

Office of the Minister of Science and Innovation

Cabinet Economic Growth and Infrastructure Committee

Funding Envelopes for the Second Tranche of National Science Challenges

Proposal

1. This paper seeks your agreement to the proposed funding envelopes for the second tranche of National Science Challenges.

Executive summary

2. On 9 September 2013, Cabinet noted governance arrangements and implementation plans for the National Science Challenges (Challenges) and agreed to funding envelopes for the first tranche of three Challenges: *The Deep South*, *Resilience to Nature's Challenges* and *High-Value Nutrition* [Cab Min (13) 31/7 refers]. MBIE issued a request for proposals (RfP) to undertake these Challenges in October 2013.
3. The Challenge funding envelopes indicate the maximum amount of funding that can be allocated to a Challenge. The envelope comprises new funding appropriated in 2012 and 2013 for the Challenges, and existing MBIE-managed science funding that is currently invested in research related to the Challenge outcomes will be transferred from other contestable funding appropriations.
4. I propose to implement the remaining seven Challenges in one further tranche via a RfP in January 2014. This paper sets out proposed funding envelopes for these seven Challenges:
 - *Ageing Well (Kia eke kairangi ki te taikaumātutanga)*
 - *A Better Start (E Tipu e Rea)*
 - *Healthier Lives (He Oranga Hauora)*
 - *Science for Technological Innovation (Kia kotahi mai – Te Ao Pūtaiao me Te Ao Hangarau)*
 - *New Zealand's Biological Heritage (Ngā Koiora Tuku Iho)*
 - *Our Land and Water (Toitū te Whenua, Toiora te Wai)*
 - *Life in a Changing Ocean (Te Tini a Tangaroa me Ngā Moana Whakaumu).*

Note: the title for the Challenge *Life in a Changing Ocean* has changed to *Sustainable Seas*.
5. Crown Research Institutes (CRIs) will invest their core funding in the Challenges as co-funding where the CRI is part of the Challenge collaboration. The Health Research Council (HRC) will work with MBIE to ensure that synergies are achieved between its research spending and the Challenges. Other government research funding, including non-Vote: Science and Innovation funding, and research funded

from other sources is not included in the Challenge funding, but may contribute significantly to Challenge outcomes.

6. The Science Board will make funding decisions for the Challenges. It will be able to approve up to the maximum of the funding envelope but can award less.
7. I propose that the funding sources outlined in **Table 1** below, totalling up to \$803.98 million, be made available to the second tranche of Challenges over a ten-year period. This includes Challenge funding envelopes and relevant CRI core funding.

Table 1: Potential ten-year funding for the second tranche of Challenges

Challenge	Funding Envelope (\$m)	Estimate of CRI Core Funding (\$m)	Total (\$m)	Relevant HRC funding (\$m)
<i>Ageing Well</i>	Up to 34.92	0.00	34.92	34.00
<i>A Better Start</i>	Up to 34.67	0.00	34.67	87.00
<i>Healthier Lives</i>	Up to 31.26	5.50	36.76	156.00
<i>Science for Technological Innovation</i>	Up to 106.03	10.52	116.55	
<i>New Zealand's Biological Heritage</i>	Up to 63.72	143.40	207.12	
<i>Our Land and Water</i>	Up to 96.86	130.53	227.39	
<i>Life in a Changing Ocean</i>	Up to 71.10	75.47	146.57	
Total	Up to 438.56	365.42	803.98	277.00

8. Expense transfers to fund Challenges will be made in the March or October Budget updates following the conclusion of the Challenge procurement process.

Background

9. The ten National Science Challenges agreed by Cabinet in April 2013 [CAB Min (13) 13/5A refers] will increase impact and value from Government's science investments. The Challenges are designed to take a more strategic approach to our science investment by targeting a series of goals which, if achieved, would have a major and enduring benefit for New Zealand. The Challenges provide an opportunity to align and focus New Zealand's research on large and complex issues by drawing scientists together from different institutions and across disciplines.
10. Budgets 2012 and 2013 allocated \$30.5 million per year of new funding to the Challenges. On 9 September 2013, Cabinet also approved the reallocation of up to \$111.3 million of MBIE-managed science funding to support the first tranche of Challenges [Cab Min (13) 31/7 refers].
11. On 9 September 2013, Cabinet also noted implementation plans for the Challenges and approved the use of a multi-year appropriation to fund the Challenges [Cab Min

(13) 31/7 refers]. In the 9 September 2013 paper I proposed implementing the remaining Challenges in two subsequent tranches in November 2013 and March 2014. To reduce administrative costs and ensure that the Challenge collaborations can begin their work as soon as possible, I propose to implement the remaining Challenges through a single RfP in January 2014.

12. The indicative timeline to implementation of the Challenges is summarised below in **Table 2**.

Table 2: Indicative timeline for Challenge implementation

Milestone	First tranche Challenges	Second tranche Challenges
Gazette notice and RfP issued	October 2013	January 2013
Challenge proposals submitted	December 2013	April 2014
Independent Assessment Panel reviews proposals	February 2014	June 2014
Science Board approves/declines proposals	March 2014	July 2014
MBIE negotiates and signs contracts with Challenge collaborations	From March 2014	From July 2014

13. Cabinet has deferred a decision on the *Building Better Homes, Towns and Cities* Challenge [CAB Min (13) 13/5A refers]. I will set out proposals for this Challenge in a separate paper in due course.
14. The second tranche Challenges and their high-level objectives as agreed by Cabinet [CAB Min (13) 13/5A refers] are summarised in **Table 3** below. **Appendix 1** provides a detailed description of all the Challenges.

