BOOSTING SCIENCE, BOOSTING OUR ECONOMY

The growth in our economic base, particularly in primary production, has been in on the back of world-class science – most of it publicly funded – and an ability by our producers to make the most of developments in technology.

But in recent years, the Government's approach to scientific research has been uncoordinated and haphazard. It has a bureaucratic funding system where scientists seem to spend more time applying for funding and reporting than actually doing science, and there are significant issues with capability and retention of scientists.

National will ensure that:

- Excellent science is performed in stable, high-quality institutions.
- Publicly-funded research is responsive to the needs of the economy.
- 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.
- Government-owned organisations are properly resourced and financially viable.
- The profile of science in New Zealand is boosted.

OUR PRINCIPLES

- A globally competitive economy.
- Encouraging ambition.
- Higher standards in education.

NATIONAL'S PLAN

1. Funding More Science

- Restrict the existing R&D tax credit and use the resulting savings to boost direct funding of research and science at universities and CRIs by $100 million a year.
- Set up a new Secure Funding allocation for CRIs.

2. Boosting Primary Sector Research

Scrap Labour's poorly-thought through Fast Forward Fund and commit to:

- Establishing an International Centre of Research dedicated to reducing on-farm greenhouse gas emissions. Fund this centre with $20 million a year.
- Increase funding for primary sector food and research by $25 million a year.
- Increase funding for research consortia in the primary & food sectors by $25 million a year.

3. Prime Minister's Prizes for Science

Introduce Prime Minister's prizes for science, including a top prize with a generous multi-year grant to further the recipient's research, and prizes for the young scientist of the year, a mid-career scientist, a science teacher, and a science communicator. Make $1 million a year available for these prizes.

4. Putting Science at the Heart of Government

Create a new role of Prime Minister's Science Advisor, filled by a scientist seconded for a time from the sector. This scientist would advise the PM and Cabinet on science and research policy, give scientific input on other policies, and provide a channel of contact between government and the science community independent of funding considerations.

Research, Science and Technology Policy

Background

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, in education, in 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 driving economic growth and increasing productivity.

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 technological developments.

New Zealand stands out amongst other developed countries for the high proportion of total 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 a number of important effects on the economy:

- it adds to the stock of scientific and technological knowledge which firms draw on;
- it helps to train and retain the scientists, technologists, engineers and researchers which firms use to absorb scientific and technological knowledge, and handle complex technology;
- it maintains a stock of resident experts who contribute to national problem solving outside their particular areas of research;
- it results in an improved ability to understand and adapt overseas research for New Zealand purposes;
- it generates commercialisable intellectual property and creates new industries;
- it better informs government policy-making;
- it underpins our ability to make the most of natural resources, have effective biosecurity and protect our environment.

New Zealand therefore must have a strong base of publicly-funded science, and correspondingly strong universities and CRIs.

In recent years the government's economic transformation terminology has promoted an "instant gratification" approach to scientific research which has done the sector a disservice and which has not recognised the myriad ways that science and technology diffuse into the economy. There has been a series of seemingly uncoordinated 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. The government has also cemented in a bureaucratic funding system where scientists seem to spend more time applying for funding and reporting than actually doing science. There are significant issues with capability and retention in the science sector.

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; and
- there is an increase in the profile and prominence of science in New Zealand.

In accordance with these goals, our election policies are to:

- restrict the existing R&D tax credit and use the resulting savings to increase the funding of research and science by $100 million a year;
- introduce guaranteed research funding to crown research institutes;
- wind up the Fast Forward Fund and commit to:
    - establishing an international centre of research into greenhouse gas emissions from livestock;
    - a new funding allocation within Vote RS&T for primary sector and food research; and

    - significantly increased funding for research consortia in primary sector
- introduce annual Prime Minister's prizes for science; and
- create the role within government of the Prime Minister's Science Advisor who will also assist in framing a longer term science strategy.
- investigate options for reducing compliance costs and bureaucracy within the science system.

