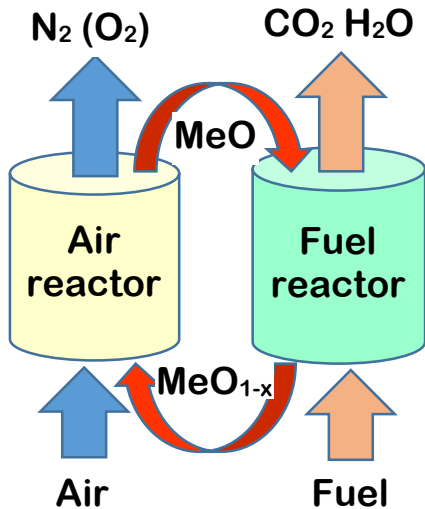


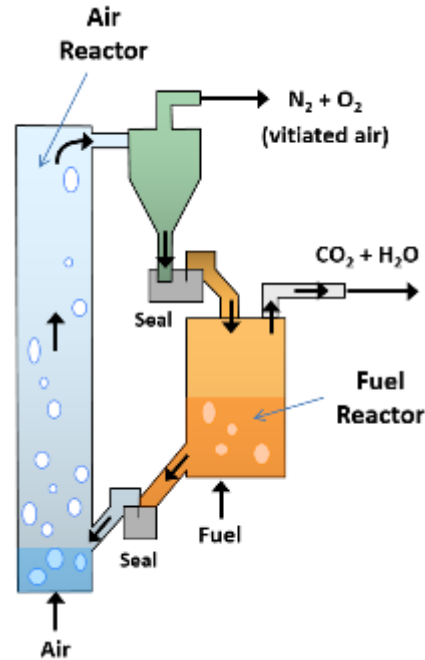
CO₂ Capture with Chemical-Looping Combustion (CLC)

Anders Lyngfelt



PRINCIPLE

metal oxide (MeO)
transfers
oxygen from
air to fuel



PRACTICE

fluidized-bed
technology



PURPOSE

Why chemical-looping combustion (CLC) ?

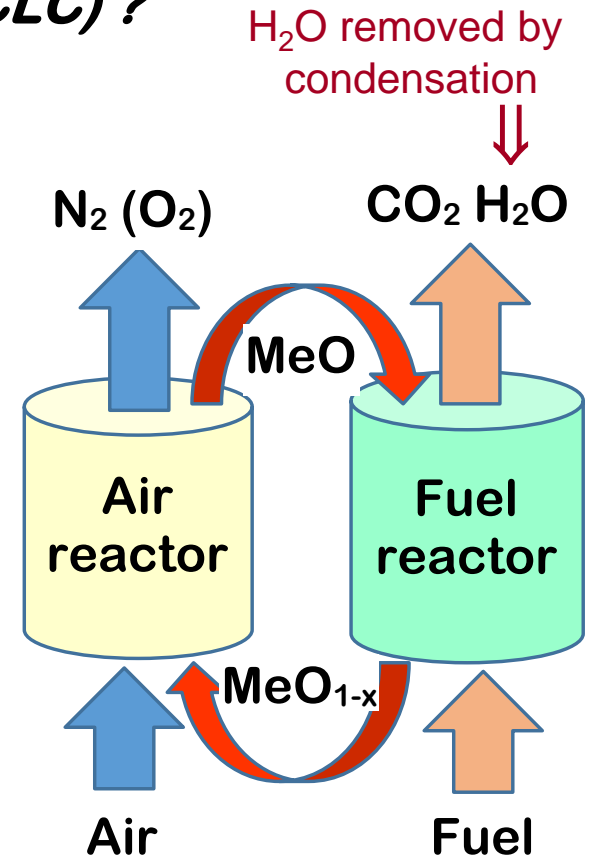
Oxygen is transferred from air to fuel by metal oxide particles

Inherent CO₂ capture:

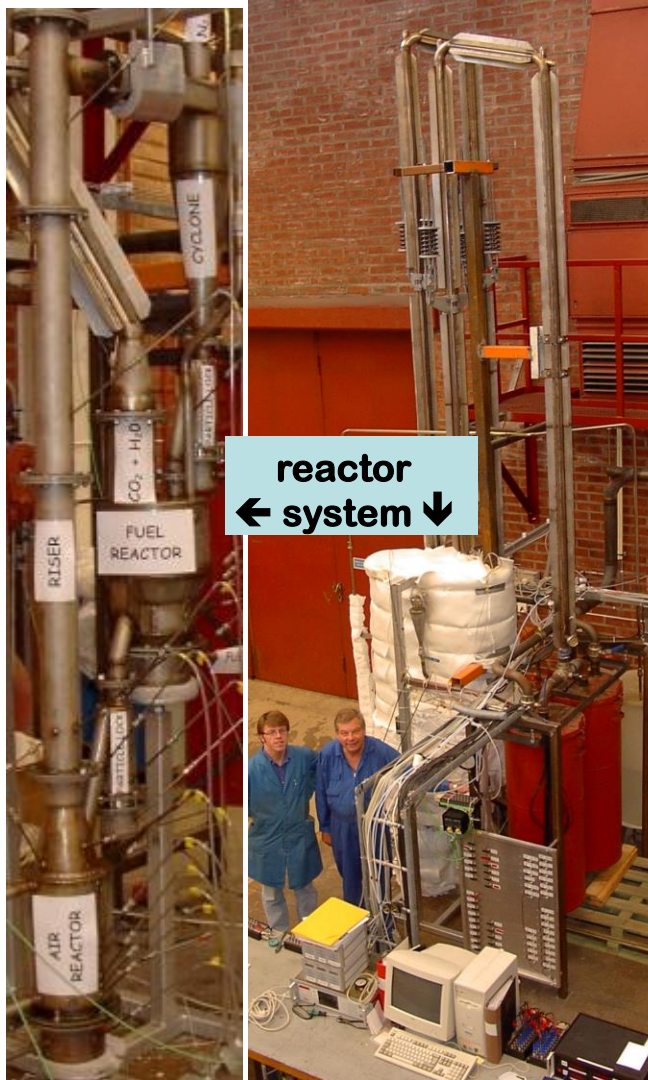
- fuel and combustion air *never mixed*
- *no active gas separation needed*
- large costs/energy penalties of gas separation avoided

