Discussion Paper

Proposed Integrated Trading System for Climate Change and Biodiversity: "GrowTradeBalance"

Prem S Maan, Executive Chairman, February 2024

This paper proposes a market-led traded solution to both New Zealand's international climate-change mitigation obligations, to its commitments to the biodiversity COP, and the increased demand from our global consumers for verified sustainable food production.

The system is designed to meet farmers and business owners where they currently are, then promoting farmer action through market opportunity rather than bureaucratic regulation. A traded solution further allows the government to set relevant goals and targets but is not reliant on centralized funding for expansion and growth.

It's our belief that this proposal will help New Zealand farmers uphold our reputation as world-leading high-value food producers — where value to consumers is increasingly tied to environmental credentials — without vilifying our hard-working farming communities.

Proposition:

- Establish a trading system, akin to the cap-and-trade system that was successfully used to tackle acid rain, to mitigate the issues identified by both the climate change COP and biodiversity COP.

Create a single fungible tradable unit that covers carbon dioxide (CO_2), methane, and biodiversity - Climate and Biodiversity Units (CBUs).

- Start with the New Zealand agricultural sector, then sell surplus credits into other sectors and markets (UK and various EU examples).

- Leverage the system to deliver multiple benefits for New Zealand Inc. from empowering the agricultural sector, to growing the economy, to saving wealth transfer to offshore markets from the Crown's balance sheet.

- Under the working title "GrowTradeBalance", grow the system to expand the economy through the positive effects of trading CBUs, positively impacting on the country's balance sheet position.

Southern Pastures

Contents

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Executive Summary:

The plan below outlines the GrowTradeBalance system to address the pressing issues identified by both the climate change Conference of Parties (COP) and Kunming-Montreal Global Biodiversity Framework, both of which New Zealand has obligations to.

GrowTradeBalance aims to create a single fungible tradable unit that encompasses CO_2, methane, and biodiversity, weighted according to national priority.

Farmers and producers earn credits for staying below the emissions cap, and for actively sequestering carbon or fostering biodiversity. Those exceeding the cap will purchase Climate and Biodiversity Units (CBUs) from those with excess credits.

By deploying a comprehensive approach, GrowTradeBalance will foster sustainable practices, reduce emissions, and protect biodiversity, while offering market-based incentives for businesses to participate.

The plan is structured to financially reward the establishment and protection of indigenous forest, which has a higher rate of long-term CO_2 sequestration (along with other environmental benefits) than exotic pine plantations.

There is the additional potential to create employment opportunities through seasonal jobs for planting, as well as long-term job creation in subsequent years for indigenous forest management.

It is proposed that GrowTradeBalance be initially implemented in the agricultural sector but designed so that it can be modified and applied economy-wide, then expanded internationally.

After achieving surplus caps within agriculture, GrowTradeBalance will grow to include other sectors and industries such as property development, where for example, developers may purchase biodiversity credits from farmers for new projects, as is the case in the UK. Similar opportunities exist in the transport or industrial sectors to offset greenhouse gas emissions.

Other benefits include:

(i) NZ not relying on the purchase of offshore offsets in future

(ii) NZ farmers becoming planet-saving superheroes (rather than the evil villains they are often portrayed as). There is a tangible increase in the

market value of our products, our access to new markets, and our social licence to operate.

(iii) A significant increase in indigenous flora and fauna

(iv) NZ becoming a global leader in climate change and biodiversity preservation – and increase in eco-tourism.

(v) The development of rural communities

(vi) Providing in-built incentives for the private sector and research organisations to develop tools and technologies to assist in the implementation of GrowTradeBalance and in reducing GHG – which can then be exported globally.

(vii) A market-driven solution that is not dependent on government funding (but that can help turbo-charge the process) and has the ability to tap and be powered by overseas funding in a capital importing country.

1. Introduction:

As farmers, consumer brand-owners and primary products ingredients merchants, we've seen first-hand how our high-end consumers' and large customers' priorities are shifting. We know there is increased demand for measurable environmental action among food producers, and pressure on farmers to prove their emissions reduction credentials.

In addition, the climate change COP has emphasized the urgent need to mitigate greenhouse gas emissions, particularly CO_2 and methane, to curb global warming and its adverse impacts.

Simultaneously, the biodiversity COP has recognized the importance of preserving and restoring ecosystems, which are vital for maintaining biodiversity and ensuring a sustainable future.

Currently, New Zealand may potentially have to spend as much as $24 billion on offshore offsets by 2030 to meet our international obligations – a net drain that our country can ill afford.

GrowTradeBalance, is an innovative solution that addresses both these challenges through an integrated cap-and-trade trading system.

Previous proposed solutions (like He Waka Eke Noa or Emissions Trading Scheme (ETS)) have met with resistance from our farming and rural communities due to the focus on greenhouse gases only, and the punitive measures required to meet targets.

GrowTradeBalance on the other hand incentivizes farmers and producers to reduce emissions, sequester carbon, and foster biodiversity. It also incentivises a system that accurately captures robust data and science about our environmental actions, which can be bundled and marketed to customers and consumers. It allows us to reduce our reliance on exotic pine, which creates downstream problems such as slash after harvest, in favour of generating financial and environmental returns for farmers from indigenous forest.

It is proposed that GrowTradeBalance be initially applied to agriculture only, where excess credits generated by those below the cap can be traded within the sector, while those exceeding the cap must purchase CBUs from credit surplus participants.

Agriculture becomes part of the long-term solution if a realistic cap is set in a global holistic food and nutrient security, as well as climate change and biodiversity, context, and if sufficient credit is given to sequestration and biodiversity growth.

This plan gives New Zealand farmers who care for our land, the animals that we farm, and the products that we produce, a positive market and sector-based solution to greenhouse gasses and biodiversity – a solution that in time will turn into another income source.

Subsequently, the program can extend to include other sectors, addressing the need for biodiversity credits in property development, as exemplified by the UK, and further promoting our farmers as a source of good in the world.