1. Restrict the R&D tax credit and fund more science

If the government wants more R&D performed it has two broad options:

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

In terms of Option 2, the government has for some time given grants to firms through Technology New Zealand. The current value of these is around $50 million a year. It also now gives firms a tax credit for R&D.

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.[1] The cost of the R&D tax credit is estimated to rise from $208 million this year to $332 million in 2011/12.[2] This is substantially more than the estimated cost when the policy was first announced. (In addition, major accounting firms have privately indicated that even the revised Budget figures are likely to significantly underestimate the actual cost to the Crown.)

This means that in the current year more than 20% of the government's total spending on R&D is Option 2 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. Given this risk, the appropriate action is to spend less of scarce funds on the tax credit and more in directly funding R&D (Option 1), and therefore get much better value for the same amount of spending.

Why is there a risk that the R&D tax credit will be ineffectual? For one thing, the tax credit subsidises a great deal of R&D that would have happened anyway, whether or not there was a tax credit. Therefore most of the money paid out as a tax credit will effect no change in the level of R&D whatsoever.

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[1] A firm spending $100,000 on R&D, for example, is able to claim a tax credit of $15,000 (on top of deducting the $100,000 as an expense).
[2] Budget 2008 estimates.

But will the tax credit result in some new R&D expenditure, that wouldn't otherwise have occurred? This is extremely difficult to tell. 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 will not be measurable, and may be quite small.

National does not want to see the R&D tax credit disappear altogether, however, because similar tax credits are now accepted as part of the international business landscape. Twenty OECD countries use tax incentives such as tax credits to encourage firms to increase their R&D expenditure, and instruments are also being developed in non-member countries, such as China. In particular, Australia has an R&D tax credit, and we compete with Australia as a country in which to do business.

National's policy is therefore to restrict the R&D tax credit to a 10% credit. This will save an average of $105 million in each of the next three years, but will still be more generous than the standard Australia R&D tax incentive.

National is going to redirect this saving into the direct funding of science and research. It 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 allocations
- 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.

The funding changes are summarised in the following table.

	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 increased funding of $315 million over three years is the biggest [check] increase in funding to directly purchase science In particular it will increase the combination of the PBRF, HRC and Marsden Fund by up to 20%.

2. Secure funding for CRIs

National intends to set up a new Secure Funding allocation for CRIs, made up initially from:

- half the savings from restricting the R&D tax credit, and
- the funding currently in the CRI Capability Fund.

The following table 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.

	2009/10 ($m)	2010/11 ($m)	2011/12 ($m)
Savings from R&D tax credit	45	52.5	60
CRI Capability Fund	50.6	50.6	50.6
Total Secure Funding for CRIs	**95.6**	**103.1**	**110.6**

Currently, the only stable funding CRIs receive is from the Capability Fund – almost all other sources of funding are contestable. 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.

National, however, 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 can simply do what they like. 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 both national and international peer review to ensure that secure funding is adding to the quality of the science they undertake. 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, rewarding excellence in research, just as there is currently between universities in terms of funding from the PBRF.

National is introducing secure funding for three reasons.

First, it makes up an important part of a portfolio of funding approaches:

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

Secure funding ensures that this third category is present amongst the research undertaken by CRIs. It will mean that at least some decision making about what scientific research should be undertaken will happen within the CRIs, who are in a good position to take a longer-term, experienced view of research needs in their sector. It means 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 is in universities, which are funded in part by the PBRF.

The second reason for secure funding is that it helps 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 will promote and enable collaboration between CRIs and universities, and help lessen the administrative burden that goes along with the current management-intensive funding system.

We are extreme amongst developed countries in having such a contestable system. 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 will also consider introducing the following measures in order to achieve greater flexibility and collaboration between CRIs and universities:

- an intellectual property incentive scheme to CRI's similar to that of universities;
- ensure that CRI's who supervise postgraduate students are able to share in the fees with universities where it is clear there is mutual benefit; and
- introduce flexibility for senior scientists to move between universities, CRI's or industry for a period of time without losing security of tenure.

We will also ensure that CRI boards are of a high quality and have a appropriate skill mix.

