The Science Media Centre put a series of 10 questions to the country's political parties to determine their policies and positions on key science-related issues.

Please find below their answers to our questions on the following issues.

1: Science priorities

The Ministry of Science and Innovation has said it plans to develop a statement of science priorities for the Government by November 30 and a statement of innovation priorities next March. What do you think should be the key statements around science and innovation made by these documents?

ACT: “First and foremost the government should be looking to create an environment conducive to good science rather than ‘doing’ science itself. Second, the government should look to create maximum contestability for funding it provides to research institutions, be they CRIs or Universities.”

GREEN: “The Green Party believes that as a society we need to commit resources to both fundamental and applied research and that all such research should aim to contribute to sustainable development. Research priorities must lead to greater understanding of the interconnections within the ecosystems on which we depend and the causes of social problems. They must also support the shift to sustainable systems of production and patterns of consumption, rather than just generating profit in the present. Research must be conducted to support innovation and new industries. This is part of our commitment to localisation and community economic development.”

LABOUR: “Our focus for science should be on creating a New Zealand which is clean, green and clever, that leverages the inherent talents of its people to produce an economy that is highly productive and innovative. Maintaining an investment in fundamental science is critical to the health of the science sector.

“Increased science input in the manufacturing and high-tech areas of our economy is critical to economic growth and more productive labour force – in addition to the expertise in our primary sector.

“Science is critical in ensuring new products and services that enhance our clean, green image. Labour believes we can grow the economy and create jobs while enhancing our environment in areas such as clean-tech, geothermal, reducing our carbon emissions through agriculture.

“Labour would also prioritise boosting business expenditure on R&D which currently is only one-third the OECD average. Increased business R&D will be a critical driver of innovation and economic growth.

“The next generation of Kiwis will have to be smarter and more innovative to compete in a fast-changing and technologically driven global economy. We need to prioritise science in schools and ensure resources are directed to teach science in a way which excites and engages students and increases the number of science and engineering graduates.”

NATIONAL: “National is committed to boosting science and driving innovation in our economy, to underpin growth and create higher-paid jobs. Our science priorities are in the areas that will enhance economic growth, so we’re focusing science and research resources squarely on growing the economy. A major part of this is improving the connections between science and business.

“Other key priorities include harnessing science to improve our environment, provide more efficient energy, and lift the performance of our health system.”

2: Crown Research Institutes

New Zealand still has eight Crown Research Institutes, after 10 were set up in 1992 with the dissolution of the DSIR. Two decades on, is this structure still the best for state-owned science companies, and what changes to taxpayer-funded science, if any, would your party implement, and why?

ACT: “ACT believes that this model has been largely successful. Having multiple and competing organisations comes closer to our policy direction of contestable funding and having multiple organisations increases the scope for experimentation, not just in the scientific sense but also in the organisational sense. ACT’s only change would be to push towards greater autonomy and competition for funding in areas where funds have been ring fenced for specific institutions, in particular, opening up more competition with Universities.”

GREEN: “We do not believe that the current management model for Crown Research Institutes (CRIs), which are now required to turn a profit, is the best. We need to develop models to get the best from the science community. We would like to see changes in funding to promote long term sustainability. We support universities and other competent science research providers being funded to conduct needed research, especially when it is linked to science education. We also support the idea of partnerships to develop applied technology. We are concerned at the extent to which public science is becoming private knowledge and would seek to redress this.”

LABOUR: “The Crown Research Institute model has worked well over the past two decades. They have produced some ground breaking research for the benefit of New Zealand and returned solid dividends to the Crown. Labour has no concrete plans to change the CRI structure. We firmly believe that any change should be based on evidence. Structure should follow function.

“Labour will, however, examine ways through which collaboration between the CRIs and our other publicly funded science centres including universities can occur. Creating the incentives to ensure a more collaborative model with the business sector and universities will be a priority.”

NATIONAL: "The Crown Research Institutes is a good model for New Zealand. However, they become too internally focussed at the expense of their sectors.

"We have reformed Crown Research Institutes to make them more effective. In 2010 we introduced the recommendations of the CRI Taskforce.

