

E-MISSION POSSIBLE

Expert roundtables on thorny questions for a net-zero NZ

Summary of Roundtable 2: Mitigation in the land sector

8 December 2017



SUMMARY HAIKU

Transforming land use
is vital to achieve our
net zero future

INTRODUCTION

This was the second of four roundtables bringing together diverse experts from New Zealand and overseas to shed new light on particularly thorny questions for New Zealand's low-emission transition. The road to a net-zero future is paved with challenging questions for which there are no definitive answers – just choices to be made under uncertainty and consequences to be faced under risk.

Motu convened the roundtable in collaboration with the New Zealand Productivity Commission, the Institute for Governance and Policy Studies at Victoria University of Wellington, and the Environmental Defence Society.

Keynote speaker Dr Andy Reisinger (New Zealand Agricultural Greenhouse Gas Research Centre) and Dr David Fleming and Dr Suzi Kerr from Motu gave presentations which are available [online](#). Distinguished panellists and experts discussed the case for transformational change in agricultural production and options for integrated policy solutions across forestry and agriculture.

Discussions involving panellists and audience members were held under the spirit of the Chatham House Rule, allowing information to be shared without attribution to individuals. This summary is intended to synthesise the range of issues raised during the presentations and discussion. It does not present a comprehensive account, consensus view, or conclusions shared by individual participants. Issues raised during the wide-ranging discussions have been loosely grouped into four themes: social change, policy and regulation, research and practice, and economy.

SESSION 2A: Reducing agricultural emissions

Dr Andy Reisinger started with the context that the livestock sector directly contributes 23% of actual global temperature change to date, and hence the emissions responsible for this warming cannot be ignored. To achieve the ambitious global temperature goals set out in the Paris Agreement, countries should be planning for net-negative emissions before 2100, not just net-zero, given the delays in emission reductions and insufficiently ambitious targets for 2030. The land sector can both remove carbon dioxide (CO₂) and reduce methane (CH₄), both of which will be needed for a net-negative emission future. Methane is a short-lived gas and does not have to reach zero to stabilise temperatures. If the world does not reduce CH₄, CO₂ will need to fall even more precipitously to achieve the same limit to warming. The actions we take on CH₄ determine the size of the challenge for CO₂. No amount of CH₄ abatement can save us unless we reduce CO₂ to zero or below, but if we are serious about delivering on the Paris goals, then we need to address both CO₂ and CH₄.

New Zealand has relatively a relatively low carbon footprint for milk production. Given our major competitors also have relatively small footprints however, the marginal global emission gains from increasing New Zealand's production are small. If New Zealand could help other less productive countries improve their productivity, it would have a significant impact on global emissions. Our choices also have an ethical dimension. If we contribute to a problem but could change, why keep doing it?

There are three categories of intervention to reduce agricultural GHG emissions: productivity improvement, new technology/practice, and land-use change. Over the past 25 years, we have already achieved substantial mitigation through



efficiency gains in agriculture compared to where we would have been otherwise. However, if agricultural output keeps increasing, then efficiency gains and new technologies will not be sufficient to reduce our absolute agricultural emissions below 1990 levels by 2030. We could reduce agriculture emissions below 1990 levels by holding output constant, which means reducing animal numbers over time, and making additional efficiency and technology improvements.

Policy design depends on the desired outcomes. We need to ask what else we could do with our land and how we could get there. If we put the agriculture sector into the ETS with no free allocation and a processor-level obligation, it will largely drive land-use change. Farmer-based price signals (whether based on price-positive or price-negative incentives) will be needed to further accelerate productivity gains. It will take more talking and listening to reach agreement on shared goals, explore alternative transition pathways and manage their impacts on people.

