



The Endex Reactor demonstrator project  
for low cost carbon capture at Stainforth.  
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# Reducing carbon capture cost from first principles



## Reduce CAPEX

- CO<sub>2</sub> @ 40% not 4% ✓
- High pressure ✓
- High temperature ✓
- Sorbent quantity small ✓
- Many light cycles ✓
- No change to GT ?
- Thus Precombustion ✓
- Add 2<sup>nd</sup> application ✓

## Maintain Efficiency

- Equilibrium sorption ✓
- Recycle waste heat ✓
- Upgrade GT efficiency ✓
- COT < T < TIT°C ✓

## Lower Operating cost

- Sorbent cheap ✓
- Sell lime - no waste ✓
- Low manpower ✓
- Stable & flexible ✓

# Endex Reactor principles

Temp ~750 deg C

## Decarboniser

- Press. 10 - 40bar
- Steam from HRSG
- Sorbent & catalyst

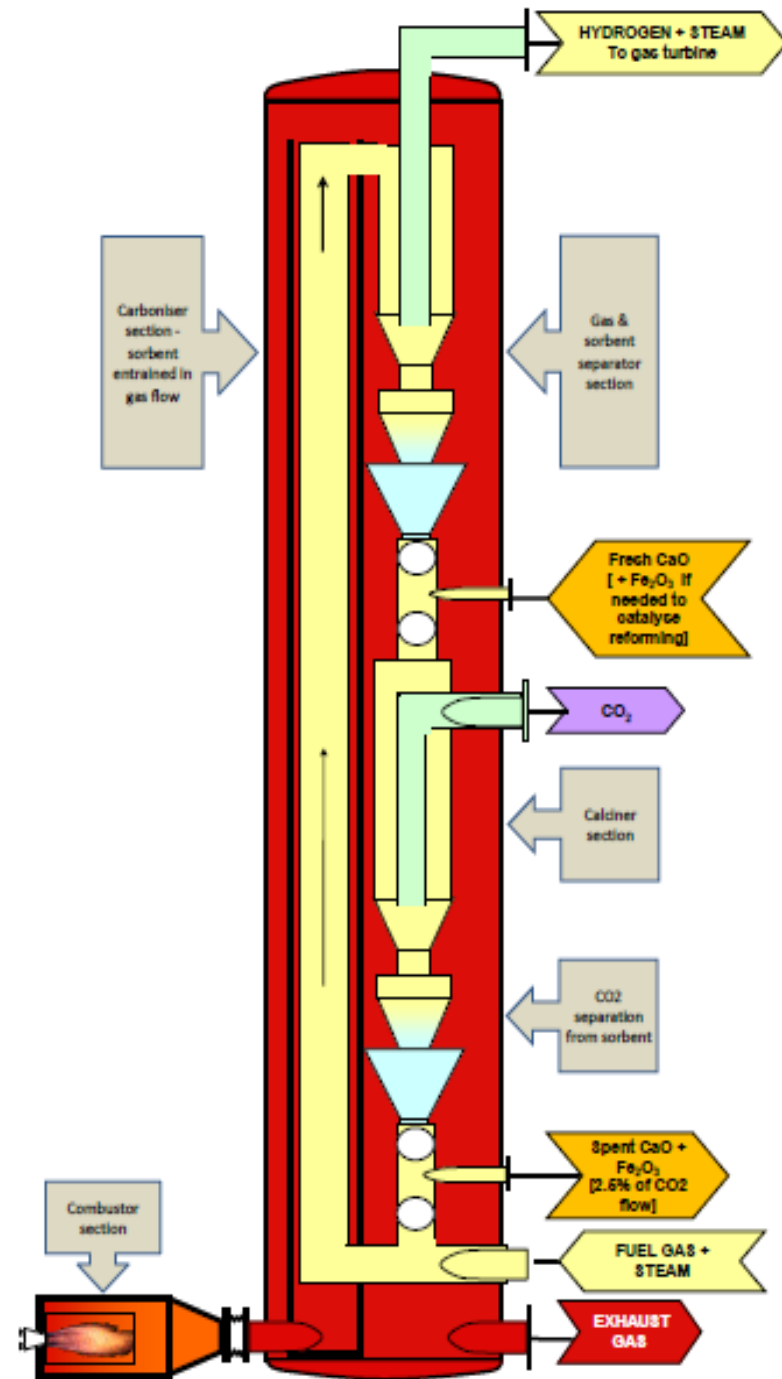
## Calciner

- Press. 1-2 bar

