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SCIENCE BOARD INVESTMENT PRIORITIES FOR THE 2014 SCIENCE INVESTMENT ROUND

PURSUANT TO THE RESEARCH, SCIENCE, AND TECHNOLOGY ACT 2010

Investment Priorities for the 2014 Science Investment Round

1. NOTICE TO THE SCIENCE BOARD

In this notice, I:

- (a) specify under section 10(3)(b) of the Research, Science, and Technology Act 2010:
 - (i) that the Science Board is to make funding decisions on proposals for funding under the 2014 science investment round;
 - (ii) the areas of research, science, or technology, or related activities for which funding is available; and
 - (iii) how much specified RS&T funding is available for allocation by the Science Board.
- (b) set criteria under section 8(1) of the Research, Science, and Technology Act 2010 for the assessment by the Science Board of proposals for funding under the 2014 science investment round.

2. 2014 SCIENCE INVESTMENT ROUND: ELIGIBILITY CRITERIA AND OTHER MATTERS

- 2.1 Funding is available under the 2014 science investment round for research, science, or technology, or related activities that meet the eligibility criteria specified in clause 2.2.
- 2.2 For a proposal to be assessed in accordance with clause 3, the proposal must:
 - (a) be to undertake research, science, or technology, or related activities that are in an area or areas specified in one of the Schedules to this notice (the "Relevant Schedule");
 - (b) specify the investment mechanism ("Investment Mechanism") in the notice entitled "Criteria for Proposals for Science-led Contestable Funding" published in the supplement to the *New Zealand Gazette*, 8 November 2013, No. 148, page 4063 (the "Science-led Contestable Tool") under which the proposal is made;
 - (c) be made under one of the Investment Mechanisms for which proposals for funding may be considered, as specified in the Relevant Schedule;
 - (d) relate to no more than one Investment Mechanism;
 - (e) meet any applicable requirements specified in the Relevant Schedule;
 - (f) meet any applicable eligibility criteria set out in the Science-led Contestable Tool; and
 - (g) meet any applicable timing, formatting, system or other similar administrative requirements imposed by the Ministry of Business, Innovation and Employment in supplying administrative services to the Science Board under section 10(7) of the Research, Science, and Technology Act 2010.
- 2.3 The areas of research, science, or technology, or related activities referred to in clause 2.2(a) are derived from the 2014 Sector Investment Plans developed for each relevant research fund. These provide the strategic context for the investment priorities, research questions and other requirements.

3. CRITERIA FOR ASSESSMENT OF PROPOSALS UNDER THE 2014 SCIENCE INVESTMENT ROUND

- 3.1 A proposal assessed as having met the eligibility criteria in clause 2.2 must be assessed in accordance with the criteria set out in the Science-led Contestable Tool, including the criteria specific to the relevant Investment Mechanism.
- 3.2 When having regard to how the proposal contributes to the mix of investments in respect of the relevant research fund for the purposes of clause 6.1 (e) of the Science-led Contestable Tool, the Science Board must have regard, in addition to the matters listed in clause 6.1(e), to the extent to which the overall mix of investments is likely to best deliver research, science, or technology, or related activities in the areas set out in the Relevant Schedule to this notice.
- 3.3 The Science Board must make funding decisions in accordance with the funding amounts and any other applicable requirements specified in the Relevant Schedule.
- 3.4 In allocating the funding amounts specified for each Research Fund in the Relevant Schedule, the Science Board may:
 - (a) reallocate unspent funding from the Smart Ideas Investment Mechanism to another Investment Mechanism for which proposals may be considered within that Research Fund
 - (b) reallocate funding between the Targeted Research and Enabling Technologies Investment Mechanisms, providing that no more than 10 per cent of the funding available to one Investment Mechanism is moved to the other, and providing that proposals may be considered under both of these mechanisms within the relevant research fund

4. REQUESTS FOR PROPOSALS AND OTHER MATTERS

- 4.1 The Ministry of Business, Innovation and Employment will release requests for proposals or similar documents that set out the timeframes for the investment processes, call for proposals, and provide information that may assist applicants when preparing their proposals.
- 4.2 Further information on the Investment Mechanisms referred to in this notice is provided in the Science-led Contestable Tool. Further information on the research funds referred to in this notice is provided in the notice entitled "Description of Funds within Vote RS&T", published in the Supplement to the *New Zealand Gazette*, 31 January 2011, No. 9, page 200.

