

Full of promise or fantasy?

The Press | Thursday, 24 July 2008

Photo [Don Scott]

Perfect potential: city sewage ponds could be used to grow microalgae which are phenomenal biomass producers.

Much confusion exists about the effects turning to biofuels will have on the world. DAVID PAINTER separates fact from fiction.

Biofuels have had a lot of publicity recently. Some of it has been wrong. Oxfam's recent report concluded that biofuel policies deepen poverty and accelerate climate change. The Parliamentary Commissioner for the Environment said the Biofuels Bill should not proceed, but Air New Zealand intends to use 10 per cent biofuel by 2013. Earthrace just broke the round-the-world powerboat record, publicising biofuel.

Confused? Here are some facts, fallacies and fantasies:

Fossil oil is biofuel. Fact. Fossil oil was formed by microscopic marine organisms trapped in geologic formations millions of years ago and subjected to extreme heat and pressure.

Other biofuels are recent. Fallacy. Rudolf Diesel ran his first engine in 1895 on peanut oil, and said in 1912 that such oils could become as important as petroleum and coal-tar products. Henry Ford designed his Model T to run on a petrol-alcohol blend, "the fuel of the future".

Cheap fossil oil is no more. Fact. Arguing when peak oil will occur or whether it has occurred is pointless.

World transport fuel problems will be solved by ...: hydrogen fuel cells, electric cars, 'water motors' etc. Fallacy. Some take too long to implement. Others violate science.

High prices for fossil oil, economic problems and rationing will occur.

Fact. A top United States analyst expects an oil-induced financial crisis about 2010 to 2015, which will last at least 10 or 12 years. US consumers will pay \$NZ5.20 a litre for petrol at the pump. It will be more in New Zealand.

Biofuel production increases food prices. Fact and fallacy. This is fact for biofuel made from food crops (first generation) or on food production land. Second-generation biofuels don't use edible crops.

Biofuel production causes deforestation. Fact and fallacy. It is fact for biofuel made from non-forest crops such as babassu palm, which displaces forest as in South-east Asia, but not generally.

Recent US and European Union biofuel policies increased food prices and deforestation. Fact. Over-enthusiastic politicians adopted biofuel-encouragement policies when only first-generation biofuels were available.

There are huge reserves of ... to quickly replace fossil oil. Insert: shale oil, tar sands, methane hydrates, etc. Fallacy. Peak oil is about volume, but also ease, cost and rate of recovery. Some reserves take more fossil energy to recover than new energy obtained, and not quickly.

The best contribution to New Zealand's transport fuel challenge will be conservation. Fact. It means using cars less, public transport more, more fuel-efficient transport, alternative energy sources and appropriate urban design and infrastructure.

Biofuels increase fuel prices. Fallacy. Almost half of Brazil's vehicle fuel is sugar-cane bioethanol, which costs \$NZ45 a barrel, while oil is \$NZ180. The Gull Oil blend in New Zealand, of 10% Fonterra bioethanol and petrol, costs slightly less than petrol. Fossil oil will increase. Biofuel will decrease with second-generation biofuels and scale economies.

Government intervention is unnecessary. The market will provide. Fantasy. State organisations control much world oil production. Global oil companies still maximise profits from selling fossil-oil products. They have no incentives to treat the small New Zealand market generously.

New Zealand has great renewable energy. Fact. We have a steep, wet, sunny, windy, fertile country and a long coastline. Transport fuel is a special, difficult case, needing high energy per volume, safety and affordability. Biofuels will ease the difficult readjustment from fossil-oil plenty.

New Zealand is active in biofuels research. Fact. The Government's main 2008 research round allocated 9%, or \$40 million, of all contestable funding to biofuels research.

The Biofuels Bill will make matters worse, affecting atmospheric carbon, deforestation, land use and food prices. Fallacy. The Bill now requires biofuels to meet "specified environmental or sustainability standards or specifications".

There is still much oil. High prices result from producers playing the market, oil companies profiteering and the actions of commodity speculators. Prices will fall and business will resume as usual. Fantasy. The first sentence is probably correct, but see the "peak oil" and "high prices" facts, and the "solved by" and "quickly replace" fallacies. Business as usual is a fantasy.

