

# HOW CAN AUSTRALIAN BIOFUEL COMPANIES BETTER UTILISE 'GREEN' MOLECULES?

by Kevin Weiss, Chief Executive, Byogy Renewables, California



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*Prior to Byogy, Kevin Weiss has worked on over 3,000 engineering projects for both public and private sectors as a CEO of a successful Engineering Company in the Silicon Valley. His knowledge of real estate development and environmental processing has placed him at the forefront of sustainable and green planning and development.*

Building the biofuels industry isn't easy, especially in competition with the oil industry. It takes guts, determination, patience, money, and most of all, a respect for fundamentals. There is no shortcut.

The primary challenge facing the ongoing survival of the renewable fuel industry is rooted in the fundamentals of scale and cost. These governing conditions are represented by the parameters of feedstock, technology, and fuel quality. New technologies must comply with each parameter to have a commercial chance.

Established in 2006, Byogy Renewables is a biofuels organisation headquartered in Silicon Valley, California that produces advanced biofuels, including diesel, jet fuel, and gasoline, from any source of ethanol or butanol. Byogy's fuels are direct renewable substitutes for petroleum-based fuels.

Since it was formed, the company has grown to over 30 people and is backed by an experienced team of petrochemical engineers, agriculture experts and proven entrepreneurs.

Byogy has grappled with the challenges of scale and cost, and notes a number of key lessons that future Australian biofuel enterprises can draw parallels with.

## THE RISK OF OUR GREAT EXPECTATIONS FOR BIOFUELS

Many biofuel technologies that had the potential to be the next silver bullet were flooded with startup capital, only to result in many missed objectives.

The missed objectives revolved primarily around being able to deliver price competitive renewable fuels. Many technologies that were funded ignored the fundamentals that deliver price competitiveness, including:

- Feedstock availability and cost – representing over 65 per cent of the final cost of the product
- Technology scale-up – with most technologies based on synthetic biology, scale-up expectations proved to be too aggressive
- Fuel quality – most technologies only produce some form of a hydrocarbon

and hence require to be blended with fossil fuels to function. The blending logistic challenges were not anticipated.

Subsequently, capital investments in biofuels have experienced a notable slowdown over the past few years. This was due to the global recession, the drop in crude oil pricing, and most importantly, the impact of over-hyped technologies' failure to deliver anything close to what was promised on producing competitively priced and truly sustainable fuels.

## ETHANOL – THE CURRENT FRONT RUNNER

The most abundant biofuel in the world today is ethanol. As advancing technologies result in the formation of future space-age fuels, ethanol has performed well as an interim molecule. The ethanol industry has matured to a global business.

However, ethanol has limitations that have become evident as the world rushes to study alcohol as a potential final solution. Blend walls and infrastructure limitations currently limit the amount of ethanol that can be used in transportation fuels. Other than countries like Brazil, which took over 30 years to build an alcohol infrastructure, ethanol is purely a blending component that is struggling to exceed a 10 per cent solution due to infrastructure challenges.

It will require billions of dollars and take decades to build an efficient alcohol fuel infrastructure to handle higher blends. With ethanol's toxic characteristics, and a lower fuel burn efficiency than fossil fuel, the question is: why spend so much time and money on a blending product that can be already replaced with more efficient 'green' molecules that fit in the existing petroleum infrastructure?

In addition, the jet aviation and marine diesel industries cannot use alcohols – even

as a blending component – due to safety and technical confines.

What better game plan exists than to build a new industry by advancing the successes of prior ones?

### HOW GREEN MOLECULES OVERCOME THE LIMITATIONS OF ETHANOL

By standing on the shoulders of both the petrochemical industry and the ethanol industry, Byogy has developed a full supply chain platform that leverages the proven processes from both industries.

Byogy eliminates the ethanol blend wall and produces significant volumes of premium fuels, offering the highest carbon emission reduction of any biofuel. It draws on a solution that unites the ethanol industry with the advanced biofuels industry – two factions continually at odds.

This solution efficiently converts ethanol or butanol into full replacement, advanced biofuels that require no blending.

The race to produce inexpensive sugars started decades ago. Higher sugar yields, combined with advanced harvesting, varietal improvements, cellulosic sugar extractions, and improved fermentation methods, clearly show that the cost of producing sugars, and hence alcohols, is trending down.

Hence, Byogy can immediately use available sources of globally produced ethanol from the fermentation of sugars and starches.

