Submission to the Climate Change Committee

By Ken Green and Graham Thoms

CO2 Sequestration Project.

Sequestering of CO_2 as limestone

This submission briefly explains the concept and method of preventing the CO_2 output of industrial fuel burning plant from entering the atmosphere by combining it with the calcium in seawater to produce the valuable and safe mineral limestone

The production of the unique material limestone can be demonstrated by combining exhaust CO_2 gas with the calcium in seawater.

Fresh water can be produced as a by-product by utilizing the waste heat from the exhaust of a plant.

The high capture rate of the method will be a source of valuable carbon credits and other savings.

Ken Green
24 Reserve Ave.
East Blaxland NSW 2774
kgreen7@bigpond.net.au

Graham Thoms
680 Londonderry Rd
Londonderry NSW 2753
bth91243@bigpond.net.au

For the consideration and action of the committee

Sequestration of carbon dioxide by reacting it with calcium to form safe, stable limestone.

This method focuses on the collection and sequestration of CO_2 gas directly from fuel burning installations such as power stations and cement works. It is an 'end of pipe' system.

The level of CO_2 in the exhaust of a conventional boiler such as a power station is 15%. This level is 27% from a cement works because of the CO_2 driven off during the process of burning limestone.

Combining captured CO_2 from an industrial exhaust with calcium to form limestone can be demonstrated.

In its basic form the sequestration technology consists of the capture into water of the CO_2 in an exhaust with a commercial device known as a 'Scrubber'. CO_2 is very soluble in water. The colder the water the more CO_2 it can absorb.

Because the process requires calcium, we use seawater in the scrubber. Seawater has trace quantities of calcium naturally occurring in ion form. This calcium is being continuously supplied and replaced from the magma.

When CO_2 is dissolved into seawater it undergoes changes in several steps. These steps happen in the ocean naturally also but take hundreds if not thousands of years. It is this process that has produced the great limestone formations seen around the world.

Our technology causes the combination of the CO_2 and calcium to produce limestone instantly.

There are several benefits to the capture and sequestration of CO_2 emissions in this way.

Because commercial scrubbers are highly effective most of the CO_2 will be removed from a fuel burning exhaust. The actual percentage will depend on the engineering of the scrubber but over 90% should be achievable.

The limestone from the process is safe and can be simply stored on the ground. The output limestone is very fine and will require no further milling prior to use. Limestone is a valuable and widely used commercial product. It is used in the manufacture of steel, glass, cement, baking soda and toothpaste. It is an important fertilizer.

Because the capture of CO_2 into water improves as the water gets colder, the first stage of the process is to pass the exhaust gas through a commercial heat exchanger. Incoming cold seawater is used for the cooling. This produces much water vapour that is available for condensation as fresh water. The energy available for this process at a power plant can be roughly calculated as 2 Megawatts for every 1 Megawatt of electricity produced. This fresh water is produced from waste heat.

A cement works can produce more than its requirement of limestone from its own exhaust.

There is a variation of the process to enable it to be used on installations that are not close to seawater.

The application of this new technology should be done along normal industrial lines. The owners of the power station would become our industrial partners and a pilot plant built to optimise the process for full scale application to this and other plant.

The work and industrial design will be contracted to a capable engineering firm. The cost of this work is rightly in the Federal R&D funds area. We can act as technical advisors.

As the CO_2 problem is large, so are effective, safe solutions. Our calculations show that the capture and sequestration of the worlds CO_2 will produce approximately 10 cubic kilometres of limestone per year.

As can be seen the very high levels of capture not only represent a great reduction in emissions but also a commercial opportunity when federal carbon credits become available.

When this method is applied to a plant burning renewable fuels the effect is an actual removal of atmospheric CO_2.

Burning of fossil fuel takes what was sequestered CO_2 and releases it. Capturing the CO_2 at the exhaust and converting it to limestone returns the CO_2 to a natural sequestered condition. It does not have to be recovered after it is mixed with atmospheric air and it does not have to be buried.