"The major performance indicator for CRIs now is their engagement with their sectors. They also now have significantly more core funding – up from $60 million to $215 million. This allows them to build long term capability, and prioritise the core research problems of their industries in a systematic way. We have also ensured that CRIs are focused on growth industries. This fits our Science & Innovation agenda of promoting economic growth through investment in science and research.

"The Government has just announced that it is establishing an Advanced Technology Institute branches in Christchurch, Auckland, and Wellington. The institute will eventually employ over 700 research and development specialists across a range of disciplines. The institute will work with both research providers and businesses to translate innovation into commercial products, by having its own extensive R&D capability that supports business (including testing and prototyping facilities), and by being able to source and interpret commercial R&D output from research providers.

"The Advanced Technology Institute model has been very successful in Denmark, Finland and Singapore, and fills a gap between manufacturers and existing tertiary institutions, whose research has a different core focus.

"Lifting the research and development capacity of our hi-tech manufacturing sector is critical to developing the huge potential that advanced manufacturing has as a stronger contributor to our export sector and growing our economy. To do this we need to increase private sector investment in R&D, and improve collaboration with public sector R&D. Our co-funded business grants are already raising business investment."

3: Science and education

Not only does New Zealand have problems persuading young people to study science at university, it has difficulty persuading graduate researchers to eventually settle in this country. How will your party make science and technology more attractive to students looking ahead to tertiary education, and what can be done to encourage them to work in New Zealand?

ACT: "ACT's core value in primary and secondary education is decentralisation. For the vast majority of students, there is one type of school, one type of teaching, and one curriculum and assessment system. To the extent that primary and secondary schools are failing to attract students into science, it is a failure of the entire system affecting

almost every student. We believe it more likely that more science friendly schools, teachers and curricula will evolve in a more decentralised system.

“That is, a system where the funding follows the child and teachers and principals have more autonomy about how they run their schools. For example, in the Canadian province in Alberta where anybody can set up a special character or “charter” school there are now thirteen such schools including the Calgary Science School which takes a scientific approach to learning.

“More generally, New Zealand faces a problem with providing interesting and well-paying jobs, evidenced by the outflow of people on a truly massive scale. In the OECD we have the second highest proportion of citizens living outside our country. ACT believes that the primary challenge is creating a stable, lightly regulated, lightly taxed environment for entrepreneurship and economic growth. ACT’s full economic policies can be found on our website.”

GREEN: “The Green Party supports facilitating a culture-shift in attitudes towards science, research, and technology through school curriculum changes and initiatives like Green Innovation Awards in the sciences. We support changes to student support to supplement loans with a bonding scheme incentivising students to remain in New Zealand. There is a big hole at the moment in funding early career researchers that creates an incentive for them to head overseas, often on a one way ticket. Properly funding post doc research positions would address this.

“Additionally we need to support secondary school teachers to inspire the next generation of scientists among us. Research shows that enthusiastic teachers do make a difference. Teachers need to have the time and energy to be creative in pupil-focused activity rather than burdened with administrative demands. To address this we support initiatives like after six years of service, teachers, including early childhood education teachers, will be entitled to a sabbatical leave for one year at 80% of their salary.”

LABOUR: “While the number of students taking business and accountancy courses have increased in the past decade, the number of science and engineering students has largely flat-lined. This trend will slow New Zealand’s development of high-tech and innovation led economy.

“In addition to enhancing the quality of science being taught in schools, Labour believes that increasing science and engineering graduates across the spectrum will be positive to increase growth in our productive sectors. The years immediately following graduation are critical to consolidate the careers of scientists. Labour will reinstate post-doctoral fellowships for recent PhD graduates, scaling up to a cost of $6 million a year, so they are supported into research careers in New Zealand instead of overseas.

“Labour will also establish a scheme for better funding, ‘brilliant’ scientists. This funding will be portable to allow scientists to take it to the most appropriate institution, purchase equipment, recruit staff and attract other world leaders in the field to New Zealand.

“Labour’s full science and innovation policy, with more details on science in education, will be released shortly.”

NATIONAL: “The attraction of science and technology for young people is directly linked to how it fits in with how they see their futures. The more important high technology industries are to our economy, the more people will want to work in the sector. Greater opportunities will lead to greater interest.

