

Office of the Minister of Science and Innovation

Cabinet Economic Growth and Infrastructure Committee

Implementing the National Science Challenges**Proposal**

1. This paper updates you on the implementation of the National Science Challenges (Challenges) and asks you to agree to the proposed funding envelopes for the first tranche of three Challenges and agree to establish a Multi-Year Appropriation (MYA) for the Challenges.

Executive summary

2. The National Science Challenges will achieve greater impact and value from the government's science investment through a strategic approach that focuses on ten mission-led Challenges that will create enduring benefit for New Zealand.
3. In April 2013 Cabinet agreed to ten Challenges and deferred one, *Building Better Homes, Towns and Cities* [CAB Min (13) 13/5A refers]. This paper provides an update on the implementation of the Challenges and asks you to agree to funding envelopes for the first tranche of three Challenges.
4. This paper focusses on the first tranche of Challenges, *Resilience to Nature's Challenges*, *The Deep South*, and *High Value Nutrition*, which are considered by the Ministry of Business, Innovation and Employment (MBIE) to be most advanced in forming potential Challenge collaborations. MBIE will issue in September a Request for Proposals (RfP) for these Challenges for a research collaboration representing 'New Zealand's best team' to deliver the Challenge. The RfPs for the subsequent two tranches are planned for November 2013 and March 2014.

Note: The Ministry of Business, Innovation and Employment has subsequently decided there will be a single Request for Proposal for the second and third Challenge tranches on or about 1 February 2014.

5. The Government has agreed to support the Challenges with \$316.5m of new funding (between 2013/14 and 2022/23) as part of Budgets 2012 and 2013. This funding will be allocated among the Challenges based on MBIE's assessment of the potential additional impact expected from using it to address research gaps and opportunities.
6. In addition, a significant proportion (15-20%) of current MBIE-managed Vote: Science and Innovation contestable research funding will be made available to the Challenge collaborations on the basis of its direct relevance of current investments to Challenge outcomes. The new funding and directly linked contestable funding together comprise the funding envelope for each Challenge.
7. Relevant core funding of Crown Research Institutes (CRIs) will be also be invested in the Challenges as co-funding where the CRI is part of the Challenge collaboration. I will ensure on-going investment by CRIs in Challenges through the powers I have as a Shareholding Minister in CRIs. Private sector co-funding will also be invested in Challenges.
8. Research funded by other government agencies and other research providers, including universities and the Health Research Council (HRC) is not explicitly required

to be linked to Challenges but may be aligned where the research also contributes to Challenge outcomes.

9. I propose that the following funding sources, totalling up to \$470.3m, should be made directly available to the first tranche of Challenges over a ten-year period¹:
- new National Science Challenges funding;
 - existing MBIE-managed contestable research funding directly linked to Challenge outcomes); and
 - relevant CRI core funding.
10. The potential funding for the first tranche of Challenges is detailed in Table 1 below. It comprises the funding envelope (made up of the new funding and directly relevant contestable funding) and CRI core funding. The Science Board will make funding decisions for the Challenges up to the maximum of the funding envelope and can award less than the maximum.

Table 1: Potential Challenge funding for the first tranche of Challenges, including Challenge funding envelopes and relevant CRI core funding (2013/14-2022/23)

	High Value Nutrition \$m	Nature's Challenges \$m	The Deep South \$m	Total \$m
CRI Core Funding	up to 97.0	up to 142.0	up to 37.0	up to 276.0
Funding envelope	up to 83.8	up to 59.4	up to 51.1	up to 194.3
Total	up to 180.8	up to 201.4	up to 88.1	up to 470.3

11. Contestability remains a core principle of the Challenge approach to ensure that the 'best team is doing the best science' to achieve the greatest impact. Contestability will occur in the selection of research programmes to be included in the proposed research plan submitted to the Science Board. The proposed research plan will also require a funding package to be allocated contestably by the Challenge collaboration, based on research gaps and new opportunities, to allow new research and researchers to contribute to the Challenge.

Background

12. The Challenges are a mission-led approach that will involve greater alignment and co-ordination of research to generate greater impact and value from the government's science investment. The Challenges complement other science priorities and business-led and discovery-led components of the science system.
13. Cabinet approved the Challenges on 22 April 2013 [CAB Min (13) 13/5A refers] following a consultative process that included science stakeholders and the New Zealand public (through 'The Great New Zealand Science Project' campaign). The Challenge topics were announced publicly on 1 May 2013.
14. Cabinet requested a report back to its Economic Growth and Infrastructure Committee by August 2013:
- on progress on implementation of the Challenges;
 - on timelines for Challenges; and

¹ Financial years 2013/14 to 2022/23.

- for agreement on funding envelopes for the Challenges.
15. Cabinet noted [CAB Min (13) 13/5A refers] that MBIE would develop the themes and outcome statements for each Challenge, building on the work of the National Science Challenges Panel by convening subject experts from across government and the research sector. Cabinet also noted that MBIE would identify options for funding the Challenges.
 16. Cabinet deferred a decision on the *Building Better Homes, Towns and Cities* Challenge pending evaluation of whether the industry research strategy which was being developed for the building and construction sector (adopted in June 2013) is suitable for incorporation into the Challenge framework [CAB Min (13) 13/5A refers]. I will set out proposals for this Challenge in a separate paper for Cabinet's approval.
 17. Through Budgets 2012 and 2013, \$316.5m of new funding will be allocated to National Science Challenges to 2022/23.
 18. Collaborations of research providers will undertake the Challenges. Each collaboration will have an individual governance structure to coordinate a broad portfolio of research activity and the expertise required to deliver Challenge outcomes effectively and efficiently.

