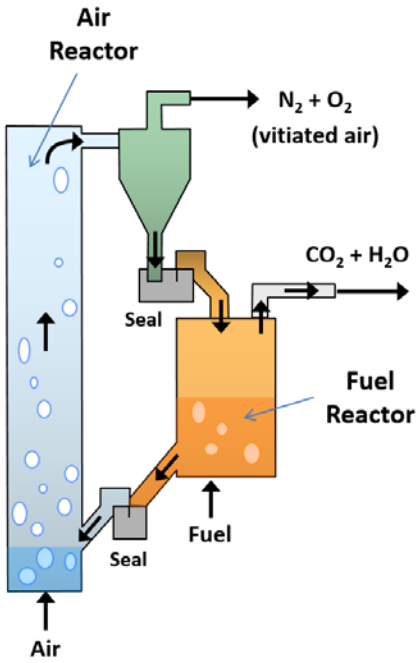
CO_2 Capture with Chemical-Looping Combustion (CLC)

Anders Lyngfelt



PRINCIPLE

metal oxide (MeO) transfers oxygen from air to fuel



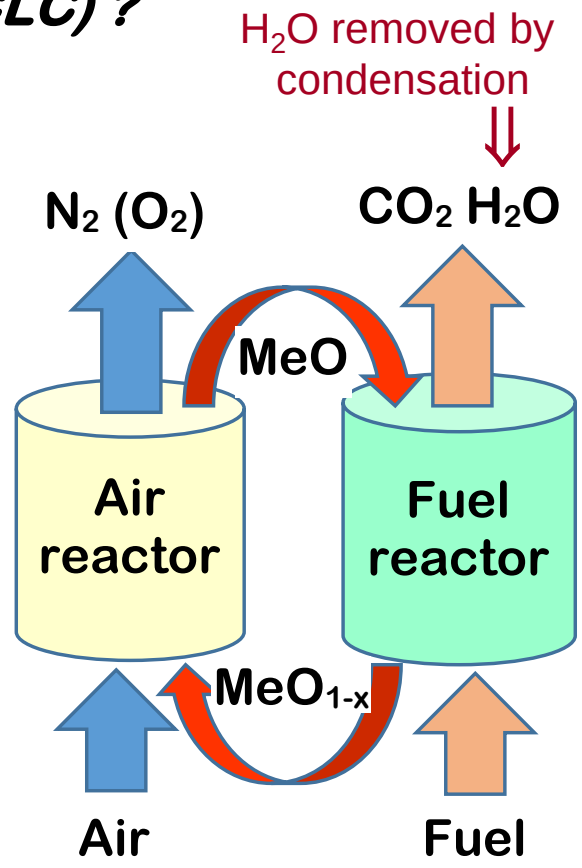
PRACTICE

fluidized-bed technology

PURPOSE

Why chemical-looping combustion (CLC) ?

Oxygen is transferred from air to fuel by metal oxide particles



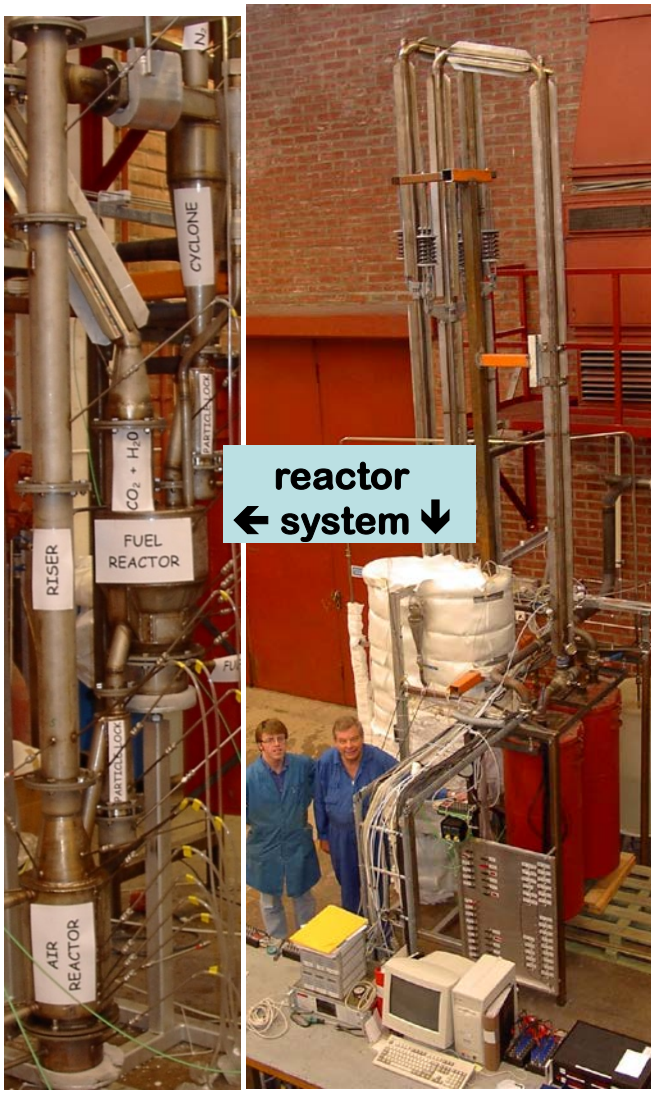
Inherent CO_2 capture:

