Te hau mārohi ki anamata Transitioning to a low-emissions and climate-resilient future discussion document

24 November 2021

Ministry for the Environment /Manatū Mō Te Taiao
PO Box 10362, Wellington 6143, New Zealand

Submitted by email to climateconsultation2021@mfe.govt.nz

Please, find below the IrrigationNZ submission to the Ministry for the Environment on Te hau mārohi ki anamata Transitioning to a low-emissions and climate-resilient future discussion document. We would appreciate the opportunity to discuss the responses in our submission or to provide additional information.

Please, direct any inquiries to:

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About IrrigationNZ

Irrigation New Zealand (IrrigationNZ) is the national representative body endorsed to represent over 3,800 members, including irrigation schemes, individual irrigators, and the irrigation service sector across all regions of New Zealand.

Our irrigator members include a wide range of farmers and growers – sheep and beef, dairy and cropping farmers, horticulturalists, winegrowers, as well as sports and recreational facilities and councils. We also represent over 120 irrigation service industry members – manufacturers, distributors, irrigation design and install companies, and irrigation decision support services for both freshwater and effluent irrigation.

We are a voluntary-membership, not-for-profit organisation whose mission is to create an environment for the responsible use of water for food and fibre production for local and international consumers and to sustain the wellbeing of communities.

As an organisation we actively take a technical leadership role in promoting best practice irrigation and carry out a range of training and education activities associated with freshwater management. Over the last five years, we have trained over 3,000 irrigators on different aspects of irrigation best practices to improve water use efficiency (lowering consumption) and better manage environmental effects (improved soil moisture management).

IrrigationNZ members share many of the same goals as other New Zealanders:

- Reduce their environmental footprints and see improvements in the health of the natural environment,
- Contribute to the wellbeing of their communities, and
- Provide for a sustainable future for New Zealand.

IrrigationNZ General Statements of Principles

- In principle, IrrigationNZ supports the Government's undertaking of preparing New Zealand's first Emissions Reduction Plan (ERP) in response to the Climate Change Commission's advice.
- Our organization sees the ERP as an important step in informing the future of our natural environment, including the quality and reliability of water necessary for food security within New Zealand and to our global markets.
- We have endeavoured to apply our knowledge to each of the consultation sections, but our key focus has been on the questions relating to agriculture. We also see that emissions from transport and waste management are significant in the food supply chain.
- Future agricultural pricing mechanisms would rely on more detailed farm-scale emission calculation tools and data, including those pertinent to irrigation.
- Climate change could require a dramatic change in the thinking of the farm management process and therefore trigger changes in farm plans, which would need to be recertified.
- IrrigationNZ notes that by utilising structured investments in climate change research, the Government can potentially achieve a global advantage in low-emissions abatement.
- Behaviour change in the farming sector will depend on having better access to information about running efficient farming practices.
- IrrigationNZ supports the proposals for moving Aotearoa/New Zealand to a circular economy, based on incentives that can support reduction of agricultural production losses and supply chain waste.
- Land use change that supports lower emission farming types will generally require a high level of water supply reliability, a key component of which is water capture and storage. Therefore,

the Government should support the move to alternative farming systems to reduce emissions by encouraging the sensible use of irrigation and the benefits for precision water application to ensure better public understanding of good use.

- IrrigationNZ encourages the Government to help industry and Māori agribusinesses show their environmental credentials for low-emissions food and fibre products to international customers by supporting agribusiness operations already focused on emissions reductions.
- IrrigationNZ agrees that the transition pathways should be guided by a set of principles, and that these principles should draw on more specific land management factors, such as within existing partnerships or policy mechanisms.
- IrrigationNZ acknowledges the importance of extending the ERP to the private sector and that cost funding is the main means of enabling private sector action, including adoption of technology and management practices in irrigation.
- As part of the ERP activities, IrrigationNZ would expect to see guidance on effective tools for reducing the carbon footprint of our irrigated food and fibre production.
- We advise the Government to use road mapping strategies to enable an actionable reduction of climate risks by using nature-based solutions.
- The adaptability of sectors can be supported by actions and activities – immediate, short-term, or long-term, parallel to considering advocacy strategies, such as the Fossil fuel subsidy reform[1,2].
- Equity, inclusive change, and public health (access to reliably grown and safe food) would need to be positioned at the centre of implementing the plan, while considering close partnerships with Iwi/Māori.
- The Government should use a holistic strategic approach to water storage infrastructure planning whereby planning processes take into consideration iwi rights and interests, and community outcomes – including drinking water, and the productive economy and where possible local hydro generation.
- Smooth transition processes across the country will depend on effective funding mechanisms and transition structures, especially those targeted towards agrisector research and education.
- We believe that in all aspects of supporting transition processes, the Government should prioritise the development of capability frameworks in industries and communities that need these the most.
- We also believe that the uptake of low-emissions business models and production methods should be based on incentives more so than penalties.
- IrrigationNZ believes that coordinated efforts across Government (e.g., support across parties or joint work between departments) are essential to the success of the climate-change response.

Transition pathway (pp. 19-23)

[1] Fossil fuel subsidy reform (FFSR) | New Zealand Ministry of Foreign Affairs and Trade (mfat.govt.nz)
[2] wwf_fossil_fuel_finance_nz_subsidies_report.pdf (panda.org)

QUESTIONS

1. Do you agree that the emissions reduction plan should be guided by a set of principles? If so, are the five principles set out above the correct ones? Please explain why or why not.