Dr David Fleming and Dr Suzi Kerr presented on Motu's research on "*Agricultural Mitigation Options and Policies*." David focused on options. New Zealand ranks highly in its contribution to global research on vaccines/inhibitors, low-emission breeds and feeds, and plant and soil additives. It has not put comparable effort into researching improved management practices. While some improved management practices have been in place for some time, their full potential has not been achieved to date. This is not just an issue of profitability/cost. While there is a relationship between GHG emissions and total dairy farm profit, there is not a relationship between GHG emissions intensity and farm profit per tonne of milk solids or GHG emissions intensity and total profit. Motu has developed a typology for barriers to adoption of no-cost options for mitigating agricultural emissions, and is researching these barriers in New Zealand. The best technologies in the world are useless if no one uses them. We need a better understanding of these barriers and policy solutions, and would benefit from better farm-level data.

Dr Suzi Kerr focused on policies. Motu's Low-Emission Future Dialogue identified two characteristics of a successful low-emission agriculture sector in New Zealand:

- we operate an ultra-GHG-efficient livestock sector, and
- we produce zero CH₄ and low N₂O nutrition (e.g. horticulture).

Policies to support the first include improving farmer education and extension, continuing research on new technologies, and providing subsidies for early adopters in exchange for data. Policies to support the second include pricing biological emissions (e.g. the ETS), improving horticulture education and extension, expanding research into new crops, providing subsidies for early adopters of new crops, and coordinating supply chains for new crops.

Bringing agriculture into the ETS at a processor level could encourage land-use change but would not be an effective driver of on-farm mitigation. Applying a farm-level obligation could involve high transaction costs and poor measurement and there is no evidence a farm-level emission price would lower emission intensity. Leakage is less of a concern in agriculture than in other sectors because the land can't move. Leakage could be mitigated by enabling land-use change to alternative production. Gradually bringing the agriculture sector into the ETS could generate valuable opportunities, incentivise the



sector to start adjustment now, and help with managing other risks (e.g. emerging synthetic meat and milk).

There are options to adjust the relative policy focus on short- versus long-lived gases with agriculture in the ETS by how we set the cap over time and how we apply metrics. In summary, to improve on-farm efficiency, we should focus for now on learning (research, education and early adoption) rather than emission pricing. However, we should also begin the shift in land use now toward more forestry and horticulture, and emission pricing can support this.

DISCUSSION POINTS:

Theme: Social change

1. New Zealanders need to believe in the possibility of being a world leader in order to facilitate a low-emission transition, and farmers need to believe that they can be a part of this transition. We can make the minority into the majority.
2. The challenge with ethics is there is no single right approach. We could aim to be the world's lowest-intensity supplier from one perspective. But can we look at ourselves in the mirror if we are contributing to global emissions? This comes down to personal ethical frameworks.
3. We will not move forward in an atmosphere of fear and defensiveness. We need to make farmers feel proud of transitioning to low-emission production methods and support our farmers to change processes at scale.
4. To help achieve low-emission farming, we should use nudge-economics to adapt and transform gradually, rather than short shocks. This is supported by forms and morals of collaborative leadership, which involves farmers at the core of decision-making. People support what they help to create.
5. There is a lot of focus on land use change and technology, but farm management can have a big impact on emissions and sequestration, and this is a social issue.
6. We need to consider the relative risks and transitional issues associated with different emergent land-use options. Gradual change may be needed for some land uses. For example, not all dairy farmers are good kiwifruit farmers. We need networks for facilitating land-use change that don't require people to wear multiple hats during the course of a day. Functioning supply chains and resilient communities are essential. We need to facilitate experimental diversification.
7. New Zealand used to have farm advisers. Do we need to return to an agency-type situation? It is hard to give farmers the advice they need. We need to put support in place to make change easier for farming families. One-on-one advice helps. Better social infrastructure is needed to implement new ideas.
8. People need to see a return or some kind of reward for their behavioral changes. We can take cues from other (global) organisations and countries that have achieved positive behavioral changes in other spaces.

