In Confidence

Office of the Minister of Science and Innovation

Chair
CABINET ECONOMIC GROWTH AND INFRASTRUCTURE COMMITTEE

NATIONAL SCIENCE CHALLENGES

Proposal

1 I propose to determine a set of National Science Challenges, as the apex of New Zealand's science investment priorities, to create a more strategic approach to science investment in New Zealand. The Challenges will be confirmed by early 2013.

2 The Challenges will be a set of mission-oriented science goals that will help to address some of the most fundamental issues New Zealand faces for its future development.

3 I propose that the process of identifying the Challenges includes significant public engagement, and I request Cabinet endorsement of this approach.

Executive summary

4 The Government confirmed its support for National Science Challenges (also referred to as Challenges) in Budget 2012, with $60 million of additional funding over four years, fulfilling a National Party election pledge.

5 Getting better value from our science investment is a key component of the Business Growth Agenda. Science underpins innovation that can increase productivity. Scientific knowledge is also used to support important social, cultural and environmental outcomes.

6 National Science Challenges will identify big science-based issues for New Zealand that, if addressed, will contribute significantly to the wellbeing of the nation, including through economic growth. The Challenges will be aspirational outcomes that are national in scale and in areas where science can potentially make a significant contribution.

7 We have an opportunity to get better value and leverage from science investments by using the Challenges concept to focus effort on ten or so big science-based issues. In this way, we can draw existing initiatives together and use the new funding to extend or complete current work or fund entirely new areas.

8 I propose to direct officials to undertake a process for identifying the Challenges in the first instance. This process will include broad public engagement in identifying the major issues facing New Zealand. To attract wide participation beyond the science community, a television campaign will be used to engender greater public interest in science and how it can contribute to addressing New Zealand's biggest issues.

9 This strategic approach to science investment has potential implications for how science is funded and for the structure of Vote Science and Innovation. I also propose that MBIE officials, in consultation with other relevant agencies, consider how the Challenges will be implemented; the implications for the Ministry of Business, Innovation and Employment

(MBIE)'s science funding arrangements and New Zealand's science and innovation system; and the structure of Vote Science and Innovation as part of existing workstreams.

10 This paper seeks Cabinet endorsement of the approach to more strategic science investments, and the broad public engagement in identifying National Science Challenges. The latter will require a technical transfer to support the broad public engagement. The Challenges will begin to be invested from around July 2013 at the earliest.

Background

11 At the election, the National Party announced a new policy to invest $60 million over the next four years in a series of National Science Challenges to find innovative solutions to some of the most fundamental science-based issues New Zealand faces in its future development. The funding was confirmed in Budget 2012.

12 New Zealand faces a number of extensive, national scale issues with science-related components that, if addressed, have the potential to contribute significantly to the wellbeing of the nation, including through economic growth. These issues cut across different sectors, with different government-agency funding and accountability relationships. Therefore, they are harder to respond to, under the existing science and research funding arrangements. A structure focused on the major cross-sectoral issues is more likely to achieve the science required to address those issues.

13 The National Science Challenges provide an opportunity to harness and focus existing and new scientific effort on the most important science-based issues facing New Zealand, to ensure greater impact. The New Zealand Government invests $1.2 billion in science and innovation and related activities, and it is important that it is directed at the issues of greatest benefit for the country. A broader approach to National Science Challenges will enable the additional funding to leverage existing initiatives and to address bigger issues than was originally envisaged.

14 The Challenges will build on the public interest in science generated by the Transit of Venus event. A very public approach will help to increase the general understanding of how science contributes to the nation's wellbeing and encourage a more scientific approach to tackling the challenges facing us. It will help to lift the profile of science and other disciplines among young people with the aim of encouraging more people into science and technology based careers. The identification of the Challenges will, therefore, involve significant public consultation as well as analysis by officials and science-user and -provider input.