Richard Branson's Virgin Atlantic Airline was the first to fly with biofuel, on February 24, 2008. Fact and fantasy. A Virgin Atlantic Boeing 747-400 flew from London to Amsterdam that day. One of four fuel tanks contained a blend of 80% fossil-oil-derived fuel and 20% vegetal oil-derived fuel. So 5% of the fuel was biofuel, for a 400km flight in an aircraft with a 14,000km range.

Air New Zealand will this year become the first airline to test second-generation biofuel, made from jatropha nut oil. Not yet fact or fallacy. Air New Zealand requires future fuel to be "environmentally sustainable and not compete with food; at least as good as today's JetA; significantly cheaper than that and readily available". This Boeing 747-400 flight will use oil from jatropha grown in south-east Africa or India. Will it really occur this year, go a reasonable distance with one engine running on 100% jatropha-derived fuel, satisfy the airline's requirements and New Zealand's expectations for sustainability and social effects?

New Zealand can produce rapeseed biodiesel, as in the European Union. Fact and fallacy. We can and are (Solid Energy subsidiary Biodiesel New Zealand), but should not. It is a first-generation feedstock that competes for arable land with food and could interfere with seed crops.

New Zealand can produce sugar-cane bioethanol, as in Brazil. Fallacy. New Zealand cannot grow sugar cane. Using crops such as sugar beet or sorghum would still compete with food production.

New Zealand can produce maize bioethanol, as in the US. Fact and fallacy. We can, but should not. It is energy inefficient and contributes to world-grain price increases.



New Zealand can produce wasteland-willow bioethanol, and simultaneously save Lake Taupo from excess nutrients. Fact and fallacy. Cellulosic materials, such as maize, need more energy for processing than sugary feedstocks. Lignin materials, such as cane willow, need even more.

New Zealand can produce useful biodiesel from waste cooking oil and tallow. Fallacy. Commercial New Zealand biodiesel production started this way. There is insufficient waste cooking oil to contribute significantly to fuel needs and better things to do with tallow, at better prices, as Environment Canterbury discovered with its biodiesel bus trial.

Biodiesel is just diesel, produced from crops and animals. Fallacy. Biodiesel is usually produced from vegetal or animal oils by base-catalysed transesterification, producing monoalkyl esters. It is an international specification fuel which can be blended with diesel or used straight in diesel engines, but it is not diesel.

More biofuel can be produced from aquatic microalgae than from land-based crops occupying the same area. City sewage ponds can be used to grow the algae. Facts. Microalgae are phenomenal biomass producers. Compare rapeseed at 1200 litres of biodiesel per hectare a year, maize at 3000 litres of bioethanol, sugar cane at 6000 litres, and jatropha or babassu palm oil at about 2000 and 4500 litres of biodiesel with pond-grown microalgae at more than 30,000 litres of oil.

New Zealand company Aquaflo Bionomic produced the world's first biodiesel from wild algae in 2006. Fallacy. Christchurch's Solvent Rescue produced biodiesel from sewage-pond algae in 2003. It was probably done earlier in Japan, Israel or the US.

Oil like fossil oil can be produced synthetically. Fact. The Fischer-Tropsch process used by Germany in the 1939-1944 war to make oil from coal is still used in South Africa. For energy and carbon reasons, it is not a good solution for New Zealand. Other options, including liquefaction of biomass, show great promise.

Round-the-world record-making 100% biodiesel powerboat Earthrace sourced enough fuel from body-fat liposuctioned from crew and volunteers to propel it for 15km of its 24,000km journey. Fact, but irrelevant. It illustrates one difficulty in basing serious discussion of biofuels in New Zealand's transport-fuel future on over-hyped publicity in media-sized bites.

These are items I have reacted to in television, radio and print. Which are facts, fallacies or fantasies, and the comments, are my opinions. Biofuels are neither good nor bad. They have an important transitional role in New Zealand's transport-fuel future.

Biofuel production can be good or bad. It is subject to commercial, regulatory and social pressures.

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