Theme: Policy and regulation

9. Global failures to manage ecosystem processes through appropriate land-use management are responsible for climate change, water quality crises, biodiversity decline, increasing cost of food production, etc. We would benefit from principle-based regulation that applies a baseline set of rules and a cross-sector approach that reflects interlinkages.
10. We need to reduce methane emissions where possible, but not in ways that contribute to higher emissions of long-lived gases. We need to think about net land-use emissions.
11. In addition to food production efficiency, we need to address food waste, food demand, and dietary preferences. We also need to think concurrently about policies and investment for trade, water, GMOs and nitrate management.
12. A diverse approach is needed to solve the problem, not one single policy. Land use change is one option but we need to plan for a future with a different climate and different markets. We also need to consider other competing land uses, like urban sprawl.
13. Global food demand is increasing and we need to think about intensity versus absolute emissions on a global scale. We still have different food production choices for managing the global emission burden while satisfying global food security.
14. National averages can mask variations within the country, and this could have implications for leakage. There is a wide variation in emission intensity across New Zealand, and this has persisted over decades. The least productive farmers do not profit from low productivity. If it was easy to change, we would have done it by now. We need to think about how



our policies will affect the range of producers.

15. There could be large opportunities for international collaboration to share New Zealand expertise with improving agricultural efficiency. New Zealand producers could work in developing countries using bilateral arrangements that involve units flowing back to New Zealand. For this to work, New Zealand also has to show credible action at home.
16. Regarding the optimal point of obligation for agriculture in the ETS, people have different views.
 - Changing farmer behaviour needs an on-farm price signal, and the potential for change on each farm is relatively small. Change at a processor level operates at a bigger scale which can be more effective.
 - From a total life-cycle assessment perspective, there are relatively significant efficiency gains to be made beyond the farm, across the supply chain and at the consumer level.
 - The point of obligation should not make any difference to the consumer incentive, but could affect how industry responds.
 - It depends on what you want to achieve. If you want land-use change, then the processor-level obligation is fine. To achieve other objectives, the optimal point of obligation depends on the use of complementary policies.
 - There could be a psychological benefit to the farm-level obligation because it could give people a sense of control, but this could be addressed through complementary policies. Conversely, farmers could be put off by the ETS requirements if they feel the obligations are a burden and there is little they can do to avoid the price.
 - We need to get people's attention for both land-use change and on-farm change, and this can be done in different ways.
17. What carbon price would be adequate on farm to shift farmers into the highly productive quadrant? We have no evidence that the carbon price would drive change. There could be other barriers. If the least profitable farmers face a high carbon price, they might exit the market and sell to a more efficient producer, but we don't even know that. This not an argument against the ETS; it is an argument not to go flat out with a farm-level ETS until we understand the value of that approach.
18. Trees are easy. They don't move. Cows move. Should we consider a range of points of obligation (i.e. for policies, regulations and market instruments) to address the range of environmental considerations beyond GHG emissions?

Theme: Research and practice

19. Producers can have a positive impact on global emissions by innovation and sharing knowledge and making the business case for low-emission production.
20. New Zealand can contribute globally with new technology. We should remain flexible and adaptable, rather than tying up land use completely and locking ourselves out of new opportunities.
21. We need to be looking at solutions that move us beyond net zero, like carbon storage.





22. We need to understand ecosystem processes and how they can contribute to reducing emissions and increasing soil health and soil carbon storage. We need to understand the integration of agriculture into broader landscapes.
23. More effective farm management would be supported by better data collection and sharing data with farmers. We could create an 18-month “rapid research” programme to build understanding of the relative impact of different farm management practices. There is a gaping hole in this space and we don’t need a high-cost five-year research programme to fill it.
24. We can use effective livestock production and other tools to improve ecosystem processes directly by promoting soil carbon sequestration and indirectly by providing cash flow for increased tree planting and new enterprises. Profitable farms are demonstrating the effectiveness of these methods.
25. Building up resilience to climate change is another important part of building up an emissions-resilient land-use sector.
26. It would be helpful to understand how much production occurs at each stage of the global dairy emissions intensity curve. There is likely to be a lot of production on the low-efficiency end. Bringing less efficient producers down the curve is a function of improving management, not waiting for new technologies, and could have an immediate payback. This is where New Zealand’s biggest contribution could be to global mitigation.
27. Collecting biophysical data is crucial to establish what changes are actually happening on farms.
28. New Zealand already has very high soil carbon levels relative to other countries. The evidence we have is that our soil carbon levels on average are not increasing; they are generally stable or declining in some areas, with some increases in hill country. We need better measurement of long-term impacts from efficient livestock management on soil carbon. There is less obvious potential to store additional carbon in soil in New Zealand than in other countries with degraded soils. We do need to continue to look at it but should not expect an untapped panacea here.
29. It could be helpful to put a framework in place in New Zealand for measuring and improving soil carbon stocks.
30. Is there an agricultural equivalent of an industrial ecology project that enables waste streams from clustered producers to become inputs for something else? New Zealand could have opportunities in this space, creating a circular economy. One example is farmers producing biofuel; another is growing algae in biodigesters.