- We note that the ERP must be guided by a set of principles. A few key principles have been incorporated into the document. These principles can be complemented by additional notes where necessary to explain the required steps.
- An evidence-based approach: The Emissions Reduction Plan (ERP) must draw on a range of existing sources, which may also include partnership frameworks. For the agricultural matters, He Waka Eke Noa – Primary Sector Climate Action Partnership is key in supporting farmers and growers to protect, restore and sustain our environment and to enhance our wellbeing and that of future generations. Evidence should also incorporate related policies, regulations, and practices such as farm plans.
- Providing for and improving the accuracy of emissions and emissions reduction should also form part of 'the evidence-based approach' principle. Business cases around various anticipated initiatives can be formed to identify the problems that exist or may exist in the process of creating an ERP, inclusive of the knowledge gaps.
- A clear, ambitious, and affordable path will depend on the points above, as well as, on policy advocacy. Under this principle, the Government would focus on mentioning emissions management programmes, restoration initiatives and/or plans (sector-specific industrial energy efficiency grant programmes, carbon capture, utilization – e.g., methane use for electricity production – and storage projects, such as the NZ Battery project[3], technology innovation, and emissions reduction system, a plan on improving accuracy of emissions data, etc.).

2. How can we enable further private sector action to reduce emissions and help achieve a productive, sustainable, and inclusive economy? In particular, what key barriers could we remove to support decarbonisation?

- We acknowledge that it is important that this plan be extended to the private sector.
- The cost of emission reduction and related programmes is the most significant barrier to decarbonisation.
- Accordingly, cost funding would be one of the incentives that the Government could create for private companies. In addition, the Government will need to work collaboratively with the private sector to create practical road maps and investment strategies for achieving clean climate goals.
- Cost funding would also be important in the irrigation sector, where the adoption of technology, and/or irrigation practices for increased water use efficiency is the goal. The cost in question refers to the capital cost of adopting such technology[4].

[3] NZ Battery Project: Downstream presentation (mbie.govt.nz)

[4] Burggraaf, V. T., Lucci, G. M., Ledgard, S. F., Antille, D. L., Snow, V. O., & de Klein, C. A. (2020). Application of circular economy principles to New Zealand pastoral farming systems. *Journal of New Zealand Grasslands*, *82*, 53-59.

3. In addition to the actions already committed to and the proposed actions in this document, what further measures could be used to help close the gap?

- We would expect to see guidance on reducing the carbon footprint of our irrigation schemes (which require energy to pressurize the required water) and communities.
- We reiterate that the Government should secure/support cost funding of the private sector/industry (farming and irrigation) investments to achieve both local pollution control and realize global benefits from such funding.
- Other measures at a higher level could include the provision of subsidies or payments for environmental services while defining the environmental and social benefits the interventions will aim to secure.
- We note that the examination of international best practices would be a useful exercise in supporting emissions reduction efforts. An article by Pearce, D. (1997) – Incentives for private sector financing of sustainable development. *Bridges to Sustainability: Business and Government Working Together for a Better Environment, Bulletin Series*, *101*, draws on some useful examples. *"Austria has capital tax exemptions for environmental investments; Finland and Japan operate accelerated depreciation schemes for environmental investments and France and Japan for energy-saving equipment; Canada has accelerated depreciation and capital cost allowances for investments in water and air pollution control"* (p.78)
- There should also be programmes that will help increase the awareness about their part in greenhouse gas emissions from their activities, which include agricultural irrigation[5].

4. How can the emissions reduction plan promote nature-based solutions that are good for both climate and biodiversity?

- We see nature-based solutions being an integral part of the emission reduction planning while considering the need to align these with other strategies (e.g., restoration and protection of forests, landscapes, and wetlands[6]). This can be manifested in the road mapping and the programmes, projects, or plans that the Government will develop to enable an actionable reduction of climate risks to nature and the delivery of measurable positive climate adaptation and/or mitigation benefits.
- The overall objective of the emissions reduction should be achieved in agreement with the National Policy Statement for Freshwater Management and National Environmental Standards for Freshwater.

5. Are there any other views you wish to share in relation to the Transition Pathway?

a) The Royal Society of NZ has worked on the emissions reduction pathways. In this work, they emphasise the problem of the knowledge gap that should be filled through the provision of

[5] s11027-013-9492-9.pdf (springer.com)
[6] Media_790171_smxx.pdf (gla.ac.uk)

detailed data to enable further analysis for creating quantitative and realistic pathways[7]. Cost-planning for research and stakeholder (universities, industry, communities, etc.) engagement will be necessary.

b) By gradually developing the necessary information and knowledge, it will be possible to examine the potential for each sector to reduce emissions for the purpose of developing tailored projects and plans that can lead to the estimation of the mitigation costs and the realization of benefits of cost savings (either immediate, short-term, or long-term).

c) The transition pathways should include plans for significantly reducing[8] and where practicable eliminating fossil fuels in the electricity system. This will be a difficult decision since the storage of renewable energy *"to build about 175 MW of renewable generation capacity each year"*[9] will depend on resource availability (sun, the speed of wind or the level of lakes) and require big investments. E.g., *"One windfarm every nine months is required through to 2050 to achieve net zero carbon emissions."* [10]

Helping sectors adapt (pp. 23-25)

QUESTIONS

6. Which actions to reduce emissions can also best improve our ability to adapt to the effects of climate change?
    - There will be immediate and short-term actions (e.g., optimization of irrigation systems to achieve energy savings, improving the energy efficiency of building, minimising the use of air travel, increasing use of public transport, walking, and cycling, planting trees, investing in fuel-efficient fleet vehicles, electrification of transport fleet, greater electrification of industrial processes, etc.) that can add to our adaptability. There will also be long-term activities that will first rely on robust research as indicated above.