Table 3: Summary of the second tranche of National Science Challenges

Challenge	Challenge objective
<i>A Better Start</i>	Improve the potential of young New Zealanders to have a healthy and successful life
<i>Ageing Well</i>	Harness science to sustain health and wellbeing into the later years of life
<i>Healthier Lives</i>	Reduce the burden of major New Zealand health problems
<i>Our Land and Water</i>	Enhance primary sector production and productivity while maintaining and improving our land and water quality for future generations
<i>Life in a Changing Ocean</i>	Understand how we can exploit our marine resources within environmental and biological constraints
<i>New Zealand's Biological Heritage</i>	Protect and manage our biodiversity, improve our biosecurity, enhance our resilience to harmful organisms
<i>Science for Technological Innovation</i>	Enhance the capacity of New Zealand to use physical and engineering sciences for economic growth

15. I propose amending the objective of the *Life in a Changing Ocean* Challenge, in response to feedback from researchers working in that sector, to 'Enhance

utilisation of our marine resources within environmental and biological constraints' as this better reflects the mission-led drivers of the Challenge.

General approach to funding the Challenges

16. The Challenge funding envelopes set the maximum Vote: Science and Innovation funding that can be awarded by the Science Board to each Challenge and include two components:
 - new funding (a portion of the \$133.5 million allocated in Budgets 2012 and 2013 for the Challenges to 2016/17¹, and \$30.5 million per year thereafter) to be allocated on the basis of the additional expected impact from further research that addresses gaps or new opportunities²; and
 - funding that becomes available as existing MBIE-managed contestable research contracts conclude. This will be transferred to the 'National Science Challenges' appropriation.
17. Other government research funding, including non-Vote: Science and Innovation funding, and research funded from other sources is not included in the funding envelopes, but may contribute significantly to Challenge outcomes. Challenge proposals will be expected to outline plans to coordinate with other sources of research.
18. The Minister for Science and Innovation and the Minister of Finance can jointly make fiscally neutral changes to the agreed funding envelopes as required, with the first changes potentially in the March Budget Update. I envisage changes being made primarily to manage and rebalance funding across the portfolio of Challenges following development of the Challenge collaborations, Challenge reviews, and ongoing monitoring of Challenge contracts.

Funding envelopes for the second tranche Challenges

19. I propose that Cabinet approve ten-year funding envelopes for the remaining seven approved Challenges as summarised in **Table 4** below. Challenge funding will be managed using a multi-year appropriation to smooth the availability of funding when current contracts conclude.³

¹ \$1.5 million of this has been spent on public consultation on the Challenges and on departmental expenditures in developing the Challenge approach in late 2012.

² The proposed distribution of new Challenge funding includes provision for new money that will be allocated to the proposed *Building Better Homes, Towns and Cities* Challenge if Cabinet agrees to its adoption.

³ The commencement date of individual Challenges is not yet known as it will depend on contract negotiations. Commencement could be in either of the 2013/14 or 2014/15 financial years.

Table 4: Proposed 10-year funding envelopes for second tranche Challenges and agreed funding envelopes for first tranche Challenges

Challenge	Funding source			Total ten-year envelope \$m
	Total funding \$m	new	Total from MBIE-managed contestable funding \$m	
First Tranche Challenges (agreed)				
<i>High Value Nutrition</i>		30.60	53.20	Up to 83.80
<i>The Deep South</i>		35.00	16.10	Up to 51.10
<i>Resilience to Nature's Challenges</i>		17.40	42.00	Up to 59.40
Subtotal (first tranche)		83.00	111.30	Up to 194.30
Second tranche Challenges (proposed)				
<i>Ageing Well</i>		29.89	5.03	Up to 34.92
<i>A Better Start</i>		29.89	4.79	Up to 34.67
<i>Healthier Lives</i>		29.89	1.38	Up to 31.26
<i>Science for Technological Innovation</i>		29.90	76.13	Up to 106.03
<i>New Zealand's Biological Heritage</i>		34.16	29.57	Up to 63.72
<i>Our Land and Water</i>		34.16	62.70	Up to 96.86
<i>Life in a Changing Ocean</i>		55.50	15.60	Up to 71.10
Subtotal (remaining Challenges)		243.38	195.18	Up to 438.56
Total		326.38	306.48	Up to 632.86

20. For the first tranche of Challenges, the approach agreed by Cabinet was to invest funding from concluding MBIE-managed research contracts where the outcomes are directly linked to the Challenge outcomes. I propose to follow the same approach for the remaining Challenges to ensure that all Challenges receive some funding from existing Vote: Science and Innovation Challenge sources, with the exception of the *Science for Technological Innovation* Challenge and the health-related Challenges.

Health Challenges

21. I propose to allocate additional funds from the MBIE-managed Health and Society fund to the three health-related Challenges: *Healthier Lives*, *A Better Start* and *Ageing Well*. This is because current MBIE-managed funding for health-related research is limited, as most funding for this is managed by HRC.

Science for Technological Innovation Challenge

22. Due to the broad objectives and long-term focus of this Challenge, there is not a clear fit with individual current contracts in MBIE's High Value Manufacturing and

Services fund. Therefore, I propose to allocate lump sums of existing MBIE-managed contestable funding to the *Science for Technological Innovation* Challenge. The lump sums will become available as current contracts in MBIE's High Value Manufacturing and Services fund conclude. MBIE has made an initial assessment of the funding needed to develop the *Science for Technological Innovation* Challenge. This may need to be revisited as thinking around delivery of this Challenge develops further.