3. Primary sector research

The government 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 the government'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

No commitments have been entered into, however, and it is extremely unlikely that any money will be spent in 2008. Progress has been limited to establishing the governance structure for the Fund. The Fund 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 across the whole of government, let alone in the R&D sector.[3] A fund requires fund managers,

[3] Government funds are those of the Crown Financial Institutions such as the NZ Superannuation Fund, ACC, and the Earthquake Commission, which operate according to proper actuarial principles. The VIF Fund, which is in the R&D sector, has as its purpose to invest in innovative young New Zealand companies.

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 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 those these are important primary industries.

Third, Fast Forward risks simply replacing funding that the private sector would have undertaken on its own account anyway. 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 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. Currently, around 30% [check] of all public spending on R&D is 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, and specified one of the Fund's principles as being "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 adhered to at all. 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 commit to:

- maintaining an international centre for research into greenhouse gas emissions from livestock, at the cost of $20 million a year (see discussion below)

- an increase in funding within Vote RS&T for primary sector and food research of $25 million a year
- an increase in funding for research consortia in the primary and food sectors of $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.

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

	2009/10 ($m)	2010/11 ($m)	2011/12 ($m)
National's policy			
International Centre for Research	20	20	20
Primary sector and food research	25	25	25
Research consortia in the primary and food sectors	25	25	25
Total increase in funding for primary sector	70	70	70
Fast Forward Fund			
Minister's estimate of funding	30	40	65

[Note these amounts are indicative at the moment.]

4. 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 amongst developed countries and Kyoto signatories in having nearly half of our greenhouse gas emissions resulting from agriculture. In the EU, 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.[4] Around the world, countries

[4] The body currently dedicated to livestock emission reduction, The Pastoral Greenhouse Gas Emission Consortium, receives a maximum of $5 million in government funding each year. Only half of that is targeted at the microbial processes that produce ruminant methane emissions. Labour claims to have committed $449 million over 5 years for climate change research. But this research is very broadly

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's policy is to establish an International Centre of Research dedicated to the reduction of on-farm greenhouse gas emissions. This Centre will 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 university or CRI 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 such as Australia, Ireland and Scotland.

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

The exact cost of such a Centre will depend on decisions about its structure. However, National currently envisages provide capital establishment funding of up to $20 million 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. To that end, we will introduce a range of annual Prime Minister's Prizes for Science.

The prizes will include a top prize and a prize for the young scientist of the year. They will also include other prizes, such as a prize for a mid-career or

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spread and includes economic analysis, the social dimensions of climate change, marine energy and research on bio-energy.

emerging scientists, a teacher of science, and a science media communicator. This approach is in line with recent initiatives in Australia, Canada and Norway, which have had some success in raising the profile of science.

The top prize will include a generous multi-year grant for the recipient to further their research. Other prizes will also come with financial rewards. National will make a total of $1 million available each year to fund these prizes.

Wherever possible the Prime Minister's Prizes would dovetail with existing prizes to retain the heritage of these prizes, ensure structures and processes are not duplicated and protect the independent selection of recipients.

The scientific community already awards a number of prizes and these prizes 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 these prizes has not yet translated into wider public recognition of scientists. For example, the Rutherford Medal is the highest award given by the New Zealand Royal Society. It is named after, and has been won by, New Zealand's most eminent scientists but it garners limited public attention.

6. Science at the heart of government

National believes there is an important role for science at the heart of government.

National's policy is to create a new role of Prime Minister's Science Adviser.

This role would 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.

He or her role would be to:

- 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. Reduce compliance costs and ensure relevance

National will investigate options for reducing compliance costs and bureaucracy within the science system. In particular, we will consider:

- ensuring that there is one best-practice, easily understood, standardised and simpler method of grant applications across all public funders. In particular, there is a need to consistently define overheads, how depreciation is treated, achieve uniformity in CV presentation and better define 'projects' and 'programmes'.
- developing a national integrated calendar so that timing of requests for proposals are spread logically and predictably throughout the year wherever possible;
- developing accountability mechanisms with the lowest compliance necessary for the size and risk of the project; and
- standardising nomenclature and information requirements throughout the sector.

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