- **Potential for real breakthrough in costs of CO₂ capture**

But does it work in practice ??



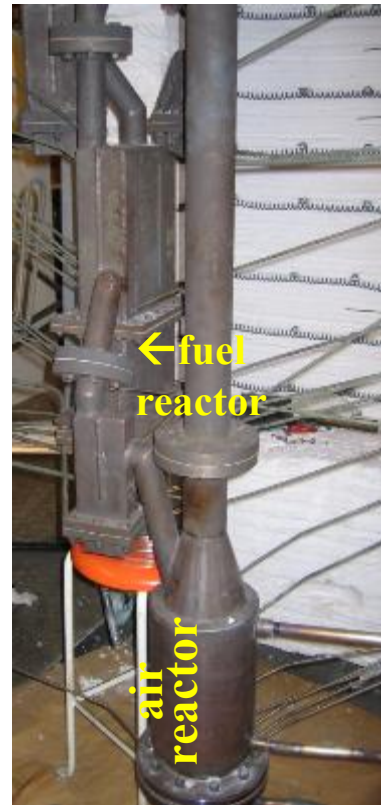
YES, IT WORKS !



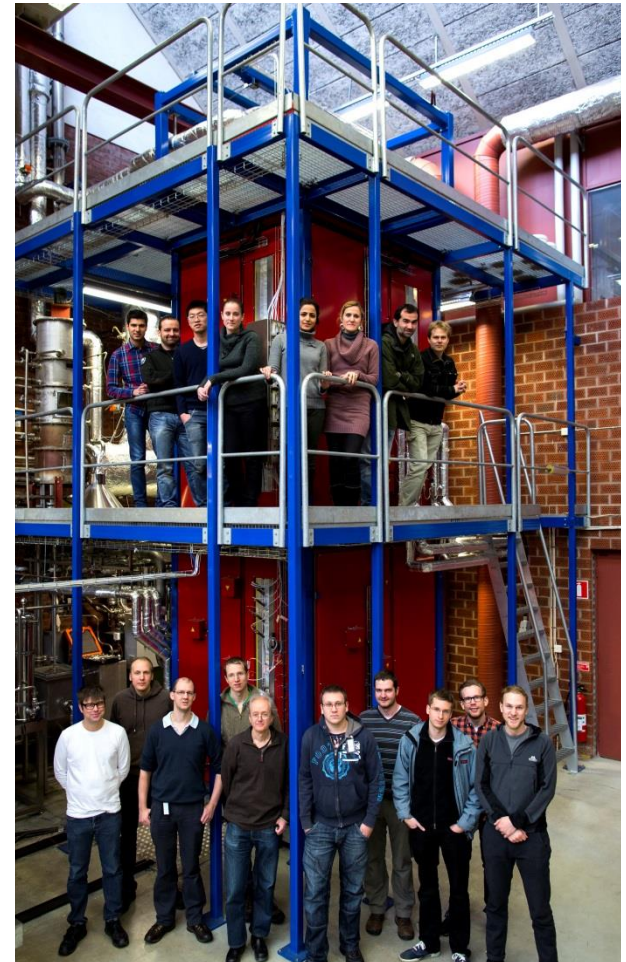
10 kW gas, 2003



300 W gas, 2004



10 kW solid fuel, 2006

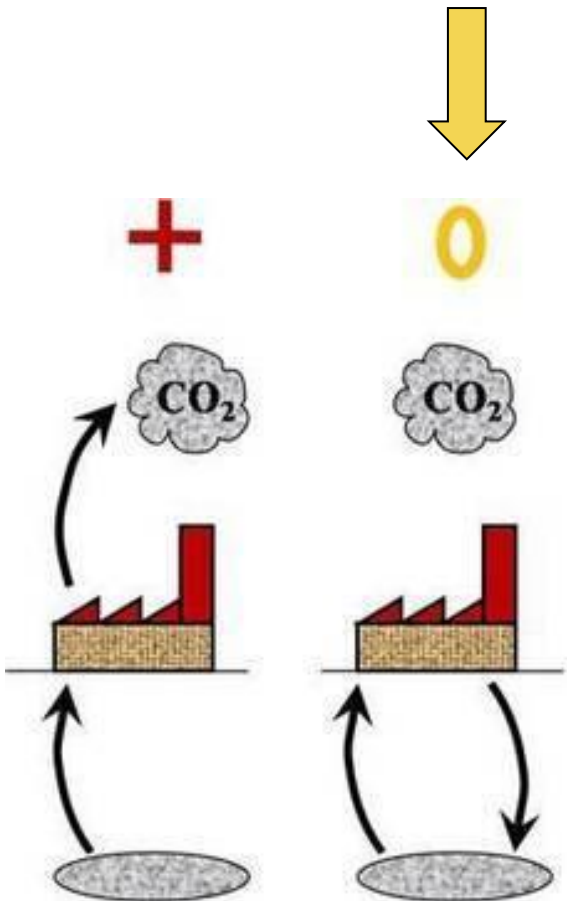


100 kW solid fuel, 2011

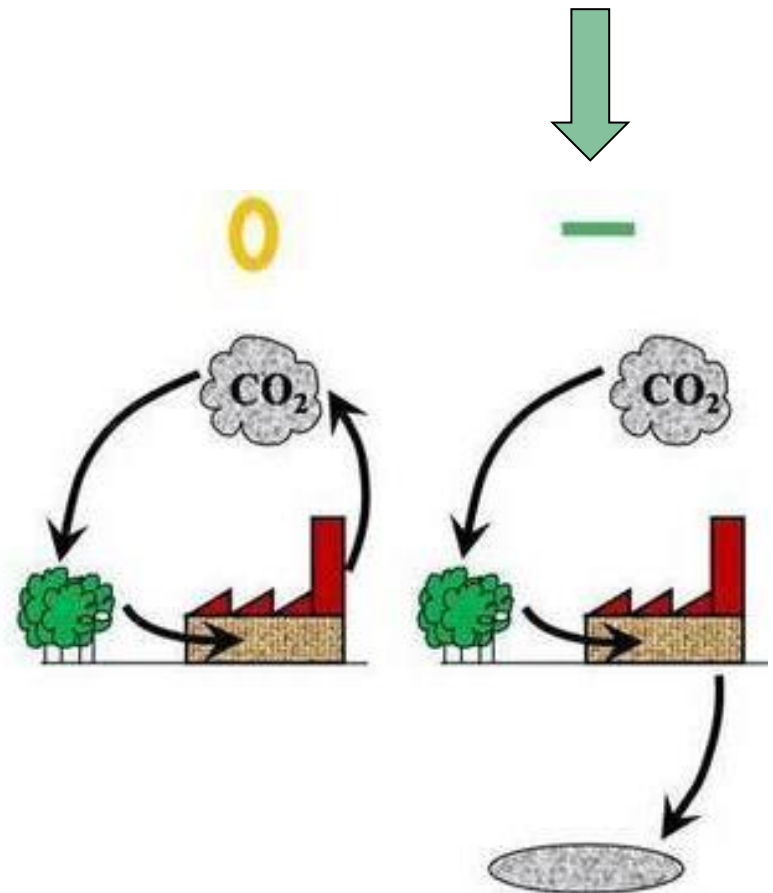
**Total operation
at Chalmers:
3700 h**

Options for CLC

Capture CO₂ from fossil fuel combustion, (or hydrogen production)