Two other sources of funding will support the Challenges

The Health Research Council

23. As noted above, most government health research funding is managed by HRC. HRC-managed funding may have considerable impact in the area of a health-related Challenge where the Challenge and HRC-funded research align. However, HRC-funded research is allocated through a separate tender process.
24. HRC and MBIE have agreed that the National Science Challenges funding process will remain independent from HRC funding processes. As such, when HRC contracts are completed, new contracts will be entered into that may not necessarily align with the Challenges. The amount of funding available to health-related Challenge research (including HRC-managed funding) may therefore change over the course of the Challenges' 10-year timeframe. HRC funding has been included in **Table 5** below alongside the Challenge funding envelopes for information, but HRC is not required to direct funding to Challenges.
25. HRC estimates that of its 2012/13 research expenditure, approximately 40 per cent or \$27.9 million was directly related to the research themes of the health-related Challenges. This may change in future years.
26. In terms of how HRC investment could be aligned with the health-related Challenges, HRC has agreed:
 - to work with MBIE to align its annual investment signals with the health-related Challenges;
 - require future contract holders working in one or more of the health-related Challenge areas to engage with challenge collaborations; and
 - HRC has agreed to enable challenge leads to bid into its contestable Partnership Programme (\$3 million per annum) to further challenge goals and grow collaborations.

Relevant CRI core funding will be invested in Challenges but does not form part of the funding envelopes

27. **Table 5** shows how CRI core funding that CRIs consider is related to Challenges could contribute to the total funding available to deliver Challenge outcomes. This estimate may change depending on the focus and composition of the Challenge collaborations, availability of funding and emerging research priorities. I will ensure

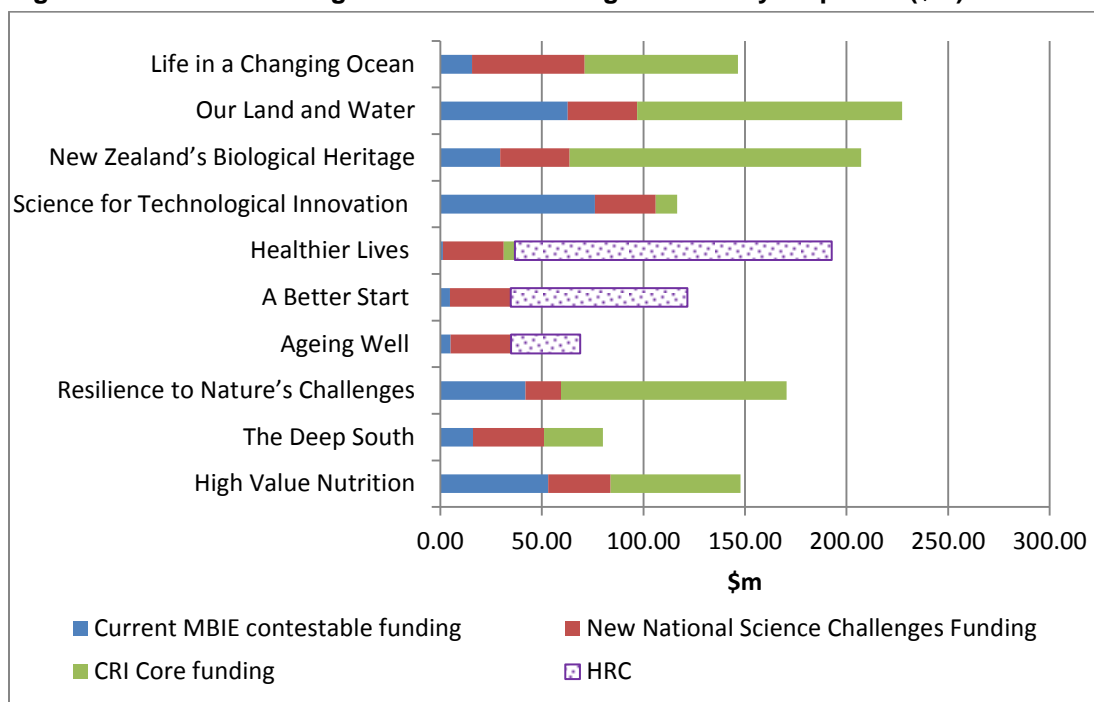
that relevant CRI core funding is invested in Challenge research, as a form of co-funding where a CRI is part of a Challenge collaboration.

Table 5: Potential 10 year CRI core funding contribution to second tranche Challenges and total funding potentially available⁴

Challenge	Revised 10 year funding envelope			Potential CRI Core Funding (assuming 2013/14 levels of investment) (\$m)	Total 10 year Challenge funding, including (incl CRI funding) (\$m)	Relevant HRC funding (\$m)
	New Challenge funding (\$m)	Funding from MBIE-managed contestable funds (\$m)	Total funding envelope (\$m)			
<i>Ageing Well</i>	29.89	5.03	up to 34.92	0.00	34.92	34.00
<i>A Better Start</i>	29.89	4.79	up to 34.67	0.00	34.67	87.00
<i>Healthier Lives</i>	29.89	1.38	up to 31.26	5.50	36.76	156.00
<i>Science for Technological Innovation</i>	29.90	76.13	up to 106.03	10.52	116.55	0.00
<i>New Zealand's Biological Heritage</i>	34.16	29.57	up to 63.72	143.40	207.12	0.00
<i>Our Land and Water</i>	34.16	62.70	up to 96.86	130.53	227.39	0.00
<i>Life in a Changing Ocean</i>	55.50	15.60	up to 71.10	75.47	146.57	0.00
Total	243.38	195.18	Up to 438.56	365.42	803.98	277.00

28. In addition, **Appendix 3** shows an initial estimate of the likely CRI core funding contribution to the Challenges from the perspective of each contributing CRI.
29. **Figure 1** below shows the potential contribution of different components of funding to all of the Challenges over a ten-year period. The graph includes HRC funding based on estimates from HRC of the amount of HRC-managed funding invested in research related to the health Challenges in 2012/13, extrapolated over a ten-year period.