Implementation of the National Science Challenges

The High Value Nutrition, Resilience to Nature's Challenges and The Deep South Challenges are ready to proceed

19. MBIE has developed high-level descriptions for each Challenge through a series of workshops that have involved researchers as well as end-users. These workshops have also stimulated some further discussions in the science sector on the Challenges and on potential collaborations.
20. The *High Value Nutrition, Resilience to Nature's Challenges* and *The Deep South* Challenges are the most ready to proceed. They will constitute the first tranche of Challenges to be implemented. The relative readiness to proceed is largely a function of the complexity of the Challenge and of the history of collaborations in the research area. The key features of Challenges in the first tranche are described in Appendix 1.
21. All ten Challenges and their high-level objectives (as agreed by Cabinet) are summarised in Table 2 below. The descriptions, themes, outcomes and initial research ideas for the Challenges in the second and third tranches will continue to be refined through an on-going engagement process between MBIE and the science sector.

Table 2: Summary 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>High-Value Nutrition</i>	Develop high-value foods with validated health benefits
<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>The Deep South</i>	Understand the role of the Antarctic and Southern Ocean in determining our climate and our future environment
<i>Science for Technological Innovation</i>	Enhance the capacity of New Zealand to use physical and engineering sciences for economic growth
<i>Resilience to Nature's Challenges</i>	Enhance our resilience to natural disasters

Decisions on Challenge proposals and the allocation of funding will be made by the Science Board

22. The Science Board² will approve proposals for Challenges and allocate funding up to the maximum approved by Cabinet for that purpose. MBIE will seek proposals through RfPs to undertake Challenges.
23. The objectives, themes and outcomes sought for each Challenge will be set out in a Gazette notice and in the relevant RfP. The Gazette notice will advise the funding envelope for each Challenge and set the criteria the Science Board must consider when assessing proposals for funding.
24. The Gazette notice and RfP will require proposals to include a research plan and a business plan.
 - **The Research Plan.** The 10–year research plan will set out how the Challenge will be addressed and how the proposed research will link to current research relevant to the Challenge in New Zealand and internationally. It will provide a detailed research programme(s) for the first 3 to 5 years and indicative research programme(s) thereafter. The plan will include evidence of a contestable allocation of research funding within the Challenge together with evidence of a transparent and robust process for prioritisation of research. It will also include a proposed package of funding that will be allocated contestably to new research and researchers. The research plan will include an explanation of how the research will give effect to MBIE's Vision Mātauranga policy.

² Constituted under the Research, Science, and Technology Act 2010 (the Act).

- **The Business Plan.** The business plan will set out who is involved in the Challenge, monitoring of contract performance and the governance and management arrangements. It will show how collaboration will facilitate the research needed to deliver the Challenge outcomes and show how institutional interests and the shared interests of the collaboration will be balanced. The plan will describe the contestable processes used to prioritise and allocate research with the Challenge. The plan will also outline how the collaboration will leverage funding and complement research from other funding sources and other research providers, and how the collaboration will engage with end-users of research. The plan will provide key performance indicators (KPIs), including lines of accountability from collaboration participants to each KPI.
25. CRIs party to a Challenge collaboration will be required to identify in detail what research they are already funding that maps to the Challenge, and how the proposed research plan for the Challenge would add further value, for example, to fill gaps in current research or data, accelerate current work or introduce new work streams.
 26. The Gazette notice and RfP for the first tranche of Challenges will be issued following Cabinet's decision on the Challenge funding envelope allocated to these Challenges. I propose that MBIE will issue further RfPs for the two remaining tranches in November 2013 and March 2014.
 27. The initial funding allocation by the Science Board will be for around four years. The Science Board may choose to fund Challenge collaborations for a longer or shorter period depending on the research proposed.
 28. Robust peer review within Challenge collaborations is essential to ensure that the research proposed is appropriate, that the science is of high quality, that the specified outcomes are achievable and that the governance and management arrangements are suitable.
 29. The research and business plans proposed by Challenge collaborations will also be assessed in depth by an independent, MBIE-appointed, assessment panel before being submitted for approval by the Science Board, based on criteria set out in the Gazette Notice. The assessment panel will have a significant number of international members because the collaborative nature of each Challenge is likely to involve a large number of New Zealand leading researchers.