Along with AI (Artificial Intelligence) and Machine Learning, there is another opportunity rich global mega-cycle that will develop that GrowTradeBalance is designed to enhance New Zealand's ability to capitalize on - and that is creating solutions to meet the requirements of the climate change and biodiversity COPs.

The private sector and research organizations will have ample motivations to develop tools and technologies to measure and validate GHG and biodiversity levels along with tools and technologies to reduce GHGs and foster biodiversity. By being ahead of the curve, New Zealand can develop valuable industries with export potential.

2. Objectives:

a. Macro Economy-Wide System

Develop GrowTradeBalance as a comprehensive cap and trade system that covers CO_2, methane, soil carbon, and biodiversity credits.

- Create a fungible tradable unit, known as the Climate and Biodiversity Unit (CBU), to simplify market transactions.
    - Encourage emission reductions, biodiversity conservation, and sustainable practices.
    - Promote corporate responsibility and accountability towards climate change and biodiversity preservation.
    - Generate accurate data and science that can be marketed to customers and consumers as proof points of NZ's environmental stewardship and credentials.
- Establish a transparent and efficient market mechanism for the trading of CBUs.

b. Agriculture Sector

- Establish within GrowTradeBalance a sector-specific cap-and-trade system initially targeting the agricultural industry only.
- Encourage agricultural stakeholders to actively sequester carbon and promote biodiversity conservation and reduce emissions. By being sector-specific, methane reduction is to be given substantially more credit (75x) as appropriate but not penalised ((See Appendix 2).
    - This weighting can be reduced as methane reduction tools become available.
    - It is proposed that a portion (1/75x) of this has to be paid back as CO_2 calculations in year 12 to reflect the changing nature of methane
- Facilitate the trading of Climate and Biodiversity Units (CBUs) within the agricultural sector.
- Require participants exceeding the emission cap by requiring them to purchase CBUs from credit surplus participants.
- Expand the system over time as the sector develops excess net credits to accommodate other sectors, such as property developers seeking biodiversity credits or oil companies seeking carbon credits.

Note: We believe that most good farmers (including sheep and beef farmers) in general terms should be supportive of GrowTradeBalance as while they may initially fall behind in greenhouse gas calculations, they will in time be able to make up for this in biodiversity calculations.

3. Methodology:

a. Setting Emission Caps and Biodiversity Targets:

- Collaborate with agricultural experts, scientists, and policymakers to set scientifically robust emission reduction targets and biodiversity conservation goals at a national level.

Allocate CO_2 and methane emission caps for industries and sectors.

b. Setting Credit Systems

- Set biodiversity conservation and fostering goals that align with regional or national priorities.
- Set up mechanisms for generating CBU credits for biodiversity based on increases in flora and fauna.
- Set up mechanisms for generating carbon sequestration CBU credits – from soil and plantings (including potentially upfronting some native planting income streams – see Appendix 5)
- Generate biodiversity and sequestration credits in a similar manner to NZUs, subject to legislative changes (see Appendix 3). See also Appendix 4 for how some biodiversity credits work in some other countries.

c. Tradable Units and Accounting:

- Develop the Climate and Biodiversity Unit (CBU) as a single fungible tradable unit representing emissions reductions, carbon sequestration, and biodiversity fostering and conservation.
- Assign a numerical value to each CBU, reflecting one or more of its environmental impact and contribution to carbon sequestration and biodiversity contribution.
- Implement an accounting framework to track and verify emission reductions and biodiversity efforts within the agricultural sector initially.

d. Market Mechanism:

- Create an online trading platform to facilitate the buying, selling, and trading of CBUs. Initially this platform will be exclusive to the agricultural sector allowing stakeholders to buy, sell, and trade CBUs until such time as the sector has net surplus CBUs.
- Implement robust monitoring, reporting, and verification mechanisms to ensure the integrity and transparency of transactions.
- Establish a mechanism for participants exceeding the cap to purchase CBUs from credit surplus participants.
- Stimulate a competitive market by establishing a clearinghouse that matches supply and demand efficiently.

e. Market Participants and Incentives:

- Structure designed so that NZX can facilitate, and broking firms (such as Jarden's) can easily transact.
- Launch the system initially within the agricultural sector, targeting farmers and other related stakeholders.
- Conduct a pilot phase with sector leaders to test the system's effectiveness, make refinements, and address any challenges.
- Gradually expand the system, as the agriculture sector develops excess CBUs, to include other sectors and encourage businesses, industries, and organizations to participate voluntarily in the cap-and-trade system.

Options for Government to encourage participation and efficiency:

- Provide financial and non-financial incentives to entities that generate significant CBUs, such as tax credits, grants, certifications, and recognition.
- Foster public-private partnerships to accelerate emission reductions and biodiversity expansion and conservation efforts.
- Consider dovetailing with complementary propositions being advanced such as Pure Advantage's 'Recloaking Papatūānuku' (see Appendix 6).

4. Implementation and Scale-Up Strategy:

a. Pilot Phase (1-2 years):

- Conduct a pilot program in the agriculture sector with volunteer industry leaders.
- Monitor and evaluate the effectiveness of the GrowTradeBalance system, refine processes, and rectify any shortcomings.

b. Outreach and Collaboration (during Pilot Phase):

- Engage farmers, agricultural organizations, and relevant stakeholders to gain buy-in and participation in the GrowTradeBalance system.
- Implement an extensive public awareness campaign to educate external stakeholders about the benefits of the GrowTradeBalance system.
- Foster partnerships with governmental bodies, environmental agencies, and financial institutions to secure support and endorsement.

c. Scale-Up:

- Expand the GrowTradeBalance system to cover all sectors, considering regional, national, and international market integration.

- Continuously assess and update emission targets and biodiversity conservation requirements based on scientific advancements, New Zealand's commitments to international agreements and national economic interests, and humanity's need for high quality nutrient dense foods.
- Convert CBUs into NZUs at an agreed multiple once the agricultural sector is in surplus, to more easily scale up and future-proof the system.

d. Potential for International Expansion:

- The GrowTradeBalance system should be designed as a model that other countries can adopt for their own comprehensive cap-and-trade framework.
- New Zealand's success in implementing and expanding the GrowTradeBalance system internationally could contribute significantly to global climate change mitigation and biodiversity preservation efforts.

