

PRECOMBUSTION TECHNOLOGIES TO AID CARBON CAPTURE

PJD Lloyd¹ & O Davidson

Abstract

It is clear that there will be increasing stress on removing carbon before combustion of fossil fuels for energy generation. This permits recovery of carbon dioxide from a far more concentrated stream than burning the carboniferous fuel in air and trying to recover the carbon dioxide from the diluted stream which results.

Precombustion involves “reforming” of the hydrocarbon fuel with a source of water to produce a stream of carbon monoxide and hydrogen, followed by “shifting” the carbon monoxide by reacting it with further water to produce carbon dioxide and more hydrogen: $\text{CO} + \text{H}_2\text{O} \rightarrow \text{CO}_2 + \text{H}_2$

A range of proven technologies can readily recover the carbon dioxide, and the hydrogen-rich stream forms the fuel.

The technologies for gasification of solid fuels to generate a CO/H₂ stream have been carefully monitored over many years in SA. Similarly for the past fifteen years direct reforming of both liquids and gases has been performed on the largest scale practised in the world. This paper therefore summarises this experience and identifies directions by which this technology can make a contribution to capturing carbon worldwide.

¹ Energy Research Centre, University of Cape Town, Private Bag Rondebosch 7701 South Africa