“We’re developing five new vocational pathways for young people through a partnership between industry training organisations and the education sector. They will clarify the existing array of options so students and their families can see the connection between what students learn at school and what industries it could lead them to.

“Manufacturing and technology is one of those pathways. The vocational pathways will describe the learning, and the assessment standards valued by broad sectors of industry. They will also include a career and study map, which will show young people potential occupations and future study options.

“Already we are seeing a change in attitudes. The three most respected people in New Zealand are scientists. Increasingly, we are hearing about smart companies that are doing very well – often with young people as their owners.

“We have already increased fundamental science funding through the Marsden Fund and Health Research Council. Many of our top young post grads work on projects funded through these means. The Rutherford Discovery Fellowships created more opportunities for young scientists a few years into their career. We are reviewing support for post-docs.

“The Advanced Technology Institute will create jobs for an additional 300-400 scientists and engineers.”

4: Biosecurity

Side effects of global warming and increased cross-border travellers and cargo are likely to be greater potential risks of incursions of pests and diseases. Global economic strife and continuing wars may also increase the risk of inadvertent incursions or even deliberate bioterrorism. What science or innovation would your party support to better prepare the country for pests, a disease outbreak, bio-terrorism attack or global pandemic?

ACT: "Our party does not have a policy on a specific science or innovation for these challenges. Science and innovation by their very nature are about discovering new knowledge, so it would be presumptuous to say we already know.

"Nevertheless we recognise that New Zealand's isolation has given us a unique ecosystem and the history of human colonisation shows how vulnerable it is to outside threats, especially introduced species. With this in mind, protecting our ecosystem is one government expenditure that the ACT Party supports in line with our broader view that it is the primary role of government to provide a safe community."

GREEN: "The most likely threat we will face are pests and diseases. As we have experience from incursions of the varroa mite, didymo, painted apple moth the impacts can be wide ranging and somewhat irreversible. Picking winners is not as important as providing a sound base that allows for good science to be undertaken both as preventative measures but also as part of the response to incursions. Part of our green jobs priority is investing in R&D though grants and tax credits. Biosecurity is important for the security of our agriculture, fishing and forestry sectors and as such would be a priority for R&D funding."

LABOUR: *Did not respond.*

NATIONAL: "National is committed to making the biosecurity system more effective and efficient by ensuring that resources are used when, and where, they are most needed. We know that biosecurity doesn't just begin and end at the border. The system works on three fronts: working overseas to stop travellers and importers from bringing pests here; working at the border to identify pests that do arrive; and working to find, manage or eliminate pests that have established here. We'll continue to engage with government agencies, local councils, industry and community groups and the New Zealand public in finding ways to improve the biosecurity system. "

5: Energy

NZ is expected to become increasing reliant on hydro-electric and wind generation in the move to alternative energy sources. How would your party provide a boost to the science needed to help diversify to other "green" energy sources, such as sustainable wave and tidal power and additional geothermal plants. And what policies would you implement to help households cut their energy consumption to reduce the need for new generation?

ACT: "The ACT Party does not support direct government investment or "picking winners" in the energy sector. The Corn Ethanol debacle of the past decade is a good example of why governments shouldn't try to do such things, as is the moth balled Marsden B Power Station at Ruakaka, a Think Big project that was built and never used. To the extent that government should try to change the energy sector, it should do so using broad based taxes such as a carbon tax and let the market function, although ACT does not currently support such a tax."

GREEN: "Part of our green jobs priority is to leverage the State Owned Energy Companies to generate investment in renewable energy technology. Initiatives like a start-up capital fund specifically targeted at clean tech opportunities, boosting government funding of R&D by $1 billion over the next three years through tax credits and grants. Additionally strong environmental regulations allow for more certainty around investment in renewable energy solutions.

"Finally we must not forget about energy efficiency and conservation measures to reduce peak demand. Insulation, and clean heat sources play a role in this but the most important step is to implement a New Zealand Energy Efficiency and Conservation Strategy (NZEECS) with real and achievable targets and milestones to assess progress."

LABOUR: *Did not respond.*

NATIONAL: "National is serious about global warming and tackling climate change. We're reducing costs for businesses while encouraging the transition to low-carbon business.

"We have established the Global Research Alliance and provided $45 million for research aimed at tackling greenhouse gas emissions.

