

Research, Science and Technology Policy

INTRODUCTION

New Zealand's future economic performance depends to a great extent on having a skilled, technologically confident workforce, and a society which can generate and use new ideas and new processes.

In a world increasingly dominated by the products and processes of science and technology – in business, education, health, in the environment, and in many other areas – the ability to understand these processes, to adopt new technologies, and to push the boundaries of scientific knowledge is crucially important. These abilities are fundamental to increasing productivity and driving economic growth.

In the past, the growth in New Zealand's economic base, particularly in primary production, has been on the back of world-class science – most of it publicly funded – and an ability by New Zealand producers to use new technologies.

Publicly-Funded Science

New Zealand stands out among other developed countries for the high proportion of total research and development (R&D) funded by the government, and also for our highly-competitive funding system. Most public funding of R&D goes to universities and Crown Research Institutes (CRIs), through a variety of mechanisms and a number of different pots of funding.

Publicly funded R&D has several important effects on the economy. It:

- Adds to the stock of scientific and technological knowledge which companies draw on.

- Helps to train and retain the scientists, technologists, engineers, and researchers that companies use to absorb scientific and technological knowledge, and to handle complex technology.
- Underpins our ability to make the most of our natural resources, maintain effective biosecurity, and protect our environment.
- Maintains a stock of resident experts who contribute to national problem solving.
- Results in an improved ability to understand and adapt overseas research to New Zealand purposes.
- Creates new industries and generates intellectual property that can be commercialised.
- Better informs government policy making.

With this in mind, National believes that New Zealand must have a strong base of publicly funded science, and correspondingly strong universities and CRIs.

Labour's Inconsistent Record

In recent years, Labour's economic transformation terminology has promoted a short-term "instant gratification" approach to scientific research. This has done the sector a disservice and does not recognise the myriad ways that science and technology diffuse into the economy. There has been a series of seemingly unco-ordinated policy decisions and a haphazard strategic focus. In rapid succession, the sector has veered from the "knowledge economy", to the "growth and innovation framework", to "economic transformation" and most recently to "sustainable transformation".

There is little consistency in policies. After previously rejecting an R&D tax credit, one was introduced in the 2007 Budget. The recently-announced Fast Forward Fund is not consistent with any other funding mechanism in the sector and will create a parallel bureaucracy. Labour has also cemented in a funding system where scientists seem to spend more time applying for funding and reporting on it than actually doing science. There are significant issues with capability and retention in the science sector.

National's Long-Term Goals

National's long-term goals for the publicly funded R&D sector are to ensure that:

- Excellent science is performed in stable, high-quality institutions.
- Publicly funded research is responsive to the needs of the economy, in both the long term and the short term.
- Resources are directed towards areas of importance for New Zealand.
- Bureaucracy and compliance costs are minimised.
- There are clear performance and accountability measures within the system.
- There is a good supply of research-trained scientists, engineers, and technologists into the workforce.
- Organisations the government owns are properly resourced and financially viable.
- There is an increase in the profile and prestige of science in New Zealand.

Summary of Policies

In accordance with our long-term goals, National will:

- Discontinue the R&D tax credit and use \$315 million of the savings to boost funding for research and science in the next three years.
- Set up a new secure funding allocation for Crown Research Institutes.
 - Establish an international centre of research dedicated to the reduction of on-farm greenhouse gas emissions.
 - Boost funding within Vote RS&T for primary sector and food research.
 - Boost funding for research consortia in the primary sector.
- Introduce annual Prime Minister's Prizes for science.
- Create the role within government of the Prime Minister's Science Adviser.
- Reduce compliance costs and unnecessary bureaucracy within the science system.

I. DISCONTINUING THE R&D TAX CREDIT AND FUNDING MORE SCIENCE

If the government wants more R&D performed in New Zealand, it has two broad options:

1. Give grants or tax credits to private sector firms to encourage them to undertake additional R&D.
2. Fund additional R&D directly, from public and/or private institutions.

In terms of option 1, the Labour Government gives grants to firms through Technology New Zealand and gives them a tax credit for the R&D they perform.

This tax credit was introduced on 1 April 2008, and is designed to provide an incentive for firms to undertake or commission additional R&D. It offers a credit of 15% of eligible expenditure on research and development, subject to certain requirements.