5. REVOCATION OF PREVIOUS NOTICES

I hereby revoke the notice entitled "Investment priorities for the 2013 science investment round and 2013 sandpit round" published in the Supplement to the *New Zealand Gazette*, 5 December 2012, No. 146, page 4228.

Dated at Wellington this 2nd day of December 2013.

HON STEVEN JOYCE, Minister of Science and Innovation.

Energy and Minerals Research Fund

1. Funding scope and amounts

- 1.1 Proposals for funding out of the Energy and Minerals Research Fund may be considered in the 2014 science investment round under the following investment mechanisms:
 - (a) **Phase 2 Smart Ideas**—proposals must be for research, science, or technology, or related activities in areas described under the heading "Nature of the fund" in the Energy and Minerals Research Fund section of the notice entitled "Description of Funds within Vote RS&T" published in the Supplement to the *New Zealand Gazette*, 31 January 2011, No. 9, page 200.
 - (b) **Targeted Research**—proposals must be for research, science, or technology or related activities:
 - (i) in one of the areas listed as an investment priority in the Targeted Research section below; and
 - (ii) directed towards answering one or more of the research questions listed under the corresponding investment priority in the Targeted Research section below.
- 1.2 The Science Board may allocate the following funding amounts from the Energy and Minerals Research Fund for proposals for funding in the 2014 science investment round:
 - (a) up to \$0.35 million per annum (excl GST) for Smart Ideas Phase 2; and
 - (b) up to \$4.0 million per annum (excl GST) for Targeted Research, of which;
 - (i) up to \$0.25 million per annum (excl GST) may be allocated to the joint research question with the High-Value Manufacturing and Services Research Fund.

Investment priority: Minerals Greater benefit from mineral resources	
Research question	Indicative funding (excl GST)
How can multi-disciplinary research, with the aim of building exploration models and subsequent validation, improve the understanding of New Zealand's on-shore mineral resources and contribute to discovering new world-class gold-silver and other commercially valuable mineral deposits?	\$1.0 million per annum for up to four years.
Research question	Indicative funding (excl GST)
What approaches can be developed to improve the understanding and management of the environmental impacts of on-shore mining in New Zealand?	\$1.0 million per annum for up to four years.
Research question	Indicative funding (excl GST)
What are the characteristics, for example location, rock type, and physical properties, of our aggregate resources and how can their use be best leveraged?	\$0.25 million per annum for up to four years.

Investment priority: Energy Resources Improved knowledge of our oil and gas resources	
Research question	Indicative funding (excl GST)
Using play fairway analysis, where do the mapped petroleum system elements from each basin intersect and how do they predict or define theoretical or proven play concepts in each basin in New Zealand, and what are the risk profiles for each working or theoretical petroleum play?	\$0.50 million per annum for up to four years.

Investment priority: Energy Resources Leveraging bioenergy resources and research	
Research question	Indicative funding (excl GST)
How can we best exploit New Zealand's natural resources through energy-related research that will support industrial symbiosis projects centred around wood waste usage?	\$1.0 million per annum for up to four years.

2.1 Joint research question with the High-Value Manufacturing and Services Research Fund

Investment priority: Minerals Greater benefit from mineral resources		
Research question	Other requirements	Indicative funding
To leverage more from our minerals base: (a) what domestic mineral resources have potential for niche mineral processing that will leverage commercial value; and (b) what manufacturing processes need to be developed to support economical and environmentally friendly post-extraction processing of the mineral resources?	Proposals must address both parts (a) and (b). Research addressing part (a) must align with the objectives and areas of research of the Energy and Minerals Research Fund as described in the notice "Description of Funds within Vote RS&T", published in the Supplement to the New Zealand Gazette, 31 January 2011, No. 9, page 200. Research addressing part (b) must align with the objectives and areas of research of the High-Value Manufacturing and Services Research Fund as described in the notice "Description of Funds within Vote RS&T", published in the Supplement to the New Zealand Gazette, 31 January 2011, No. 9, page 200.	Total funding for part (a) and part (b) is \$0.5 million per annum for up to four years, of which; - \$0.25 million per annum will be allocated from the Energy and Minerals Research Fund for part (a) and - \$0.25 million per annum will be allocated from the High-Value Manufacturing and Services Research Fund for part (b).