Capture CO₂ from air with biomass combustion, (negative emissions)



Need for negative emissions ??

Carbon budget for max 1.5°C and 2°C :

200 and 800 Gton CO₂

Emissions today >35 Gton/yr :

>>> 6 - 25 years left of today's emissions



Negative emissions will be needed to meet climate targets

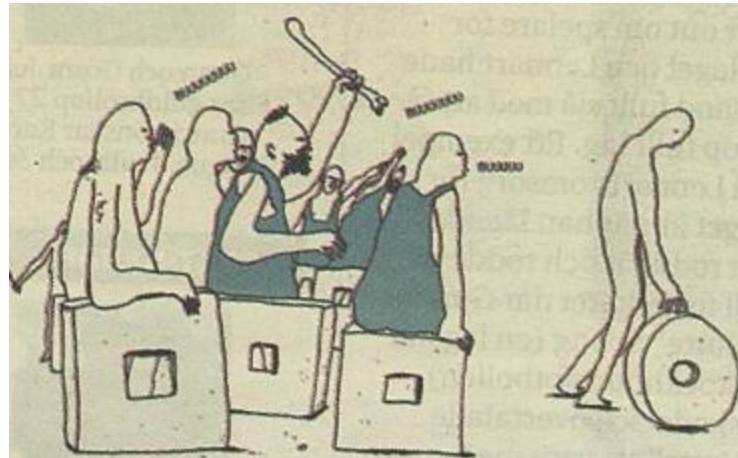
THANK YOU !



Tobias
Mattisson



Magnus
Rydén



Carl
Linderholm



Anders
Lyngfelt

>300 CLC publications and 7 CLC songs at:

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