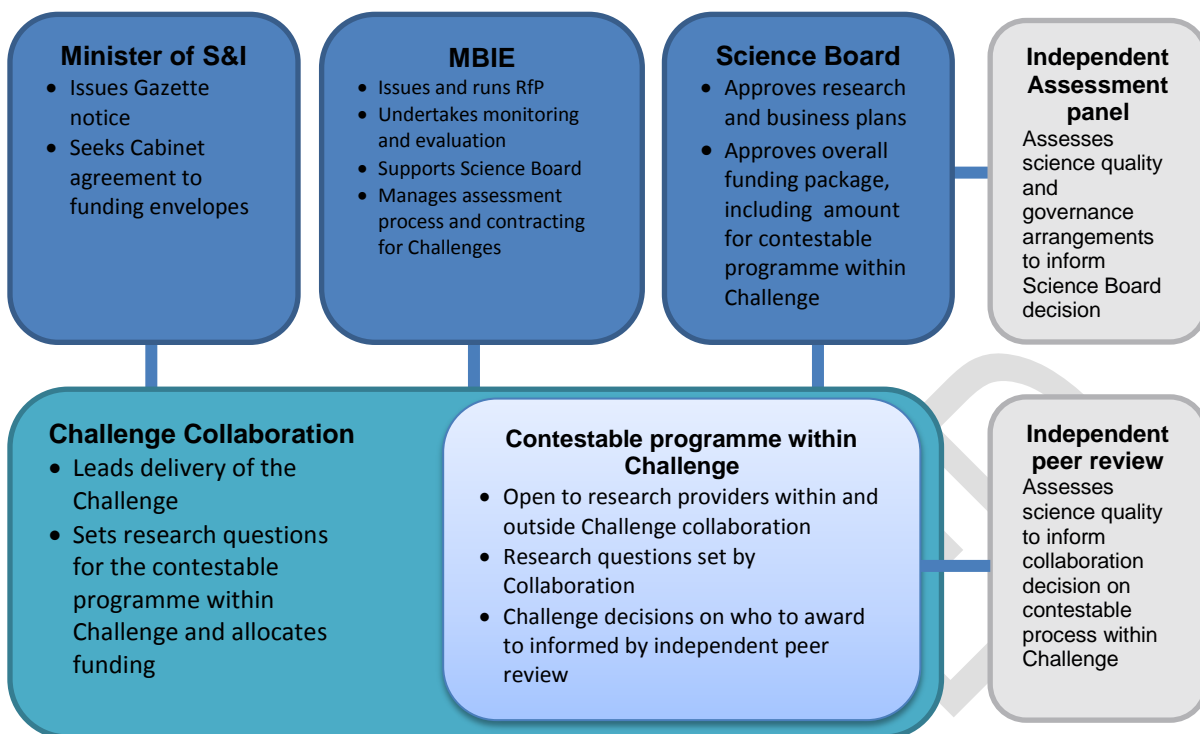
Monitoring and evaluation is crucial to the on-going performance of the Challenges

30. MBIE will monitor Challenge collaborations and undertake periodic in-depth reviews of each Challenge (for example at the fourth and seventh year). Each Challenge collaboration will submit a refreshed and revised research plan to the Science Board. Decisions made on the basis of the review could include revising the research plan, renewing, increasing or decreasing funding or winding up the Challenge. Each Challenge will be assessed at the end of the ten-year period to assess its effectiveness in delivering the Challenge outcomes. I will report back to Cabinet in February 2014 with a performance and monitoring framework for the Challenges.
31. I propose that the Vote Minister for Science and Innovation and the Minister of Finance will jointly make fiscally neutral changes to the agreed funding envelopes as required, based on the outcomes of Challenge reviews or Challenge performance monitoring.

Contestability within the Challenge collaborations will ensure the best research is selected

32. The 'best team doing the best science' is central to the success of the Challenges. There are a number of mechanisms within the Challenge approach to help to ensure that the Challenge is dynamic and refreshed with new research and researchers.
33. Challenge collaborations will facilitate a contest within the Challenge for research ideas in order to select the most effective research teams and programmes for proposed research and business plans submitted in response to the RfP. There is no automatic entitlement for existing providers of research to continue to receive funding beyond the maturity of existing contracts.
34. The research and business plans submitted to the Science Board will include details of the contestable process used to identify, assess, prioritise and select the research teams and programmes, including the use of independent external peer review. Challenge collaborations will prioritise research that will be most effective in delivering Challenge outcomes and performance against contracts within the Challenge.
35. Each research plan will be required to specify the mechanisms proposed to include new ideas, knowledge, research and researchers into the Challenge and will include a proposed funding package within the funding envelope to allocate to research on a contestable basis. The Challenge collaboration will set the research questions to be addressed and the contest will be open to research providers both within and outside the Challenge collaboration. The research that is proposed will be subject to independent, external peer review, and will be selected and funded by the Challenge collaboration. This mechanism will allow research gaps and new opportunities to be addressed and will also allow new researchers and research providers to be included in the Challenge collaboration.
36. In addition, MBIE contestable research funding outside Challenge funding envelopes will be available to the Challenges. Challenge collaborations will be able to bid for contestable research funding as current contracts mature. These proposals will be considered alongside other research proposals for research areas of priority not directly related to Challenges.
37. The Science Board decisions on allocation of funding from MBIE-managed contestable research funding will, over time, result in shifts of funding to areas of the greatest potential impact that may result in more funding being allocated to Challenges.
38. Figure 1 shows how funding and governance of the Challenges will work, including the contestable process within the Challenge:

Figure 1: Funding and governance of National Science Challenges



Proposed changes to the Science Board's role and membership

39. The Science Board will have a role in making funding decisions on Challenge programmes and plans. The Board will take a long-term strategic view of the Crown's investment and make assessments as to where the greatest value from additional investment will be realised.
40. I will appoint two new members to the Science Board (which, with retirements, will result in a net increase of one member) to enhance its capability and equip the Board to make decisions in relation to funding the Challenges. I propose to take a paper to the Appointments and Honours Cabinet Committee later this year seeking the Committee's agreement to the appointments. I am seeking experience in financial management, governance, the social sciences, evaluation and monitoring, and knowledge of how scientific research can be applied to achieve a range of outcomes.