High-Value Manufacturing and Services Research Fund

- 1. Funding scope and amounts
- 1.1 Proposals for funding out of the High-Value Manufacturing and Services Research Fund may be considered in the 2014 science investment round under the following Investment Mechanisms:
 - (a) Smart Ideas as described in the notice "Funding for Smart Ideas in the 2014 Science Investment Round", published in the Supplement to the New Zealand Gazette, 8 November 2013, No. 148, page 4073.
 - (b) **Enabling Technologies** proposals must be for research, science, or technology or related activities:
 - (i) in one of the areas listed as an investment priority in the Enabling Technologies section below; and
 - (ii) directed towards answering one of the research questions listed under the corresponding investment priority in the Enabling Technologies section below.
 - (c) **Targeted Research** proposals must be for research, science, or technology, or related activities:
 - (i) in one of the areas listed as an investment priority in the Targeted Research section below; and
 - (ii) directed towards answering one of the research questions listed under the corresponding investment priority in the Targeted Research section below.
- 1.2 The Science Board may allocate the following funding amounts from the High-Value Manufacturing and Services Research Fund for proposals for funding in the 2014 science investment round:
 - (a) up to \$10 million per annum (excl GST) for Enabling Technologies; and
 - (b) up to \$7 million per annum (excl GST) for Targeted Research, of which;
 - (i) up to \$0.25 million per annum (excl GST) may be allocated to the joint research question with the Energy and Minerals Research Fund.

2. Enabling Technologies

Investment priority: Novel materials, manufacturing and applications

New products and services created by transforming materials and/or automating production, and improved efficiencies in production from new engineering tools or processes.

Research question	Indicative funding (excl GST)
a) What research can be undertaken on the use of renewable materials that will increase New Zealand's export potential? OR	Between \$1.5 million and \$2.5 million per annum per proposal for up to six years.
b) What research is required to develop materials that lead to products with export potential for New Zealand because they have distinctive properties such as:	
(i) high strength, low weight; or(ii) improved performance in applications involving extreme temperatures and/or pressures?	

Investment priority: Medical and health technologies

New and emerging technologies that impact on human health and wellbeing. This includes diagnostic and imaging devices, health IT, drug discovery and delivery systems, and assistive and rehabilitative devices. Health services research is not included.

Research question	Indicative funding (excl GST)
(a) What research in drug discovery can be undertaken that will lead to significant, growing and lasting economic benefit to New Zealand including to New Zealand pharmaceutical/pharmaceutical-related businesses?	Between \$1.5 million and \$2.5 million per annum per proposal for up to six years.
OR	
(b) What new technologies can be developed that by improving patient outcomes and reducing cost of treatments create export opportunities for New Zealand businesses?	
The focus of this research question is on human health with potential for inclusion of animal health where manufactured exports are the key outcome.	

Investment priority: Information, communication and digital technologies

Productivity improvement tools, data management tools, communications technologies and digital tools for creativity.

and digital tools for creativity.	
Research question	Indicative funding (excl GST)
(a) What research can be undertaken in the following areas to support the export potential of New Zealand businesses (including e-health businesses):	\$2.0 million per annum per proposal for up to six years.
(i) capture, curation, storage, search, sharing, transfer, analysis, and visualisation of very large data sets (big data); and/or	
(ii) shared resources, distributed computing over a network, network-based services (cloud computing); and/or	
(iii) prevention and monitoring of unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources (security)?	

3. Targeted Research

Investment priority: Novel materials, manufacturing and applications

New products and services created by transforming materials and/or automating production, and improved efficiencies in production from new engineering tools or processes.

Research question	Indicative funding (excl GST)
What new products and/or services can be created to increase the export potential for New Zealand businesses through R&D in:	Up to \$2.0 million per annum for up to four years.
(b) sensors that will reduce costs, increase accuracy, sensitivity and repeatability; or	
(c) new materials with properties of good abrasion and hardness, and which will perform well under low temperatures and high pressure; or	
(d) self-cleaning materials for food processing and agri-tech businesses; or	
(e) biochemical materials; or	
(f) coatings with properties such as ice repellency and conductivity (for example, for aeronautical applications); or	
(g) new materials or material technology that will decrease the cost of goods?	