Comment

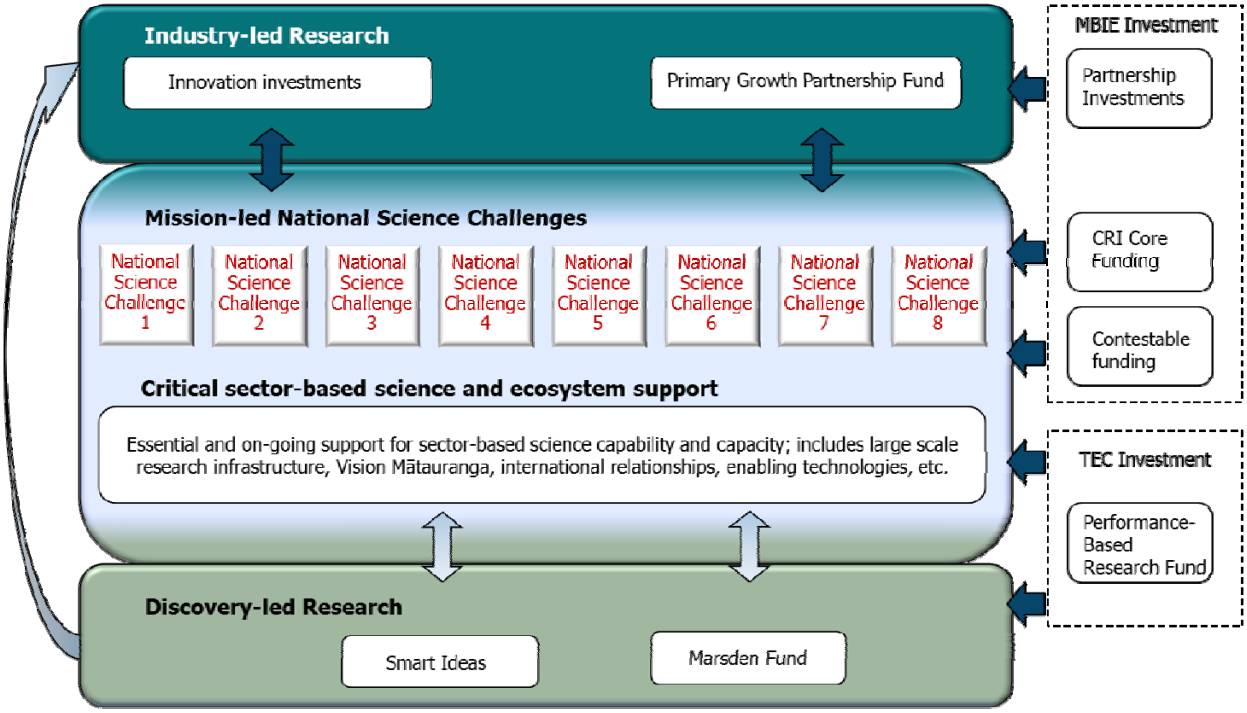
What are the National Science Challenges?

15 New Zealand faces a number of issues and opportunities that, if solved, would be prospects for creating a better New Zealand. The National Science Challenges provide an opportunity to identify which issues are most important to New Zealand and will allow the Government to take a more strategic approach to addressing them through existing and future science investments.

16 The National Science Challenges will be mission-led science priorities that respond to the most important, national-scale issues and opportunities identified by science stakeholders and the New Zealand public (see Figure 1). The Challenges will complement other

science priorities and business-led and discovery-led components of the science ecosystem.

