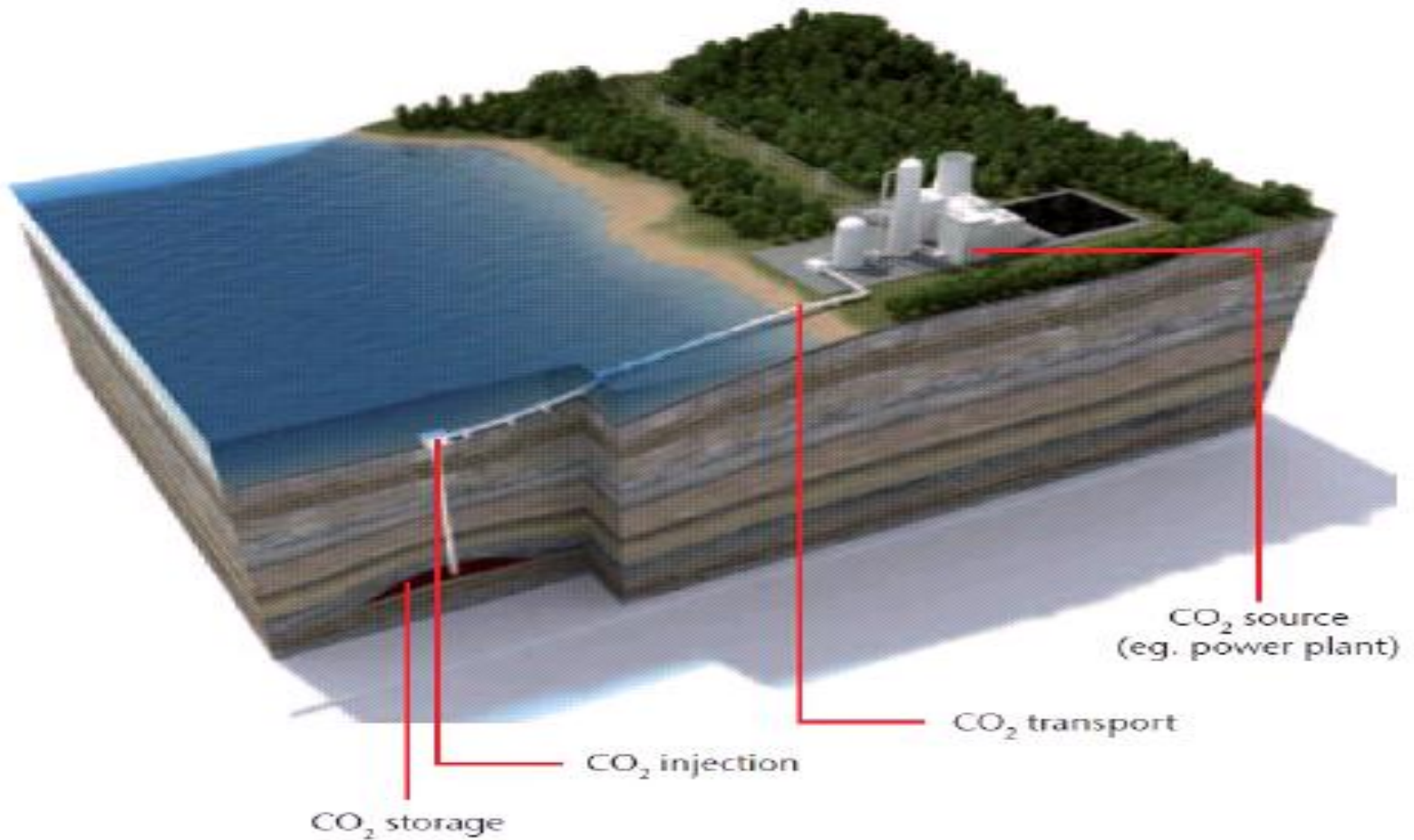


Does CCS Have Any Future in The Gas Industry?