**Combustor** by air addition to fuel stream

**GT** burns  $H_2$  with steam; low NOX, high efficiency

**CO<sub>2</sub>** superheats steam



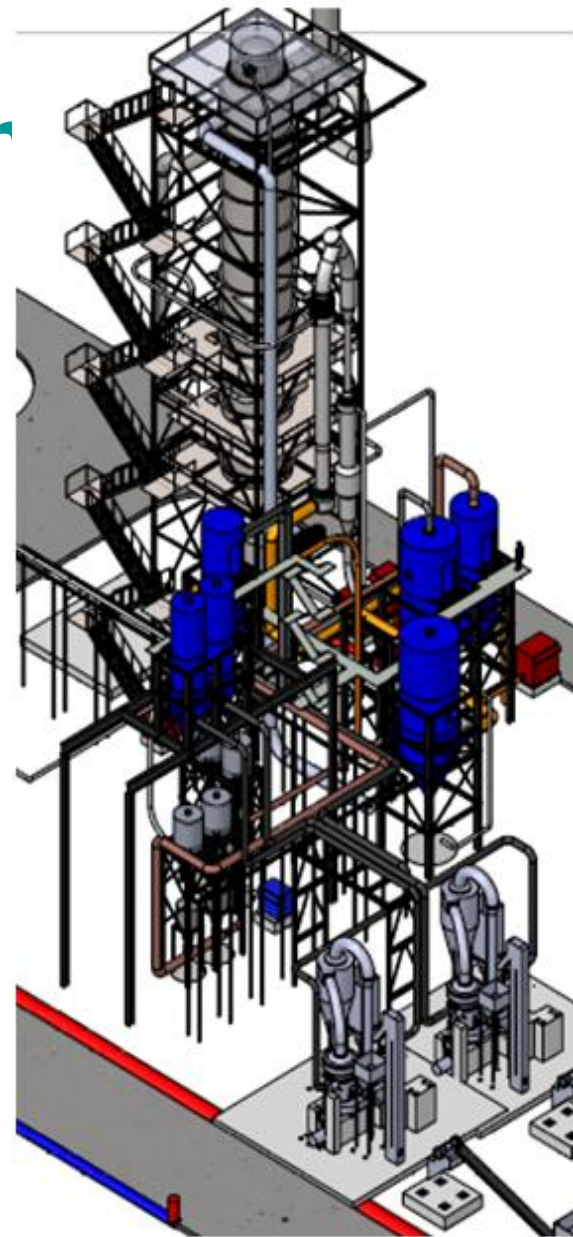
# Project description

## INPUTS

- Natural gas feed to Endex reactor
- Limestone,  $\text{Fe}_2\text{O}_3$
- Water & air
- Small footprint, 2ha/GW

## OUTPUTS

- ~2MWe from gas turbine
- $\text{CO}_2$ , lime, water vapour,  $\text{N}_2$



# Findings and follow up

- Show substantial GT performance upgrade
- Flexibility, optimisation, design parameters
- Integration issues, future gas turbines
- Lay out the path to “target zero” in 2020
- Apps for Endex – hydrogen, industry, other
  - for capital cost spread
- 2<sup>nd</sup> demo ~60MWt in 2016 & then multiples
  - Full scale in 2017/18
- Thank you TSB & DECC for your support