7. Which actions to reduce emissions could increase future risks and impacts of climate change, and therefore need to be avoided?

    Acting without having sufficient knowledge in any initiative can increase future risks to nature from climate change. For more informed decision-making, the MfE should liaise with specialised research collaborations that work on sustainability issues (whether these are at the academic or Government level).

Working with our Tiriti partners

[7] Emission reduction pathways (royalsociety.org.nz)
[8] New Zealand's use of coal for electricity generation surges | Stuff.co.nz
[9] Petroleum and the New Zealand Energy Strategy | Beehive.govt.nz
[10] Electricity Sector Investment On Track For 1.5 Degrees | Scoop News

QUESTIONS (p. 26)

8. The Climate Change Commission has recommended that the Government and iwi/Māori partner on a series of national plans and strategies to decarbonise our economy. Which, if any, of the strategies listed are a particular priority for your whānau, hapū, or iwi and why is this?

   n/a

9. What actions should a Māori-led transition strategy prioritise? What impact do you think these actions will have for Māori generally or for our emission reduction targets? What impact will these actions have for you?

- We note that the Commission has mentioned three main plans[11] that are relevant to Māori-led transition: these include reduction of emissions and increased removal of greenhouse gases, a strategy of meeting emissions budgets and adapting to the impacts of climate change, and a strategy to mitigate impacts from reducing emissions and increasing removals.

- All three plans and strategies are important from our viewpoint. The potential impacts and risks from intervention efforts must be assessed in advance so that mitigation is effective. This should be in line with the consideration of the Iwi/Māori vulnerability to climate change effects, including being climate change migrants and refugees.

- Overall, we express support for the approach encouraged by Māori Climate Commissioner Donna Awatere Huata, which is about *"closer working with Māori to achieve meaningful, inclusive, and more ambitious domestic change"*[12]—especially when considering partnership interests in carbon farming, land use, and resources.

- Prioritisation of actions for the transition stage should focus on active and informed participation of Māori in setting priorities about climate change and health (as it is understood in the Māori worldview), as well as the associated decision making, which will include the delivery of mitigation and adaptation programs (Jones, Bennett, Keating, and Blaiklock, 2014)[13].

- With the transition paths and economic changes, it will be important that social inequality does not deepen. For this reason, both equity and public health would need to be positioned at the centre of climate change strategies. This should progressively start with the ratification of some of the international human rights standards relevant to Māori as the indigenous people of Aotearoa/New Zealand: e.g., International Covenant on Economic, Social and Cultural Rights, United Nations Declaration on the Rights of Indigenous Peoples, and International Labour Organization Convention No. 169.

[11] Reducing emissions » Climate Change Commission (climatecommission.govt.nz)
[12] Call For Climate Commission To Show More Vision, Working With Māori | Scoop News
[13] Jones2.pdf (harvard.edu)

- There should also be close cooperation with the Ministry for Te Puni Kōkiri /Ministry of Māori Development and the Economic Resilience Programme, which focuses on investment strategies that can prepare the Māori for coping with climate change effects – housing, employment, and Māori Enterprise growth.

10. What would help your whānau, community, Māori collective, or business to participate in the development of the strategy?
    n/a

11. What information would your Māori collective, community, or business like to capture in an emissions profile? Could this information support emissions reductions at a whānau level?
    n/a

12. Reflecting on the Commission's recommendation for a mechanism that would build strong Te Tiriti partnerships, what existing models of partnership are you aware of that have resulted in good outcomes for Māori? Why were they effective?

    - Te Puni Kōkiri /Ministry of Māori Development has information on successful partnerships that could be considered as case studies to learn from.
    - Successful partnerships between Māori communities and researchers or maybe some industries should also be considered.
    - There are several large irrigation schemes in Northland owned and managed by Māori – they get to make effective decisions about land use.

Making an equitable transition (pp. 26-31)

QUESTIONS

The Climate Change Commission recommends developing an Equitable Transitions Strategy that addresses the following objectives: partnership with iwi/Māori, proactive transition planning, strengthening the responsiveness of the education system, supporting workers in transition, and minimising unequal impacts in all new policies.

13. Do you agree with the objectives for an Equitable Transitions Strategy as set out by the Climate Change Commission? What additional objectives should be included?
    We agree with the identified high-level objectives for an Equitable Transition Strategy.

14. What additional measures are needed to give effect to the objectives noted by the Climate Change Commission, and any other objectives that you think should be included in an Equitable Transitions Strategy?