⁴ Note that the potential CRI core funding contribution to first tranche Challenges was revised following Cabinet's approval of the first-tranche Challenge envelopes

Figure 1: Potential funding available to Challenges over 10 year period (\$m)

30. Overall, MBIE estimates that when all contracts mapped to the Challenges have matured, up to approximately 27 per cent of current MBIE-managed Vote: Science and Innovation contestable research funding will be invested in the Challenges

Next steps

31. MBIE, with advice from independent experts, is producing a performance framework for the Challenges that will outline how Challenge progress and outcomes will be assessed. The framework will include a focus on the net benefit and impact of the funding allocated to Challenges. The Challenges performance framework will be submitted for approval by the Minister of Science and Innovation and Minister of Finance in February 2014.
32. I have appointed two new members to the Science Board (that will increase the Board's membership from seven to eight) to enhance its capability and equip the Board to make decisions in relation to funding the Challenges.
33. MBIE plans to issue an RfP on 31 January 2014 for the second tranche of Challenges for which I seek agreement to funding envelopes in this paper. The Science Board will make funding decisions for the Challenges.
34. MBIE will continue to work closely with HRC on the implementation of the health-related Challenges, in particular *Healthier Lives*, as Vote: Science and Innovation funding for research in this Challenge area is largely managed by HRC.
35. I propose to update the Committee on progress on Challenge 11 – *Building Better Homes, Towns and Cities* – in due course. If adopted, Challenge 11 will be implemented through a separate RfP. Potential funding for this Challenge has been

identified from within new National Science Challenges funding and existing MBIE-managed contestable funding.

Consultation

36. The following agencies were consulted in the development of this paper: Tertiary Education Commission, Ministry for the Environment, Ministry of Social Development, Ministry of Health, Health Research Council, Ministry of Education, Ministry for Primary Industries, The Treasury, Te Puni Kōkiri, Department of Conservation, Ministry of Transport, Ministry of Foreign Affairs and Trade, and New Zealand Trade and Enterprise. The Department of the Prime Minister and Cabinet was informed.

Financial implications

37. The proposals in this paper are fiscally neutral, but there are broader financial implications through the transfer of funding from annual appropriations to the National Science Challenges multi-year appropriation.
38. I propose to transfer \$0.265 million from Non-Departmental Research Contract Management output expense to Departmental output expenses: Science and Innovation Contract Management, to enable MBIE to implement the remaining Challenges.
39. The transfer of funding for MBIE to run National Science Challenges processes is required given the additional funding in Budget 2012 and 2013 for Challenges. The additional funding for Challenges enables higher value contracts that will create additional work for MBIE in the establishment and on-going management of each of the Challenges. This work will include comprehensive periodic Challenge reviews, as well as monitoring, review of annual reporting, regular reporting, and other management and oversight duties. The additional funding sought would also cover the cost of implementing communications plans for the Challenges.

40.

Withheld under s.9 (2)(g)(i) of the *Official Information Act 1982*

41. New funding was appropriated in Budgets 2012 and 2013 and changes were made as part of the 2013 March Baseline Update. This resulted in the funding profile for the National Science Challenges appropriation in Vote: Science and Innovation shown in **Table 6** below. This funding can be re-profiled in the future given Cabinet has agreed to the establishment of a Multi-Year Appropriation for the Challenges.

Table 6: Profile of new Challenge funding allocated in Budgets 2012 and 2013

	2012/13 (\$m)	2013/14 (\$m)	2014/15 (\$m)	2015/16 (\$m)	2016/17 (\$m)	Total (\$m)
Budget 2012 funding	15.0	14.5	14.5	14.5	14.5	73.5
March Baseline Update changes	(13.5)	4.5	4.5	4.5	0	(13.5)
Budget 2013 funding	0	23.1	18.4	16.0	16.0	73.5
Total	1.5	42.1	37.4	35.0	30.5	133.5

Human rights implications

42. This paper has no human rights implications.

Legislative implications

43. This paper has no legislative implications.

Gender implications

44. This paper has no gender implications.

Disability implications

45. This paper has no disability implications.

Publicity

46. Subject to Cabinet's agreement to the proposals in this paper, I will make an announcement about the funding envelopes for the second tranche of Challenges. This announcement will publicise to the sector the funding available for each Challenge, and the next steps in the implementation of the Challenges. I also propose to make this Cabinet paper publicly available.
47. Following release of the Cabinet paper, the Ministry of Business, Innovation and Employment will publish the relevant Gazette Notice and Request for Proposals. MBIE will advise the sector of the release of these documents.
48. Public outreach, communication and education are important aspects of the Challenges. Each proposal will be expected to outline plans for public engagement, outreach, communication and education activities.

Recommendations

I recommend that the Committee:

1. **Note** that on 9 September 2013, Cabinet agreed funding envelopes for the first three National Science Challenges [Cab Min (13) 31/7 refers];
2. **Note** that the process for selecting and contracting with Challenge collaborations will be as described in the 9 September 2013 paper [Cab Min (13) 31/7 refers] which includes:
 - a. the use of a Gazette notice to advise the funding envelope for each Challenge and to set the criteria the Science Board must consider when assessing proposals for funding;
 - b. a Request for Proposals to undertake Challenges that will be referred to the Science Board for decision; and
 - c. the Science Board making funding decisions to award Challenge funding to a collaboration, approving a detailed research and business plan, and setting terms of funding;
3. **Note** my intention that MBIE issue a single further RfP for the seven Challenges for which I am seeking agreement to funding envelopes in this paper and that this varies from my earlier proposal noted by Cabinet that two further RfPs be issued in October 2013 and February 2014 [Cab Min (13) 31/7 refers];
4. **Note** that subject to Cabinet's approval of funding envelopes, a Request for Proposals for the *Ageing Well, A Better Start, Healthier Lives, Science for Technological Innovation, New Zealand's Biological Heritage, Our Land and Water, and Life in a Changing Ocean* National Science Challenges will be issued on 31 January 2014;
5. **Agree** that some Vote: Science and Innovation contestable funding will be moved from the contestable funding process to fund the second tranche of National Science Challenges and will be:
 - a. transferred from the current contestable funds into the National Science Challenges appropriation;
 - b. included in the envelope for the relevant Challenge; and
 - c. made available for allocation to Challenge collaborations – this specifically excludes funding allocated through other mechanisms (for example, CRI core funding, funding managed by HRC and the Marsden Fund);
7. **Agree** that additional funding will be made available to support the health-related Challenges and *Science for Technological Innovation* Challenge that is from MBIE-managed contestable funds relevant to these Challenges but is currently in contracts not directly linked to the Challenge outcomes;