Treasury estimates that the cost of the R&D tax credit will rise from \$208 million this year to \$332 million in 2011/12. This is substantially more than the estimated cost when the policy was first announced.

This means that in the current year, more than 20% of the government's total spending on R&D is option 1 spending – that is, it is made up of the R&D tax credit and grants to private-sector firms.

National has concerns about this balance of spending because there is a real risk that the R&D tax credit will be ineffectual.

First, the tax credit subsidises a great deal of R&D that would have happened anyway, whether or not there was a tax credit. Therefore, much of the money paid out as a tax credit will effect no change in the level of R&D whatsoever.

Secondly, it is not clear how much new R&D expenditure the tax credit will encourage that wouldn't otherwise have occurred. The credit will almost certainly result in a rise in reported expenditure on R&D, but in part this will be because there is now an incentive to get expenditure classified as R&D for the purposes of claiming the credit. Accounting firms have been active in advising firms on how to report their expenses so as to claim a credit. So the real increase in R&D as a result of the tax credit cannot be easily measured, and may be quite small.

Given these concerns, National believes the appropriate action is to discontinue the R&D tax credit and spend more on directly purchasing R&D (option 2).

NOTE:

This policy was originally released on 25 September. At that time, we announced that the R&D tax credit would be reduced from a 15% credit to a 10% credit, for the reasons outlined above.

We said that the reason for not abolishing the R&D tax credit altogether was that most OECD countries have such tax credits, and they are accepted as part of the international business landscape.

However, given the persistent operating deficits revealed in the pre-election fiscal update (PREFU), these tax credits have become a "nice-to-have" item that is simply not affordable any more. National will, therefore, discontinue the R&D tax credits altogether, from 1 April 2009.

This change, which was announced in National's Fiscal Policy two days after the PREFU, is the only amendment to the policy that was announced on 25 September.

National will:

Discontinue the R&D tax credit from 1 April 2009 and use a third of the savings to directly fund research.

- Redirect \$315 million of the savings into the direct funding of science and research. This will go into research at both universities and CRIs, by being split 50:50 between:
 - An increase to the Performance Based Research Fund (PBRF), Marsden Fund, and Health Research Council (HRC) funding .
 - The creation of a new secure funding allocation system for CRIs (see discussion below for more details).

How much funding will go to each of the PBRF, HRC, and Marsden Fund will be determined after discussion with the sector.

Table 1 - Proposed Funding Changes from the R&D Tax Credit

	2009/10 (\$m)	2010/11 (\$m)	2011/12 (\$m)
Savings from R&D tax credit	90	105	120
Applied to:			
Increase in PBRF, HRC, and Marsden Fund	45	52.5	60
Secure funding for CRIs	45	52.5	60

This increase of \$315 million over three years is a considerable boost in funding to directly purchase science.

2. SECURE FUNDING FOR CRIs

Currently, the only secure funding that CRIs receive is from the CRI Capability Fund. However, the Capability Fund is small and is more like transitional funding to give CRIs the capability to bid for more contestable funding at a later stage, not a mainstream source of funding. Almost all other sources of funding for CRIs are contestable.

New Zealand is extreme among developed countries in having a system weighted so heavily towards contestable funding. In a recent review of New Zealand's innovation system, the OECD made these comments about CRIs.

A more strategic role for the CRIs will require shifting their funding from the current very high proportion of contestable funding towards more core funding. The system whereby CRIs compete for a large percentage of their funding has been very successful in encouraging them to undertake projects which meet the expressed needs of users but is probably less effective for encouraging them to undertake longer-term projects which try to anticipate those needs. It has also encouraged an entrepreneurial attitude towards creating new business opportunities based on their applied research. However there is a distinct risk that continuation of the current funding system will make them more and more like profit-seeking businesses, and that they may neglect the maintenance and development of the core stock of applied scientific and technological knowledge on which their role in helping businesses and society must ultimately rest. The system also creates uncertainty among the researchers themselves and makes co-operation between research institutes more difficult.

National wants to provide a greater degree of secure funding for our CRIs. There are three main reasons for our thinking.

First, secure funding can make up an important part of a portfolio of funding approaches, which includes:

- Research that is driven by the end-users, ie industry in most cases.
- Research which is driven by the government's strategic priorities.
- Research which is driven by researchers themselves.

