

Questions and Answers

1. What are the National Science Challenges?

The National Science Challenges will tackle some of the biggest science-based issues and opportunities facing New Zealand.

The Challenges are designed to take a more strategic approach to our science investment by targeting a series of goals which, if they are 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 to achieve a common goal through collaboration.

2. Why are the National Science Challenges necessary?

New Zealand faces a number of large and complex issues and opportunities that if solved or addressed have the potential to have a positive impact on New Zealand's future.

We have a small and reasonably fragmented science system. Aligning and focusing research through the Challenges will help the Government and New Zealand to meet those challenges and get better value from our annual investment of \$1.2 billion in science and innovation.

Our science system is also an important part of our economic and people-to-people linkages to the wider world. The Challenge research will assist New Zealand to become a bigger player in the identified areas of work, and provide opportunities for innovation and business development on the world stage.

The process for identifying the National Science Challenges

3. How were the Challenges identified?

The process involved a number of phases:

- a. Engagement with the public, science sector and science users between September 2012 and January 2013.
- b. Analysis and prioritisation of potential Challenges by an independent panel of experts chaired by the Prime Minister's Chief Science Advisor Professor Sir Peter Gluckman between February and March. A report was provided to Ministers on 27 March. The panel's report is here:

<http://www.msi.govt.nz/assets/Update-me/National-Science-Challenges/Peak-Panel-report.pdf>.

- c. Cabinet consideration and approval of ten challenges in April 2013.

4. What was the public engagement process?

The Great NZ Science Project television and social marketing campaign was used to raise public awareness about the Challenges, and the public were invited to share their views online. Alongside this, a series of workshops with the science sector, including businesses, government (local and central) users of science, and science providers were run. The workshops also focused on identifying how the Challenges are relevant to Māori across all sectors.

223 eligible submissions were received from the science and research sector. The public campaign resulted in 138 submissions and 616 ideas and comments discussing the submitted challenges posted to the Challenges websites. By the end of January the Great NZ Science Project website had received 34,908 unique visitors. A Facebook page received approximately 15,000 followers by the end of January, indicating a high level of public interest in the Challenges.

6. What was the independent panel process?

The National Science Challenges Panel consists of 11 science experts and representatives of emerging researchers appointed by the Minister and chaired by the Prime Minister's Chief Science Advisor Professor Sir Peter Gluckman. It met to identify Challenges between February and March 2013. The Panel was provided with the submissions received from the science and research sector, and a summary of the public submissions and comments which it used to inform the process of identifying the challenge topics. The Panel's Terms of Reference also outlined a list of criteria and features that formed the basis of the Panel's consideration of submissions and possible Challenges.

The Panel members agreed on a shortlist of challenges that met the criteria. Descriptions were developed for each Challenge which describe the opportunity and expected outcomes sought for each challenge. Themes and examples of possible research were identified for illustrative purposes.

7. What were the criteria for recommending a Challenge?

The five criteria were (refer Appendix 2 of the Panel Report):

- Targets a high level goal which, if achieved, would have a major and enduring public benefit for New Zealand
- There is wide public consensus that the Challenge will address an issue or opportunity of wide public importance to New Zealand
- Scientific research is essential to solving the Challenge
- New Zealand has the broad scientific capabilities and capacity to undertake the Challenge successfully
- There is sufficient external motivation and linkages for the research results to be successfully implemented to achieve the Challenge goal.

8. What Challenges did the Panel recommend?

The Panel identified 12 Challenges which it considered met the criteria. They are areas where the Panel considered the Challenge approach would create significant additional benefits, primarily through the strengthened coordination and integration of research. The 12 Challenges cover research to protect our environment, advance our economic growth and improve the health of New Zealanders. These recommended Challenges were:

- **Challenge 1 Aging well:** Harnessing science to sustain health and wellbeing into the later years of life, so that older people can continue to contribute to New Zealand
- **Challenge 2 A better start:** Research to improve the potential of young New Zealanders (up to 25 years) to have a healthy and successful life
- **Challenge 3 Healthier lives:** Research to reduce the burden of major New Zealand health problems
- **Challenge 4 High value nutrition:** Research to develop high value foods with validated health benefits
- **Challenge 5 New Zealand's biological heritage:** Research to protect and manage our biodiversity
- **Challenge 6 Towards more sustainable primary production:** Research to enhance primary productivity to meet future demands while protecting water quality and recognising environmental constraints
- **Challenge 7 Enhanced biosecurity:** Research to enhance our resilience to potential harm caused by the invasion of organisms that affect the health of animals and plants
- **Challenge 8 Life in a changing ocean:** Research to understand, exploit and sustain our marine richness
- **Challenge 9 The Deep South:** Research to understand the role of the Antarctic and Southern Ocean in determining our future environment

- **Challenge 10 Science for technological innovation:** Research to enhance the capacity of New Zealand to use physical and engineering sciences for economic growth
- **Challenge 11 Building better homes, towns and cities:** Research to develop affordable and better housing and urban environments
- **Challenge 12 Nature's challenges:** Research to enhance our resilience to physical challenges that nature throws at us

9. Why were only 10 of the Challenges selected?

In April 2013 Cabinet considered the Panel's report and approved 10 of the Challenges by combining two of the challenges and deferring another of the Challenges identified by the Panel.

The biodiversity and biosecurity Challenges (Challenges 5 and 7) identified by the Panel have quite close linkages and will be combined into a single Challenge (something the Panel had originally considered during their deliberation). This will be titled, '**New Zealand's biological heritage – protecting and managing our biodiversity, improving our biosecurity, and enhancing our resilience to harmful organisms**'.

The *Building better homes, towns and cities* Challenge (Challenge 11) identified by the Panel has been deferred. Deferral will allow time to assess whether the research strategy currently being developed by the building and construction industry (*Building a better New Zealand*, led by BRANZ) would benefit from being fully incorporated into a National Science Challenge.

10. Why are some key research areas not identified as challenges?

Some important areas of science identified through submissions have not been selected as standalone Challenges because they are cross-cutting issues that are woven through a number of the Challenges. Elements of climate change, for example, are reflected in components of a number of Challenges. Understanding the impact of climate change is a focus of the Deep South Challenge while the Challenges addressing sustainable primary production, biodiversity and biosecurity, and nature's challenges include research on managing and adapting to climate change.

11. What will happen to research in areas that are not covered by the NSCs?

Not all areas of science that are of importance to New Zealand are able to be covered by the Challenge approach, but this does not make them any less important for New Zealand to address. The government's support for this wider research

agenda will be addressed in the upcoming National Statement of Science Investment.

12. How long are the Challenges intended to last?

The Challenges are intended to be long term priority areas for mission-oriented investment science. The research plans will set the agenda for up to 10 years. This will provide increased clarity on the strategic direction of research and greater certainty to researchers, end users and organisations.

Medium term review and evaluation of each Challenge will be undertaken, and the reviews could result in the Science Board making decisions to seek revisions to a research plan, or to increase or decrease the allocated funding.

Challenge governance arrangements

13. How will the Challenges be managed?

- An expanded Science Board will act as an overarching governance body. It will formally appoint the Challenge leads, manage the allocation of Challenge funding to research plans and oversee the performance and progress of each challenge. Additional members will be appointed to the current Science Board to supplement the skills of the current Board.
- Each Challenge will have a lead(s) entity that will be responsible for managing the delivery of the research, funding and other resources to address the Challenge research goals. For the more complex Challenges, leads may be appointed for each of the themes within the Challenge. They will be accountable for the fulfilment of contractual and performance requirements as agreed with the Science Board.

14. How will the Challenges be implemented?

High level implementation plan

A high level implementation plan is being developed for the National Science Challenges as a whole and for individual Challenges. The purpose of this is to refine and clarify the research themes of the Challenges and the research components involved in each theme. Research gaps and opportunities are being identified by mapping existing research across government, and (where known) the private sector, to challenges.

The plan is being developed by MBIE, in cooperation with the Panel, government departments and, where relevant, other key experts.