5. Financial Model Considerations:

- Estimate the capital required to develop and maintain the trading platform, monitoring systems, and administrative infrastructure.
    - Assume NZX as the default provider, and hold discussions accordingly.
- Establish pricing mechanisms for the purchase and sale of CBUs within the agricultural sector.
- Marketing/meeting budget to sell the system initially to policymakers and then to the market users.
- Raise the capital to fund the launch GrowTradeBalance, to run it as a successful business and expand it, initially to other sectors and then export the model to other countries.
    - There are various business models that can be applied here from a traditional corporate to a foundation.
    - The model needs to such that the system runs with the prime measure of success being expansion and not profit – but business discipline introduces efficiencies that are important for success.

6. Conclusion:

Implementing an integrated GrowTradeBalance system that covers CO_2, methane, soil carbon and biodiversity offers an effective market-based solution to address the challenges faced by our farmers as we look to secure future global market advantage, as well as managing the significant issues identified by the recent climate change and biodiversity COPs.

Through the initial restricted trading of CBUs in the agricultural sector only, farmers and producers will have opportunities to earn credits and develop sustainable practices at a scale and pace that suits each business. The gradual inclusion of other sectors ensures that CBUs are readily accessible for sustainable development and ultimately for meeting New Zealand's obligations to the Paris COP Agreement. It also allows NZ to meet its commitments to the Biodiversity COP.

It turbo-charges the creation of associated innovations with export potential from the private sector and research organisations.

Subject to a NZU swap mechanism (Appendix 5), native plantings could be fully funded by investment capital.

This plan outlines how the development, implementation, and scale-up of this system can be accomplished to create a sustainable resilient future by reducing emissions, fostering biodiversity, enhancing economic viability, and collaboration across sectors.

I believe that GrowTradeBalance system provides an elegant solution to many of the issues New Zealand currently faces in that it is:

- Relatively simple – once implemented, users will find it easy to use after they have tried it as it will be user-centric.
- Efficient – it is market based and self-correcting with its own supply and demand built in with over-supply being a success that will then flow onto other industries – and under-supply increasing prices thereby providing the necessary motive for tremendous commercial innovation.
- Effective – it addresses the problems that NZ as a country and our agricultural industry faces regarding GHG, biodiversity commitments, premium market preservation and growth – and simply market access.
- Kiwi Ingenuity – it has aspects of novel thinking that will allow NZ to increase its global soft power by exporting the systems and the innovations that will flow from it around the world.
- Long-term focus – GrowTradeBalance is based on long-term thinking and is adaptable to future challenges.
- Cost-effective – and especially so from the Government's perspective.

I recommend it to you.

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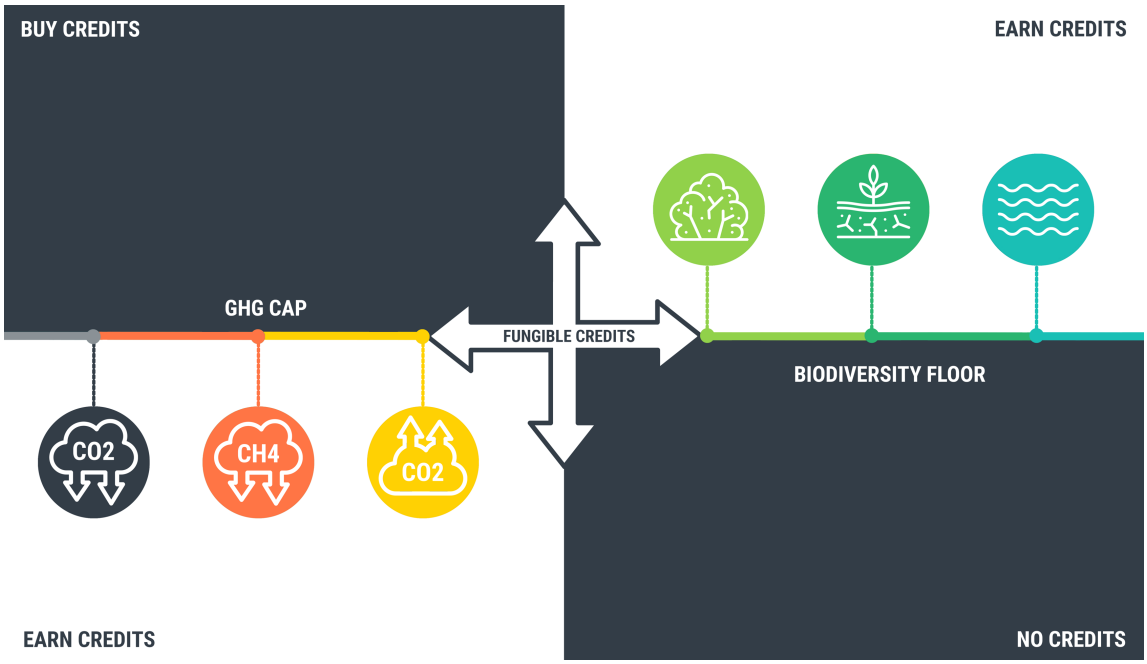
Appendix 1: Diagram of Proposed GrowTradeBalance

GHG Cap set. **Carbon Dioxide** and **Methane** emissions calculated, weighted on lifespan and any **Carbon Sequestration** offset accounted in total on-farm emissions



Biodiversity credits earnt on the improvement of biodiversity relating to: **Plants**, **Soil**, & **Water**

Appendix 2: Weighting Methane vs Carbon Dioxide

Methane vs Carbon Dioxide

In working out what weight to give to Methane reductions vs CO_2 reductions, it is important to consider its relative importance.

Methane is a greenhouse gas that is significantly more potent than CO_2 at trapping heat in the Earth's atmosphere over a shorter time frame. However, when considering methane's overall impact on global warming, it is important to consider both its potency and its concentration.