Figure 1 Framework for science investments (simplified)

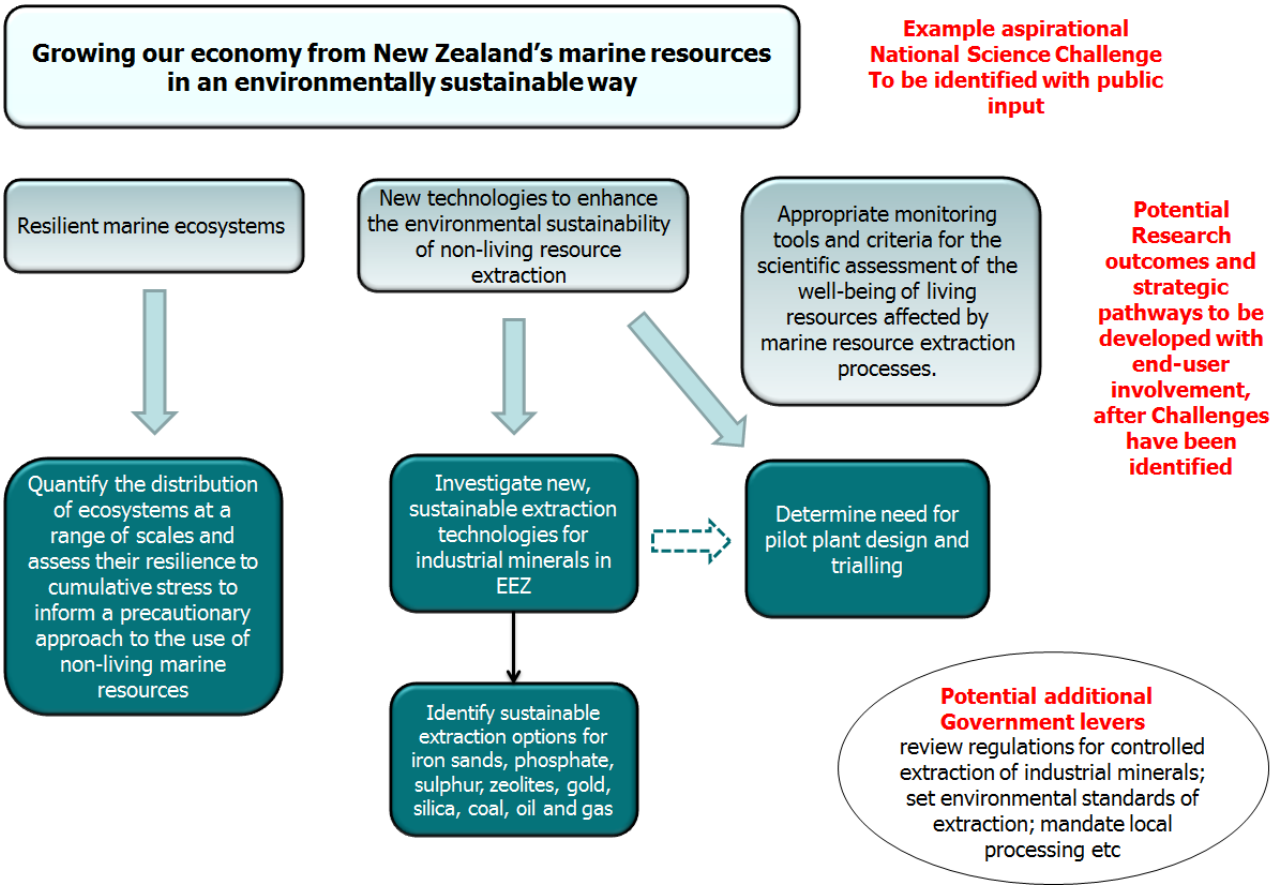


17 Each Challenge will include a number of initiatives, co-ordinated to provide a clear and connected pathway to achieving the outcomes sought, and connected with end-users to promote adoption. Recommendations from science outcomes will be made that relate to other levers (e.g. Government policy, see Figure 2).

18 Over time, we will focus relevant funding on these Challenges in addition to the National Science Challenges funding; draw existing initiatives together across government to ensure that they are well co-ordinated and directed; and use new, targeted investments to extend and complete work as well as fund new work needed to address the Challenges.