8. **Note** that, as for the first tranche of Challenges, the allocation of new Challenge funding to the proposed funding envelopes has been based on MBIE's assessment of the potential to address research gaps and new opportunities in these Challenge areas in order to create additional impact;
9. **Note** the Health Research Council (HRC) and MBIE will maintain independent funding processes but that HRC will work with MBIE to promote the alignment of research it funds to Challenges and engagement between HRC funded researchers and Challenge collaborations;
10. **Agree** ten-year funding envelopes specifying the maximum funding available to a Challenge (based on existing Vote: Science and Innovation funding and money allocated to National Science Challenges in Budgets 2012 and 2013) for the second tranche Challenges as shown below:

Challenge	Funding source		Total ten-year envelope (\$m)
	Total new funding (\$m)	Total from MBIE-managed contestable funding (\$m)	
<i>Ageing Well</i>	29.89	5.03	Up to 34.92
<i>A Better Start</i>	29.89	4.79	Up to 34.67
<i>Healthier Lives</i>	29.89	1.38	Up to 31.26
<i>Science for Technological Innovation</i>	29.90	76.13	Up to 106.03
<i>New Zealand's Biological Heritage</i>	34.16	29.57	Up to 63.72
<i>Our Land and Water</i>	34.16	62.70	Up to 96.86
<i>Life in a Changing Ocean</i>	55.50	15.60	Up to 71.10
Total (second tranche)	243.38	195.18	Up to 438.56

10. **Note** that I will ensure, as a shareholding Minister in Crown Research Institutes, that Crown Research Institutes maintain an appropriate level of investment of relevant core funding in Challenges;
11. **Approve** the following fiscally neutral adjustment to provide for additional costs of administering the challenges with no impact on the operating balance:

Vote: Science and Innovation Minister of Science and Innovation	\$ million – increase/(decrease)				
	2013/14	2014/15	2015/16	2016/17	2017/18 & out-years
Departmental output expenses: Science and Innovation Contract Management	0.265	0.265	0.265	0.265	0.265
Non-departmental output expenses: Research Contract Management	(0.265)	(0.265)	(0.265)	(0.265)	(0.265)
Total Operating	-	-	-	-	-

12.

Withheld under s.9 (2)(g)(i) of the *Official Information Act* 1982

13. **Note** that the indicative funding profile for the ‘National Science Challenges’ multi-year appropriation is as follows:

Indicative annual spending profile	\$m – increase/(decrease)					
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
		8.9	41.0	41.0	41.0	43.6

14. **Agree** that the two proposed changes to appropriations for 2013/14 above be included in the 2013/14 Supplementary Estimates and that, in the interim, the increase be met from Imprest Supply;

15. **Agree** that Joint Ministers will determine appropriate funding transfers for 2013/14 through the March Baseline Update process;

16. **Note** that MBIE will submit a performance framework for the Challenges for approval by the Minister of Science and Innovation and Minister of Finance in February 2014;
17. **Note** that I have made two appointments to the Science Board increasing its membership from seven to eight;
18. **Agree** to amend the 'Challenge objective' of the *Life in a Changing Ocean* Challenge to 'Enhance utilisation of our marine resources within environmental and biological constraints' as this better reflects the mission-led drivers behind the Challenge;
19. **Agree** that following Cabinet's decision on these recommendations I will:
 - a. issue a press release announcing the funding envelopes and next steps;
and
 - b. make this Cabinet paper publicly available.

Hon Steven Joyce
Minister of Science and Innovation

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Appendix 1

Implementation of National Science Challenges (as at 3 December 2013)