- We note that the transition should base itself on the following main criteria, — available, accessible, acceptable, and of good quality[14]. These criteria should particularly apply to the future public health system and the education system; how the current finance measures would be adjusted to reducing inequalities, ensuring the human rights are achieved, and the avenues for assuring accountability.
- The Government should use a more holistic approach to water storage infrastructure planning whereby planning processes enable rather than inhibit equitable, strategic, effective, and efficient capture and distribution of water with the least impact on the environment. This planning must take into consideration iwi rights and interests, community outcomes – including drinking water, and the productive economy and where possible local hydro generation.

The Commission suggests that the Equitable Transitions Strategy should be co-designed alongside iwi/Māori, local government, regional economic development agencies, businesses, workers, unions, the disability community, and community groups.

15. What models and approaches should be used in developing an Equitable Transitions Strategy to ensure that it incorporates and effectively responds to the perspectives and priorities of different groups?

- A key approach to developing an Equitable Transition Strategy would be setting a timeline of preparing and delivering plans, policies, and programmes, such as creating clean energy jobs or low-emissions land use which factors in equitable participation by industries and communities, by also specifying the benefits (%) for disadvantaged communities.

Other actions

16. How can Government further support households (particularly low-income households) to reduce their emissions footprint?

- The suitable avenues for supporting households in reducing emissions should start with a Reduction Opportunity Assessment Programme, the delivery of which should be supported by the Government by a competitive grant process. This baseline and opportunity assessment programme can generate sound advice on the required resources.

17. How can Government further support workers at threat of displacement to develop new skills and find good jobs with minimal disruption?

- We hope to see NZ Government support a smooth transition process across the country by creating mechanisms that will assure people get the necessary skills for the new job market. For this reason, creating an effective transition structure, such as a

[14] Jones, R., Bennett, H., Keating, G., & Blaiklock, A. (2014). Climate change and the right to health for Maori in Aotearoa/New Zealand. *Health & Hum. Rts. J.*, *16*, 54.

transition task force, will be necessary. The task force can provide advice on how to make effective transition away from emission-intensive employment to green jobs, or the advice on the budgeting of worker transition centres that will offer skills to people in various industries.

- The Government may also need to establish an infrastructure fund to support priority projects and economic diversification in impacted communities/businesses.

18. What additional resources, tools, and information are needed to support community transition planning?
    - It would be necessary to research emerging technologies and to determine the ability of communities to adapt and plan.
    - Assessment of climate change awareness and emission reduction knowledge and preparedness would be key as well. Communities, schools, industries could be part of the transition planning and implementation processes to secure a better understanding and ownership of transition and the expected benefits from this transition.
    - Aligned to this type of assessment, it would be important to raise awareness of people by engaging schools, industries, communities, and the Government.

19. How could the uptake of low-emissions business models and production methods be best encouraged?
    - We perceive encouragement of uptake of low-emissions business models and production methods to be based on incentives. Incentives may include loans and venture capital investments, or trading credits from Government programmes among others.

20. Is there anything else you wish to share in relation to making an equitable transition?
    - The equitable transition will require intensive investments in the development of carbon capture and sequestration. Incentives from the Government may include programmes to support farmer participation in the industry, a production incentive to stimulate domestic production, exemption from registration or value-added taxes, low annual road tax for electric vehicles, free municipal parking for electric vehicles, and/or Government grant programmes based on specific eligibility criteria.

Government accountability and coordination (pp. 32-34)

QUESTIONS

21. In addition to the Climate Change Commission monitoring and reporting on progress, what other measures are needed to ensure the government is held accountable?
    - Some of the key bases for accountability would be expressed in:

    a) A credible ERP that has set clear and actionable targets, and one that allocates resources through transparent budgets that can be tracked.
    b) Policy processes that are open to broad and meaningful consultation.

c) The role of media in reporting Government's commitment (e.g., whether the Government created dedicated task forces, and took actions to secure climate finance, what the results were).
d) The requirement to limit or reduce NZ's GHG emissions under international commitments.

22. How can new ways of working together, like mission-oriented innovation, help meet our ambitious goals for a fair and inclusive society and a productive, sustainable, and climate-resilient economy?

- New ways of working can mean identifying a clear objective/societal goal (e.g., better adaptation to climate change) which drives new learning, knowledge, and experimentation that have political support. The new ways of learning are characterised by the meaningful participation of different groups and communities, and by putting together a policy, infrastructure, and technology (as is also mentioned on p. 45 of the current discussion document). In practice, this may mean the New Zealand CleanTech Mission partnership, which was launched in July 2021 to help Kiwi businesses develop world-leading CleanTech[15]. This initiative shows the potential of a more intentional approach to support entire industries, comprised of multiple technology verticals and not necessarily individual companies.
- An independent report, *New Zealand Climate Tech for The World* benchmark's NZ's current environmental innovation ecosystem and addresses the potential of the new ways of working together. Report findings include significant economic and environmental opportunities for NZ CleanTech, and several key hurdles to overcome for sector growth[16].
- It is to be noted however that the new ways of working together may be linked to a food safety risk and potentially damage the integrity of the food system as is noted in the draft strategy[17] for the Agritech sector (see p. 12).

23. Is there anything else you wish to share in relation to government accountability and coordination?

No.

Funding and financing (pp. 35-36)

QUESTIONS

24. What are the main barriers or gaps that affect the flow of private capital into low-emissions investment in Aotearoa?