19 The National Science Challenges build on the approach used for the Australian National Research Priorities and the Australian Flagship programmes, governed and managed by the Commonwealth Science and Industrial Research Organisation (CSIRO, Australia's main science provider). The Flagships model does not encompass all science investment, but focuses a portion of annual CSIRO investments (about 45%) on the most important research outcomes needed to address particular priorities. Other CSIRO investments support the priority science needs that are not national-scale priorities, and it is envisaged New Zealand would similarly continue to support important science outcomes that sit alongside, and are separate from, National Science Challenges. MBIE would manage the investments to National Science Challenges from Vote Science and Innovation, while other agencies may take the lead as appropriate on some Challenges. MBIE may devolve management to science providers through collaborative platforms.

Figure 2 Example of a National Science Challenge



The National Science Challenge approach will allow us to improve the value of our investment in science

20 This approach to National Science Challenges provides the opportunity to get better value from our science investment. It will permit a more strategic approach to managing and coordinating science investments to achieving national scale, cross-sectoral Challenges. It also provides the impetus to improve collaboration between researchers and end-users of science; and to focus research on the desired outcomes to incentivise the implementation of research results, increasing their subsequent impact.

21 A whole of government approach based on National Science Challenges has several benefits. It will:

a Enable more strategic alignment of investments across Government agencies over time by having a clear framework for coordinating and aligning public investments in science towards the Government's goals;

b Increase the potential value from the Government's science investments by focusing research investment on outcomes that can add the greatest benefit to New Zealand;

c Ensure that any policy decisions required to address Challenges are included in the consideration of what components of research to undertake;

d Identify specific science-related gaps that need to be filled with new investment to achieve progress towards addressing the Challenges;

e Provide certainty of direction to other science funders, users and providers by sending the signals that they can use for research planning; and

f Provide a better basis for decisions on what science to invest in and when to cease investing in science outcomes through better monitoring of investments across all portfolios.

22 It is likely that a significant amount of work currently underway is already contributing to some aspects of National Science Challenges. However, the current approach can be improved. The Government's current pattern of science investment, e.g. CRI core funding and science contestable funding, is governed by investment plans that are not necessarily devised with an integrated, strategic view to addressing issues of greatest national importance. The National Science Challenge approach could also improve delivery of science services to meet the needs of the Māori economy and the growth of the Māori asset base.

23 The National Science Challenges approach will maximise existing effort, through extensive coordination to achieve progress on science outcomes agreed with other research funders, providers and users; identify the gaps that require additional resources; and connect solutions to end users so that results can be applied to the Challenges.

24 The more strategic and co-ordinated approach to science funding implied by the Challenges has ramifications for the existing funding system used by MBIE. For example, the Challenges approach could involve different funding mechanisms than the current contestable model. It also suggests a substantially greater role for MBIE in co-ordinating the science work programmes that it funds.