Theme: Economy

31. If farmers claim an entitlement to pollute and want to get paid for reducing emissions, there could be consequential liability claims for past damages and possibly future ones, too.
32. With price volatility and uncertainty, the ETS is unlikely to provide effective incentives. NZ businesses would benefit from large-scale partnerships and facilitative policies, a positive vision, and application of behavioural economics and nudges to make it easier to change.



33. Would an ETS take money away from farms instead of using money to invest in farms? Note that ETS auction revenue could also be recycled to farms.
34. If we pay farmers to improve soil carbon, will they be penalised if it goes down? What about biochar?
35. We need to look at the commercial imperative and consumer demand. There is growing demand for low-emission farming from customers and major retailers. We need to think about our connection to markets and where we can deliver value. We need to look at certification, tracing and labelling. We are operating in a system which is moving fast. Origin Green in Ireland is an interesting example to consider. We need to take the global context into account.
36. Regarding land-use change and horticulture, it has taken 30 years to get to \$5 billion in horticultural production. We are looking at increasing to \$10 billion in the next 10 years and \$15 billion in the next 20 years. That is projected to take an extra 0.8% of land use in New Zealand. We are not looking at big shifts in land use to increase production value. We need to make sure we have the land types available for this. Our highly versatile land is limited. We need to make sure we are doing the right land-use changes on the appropriate type of land.

SESSION 2B: Integrated policy solutions for the land sector

Suzi Kerr presented on “*Integrating forest and agriculture policy options.*” For GHG mitigation, we are looking at two types of land-use change. The first is shifting marginal sheep/beef land and other (more productive) land toward plantations and natives. Empirical evidence suggests that people respond more strongly to positive rewards from forestry than they do to negative penalties on agricultural GHGs, so we need to create positive pull toward alternative land uses as well as a push from the ruminant sectors. The second is shifting better-quality ruminant land toward horticulture or other possibilities.

Recent projections (based on a \$25 emission price on forestry) suggest that New Zealand is not heading toward lower-emission land uses. New Zealand does face potential change drivers for land-use profitability, such as the uptake of synthetic meat and milk, climate change impacts or changes in commodity prices. A diversified rural sector could help improve economic resilience and more research is needed on the possible opportunities. We need a strategic transition; when agricultural profits go down, rural land values generally go down and economic welfare is impacted in rural communities and nearby urban areas. Different landowners will face different opportunities and costs. Gradual change can help to reduce transition costs.

We need integrated solutions. Research shows that addressing water quality issues in agriculture only by changing on-farm practices will not drive significant GHG mitigation. Moving toward native forests could produce significant co-benefits, but this has not been driven so far by the NZ ETS. New Zealand has roughly 1.5 million hectares of marginal pasture land that could be shifted into native forest regeneration if current barriers were addressed. Riparian native forests are not a significant mitigation opportunity but could still be encouraged. Forestry investment has been hampered by price uncertainty under the NZ ETS. Improving emission price predictability and reducing complexity and risks for small players would help. Applying averaging to account for emission fluxes from harvest/replanting cycles could help plantation foresters but this needs to be done carefully. This could be done privately in theory. If the government moves in this direction, it should avoid subsidies and make this optional for landowners to incentivize permanent forestry.

In conclusion, land-use change needs to start now, as delay is costly. We need better price signals and additional institutional supports to drive desirable land-use changes.