Funding envelopes for the Challenges

Each funding envelope includes funds from MBIE-managed maturing research contracts that directly link to each Challenge, and new National Science Challenges money

41. The Challenge funding envelopes will set the maximum Vote: Science and Innovation funding that can be awarded by the Science Board to each Challenge and includes two components:

- new funding (a portion of the \$133.5 million allocated in Budgets 2012 and 2013 for the National Science Challenges to 2016/17³, and \$30.5m per year thereafter); and
 - funding made available on maturation of existing MBIE-managed contestable research contracts for which the project descriptions **directly** link to Challenge outcomes, which will be transferred to the 'National Science Challenges' appropriation as current contracts mature (see Table 5).
42. I propose that new funding is initially allocated on the basis of the additional expected impact from further research in the Challenge on the basis of MBIE's assessment of two criteria (see Appendix 3):
- 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 impact⁴.

MBIE-managed funding not directly related to Challenge is excluded from the Challenge funding envelope

43. Maturing MBIE Vote: Science and Innovation research contracts that are indirectly related to a Challenge area but which do not directly contribute to Challenge outcomes do not fall within the Challenge funding envelopes.
44. The Challenge funding envelopes exclude other Vote: Science and Innovation funding, such as:
- sector-based research contracts outside Challenge areas (for example, research in energy);
 - research funding allocated through other mechanisms (for example, HRC funding, Marsden Fund); and
 - funding for Centres of Research Excellence, Smart Ideas, Independent Research Organisation funding, Partnerships, Science Skills and Leadership funds, and Infrastructure and International funding.

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

45. CRI core funding supports work that underpins many of the Challenges. Core funding, while not part of the Challenge funding envelopes, will be central to the success of many Challenges, by enabling new funding to focus on research to deliver additional benefits in Challenges. Relevant CRI core funding will be invested in Challenges as a form of co-funding, where CRIs are part of a Challenge collaboration.
46. I will ensure that the priorities of CRIs are aligned with Challenges to maximise the impact of both Challenge and CRI funding, regardless of the outcome of the RfP process and the membership of Challenge collaborations. Appendix 3 shows an initial assessment of the potential contribution that CRI core funding could make to Challenges.

³ \$1.5m of this has been spent on public consultation on the Challenges and on departmental expenditures in developing the Challenge approach in late 2012.

⁴ The proposed distribution of new Challenge funding includes provision for new money that will be allocated to Challenge 11 if Cabinet agrees to its adoption

47. Table 3 shows in more detail how the three Challenge funding components and CRI core funding will support Challenges.

Table 3: Challenge funding components

The Challenge funding envelopes will include	
New National Science Challenges funding	<ul style="list-style-type: none"> included in the National Science Challenges appropriation allocated based on potential impact allows current gaps and opportunities to be addressed.
Funding currently in contestable MBIE-managed research contracts for which project descriptions directly link to Challenge outcomes (when current contracts mature)	<ul style="list-style-type: none"> reflects current levels of funding in research linked to Challenge outcomes transferred to the National Science Challenges appropriation acknowledges current research capability provides funding certainty for a ten-year period
The Vote: Science and Innovation contestable research funding includes	
Funding currently in contestable MBIE-managed research contracts which indirectly relates to Challenges (when current contracts mature)	<ul style="list-style-type: none"> allocated through a contestable process open to all eligible applicants including Challenge collaborations recognises that not all research in Challenge areas directly contributes to Challenge outcomes continues to be run by MBIE
CRI core funding includes	
CRI core funding currently invested in activities which have been identified as related to Challenge outcomes	<ul style="list-style-type: none"> where CRIs are part of a Challenge collaboration, will be treated as a form of co-funding will contribute to Challenge outcomes on an on-going basis

Other government science investment will support Challenge outcomes but is not included in the Challenge funding envelopes

48. Other government research funding, including non-Vote: Science and Innovation funding, and research funded by other sources will contribute significantly to Challenge outcomes. Challenge research should inform and be informed by research (funded by a variety of sources) that contributes to the Challenge outcomes through networking and collaborating to create research synergies.

49. MBIE will continue to work with other research funders and providers to increase understanding about New Zealand research activity in order to support applicants and Challenge collaborations, and to improve our understanding of research funding and research activity in New Zealand.

Funding envelopes for the first tranche of challenges are proposed

50. I propose that Cabinet approve ten-year funding envelopes for the first three Challenges as summarised in Table 4 below. The funding envelope specifies the maximum allocation available for funding decisions by the Science Board. The ten-year envelope will allow Challenge collaborations to take a long-term view of their activities, while medium-term allocation of funding and reviews will ensure fiscal prudence and an outcomes focus.

51. The initial funding allocations will be made by the Science Board for around four years. The Science Board may decide to increase, decrease or reject future funding to a Challenge collaboration within the envelope following reviews. I propose that I, as the Minister of Science and Innovation, with the Minister of Finance, jointly approve any necessary changes to the Challenge funding envelopes following the outcome of reviews or on-going Challenge collaboration monitoring.