[15] New Zealand CleanTech Mission | Callaghan Innovation
[16] NZ_Climate_Tech_For_The_World_report.pdf (callaghaninnovation.govt.nz)
[17] Growing innovative industries in New Zealand: Agritech in New Zealand - towards an industry transformation plan (mbie.govt.nz)

- Some barriers or gaps that may potentially affect the flow of private capital into low-emissions investment in Aotearoa/New Zealand are listed below:
    - Force majeure situations, such as Covid-19,
    - Risk perception, e.g., agriculture may seem unattractive to investors because it occasionally attracts negative headlines,
    - Lack of investment in clean energy,
    - The regulatory environment,
    - Access to finance, or
    - The capacity of investors to assess risks[18] .
- The Government could make stronger public statements in support of agriculture a viable long-term investment.

25. What constraints have Māori and Māori collectives experienced in accessing finance for climate change response activities?
    - It is known that Kainga Whenua loan scheme was created primarily for the building of houses and that the provision of grants to cover the costs of connecting developments on Māori freehold land to existing infrastructure are part of this scheme. These grants are supposed to enable the better building of homes on the land, and if funding is needed for significant repairs or investment due to climate change, owners of Māori freehold land may face serious competition for Government funding and have limited access to resources to be obtained from the general system (White, 2018)[19]. This scenario may similarly apply to investments in agriculture/irrigation infrastructure.
    - The eligibility criteria for grants may also appear as a constraint to accessing finance for climate change response activities (White, 2018).
    - Finally, if Māori freehold landowners want to get access to finance for infrastructure investments or irrigation repairs, insurance will appear as a problem, especially with the climate change risks (and the associated risk premiums creating affordability issues for customers/landowners). "Damage to the land or risk of future damage may cause insurers to decline cover, as the exposure to risk and potential cost becomes too high" (White, 2018, p. 14) for the Māori and the Māori collective's ability to cope with the heightened strain on their land.

26. What else should the Government prioritise in directing public and private finance into low-emissions investment and activity?
    - In all aspects of supporting the transition process, the Government should prioritise the development of capability framework and capacity building in industries and communities that need these the most.

[18] PowerPoint Presentation (otago.ac.nz)
[19] White, S. (2018). Māori Freehold Land & Climate Change Adaptation

27. Is there anything else you wish to share in relation to funding and financing?
    No.

Emissions pricing (pp. 36-40)

QUESTIONS

28. Do you have sufficient information on future emissions price paths to inform your investment decisions?
    - We are aware of the He Waka Eke Noa's programme of work to look at measurement, management, and pricing of agricultural emissions over the next few months as a key part of the policy package to reduce agricultural emissions.
    - Currently, there is limited information on emissions pricing and the cost of farming if they produce milk or meat[20]. However, future agricultural pricing mechanisms might be designed to contain more detailed farm-scale emission calculation tools and data[21] such as fertilizer, and irrigation – the energy demand for irrigation, diesel use for mechanisation purposes, or power use by irrigation and other types of pumps supporting irrigation[22].

29. What emissions price are you factoring into your investment decisions?
    - As per the answer above, there is limited information on the pricing paths. We understand that in the future, carbon price can potentially vary and therefore provide differing incentives for reduction and investment decisions across the board.

30. Do you agree the treatment of forestry in the NZ ETS should not result in a delay, or reduction of effort, in reducing gross emissions in other sectors of the economy?
    - As per our previous submission, IrrigationNZ agrees that forest sequestration should not displace or delay reducing emissions in different other sectors of the economy.

31. What are your views on the options presented above to constrain forestry inside the NZ ETS? What does the Government need to consider when assessing options? What unintended consequences do we need to consider to ensure we do not unnecessarily restrict forest planting?
    - We suggest that there needs to be consistency in progress and a balance of incentives in forestry and other sectors or activities (e.g., the export of synthetic greenhouse gases and the production of products that embed carbon) to maintain investor and landowner and/or company confidence.

[20] Government sets deadline for farmer emissions | Stuff.co.nz
[21] Know your numbers | Ag Matters
[22] Microsoft Word - wanz09Final00145.docx (waternz.org.nz)

- As the proposed plan indicates clarity of options will depend on identifying and working through the risks and benefits of different approaches, including the status quo during the policy development process (see p. 39).

32. Are there any other views you wish to share in relation to emissions pricing?
    - We expect to receive more information on the emissions impacts in agriculture to inform planning decisions that are useful for our farmers/irrigators.

Planning (pp. 40-42)

QUESTIONS

33. In addition to resource management reform, what changes should we prioritise to ensure our planning system enables emissions reductions across sectors? This could include partnerships, emissions impact quantification for planning decisions, improving data and evidence, expectations for crown entities, enabling local government to make decisions to reduce emissions.
    - Cross-party support and coordinated efforts are of high significance. As we noted previously, IrrigationNZ supports the need for cross-party support for our country's climate change response and that coordinated efforts across Government are essential to the success of that response. However, for the response to be successful, there needs to be coordinated response across other policy settings (e.g., freshwater regulation, biodiversity enhancement, highly productive land, primary production strategy 'Fit for a Better World', three waters, the water services bill, etc.). IrrigationNZ is concerned that if there is a lack of coordination people will get policy fatigue and will fail to act or will be inhibited by cost and red tape as well as miss opportunities for more strategic long-term outcomes.
    - The Government should specifically consider that emission reduction efforts should be aligned with the planned Freshwater Farm Plans. Climate change could require a dramatic change in the thinking of the farm management process and therefore trigger changes in the farm plan which will need to be recertified.

