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Future Pathways Policy Team  
Ministry of Business, Innovation & Employment

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## Te Ara Paerangi Future Pathways Green Paper:

### Lincoln Agritech's Response

We thank the Minister and MBIE for the initiative and preparedness for change outlined in the green paper and endorse much of the content. We appreciate the opportunity to contribute to the thinking, rationale for change, and formulation of a more optimal science system for NZ. Below is a brief summary of our response, followed by more detailed argument and recommendations.

#### Summary

A key and over-arching aspect to science funding in New Zealand is what does government wish to achieve from its investment in research? A statement to this effect is largely absent from the green paper yet such strategic intent is needed to design the most appropriate strategy. We have assumed the following, admittedly non-comprehensive and non-explicit, statement of government intent.

*A vibrant researcher network, well-connected to users and delivering appropriately adapted research outputs to maximise the likelihood of impact. The research will conform to the principles of Te Tiriti, and deliver excellent, world-class research to:*

- *Start new, and support and increase existing NZ high value exports (mean attributable ROI on economic R&D investment >100%)*
- *Build the well-being of all NZers, equitably (attributable metrics improving)*
- *Improve industry and sector efficiencies, and NZ's environment and sustainability (attributable metrics improving)*
- *Respond to global threats (e.g. climate change, pandemics).*

#### 1. RESEARCH PRIORITIES

*We describe below a fresh and innovative approach to establishing research priorities, in turn driven by a broad-based, non-institutional, consultative and data-driven council. We propose considering metrics such as impact and innovation elasticity across sectors to help determine research priorities.*

#### 2. TE TIRITI, MĀTAURANGA MĀORI AND MĀORI ASPIRATIONS

*We support existing submissions and acknowledgement of the Future Pathways paper which seeks to engage more with Māori and to honour the principles of Te Tiriti in the research landscape.*

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### 3. FUNDING

*A mixed funding model is essential to remove disincentives to collaboration, retain capability and engender collaboration that multiplies effort and expertise and enhances impact.*

### 4. INSTITUTIONS

*We advocate natural, organic clustering of research expertise, unencumbered by competition in funding. Currently, institutional financial imperatives coupled with competitive research funding disincentivise true collaboration, as does inaccessible or unknown specialist infrastructure.*

### 5. RESEARCH WORKFORCE

*Fundamental capability and knowledge across key science areas must be retained regardless of current research priorities.*

### 6. RESEARCH INFRASTRUCTURE

*Current funding and ownership models are a disincentive to sharing key infrastructure.*

## Detailed Response

### 1. RESEARCH PRIORITIES

#### **1.2.2 Priorities design**

#### **- What principles could be used to determine the scope and focus of national research Priorities?**

*Both the scope and focus of national research priorities need to be responsive and dynamic, determined by a research council (refer below) and reflect the underlying need to:*

- *Maintain and build research capability and facilities*
- *Reflect NZ's current and envisioned future needs in:*
  - *Discovery-based research*
  - *Targeted research with a dynamic scope and focus based on existing categories: economic, social (well-being and cultural) and environmental.*

*Target a designated quantum of funding to the most promising sectors (refer 1.3.2), pre-formulate the basic sector benefit cases and let researchers and their industries explore how these could be realised. Importantly, set aside a portion for Greenfield 'investment, speculative, but still based on data.*

#### **1.3.2 Priority-setting process**

#### **- What principles should guide a national research Priority-setting process?**

*A fresh approach to establishing science priorities is needed. Currently, research priorities comprise government offering R&D funding opportunities and accepting/declining the proposals that emerge, based on the perceived quality and impact of the respective proposals. Whether or not they contribute to a particular sector or society need is*

*substantially immaterial. Hence research effort is targeted to research areas effectively designated by:*

- (i) CRIs and their SSIF process and funds, and for competitive processes by*
- (ii) researchers formulating bids that pass excellence and then*
- (iii) impact assessment by 4 assessors with constrained pan-proposal consideration.*