Secure funding would ensure that this third category is present among the research undertaken by CRIs. It would mean that at least some decisions about what scientific research will be undertaken will happen within the CRIs, which are in a good position to take a longer-term, experienced view of research needs in their sector. It would mean that CRIs will be better able to drive their own agreed strategic direction.

Currently, the only significant publicly funded research which is driven by the researchers themselves happens in universities, which are funded in part by the PBRF.

The second reason to encourage secure funding is that it would help to provide a stable employment environment in order to attract and retain quality staff. In a highly contestable system, new projects may not be available to provide continuing employment, and CRIs risk losing their on-going capability to do research.

Finally, more secure funding would promote and enable collaboration between CRIs and universities, and help lessen the administrative burden that goes along with the current management-intensive funding system.

National will set up a new secure funding allocation for CRIs, made up initially from:

- Half the savings from reducing the size of the R&D tax credit.
- The funding currently in the CRI Capability Fund.

Table 2 shows what this will mean in terms of secure funding over the next three years. Secure funding is likely to make up around 14% of total CRI revenue in these years.

Table 2 - Secure Funding for CRIs

	2009/10 (\$m)	2010/11 (\$m)	2011/12 (\$m)
Savings from R&D tax credit	45.0	52.5	60.0
CRI Capability Fund	50.6	50.6	50.6
Total Secure Funding for CRIs	95.6	103.1	110.6

National will treat the secure funding allocation as a core part of the CRIs' revenue stream. We will fund CRIs on a longer-term basis to develop and maintain a nationally significant research capacity in their core areas of science.

This does not mean that CRIs will be able to do what they like with their secure funding. CRIs will have to agree with the government on the broad uses of this funding, and research will still have to be undertaken with an eye to an ultimate end use or application.

Moreover, CRIs will have to be accountable for their use of this funding. They will be subject to international peer review to ensure that secure funding is adding to the quality of the science they undertake. To this end, National will investigate how quality can be measured similarly in universities and in CRIs to help create a more seamless system.

Well-performing CRIs will attract further increases in funding. As the secure funding allocation evolves, therefore, it will introduce a degree of contestability between CRIs at an institutional level, just as there is currently between universities in terms of funding from the PBRF. This will reward excellence in research.

Where appropriate, National will encourage collaboration across CRIs to ensure New Zealand's capability is used to maximum benefit.

We will also consider introducing the following measures to achieve greater flexibility and collaboration between CRIs and universities:

- An intellectual property policy for CRIs that rewards individual inventors as well as optimising outcomes for New Zealand.
- Encouraging mechanisms that favour co-supervision of postgraduate students between CRIs and universities.
- Support mechanisms that enable senior scientists to hold joint appointments and/or move between universities, CRIs, and industry for periods of time without losing status and career opportunities when they return.

In addition to CRIs, there are a number of independent research organisations such as the Cawthron Institute and the Malaghan Institute that are subject to similar uncertainties of funding because they rely on highly contestable government funding or private appeals.

National will investigate how independent research institutes that do significant contract work through government funding might receive a similar type of funding to the secure funding for CRI's, provided they fulfil accountability and performance criteria.

3. PRIMARY SECTOR RESEARCH

Labour has recently established the 'Fast Forward Fund'. This is a capital allocation from the government of \$700 million which will be invested in financial securities. The returns and capital of the fund will be spent on R&D in the pastoral and food sectors. Research projects will be those relating to the chain from "farm to fork", that is, agricultural, horticultural, and seafood industries that produce foods and food products.

The fund will be used up over a 10-to 15-year period, and Labour's aim is for spending to be matched dollar for dollar by industry groups. Several of the major corporate players in the sector have said they are prepared to participate.

Initial estimates from the Minister of Agriculture were that the following sums were indicative of what the fund would pay out in its first few (calendar) years:

2008	\$20 million
2009	\$30 million
2010	\$40 million
2011	\$65 million

To our knowledge, no firm commitments have been entered into, however, and it is unlikely that any significant money will be spent in 2008. Progress has been limited to establishing the governance structure for the fund. It will have an independent board, with its own secretariat. There will be a number of strategic investment programmes, each with its own steering group, comprising government and industry parties. Each programme will be developed through the negotiation of a number of inter-related and mutually supporting projects between investors (government and industry) and providers.