34. What more do we need to do to promote urban intensification, support low-emissions land uses, and concentrate intensification around public transport and walkable neighbourhoods?

    - It would be important for the Government to consider existing information to support the objectives stated in the question. This would include the recent relevant submissions on climate change (e.g., Hīkina te Kohupara informing the transport chapter of the Emissions Reduction Plan, The Climate Change Commission Report, or Discussion paper on a Clean Car Standard and Clean Car Discount, Ministry of Transport, (9 July 2019) https://www.transport.govt.nz/multi-modal/climatechange/electric-vehicles/clean-cars/).
    - The integration and coordination of policies (e.g., through spatial planning) would be central in supporting the objectives stated in the question as well. In this regard, the

relevant strategies would include those on energy production and renewables (e.g., the NZ Energy Strategy), work programmes that would relate to transport and waste (e.g., NZ Transport Strategy, the Transport Emissions Action Plan, the NZ Waste Strategy). The National Policy Statement on Urban Development. The Statement has announced Objective 8 on New Zealand's urban environment with the latter supporting reduction in greenhouse gas emissions, and being resilient to the current and future effects of climate change (see p. 10).

- Promotion of urban intensification would also require investment in sustainability (as is outlined in the Toitū Te Taiao Our Sustainability Action Plan, 2020) and institutional change – with the involvement of developers, investors, urban designers, architects, and accountability instruments (e.g., programmes on land transport, regional planning and agriculture, and technology).

35. Are there any other views you wish to share in relation to planning?

No.

Research, science, and innovation (pp. 42-46)

QUESTIONS

36. What are the big challenges, particularly around technology, that a mission-based approach could help solve?
    - The main challenges could be the slow introduction of innovation or the late adoption of tools. The speed of the uptake could be significantly determined by the joining of "efforts, resources, and knowledge across disciplines, sectors, and policies, to collectively support projects that tackle climate change" (p. 45).

37. How can the research, science, and innovation system better support sectors such as energy, waste, or hard-to-abate industries?
    - Research and science can help advance the sectors, such as agriculture, energy, waste, and infrastructure, while offering integrated holistic solutions to emissions reduction. Science and research can boost the development and use of new low-emission technology, the finetuning of production systems, and implementation of governance strategies.
    - Research and science can also improve the access to information (e.g., how to develop and use low-emissions technology, or the use of electrification in heat and transport). A good example of a science-backed practical information source on the reduction of GHG is Ag Matters[23]. MBIE's NZ Battery Project is another science-based initiative which looks into options of resolving the country's 'dry year risk' problem by assessing viability of pumped hydro power storage, hydrological modelling, and detailed engineering design[24].

[23] About Ag Matters | Ag Matters

[24] NZ Battery Project: Downstream presentation (mbie.govt.nz)

- Research also backs practical legal information[25] which assists with the knowledge of the corresponding obligations in the farming or other sectors.
- With regards to irrigation water pumping systems, science and research can inform the pumped irrigation system efficiency and selection of an efficient pump/motor combination, which is a key element of achieving whole of life energy and cost-efficiency.

38. What opportunities are there in areas where Aotearoa has a unique global advantage in low-emissions abatement?
    - There is available research[26] on the various opportunities that the Government can harness to achieve a global advantage in low-emissions abatement. We expect that ongoing investments in research and science will produce new knowledge on these opportunities.

39. How can Aotearoa grow frontier firms to have an impact on the global green economy? Are there additional requirements needed to ensure the growth of Māori frontier firms? How can we best support and learn from mātauranga Māori in the science and innovation systems, to lower emissions?
    n/a

40. What are the opportunities for innovation that could generate the greatest reduction in emissions? What emissions reduction could we expect from these innovations, and how could we quantify it?
    - See the response to question 38.
    - Different innovations will have different emission reduction results.
    - Existing tools could be used for quantification purposes depending on the sector.

41. Are there any other views you wish to share in relation to research, science, and innovation?
    n/a

Behaviour change – empowering action (pp. 46-48)

QUESTIONS

42. What information, tools or forums would encourage you to take greater action on climate change?
    - Our farmers will need to have access to information on running more efficient irrigation practices. This information may be on the operation (e.g., information on water, fertilizer and waste management when operating farms), technology, and funding.
    - Information on the benefits of efficient water use, demand management, and where storage fits in.

[25] Framework to Regulate On-farm Emissions | Articles | Cooney Lees Morgan
[26] Vivid Economics (pureadvantage.org)

- Information will need to be local and trusted. The advisor providing the information will need to be properly trained.
- Regulations must be consistent nationally and applicable within a local context.

43. What messages and/or sources of information would you trust to inform you on the need and benefits of reducing your individual and/or your businesses emissions?
    - Guidance materials that have been through broad consultation processes.
    - Information developed in collaboration between the regulators, the community, and iwi, establishing values, objectives, and actions.
    - Information coming from reputable organisations, that use science or evidence-based approaches to working on policy matters.

44. Are there other views you wish to share in relation to behaviour change?

n/a

Moving Aotearoa to a circular economy (pp.48-52)

45. Recognising our strengths, challenges, and opportunities, what do you think our circular economy could look like in 2030, 2040, and 2050, and what do we need to do to get there?
    - Existing research on Aotearoa/New Zealand indicates that waste to energy or to other systems processing can render specific positive results. When we consider agriculture and water use, opportunities for re-use appear as feasible. This can include the capture of rainwater in certain irrigation systems.