*This results in a semi random process that favours compelling cases that are not necessarily and we venture to say, perhaps not often, best practice for competitive funds. While we consider that such largely researcher-led science is appropriate for untargeted and a portion (e.g. 30%) of targeted research funding, most needs to address national priorities. We hasten to add that (i) these priorities must be able to be shifted over time (ii) stability in research direction is critical to ensure traction and impact and (iii) follow guidance in meeting national priorities but avoid the overly prescriptive designations from several years ago that resulted in providers shoe-horning research concepts into inappropriate categories.*

*We consider that maximising research impact includes using a data-driven science-based approach to science investment able to recognise and relate to research, prior and existing research in NZ and offshore. For example a (NZ and international) research context section in MBIE research applications was previously required and if reinstated for all funding, not just MBIE contestable, a data base should be built and incorporate research findings from annual reporting.*

*For economic outcomes a sector-based analysis is essential – there are substantial existing data on sectors and opportunities and markets held by NZTE, MPI, Callaghan, MBIE, etc.*

*A process is required to determine where NZ should invest for strategic and targeted research. This demands an informed pan-sector process that looks at and compares export sectors from several perspectives including:*

- 1. innovation elasticity (to what extent does increased R&D investment actually result in new innovative approaches)*
- 2. size elasticity (to what extent does increased R&D investment actually lead to increased export volumes)*
- 3. market elasticity/saturation – price elasticity of existing market, i.e. is there much point in increasing export volumes*
- 4. market maturity/disruption – what is the likelihood that new innovations will actually lead to improved export returns.*

*We consider it appropriate to build metrics for these factors so that R&D in each sector can be compared (NZTE, MPI, Callaghan, MBIE have existing data including on prior and current research to form appropriate initial metrics). Then it is appropriate that MBIE/NZTE use these metrics to build overarching sector-wide research investment cases, e.g. one measure could be derived from plotting priority sector initiatives against their urgency. These sector-wide investment cases would form the basis from which proposals build individual business or*

*investment cases around specific research. Importantly, many research topics will cut across (deliver to) multiple sectors.*

*The above approach builds on SFTI's excellent mission lab approach and has some similarity to UNZ-proposed Research Council but critically, must avoid the gamekeeper-poacher conflict that one may infer from the UNZ approach as described.*

*Most importantly, the Research Council must be apolitical (but still be directed by government priorities), institutionally independent, sectorially independent and research discipline agnostic. Further, it must be very well connected-to/ informed-by NZTE, MBIE, sectors (incl. central and local government departments), Māori, local and international research and providers. It may form a near full-time role for (e.g.) ten Research Council members.*

#### **- How can the process best give effect to Te Tiriti?**

*We support existing submissions and acknowledgement of the Future Pathways paper which seeks to engage more with Māori and to honour the principles of Te Tiriti in the research landscape.*

#### **1.4.2 Operationalising Priorities**

##### **-How should the strategy for each national research Priority be set and how do we operationalise them?**

*NZ currently has a complex research funding system with a plethora of funding processes. We consider a key principle is simplicity, efficiency and commonality of process and management. This could be achieved efficiently by aggregating and apportioning all government research funding (include appropriately ring-fenced funding from TEC, MPI, HRC, etc) into three fundamental mechanisms:*

- 1. Organisational support to maintain viability and ensure retention of essential skills for (i) unexpected substantial events such as plant/animal/human disease, disruption in technology or food or energy and (ii) changes in NZ's research priorities. NB Universities already have a high level of base funded support through TEC. This base funding could comprise, for example, 50% of the current budgets of:*
  - all CRIs (including Callaghan, see below)*
  - publically-owned and very strategic privately owned IRANZ and similar organisations such as Matai, Cawthron, LAL, Motu, Malaghan*
  - devolved PSAF organisations – KiwiNet and Return on Science.*

*Importantly, organisational support must contribute to items 2 and 3 below via an appropriate rigorous but not onerous, audited process, preferably via the same*

*overarching allocation mechanism, and aligned to their respective areas (e.g. GNS for earthquake research). However we do favour, for each of 1-3 here, new entrants and some competition in traditionally 'owned' sectors to push innovation and renewal.*