CO₂ Transport

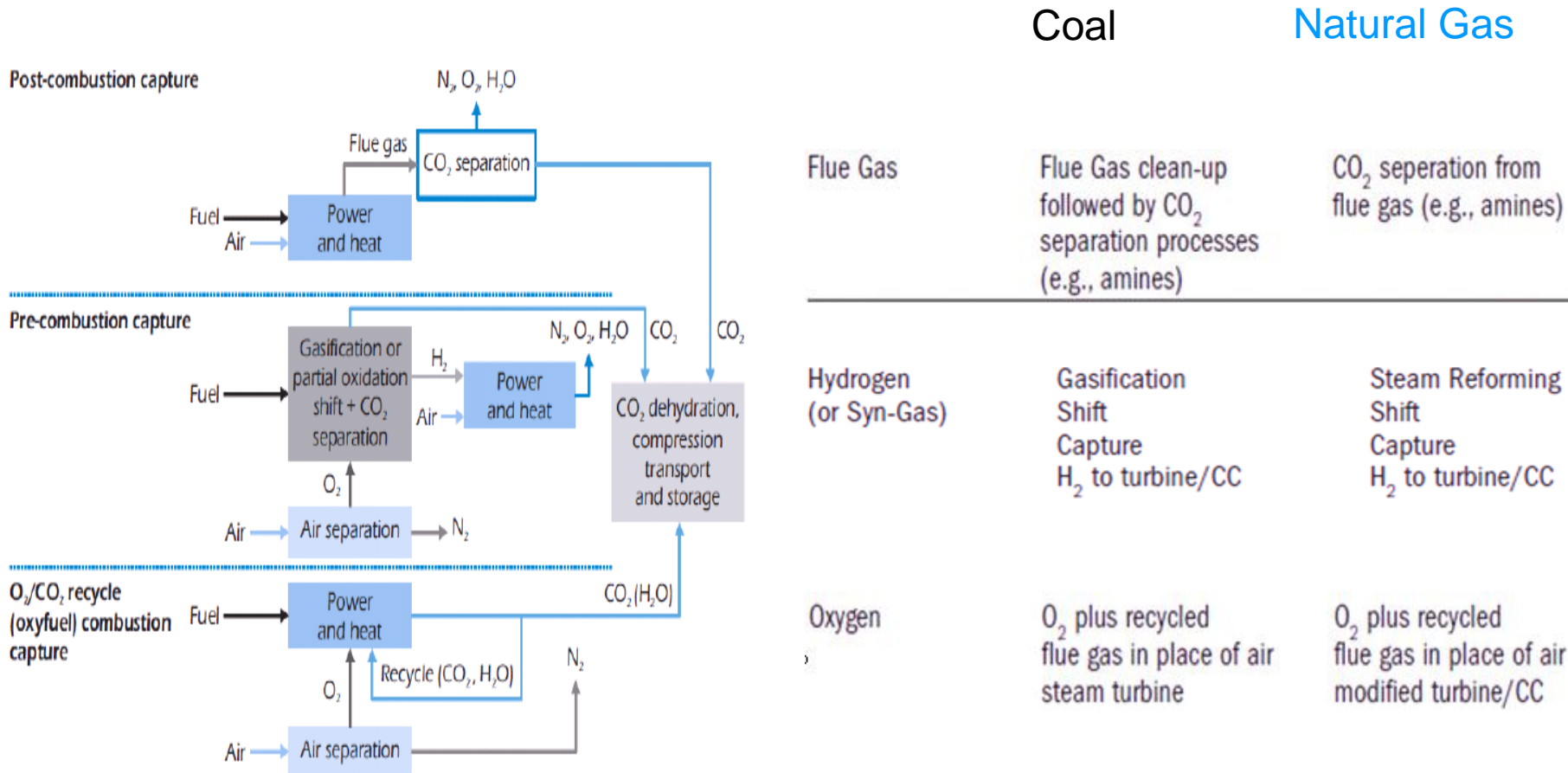
CCS scheme



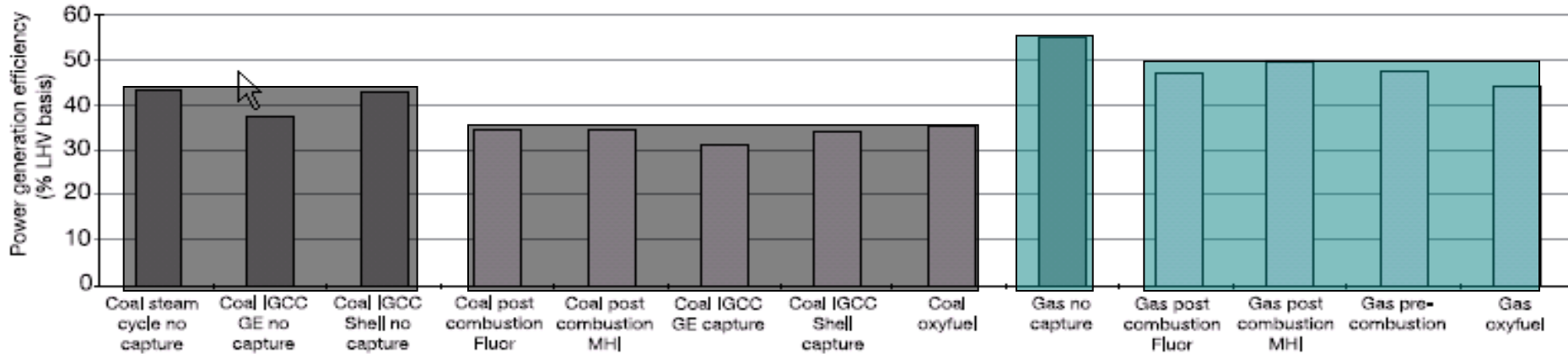
Combustion processes for Power Generation

- Pulverized Coal
- Natural Gas Combined Cycle Low CO₂ pressure in Flue gas
Existing Technology
- Integrated coal Gasification Combined Cycle
- Oxy Combustion High CO₂ pressure in Flue gas
Improvement in Processes