Combustion activity using fossil fuel can go on without interference to commercial activity and without increasing atmospheric CO_2 levels.
This process performs an important function as an element to give us transition time to convert from a fossil fuel dependant society to a renewable energy society.
Fresh water is a by-product using waste heat.

The application of this technology may increase the cost of generating power but there are some offsets.

The exhaust scrubber will replace the current methods of bag farms and precipitators used to remove fly ash from the exhaust.

Fresh water supplies from the plants may offset other capital works.
Additional engineering and science activity.
New training areas.
Income from local and overseas licensing.
Applicable to road tunnel filtration problems.

As it has been pointed out a lot of the structure of the capture plant is commercial equipment from existing manufacturers and technologists. The combiner stage also uses components from existing industries and technologies arranged to suit this purpose.

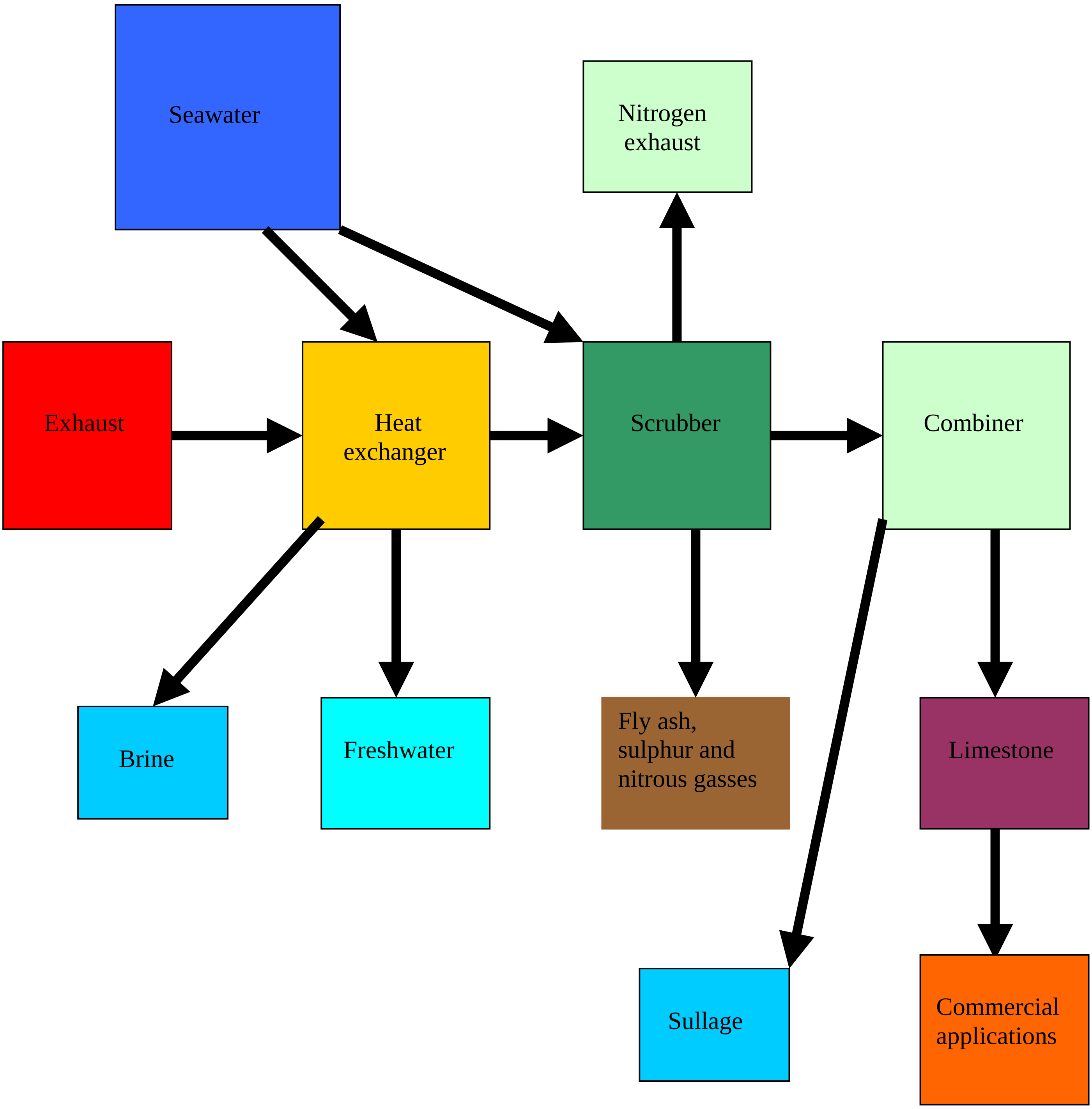
This submission has been deliberately kept fairly general however the technology is based on an in depth knowledge of the factors that bring about the combining of CO2 and calcium through research and testing. The scientific information is contained in our patents.

