



CCS process modelling

Accelerate development and manage risk

A key challenge for investigators into Carbon Capture and Storage (CCS) options is the accurate predictive quantification of the behaviour of the complex processes involved. This is particularly true for new technologies where there is little operating experience on which to draw.

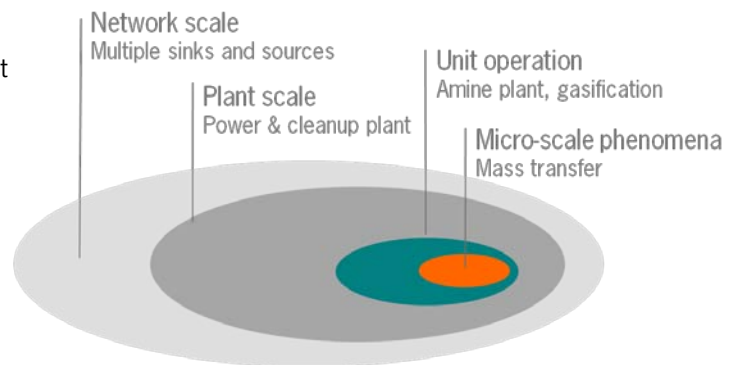
The complexity is compounded by the need to take interactions between different systems – across whole plants or even across power or CO₂ networks – when optimising, to ensure that local optimisation does not result in undesired consequences elsewhere.

Advanced Process Modelling is a key technology for accelerating innovation and managing the significant risk across all areas of development – power plant, capture plant, transmission/distribution and underground storage.

Modelling at multiple scales

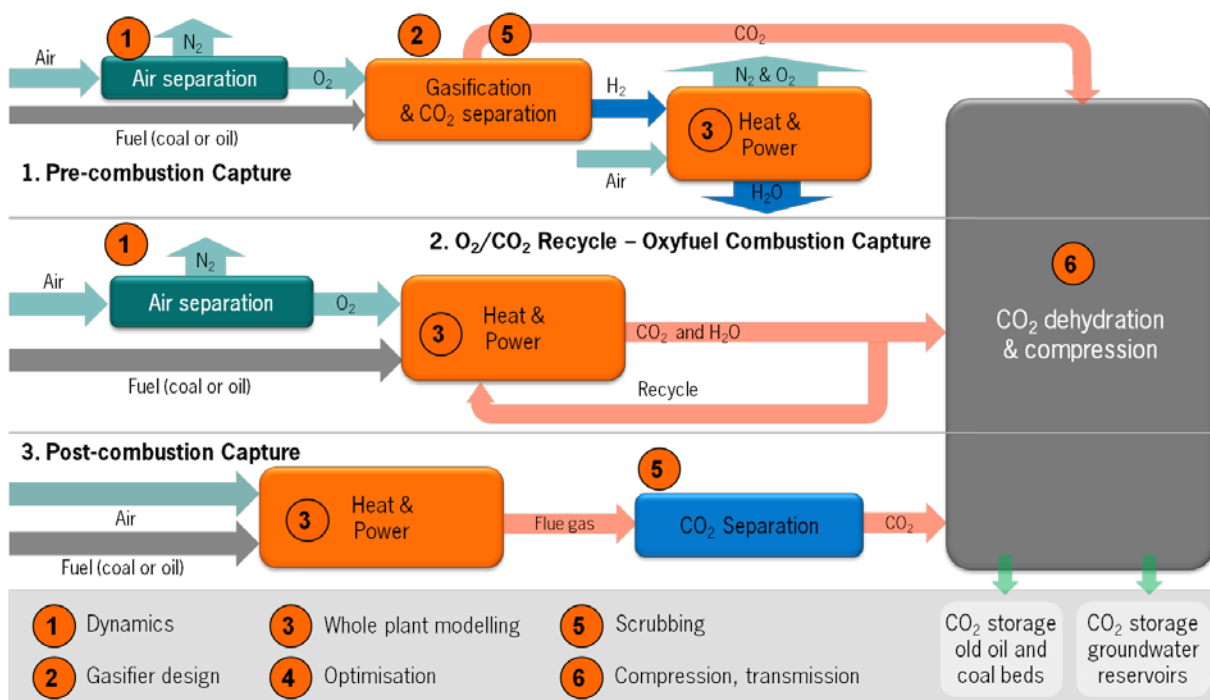
An added challenge is that in order to predict behaviour accurately, interactions at many different scales need to be taken into account simultaneously.