Investment priority: Agri-technologies

New and emerging technologies based on New Zealand's expertise in the agriculture and other primary sectors, particularly those technologies that exploit crossovers between agriculture and new materials, information and communications technologies and health technologies.

Research question	Indicative funding (excl GST)
What new and emerging agri-technologies can be developed to increase New Zealand's competitive advantage in the agriculture and primary sectors through R&D in:	Up to \$2.0 million per annum for up to four years.
(a) sensors for:	
(i) internal imaging; or(ii) high-speed composition analysis; or(iii) detection of bacteria and pathogens; or	
(b) multi-purpose robots; or	
(c) multi-variate analysis, to better understand complex interactions in the New Zealand agricultural export chain?	

Investment priority: Medical and health technologies

New and emerging technologies that impact on human health and wellbeing. This includes diagnostic and imaging devices, health IT, drug discovery and delivery systems, and assistive and rehabilitative devices. Health services research is not included.

Research question	Indicative funding (excl GST)
What new and emerging medical and health technologies can be developed that will increase New Zealand's export potential through R&D in:	Up to \$2.0 million per annum for up to four years.
(a) devices that assist with stroke and other neurological disorders; or	
(b) materials for implants that encourage cell and bone growth on/in the implant; or	
(c) materials that aid wound repair; or	
(d) devices that improve diagnosis/detection of diseases particularly at an early stage?	
The focus of this research question is on human health with potential for inclusion of animal health where manufactured exports are the key outcome.	

Investment priority: Information, communication and digital technologies Productivity improvement tools, data management tools, communications technologies and digital tools for creativity.	
Research question	Indicative funding (excl GST)
What research can be undertaken that will increase the productivity of New Zealand businesses through R&D in:	Up to \$2.0 million per annum for up to four years.
(a) wireless connectivity of multiple remote devices; and/or	
(b) tools facilitating collection, analysis and presentation of large amounts of data?	

3.1 Targeted Research joint research question with the Energy and Minerals Research Fund

Investment priority: Novel materials, manufacturing and applications

New products and services created by transforming materials and/or automating production. and improved efficiencies in production from new engineering tools or processes. **Indicative funding** Research question Other requirements (excl GST) To leverage more from our minerals Proposals must address Total funding for part (a) and base: both parts (a) and (b). part (b) is \$0.5 million per annum for up to four years, Research addressing part (a) what domestic mineral resources of which; (a) must align with the have potential for niche mineral objectives and areas of processing that will leverage - \$0.25 million per annum research of the Energy and commercial value; and will be allocated from the Minerals Research Fund as (b) what manufacturing processes Energy and Minerals described in the notice need to be developed to support Research Fund for part (a)

"Description of Funds within

economical and environmentally friendly post-extraction processing of the mineral resources?

Vote RS&T", published in the Supplement to the New Zealand Gazette, 31 January 2011, No. 9, page 200.

Research addressing part (b) must align with the objectives and areas of research of the High-Value Manufacturing and Services Research Fund as described in the notice "Description of Funds within Vote RS&T", published in the Supplement to the New Zealand Gazette, 31 January 2011, No. 9, page 200.

and

 \$0.25 million per annum will be allocated from the High Value Manufacturing and Services Research Fund for part (b).