46. How would you define the bioeconomy and what should be in the scope of a bioeconomy agenda? What opportunities do you see in the bioeconomy for Aotearoa?
    - Waste management, e.g., getting rid of plastic materials in favour of recyclable cardboard.
    - Further research and analysis of bioresources, because at this stage it does not prove to be efficient due to time and cost.
    - Biological fuels can be unreliable because crops still need sunlight to grow; the amount of sunshine in NZ would need to be factored in when considering an option for bio-based resource reliance (see the answer to Question 5).
    - IrrigationNZ is also keen to see an increase in hydro generation in small, localised units to reduce transmission wastage and provide a multi-use option for stored water when solar and wind are not as readily available. The price of electricity will be keen to decarbonise the country.

47. What should a circular economy strategy for Aotearoa include? Do you agree the bioeconomy should be included within a circular economy strategy?
    - A circular economy strategy for Aotearoa/New Zealand should include incentives. We note that there needs to be Government intervention to support waste minimisation

practices and those of transition from recycling to reuse. Intervention can be creating incentives for producers to invest in products that are more likely to be reused, or providing education programmes on the supply chain responsibilities, product expectations, or the multi-use practices for communities. Other interventions can mean organising 'buy local' campaigns.

- The bioeconomy should be included within a circular economy strategy if evidence-based research supports this type of inclusion.

48. What are your views of the potential proposals we have outlined? What work could we progress or start immediately on a circular economy and/or bioeconomy before drawing up a comprehensive strategy?
    - We support the proposals for moving Aotearoa/New Zealand to a circular economy, and we note that these proposals should include the reduction of agricultural production losses and waste.
    - We assume that the use of mitigation technologies and farming practices can help reduce GHG emissions. There needs to be further consideration of smaller local production leading to fewer distribution costs (distance between supplier and consumer); and hydro-energy production (i.e., less reliance on carbon-based energy), the use of low energy transport, processors using efficient factories, etc.
    - There is a reference on existing programmes and ongoing research in the discussion document that the Government could base its first actions on, by paralleling investing in innovative research and awareness building.

49. What do you see as the main barriers to taking a circular approach, or expanding the bioeconomy in Aotearoa?

- The cost of technology adoption or purchase to enable expansion of bioeconomy can appear as a barrier to taking a circular approach.
- Costs arising from the ERP can result in additional barriers for the continued development of iwi/Māori landholdings, and farmers/irrigators thereof.
- In the context of waste recycling, e.g., stringent cleaning and transport requirements can be barriers to adoption for some farmers[27].

Agriculture (pp. 97-100)

QUESTIONS

83. How could the Government better support and target farm advisory and extension services to support farmers and growers to reduce their emissions?

[27] Burggraaf, V. T., Lucci, G. M., Ledgard, S. F., Antille, D. L., Snow, V. O., & de Klein, C. A. (2020). Application of circular economy principles to New Zealand pastoral farming systems. *Journal of New Zealand Grasslands*, *82*, 53-59.

- We have to make sure there are enough advisory and extension services to support emission reduction (e.g., through the quick uptake of technology innovations) geographically and across various farming types. This can be done by exploring successful extension models.
- There is good management practice recommendations guidance and standards from sector bodies (IrrigationNZ, DairyNZ, Beef+LNZ, HortNZ, etc.) that need to be considered.
- Additional support (e.g., training) for farmers and growers will be needed in adopting change, and incentives. Support from MPI extension services and catchment-based initiatives will be key to ensuring we are creating the right behaviour.
- As emphasised in our earlier submission, investment in extension services to support member-based bodies, will be key to helping transition and improving practices that reduce laggards and achieve the outcomes we collectively want.
- There needs to be a national consistency and central oversight of the services guidance and standards but still allowing regional flexibility.

a. How could the Government support the specific needs of Māori-collective landowners?
    - Farm advisory and extension services must be consistently available, local, and trusted through the building of sound relationships and trust with Māori collective landowners.
    - The ability of Māori collective landowners to implement change is constrained by their financial models and land ownership structures. Therefore, specific funding support and timeline consideration is needed.
    - The Government should consider funding Māori-specific advisory and extension services.

84. What could the Government do to encourage uptake of on-farm mitigation practices ahead of implementing a pricing mechanism for agricultural emissions?

- IrrigationNZ believes that the Government can support alternative farming systems to reduce emissions by:
    a. Accelerating investment in high resolution, consistent, publicly available, nationwide, land and climate information and decision-making tools and processes, to better inform local and national land-use decisions.
    b. Supporting deployment of the systems and infrastructure needed for alternative farming systems and products – including water storage.
    c. Supporting the implementation of localised solutions to hydro-generation for communities on a smaller scale that also have community and production benefits.
    d. Prioritising initiatives including provenance marketing to reduce barriers and enable international market access for proven low emissions food and fibre products.
    e. Encouraging the sensible use of irrigation in Aotearoa/New Zealand and the benefits for precision water application to ensure better public understanding and good use, rather than a negative story that is often left unfettered. As an example, converting 20% (200ha) of dairy farming into high-value horticulture and 5% conservation land results in a reduction in GHG of 19%- 22% (Leftfield Innovation) but requires a significant amount more water per hectare.