Methane is approximately 28 to 36 times more potent than CO_2 at trapping heat over a 100-year period. This characteristic, known as the global warming potential (GWP), accounts for both the higher heat-trapping ability of methane molecules and its shorter atmospheric lifetime compared to CO_2. Over a 20-year period, methane's GWP is estimated to be even higher, ranging from 84 to 87 times that of CO_2.

It is therefore worth noting that the relative significance of methane and CO_2 in causing global warming depends on the time scale considered. Over shorter time frames, such as a few decades, methane's impact is relatively higher due to its potency.

The above fact, along with the facts of New Zealand's obligation to the Paris Climate Change COP agreement and our pastoral based economy with its large methane exposure means we have to focus much more on methane.

However, methane reduction is hard to achieve and farmers need to be compensated accordingly. Much of the methane released in the world comes from sources such as natural gas leakages, wetlands, food wastes and rice paddies.

We propose that methane should initially be given a higher weighting towards its short term nature to recognise the more immediate benefit it brings and also that it is harder to reduce.

Our suggestion is that **1MT of Methane reduction = 75 MT** CO_2

It is also proposed that after its 12 year lifecycle, each MT of methane should be counted as 1MT of CO_2 to reflect the natural lifecycle of methane in the atmosphere.

For example if a farmer reduces methane level by 100mt they will achieve 7500 CO_2

credits. After 12 years when this methane has converted to CO_2, they will therefore have 75 CO_2 credits equivalent that they will need to offset, either proving further reduction of methane or CO_2 to offset this or purchasing/earning credits.

While there is merit in the reduction of methane on a short term basis, we must acknowledge the full lifecycle of the greenhouse gas.

NOTE: This conversion formula would be modified in the future as effective tools for reducing methane become available. Therefore there is an incentive for sustainable farmers and early adopters of GrowTradeBalance.

Appendix 3: Creating Biodiversity and Carbon Sequestration Credits

The Climate and Biodiversity Units (CBU) GrowTradeBalance system requires that credits be given to farmers for fostering biodiversity and for carbon sequestration.

The discussion below is focused on biodiversity – and a similar and simpler measuring process would be followed for carbon sequestration.

The system under which the New Zealand government issues NZUs (carbon units) or a similar mechanism could potentially be adapted to issue biodiversity credits or units which would then be converted into the proposed Climate and Biodiversity Units CBUs.

The issuance of biodiversity credits would require the establishment of a measurable framework that recognizes and incentivizes biodiversity conservation and restoration efforts – or importantly fostering new areas of biodiversity that leads to increases in native flora and fauna over the years.

Similar to carbon credits, biodiversity credits could be designed to represent the positive impact on biodiversity resulting from certain activities or projects.

To develop a biodiversity credit system, some of the key components that would need to be considered are

Baseline Determination: Just like in carbon credit systems, a baseline would need to be established against which the improvements in biodiversity can be measured. This baseline would reflect the pre-existing or expected state of biodiversity in the absence of the conservation or restoration or fostering initiatives.

Measurement: Scientific methodologies will need to underpin the assessment of biodiversity credits. This can involve field surveys, remote sensing technologies, genetic analysis, or modelling techniques to assess indicators such as species richness, habitat quality, ecosystem functions, or genetic diversity. It will be imperative to engage key sector stakeholders to determine the best methodologies for each landscape i.e. catchment groups and DOC when identifying aquaculture biodiversity methodologies.

Another key step is to work out what the equivalence measure should i.e. how many biodiversity credits should equal 1MT of sequestered carbon. Appendix 4 has examples of how other countries are valuing biodiversity credits. Our suggestion is

that once a dollar value has been assigned to various forms of biodiversity then this $ equivalent be translated into $ for $ into carbon units – after all money is fungible.

Credit Issuance and Accounting: Biodiversity credits would be issued based on the positive impact achieved in relation to the established baseline.

Verification and Certification: A robust verification process would be essential to ensure the accuracy and credibility of biodiversity credits. Independent third-party verification, similar to CO_2 offset projects, could be employed to verify the claimed biodiversity outcomes and ensure adherence to defined standards.

Examples of Biodiversity Credit generation:

1. Habitat Conservation: Biodiversity credits could be generated by protecting and restoring or even starting new specific habitats. This may involve creating or managing protected areas, conserving wetlands, or implementing agroforestry practices. The measurement of credits in this case can be based on the size, quality, and rarity of the habitat preserved or restored.

2. Species Protection: Another way to generate biodiversity credits is by focusing on the conservation of endangered or threatened species or simply fostering more native fauna. The measurement of credits may involve assessing population growth, genetic diversity, or the expansion of suitable habitats for the target species. We for example have undertaken massive native plantings on our Canterbury farms and native fauna have almost magically appeared and Plant & Food do annual surveys to measure increases in various populations.

3. Ecosystem Services: Biodiversity credits can also be generated by maintaining ecosystem services that benefit human and native fauna well-being. For instance, native forests can be assigned credits for services other than carbon sequestration such as water filtration. The measurement of credits can involve quantifying the ecological functions provided by the ecosystem and comparing it to a baseline value.

4. Waterways Biodiversity Increases: Biodiversity credits can be generated through the increases in biodiversity of the waterways running through farms. Tools developed in NZ now exist that can measure this quickly and efficiently.

5. Soil Biodiversity Increases: Biodiversity credits can be generated through the increases in biodiversity of the soil. This is important as better soil means better carbon, water, and nutrient retention – and it is estimated that half of all living species reside in the soil.

Appendix 4: Examples pf Biodiversity Credit Systems

Examples of existing biodiversity credit systems:

1. United Kingdom:
   The UK has implemented a Statutory Biodiversity program, used to fund habitat re-creation.

   The UK Government sells the credits to developers if net biodiversity gain cannot be achieved in the development space. The cost to purchase the credits is also higher than the price for equivalent biodiversity net-gain in the market. The credit system also sets out areas which are irreplaceable and cannot be developed on.

2. European Union
   The EU has a number of policies related to biodiversity offsets. The EU Biodiversity Strategy for 2030 includes the objective of no net loss of biodiversity and a net gain of biodiversity where possible.