DISCUSSION POINTS:

Theme: Social change

1. When discussing options with farmers, we should not categorize land as “unproductive” or imply it is being taken away. The land necessary to plant a billion trees is owned by people and these people have to be part of the conversation.

Theme: Policy and regulation

2. To achieve the billion trees, we need to access suitable land at an appropriate cost. Wilding growth could be used to sequester carbon, but the current policy dictates the wilding eradication at a cost to taxpayers and with increasing emissions. Wildings should not be encouraged as they produce negative outcomes. Smart policy would focus on the middle ground for direct intervention and management to promote efficient sequestration. It would help to open up more areas of DOC land for afforestation. Planting natives is valuable but could involve much higher costs.
3. There can be useful linkages between water quality and climate change measures. Canterbury regulations stipulate that there can be no net increase in nitrate losses in the region, which effectively imposes a cap on dairy in the absence of more advanced mitigation technologies or practices.
4. Wildings can negatively affect water supply and landscape values, but there could also be positive impacts, such as reducing local temperatures.
5. We need to control wilding pines because otherwise they would transform our landscapes. We need to find better approaches to afforestation.
6. If we were actively pricing water quality and other ecosystem benefits from forestry as well as pricing carbon more effectively, there would be a much stronger driver for change in water-sensitive catchments. We could develop multiple revenue streams supporting effective landscape management.
7. We should think separately about forestry and carbon farming. They can be quite different industries. From a near-term carbon sequestration perspective, the tradeoffs between exotics and natives issue are less around costs than growth rates. Natives grow more slowly in the short term but offer have additional values. In permanent forests in the long term, native forests can be as valuable as exotic species. We can also have natives come through in permanent exotic forests. There can be rapid carbon gains up front from planting exotics and long-term benefits from emergence of natives in those forests. We need to think holistically. Where does the coordination function sit and how can we feed in expertise? What coordination needs to be inside and outside of government?

Theme: Research and practice

8. Significant change is already underway with farmers and it may not yet be evident in the research data. We are already seeing a major shift into horticulture (key examples being kiwifruit, apples, avocados and cherries). With a generation, horticulture may be the biggest primary sector for many reasons (e.g. climate change, water quality and animal welfare).
9. Research and modelling need to include more direct communication with farmers. There is a demand among farmers for knowledge and tools to reduce emissions. We need integrated solutions that build value around biodiversity, water quality and climate mitigation.
10. Wind erosion used to be a big issue in Canterbury, and tree planting was used to address this. When Canterbury became more efficient with irrigation and wind erosion was no longer a threat, these trees were cut down again. We do still need trees on dairy farms for other ecological services. Farmers need to prioritise competing investment decisions, and would benefit from support for riparian planting.
11. New sensor technologies will generate better management information which could be a game changer.
12. We need better evidence on the relative cost of native regeneration. This could really change the cost profile for investors. There are case studies of Manuka establishment which are very successful and generating revenue.
13. More research is needed on horticulture. This is challenging because of its diversity.
14. We tend to invest our research into the things we already do, and use exotic plantations as our model for building up an industry in natives. We should think about this in different ways. New research is emerging on higher-than-expected rates of carbon sequestration in native forests. With natives, birds can do the planting. We need to consider the other values from native forests for honey, biomedical products, and ecosystem services. Given our landscape diversity, we should be doing forest planning in bioregions and thinking systemically. Our communities are also diverse and we need to consider the human factors, which likewise are not homogeneous.



