



Key conclusions

- Co-production of electricity and H₂ from coal and natural gas is feasible and deemed techno/economically viable
- Pre-combustion CO₂ capture will benefit from efficiency improvements in the gasification process and the power cycle (pioneering work)
- Pre-normative work suggests new requirements for CO₂ and H₂ (proper balance is key for the cost of CCS and H₂ production)
- Pressure build-up from CO₂ injected into deep aquifers can be obviated by new injection strategies

DYNAMIS addresses two main dimensions:

- 1) near-zero emission power generation
- 2) large-scale dimension for H₂ deployment for early adopters (the European transport sector)

This comprises, as an interim step aimed at realisation by 2012-2015:

- technology options
- gas handling, conditioning and transport of gas (H₂ and CO₂)
- pre-selection of European production and storage sites using geological information
- societal issues

Technical data of a DYNAMIS plant

Capture:

- Plant: 400 MWe class facilitating co-production of 50 MW H₂ (HHV)
- Basis technology: Integrated coal gasification combined cycle with pre-combustion decarbonisation (IGCC-CCS) using a topping cycle fed with H₂-rich fuel
- Optional technology: Natural gas combined cycle with post-combustion CO₂ capture (NGCC-CCS) with a parallel steam-methane reformer (SMR) for H₂ production
- CO₂ capture rate: 90%

Handling of gas yields:

- Hydrogen purity: To comply with the specification of a (future) European H₂ infrastructure (notably the transport sector)
- Captured CO₂: To be compressed and transformed into dense phase (supercritical pressure or cryogenic)
- CO₂ composition and impurity levels: Recommendations justified by technical verification and HSE concerns

Storage:

- CO₂ injection rate: Around 3 Mtpa (mainly into aquifers or for EOR/EGR)
- Storage capacity: 100 Mt CO₂ (minimum)
- Modelling pre-qualifies sufficiency of storage sites in the vicinity of four (tentative) plant locations (two in the UK, one in Norway and one in Germany).

Financing and bankability:

Modelling suggests that provided equitable revenues are secured the cost of CO₂ capture and storage may become lower than the typical pre-DYNAMIS level of €50-60 per tonne CO₂

Dynamis Consortium

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