SUBMISSION

TO:	Productivity Commission
FROM:	Apiculture New Zealand
SUBMISSION ON:	Transition to a Low Carbon Economy
DATE:	8th June 2018

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1. INTRODUCTION

1.1 The New Zealand agriculture and horticulture economy is reliant on the pollination services from a healthy honey bee population estimated in excess of $5 billion annually as well as increasing production and exports of high value products from the hive. The value of honey exported in 2017 was $329 million see MPI Apiculture Monitoring Programme 2017.

1.2 The Apiculture Industry is well aware of seasonal fluctuations in hive production from weather events as opposed to more gradual anthropogenic climate change. However, the Apiculture Industry is becoming more aware and concerned about the potential adverse effects that anthropogenic climate change will have on plant species and the interactions between plants and honey bees. Plants respond to adverse weather conditions by shutting down the production of nectar and pollen. Climate change will make adverse seasonal weather events more likely, more severe and more frequent. As back ground to our submission we attach two papers that detail the likely impacts on honey bees and plant-pollinator mutualisms as follows.
Climate change: impact on honey bee populations and diseases
by Le Conte & Navajas 2008 and
Warming, CO2, and nitrogen deposition interactively affect a plant-pollinator mutualism by E. R. Hoover et al 2012.

1.3 We will answer the two broad questions raised by this enquiry.

1. What opportunities in apiculture exist for the New Zealand economy to maximize the benefits and minimise the cost of transitioning to a lower net-emissions economy, while continuing to grow incomes and wellbeing?
2. How can New Zealand's regulatory, technological, financial and institutional systems, processes and practices help realise the benefits and minimise the costs and risks of a transition to a lower net emissions economy?

2. OPPORTUNITIES

2.1 Wealth, transport & emissions. Apiculture is little different to other land-based industries in our use of transport and the use of energy in the processing of products the industry produces. However, compared with other apicultural industries in other countries New Zealand apiculture is wealthy by comparison. This wealth has arisen over the last two decades from disproportionately higher values achieved in markets for New Zealand honey. The reasons for this are fourfold.

1. The research conducted from the 1980s by the late Dr Peter Molan and his colleagues into the bio-actives in manuka honey has greatly contributed to the high value now placed on manuka honey in all markets. This has further been improved on by the research and marketing efforts of various companies and researchers over the last two decades. The high value of manuka honey has tended to lift the values of all New Zealand honeys over time.

2. The New Zealand system of apiary site registration for the control of disease and for biosecurity reasons has allowed for precision in market product traceability which has further enhanced the value of our apicultural products internationally. In addition, the New Zealand pest management plan for the control of American Foul Brood Disease (see http://www.afb.org.nz) does not allow the use of antibiotics to control this disease in our hives. Essentially our policy under law is a seek-and-destroy strategy for American Foul Brood disease, which gives confidence of authenticity and an assurance of our honey being antibiotic residue free to our markets. New Zealand honey is regularly tested in New Zealand for residues of either chemical and biological origin.

3. New Zealand allows the importation of bee products from only a handful of Pacific Island countries and has maintained a strict ban on general bee and honey imports for phytosanitary reasons. While the primary purpose of these restrictions remains to prevent the importation of exotic bee pests and diseases it has prevented the importation of cheap foreign honey and resulting adulteration of New Zealand honey. The history of international trade in honey has shown in many countries that importation of cheap foreign honey for re-export and subsequent passing off as originating from the importing country has economically degraded products. Adulteration of honey with sugar and the passing off or laundering of products as natural honey for synthetic products, is a major problem in the international honey trade. See attached presentation **Honey Quality and the International Honey Market** by Norberto-Garcia (2018) http://innovationsinagriculture.com/wp-content/uploads/2018/02/Norberto-Garcia.pdf and **Current Issues and Trends in the Global Honey Market** by Elflein 2012.

   New Zealand maintains a ban on the general release of genetically modified organisms (GM) following the 2000 Royal Commission on Genetic Modification. As such New Zealand honey can claim to be GM free in international markets giving our honey a market advantage. The majority of New Zealand honey traded internationally builds on the advantages of intrinsic purity, source, traceability, verified standards and the New Zealand brand that New Zealand products gain in international markets. While only a handful of companies use the term “GM Free” on their product labelling, GM Free is intrinsic to the story that most New Zealand honey and bee product exporting companies ascribe to. While GMO Free status might not be the principal driver in the wealth of this industry it is nonetheless seen by the apiculture industry as an important attribute of its overall image.