Theme: Economy

15. Rapid change is possible, as shown by the drop in sheep farming in recent decades. New Zealand may have reached peak dairy. Tree planting, including natives, is a big opportunity for farmers.
16. We need to look at our macroeconomic settings. Our lending criteria allow people to borrow money to buy more land. We need to focus more on enabling on-farm productivity gains to reduce emissions.
17. Partnership models can be used to help conserve land and water resources, and New Zealand can learn from experience in other countries. Environmental funding typically comes from government and philanthropy and this is limited. To scale up, we need to look at “impact investment” models which generate social and environmental returns. We also need to develop more investable projects.
18. We need to develop creative ways of addressing land value. A key opportunity is land owned by Māori communities which could be suitable for afforestation. To drive behaviour change in land use, we need to create favorable financial outcomes.
19. The ETS creates a cash flow for forest owners at the beginning, but not in the longer term unless the forest is permanent and generating an additional benefit. Averaging does create an incentive to bring landowners in. Storing carbon in harvested wood products is a further benefit to be recognised. The private sector could develop financial instruments to help bridge up-front financing gaps for forest establishment.
20. We need to consider the potential value-added from using natives for plantation forestry. However, there are market reasons why pine plantations are so prevalent in New Zealand.
21. Most big businesses are looking for least-cost solutions, and establishing native plantations is costly. How can we get more money to incentivise planting natives?
22. The combination of market drivers will produce massive change in global demand for our primary-sector products. Farmers can already get paid more for their animals if they can tick boxes for water, animal welfare and emissions. It is possible that within a generation, protein will not be coming from livestock production the way it is today. Most of our timber exports currently are in log form because of trade barriers. We need to advocate internationally for better approaches to exporting our timber. We should look more at investing in domestic wood processing.

CONCLUDING REMARKS

Catherine Leining from Motu presented outcomes from a participant registration survey. The roundtable had 60-65 participants. Of 41 survey respondents, 71% indicated that New Zealand can achieve a net-zero-emission economy sometime this century, 22% said it cannot, and 7% said they didn't know. Of 35 respondents, 49% said that synthetic meat and milk would be significant or very significant competitors for New Zealand's traditional agricultural exports. Additional survey responses are noted at the end of this summary.



Catherine then offered reflections on key issues raised during the roundtable.

- The implication of New Zealand’s Paris Commitment is not just net-zero emissions; we are looking for net-negative emissions. In our agriculture sector, efficiency gains are being outpaced by increases in production so emissions continue to rise. We need net positive solutions: integrated solutions that extend across linked issues and work socially, environmentally and economically.
- We are hoping for better technologies, but they will be useless if they are not adopted quickly. We need to work on solutions to adoption barriers.
- This is an issue of social change, perhaps even more than technical change. We need to be thinking about the needs of rural communities and talking with farmers. This is about people and the land. We need to consider underlying values and ethics. We need to think about strengthening our social infrastructure, applying collaborative leadership and developing better systems for advising farmers.
- Today’s dominant business models don’t necessarily fit well with managing a mosaic of land uses. We need better approaches to work with diverse landscapes and ecosystems.
- Our policy approaches need to be flexible and adaptable. These could be driven by principles applicable to changing market drivers, technologies, and consumer and social attitudes.
- New Zealand’s biggest gains will come from being copied by other countries. We need to be credible at home, and people in other countries will need to want what we have.
- We need to start now, and some rapid changes are already underway. Today’s minority can become tomorrow’s majority. We need to do more of what is already working. We need to generate better information and on-farm data about what works and what doesn’t.
- A lot of the debate we have had so far as a country has focused on whether biological agricultural emissions should be inside or outside of the ETS. Nonviolent communication advises that people get into trouble when they start debating strategies without understanding each other’s needs. We have not properly assessed the needs of the sector, and we will understand effective solutions better when we do. There has been a perception that if agriculture is out of the ETS, it means the sector won’t do anything about climate change. Whether agriculture is inside or outside of the ETS, it can and must be part of the solution and there will need to be complementary policies.
- We need to think about both “push” and “pull” mechanisms. People need to want to change.

One issue on the agenda did not get attention during the discussion. If we are facing future carbon prices above \$100 per tonne, what does that mean for our land sector? We are stuck in a mindset of carbon prices below \$25 with the potential to decline significantly. We need to think differently about this.

We started the day by thinking about whether we should address this issue using one basket or two baskets of gases, and how we tend to put this issue in the “too hard” basket. Then we talked about the difficulty of putting all of our eggs in one basket. We have a diversity of opportunities and need a diversity of solutions. We can choose to weave a new basket, through our political and social institutions, policies and financial incentives that can hold these opportunities. Perhaps our ultimate vision can be that of a cornucopia that is overflowing with an abundance of land-sector products consistent with a net-zero – and net-negative – emission future.