Biological Industries Research Fund

- 1. Funding scope and amounts
- 1.1 Proposals for funding out of the Biological Industries Research Fund may be considered in the 2014 science investment round under the following Investment Mechanisms:
 - (a) Smart Ideas as described in the notice "Funding for Smart Ideas in the 2014 Science Investment Round", published in the Supplement to the New Zealand Gazette, 8 November 2013, No. 148, page 4073.
 - (b) **Enabling Technologies** proposals must be for research, science, or technology or related activities:
 - (i) in one of the areas listed as an investment priority under the Enabling Technologies section below; and
 - (ii) directed towards answering one of the research questions listed under the corresponding investment priority in the Enabling Technologies section below.
 - (c) **Targeted Research** proposals must be for research, science, or technology, or related activities:
 - (i) in one of the areas listed as an investment priority under the Targeted Research section below; and
 - (ii) directed towards answering one of the research questions listed under the corresponding investment priority in the Targeted Research section below.
- 1.2 The Science Board may allocate the following funding amounts from the Biological Industries Research Fund for proposals for funding in the 2014 science investment round:
 - (a) up to \$5.1 million per annum (excl GST) across Enabling Technologies and Targeted Research, of which:
 - (i) up to \$5.0 million per annum (excl GST) may be allocated to Enabling Technologies; and
 - (ii) up to \$0.5 million per annum (excl GST) may be allocated to Targeted Research.

Enabling Technologies 2.

Investment priority : Improving the competitive advantage of existing export goods and services, and New value-add export goods and services	
Research question	Indicative funding (excl GST)
How can we improve the returns from New Zealand's primary raw materials through post-harvest food and fibre processing, with a focus on all of the following:	\$1.5 – 3.0 million per annum for up to six years.
a) processes new to, or currently in limited use in, New Zealand industry including but not limited to unit operations* such as high-pressure processing or ultrasonics; and	
b) significant improvements to existing and widely used unit operations, eg drying or freezing; and	
c) building a comprehensive and integrated set of processing capability that can be accessed by New Zealand industry?	
* A unit operation is a basic step in a <u>process</u> . Unit operations involve bringing about a physical change such as reaction, separation, crystallisation, evaporation, filtration etc. A process may have many unit operations.	

Investment priority: Protection and risk management		
Research question	Indicative funding (excl GST)	
How can food safety be improved through new or improved diagnostics, with a focus on all of the following:	\$1.5 – 3.0 million per annum for up to six years.	
improved performance (eg cover a wider range of contaminants, improved accuracy or improved specificity); and		
2) lower cost to implement and to use; and		
provide reliable, accurate and precise results faster than current methods; and		
4) lead to improved compliance; and		
5) be accepted by regulatory authorities?		
Including, but not limited to:		
existing or potential chemical, microbiological, radiological, or physical contaminants, or		
techniques such as food fingerprinting and predictive scanning to validate authenticity and purity, or		
emerging food safety issues.		

Investment priority: Improving the competitive advantage of existing export goods and services		
Research question	Indicative funding (excl GST)	
How can we improve the competitive advantage of, and returns to, New Zealand's seed industry including but not limited to the production of seeds for the arable, pastoral, vegetable, or floriculture sectors or products derived from seeds?	\$0.3 – 0.5 million per annum for up to six years.	

Health and Society Research Fund

1. Funding scope and amounts

- 1.1 The following priorities relate only to the Society component of the Health and Society Research Fund. The Health component of the fund is managed by the Health Research Council.
- 1.2 Proposals for funding out of the Health and Society Research Fund may be considered in the 2014 science investment round under the following Investment Mechanisms:
 - (a) **Targeted Research** proposals must be for research, science, or technology, or related activities:
 - (i) in one of the areas listed as an investment priority under the Targeted Research section below; and
 - (ii) directed towards answering one of the research questions listed under the corresponding investment priority in the Targeted Research section below/
- 1.3 The Science Board may allocate the following funding amounts from the Health and Society Research Fund for proposals for funding in the 2014 science investment round:
 - (a) up to \$2.4 million per annum for Targeted Research

Investment priority: Benefiting from the diversity of 21st century New Zealanders	
Research question	Indicative funding (excl GST)
How can we prepare for and make the most of the projected changes in the demographic structure of the New Zealand population resulting from migration, population ageing, changing fertility, and urban growth? In particular:	\$0.8 million per annum for four to six years.
what are the social, economic, political, cultural, environmental and infrastructural consequences of these population changes at national and sub-national levels?	
what determines the effectiveness of institutions and their interactions in responding to these changes?	

Investment priority: Successful outcomes for New Zealand's children from their families/whānau, communities, and neighbourhoods	
Research question	Indicative funding (excl GST)
In what ways can we ensure children are actively engaged and participating in the development of their digital world to maximise opportunities for their cognitive and social development? In particular:	\$0.6 million per annum for four years.
how does participation in the digital world influence children's cognitive and social development?	
what skills, knowledge and capabilities do children need to manage, engage and benefit from participating in the digital world?	
how can family, educators and society effectively support children's involvement in the digital world?	