   Although there is no unified system, several member states have implemented their own offsetting frameworks, including Germany, France, Belgium, Sweden, Finland, and Spain. Of particular interest of these schemes, the following have trading mechanisms:

   1. **Germany:** Through its "Offset Agency," developers can purchase biodiversity credits from offset projects that have generated surplus ecological benefits. These credits can be traded in the market, enabling developers to meet their offset obligations.

   2. **France:** Developers can meet their offset requirements by purchasing biodiversity credits from approved offset projects. The trading mechanism facilitates the transfer of credits between offset providers and developers.

   3. **The Netherlands:** The Netherlands' trading program is called "Mitigation Banking." It enables the trade of biodiversity credits between developers and nature management organizations. Developers can purchase credits from projects that have generated ecological benefits, allowing them to compensate for their impacts.

4. **Sweden:** Sweden's "Naturkonto" biodiversity offsetting program includes a trading component. Developers can meet their offset obligations by purchasing biodiversity credits from conservation projects or other developers who have generated surplus ecological benefits. The trading system allows for the transfer of credits between parties.

5. Australia

   At a national level, the federal government released a draft National Environmental Standard for Biodiversity Offsets in 2020. However, implementation to date has been done at a state level variously by the following states:

   - New South Wales

     Biodiversity Offsets Scheme – aims to deliver at least a "no net loss" for biodiversity outcome for biodiversity. Developers must offset the biodiversity impacts of their projects by providing credits through the restoration or protection of ecosystems elsewhere.

   - Queensland

     Environmental Offsets Framework - requires developers to offset any significant residual impacts on matters of environmental significance. The framework includes a hierarchy of offsets, starting with avoidance and mitigation, followed by on-site, regional, and lastly, financial offsets.

   - Western Australia

     Biodiversity Conservation Regulation - requires developers to offset any significant residual impacts on matters of environmental significance. The framework includes a hierarchy of offsets, starting with avoidance and mitigation, followed by on-site, regional, and lastly, financial offsets.

   - Victoria

     No statutory framework but has voluntary offsets programs and guidelines available to guide developers in offsetting their impacts on biodiversity.

6. United States

   The largest example of biodiversity credit system in the USA is the U.S. Endangered Species Act (ESA).

   Under the ESA, developers may be required to purchase credits to compensate for the adverse effects their projects might have on endangered or threatened species and their habitats.

The market-based approach allows the purchase and sale of biodiversity credits through the conservation banking system.

7. Colombia:
   The Bosque de Niebla-El Globo Habitat Bank has dedicated to conserving native species in the High Andes.

   They have issued Voluntary Biodiversity Credits that can be purchased, corresponding to 30 years of conservations and/or restoration of 10 square metres of the Bosque de Niebla region: home to the "vulnerable" spectacled bear, and the endangered yellow-eared parrot and black chestnut eagle.

8. Mexico:
   Nairobi-based CYNK partnership with UN Educational, Scientific, and Cultural Organization to utilize biodiversity credits as a fund for protection of biodiversity in the El Vizcaino Biosphere Reserve in Mexico – a World Heritage Site.

   This project utilized the UNESCO branded biodiversity credit futures to generate funds.

Appendix 5: Incorporating Behavioural Economics and Game Theory

Incorporating aspects of Behavioural Economics and Game Theory can enhance the effectiveness and encourage active participation in the GrowTradeBalance system.

This helps make it more "carrot-like" and different to previous propositions that, on the surface at least appeared more "stick-like" to potential participants.

Here are some ways these concepts could be applied (and the focus here is just on the agricultural sector initially):

1. Framing and Messaging:
   Behavioural Economics emphasizes that how information is presented can significantly influence decision-making.

   When communicating the benefits of the GrowTradeBalance system to farmers and producers, it is crucial to frame the message in a way that resonates with their specific concerns and interests.

   Highlighting the potential economic gains from participating in the system, such as improved efficiency, enhanced market competitiveness, improved environmental stewardship, social image and licence, and potential future income source, can motivate farmers to engage actively in sustainable practices.

2. Incentive Design:
   Game Theory can help design incentives within the trading system that align with the motivations of farmers. By considering the motivations and behaviours of market participants, incentives can be structured to align individual and collective interests.

   For instance, offering financial rewards, tax incentives, or grants to farmers who consistently stay below the emission cap or actively adopt regenerative farming practices can encourage participation. Additionally, implementing bonus credits for farmers who voluntarily invest in biodiversity fostering or permanent conservation on their land can further incentivize engagement.

   Early participants who prove that they are below the cap and/or have demonstrated that they are early adopters of sustainable practices or

biodiversity fostering/conservation could be offered additional incentives, such as priority access to credits to encourage engagement.

3. Education and Training:
   Behavioural Economics recognizes that lack of information or awareness can hinder behavioural change.

   Providing farmers with accessible and relevant information, educational resources, and specialized training about sustainable farming techniques, greenhouse gas (GHG) emissions reduction strategies, and biodiversity conservation and fostering practices can empower them to make informed decisions and actively participate in the trading system.

4. Peer Comparison and Feedback:
   Behavioural nudges can play a crucial role in influencing farmers' decisions and behaviours – and we know Kiwi farmers love friendly competition.

Implementing mechanisms that provide farmers with feedback on their performance compared to their peers, such as benchmarking their CO_2 footprint or biodiversity conservation efforts, can create healthy competition and encourage them to strive for continuous improvement.

5. Monitoring, Transparency and Publicity:
   Behavioural Economics suggests that people tend to conform to social norms and are influenced by feedback on their behaviour.

   The plan would be to implement transparent monitoring mechanisms, and recognize the leaders in sustainable practices or biodiversity conservation/fostering at national and regional levels for each agricultural sector.

   Publicly showcasing the achievements of participants can create positive peer pressure and encourage others to follow suit.

   The idea is to celebrate leaders and not to make laggards feel bitter (as that could create a backlash), it is to also change the public perception about farming – that farming is part of the solution to the issues identified by the Climate Change COP and Biodiversity COP.