We have found how difficult it is to predict the questions that arise in discussions in this field and to try and provide answers in advance. Our approach here has been to give a description of the structure of the process and its deployment as we see it. Importantly we stand ready to answer concerns or questions that may arise.
The sequestration of CO2 is probably the most important challenge of our age. What lies before us is a huge amount of work and it will probably present some development problems to be overcome.

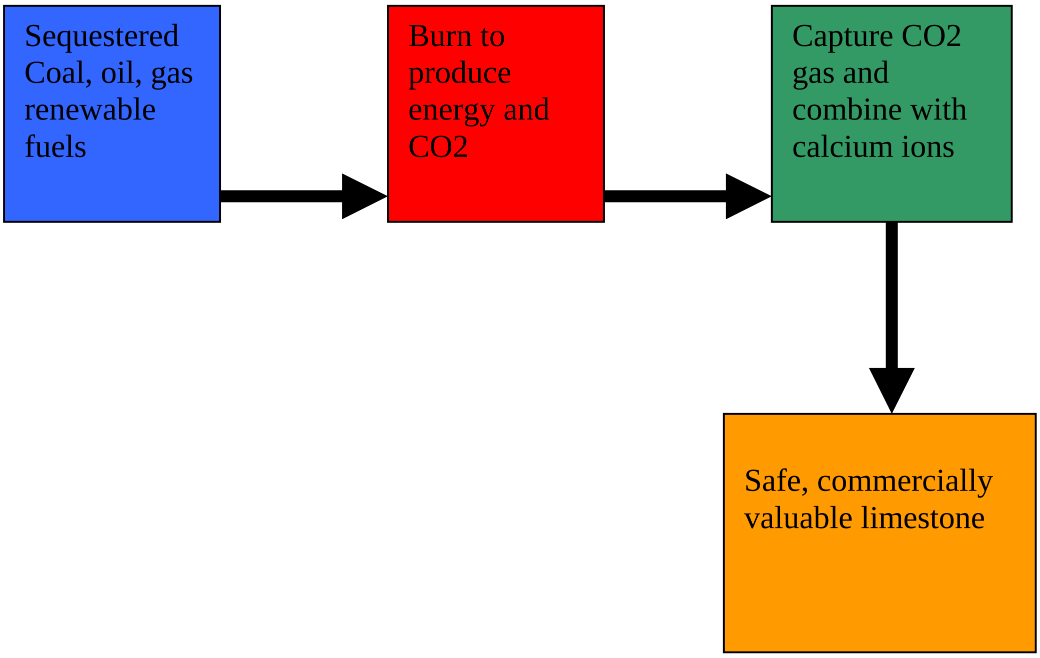
Because this science is based on a naturally occurring principle and the end material is just limestone, the success of this project will give us the best result possible.

The attached diagrams are intended to improve the clarity of the explanation.

Flow diagram – sequestering CO2 as limestone



This diagram shows the changes to materials involved in the process



Proposed structure for the capture and sequestration of CO2 from a power station.