- The Government should look to build on current good management practices (GMP), including sediment nutrient control, and water resource management, rather than start from scratch. Many GMPs are widely captured in existing farm environment plans, and our submission to MfE encourages that the FW-FPs adopt rather than replace GMP.
- The Government should support scrutiny of post-farm gate food supply chain, looking at transport and secondary manufacturing of food, fibre, beverages in Aotearoa/New Zealand. Local manufacturing and consumption should be encouraged through promoting NZ food story, thus leading to less carbon miles and encouraging incentive pricing mechanisms.
- We encourage the Government to continue with its investigation of supermarket duopoly that heavily influences linkages between consumer choice and creates a lag of rewarding producers through appropriate pricing.
- There needs to be a recognition of the balance between regulatory enforcement and incentivization of adopting good management practices.
- The government needs to investigate the incentivization (such as tax credits) of adopting good management practices, not just applying emissions charge through an ETS or the agricultural emission pricing.

85. What research and development on mitigations should Government and the sector be supporting?

- The Government and the agricultural sector need to continue their research and development on ruminant digestive functions.
- In addition, strong support is needed for land-use change to low-emissions farming types, but IrrigationNZ encourages the Government to pursue its strategic intent on water storage and distribution as an enabler of land-use change.
- Many alternative land uses require access to highly reliable water supply to make business decisions viable and attractive within a competitive international supply chain.
- To ensure water storage and distribution infrastructure is correctly scaled and affordable within a multi-use community context, the Government needs to work with the industry on R&D programmes that support water-use efficiency and demand management.
- As noted in the IrrigationNZ's submission for the Climate Change Commission Report, we believe that there needs to be more Government funding in R&D to quickly develop new technologies, as well as, in precision water and nutrient application.
- The Government needs to continue investigations into improvements in Overseer, including its GHG module.

86. How could the Government help industry and Māori agribusinesses show their environmental credentials for low-emissions food and fibre products to international customers?

- We advise that the Government picks up the good models that are already operating and supports them (e.g., Miraka, Tohu Wines, Wairarapa Moana Farms).

87. How could the Government help reduce barriers to changing land use to lower emissions farming systems and products? What tools and information would be most useful to support decision-making on land use?

- It will be necessary to make sure legislations are practical, that the benefits surpass costs and that transition timelines recognise the need for industry capacity building.

88. Are there any other views you wish to share in relation to agriculture?

- It is widely known that the agricultural sector has a big role in GHG emissions with a set of varying objectives that can make the consolidated effort more difficult. However, we would like to emphasise the importance of the following themes relevant to agriculture that the ERP should incorporate in its initial stages. We note that some of these themes have been covered in our Submission for the Climate Change Commission Report.

Food and fibre production

- Aotearoa/New Zealand commands a premium for its exports, as being one of the safest food production countries with high-quality products, and strong agriculture R&D. Consumers will continue to demand ongoing improvements in quality and nutritional value. Therefore, the move to a lower emissions outcome and continue to be ahead of the world in our products will be something to keep us ahead of the consumer needs. Currently, this prospect is constrained due to the low presence of financing: See NZ Climate Tech For The World report.pdf (callaghaninnovation.govt.nz).
- Further land-use into crops that can be used for alternative proteins is an option for more marginal land – however, again, water is key to being able to grow these alternatives, and investment in infrastructure for capture and storage will be needed, as will development of new technologies that are currently unavailable.

Land-use changes away from ruminants to horticulture

- Diversifying land uses and switching some land that is currently in livestock agriculture to uses like horticulture or arable cropping. As an example, converting 20% (200ha) of dairy farming into high-value horticulture and 5% conservation land results in a reduction in GHG of 19%- 22% (Leftfield Innovation).
- Linked to this process, there needs to be clarity of methodologies in calculating emissions and removals from the agricultural sector.
- The Government should invest in planning of making good practices of production systems visible, i.e., celebrate efficient operations internationally as part of the benefits that can be realised from the emission reduction work.

Water storage and capture

- IrrigationNZ believes that there needs to be a national strategy on the water –water capture and storage as both enable change and a mitigant against climate change.

- Efficient use and demand management should be placed at the centre of water storage and capture planning and investment decisions.
- Supporting deployment of the systems and infrastructure needed for alternative farming systems and products – including water storage.

Policy and action

As noted in our previous submission, regional and central Government policy which provides for and enables the capture, storage, and efficient distribution of water will be needed for:

- Mitigating against climate change that is already occurring and impacting the primary sector and our stores of reliable drinking water – e.g., there are already general reductions in water body flows, and increases in droughts and weather events.
- Increasing local hydropower generation and reducing transfer wastage as the need for energy increases with a reduction in fossil fuels and moves to more EVs.
- Using water to enable diversifying land uses and switching some land that is currently in livestock agriculture to uses like horticulture or arable cropping.
- Responding quickly to market demands for various products that have higher water use.
- Transforming to alternative farming systems or mixed farm operations.
- Training, education, and skills development.
- The creation of jobs.
- Enabling investment in research for new farming systems and new technologies as consumer desires change.
- Enabling a more holistic approach to water storage infrastructure planning whereby planning processes enable rather than inhibit a community, iwi, social and productive approach for the capture, storage, and distribution of water where it has the least impact on the environment.

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