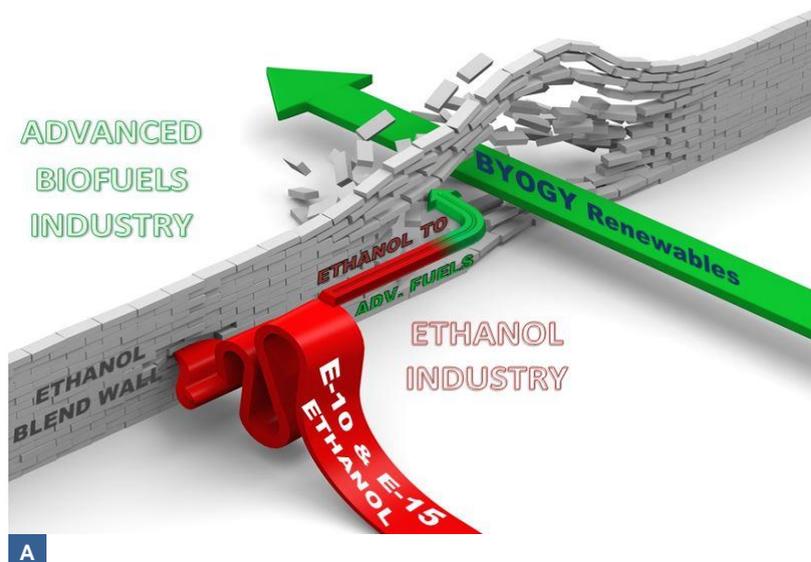
But because the cost of end products is over 65 per cent of the cost of feedstock, Byogy has formed strategic feedstock partnerships – such as with AusAgave in Australia – that show that game-changing low-cost sugar production is possible with the addition of valuable co-product creation, such as renewable fiberboard and carbon fiber replacement. Byogy's process is a true bio-refinery that capitalizes on a portfolio of products all generating revenue in different markets.

Today, ethanol is being produced from many sources, not just plant sugars. Waste flue gases, agricultural residues, algae, municipal solid waste, and food and beverage waste will expand the global ethanol production over the coming years.

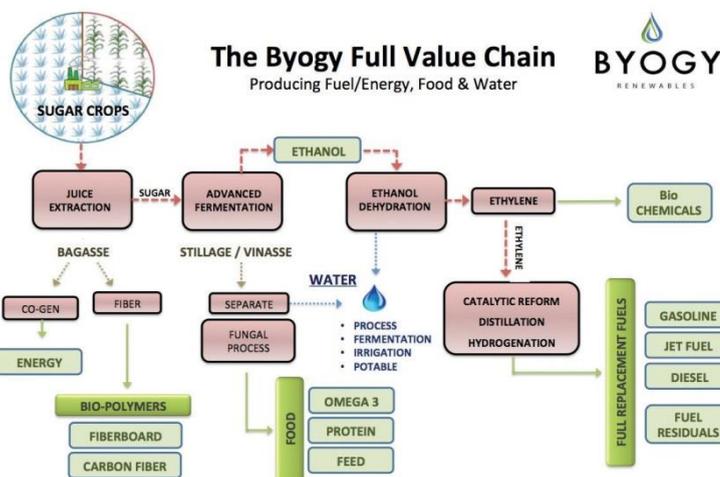
Technologies such as Byogy's, eliminates the constraints holding the current ethanol industry in corral. It overcomes the problem of the existing ethanol market such as the struggle to push more alcohol into incompatible infrastructure. Byogy's platform can create more jobs by allowing the ethanol industry to produce as much ethanol as possible to blend and convert into premium renewable fuels.

Full adherence to the fundamentals of scale and cost results in a supply chain that produces high value co-products such as

### ADVANCED BIOFUELS INDUSTRY



A



B

human food protein, omega-3 oils, animal feed, and organic fertilisers from the waste streams generated along the chain.

In addition to the high-quality biofuels such as gasoline, diesel and jet fuel, Byogy is also a net producer of pure water that can be recycled to irrigation or sent back into the process, as opposed to sourcing water from natural resources.

Technology that does not require the use, development, or invention of any new microbes, enzymes, genetically modified organisms or breakthroughs in industrial biotechnology is the way to go. It is a pure catalytic system.

Unlike synthetic biology platforms that will take decades to perfect, proven technology in the petrochemical industry has already been used at refinery scale for decades. Crude oil can simply be replaced with ethanol to produce the same distribution of final fuel products.

Respecting the final fundamental of fuel quality, Byogy produces full replacement hydrocarbons consisting of gasoline, jet fuel, diesel, and heating oil. All products are

produced onsite and require no further refining steps or special transportation infrastructure. The fuels work in all existing pipes, cars, trucks, engines, ships, planes, and infrastructure, without any modifications or handling conditions.

By building on first-generation biofuel, adding valuable co-products, using proven petrochemical technology, and producing full replacement fuels, a supply chain platform can support the most logical and cost-effective means of meeting carbon neutral goals in the biofuels industry. <sup>ecp</sup>

A: Eliminating the ethanol blend wall.

B: The Byogy full value chain.

Kevin Weiss will be a Plenary Session Speaker at the Bioenergy Australia 2015 conference from 30 November - 1 December. The conference covers the many facets of bioenergy and the opportunities for Australia. Visit [bioenergyaustralia.org](http://bioenergyaustralia.org) for details.