Investment priority: New Zealanders have healthier lives and age well through better leverage of social, economic, and cultural factors		
Research question	Indicative funding (excl GST)	
What constitutes successful, cost-effective intervention programmes for setting healthy habits for life and how can these be applied into new pilot intervention(s)?	\$0.4 – 0.6 million per annum for four to six years.	
Could include potential mediators of a healthy lifestyle such as diet, exercise, stress, sleep, addiction, work and living environments.		
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Research question	Indicative funding (excl GST)	
Research question How do we enable New Zealand's ageing population to have more meaningful lives within the community?		
How do we enable New Zealand's ageing population to have more	(excl GST) \$0.4 – 0.6 million per annum	
How do we enable New Zealand's ageing population to have more meaningful lives within the community?	(excl GST) \$0.4 – 0.6 million per annum	

Environmental Research Fund

1. Funding scope and amounts

- 1.1 Proposals for funding out of the Environmental Research Fund may be considered in the 2014 science investment round under the following Investment Mechanisms:
 - (a) **Smart Ideas** as described in the notice "Funding for Smart Ideas in the 2014 Science Investment Round", published in the Supplement to the *New Zealand Gazette*, 8 November 2013, No. 148, page 4073.
 - (b) **Targeted Research** proposals must be for research, science, or technology, or related activities:
 - (i) in one of the areas listed as an investment priority under the Targeted Research section below; and
 - (ii) directed towards answering one of the research questions listed under the corresponding investment priority in the Targeted Research section below.
- 1.2 The Science Board may allocate the following funding amounts from the Environmental Research Fund for proposals for funding in the 2014 science investment round:
 - (a) up to \$1.6 million per annum (excl GST) for Targeted Research.

Investment priority: Innovative analysis of environmental data		
Research question	Indicative funding (excl GST)	
What is the most effective approach to data analysis that would allow most new knowledge and value to be created from existing environmental data sets? Proposed research should demonstrate novel ways to productively use environmental data and could:	\$0.5 million per annum for two years – in exceptional cases a proposal may be funded for up to four years.	
improve existing databases and portals through updating, revising, and rationalisation to increase integration across heterogeneous data resources		
provide and optimise open access and use of existing data and databases to a broad community of interest - to analyse, visualise, summarise and download data		
provide robust and novel ways to use and store data, including for example mapping and GIS front-ends to data		
lower transaction costs to access and use of data (eg through standards, automation, and opportunities that emerge from developing representativeness)		
increase open data use and availability.		

Investment priority: Antarctic terrestrial research		
Research question	Indicative funding (excl GST)	
What new knowledge and value can be created from the novel analysis of existing terrestrial Antarctic environmental data?	\$0.4 million per annum for up to four years — in exceptional cases a proposal may be funded for up to six years.	
Research question	Indicative funding (excl GST)	
What is the most robust, science-based approach to spatial planning for the conservation and management of the Antarctic Dry Valleys? Proposed research should focus on: understanding the resilience of the Dry Valleys to human impact, in the context of likely environmental and climate change	\$0.7 million per annum for two years — in exceptional cases a proposal may be funded for up to four years.	
 quantifying and modelling human activities and impacts, including spatial and temporal change in such impacts (ie cumulative impacts). 		

Hazards and Infrastructure Research Fund

- 1. Funding scope and amounts
- 1.1 Proposals for funding out of the Hazards and Infrastructure Research Fund may be considered in the 2014 science investment round under the following Investment Mechanisms:
 - (a) Phase 2 Smart Ideas proposals must be for research, science, or technology, or related activities in areas described under the heading "Nature of the fund" in the Hazards and Infrastructure Research Fund section of the notice entitled "Description of Funds within Vote RS&T" published in the Supplement to the New Zealand Gazette, 31 January 2011, No. 9, page 200.
- 1.2 The Science Board may allocate the following funding amounts from the Hazards and Infrastructure Research Fund for proposals for funding in the 2014 science investment round:
 - (a) up to \$0.24 million per annum (excl GST) for Phase 2 Smart Ideas.

