

## Carbon Sourcing for Xtl and Gasification Based Power Generation

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Many carbon sources have been suggested as the 'X' in Xtl. These have included coal, refinery char, carbonaceous shale and biomass. Technically any of these carbon containing fuels can be the source of syn-gas, being a mixture of hydrogen and carbon monoxide that can be reacted to produce synthetic petroleum and/or utilised for power generation.

Biomass use in power generation and/or synthetic fuel production is looked upon as being a way to achieving carbon neutral emissions from the use of biomass combustion technologies, however there are competing uses of biomass that include enriching soil carbon to increase cropping. Biomass is also an intermittent energy source, in that its availability is seasonal and variable due to weather cycle variations, and it also has the disadvantage of being biologically reactive, such that it usually has a short storage life. Biomass also has the disadvantage that its harvesting to provide significant raw energy resources is very energy consuming.

The major source of carbon that is concentrated, widely distributed across the globe (and thus 'democratic') and is not in contestable supply, such as oil and natural gas, is coal. Coal, for this discussion includes lignite and high carbon shales, is falling out of use in directly fired combustion systems including power generation and industrial applications, however power generation utilising gasified coal and Coal to Liquids (CTL) offers new opportunities to meet both the developed and developing world's energy demand.

This paper looks at the sourcing of carbon from biomass and two coal resource exploitation techniques, these being Underground Coal Gasification (UCG) and selective open-cut winning of 'second grade' coal that would be directly aimed at mine-mouth IGCC power generation and CTL. This paper will examine UCG for its potential (and challenges) to turn 'unminable' coal resources into raw energy, and then look at lower grade mined coal (including washery middlings, washery rejects and sub-standard seams) being produced as a second product stream. Scheduling of mining operations, the stockpiling of lower grade coal and the types of gasification plant suitable for specific coals will be discussed. Economic and environmental considerations will be addressed with respect to biomass, UCG, coal mining and stockpiling, and the conversion processes being power generation and CTL.