

**BEFORE COMMISSIONERS APPOINTED BY THE WAIKATO DISTRICT
COUNCIL**

UNDER the Resource Management Act 1991

IN THE MATTER of a further submission on the proposed Waikato District
Plan by BioTech New Zealand (further submission no.
1225)

**EVIDENCE OF WILL BARKER FOR BIOTECH NEW ZEALAND
(BIOTECHNZ)**

18 December 2019

Summary of evidence

- 1 Many global and local challenges can be addressed, or at least addressed in part, through the implementation of GM technologies.
- 2 There is a substantial body of evidence highlighting that GM technologies do not cause adverse environmental or health effects compared to conventional technologies.
- 3 Many of New Zealand's trading partners and competitors are enjoying substantial economic benefits from employing GM technologies.
- 4 The use of GM technologies is already stringently regulated in New Zealand and there is no need for further regulation at the local level.
- 5 Implementation of GMO provision into the Proposed Waikato District Plan will discourage companies engaged in the development of GM technologies and may force them out of the region or overseas.
- 6 **Losing highly innovative companies are a significant economic opportunity loss for New Zealand and the regions as these companies bring new partnership, international and national investment, attract and secure key technical staff.**

Introduction

- 7 My name is Dr Will Barker
- 8 I am the co-founder and CEO of Mint Innovation
- 9 Mint Innovation is a New Zealand cleantech company, which has scaled biological process that recovers valuable metals from waste streams. Combined with the advantages of low-cost chemistry, we aim to make it viable, both economically and environmentally, to capture value from e-waste near its point of collection.

Qualifications and experience

- 10 I hold a Bachelors Degree with Honours in Chemistry and a PhD in synthetic chemistry from the University of Leicester in England. I am also a qualified patent attorney.

- 11 I have extensive experience commercializing biotechnologies gained through a range of roles over the last 10 years including:
- 2005-2007 Baldwins IP, Patent Executive (Biotechnology)
 - 207-2014 LanzaTech New Zealand Limited, VP External Affairs
 - 2014-2017 NZBIO, Chief Executive
 - 2015-2016 Powerhouse Ventures, Auckland Investment Manager
 - 2014 - Co-founder and CEO of Mint Innovation to current
- 12 LanzaTech is a New Zealand company that was based in Auckland. LanzaTech is in the process of commercializing technology for the microbial conversion of waste gases to fuels and chemicals. At LanzaTech, I was part of the executive leadership team where I involved in strategic decision making relating to the commercialization of micro-organisms, including genetically modified organisms.
- 13 At LanzaTech, I was also involved in gaining EPA approval for the use of microorganisms under HSNO.

Context

- 14 Worldwide, genetic modification (GM) of organisms have been successfully employed to add value or mitigate harm across a range of industries and sectors. Existing or recent NZBIO members have developed GM technologies to:
- Mitigate climate change
 - Mitigate petrochemical usage
 - Improve agriculture
 - Improve forestry
 - Mitigate pesticide usage
 - Develop medical treatments
 - Improve crop/food production
- 15 The Hazardous Substances and New Organisms Act 1996 (HSNO), regulates the deliberate introduction of novel species, produced by GM or imported from offshore, into New Zealand. The New Zealand economy, and particularly its export component, is currently dominated by the primary sector. With New Zealand's agricultural systems based on imported species the regulation of how new organisms is therefore a key piece of legislation in the growth of New Zealand's economy.
- 16 Food and beverage, Agriculture, Forestry and Fisheries are dependent on living organisms. With New Zealand's land and water resources being limited, core

productivity in these sectors can only be significantly improved by increasing the productivity of the species already cultivated or by introducing new ones. In addition, GM technologies may be employed to mitigate the harm of current practices.