Table 4: Proposed cumulative ten-year funding envelopes for the first tranche of three Challenges (2013/14-2022/23)

Funding source	High Value Nutrition \$m	Nature's Challenges \$m	The Deep South \$m	Total \$m
Total new funding	up to 30.6	up to 17.4	up to 35.0	up to 83.0
Total directly linked existing contracts	up to 53.2	up to 42.0	up to 16.1	up to 111.3
Total ten-year envelope	up to 83.8	up to 59.4	up to 51.1	up to 194.3

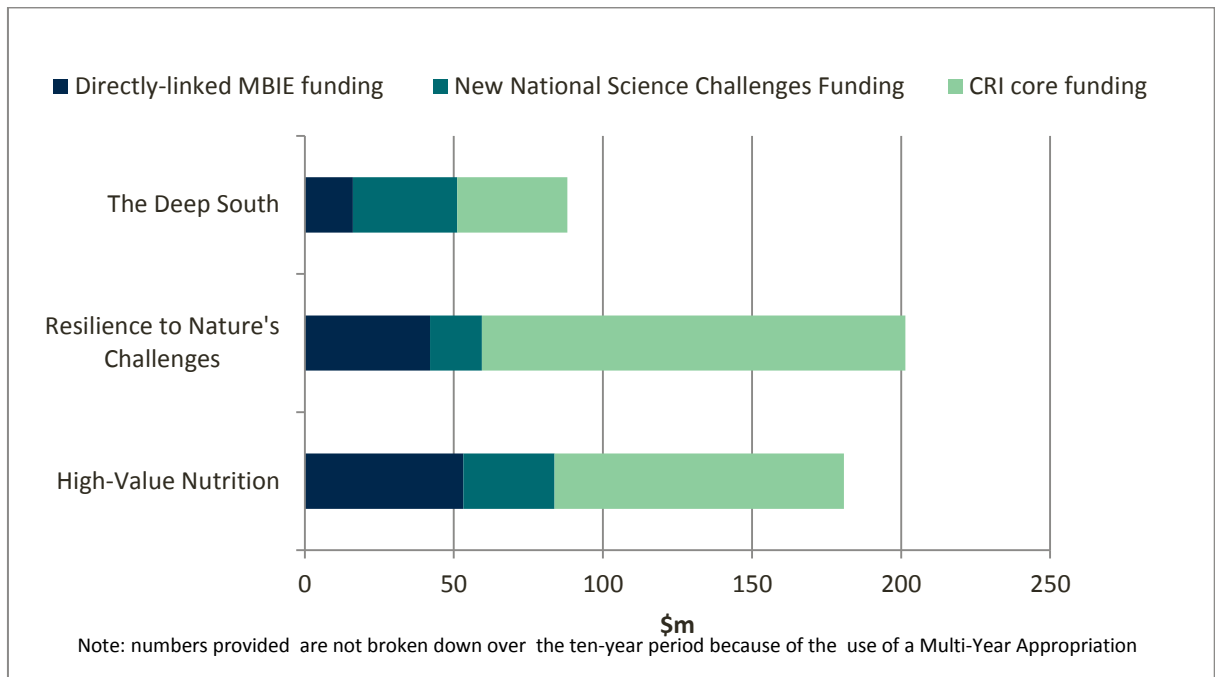
52. Table 5 shows how CRI core funding related to Challenges in the first tranche will also contribute to the total funding available to deliver Challenge outcomes.

Table 5: The potential ten-year CRI core funding contribution to first-tranche Challenges and consequent amount of funding potentially available to the Challenges (2013/14-2022/23)

Funding source	High Value Nutrition \$m	Nature's Challenges \$m	The Deep South \$m	Total \$m
CRI Core Funding (assuming 2013/14 levels of investment)	up to 97.0	up to 142.0	up to 37.0	up to 276.0
Total ten-year envelope	up to 83.8	up to 59.4	up to 51.1	up to 194.3
Total ten-year Challenge funding, including funding envelope, and potential contribution from relevant CRI core funding	up to 180.8	up to 201.4	up to 88.1	up to 470.3

53. Figure 2 shows the potential contribution of different components of funding to the first tranche Challenges over a ten-year period.

Figure 2: Potential contribution of funding components to first tranche Challenges 2013/14-2022/23 (\$m)



54. I will propose funding envelopes for the other seven agreed Challenges following further workshops to refine the themes and outcomes of these Challenges. I expect to seek Cabinet agreement on funding envelopes for the second and third tranches of Challenges in October 2013 and February 2014 respectively.

I propose that Challenges are funded using a Multi-Year Appropriation

55. I propose that the National Science Challenges appropriation be established as a five-year Multi-Year Appropriation (MYA) that can subsequently be extended to cover the ten-year period of the Challenges. The National Science Challenges appropriation is suitable for a MYA because:

- (a) Total costs over the multi-year period can be contained due to Cabinet's ability to control the number of Challenges and their funding envelopes;
- (b) The research plan for each Challenge will cover multiple financial years (ten years); and
- (c) As the funded research is outcomes driven, programme costs are likely to be unevenly distributed across the multi-year period.