Workshops

Once the high level plan is developed, workshops for each Challenge will be held with science providers, industry groups, relevant officials from local and central government, sector stakeholders and Panel members to refine the research detail for each Challenge. A proposed Challenge lead and collaborative research group are expected to emerge through these workshops.

Development of detailed research and business plans

The Challenge collaborative groups, guided by the Challenge lead, will then develop detailed research and business plans building upon the high level plan as refined through the workshops. Following approval of the Challenge research plan by the Science Board, MBIE will finalise contracts among Challenge leads and participants.

15. How can stakeholders get involved in the workshops, especially those who do not currently have contracts in the Challenge areas?

Key stakeholders, industry groups and end-users will be invited to participate in the workshops. There will also be an open invitation to all research providers who might wish to participate in the delivery of a challenge. These will be held following development of the high level implementation plan. Details will be available on the National Science Challenges website by the end of May

16. How can early career researchers get involved?

There will be an expectation that research organisations, including those participating in Challenges, will involve an appropriate mix of individuals to deliver research programmes, including post-doctoral researchers. As part of the Challenge implementation we are looking at ways we can support post-doctoral and early stage researchers whose work is aligned with the Challenges.

17. Will the Challenges be led by new entities?

The scale and nature of the research programme needed to address a Challenge will need to be delivered through some form of collaborative arrangement that is fit-for-purpose to meet the research needs of each Challenge. There will need to be a legal entity designated as a Challenge lead. The Challenge lead will have responsibility for managing the long-term research programme to deliver a Challenge, ensuring funding is allocated and managed appropriately by Challenge participants, and for

monitoring and reporting on the delivery of the research projects. This Challenge lead could be an existing entity or a new collaborative arrangement specifically formed to lead a Challenge. There are already a number of effective collaborative arrangements in operation in the sector, for examples, the Centres of Research Excellence (CoREs), the Natural Hazards Platform and research partnerships and consortia.

18. What is the implementation timeline of the Challenges?

The implementation of the Challenges will be staggered. A sequenced implementation will enable research providers the necessary time to develop their research proposals and their agreements to support collaborative participation in a Challenge. Some Challenges will be ready to start sooner because their research programmes are smaller in scale, and/or they have well-developed research strategies in place, and/or they have existing collaborative arrangements to draw upon.

It is anticipated three to four Challenges will commence work in 2013. It is expected a further three Challenges will be implemented by March 2014 and the final three to four by September 2014.

Funding

19. How do the Challenges fit within the Government's plan for science and innovation?

The Government has recently published the *Building Innovation Progress Report* setting out a comprehensive range of initiatives for improving science and innovation. Boosting public science investment is a core initiative in the plan. The Challenges are key in making sure this investment is focused on research that is relevant to New Zealand, and achieves value for taxpayers.

20. Will the Challenges affect Government funding of science?

Over time the Challenges will have implications for how science is funded in New Zealand. A proportion of the Government's contestable contract funding will, over time, be transferred to support the achievement of the Challenges. Existing contracts will not be affected, but where their research outcomes contribute to the Challenge, it will be important that there is general awareness amongst Challenge participants of the research, thereby ensuring that the Challenge research programme avoids duplication and identifies new opportunities and activities.

Where appropriate, the Crown Research Institutes, the Health Research Council, Callaghan Innovation and other government research funders will align their research investments to support the Challenges.

21. How will the National Science Challenges affect Crown Research Institute Core Funding?

Crown Research Institute (CRI) core funding will not be affected. CRIs will play an integral role in participating in Challenges relevant to their areas of expertise. While CRIs will appropriately align their research programmes to support the Challenges, they will continue to maintain responsibility and control of research funding that is related to a Challenge. Research in non-Challenge areas will be retained and accounted for separately.

22. Does this mean there will be more money for science?

Yes. The Government is committed to continuing to increase public science and innovation funding towards 0.8percent of GDP as fiscal conditions allow, as outlined in the recent *Building Innovation Progress Report*.