- fuel and combustion air *never mixed*
- *no active gas separation needed*
- large costs/energy penalties of gas separation avoided

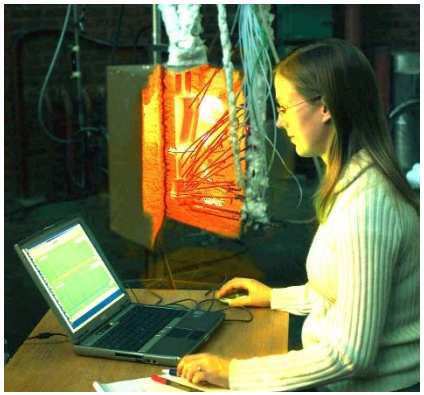
- **Potential for real breakthrough in costs of CO_2 capture**

But does it work in practice ??

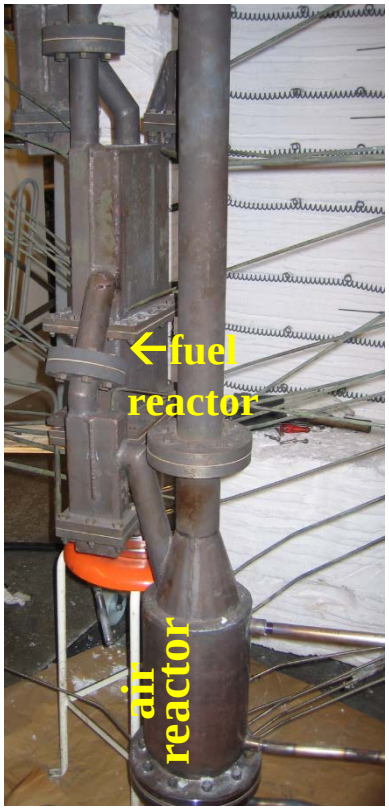
YES, IT WORKS !