56. A MYA will allow for the Challenge collaboration funding profile to match the business and research plan of the Challenge collaboration. This will provide certainty and should improve the ability of researchers to deliver the Challenge outcomes. With an annual appropriation, Challenge collaborations would have to prioritise research programmes according to when funding becomes available (as current contracts that have been directly linked to the Challenge mature), rather than organising a research programme in order to optimise delivery of outcomes.

57. Current MBIE-managed research contracts directly-linked to Challenges mature over the next seven financial years. MBIE will transfer funding in current contracts directly linked

to Challenges into the 'National Science Challenges' appropriation along with new National Science Challenges funding.

58. I propose that the Minister of Finance, and I, as the Vote Minister, have delegated authority to jointly approve fiscally neutral adjustments to the proposed MYA: 'National Science Challenges'.
59. Numbers presented in this paper assume approval of an initial five-year MYA, which will then be rolled over to cover the entire ten-year period of the Challenge contracts.

A significant amount of MBIE-managed funding will remain in the existing contestable funding process

60. Table 6 shows an indicative breakdown of the ten-year (2013/14-2022/23) funding landscape following implementation of the Challenges. The funding envelopes for tranche two and three Challenges will change as the scope of these Challenges is developed further. The proposed allocation of new funding includes a contingency to allow for the possible addition of the *Building Better Homes, Towns and Cities* to the portfolio. If this Challenge does not proceed the resulting surplus will be allocated to other Challenges.

Table 6: MBIE-managed contestable funding following implementation of Challenges (2013/14-2022/23)

	New National Science Challenges funding (\$m)	Current MBIE-managed contestable funding (\$m)	Total (\$m)
National Science Challenges Funding envelopes			
First tranche Challenges	83	111.3	194.3
Second and third tranche Challenges	233.5	371.9	605.4
Subtotal	316.5	483.2*	799.7
Remaining MBIE-managed contestable research funding			
MBIE contestable research funding indirectly related to Challenges		712	
MBIE contestable research funding not related to Challenges		1575	
Subtotal		2287	
Total		2770.2	

*Percentage of MBIE contestable research funding directly linked to Challenges = 17.4%

Next steps

61. MBIE will issue an RfP in September 2013 for the first tranche of Challenges. I will propose funding envelopes for the subsequent tranches of Challenges in October 2013 and February 2014.
62. MBIE will consult with the Health Research Council over the implementation of the health-related Challenges, *A Better Start*, *Healthier Lives* and *Ageing Well*, which will fall into the second and third tranches.
63. I will bring a separate Cabinet paper to this committee seeking a decision on whether to adopt Challenge 11 *Building Better Homes, Towns and Cities*, which Cabinet deferred pending consideration of whether the industry research strategy which was being developed for the building and construction sector (adopted in June 2013) is suitable for incorporation into the Challenge framework.

Consultation

64. The following agencies were consulted in the development of this paper and their views have been incorporated: 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.

Treasury Comment

65. While Treasury is comfortable with the direction of the paper, Ministers should be aware that these changes significantly shift the balance of science funding away from contestable allocation mechanisms, and towards the National Science Challenge approach.
66. The funding envelopes proposed for the Challenges are largely based on historical research areas, because there is limited information available on the potential impact of each Challenge, and because the Challenges need to build on existing research capability.
67. Over time, it will be important to be able to shift funding to areas with the greatest potential for impact, as information on the performance of the challenges becomes available. Although the Science Board will be able to shift funding between the challenges, it is unclear when and how these decisions will be made. We recommend that MBIE include details on how Challenge funding will be shifted over time in their February 2014 report back to Cabinet.

Financial implications

68. The proposals in this paper are fiscally neutral, but there are broader financial implications through the proposed use of MYAs.
69. New funding was already appropriated as part of Budgets 2012 and 2013 and changes were made as part of the 2013 March Baseline Update resulting in the funding profile for the National Science Challenges appropriation in Vote: Science and Innovation shown in **Table 7** below:

Table 7: Profile of available new Challenges funding allocated in Budgets 2012 and 2013 (which can be re-profiled using the proposed Multi-Year Appropriation)

	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

70. This paper has no human rights implications.

Legislative implications

71. This paper has no legislative implications.

Gender implications

72. This paper has no gender implications.

Disability implications

73. This paper has no disability implications.

Publicity

74. Subject to Cabinet's agreement to the proposals in this paper, I will make an announcement about the funding envelopes for the first tranche of Challenges. This announcement will publicise to the sector the funding potentially available for each Challenge, the first tranche of Challenges to be launched, and the next steps in the implementation of the Challenges. I also propose to make this Cabinet paper publicly available.

75. The communications strategy for the Challenges will have two strands. The first strand focuses on the science sector and aims to inform the sector of the implementation of the Challenges, and how the Challenges will affect the science funding system over time.

76. The second strand focuses on the general public and aims to build on the momentum established through the Great New Zealand Science Project. This strand will use the Challenges as a framework for further public engagement. This strategy will also align to the work currently under way to improve science education and public engagement through the Science and Society leadership project.