New Zealand's apiculture industry aims to produce products for high-end, discerning markets that are prepared to pay for the confidence and authenticity that brand New Zealand brings. There is an inherent tension between the rapid advances in genetic technology and what it could deliver in terms of breeding better bee stocks and plant species with the perception for what our markets may see as quality products. This will be a discussion that all of New Zealand's agriculture sector needs to have as the GM of 2018 is vastly different from that of the late 1990s and will change with even greater pace in the years ahead. How our markets react and where we position ourselves in terms of retaining and growing those markets will be critical to maintaining the comparative wealth of New Zealand's apiculture.

As a result of its comparative wealth from these four factors New Zealand apiculture is at greater economic advantage compared to apiculture industries in other countries. This is emphasized by the recent rapid growth in hive numbers in New Zealand, compared with declines in beekeeping and rapid colony losses experienced in other countries. This comparative advantage makes our industry better placed economically to upgrade transport, machinery and systems to low carbon emissions standards as technology advances.

A key source of emissions in the Apiculture sector is in the transportation of hives between honey and over-wintering sites, particularly in the mānuka sector where some producers follow the mānuka flowering through the North Island. This can be addressed through a residential apiary system, where hives are located on one site year-round, or only have a short distance to travel between their honey and over-wintering sites. Refer to sections on Trees for Bees and Plantation Mānuka.

2.2 Biosecurity. The NZ apiculture industry through Apiculture New Zealand (ApiNZ) recognizes the critical importance of effective biosecurity in the maintenance of its economic wealth. The opportunity exists for the NZ apiculture industry through ApiNZ to enter in a Government Industry Agreement (GIA) with MPI to maintain and enhance our biosecurity systems. The introduction of new exotic pests or pathogens of bees would necessitate more visits to hives and more intense hive management leading to an increase in the release of atmospheric carbon from increased travel and general hive management as a result. For example, the discovery and spread of the varroa mite first found in 2000 was a paradigm shift for the industry that resulted in significantly more work, cost and travel to maintain hive health. As such effective biosecurity has a critical linking effect to reductions in emissions of atmospheric carbon.

2.3 Certification schemes for carbon reduction/carbon neutral. Another opportunity is around the education of and uptake of the various Enviro-mark certification schemes around the reduction of carbon by businesses outlined by Manaaki Whenua - Landcare Research.

https://www.enviro-mark.com/what-we-offer While carbon reduction certification is currently the decision of various businesses ApiNZ could play an important part in encouraging carbon reduction and its benefits without endorsing any one certification mark.

2.4 Encouragement of innovation and excellence in carbon reductions. ApiNZ could encourage its members and the wider industry to uptake technology and advice from the likes of the Energy Efficiency and Conservation Authority or EECA. See https://www.eeca.govt.nz/about-eeca/ Biannual EECA business awards such as the 2016 innovation award given to Hellers and Active Refrigeration is an example of the type of award that the Apiculture Industry might enter. Honey processing plants often use both heating and cooling systems to warm honey during processing and to chill it down after packing. A dual system of heating and cooling by energy transfer between the two is a good example of what could be saved in terms of overall energy reduction. Most processing is conducted during the summer months which offers the opportunity for more solar heating and electricity production during the seasonal peak in energy demand.