Example GM Technologies to Mitigate Harm

- 17 The effects of climate change are being felt today, and future projections represent an unacceptably high and potentially catastrophic risk to human health. The direct effects of climate change include increased heat stress, floods, drought, and increased frequency of intense storms, with the indirect threatening population health through adverse changes in air pollution, the spread of disease vectors, food insecurity and under-nutrition, displacement, and mental ill health.¹ It should be noted that these health effects will be felt most keenly amongst the poorest most vulnerable communities, both locally and regionally (for example our Pacific neighbour's).
- 18 GM technologies have a significant role to play in mitigating the effects of climate change in addition to mitigating the harm caused.
- 19 Climate change is predicted to affect New Zealand significantly² but potentially not as adversely as some of our agricultural trading competitor nations. The increase in temperature is likely to extend plant growing seasons but also to increase the numbers of pests. Increasing temperature coupled with increasing carbon dioxide levels will have an initial significant positive effect on pasture grass growth across New Zealand.³ However, as the temperature increases beyond the optimum range for our current agricultural species new ones will have to be found to maintain the sector.
- 20 Changes in water distribution will have a more immediate effect. The major predicted changes expected are an increase in seasonal differences with winters becoming very significantly wetter in the west and drier in the east and summers a little drier in the west and wetter in the east.⁴ This will intensify current regional differences and mean a wider range of cultivars will be required to maintain agricultural productivity. Plants and animals that show better tolerance to heat, pests, and drought will be required.
- 21 A significant amount of work on GM approaches to improve plant resistance to changing climate has been undertaken world-wide⁵ particularly drought tolerance⁶ and heat tolerance.⁷ At this point very little of this work has been performed on species of direct interest to New Zealand agricultural systems. Work will also be needed to understand and address animal responses to climate change.

- 22 A significant issue facing New Zealand agriculture, particularly the dairy industry, is nitrogen and phosphorous run-off into waterways.⁸ Improving land management practices are reducing nutrient run-off, but not at rate of productivity rise.⁹ As the situation worsens and monitoring practices improve, pollution of water-ways is becoming a “licence-to-farm” issue for local bodies and the public at large, limiting growth in the sector.
- 23 Nitrogen leaching from fertiliser application, either from synthetic fertiliser or use of stock effluent, is a world-wide issue and a number of approaches involving GM technologies have been taken to producing plants that use nitrogen more efficiently.¹⁰ The technologies being developed internationally could be applied to species used in New Zealand’s pastoral systems to reduce the amount of external nitrogen applied to pasture to maintain and increase productivity.

Example GM Technologies to Add Value

- 24 Adding value to New Zealand’s primary industries over and above simple productivity gains can be achieved by improved processing methods or improving the characteristics - in terms of better properties or novel components - of the species cultivated, for example through the use of GM technologies.

Pharmaceuticals

- 25 Currently of 6 of top 10 drugs by value (US\$38 billion) internationally are large molecule biologics manufactured using GM micro-organisms and there is a growing international business in biosimilars¹¹ (generic versions of biologics).

Biofuels and chemicals

- 26 The ability to alter wood by lowering lignin content is particularly important if wood based biofuels are to become economic. It could also have a dramatic effect on paper production with GM reduction of lignin estimated to improve pulping cost
- 27 Ethanol is a relatively low value product and any attempt to produce more complex and valuable materials that could replace petrochemical feed-stocks will require GM organisms.

Food and Beverage Manufacturing

- 28 A large number of foods are produced by fermentation of raw materials by micro-organisms and, increasingly importantly, enzymes produced by micro-organisms. Adapting these micro-organisms and enzymes to operate more efficiently in processing, by for example increasing their tolerance to heat or resistance to solvents, or producing modified products, can be accomplished by GM or gene editing. Because the GM organism is not in the product the final food is not classified

as GM. DuPont Nutrition estimate that the value of GM enzymes used in food production will increase from US\$400 million pa in 2012 to US\$600 million in 2018. Their use results in considerable cost saving by lowering processing costs and reducing waste as well as by generating new products.

Forestry

29 Others will discuss forestry, but it is noteworthy that Brazil has recently approved commercial use of GM plantation eucalyptus with a 20% productivity improvement. It is estimated this will allow harvest of trees after 5.5 years as opposed to seven years for current varieties and require 13% less land to give the same productivity.¹²

Crops

30 Others will discuss agriculture, but from a technology perspective it is noteworthy that the most significant international experience of the use of GM innovation is broad-acre crops. Wherever GM crops have been offered to farmers they have been adopted¹³ and given economic¹⁴ and environmental benefits. A recent EU review of GMO summarising 130 research projects, covering a period of more than 25 years of research, and involving more than 500 independent research groups concluded:¹⁵

“There is no validated evidence that GM crops have greater adverse impact on health and the environment than any other technology used in plant breeding. There is compelling evidence that GM crops can contribute to sustainable development goals with benefits to farmers, consumers, the environment and the economy.”