Recommendations

77. I recommend that the Committee:

1. **Note** that on 26 April 2013 [CAB Min (13) 13/5A refers], Cabinet directed the Minister of Science and Innovation to report back to EGI on progress in implementation of the ten National Science Challenges (Challenges), including:
 - a. advice on the implementation process, including details on selecting Challenge leads and collaborations;
 - b. advice on timelines for the Challenges, including consideration of Challenge 11 'Building Better Homes, Towns and Cities'; and
 - c. seeking agreement on the funding envelopes for the Challenges to be implemented in 2013
2. **Note** the process for selecting and contracting with Challenge collaborations which includes:
 - a. the use of Gazette notices 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** that the Request for Proposals for the *Deep South, Nature's Challenges* and *High Value Nutrition* National Science Challenges will be issued in September 2013
4. **Note** that it is expected that allocating funding through the Challenges process will result in greater alignment and co-ordination of government investment in Challenge areas and permit reallocation of investments leading to greater impact over time
5. **Agree** that Vote: Science and Innovation contestable funding in current contracts that directly link to the outcome of a Challenge will be used to fund Challenges once current contracts mature
6. **Agree** that current MBIE-managed contestable funding that directly links to a Challenge outcome:
 - a. will be moved from the current investment process into the National Science Challenges appropriation;
 - b. will be included in the envelope for the relevant Challenge; and
 - c. will be made available for allocation to Challenge collaborations. This specifically excludes funding allocated through other mechanisms (for example, Crown Research Institute (CRI) core funding, Health Research Council,

Marsden Fund; and funding for CoREs, Smart Ideas, IRO funding, Partnerships, Science Skills and Leadership funds, Infrastructure and International funding)

7. **Note** that the allocation of new Challenges funding in the proposed funding envelopes for the first tranche of Challenges has been based on MBIE's assessment of the ability to address research gaps and new opportunities in these Challenge areas in order to create additional impact
8. **Agree** funding envelopes specifying the maximum funding available to a Challenge (based on existing Vote: Science and Innovation funding directly linked to Challenges and new money allocated to Challenges in Budgets 2012 and 2013) for the first tranche of Challenges as shown below:

Funding source	High Value Nutrition \$m	Nature's Challenges \$m	The Deep South \$m	Total \$m
Total new funding	up to 30.6	up to 17.4	up to 35.0	up to 83.0
Total directly linked contracts	up to 53.2	up to 42.0	up to 16.1	up to 111.3
Total ten year (2013/14-2023/24) envelope	up to 83.8	up to 59.4	up to 51.1	up to 194.3

9. **Note** that to give further flexibility to allocate resources for maximum impact, Vote: Science and Innovation contestable funding that is currently in a contract that is related to a Challenge, but is not directly linked to Challenge outcomes, will:
 - a. be invested through a contestable process;
 - b. be available to all research providers (including Challenge collaborations); and
 - c. not constitute part of the on-going Challenge funding envelope even if awarded to a Challenge collaboration through the contestable process
10. **Note** that Vote: Science and Innovation funding currently in contracts not identified as directly linked or related to Challenges will remain outside the Challenges appropriation and will be reinvested using current funding mechanisms as contracts mature
11. **Note** that I will ensure, as a shareholding Minister in Crown Research Institutes, that Crown Research Institutes continue to invest relevant core funding in Challenges at current levels
12. **Agree** that MBIE will have the ability to undertake reviews of each Challenge, or all the Challenges as a portfolio, at intervals to be specified, and that these reviews will be the vehicle for making longer-term funding investment decisions
13. **Note** that Challenge collaborations will run a contestable process within the Challenge for a proportion of Challenge funding with the aim of facilitating dynamism and the refresh of Challenge participants

14. **Note** that the Minister of Science and Innovation will seek Cabinet's agreement in October 2013 and February 2014 to funding envelopes for the second and third tranches of Challenges respectively

Note: The Ministry of Business, Innovation and Employment has subsequently decided there will be a single Request for Proposal for the second and third Challenge tranches on or about 1 February 2014.

15. **Agree** that the Minister of Science and Innovation and Minister of Finance can jointly make fiscally neutral changes to the agreed funding envelopes based on the outcomes of Challenge reviews or Challenge performance monitoring
16. **Direct** MBIE to report back to Cabinet in February 2014 with a performance and monitoring framework for the Challenges and details on how this framework will be used to guide decisions on funding allocations between the Challenges over time
17. **Agree** to create a new Non-Departmental Output Expense 'National Science Challenges' as a five-year Multi-Year Appropriation in Vote: Science and Innovation commencing 01 October 2013, and expiring 01 October 2018
18. **Agree** that the scope of this appropriation be 'This appropriation is limited to research and research applications to find innovative solutions to fundamental issues New Zealand faces in its future development'
19. **Approve** the following change to appropriations to give effect to the policy decision in recommendation 5 and 6 above with no impact on the operating balance:

	\$m - increase/(decrease)				
Vote Science and Innovation	2012/13	2013/14 to 2017/18			
Non-Departmental Output Expense: National Science Challenges (MYA)		175.5			
Non-Departmental Output Expense: National Science Challenges	(42.1)	(37.4)	(35.0)	(30.5)	(30.5)
Total Operating	0.0	0.0	0.0	0.0	0.0

20. **Note** that the indicative funding profile for the new Multi-Year Appropriation described in recommendation 17 above is as follows:

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

21. **Agree** that the 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

22. **Authorise** the Minister of Finance and the Minister of Science and Innovation to jointly make fiscally neutral adjustments to the Multi Year Appropriation: 'National Science Challenges'
23. **Note** that the membership of the Science Board will be augmented to increase its capability to manage the portfolio of Challenge collaborations
24. **Agree** that following Cabinet's decision on these recommendations:
 - a. I will issue a press release on the funding envelopes and next steps; and
 - b. make this Cabinet paper publicly available.