New funding of \$60 million (over four years) was announced in Budget 2012 to support the implementation of the Challenges and a further \$73.5 million will be allocated in Budget 2013 as part of the Internationally Focused Growth package. This \$133.5 million (over four years) will be used to fund new research in support of the Challenges.

The introduction of the Challenges approach does not reduce the level of government commitment to support the wider research agenda. The role of other science investment, such as the Marsden Fund, infrastructure, and science skills will be addressed in the upcoming National Statement of Science Investment. It is due to be considered by Cabinet in June 2013.

23. How will funding be allocated between and within Challenges?

The high level Challenge implementation plan will identify research gaps and opportunities, and the existing research components and elements that are contributing to a Challenge. Cabinet will set a funding envelope for each Challenge based on the implementation plan. The overall mix of investment across the Challenges will depend on the identified gaps and opportunities in research and funding needs across the Challenge programme.

The detailed research and business plans developed for each Challenge will build on the implementation plan and provide the detail of the research projects underlying the Challenge and the funding requirements to support those projects. The Research plans will be assessed by independent peer reviewers. The Science Board will manage the allocation of funding to research plans within the funding envelope for the Challenge set by Cabinet.

24. Won't the Challenges just be another addition to a crowded sea of research grants?

No. Many of the large science-based issues that are fundamental to New Zealand's development cut across different sectors, with different sources of government funding, making them harder to fully respond to. The Challenges will simplify, coordinate and focus new and existing research to address these issues, and will also maximise the benefits of existing expenditure.

Monitoring and Evaluation

25. How will delivery of the Challenge outcomes be monitored and evaluated?

A comprehensive monitoring and evaluation framework will be a cornerstone of the implementation of the Challenges. Components of this will include:

- Rigorous independent peer review and assessment of research plans before they are submitted for approval by the Science Board.
- The provision of funding for each Challenge for a set period of around 3-5 years. The performance of each Challenge in achieving its defined outcomes (both science quality and impact of research) will be reviewed prior to expiry of the funding. This may lead to decisions including revising the research plan, reviewing, increasing or decreasing funding or winding up the Challenge.
- Monitoring of the effectiveness and impact of the Challenge approach as a whole. This may lead to decisions to refresh the Challenges or adjust the Challenge approach.

Leadership Challenge – Science and Society

26. What is the leadership Challenge?

The National Science Challenges Panel identified a special 'leadership challenge' for the government (refer Panel report: <http://www.msi.govt.nz/assets/Update-me/National-Science-Challenges/Peak-Panel-report.pdf>). This Challenge asked government to take a lead in improving the science capacities and the public's understanding of science, including science education in schools. The Panel noted

that the success of all the Challenges depends on enhancing the role that science plays in New Zealand society. .

27. What were the Panel's recommendations for the leadership Challenge?

The Panel identified the need for government and its agencies to take concrete steps to promote the necessary science capacities and literacy of New Zealanders through:

- Science, technology, engineering and maths (STEM) education in primary and secondary schools
- Public understanding of science
- Technology assessment and risk forecasting
- Early discussion amongst society on new technologies to develop the social licence and agree boundaries.

28. What is the role of 'science in society'?

Public engagement in science is necessary for three main reasons:

- Science, technology, engineering and maths (STEM) 'literacy' (through education and community and workplace learning) are necessary for the development of the skills required for a healthy society and knowledge-based economy.
- Awareness of the issues around science enables the public to engage in robust debate and agree where the boundaries should lie in terms of 'progress'. This is necessary to set cultural and social boundaries about what is acceptable to society, based on an understanding of the trade-offs of risks and opportunities, and understanding and coping with uncertainties.
- Evidence-based policy decisions by government enable confidence that the right decisions are being made, or that trade-offs are being accepted with full understanding of risks and opportunities.

29. How will the leadership Challenge be addressed?

Further work will be undertaken as part of the Challenge implementation to determine how best the government and its agencies can progress the leadership Challenge to ensure the government's role within the science and education sector is effective and public engagement with science is enhanced. The National Statement of Science Investment will identify how government can take up this leadership Challenge and set out the funding available for science skills leadership.