2. *Fundamental and untargeted research, includes Marsden, similar to the existing process.*
3. *Targeted contestable (include catalyst, existing Callaghan funding to industry, PSAF funding, etc). This would include processes with differing eligibility, e.g. research providers (existing Endeavour), research providers (existing PSAF), industry (existing Callaghan).*

*Further, in the interests of efficiency and of maximising the allocation of resources to research rather than research fund allocation and process, we advocate very few, ideally one, allocation bodies and committees.*

## 2. TE TIRITI, MĀTAURANGA MĀORI AND MĀORI ASPIRATIONS

*We have no comment to add beyond the content of the green paper and submissions from other providers.*

## 3. FUNDING

### **3.2.1 Core functions**

**- How should we decide what constitutes a core function and how do we fund them?**

*Core functions for institutions stifle innovation elsewhere and engenders 'protect our patch' behaviour. We consider it better to allow research and impact clustering to occur naturally, as implied currently by CRI and IRO names and University faculties. Nevertheless, it is vital that core functions are maintained but, along with facilities retention, this is closely tied to capability retention. Much research expertise is currently well-distributed across NZ and across research institutions.*

*If CRIs are to remain in their current sector-oriented form, a glaring and substantial gap exists. The 'industrial research' capability previously in IRL has been decimated, with some remaining within Callaghan Innovation. Either that capability needs to be rebuilt within an IRL-like model (we consider it imperative that the Callaghan grants function is rolled back into MBIE) or formalised within an existing or merged CRI/IRO.*

### **3.3.2 Establishing a base grant and base grant design**

**- Do you think a base grant funding model will improve stability and resilience for research organisations, and how should we go about designing and implementing such a funding model?**

*A base grant plus competitive process plus commercial activity model is very appropriate for all public-good providers. The base grant component must reflect the importance of*

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*capability retention and building capability in early career scientists. That, plus any competitive funding component must be auditable, and actually audited, to avoid cross-subsidy between the two and to avoid cross-subsidy into any commercial activity. Publically funded research must not directly subsidise commercial activity and must not result in anti-competitive behaviour.*

*In our experience, e.g. via SfTI, despite the best intentions, true collaboration diminishes with distance, becoming fragmented so that distinct tasks tend to be allocated to geographically-distant organisations. Nevertheless, we consider that only through a model such as this can true collaboration be at least partially restored and the collaborative impediments such as distance be minimised.*

*If there is a change from full cost funding to marginal cost funding for organisations that receive base grants, it is imperative that there are still funding opportunities for organisations that don't have base grants, for example competitive rounds. If an organisation that is not receiving base funding is awarded competitive funding it must be at full cost.*

*LAL considers PSAF a very important and enabling mechanism for generating impact. We consider it should encompass all research categories – social, environmental, economic, and that the level of support from PSAF should be increased from 50% to 75% of the project cost with the remaining 25% coming from the research organisation.*

## **4. INSTITUTIONS**

### **4.4.1 Institution design**

**- How do we design collaborative, adaptive and agile research institutions that will serve current and future needs?**

*Competition reduces collaboration. When organisations financial performance is tied to securing research contracts, behaviour is different from were that not the case. So to maximise collaboration, competition relating to research funding needs to be removed. However we do recognise the value of competitive processes in rigour and fresh innovation and a reasonable component of the national investment in research needs to continue to exist.*

*Alternative incentives or requirements are required, a different set of metrics. If competition were shifted to impact, including spinouts and commercialisation (preferably via companies or direct licensing), collaboration would be less stifled although we envisage attribution to impact and the metrics would add complexity.*

*As mentioned above, where research organisations are involved in commercial activities and in government supported research, and we consider this to be positive in extending the impact of the research, the activities must be separate with no cross-subsidisation, and be auditably so.*



*Currently, research organisations (much less so universities) tend to have specialist sector or application core functions, less so from a research perspective. Clustering of research expertise does occur, and the NSCs and SfTI in particular, have facilitated that. The question remains how best to ensure fundamental science and research capability, can be applied across sectors. We believe elevating collaboration, and reduced funding competition is needed to achieve this, is essential.*