RFP issue date	October 2013	October 2013	October 2013	31 January 2014	31 January 2014
Challenge	Resilience to Nature's Challenges Kia Manawaroa – Ngā Ākina o Te Ao Tūroa	High-Value Nutrition Ko Ngā Kai Whai Painga	The Deep South Te Kōmata o Te Tonga	New Zealand's Biological Heritage Ngā Kōiora Tuku Iho	A Better Start E Tipu e Rea
Objective	To enhance New Zealand's resilience to natural disasters	To develop high-value foods with validated health benefits to drive economic growth	To understand the role of the Antarctic and southern ocean in determining our climate and our future environment	Protect and manage our biodiversity, improve our biosecurity, enhance our resilience to harmful organisms	Improve the potential of young New Zealanders to have a healthy and successful life
Indicative themes & outcomes <i>Overarching Māori principles and values reflected and embedded in themes.</i>	<p>Resilient society Natural hazard risks are better understood and managed, reducing vulnerability and improving response and recovery.</p> <p>Resilient buildings and infrastructure Losses due to building and infrastructure damage or failure are avoided and minimised.</p> <p>Risk assessment Cost-effective mitigation measures are in place across all natural hazards, and residual risk is managed effectively.</p> <p>Geological hazards The ability to avoid and minimise losses due to geological hazards is improved.</p> <p>Weather hazards The ability to avoid and minimise losses due to weather hazards is improved.</p> <p>Fire hazards The ability to avoid and minimise losses due to fire hazards is improved.</p>	<p>Clinical application (what food to do what) Health targets are identified that are amenable to a science, evidence-based food solution to drive economic growth.</p> <p>Biomarkers (measuring impact, clarifying risk) New Zealand science provides authoritative leadership and capability on validated biomarkers for human health.</p> <p>Meeting consumer preferences and health values Profitable high-value food products are produced and marketed backed by scientifically validated health claims.</p> <p>Science of food The biological delivery of safe, efficacious and acceptable food products to consumers is enabled, regardless of target export market.</p> <p>Explanatory notes: Food = food and beverages. Establishment of a virtual centre is a key component of this Challenge.</p>	<p>Processes, uncertainties and tipping points, including detection and attribution The fundamental science essential for robust 'predictions/projections of change', is identified and prioritised to fill current knowledge gaps.</p> <p>Predictions/projections of change Predictions/projections for the 'consequences of change' are improved.</p> <p>Consequences of change: adaptable, responsive and resilient New Zealand The critical role that the Antarctic and southern ocean have in our social, cultural and economic well-being, and implications for active kaitiakitanga, are well understood by New Zealanders.</p> <p>Knowledge of how our environment will change (incorporating risk and uncertainty) contributes to the development of appropriate policy and adaptation plans and is implemented through our decisions as New Zealanders.</p>	<p>Discovery and characterisation New Zealand's indigenous and introduced biodiversity are sufficiently understood across a range of scales and knowledge systems to inform the design of a world-leading system for prioritising biosecurity and biodiversity management.</p> <p>Interdependencies, functions, ecosystems and resilience Management for resilience of our indigenous and introduced ecosystems is supported by understanding of the linkages between biodiversity, evolution, ecosystem function and services, Mātauranga Māori and environmental and economic pressures.</p> <p>Mitigation and restoration New Zealand has diverse and vibrant indigenous and introduced ecosystems, across a range of scales. Responses to economic and environmental drivers (threats and risks) are balanced to support kaitiakitanga and ensure long-term sustainability.</p> <p>Detection, measurement and assessment New Zealand has quantitative and qualitative measurement and assessment tools, integrated across the biosecurity and biodiversity domains and consistent with international best practice/standards, to enable the understanding, monitoring and evaluation of status and trends of biodiversity and the impacts of invasive organisms.</p> <p>Social partnerships and licence Social partnerships with motivated and enabled citizens, scientists, kaitiaki and decision makers are built, providing the basis for a social licence to apply new management methodologies, tools, technologies and solutions.</p>	<p>Maternal health, pregnancy and early childhood New and existing knowledge is used to understand embryonic, perinatal, infant and child development and the intrinsic and extrinsic factors that impact upon the developmental processes to determine better early life outcomes including future physical, mental, emotional, and intergenerational health in order to inform evidence based interventions.</p> <p>Successful transition into healthy adulthood Our understanding of human behaviour is enhanced using new and existing knowledge, including the links between the relevant genes and the physical and socio-economic environment, allowing the development of interventions to manage risk, improve health and educational outcomes, and promote resilience in our population.</p> <p>Education, living in the digital world New and existing knowledge is used to understand the different world in which our children are growing up, and our parenting, educational and employment practices adapted to optimise health, wellbeing and productivity.</p> <p>The possibilities offered by digital technologies are built on to create a more interactive learning experience for our children, instil a fascination for science and enhance learning and development.</p>

IN CONFIDENCE

<p>Possible key research providers*</p> <p><i>*List is indicative; other providers may be included.</i></p>	<p>GNS Science, Massey University, NIWA, Scion, the University of Auckland, University of Canterbury, University of Otago, University of Waikato, Victoria University of Wellington, Opus Research, NZ Meteorological Service.</p>	<p>AgResearch, ESR, Malaghan Institute, Massey University, Plant and Food Research, Riddet Centre, the University of Auckland, University of Otago, Victoria University of Wellington, NZIER.</p> <p>Overseas organisations likely to be involved.</p>	<p>Cawthron Institute, GNS Science, Massey University, NIWA, University of Canterbury, University of Otago, University of Waikato, Victoria University of Wellington.</p> <p>Significant scope for international collaboration.</p>	<p>Landcare Research, AgResearch, Plant and Food Research, NIWA, DOC, University of Auckland, University of Otago, Massey University, VUW, University of Canterbury, University of Waikato, Cawthron Institute, Lincoln University, AUT, ESR, GNS, Scion, Waikato Raupatu Lands Trust, Eco Research, Wānanga, Iwi, hapū and Māori health researchers.</p>	<p>University of Otago, University of Auckland (Liggins Institute), Massey University, AUT, NZCER, ESR, Families Commission, Waikato University, University of Canterbury, Callaghan Innovation, Wānanga, Iwi, hapū and Māori health researchers.</p>
<p>Proposed funding (over 10 years excl GST)</p>	<p>Total: \$59.4 million New funding: \$17.4 million Existing contracts: \$42.0 million</p>	<p>Total: \$83.8 million New funding: \$30.6 million Existing contracts: \$53.2 million</p>	<p>Total: \$51.1 million New funding: \$35.0 million Existing contracts: \$16.1 million</p>	<p>Total: Up to \$63.72million New funding: \$34.16 million Existing contracts: \$29.57million</p>	<p>Total: Up to \$34.67 million New funding: \$29.89 million Existing contracts: \$4.79 million</p>
<p>Assessment of readiness</p>	<p>Ready; Challenge collaboration is working towards a response to RfP.</p>	<p>Ready; Challenge collaboration is working towards a response to RfP.</p>	<p>Ready; Challenge collaboration is working towards a response to RfP.</p>	<p>Scope of Challenge research is broad; facilitated sector meetings are refining the research focus.</p>	<p>Momentum exists – MBIE is helping move forward.</p>

