



Our constantly changing world presents humankind with uncertainty and evolving environmental challenges. One thing we can be sure of is that international demand for renewable fuels will continue to grow.



Is micro-algae a future bio-fuel

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Imagine if we could

- Grow a fuel without using land
- Grow a fuel without polluting the atmosphere
- Grow a fuel without creating greenhouse gases
- Take a crop every day instead of yearly
- Generate up to 300 times more per acre
- Grow crops in both fresh and sea water

Well we can

- Micro algae will do all these things

What are micro algae

- Micro algae are 1 to 5 microns in size
- Wild algae are thousands of algae species
- Thousands of diatom species
- Populations vary with climate and temp
- But all contain lipid oils
- Algae were the source of our oil and gas
- Algae are the source of the planet's oxygen
- Algae absorb most of the planet's CO₂

Other algae species

- Macro algae have been cultivated actively
- Many universities have studied macros
- They are much easier to catch & harvest
- Species such as spirulina are well known
- Marine macro algae are also under study
- Decades of collection and identification work exists

The contrarian approach

- We decided not to try and modify nature
- We chose to use solar energy, chlorophyll, photosynthesis, and free nutrients from effluent management systems (EMS)
- Micro algae complete their life cycle in EMS ponds and absorb the effluent
- Most of the nitrogen and phosphorus is absorbed and reduced to tolerable levels

Marlborough EMS



Dispatch to the sea



Our fuel source reveals itself



The fishtrap



The trapped fish



Bio-remediation

- Start with heavily polluted waste water
- Scavenged by micro algae and solar energy
- Transforms EMS waste to lipid oils
- Now the water is clean again and reusable
- Irrigation, stock water, industrial washing
- Potable water when it becomes critical

Aqua and Flo



Conversion

- Micro-algae is now processed into biofuel
- As with harvesting we also have a graveyard of technologies that did not work
- Now we have a quiver of technologies that we have developed which do work
- Economics and energy balance are crucial as we now scale up commercial production in our non subsidised economy

The never ending journey

- “Algae to diesel is still decades away”
- Or so we are told by most pundits
- That does not fit with our 2006 experience
- Massey University conducted our engine tests
- Our Minister of Energy, the Hon David Parker drove an unmodified diesel Land Rover down the Wellington motorway on Aquaflow biodiesel
- We still have an enormous amount to learn
- But we already have a year’s operation in making biodiesel, under our belt



The 'trip' that is decades away



Why all this effort

- Algae are predicted to be up to 300 times more productive per acre than land crops
- Oil yields of 40%-50% are predicted
- No productive 'food' land will be used
- If we are to feed 10 billion Earthlings, where?
- If we are to fuel 1.5 billion cars, how?
- If we are to reverse global warming, when?