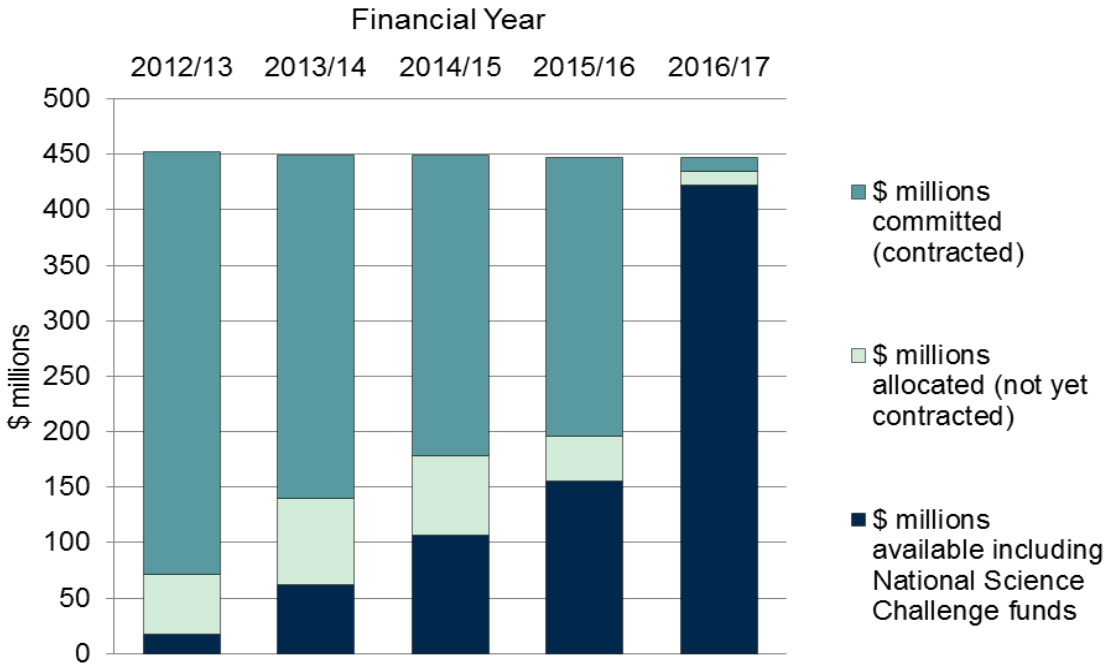
25 I propose to direct officials to identify appropriate funding and implementation mechanisms for the Challenges and analyse the implications on the science and innovation system and other science funding as part of a priority policy work stream: to review and simplify funding models for research and commercialisation.

26 Once the Challenges have been identified, existing initiatives, including for example research projects in universities, will be mapped to each Challenge to identify gaps where new science investments and other activities (such as policy interventions) are required to achieve it. CRIs, universities, and other science providers will be deeply involved in the process to identify and develop pathways for achieving the Challenges, alongside government agencies and other research users.

27 The additional $60 million over four years of science and innovation funding made available for National Science Challenges in Budget 2012 will be exclusively applied to Challenges. At present, much of Vote Science and Innovation is committed to medium and long-term projects and outcomes supporting a variety of important science-related areas. Over time, as existing contracts end and these other funds become unallocated, this funding will be available for allocation to support Challenges where appropriate (see Figure 3).

28 I propose to direct officials to develop a Statement of Science Investment Priorities once National Science Challenges have been identified. The Statement will specify the balance of funding across industry-led, mission-led and discovery-led research and also include the balance of funding across Challenges and other critical, sector-based science activities.

Figure 3 Committed, allocated and available MBIE science investments 2012/13 - 2016/17



Allocated means funds can be redirected, but they are currently intended for a particular science priority area.

The Challenges will be identified with a public, transparent, inclusive process

29 The recently held celebration of the Transit of Venus, including a science forum and schools engagement, demonstrated the importance of involving New Zealand communities in science at the grass roots level. To follow on from this approach, I propose a dual consultation process that not only obtains input from key science funders, providers and users but also engages with the public to identify significant National Science Challenges. This is a novel way for both engaging public in science and addressing public investments to issues of greatest public interest.

30 It is important that we have strong public engagement to identify the National Science Challenges, to ensure an enduring public support and endorsement of investments. A public approach will help to lift the profile of science and other disciplines, particularly among young people and their families, lifting the level of science literacy in New Zealand. It will also encourage more people into science and technology based careers, and foster a more scientific approach to tackling New Zealand's challenges.

31 Strong input from science funders, users and providers will ensure that the Challenges are in areas where science can make a significant contribution, noting that other, non-science-related actions will also be essential to address National Science Challenges.

32 The process for identifying and prioritising the Challenges builds on world-standard practices that are:

a Consultative, with broad input from the public, experts and research users

b Rigorous, based on greatest expected benefit, or highest value, to New Zealand

c Transparent, with clear processes and criteria

d Timely, balancing credibility and durability against speed of the process.

33 The process will identify the important, national-scale issues that New Zealand most needs to address, and the corresponding areas for which science can make a difference, as conceived by expert research users and providers, and the public. A key factor for the identification of the Challenges will be a focus on how the research results will be implemented to achieve outcomes sought.