3 RESEARCH AND TECHNOLOGY

3.1 Trees for Bees. The rapid growth in hive numbers is placing strain on pollen and nectar resources in regions of high hive density. It is critical for hive health and productivity to have adequate nectar and pollen sources available in quantity with overlapping flowering times to provide bee forage for extended periods during spring and autumn. Hives rely on natural pollen and nectar resources for the critical build up in bee numbers in spring in order to reach sufficient strength for pollination duties or honey production and conversely hives need sufficient stores to survive the winter and to maintain their immune response from pathogens. Therefore, strategic bee forage planting around home yard and over-wintering sites is critical. See attached heat map from MPI on hive density as at March 2016. There is an opportunity to partner with landowners to gain co-benefits through the planting of trees that provide nectar and pollen forage for bees during the critical spring and autumn periods as well as providing landowners with benefits ranging from erosion control, shelter, shade, increased native biodiversity and riparian management. The Trees for Bees research project has been running for some nine years and has produced a wealth of published data on the value and planting of various tree and plant species for bees including many of our indigenous species. See published information on the Trees for Bees web site at http://www.treesforbeesnz.org/home. A key component of this research project is the planting of trees on demonstration farms on various types of farm throughout the country, to develop and test planting designs and species mixes for different situations.

3.2 The opportunity exists to expand the planting of Trees for bees based around the results from this research and to work with landowners and government in building more resilience into our agricultural systems. Such research will not only to help beekeepers to cope with a changing climate but will also provide vital and available nutrition for bees and other beneficial insects. This research is a key component in the development of plantation mānuka, in that by incorporating bee forage that flowers outside the manuka season into these plantations reduces the need for supplementary feeding with imported sugar and protein and allows these plantations to operate as residential apiaries, reducing the need for transporting of hives. This research will also lead to biodiversity gains for many native flora and fauna and improved fresh water quality along riparian margins.

ApiNZ supports increased animal pest management throughout New Zealand particularly in native forests that are browsed upon by pests such as possums. Research has shown that possum browsing can have severe effects on the production of honey and pollen from plants by greatly reducing the production from them. The reduction of browsing by pest animals naturally leads to greater carbon sequestration through greater plant growth. See attached paper by SC Mowbray on pest eradication of Rangitoto and Motutapu Islands in the 1990's and its positive effects on honey production. Page 230.

3.3 Plantation Manuka. There is a significant opportunity to plant plantation manuka on land that is suitable for it. There is a range of options for funding and for landowners to earn carbon credits for plantation manuka as per the attached MPI Forestry Schemes and Grants spread sheet. Most manuka honey produced at present comes from wild harvest, and with the growth of and market demand there is an increasing opportunity to plant plantations of manuka for the high-value honey harvest and for essential oils. The manuka honey sector has a growth target of $1.2 billion in honey exports by 2028 (currently $329m). The only way that the $1.2 billion target can be reached is through the planting of plantation manuka as in many places as possible as the wild harvest is at its maximum yield due to current hive stocking rates.

3.4 Opportunities around improving hive health. Research and the introduction of new technology to control or even eradicate pests and diseases of bee hives in New Zealand using future advances in science offers the opportunity to improve bee health in a sustainable way by reducing carbon emissions from the need for less travel for hive management. If for example a pest such as the varroa mite could be eradicated from New Zealand it would provide the industry with an enormous gain in terms of productivity, costs, competitive advantage and carbon reduction.

3.5 The role of pollination. A healthy and thriving apiculture industry means better pollination outcomes for both paid and non-paid pollination services by bees, resulting in greater seed set and resilience in plant growth in the face of anthropogenic climate change.

ApiNZ is about to seek an industry mandate on the introduction of a commodity levy to pay for industry good projects such as research and biosecurity. If this gets signed into law by early 2019 following a positive vote by industry it will enable a range of significant research projects in collaboration with government funding to be undertaken that will lift the value, productivity, and bee health while helping to reduce the industry's carbon emissions over time. More needs to be done with research on the effect of a changing climate on pollination. See the paper by Shelley ER Hoover attached.

Invasive species such as wasps predate on beneficial insects such as bees leading to a reduction on their effectiveness at pollination of important crops and pasture. It has been estimated that the eradication of wasps would result in a net annual gain of $62 million per annum for agriculture through improved pollination and the consequent need for less nitrogenous fertilizers which in turn would lead to the release of fewer nitrogenous gases that contribute to anthropogenic climate change. See attached paper An Evaluation of Pest wasps (Vespula sp) in New Zealand. McIntyre & Hellstrom 2015.

