FACT SHEET– Carbon Capture and Recycling

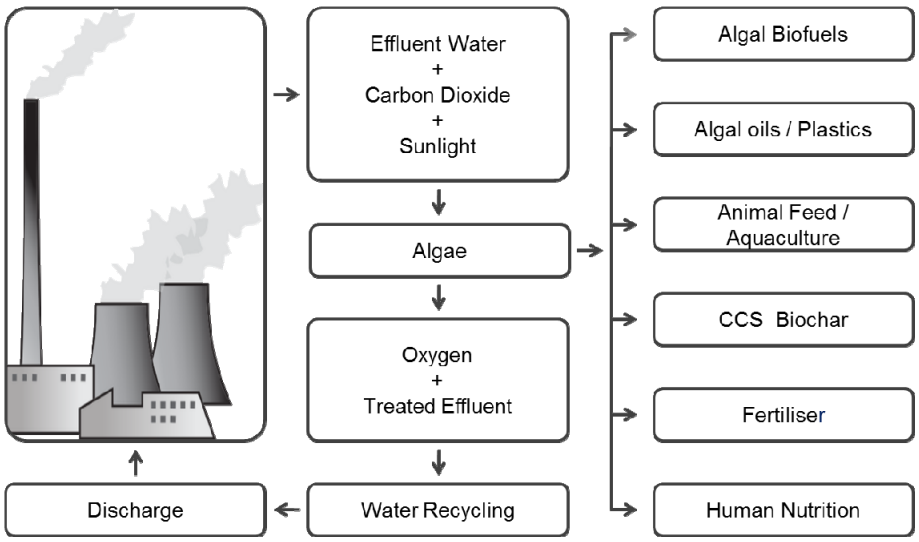
Algal Synthesis— farming valuable biomass from waste CO_2

Towards a commercially sustainable emissions abatement solution

MBD Energy is at the forefront of an important and exciting new carbon capture and recycling technology that offers to help cut CO_2 from heavy industry – and deliver the growing populations of the world increased fuel, food and water security. We've developed and have begun deploying our "bolt-on" emissions abatement solution suited to most large stationary emitters including coal and gas fired electricity generators, smelters, refineries and cement plants.

What makes our process so significant is that we've found a way to derive substantial commercial value from previously unrecyclable industrial waste normally simply released into the environment. We capture and recycle waste flue-gas emissions and contaminated waste water into highly versatile and potentially valuable biomass for the production of a range of downstream energy and nutrition commodities.

Called "Algal Synthesis" our process takes the host emitter's captured flue-gas CO_2 – and contaminated waste water – recycling both as essential nutrients to produce large daily commercial harvests of algae biomass.



In our proprietary Algal Synthesiser (BAGS) membranes, select strains of natural algae local to the host emitter double in mass in as short a time frame as just a single day.

Tests at our unique R&D facility at James Cook University have confirmed the suitability of this algae biomass for the production of various forms of biofuels, animal feed and human foods as well as fertilisers and other useful products.

In fact, our scientific and technical team has estimated that each million tonnes of waste captured CO_2 could earn about $250M in earnings from sales of stock feed meal and fuel. Put simply, we've found an effective way of recycling CO_2 into energy and commercial earnings.

Putting our technology to work

'Stage 2' on our pathway to commercialisation is our deployment of a one hectare Algal Synthesiser at Tarong Power Station in Southern Queensland where captured flue-gas will be piped directly into our system.

We're well advanced with construction and expect commissioning of the facility within the September quarter of this year. In addition to our project at Tarong Power Station we also have agreements with two other major power stations in Australia.

We will use our project at Tarong as a foundation for progressively building much larger Algal Synthesisers at major emissions sites.

Commencing next year we anticipate constructing a Stage 3 facility of about 80 to 100 hectares – with potential to be expanded in Stage 4 up to some thousands of hectares.

At this large scale, each Algal Synthesiser could have capacity to capture and recycle about 50 per cent of the carbon emissions from each host power station – producing in the order of 2000 tonnes-per-day of algae biomass.

Construction of our first Power Station Algal Synthesiser began in 2010 and will be completed in September 2011.

FACT SHEET– Algal Synthesis

Algal Synthesis—how it works

The Earth's natural response to atmospheric greenhouses gases including CO_2 is the production of biomass and vegetation which, with the help of sunlight and water, use these gases as feedstock for new plant growth and the gradual return of carbon to soils. It's how, over millennia, the world's reserves of coal, oil and gas were produced. Now, MBD Energy has developed a technology that allows this natural carbon cycle to be replicated under process-controlled conditions for the abatement of waste CO_2 in as short a time as one day.

Algae under cultivation at MBD's R&D Facility. In addition to the covered units (pictured), 10 and 50 metre fully enclosed plastic membranes are also used.

Called Algal Synthesis, the process involves the injection of captured flue-gases into a waste water growth medium contained in large plastic membranes to produce rapid expansion approximating up to a doubling of oil-rich algal biomass daily. This algal biomass may be harvested daily to produce algal meal suitable for nutritious, lower-methane animal feed, human nutritional supplements, and oils suited to making plastics and transport fuels including biodiesel.

Current production forecasts indicate that the sale of these down-stream commodities should readily offset the cost of building and operating such a waste CO_2 emissions abatement technology, thus progressively helping deliver cleaner electricity production at the lowest possible cost to consumers — whilst potentially helping to significantly cut net carbon emissions.

Sunlight, CO_2 and water grow algae biomass to produce potential secure new supplies of nutrition and energy

Sunlight and greenhouse gases mix with waste water in an MBD Algal Synthesiser to produce algae biomass ideally suited to downstream production of nutritious animal feed and extraction of algae oil for the manufacture of transport fuel. Alternatively, if desired the algal biomass can be used as a rich fertiliser to sustainably improve farm soils or recycled as a supplement to coal in the form of dry fuel pellets or briquettes.

Bioremediation of contaminated waste water

Macro and micro algae can be applied to sequester, remove or transform pollutants such as excess nutrients, xenobiotics, and heavy metals from wastewater. These applications are known as algal synthesis bioremediation. The processes have potential to yield commercial product in the form of algal biomass that can be used to produce biofuel pellets or briquettes, liquid biofuels, biogas, fertilisers and other products.

Algal synthesis bioremediation of contaminated water may constitute a less costly and more environmentally friendly alternative to other treatment methods (such as reverse osmosis) due to its relative simplicity and ready potential for nutrients and heavy metals recovery.

In response to requests from the coal-seam gas industry, refineries and power station partners, MBD has cultivated a wide diversity of macro algae strains at its R&D facility and with these strains has conducted comprehensive trials across a range of industrial wastewater contamination issues and bioremediation approaches.

Tighter environmental controls over waste water management in each state are diminishing the role evaporation ponds can now have as an acceptable solution for industry—further increasing the impetus for sustainable bioremediation solutions such as ours.