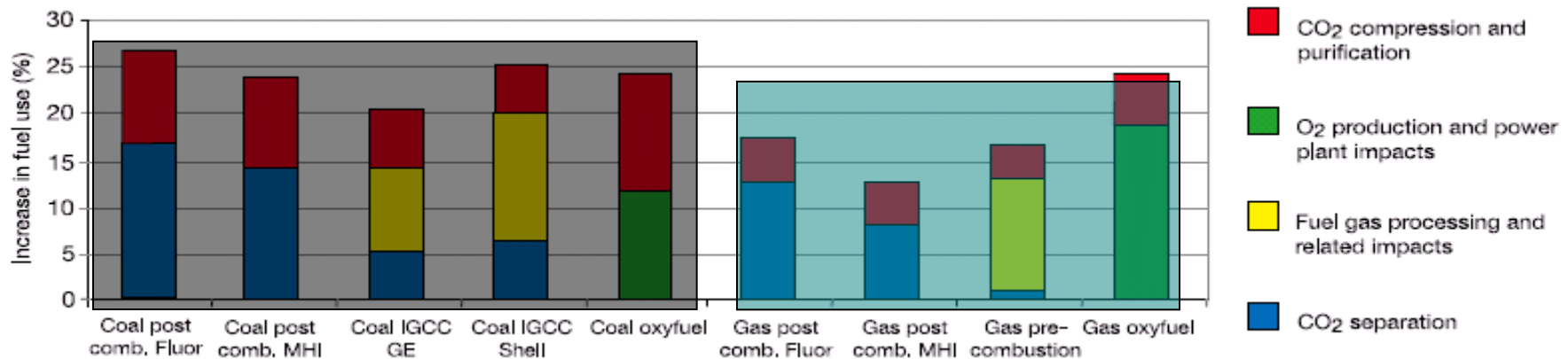
Capture processes



Natural gas vs coal

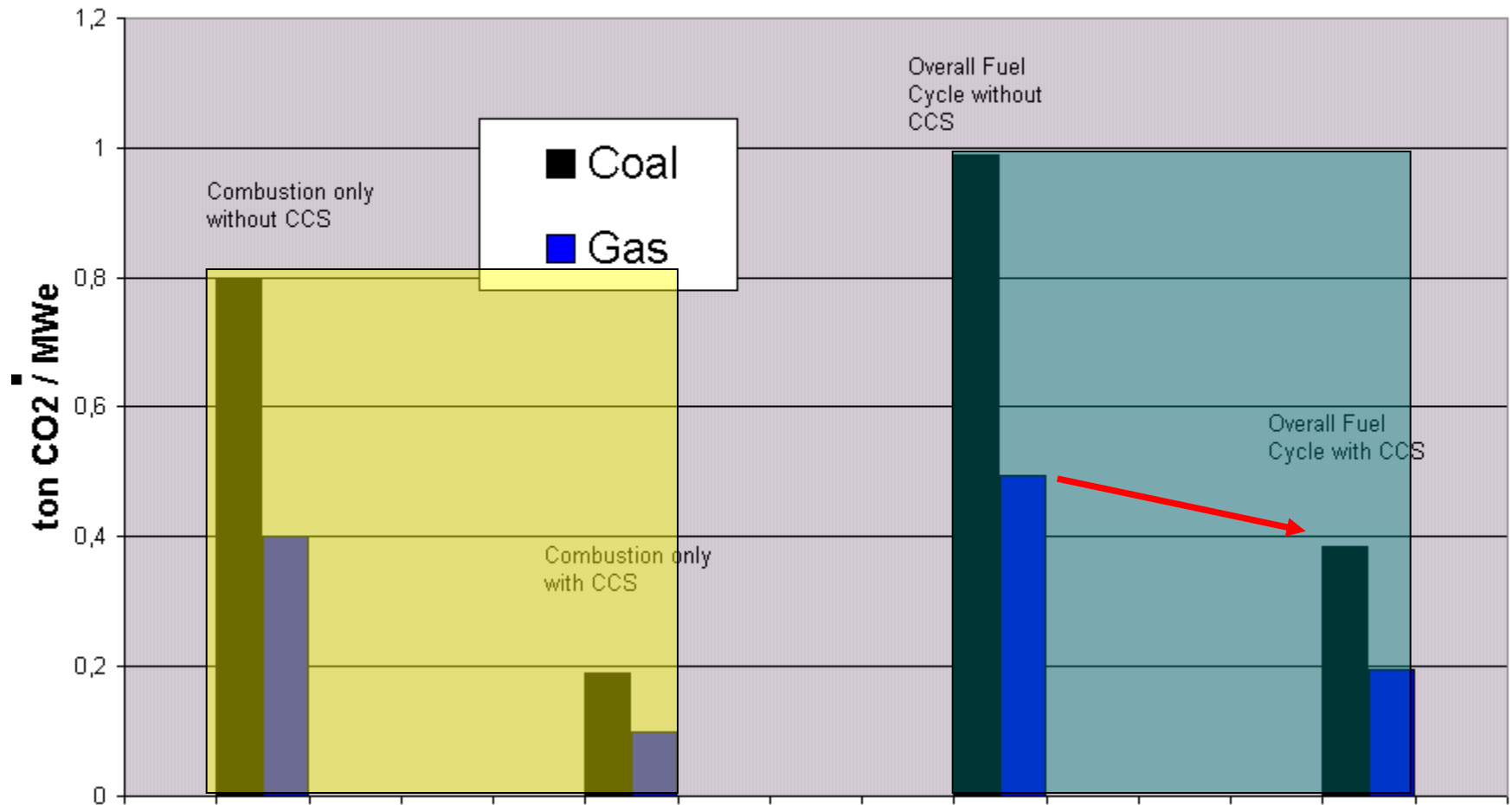


Thermal efficiencies of power plants with and without CO₂ capture, % LHV-basis

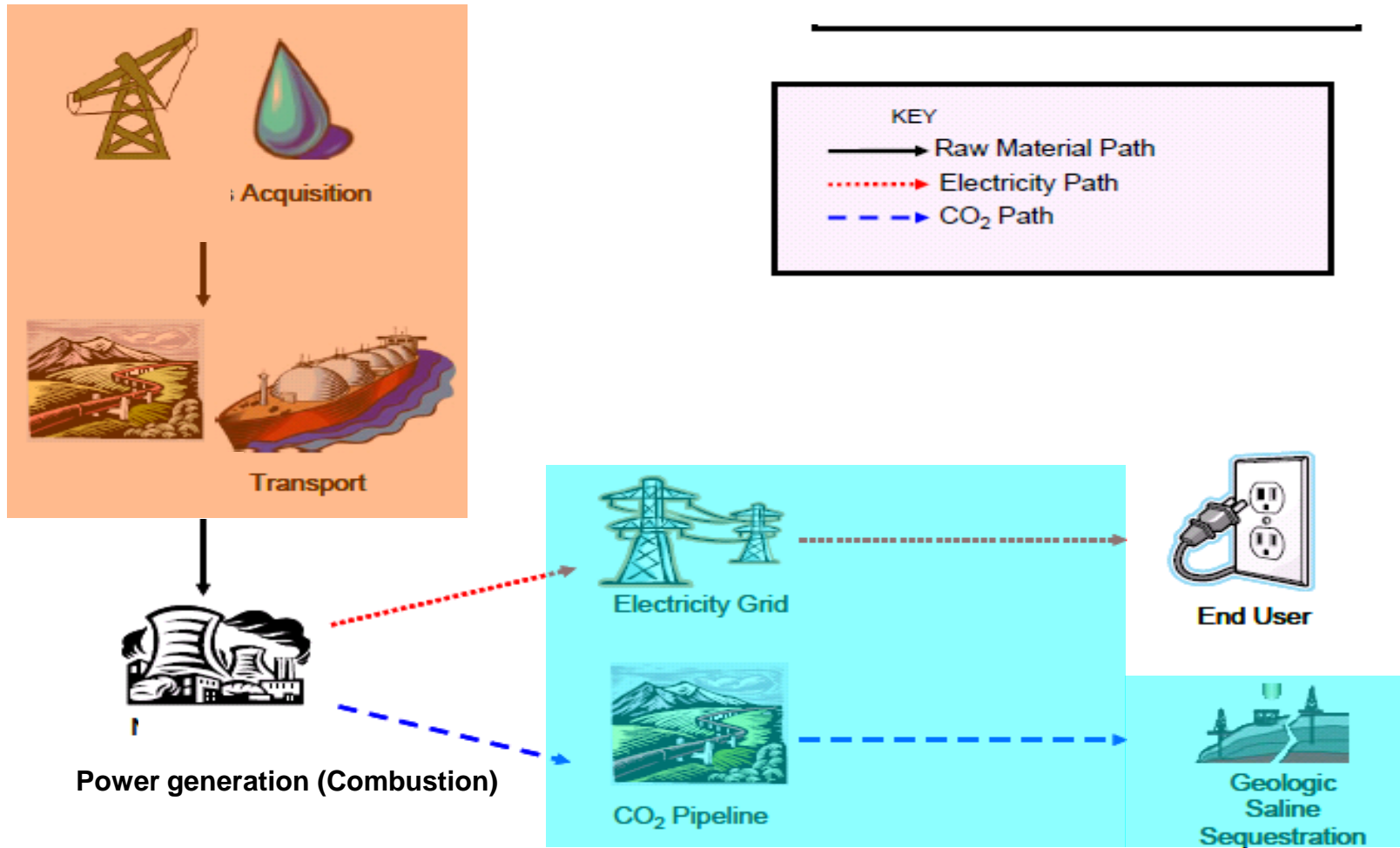


Percentage increase in fuel use per kWh of electricity due to CCS, compared to the same plant without capture

Coal vs Natural Gas emissions



Overall Fuel Cycle



Integrated CCS option

- Use of Captured Carbon to Enhance Recovery Hydrocarbon (EHR) could improve the overall efficiency of the process.

CO₂ Transportation issues

To be economically viable Carbon Dioxide transportation needs:

- 24hs - 7ds continuous flow,
- dense –supercritical phase,(press.or cooled)
- near range from capture to storage areas,
- proper framework (legal, technical).

Main points

- pipeline best option for large CO₂ volumes,
- different condition from oil&gas transportation,
- existing and proved technology on EOR,
- lack of standards and release KH,
- need for incremental knowledge,
- time to market 3 y (transport).
- Gas, Energy Integrated Companies have proper background to cope with CO₂ pipeline challenges.