"We have also established a Green Growth Advisory Group, to provide advice on how to achieve economic growth while also promoting environmental protection.

"Our goal is to be 90% renewable by 2025. A key factor in achieving this goal is reform of the Resource Management Act, allowing renewable projects to be consented far earlier than under the previous Government. We invest around $18 m per year in

renewable energy research. This includes research into geothermal, bio, solar, wave and tidal energy.

“National has invested significantly in insulation and clean heating, to help reduce households’ energy consumption. We’re investing $347 million and more than 130,000 homes have now been retrofitted. The Government also recently introduced new energy efficiency standards for products and appliances which are expected to create net savings of $360 million for the country by 2020. “

6: Research and development

In 2009, Australia was ranked 12th among OECD member countries for its spending on R&D as a percentage of GDP and New Zealand was ranked 27th. What is your party’s approach to encouraging R&D in general, and in particular, among New Zealand businesses? What policies would you implement to encourage private sector R&D?

ACT: “The ratio of R&D to conventional investment that firms in a country should undertake is an open question. Sometimes it makes sense to develop IP here in New Zealand, other times it actually makes more sense to be an importer of IP. In other words, we should never try to reinvent the wheel. For this reason, ACT does not have a policy targeting any particular level of R&D spending or specific policies designed to encourage it.

“We believe that solving New Zealand’s broader problem with attracting investment will likely raise R&D and we should solve that problem first. ACT’s economic policies for providing a low tax, lightly regulated environment that is conducive to investment can be found on our website.”

GREEN: “New Zealand invests 1.31% of GDP in R&D — close to half the average spent across OECD countries. Instead of subsidising polluters up to $1.2 billion per year to continue to emit CO2 under our current Emissions Trading Scheme, we would change the scheme and redirect that subsidy into industry-related R&D expenditure. Achieved through a combination of tax credits and grants this would be focused on clean tech solutions and priority given to fields where we enjoy a competitive advantage.”

LABOUR: *Did not respond.*

NATIONAL: “National has invested more into science and innovation every year since taking office. Vote MSI has increased from $689 million in 2008 to $773 million last year. There has been significant investment through other portfolios, such as the

Primary Growth Partnership. PGP commitments co funded through Government and business have reached nearly $500 million.

“In Budget 2009 we put 23% more funding into the Marsden Fund and 13% more into the Health Research Council.

“Our business innovation support package in Budget 2010 increased funding by $225 million over four years. This included $189 million for Technology Development Grants, and $20 million for Technology Transfer Vouchers. We continued the Tech NZ scheme of matched funding ‘one off’ grants with funding of $47 million per year.

“All of these schemes are co-funded, which means applicants have to put in their own funds as well. This stimulates further private sector investment in R&D.

“We believe that targeted grants are far more effective at building real R&D capability in industry, rather than tax credits. Tax credits encourage accounting innovation over business innovation. We can also better target R&D spending where it has the greatest impact.

“The results of this have been clear. New Zealand now invests $2.5 billion a year in science and innovation – up 13 per cent from 2008. R&D spending as a percentage of GDP was up to 1.3% (up from 1.19%), and business R&D spending was $1 billion (up 10%). Our latest announcement will dramatically add to these results.

“The latest TIN 100 report into New Zealand’s largest high tech firms notes that our top 100 companies lifted their R&D investment by 15% over the last two years.

“National’s intention is clear – we want to raise the level of innovation investment. We have done and we will continue to do so. The Advanced Technology Institute is just the latest example of significant investment.”

7: Water quality

Degradation of water quality in lowland waterways is an increasing problem, but intensification of agriculture looks set to continue as population increases and lifestyle changes in markets such as Asia create more demand for food from New Zealand. What is your party's policy on supporting science and innovation to mitigate the environmental impacts of development, habitation and industry on waterways and what science and technology would you implement to reduce the effects on waterways of diffuse pollution from farmland?

ACT: "ACT supports science and technology solving this problem, but it should be solved by creating demand for a solution through enforcing proper standards on waterway pollution first. This approach makes it more likely that the most efficient solutions will be found. This approach is different to picking a 'winner' solution first then hoping it will solve the problem."