34 The process will involve a number of phases (see Figure 4):

a Identification of illustrative Challenges to inform engagement

b Wide public engagement as well as engagement of experts and end-users to identify potential Challenges

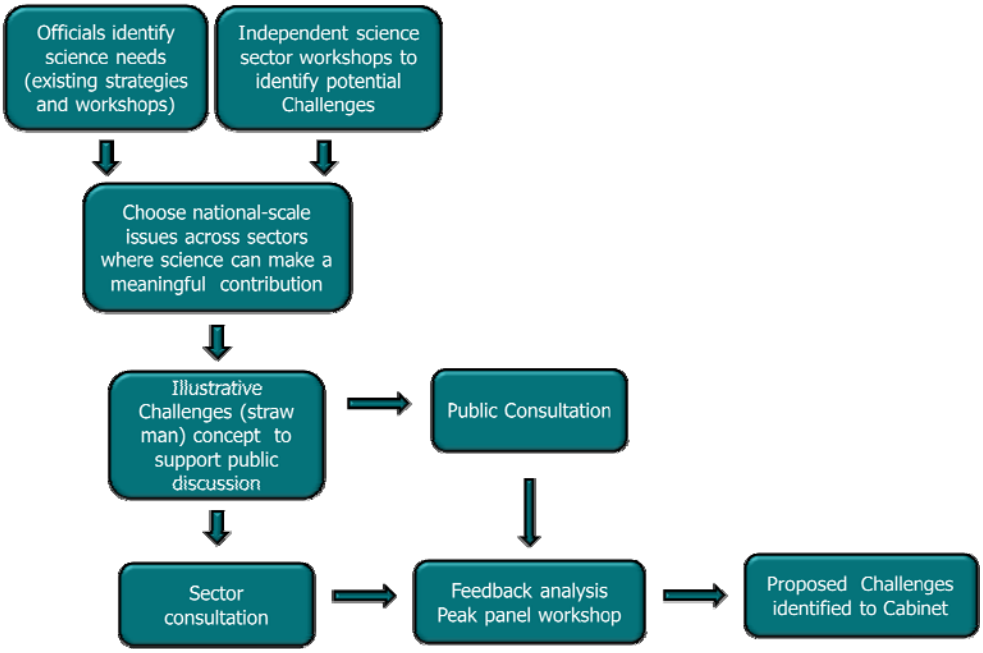
c Analysis and prioritisation of longlist of potential Challenges using panels of experts and end-users

d Identification of shortlist of proposed Challenges using peak panel of experts chaired by Professor Sir Peter Gluckman

e Selection of National Science Challenges by Cabinet.

35 The public consultation will include a number of activities to excite public interest in, and contributions to, identifying National Science Challenges, including a television promotional campaign. This campaign aims to raise public awareness of the opportunity to be involved in identifying our greatest National Science Challenges.

Figure 4 Process for identifying challenges



36 The proposed process for identifying the Challenges with broad public input will take four to five months. This time is needed to develop a television campaign, and associated resources for the public, that can support widespread public engagement.

37 The shortlist of proposed Challenges will be provided for approval by Cabinet in March 2013.

Risks

38 Using a broad public engagement to identify high level National Science Challenges has the potential to raise unrealistic expectations around issues that can be solved by the Government (or addressed through science alone). This risk will be mitigated by offering examples of potential Challenges (as identified by government departments, other science users, and science providers that relate to existing government strategies and priorities). Explanations around the contribution of other mechanisms - apart from science - to resolve issues will also be provided.

Consultation

39 The following agencies have been consulted on this paper: Ministries of/for Health, Primary Industries, Education, Environment, Transport, Maori Development, Social Development, the Tertiary Education Commission and the Department of Conservation. The Department of Prime Minister and Cabinet has been informed.