*We support the intention to change the focus of CRI Directors to consider the national picture rather than be bound by the companies act to only look at the benefits to the organisation they govern.*

#### **4.4.2 Role of institutions in workforce development**

**- How can institutions be designed to better support capability, skills and workforce development?**

*We have no comment to add beyond the content of the green paper and submissions from other providers.*

#### **4.4.3 Better coordinated property and capital investment**

**- How should we make decisions on large property and capital investments under a more coordinated approach?**

*We have no comment to add beyond the content of the green paper and submissions from other providers.*

#### **4.5 Institution design and Te Tiriti**

**- How do we design Tiriti-enabled institutions?**

*We consider this has been well-addressed by other submissions and have nothing further to add.*

#### **4.6 Knowledge exchange**

**- How do we better support knowledge exchange and impact generation?**

*The above measures that include an overarching sector-oriented research investment case (of the form of a business case but are just as likely to be based on non-economic metrics) and beneath that a research- or development-specific investment case, whether part of a competitive proposal, a base-funded work stream, or a close to industry or user programme such as PSAF project or a Callaghan-type project.*

**- What should be the role of research institutions in transferring knowledge into operational environments and technologies?**

*As the source of research-based knowledge, methods and technologies, it is crucial that research institutions are very well connected to their relevant sectors. In relation to specific research programmes or technological developments, the research personnel need to be immersed in the respective industry(s), community(s) or end user(s).*

*Our view is that user connectivity is not a role but a fundamental responsibility of the recipient of public research funds to maximise the benefit and impact resulting from the funded research.*

*Commercialisation is a vital metric for knowledge transfer and impact. By this means, much of the research output that can be implemented via commercial products or services, should be and we see PSAF as an important tool in this process.*

## **5. RESEARCH WORKFORCE**

### **5.2 Workforce and research Priorities**

#### **- How should we include workforce considerations in the design of national research Priorities?**

*Workforce considerations require an innovative approach that includes ensuring retention/protection and maintenance/renewal of essential expertise, especially that on which NZ relies, e.g. health, forages, greenhouse gases. This research expertise which underpins the human, environmental and financial well-being of NZ and NZers, must be preserved. Further, NZ's capabilities and capacity and fundamental research skills need to be built to respond to new needs and opportunities. Both the maintenance and extension components must include support for early career scientists and their development to ensure succession and avoid loss of critical expertise.*

*Support for international students and researchers, including easier immigration, and for early career researchers who together form our future researcher base, is vital. Consideration should be given to subsidising, e.g. by 20%, the year-1 salaries of early career researchers. Ideally, this would be through an application process that would provide MBIE with data on new entrants.*

*Fundamental to enabling maintaining and renewing and developing NZ's research capability and capacity is stable funding for research institutes so they do not need to modulate their essential researcher base according to funding success. At the same time, institutional governance must recognise that central government stable funding is not intended for unjustifiable year on year growth.*

*We also encourage co-location for research and especially for knowledge transfer to industry/government/communities/users. Benefits arise in terms of increased uptake and impact and also building capability and nous in researchers.*

#### **5.3.1 Base grant and workforce**

##### **- What impact would a base grant have on the research workforce?**

*Covered above since we consider it inextricably linked to nurturing NZ's research resource while also being responsible employers.*



### 5.3.2 Better designed funding mechanisms

- How do we design new funding mechanisms that strongly focus on workforce outcomes?

## 6. RESEARCH INFRASTRUCTURE

### 6.2.2 Funding research infrastructure

- How do we support sustainable, efficient and enabling investment in research infrastructure?

*To enhance collaboration and efficiency within NZ's research environment, and to help ensure that world-class research is a reality, research infrastructure and in particular specialist scientific instruments and facilities are known to, and available to, all research projects. Importantly, the same approach should apply to specialist human skills. We consider this could be a further role for MBIE to provide access to their data base, and for researchers and provider institutions, to contribute to, a facilities and expertise database. A degree of security could be applied by allowing access only via the MBIE portal.*

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and

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