31 In a comprehensive review of the scientific literature on GM crop safety for the last 10 years, the authors concluded that the scientific research conducted so far has not detected any significant hazard directly connected with the use of GM crops.¹⁶

Use of GM Technology in New Zealand

Approval Process under HSNO

32 Approval from the EPA is needed before any GM organism can be imported into containment in New Zealand. Further application(s) are necessary before it can be released into the environment for either field testing or commercialisation.

33 EPA has the necessary experience for evaluating the use of GM technologies and already employs stringent protocols to regulate use. It is noted that in a recent benchmarking exercise evaluating the restrictiveness of regulatory systems, New Zealand ranked among the more stringent regulations for managing the use of GM technologies (ranked alongside countries including Germany, Sweden and Ireland).¹⁷ It is worth pointing out that our regulations were considered significantly more stringent and restrictive than our major trading partners (USA, China, Australia) and

those countries we consider as competitors for primary industry exports (Australia, Brazil, Argentina, Chile, USA, Canada).

National Level Decision Making:

- It is not appropriate for councils to use the Resource Management Act 1991 (RMA) for the purpose of controlling GMO's. Decisions about the testing and release of GMOs are best made at the national level, by the Environmental Protection Agency using the clear and robust process for decision making, as set out in [HSNO].
- The EPA is expert in environmental risk management. Approvals for GM activities can have conditions attached to protect the environment from adverse effects¹⁸.
- The cost of a HSNO approval from the EPA can be up to \$40,000. The additional cost of preparing the application can be much greater than this figure. An applicant who is not in a financial position to meet these costs is not granted approval.

Monitoring:

- The EPA may impose controls on an approval to require monitoring, auditing, reporting and record keeping.

Public Input into HSNO decision making:

- HSNO has clear processes for public, including local authority, input into decision making. This allows community concerns to be fully considered by the EPA.

Technical Expertise:

- The EPA has the necessary risk assessment, legal, policy and scientific expertise required to consider GMO applications.

Duplication of Regulation and Compliance costs:

- The proposed objective and policies would create unnecessary duplication with HSNO. They will also impose additional compliance costs on the applicant.

Liability in the event of adverse effect:

- HSNO has appropriate liability provisions that were amended in 2003. HSNO's civil liability provisions allow a person who has suffered harm or loss as a result of certain acts or omissions or breaches of the Act to seek damages through the courts. If any issues with liability arise they should be resolved under HSNO and apply across New Zealand, rather than be developed on a district by district basis.
- 34 Further regulation as proposed GMO provision into the Waikato District Plan will add further unnecessary cost, administration and uncertainty to an already rigorous and stringent process.

High Value Technology Development

- 35 LanzaTech is a New Zealand company that moved all operations out of Auckland, maintaining facilities in the US, Taiwan and China. LanzaTech uses naturally

occurring and genetically modified organisms to produce a range of fuels and chemicals from carbon containing gases.

- 36 Until late 2014 LanzaTech had a pilot facility located at Glenbrook steel mill, Waiuku, suitable for converting steel mill waste gases into valuable fuels and chemicals using naturally occurring and GM organisms. In order to use GM organisms at the steel mill, LanzaTech would have had to apply for approval under HSNO. GMO provision into the District Plans would make this application process more onerous if not impossible.
- 37 LanzaTech has been named to Fast Company's prestigious annual list of the World's Most Innovative Companies for 2019. Ranked number one in the Energy Category, the disruptive Carbon Recycling company entered the top 50 at number 27. The list honors the businesses making the most profound impact on both industry and culture, showcasing a variety of ways to thrive in today's volatile world¹⁹.
- 38 Lanzatech, with \$72 million in new funding at a nearly \$1 billion valuation and a newly inked partnership with biotechnology giant Novo Holdings, the company is looking to expand its suite of products beyond ethanol manufacturing, thanks, in part, to the intellectual property held by Novozymes (a Novo Holdings subsidiary)²⁰.
- 39 Lanzatech's Sean Simpson is quoted in saying "***shifting the company from Auckland to Illinois was a commercial necessity, reflecting the relative cost of doing business, proximity to projects of scale, the difficulty of attracting key technical staff to New Zealand and the country's regulatory barriers to using genetically modified organisms – a key element in Lanzatech's bio-fuel production***".²¹
- 40 Implementation of GMO provision into the Proposed Waikato District Plan will discourage other companies engaged in the development of GM technologies, may force them out of the region or overseas which means loss of world leading technology, jobs and economic opportunities for the regions .

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