For example, the reaction kinetics around a pulverised coal particle are a key factor in determining the equipment size and hence economics of a gasification process.



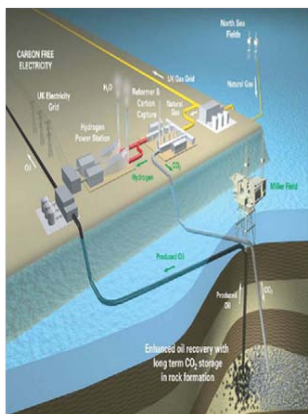
Modelling across the CCS design and operating space

Modelling applies at many different points across the CCS space. Typical examples are shown here:



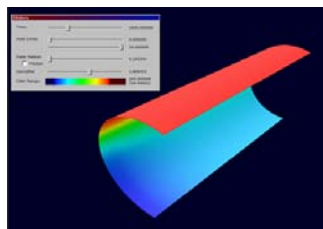
Typical generation routes with carbon capture options

Examples

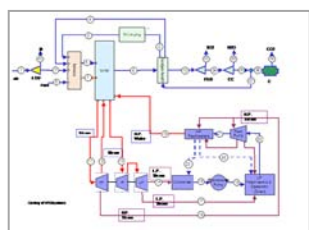
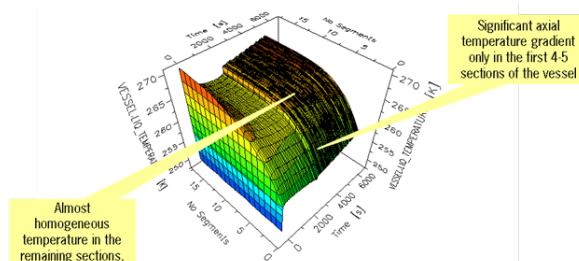


Example: CO₂ compression and transmission

Objective: investigate behaviour under different handling scenarios in order to – for example – determine minimum equipment wall temperatures during blowdown.



Wall temperature maps



Example: Whole plant modelling

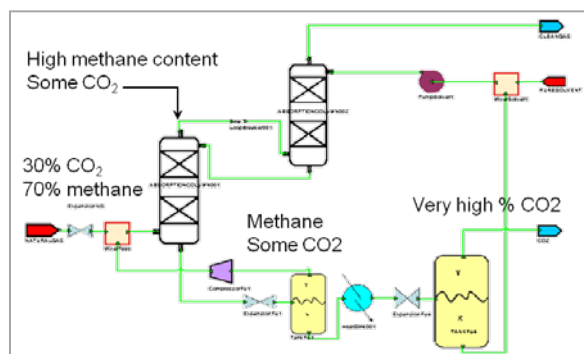
Objective: investigate performance of whole plant with carbon capture options in order to design and optimise taking all interactions into account.

Didcot A plant modified for oxyfuel combustion

Example: CO₂ capture system design

Objective: design system to handle multiple scenarios and conditions PLUS simultaneously optimise process design and solvent molecular design.

Solvent loop optimal design



Why model?

High-accuracy predictive modelling helps you to:

- Accurately predict **new process performance**
- **Rank design options** based on high-quality predictive data
- Optimise **process design** and **performance**
- **Reduce demonstration plant** testing
- Formally **quantify** and **manage risk**
- Improve the effectiveness of **R&D experimentation**
- Integrate **R&D** and **engineering design**
- Accelerate **process innovation** at all levels.

PSE supplies **gPROMS modelling technology, advanced process models** and **expert services** around the work. Contact your nearest office for more information.



Accelerate innovation

Manage risk