We gratefully acknowledge IGPS for hosting this roundtable, and the Aotearoa Foundation and our other funders:



Motu Economic and Public Policy Research is an independent research institute operating as a charitable trust. It is the top-ranked economics organisation in New Zealand and in the top ten global economic think tanks, according to the Research Papers in Economics (RePEc) website, which ranks all economists and economic research organisations in the world based on the quantity and quality of their research publications.

SURVEY RESPONSES TO QUESTIONS: (Edited for clarity and conciseness.)

“What action by farmers would have the most impact right now in supporting a low-emission agriculture sector?”

Efficiency/profitability/intensity	Technology	Land-use change	Carbon price/ETS
<p>Reduce dairy herds to achieve a better balance of cost, production and profit (x6)</p> <p>Continue to drive efficiency in the livestock production (x4)</p> <p>Increased resources efficiency and changes in production systems</p> <p>Acceptance of the need for significant absolute reductions, vs efficiency being enough</p> <p>Adopting best practice low management</p> <p>Improving production efficiency, lower nitrogen fertiliser</p> <p>Calculation of their individual GHG footprint & a programme for reduction</p>	<p>Looking for new innovations</p>	<p>Being able to recognise tree plantings as carbon sinks</p> <p>Retirement/afforestation of non-productive land</p> <p>Changing some land use, e.g. planting/regeneration</p> <p>Carrying out marginal planting</p> <p>Changing land uses when appropriate</p> <p>Considering land use change to lower emissions uses</p> <p>Reducing livestock in favour of alternative plant proteins through to more forestry according to land capability</p> <p>Diversification – use land for products other than animals</p> <p>Focusing on soil health, land use optimisation, and integration</p>	<p>Acceptance and support for agriculture’s inclusion in the ETS</p> <p>Signal shift of agriculture into ETS</p> <p>Ending their 25 years of opposition to introducing realistic price signals around all types of farming externalities</p>





“What action by government would have the most impact right now in supporting a low-emission agriculture sector?”

Research/development/adoption	General	Carbon price/ ETS/incentives
Supporting extension of existing known technologies, improved extension of known material Continual investment in research for mitigation of methane and nitrous oxide. Investment in research and technology Supporting a research & innovation fund that encourages farmer-researcher partnership projects behind the farm gate Boosting research and development education and extension, co-funded by industry to extent possible.	Having CONSISTENT policy Teeth in agricultural regulation Set up climate commission Helping the sector see what a low emissions future looks like. Spelling out an inclusive vision of the need for transition in the land-based industries and how this can be carried forward Unsure at the moment Supporting diversification?	Bring agriculture into the ETS (x5) Allow tree plantings to be recognised and effectively count for GHG offsets. Pricing pollution/emissions (x3) Provide incentives for GHG emissions inefficiencies in both absolute and intensity terms (in consideration of export income requirements and also risk of carbon leakage) Financial support

“What is the most significant barrier to large-scale afforestation?”

Land use/ownership issues	Profitability	Other	Carbon price/ETS
Individual farm ownership & maintaining a sustainable farming operation The discussion on “Whose land does it go on?” Honesty required amongst farmers that the average pasture production is not uniform across a whole farm and many areas would be better in trees than low efficiency livestock production Access to land Effective/competing/suitable land use (x4)	Cost/benefit does not stack up compared with using land for other purposes (x6) Poor cash flow (x3) Need for financial support/ capital investment (x3) Inflated rural land prices (x2) The price of land	It’s complicated Poor social outcomes Too complex for a simple answer, but revolves around the wide regulatory framework Mind set Public attitude (preference for open rather than forested landscapes) Monocultural, short-term thinking A lack of regard for context	Policy uncertainty around the ETS (x5) Loose ETS settings The ETS Current carbon price too low Our tendency to think that financial policy instruments are the most effective tool for changing farmer behaviour