National welcomes the size of the increase in spending for primary sector R&D. The primary sector remains at the heart of the New Zealand

economy, and its strong and sustained productivity growth has always rested on a world-class scientific base.

However, we have a number of concerns with the Fast Forward approach, which has not been well thought-out.

First, the use of an investment fund, rather than an annual operating appropriation, makes little sense. There are no similar funds in other areas of public spending, let alone in the R&D sector. A fund requires fund managers, which adds a layer of extra costs, and the amount available each year depends on international financial trends. The capital allocated to the fund is essentially borrowed from the Crown at an interest rate of around 6% a year, because that \$700 million could have been used to pay down government debt. The use of a capital fund is in fact a gimmick, the purpose of which is to highlight the total amount of money being spent from a stream of research funding.

Second, the scope of Fast Forward is limited to R&D, which is ultimately food-related. Therefore, a research field such as pasture improvement would be eligible for funding from Fast Forward, because it is in the chain from farm to fork. On the other hand, anything to do with wool or hides or wood, for example, would not be, even though these are important primary industries.

Third, Fast Forward risks simply replacing funding that the private sector would otherwise have undertaken on its own account. One of the principles of the fund is that investments will be additional to, and not displace, current private spending on R&D, but this is impossible to ensure. And what is "current private spending" 10 or 15 years down the track?

Finally, the fund will not use any of the existing processes used in the sector for setting priorities, funding, and monitoring – it will operate quite

separately from the rest of the Government's R&D infrastructure. This risks creating separate layers of bureaucracy and a lack of co-ordination between different parts of the R&D system. A significant proportion of all public R&D is already related to primary production, including R&D done in conjunction with the private sector, so it is not as if the Government needed to start from scratch.

The initial Cabinet paper for Fast Forward recognised this risk. It specified that one of the fund's principles was "to minimise transaction costs by using existing investment management and institutional structures as far as possible (such as research consortia)" and recognises that "using existing mechanisms as much as possible should help to maintain efficiency, cost-effectiveness and coordination of the system".

However, this principle is not being followed. As described above, Fast Forward is creating an entirely parallel process, and the only link to existing mechanisms is the presence of people from government agencies on the programme steering groups.

National's policy is to continue with the same quantum of new funding but to spend it in a way that ensures better research outcomes.

National will wind up the Fast Forward Fund and:

- Establish an international centre for research dedicated to the reduction of on-farm greenhouse gas emissions, and fund it at \$20 million a year (see the discussion below).
- Boost funding within Vote RS&T for primary sector and food research by \$25 million a year.
- Boost funding for research consortia in the primary and food sectors by \$25 million a year.

We will also talk to the establishment group about what they have learned from Fast Forward that can usefully be carried over. Where R&D initiatives have already been established through Fast Forward, consideration will be given to continuing them.

Table 3 shows what this new allocation of funding will mean over the next three years and compares it with the Minister of Agriculture's estimate of funding under the Fast Forward Fund.

Table 3 - National's New Funding for Primary Sector Research

	2009/10 (\$m)	2010/11 (\$m)	2011/12 (\$m)
National's policy			
Establish and maintain an International Centre for Research	20	20	20
Boost funding for Primary sector and food research	25	25	25
Boost funding for research consortia in the primary and food sectors	25	25	25
Total increase in funding for primary sector	70	70	70
<i>This compares with:</i>			
Minister's estimate of funding for the Fast Forward Fund	30	40	65

4. BOOSTING CLIMATE CHANGE RESEARCH

National is committed to honouring New Zealand's obligations under the Kyoto Protocol and reducing this country's greenhouse gas emissions by 50% by 2050.

New Zealand is unique among developed countries and Kyoto signatories in that nearly half of our greenhouse gas emissions come from agriculture. For example, in the European Union, emissions from agriculture comprise well under 10% of total emissions.

Our agricultural emissions represent a large liability under Kyoto. However, we believe that the cost of lowering agricultural emissions should not be borne by the primary sector alone and should not rely simply on reducing stock numbers.

National is committed to boosting research and development into emissions-reducing technology, especially in agriculture. Around the world, countries will focus their research dollars on the main causes of their own emissions, and so should we. We have an opportunity to reduce our own emissions, and therefore our potential liabilities, and to export our home-grown technology to other parts of the world. This has the potential to be our unique contribution to the global effort to reduce greenhouse gas emissions.