6. Collaborative Farming Initiatives:

Game Theory principles can be applied to encourage collaboration among farmers.

Establishing partnership farming initiatives, cooperatives, or local networks can facilitate information sharing, resource pooling, and joint implementation of sustainable practices – and potentially for trading CBUs.

Collaboration can reduce transaction costs, enhance market access for agricultural products and CBUs, and encourage knowledge exchange, fostering a sense of shared responsibility and promoting the success of the trading system.

By incorporating these specific aspects of Behavioural Economics and Game Theory into the design and implementation of the GrowTradeBalance system within the agricultural and farming sector, it can effectively incentivize farmers to actively participate, adopt sustainable practices, reduce emissions, and contribute to fostering and conserving biodiversity.

Appendix 6: Fast-Tracking Indigenous Forests with NZUs

Background: Indigenous Forests vs Pine Forests

Under the ETS (Emissions Trading Scheme) system in New Zealand, participants almost always invest in exotic pine trees over indigenous trees due to their faster CO_2 sequestration rates. This preference is primarily driven by the short-term economic benefits associated with carbon credits and the ability to generate revenue through the sale of those credits (NZUs).

Exotic pine trees, such as Pinus Radiata, have a relatively rapid growth rate in New Zealand's benign climate and reach maturity within a relatively short span of time. This results in a quicker accumulation of biomass and subsequent CO_2 sequestration. The NZUs earned through the sequestration process can be sold in the carbon market, providing financial incentives for those who invest in such forests.

However many pine forests are planted on valuable land that could be used for food production, or on land where it is becoming untenable to harvest, creating ecological risk for local communities.

In the long term, creating indigenous forests is beneficial for fostering native flora and fauna and addressing climate change mitigation and biodiversity needs, for the following reasons:

1. **Biodiversity conservation:** Indigenous forests provide a habitat for a wide range of native plants and animals. They offer ecological niches and support numerous specialized species that have co-evolved with the native ecosystem. By promoting indigenous forests, we can protect and preserve these unique and often endangered species.

2. **Enhanced CO_2 sequestration:** Although exotic pine trees sequester CO_2 quickly during their growth phase, they eventually reach maturity, and their growth rate slows down. In contrast, indigenous forests can sequester CO_2 over far longer periods of time and often store significantly larger amounts of CO_2 in their biomass and soils. They act as long-term CO_2 sinks and contribute to mitigating climate change.

3. **Improved ecosystem services:** Indigenous forests provide a wide range of ecosystem services, including water retention, erosion control, and nutrient cycling. They contribute to maintaining water quality, regulating local climates,

and supporting sustainable agriculture. Their complex structure and diverse vegetation also provide better protection against natural disasters like floods and landslides.

4. **Cultural significance:** Indigenous forests hold immense cultural value for indigenous communities. They are often associated with ancestral knowledge, traditions, and spiritual beliefs. Conserving and restoring indigenous forests not only benefits biodiversity but also acknowledges and respects the cultural heritage of iwi and hapū.

In summary, while exotic pine trees may offer short-term economic benefits through faster CO_2 sequestration rates and the sale of NZUs, investing in indigenous forests is more favourable in the long term. Indigenous forests promote biodiversity conservation, enhance CO_2 sequestration over extended periods, provide essential ecosystem services, and uphold cultural significance. Prioritizing and supporting the creation of indigenous forests is crucial for the planet's climate change mitigation and biodiversity needs.

Empowering Indigenous Forests with NZUs

If indigenous forests deliver more CO_2 sequestration, and therefore more NZUs, why don't landowners or investors invest in indigenous forests instead of the much lower quality (in terms of biodiversity, ecological and cultural benefits) pine forests?

The answer is that under the current ETS system, indigenous trees initially sequester CO_2 at a much slower rate and investors prefer the better earning rate provided by pine forests.

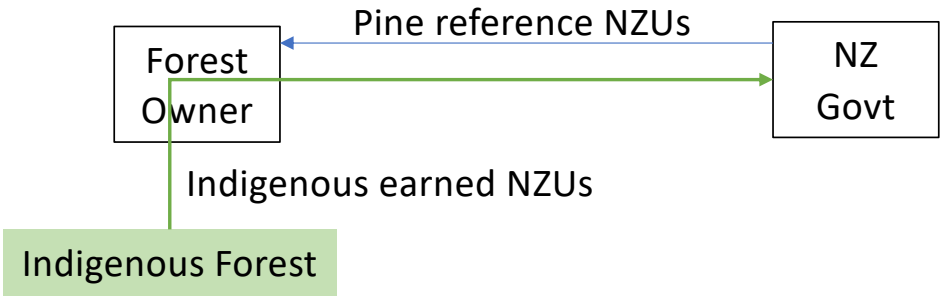
Under our GrowTradeBalance proposal indigenous forestry investors will get two sources of income:

(a) CBUs from the biodiversity fostering as the indigenous forests leads to increases in other flora and fauna.
(b) NZUs from the plantings.

In addition, it is proposed that a derivatives contract be created whereby the indigenous forestry owner can swap the NZUs earned with the New Zealand Government for Pinus Radiata NZU sequestration rates.

This is akin to say a fixed for floating interest rate swap with bank for a borrower – something that farmers and indeed many homeowners would be familiar with.

This has advantages for both parties to the transaction. It is a win-win proposition as outlined below.



NB The Forest Owners will earn more than the Government in the early years but their income will cease much sooner than the Governments. The Crown/New Zealand Inc. is the longer term "winner".

The forestry owner, is able to earn the same NZU based income stream as if they had invested in pine forest.

For the agricultural sector there is the added bonus of CBUs for fostering biodiversity – and the joy of having permanent pockets of native forests on parts of the farms that could not be utilised for anything else.

For New Zealand Government, it locks in a much bigger pool of carbon credits with which to meet its international treaty obligations.

Potential Funding Sources

Given that there has been no shortage of offshore investors willing to invest in pine forests for its NZU income earning stream, the same pool of investors could be tapped to fund the planting of indigenous forests on our farms and unused lands under the GrowTradeBalance system with the landowner getting all the other benefits.