Hon Steven Joyce
Minister of Science and Innovation

4 September 2013

RELEASED

Appendix 1: (High level implementation plans) Attached

Implementation of Tranche One of the National Science Challenges			
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
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
Indicative themes	Resilient Society Natural hazards risks are better understood and managed, reducing vulnerability and improving response and recovery.	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.	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.
Outcomes	Resilient buildings and infrastructure Losses due to building and infrastructure damage or failure are avoided and minimised. Risk assessment Cost-effective mitigation measures are in place across all natural hazards, and residual risk is managed effectively. Geological hazards The ability to avoid and minimise losses due to geological hazards is improved. Weather hazards The ability to avoid and minimise losses due to weather hazards is improved. Fire hazards The ability to avoid and minimise losses due to fire hazards is improved.	Biomarkers (measuring impact, clarifying risk) New Zealand science provides authoritative leadership and capability on validated biomarkers for human health. Meeting consumer preferences and health values Profitable high-value food products are produced and marketed backed by scientifically validated health claims. Science of food The biological delivery of safe, efficacious and acceptable food products to consumers is enabled, regardless of target export market. Explanatory note: Food = food and beverages.	Predictions/projections of change Predictions/projections for the 'consequences of change' are improved. 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. 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.
Possible key research providers	GNS Science, Massey University, NIWA, Scion, the University of Auckland, University of Canterbury, University of Otago, University of Waikato, Victoria University of Wellington	AgResearch, ESR, Malaghan Institute, Massey University, Plant and Food Research, Riddet Centre, the University of Auckland, University of Otago, Victoria University of Wellington. Overseas organisations likely to be involved.	Cawthron Institute, GNS Science, Massey University, NIWA, University of Canterbury, University of Otago, University of Waikato, Victoria University of Wellington. Significant scope for international collaboration.
Proposed funding (over 10 years excl GST)	Total: \$59.4 million New funding: \$17.4 million Existing contracts: \$42.0 million	Total: \$83.8 million New funding: \$30.6 million Existing contracts: \$53.2 million	Total: \$51.1 million New funding: \$35.0 million Existing contracts: \$16.1 million
Assessment of readiness	Ready to go, collaborative model already exists	Preliminary discussions have taken place – can move quickly	Preliminary discussions have taken place

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

1. The following criteria were used by MBIE science investment staff to ascertain the allocation of new funding to 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. From 2016/17, the new funding baseline from Budget 2012 and 2013 will be \$30.5m.
3. In 2012/13, \$1.5m from the National Science Challenges appropriation was spent on departmental expenses in developing the Challenge approach and public consultation (including TV advertising) related to the Challenges. In addition, \$0.5m from the National Science Challenges appropriation has been allocated to departmental expenses on an on-going basis.
4. The investment profile for Challenges across the contract period can be determined following the RfP process to support the needs of Challenge collaborations. Subject to Cabinet agreeing to create a MYA, funds available for investment in Challenges (new funding and funds in existing contracts mapped to Challenges) can be redeployed within the ten year period. The expected surplus of new NSC funding of \$33.7m from 2013/14 will be transferred into the MYA using an expense transfer.
5. The table below shows the proposed maximum allocation of new National Science Challenges funding to first tranche Challenges from 2013/14 to 2022/23. The actual profile of funding over this period can be amended to suit research needs using the proposed MYA.

Table showing the proposed maximum allocation of new funding for the first tranche of Challenges over the ten-year period of the first tranche of Challenges (2013/14 to 2022/23)

Challenge	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	TOTAL
High Value Nutrition	3.3	3.5	3.5	3.5	3.2	3.2	2.60	2.60	2.60	2.60	30.6
Nature's Challenges	1.8	2	2	2	1.8	1.8	1.49	1.49	1.49	1.49	17.4
The Deep South	3.8	4	4	4	3.6	3.6	2.98	2.98	2.98	2.98	35.0

Appendix 3: Indication of the potential contribution of CRI core funding to the first tranche of Challenges

1. The numbers in the table below give an indication of the potential contribution that CRI core funding may make to the first tranche of Challenges, and are based on an assessment by CRIs of their current (2013/14) planned investments in Challenge-related research. The total CRI contribution over the ten-year period 2013/14-2023/24 has been calculated by multiplying 2013/14 funding over the period.
2. Funding linked to Callaghan Innovation Research Limited (CIRL) has not been included in these calculations.

Potential annual contribution of CRI funding to the first tranche of Challenges

Challenge	AgResearch	ESR	GNS	Land-care	NIWA	Plant & Food	Scion	Total	Research	Collections and Databases	Tech-transfer and other
High-Value Nutrition	Withheld under s.9(2)(b)(ii) of the <i>Official Information Act 1982</i>							9.7	9.6	-	0.0
Resilience to Nature's Challenges								14.2	12.5	0.5	1.3
The Deep South								3.7	2.9	0.7	0.2
Total								27.6	25.0	1.2	1.5