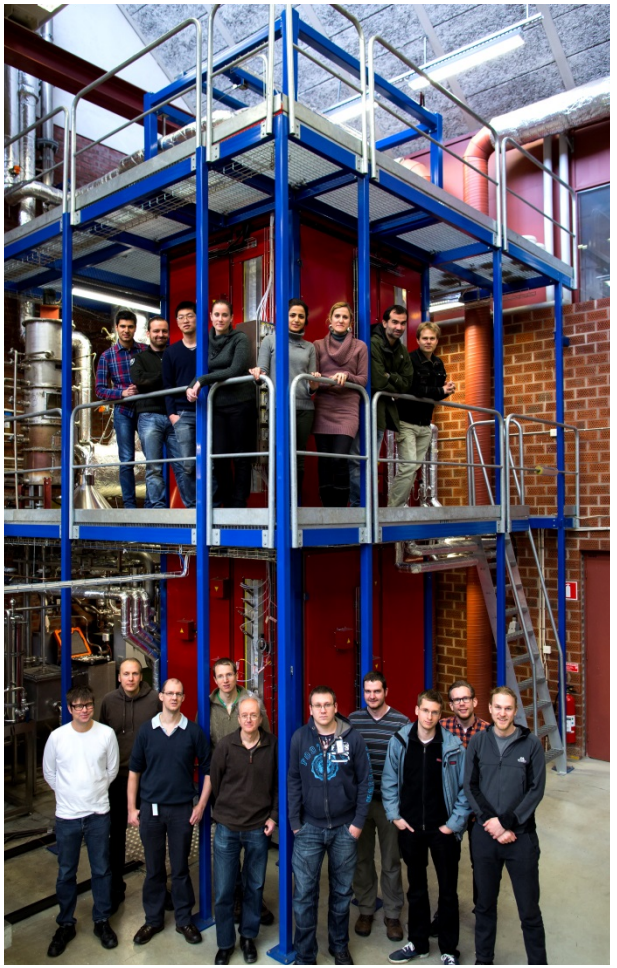
10 kW gas, 2003



300 W gas, 2004



10 kW solid fuel, 2006

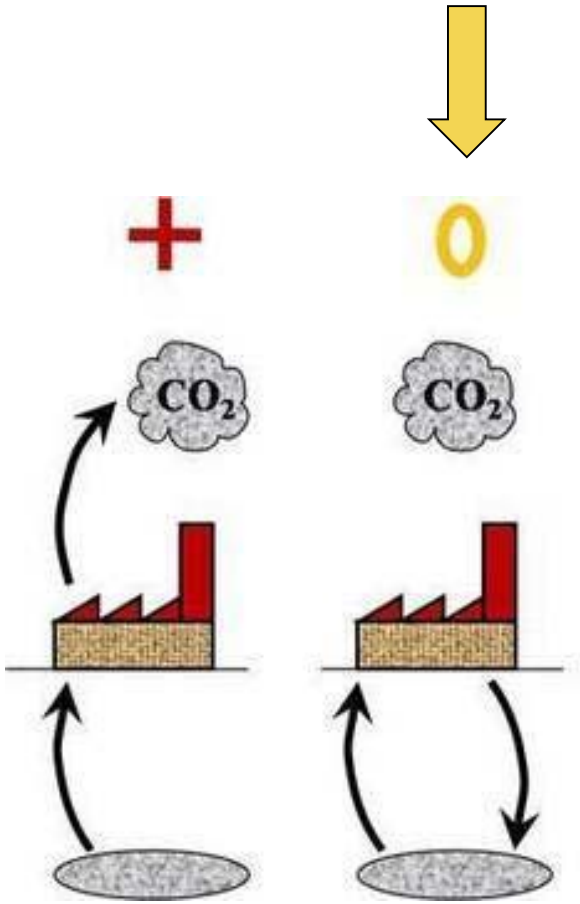


100 kW solid fuel, 2011

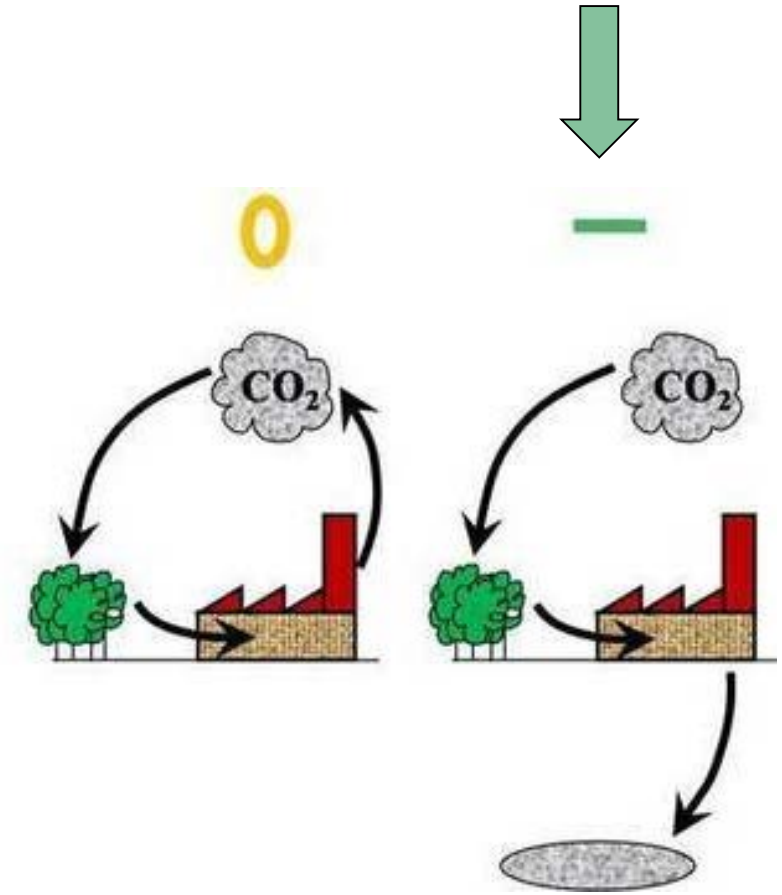
Total operation at Chalmers: 3700 h

Options for CLC

Capture CO_2 from fossil fuel combustion, (or hydrogen production)



Capture CO_2 from air with biomass combustion, (negative emissions)



Need for negative emissions ??

Carbon budget for max 1.5ºC and 2ºC :

200 and 800 Gton CO_2

Emissions today >35 Gton/yr :

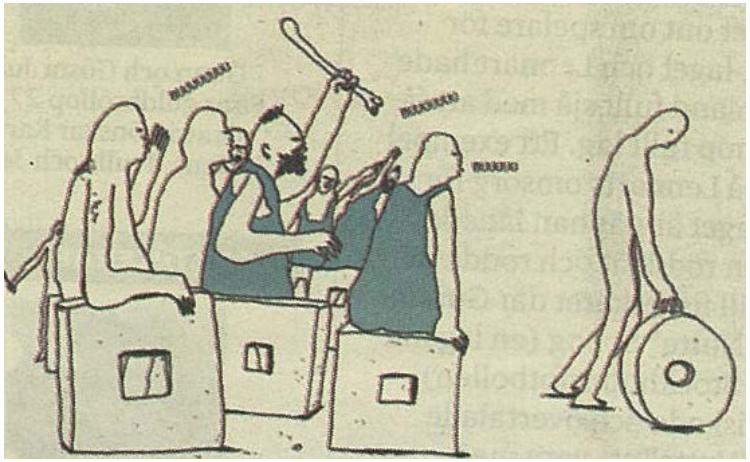
>>> 6 - 25 years left of todays emissions

<u>Negative emissions</u> will be needed to meet climate targets

Tobias Mattisson

Magnus Rydén

THANK YOU !



Carl Linderholm

Anders Lyngfelt

>300 CLC publications and 7 CLC songs at:

http://www.entek.chalmers.se/lyngfelt/co2/co2.htm