Appendix 6: Supplement: Carbon Dioxide Sequestration Rates

CO_2 sequestration current annual increment (CAI) rate for common native plants

Age	Totara	Kauri	Kahikatea	Rimu	Other conifers	Puriri	Beech	Other broadleaves	Mixed shrubs
10	3.8	5.1	3.6	4.7	4.6	2.8	4.7	4.1	32.7
20	8.5	13.7	10.1	12.7	12.6	8.1	12.8	11.4	8.8
30	12.6	21.4	16.3	20.0	19.8	13.5	20.1	18.2	
40	15.9	26.8	21.3	25.4	25.2	18.1	25.4	23.4	
50	18.2	29.9	24.6	28.6	28.4	21.4	28.6	26.7	
60	19.8	30.9	26.5		29.7	23.5	29.9	28.2	
70	20.6	30.5	27.0		29.6	24.5	29.7	28.5	
80	20.8						28.6		
90	20.7						26.7		
100	20.1						24.5		
110	19.4						22.2		
120	18.4								

CO_2 sequestration current annual increment (CAI) rate for Pinus Radiata

Age	AKL	W/T	BOP	Gis	H/SNI	n/m	c/w	O	S
10	16.60	14.20	15.50	20.10	19.70	11.70	10.10	12.40	16.00
20	32.30	30.10	26.60	30.30	30.00	22.10	14.90	18.80	22.70
30	27.90	28.30	26.20	27.60	27.80	27.50	24.20	28.30	29.40
40	21.10	22.60	20.40	21.80	22.10	23.40	22.40	25.10	25.60
50	20.10	21.20	18.50	21.90	22.20	20.10	19.20	23.00	23.90

Appendix 7: Dovetailing with Complimentary Proposals

We are aware of a proposal being promoted by PureAdvantage™ called 'Recloaking Papatūānuku' that attempts to address some of the same issues of climate change, biodiversity loss and meeting New Zealand's international treaty obligations.

A description of their proposal can be found here:
https://pureadvantage.org/recloaking-papatuanuku/#subscribe

The business case proposes capturing approximately 1,500 million tonnes of carbon dioxide (TCO_2) between 2024 and 2100. This amount is equivalent to around 20 years of New Zealand's current emissions (76.8 million TCO_2 in 2021).

In terms of costs, the Recloaking Papatūānuku program offers a lower average abatement cost of \$32/TCO_2 compared to international offsets, which have an average cost of around \$60/TCO_2. The total expected cost of the program is estimated to be approximately \$11.8-12.1 billion by 2050, but when discounted to its present value, it would be around \$8.5-9.5 billion by 2050.

The business case outlines three potential policy options for implementing the program – all of which require the use of the Crown's balance sheet. The first option involves providing financing to landowners, who repay it through Emissions Trading Scheme (ETS) income. They would own ETS revenues and repay the Crown loans. The second option suggests granting upfront funds to landowners for reforestation, with costs shared between landowners and the Crown. ETS income or carbon credit sales would be utilized, and revenues would be shared with the Crown, which would have the right of first refusal. Lastly, the third option proposes the Crown funding reforestation and receiving carbon credits in return. The Crown covers all upfront costs, and landowners would receive a yearly incentive payment.

Our proposal by contrast is market based and focused initially on the agricultural sector. However, there is the opportunity for the two proposals to dovetail in as the interests are aligned, should that be of appeal to the government.

Appendix 8: New Zealand – A World Leader Again

New Zealand used to be renowned for its clean green "100% Pure" image but lately it appears that we are, perhaps unfairly, often painted as laggards. By adopting this GrowTradeBalance proposal, New Zealand can seize the initiative and become a leader again.

This discussion paper proposes an integrated GrowTradeBalance system, covering CO_2, methane, soil carbon sequestration, and biodiversity, as a means to address climate change and biodiversity concerns - whilst delivering a host of associated benefits.

By initially focusing on the agricultural sector and further expanding to other sectors, this system offers market-based incentives for emissions reductions and biodiversity protection.

If successfully implemented in New Zealand and exported to other countries around the world, this approach has the potential to make substantial global contributions - to allow us to leverage our expertise for the greater planetary good.

This proposal therefore envisions New Zealand as a global leader in climate change mitigation and biodiversity preservation.

By adopting the suggested system and rallying international support, NZ could make significant contributions to global climate action efforts, reduce greenhouse gas emissions, foster technological innovation, and enhance biodiversity conservation.

Through these collective actions, NZ has the potential to influence a more sustainable and resilient future for the planet.

…and Kiwi Farmers become planet saving super-heroes
rather than evil-villains that they are often portrayed as…

Appendix 9: International Markets Usage of Cap & Trade Systems

Background: Successful Proven History – US and Acid Rain

The cap-and-trade system approved by President Bush to address acid rain was established under the Clean Air Act Amendments of 1990. This system aimed to reduce emissions of sulphur dioxide (SO2) and nitrogen oxides (NOx), which are primarily responsible for acid rain formation.

Here's how the system worked:

1. Setting emission allowances: The first step involved setting a national cap on the total amount of SO2 and NOx emissions allowed from covered sources, such as power plants and industrial facilities. These emission allowances were distributed among the sources.

2. Allocation of allowances: The Environmental Protection Agency (EPA) allocated a portion of the total allowances to existing power plants based on their historical emissions. This ensured a fair and gradual transition to the new system.

3. Trading mechanism: After the allocation, power plants had the flexibility to buy, sell, or bank allowances. Any excess allowances or emission reductions achieved beyond their required levels could be sold as surplus allowances to other sources that needed them. This created a market for allowances, encouraging cost-effective emission reductions.

4. Compliance requirements: Covered sources were required to surrender a number of allowances equal to their actual emissions each year. If a source had more emissions than allowances, it had to acquire additional allowances from the market or face penalties.

5. Monitoring and enforcement: The EPA established a system for monitoring emissions and tracking allowance holdings. It verified compliance and enforced penalties for non-compliance.