4. REGULATORY AND ISTITUTIONAL BARRIERS TO THE TRANSITION TO A LOW CARBON INDUSTRY

4.1 Funding for tree planting and ETS credits. There is a mix of forestry schemes and grants available as outlined in the attached spread sheet from MPI. Some of these schemes create barriers to apiculture as follows;

1. The minimum height restrictions on plants at five metres from the Emissions Trading Scheme (ETS) excludes valuable bee forage plants such as Tagasaste *Chamaecytisus proliferus.* All plants sequester carbon even if they have relatively short lives such as Tagasaste by the fact that they seed and renew over the course of their life cycles often leading to net gains in numbers of plants over time.

2. A minimum of 30 meters of plantings as part of riparian management under the ETS. The width of 30 meters on many farms is impracticable for the amount of land it will take away from farming. Many hive sites are along waterways on farms and the shelter and microclimates that a well planned and implemented riparian tree planting affords hives sites should be encouraged by regulations that provide best fit to these circumstances as well as to the landowners.

About Apiculture New Zealand

"The New Zealand beekeeping and honey industry is a vibrant and growing contributor to New Zealand's economy, nationally respected; internationally recognised." As such ApiNZ ascribes to taking its part as a contributor and partner in developing a low-carbon economy.

ApiNZ' s strategy places it at the centre of relationships with key influencers so that they experience a trusted and united body including our members and external bodies plus all of government.

ApiNZ seeks to build greater network density in its relationships with Government agencies and institutions, in particular the Ministry for Primary Industries. This is a vital part of its business strategy. Through the development of better communications, institutional alignment and relationships between parties we see the opportunity for the reduction in those barriers that remain to enable the apiculture Industry to play its part in a transition to a low-carbon economy.

ATTACHMENTS

- **Climate change: impact on honey bee populations and diseases** Y. Le Conte (1) & M. Navajas (2) French National Institute for Agronomic Research *Rev. sci. tech. Off. int. Epiz.*, 2008, 27 (2), 499-510 https://apinz.org.nz/wp-content/uploads/2018/06/Le_Conte-et-NAvajas-OIE-ANG-copy-Srept-2008.pdf
- **Warming, CO2, and nitrogen deposition interactively affect a plant-pollinator mutualism** Shelley E. R. Hoover, Jenny J. Ladley, Anastasia A. Shchepetkina, Maggie Tisch, Steven P. Gieseg and Jason M. Tylianakis* School of Biological Sciences, University of Canterbury Ecology Letters, (2012) 15: 227–234. https://apinz.org.nz/wp-content/uploads/2018/06/Hoover_etal_2012EcolLett.pdf
- See Trees for Bees at http://www.treesforbeesnz.org/home
- **Honey Quality and the International Honey Market** Prof. Norberto GARCIA (U.N.S. – ARGENTINA) ApiArab Expo 2018
- **Current Issues and Trends in the Global Honey Market** by Lutz Elflein 2012 https://www.apimondia.com/congresses/2013/Technology-Quality/Plenary-Session www.interlink.com
- **MPI Heat map of hive density** in New Zealand as at March 2016. https://apinz.org.nz/wp-content/uploads/2018/06/heatmap-of-New-Zealand-apiaries-March-2016.pdf
- **Forestry Schemes and Grants spreadsheet** of MPI funding programmes for forestry https://apinz.org.nz/wp-content/uploads/2018/06/Grants-2018-Forestry-Schemes-and-Grants-Matrix-Gisborne-specific.pdf
- **Eradication of introduced Australian marsupials (brushtail possum and brushtailed rock wallaby) from Rangitoto and Motutapu Islands, New Zealand** – effects of the eradication page 230. SC Mowbray 2002 https://apinz.org.nz/wp-content/uploads/2018/06/Eradication-of-introduced-Australian-marsupials-brushtail-possum-and-brushtailed-rock-wallaby-from-Rangitoto-and-Motutapu-Islands-New-Zealand.pdf

- **An Evaluation of the costs of pest wasps (Vespula species) in New Zealand**. McIntyre & Hellstrom 2015. Part 3.13 Pollination benefits of wasp eradication. https://apinz.org.nz/wp-content/uploads/2018/06/MacIntyre-and-Hellstrom-2015-Evaluation-vespulid-wasps-nz-copy.pdf
- **Trees for Bees booklet & pamphlets.** A selection of these will be posted under separate cover direct to the offices of the Productivity Commission.