RELEASED

Appendix 1 (cont):

Implementation of National Science Challenges (as at 3 December 2013)

RFP issue date	31 January 2014	31 January 2014	31 January 2014	31 January 2014	31 January 2014
Challenge	Ageing Well Kia eke kairangi ki te taikaumātuatanga	Healthier Lives He Oranga Hauora	Science for Technological Innovation Kia kotahi mai – Te Ao Pūtaiao me Te Ao Hangarau	Life in a Changing Ocean Te Tini a Tangaroa me Ngā Moana Whakaamu	Our Land and Water Toitū te Whenua, Toiora te Wai
Objective	Harness science to sustain health and wellbeing into the later years of life	Reduce the burden of major New Zealand health problems	Enhance the capacity of New Zealand to use physical and engineering sciences for economic growth	Enhance utilisation of our marine resources within environmental and biological constraints	Enhance primary sector production and productivity while maintaining and improving our land and water quality for future generations
Indicative themes & outcomes <i>Overarching Māori principles and values are reflected and embedded in themes.</i>	<p>Maintaining brain health The number of older people requiring residential care due to cognitive and other neurodegenerative deficits, including those resulting from stroke is reduced.</p> <p>Dealing with physical frailty Older people maintain more independent mobility later in life with reduced osteoarthritis and fracture rates, reduced hospital re-admissions and increased physical activity.</p> <p>Enhancing the role of older people in society Older people have increased engagement and a sense that their roles and contributions are valued and supported within their culture and communities.</p>	<p>Prevention Disease in New Zealanders is prevented and reduced through high quality scientific evidence indicating which health interventions should be effective for equitable outcomes.</p> <p>Innovation in health delivery, diagnostics and therapies – “the right treatment for the right patient” The diagnosis and treatment of obesity, diabetes, cancer and cardiovascular disease is improved to reduce their negative impacts on New Zealanders for equitable outcomes.</p> <p>Population/cultural/social factors – underpinning theme fundamental to the Challenge Emotional, behavioural, cultural, social, educational and economic considerations specific to New Zealand have underpinned the science thinking of the two themes above, resulting in equitable approaches to reducing the burden of major New Zealand health problems.</p>	<p>Materials, manufacturing and design A wide range of new or enhanced materials and technological processes are developed that enable industry to advance new or enhanced products, services and processes.</p> <p>Sensors, robotics and automation A wide range of new or enhanced sensors and sensing technologies are developed and are implemented in a variety of new or enhanced products or applications. Robotics and automation are applied to a wide range of applications to reduce costs, improve efficiencies, enhance safety in environments dangerous to humans and undertake tasks not otherwise economically viable.</p> <p>IT, data analytics and modelling A wide range of new or enhanced hardware components, systems and software applications are developed that enable industry to incorporate them into new or enhanced products and services.</p>	<p>Characterising our ocean An integrated temporal and spatial baseline of biological and physical resources, as well as human activities, is established. This provides a basis for understanding the dynamics, and sensitivities and resilience of ocean and coastal systems.</p> <p>Understanding the dynamics and sensitivities of ocean and coastal systems The interconnectedness between ocean systems, including human activities is understood to enable adaptation and mitigation of impacts of change.</p> <p>Towards effective integrated management of oceans and coasts considering environmental, societal, cultural, Māori and economic concerns The evidence base to inform and develop management and policy frameworks is enhanced to optimise the sustainable use and resilience of coastal and ocean resources within societal, cultural, Māori and economic values, rights and interests.</p>	<p>Defining and meeting social values Society has confidence in New Zealand’s primary production systems because they meet the social, environmental, cultural, Māori and economic requirements of New Zealanders and their markets, including maintenance and improvement of their land and water quality.</p> <p>Optimising primary sector supply chains Technical barriers, and other barriers are identified and overcome (if science can address these), and product performance requirements are met to optimise value to New Zealand’s primary producers and processors, and consumers.</p> <p>Land and water management The functions and environmental limits of land and water systems are sufficiently understood and defined within societal, cultural, Māori and economic values, rights and interests and incorporated into sustainable production systems.</p> <p>Adaptable, responsive and resilient land-based primary production systems Sustainable productive capacity and profitability is ensured, by developing and adopting tools, technologies and systems that support a flexible and responsive primary industry.</p>

IN CONFIDENCE

<p>Possible key research providers*</p> <p><i>*List is indicative; other providers may be included.</i></p>	<p>University of Otago, University of Auckland, AUT, Massey University, Centre for Research Evaluation and Social Assessment (CRESA), Whanau ora groups, Wānanga, Iwi, hapū and Māori health researchers.</p> <p>Significant potential for international collaboration.</p>	<p>University of Otago, University of Auckland, Malaghan Institute, Medical Research Institute of NZ, Massey University, AUT.</p>	<p>Scion, GNS Science, Callaghan Innovation, University of Auckland, University of Canterbury, University of Otago, Viclink, VUW, Massey University, University of Waikato, Lincoln Agritech, AgResearch, Plant and Food Research, Wānanga, Iwi, hapū and Māori health researchers, and others.</p> <p>Researchers have been engaging with industry.</p>	<p>NIWA, GNS Science, Plant and Food Research, University of Auckland, University of Otago, University of Canterbury, Massey University, Cawthron Institute, Wānanga, Iwi, hapū and Māori health researchers, University of Waikato, VUW, Lincoln.</p>	<p>AgResearch, NIWA, Landcare Research, Plant and Food Research, GNS Science, ESR, Aqualink, Cawthron Institute, Massey University, University of Otago, University of Canterbury, University of Auckland, Wānanga, Iwi, hapū and Māori health researchers, Lincoln University, Lincoln Agritech, Callaghan Innovation, Victoria University, University of Waikato, Scion, AUT.</p>
<p>Proposed funding (over 10 yrs excl GST)</p>	<p>Total: Up to \$34.92 million New funding: \$29.89 million Existing contracts: \$5.03 million</p>	<p>Total: Up to \$31.26 million New funding: \$29.89 million Existing contracts: \$1.38 million</p>	<p>Total: Up to \$106.03 million New funding: \$29.90 million Existing contracts: \$76.13 million</p>	<p>Total: Up to \$71.10 million New funding: \$55.50 million Existing contracts: \$15.60 million</p>	<p>Total: Up to \$98.86 million New funding: \$34.16 million Existing contracts: \$62.70 million</p>
<p>Assessment of readiness</p>	<p>Science questions need development. MBIE is continuing to work with the sector.</p>	<p>Science questions are developing. MBIE is continuing to work with the sector.</p>	<p>Very broad and fragmented sector. Initial five themes (novel materials, robotics and automation, sensing and measurement, design and manufacturing, IT data and processing) have been consolidated into three. MBIE is working with the sector.</p>	<p>The sector is actively progressing the science questions; MBIE is engaged in the process.</p>	<p>The sector is actively progressing the science questions; MBIE is engaged in the process.</p>