6. Reduction targets: The cap on allowances was set to gradually decline over time, leading to reduced overall emissions. The system provided an incentive for sources to adopt cleaner technologies, improve energy efficiency, or switch to low-sulphur fuels.

7. Environmental benefits: By capping emissions and allowing trade, the cap-and-trade system encouraged cost-effective emission reductions across the industry. This approach fostered innovation and allowed the market to determine the most efficient methods for achieving environmental goals.

Overall, the cap-and-trade system established by President Bush for acid rain was successful. It effectively reduced SO2 and NOx emissions over time, helping to alleviate the environmental and public health impacts associated with acid rain.

The lessons learned from this system have informed subsequent cap-and-trade initiatives around the world.

GrowTradeBalance builds and expands on this.

Current Schemes

Note: We are not making value judgements or recommending any of the systems below but merely noting that there are existing cap-and-trade systems in place – some of which may have elements that may prove to be of relevance in designing the optimal GrowTradeBalance system.

Europe:

European Union Emissions Trading Systems

- The cap is reduced annually in line with the EU's climate target, ensuring that emissions decrease overtime. Since 2005, the EU ETS has helped bring down emissions from power and industry plants by 37%.
- For each year, companies must surrender enough allowances to fully account for their emissions, otherwise heavy fines are imposed.
- Buy allowances on EU carbon market, given some and can trade. If operator reduces emissions, they can either keep spare allowances to use in the future or sell them.
- Declining cap offers companies certainty about the scarcity of allowances long term and ensures that allowances have market value.
- Cost is an incentive for companies to reduce emissions and generates revenue that go into national budgets to support investment into renewable energy, energy efficiency, low-carbon technology.
- *Since 2013 it has generated EU152 bn*
- *Under the European Climate Law, EU Member States will become climate neutral by 2050. As a first milestone, they aim to reduce net emissions by at least 55% by 2030 compared to 1990. The EU ETS is critical to achieving this*

in a cost-efficient manner and the 2023 revision aligns the system with this ambition.

- *CO_2 emissions in the sectors covered have fallen by 30% since 2005 inception.*

USA:

- Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia
- Cap CO_2 from power sector.
- Nine states from inception have reduced CO_2 by over 50% in the sector, over 90 million short tonnes of annual power.
- Energy bill savings of US$1.2bn lifetime
- Avoid emission of 4.4 million short tonnes of harmful CO_2 emissions
- $604 million invested in Clean Energy
- 60% of total generation from clean or renewable sources

<u>California:</u>

- *Statewide limit on sources responsible for 85% of California's GHG emissions and establishes a price signal to drive long-term investment in cleaner fuels and more efficient use of energy.*
- *Covers 450 entities - rolled out since 2013.*
- *Set 2% lower than emissions level forecast for 2012, down 2% for 2014, down 3% annually from 2015 to 2020.*
- *Trading of allowances allowed to minimise cost of pollution controls.*
- *Banking of allowances allowed to guard against shortages and price swings.*
- *4% allowances held in strategic reserve.*
- *Offsets allowed for up to 8% of a facilities compliance obligation.*
- *Restricted to: forestry, urban-forestry, dairy digesters, destruction of ozone depleting substance, mine methane capture.*

Canada

Quebec

- Linked to the California cap-and-trade system through the Western Climate Initiative for liquidity.
- Covers major emitting sectors such as industrial, electricity and transportation that account for 85% of Quebec's GHG emissions.
- Government issues emissions allowances and distributes them through auctions and by mutual agreement. Entities with excess allowances can trade allowances to those requiring them.

South Korea:

National emissions trading scheme

- Launched 2015
- Covers: waste, domestic aviation, transport, buildings, industry, power
- Covers CO2, CH4, N2O, PFCs, HFCs, SF6
- 2030 target of 35% decline below 2018 emissions, 40% expected.
- 2050 carbon neutrality target
- Covers 70% of national emissions (updated 74%)

UK:

Emissions Trading Scheme

- Operation on 1/1/2021
- Cap is 5% lower than UK share of the EU ETS pre-Brexit.
- Current reserve price is 22 pounds/mt.
- Limited to internal flights, electricity generation, energy consuming industries
- Fine for exceeding allowances is 100 pounds/mt.
- Net zero 2050 target
- Falling cap
- https://www.gov.uk/government/collections/uk-emissions-trading-scheme-uk-ets-technical-guidance-and-tools
- https://www.gov.uk/government/collections/uk-emissions-trading-scheme-uk-ets-technical-guidance-and-tools

Appendix 10: Author's Brief Background

Prem Maan, the co-founder and Executive Chairman of Southern Pastures, has a diverse background encompassing economics, investment banking, funds management, and agriculture.

With his in-depth knowledge and experience, Prem outlines a proposition tailored to garner support from the farming community and fulfil New Zealand's legal obligations.

Recognizing the importance of global trade for New Zealand's products, Prem is keenly aware of both premium retail consumer and wholesale customer preferences and the potential consequences of losing market access.

Additionally, Prem understands the rising sea-level challenges faced by Pacific nations and believes that if the proposition is embraced, New Zealand can re-emerge as the leader in the region.

Prem's engagement with farmers in New Zealand, Australia, the UK, and the US, has solidified his belief that farmers universally have a deep love for their land. He is confident that if this proposition is adopted in New Zealand, its success can be shared and replicated elsewhere.

Overall, the proposition in this discussion paper combines Prem and his colleagues comprehensive expertise and understanding of the agricultural sector, marketing, and global markets to ensure New Zealand's position as a leader in sustainable agriculture and responsible trade practices.

About Southern Pastures

Southern Pastures is an institutional dairy fund formed by its directors, Prem Maan, Graham Mourie, Phillip Wight and Taari Nicholas and Foundation Capital.

It owns 19 dairy farms in Waikato and Canterbury along with Lewis Road Creamery and New Zealand Grass Fed Products.

Southern Pastures Group has been recognised in New Zealand and in premium overseas markets for its sustainability track records and the quality of its products.