



The combustion products are fed into a series of heat exchangers and are cooled down by the returning remnant gases from the refrigeration process. Water, SO<sub>x</sub> and NO<sub>x</sub> present get condensed out of the flue gas stream as individual components, i.e. the NO<sub>x</sub> is collected as N<sub>2</sub>O, NO and NO<sub>2</sub> separately.

CO<sub>2</sub> is collected as a solid and fed into a series of chambers where it is allowed to pressurise and go into the liquid phase ready for transfer to a sequestration process. The pressurisation process can be assisted with steam earmarked for the condensers in power stations thus saving on cooling water requirements. Also, power station operators no longer need to keep the flue gases above 200 °C to prevent condensation in the chimney stacks and can recover more heat from the fuel.

The exiting gases now have only about 270ppm of CO<sub>2</sub> as opposed to around 400ppm of CO<sub>2</sub> in the incoming combustion air. For a 1000MW power station this amounts to \$300,000 per year in carbon credits (based on the EU price, approx. AUD 33.00) over and above what it would generate from the total removal of CO<sub>2</sub> from fuel.

The refrigeration processes is powered by pulse combustion. This enables a very compact and efficient “engine” at one end of the pulse tube that forms the thermo-acoustic refrigerator. There are no moving parts. Modifications to the cold end of the pulse tube further improve the efficiency of this refrigerator.

The application of this process, together with pulse combustion in the coal burning process, or the burning of natural gas, could result in greenhouse gas free electricity at, or lower than, today’s electricity prices.

Using acoustic technology we expect to dry and gasify brown (or black) coal, then burning the gas using pulse combustion, produce 1.5 Megawatts of electric power per tonne of coal, instead of 1.0 MW as is current practice.

This extra 0.5 MWH of electricity is worth \$21.00.

Capture is expected to cost \$3.00 per tonne and storage, in sub-ocean silts, under 3,300 metres of seawater to provide the requisite pressure, if done according to the recommendations of Dr. John Holdren (now chief scientific advisor to President Obama) and team from Harvard should cost \$10 per tonne, possibly less, requiring little or no monitoring for endless years, as is required with geosequestration storage in old gas wells and other cavities.

Due to 1.4 tonnes of greenhouse gases to produce the 1.5 MWH we can expect a storage cost of \$14.00 and a capture cost of \$4.20.

This \$18.20 cost is absorbed by the \$21 for half a megawatt hour (MWH). So we are in front on costs, we have nil (or minus, as we collect one third of ambient greenhouse gases) emissions and even more in front because, with this system, no water is required for the cooling of the power station.

ENDS.

**DOCKLANDS SCIENCE PARK PTY. LTD.** Ph. 61 3 9866 6966.

e-mail: [jtm@docscipark.com.au](mailto:jtm@docscipark.com.au)

Website: [www.docscipark.com.au](http://www.docscipark.com.au)