The most important, and most difficult, area of research will be into methane from deer, sheep, and cattle. New Zealand already has significant experience in ruminant microbiology. Even so, there are only a small number of scientists and technicians, around 25, working in this area.

National will establish an international centre of research dedicated to the reduction of on-farm greenhouse gas emissions. This centre will include a focus on conducting scientific research into methods for reducing methane emissions from ruminants, and better understanding of ruminant animal bio-physiology, growth, and reproduction.

This centre would be a 'virtual centre' – a multi-institutional research network with scientists and researchers from Crown and private sector agencies working together on a commonly agreed work programme.

We are flexible as to the precise structure of this centre, but would likely appoint one CRI or university as the lead agency, with other universities, CRIs, and industry groups closely involved. We would also aim to establish links with research institutions in other countries which have established strengths in pastoral farming science.

The centre would build on existing government-private sector research initiatives in this area, specifically the Pastoral Greenhouse Gas Consortium.

The exact cost of such a centre will depend on decisions about its structure. However, National envisages providing capital establishment funding and ongoing operational funding of up to \$20 million a year.

5. PRIME MINISTER'S PRIZES FOR SCIENCE

New Zealand scientists are doing high-quality research in many disciplines, but too often their achievements receive little public acclaim. National is committed to raising the profile and prestige of science in New Zealand.

National will introduce a range of annual Prime Minister's Prizes for Science, and make a total of \$1 million available each year to fund them. Prizes will include:

- A supreme science prize.
- A prize for the young scientist of the year.
- Other prizes, could include a prize for a mid-career or emerging scientist, a teacher of science, and a science media communicator.

This approach is in line with recent initiatives in Australia, Canada, and Norway, which have helped raise the profile of science in these countries.

The supreme science prize will include a generous multi-year grant for the recipient to further their research. Other prizes will also come with financial rewards.

The scientific community already awards a number of prizes and they are highly sought after. They have prestige within the scientific community and carry the names of some of our greatest scientists.

However, these prizes come with little or no financial rewards, and winning them has not yet translated into wider public recognition of scientists. For example, the Rutherford Medal is the most prestigious scientific award in the country, instituted by the New Zealand Royal Society at the request of the Government. It is named after, and has been

won by, New Zealand's most eminent scientists but it attracts limited public attention.

Wherever possible, the Prime Minister's Prizes would dovetail with existing prizes to:

- Retain the heritage of the existing prizes.
- Ensure structures and processes are not duplicated.
- Protect the independent selection of recipients.

6. SCIENCE AT THE HEART OF GOVERNMENT

We believe there is an important role for science at the heart of government.

National will create a new role of Prime Minister's Science Adviser. This role will be filled by a scientist seconded for a time from the sector. He or she would be an adviser, not just to the Prime Minister, but to all members of the Cabinet.

The Prime Minister's Science Adviser will:

- Provide input to ministers on science and research policy.
- Guide ministers on the range of policy options available to them in the light of the scientific understanding of any policy issue, not just science policy.
- Maintain extensive networks with scientists so as to be alert to up-to-date issues and discoveries and know where to go for the best advice.
- Be a channel of contact between the government and science community, and one which is independent of any consideration of government funding.

This position would not usurp the role of the Minister of Research, Science and Technology in taking across-government leadership of RS&T policy.

7. REDUCING COMPLIANCE COSTS AND ENSURING RELEVANCE

In the first six months of office, National will investigate options for reducing compliance costs and unnecessary bureaucracy within the science system. In particular, we will work towards:

- Reducing product clutter and the proliferation of funding pots.
- Developing accountability mechanisms with the lowest compliance necessary for the size and risk of the project.
- Developing best practice mechanisms for funding proposals and contracts, including common templates for equivalent information, common contract formats, and common sign-off requirements across the different public funding agencies.
- Developing a nationally co-ordinated calendar of the RS&T funding cycle that spreads the activities of all participants predictably through the year.

- Avoiding one-off or ad hoc funding processes for small sums of funding out of the normal cycle.
- Using common terminology and definitions across the sector.
- Reducing duplication in administrative functions across funders.
- Facilitating common electronic transfers of information rather than paper-based transfers.

National will also expect public funders and providers to demonstrate that projects are relevant to the interests of New Zealand.

National will reduce compliance costs and unnecessary bureaucracy within the science system.