Financial implications

40 The extensive public engagement that will be undertaken will require some of the appropriation for the National Science Challenges to be diverted to departmental expenditure, to enable the communications plan described.

41 I propose a transfer of $1 million to departmental expenditure in the first year from the National Science Challenges funding to support a comprehensive communications and engagement strategy, including a television publicity campaign, in order to maximise the potential public engagement in identifying issues of national importance.

Human rights, gender, disability, legislative and Regulatory Impact and Business Compliance Cost Statement implications

42 This Cabinet paper does not raise any issues with implications for human rights, gender, disability, legislative, or business risks.

Publicity

43 There will be an announcement at the commencement of the project following Cabinet approval of this paper to make the public aware of its opportunities to contribute to identifying issues of national importance.

44 The communications strategy aims to engage the general public (beyond the science sector) in thinking about New Zealand's greatest challenges to which science can contribute, and will involve a television campaign. It will direct how the public can participate both in identifying Challenges and will outline on-going science engagement with the public. This is an opportunity to raise the awareness of science across New Zealand society.

45 The second stage of the communications strategy provides for ongoing engagement of schools in the Challenges, using existing 'science in schools' schemes and linking them and the school curriculum with the National Science Challenges.

46 There will be an announcement following the final decision by Cabinet on the Challenges to be undertaken in 2013.

Recommendations

47 I recommend that the Committee:

1. **Note** that the government confirmed its support for National Science Challenges in Budget 2012, with $60 million of additional funding over four years.

2. **Note** that the National Science Challenges will involve a strategic approach to science investment that will align, coordinate and fund science work programmes to tackle the Challenges, to address some of the most fundamental science-based issues New Zealand faces in its future development.

3. **Note** that National Science Challenges will be identified using broad consultation with science users, science providers, and the public.

4. **Agree** to a broad public engagement process to support identifying the National Science Challenges, including a television campaign and a public announcement.

5. **Note** that Cabinet approval will be sought in 2013 on the Challenges identified.

6. **Direct** officials at MBIE in consultation with other relevant government agencies and the Prime Minister's Chief Science Advisor, to identify a shortlist of National Science Challenges for Cabinet approval and report back in March 2013.

7. **Direct** officials at MBIE in consultation with other relevant agencies to:

    a. determine the appropriate investment mechanisms to support the National Science Challenges,

    b. determine the implications for the New Zealand science and innovation system of implementing the Challenges, and

    c. report back in March 2013.

8. **Direct** officials at MBIE in consultation with other relevant agencies to develop a Statement of Science Investment Priorities including implications for changes in funding for the science and innovation system, and report back by June 2013.

9. **Agree** that a new Output Class "Public consultation and engagement on National Science Challenges" be added to the Multiclass Output Expense appropriation "Advice and Support on Shaping the Science and Innovation System in Vote Science and Innovation to provide for the additional costs of public engagement including a promotional television campaign.

Advice and Support on Shaping the Science and Innovation System	**Scope Statement**
Public consultation and engagement on National Science Challenges	This output class is limited to costs of public engagement on National Science Challenges

10. **Approve** the following changes to appropriations, with no impact on the operating balance:

	$m – increase/(decrease)			
Vote Science and Innovation Minister of Science and Innovation	**2012/13**	**2013/14**	**2014/15**	**2015/16 & Outyears**
Departmental Multi-class output Expense: Advice and Support on Shaping the Science and Innovation System MCOA Public consultation and engagement on National Science Challenges (funded by revenue Crown)	1.000	0.00	0.00	0.00
Non Departmental Output Expense: National Science Challenges	(1.000)	(0.00)	(0.00)	(0.00)

9. **Agree** that the proposed changes to appropriations for 2012/13 above be included in the 2012/13 Supplementary Estimates and that, in the interim, the increase be met from Imprest Supply.

10. **Note** that the Minister of Science and Innovation will keep Ministers informed on progress on identifying the National Science Challenges.

Hon Steven Joyce
Minister of Science and Innovation

_____ / _____ / 2012