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Appendix 2: Proposed allocation of new National Science Challenges funding for the remaining Challenges.

1. The following criteria were used by MBIE science investment staff to determine the allocation of new funding to all Challenges:
 - the ability to address gaps in the Challenge research areas in order to create additional impact; and
 - the ability to address new research opportunities in the Challenge research areas in order to create additional impact.
2. The table below shows the proposed maximum allocation of new National Science Challenges funding to the remaining seven Challenges over ten years (the first tranche Challenges are also shown in grey below). The actual profile of funding over this period can be amended to suit research needs using the 'National Science Challenges' multi-year appropriation.
3. The significantly higher level of new funding proposed for the *Life in a Changing Ocean* Challenge reflects that this is the widest research topic of the Challenges, spanning fisheries, mining, environment and ecosystems. There is a lack of basic data to support research in New Zealand's large marine territory, and the costs of undertaking research in the marine environment are high. There are significant opportunities for enduring benefits to New Zealand from further research on this Challenge topic.

Proposed maximum allocation of new funding for the second tranche of Challenges over 10 year period and agreed allocations to first tranche Challenges (\$m)

Challenge (\$m)	Year 1⁵	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	TOTAL
First tranche Challenges (agreed)											
<i>High Value Nutrition</i>	3.3	3.5	3.5	3.5	3.2	3.2	2.6	2.6	2.6	2.6	30.6
<i>Nature's Challenges</i>	1.8	2.0	2.0	2.0	1.8	1.8	1.5	1.5	1.5	1.5	17.4
<i>The Deep South</i>	3.8	4.0	4.0	4.0	3.6	3.6	3.0	3.0	3.0	3.0	35.0
Second Tranche Challenges (proposed)											
<i>Ageing Well</i>	3.2	3.5	3.5	3.2	3.2	2.6	2.6	2.6	2.6	2.6	29.6
<i>A Better Start</i>	3.2	3.5	3.5	3.2	3.2	2.6	2.6	2.6	2.6	2.6	29.6
<i>Healthier Lives</i>	3.2	3.5	3.5	3.2	3.2	2.6	2.6	2.6	2.6	2.6	29.6
<i>Science for Technological Innovation</i>	3.2	3.5	3.5	3.2	3.2	2.6	2.6	2.6	2.6	2.6	29.6
<i>New Zealand's Biological Heritage</i>	3.8	4.0	4.0	3.6	3.6	3.0	3.0	3.0	3.0	3.0	34.0
<i>Our Land and Water</i>	3.8	4.0	4.0	3.6	3.6	3.0	3.0	3.0	3.0	3.0	34.0
<i>Life in a Changing Ocean</i>	6.3	6.5	6.5	5.9	5.9	4.8	4.8	4.8	4.8	4.8	55.3
Total	35.6	38	38	35.4	34.5	9.8	28.3	28.3	28.3	28.3	324.5

⁵ It is expected that first tranche Challenges will commence in financial year 2013/14 and second tranche Challenges in financial year 2014/15, but this is contingent on the outcome of the procurement process.

Appendix 3: Estimate of the potential annual contribution of CRI core funding to the remaining Challenges

1. The numbers in the table below give estimates of the potential annual contribution from CRI core funding to the National Science Challenges. These figures are based on an assessment by CRIs of their current (2013/14) planned investments in Challenge-related research. The total ten-year CRI contribution has been calculated by multiplying 2013/14 funding over the period. Estimates for the first tranche of three Challenges are also included in this table for information.
2. Funding linked to Callaghan Innovation Research Limited (CIRL) has not been included in these calculations.

Potential annual contribution of CRI funding to the ten agreed Challenges (\$m)

Challenge (\$m)	AgResearch	ESR	GNS	Land-care	NiWA	Plant & Food	Scion	TOTAL
First tranche Challenges								
<i>High-Value Nutrition</i>								6.4
<i>Resilience to Nature's Challenges</i>								11.1
<i>The Deep South</i>								2.9
Subtotal (first tranche)								20.4
Second tranche Challenges								
<i>Ageing Well</i>								0.0
<i>A Better Start</i>								0.0
<i>Healthier Lives</i>								0.6
<i>Science for Technological Innovation</i>								1.1
<i>New Zealand's Biological Heritage</i>								14.4
<i>Our Land and Water</i>								13.1
<i>Life in a Changing Ocean</i>								7.5
Subtotal (second tranche)								36.7
Total								57.1

Withheld under s.9 (2) (b)(ii) of the *Official Information Act 1982*