GREEN: "Water quality is a Green Party priority this election. We are drawing to heavily on our natural capital and damaging the sustainability of agriculture operations in the future. We want to introduce a fair charge for the commercial use of water. This charge incentivises uses of our water resources to do so more efficiently creating demand for good solutions. Some of the revenue generated by this charge would be recycled back into low tech waterway protection – riparian planting. Agriculture, as an industry where we have a competitive advantage, would be a good candidate for receiving the R&D tax credits and grants mentioned above."

LABOUR: *Did not respond.*

NATIONAL: "National's Bluegreen approach is about the balance between growing the economy while improving our environmental management. New Zealand is more richly blessed with fresh water than just about any other country, and if we take a balanced, collaborative approach we can wisely use this resource to create jobs and wealth as well as providing for recreation and conservation.

"We have increased the investment in waterway clean-ups by five-fold to more than $265 million, compared to just $16 million spent between 2004 and 2008. This will clean up significant water bodies such as Lake Taupo and the Waikato River, and reflects the importance National puts on improved fresh water management. This also includes a $15 million contestable water clean-up fund for Councils with water pollution problems.

"We have doubled funding for New Zealand Landcare Trust to enable it to expand and grow its successful land management work. This includes support for landcare and community based groups, fostering research and providing land management training.

"We've announced a balanced package of reforms including:

- Establishing the Land & Water Forum.
- A National Policy Statement on Freshwater.
- Doubling penalties for non-compliance.
- Regulations for metering 98% of water takes.

“The Government has engaged the Land and Water Forum again to advance the next stage of work on methods, tools and governance arrangements for setting limits for water quality, quantity, and allocation. The Forum will report to Government during 2012.

“We have also established the Irrigation Acceleration Fund to provide $35 million over five years to support the development of proposals to the ‘investment ready’ prospectus stage. Smart irrigation infrastructure will boost economic development and growth in our primary sectors.

“The fund will support regional scale rural water infrastructure proposals such as community irrigation schemes. All successful projects will need to be committed to good industry practice that promotes efficient water use and environmental management, particularly around land-use intensification. Irrigation good practice is essential if we are to protect our vital water resource for the future.”

8: Health

The health system faces challenges such as helping young people to a healthy adult life, and improving the quality of old age for an increasing proportion of the population. How would your party improve biomedical research in New Zealand and public access to the benefits that it provides, while at the same time meeting the health needs of an ageing population?

ACT: “We do not have a specific policy on this, except to say that we do not support government attempting to pick winners in the biomedical space. New Zealand has excellent biotech companies such as F&P Healthcare and start-ups such as Nexus 6 which show what New Zealand firms can achieve, however they tend to be in surprising niches (sleep apnoea and asthma monitoring in these examples), which governments are unlikely to identify faster than entrepreneurs.

“ACT believes that creating the right environment for entrepreneurship generally will see more biomedical research. However from the point of view of the healthcare consuming public, we should be realistic about the fact that New Zealand is only 0.2% of the world economy and the majority of benefits will come from overseas. The most important factor in whether New Zealanders can access these is going to be the productivity and living standards of the overall economy.”

GREEN: "We see the best opportunities for health research within a New Zealand context focused on public health measures and population specific measures especially addressing health issues of Maori and Pacifika people."

LABOUR: *Did not respond.*

NATIONAL: "Science that directly boosts economic growth through effective market-driven research has been a key element of National's agenda. The increased funding we've provided specifically demonstrates the Government's strong commitment to the biomedical technology sector and the high-tech therapeutics industry."

9: Marine sustainability

Government and industry have signalled increased effort in offshore petroleum exploration, and talked of the potential for sea-floor mining in the future. What policies will you implement to help preserve the health of the oceans surrounding New Zealand, and how will you gauge the environmental impacts of exploiting mineral resources on New Zealand's continental shelf?

ACT: "We do not have sufficient policy on measuring the impact. We are in favour of exploring the potential for harvesting great wealth from off-shore energy and mineral activities, and we acknowledge that if this sector expands then the government will have to increase its infrastructure for policing these."

GREEN: "We support: Creation of a network of marine reserves of a viable area, representing all marine eco-system types within our Exclusive Economic Zone; Amending the National Parks Act to facilitate the protection of marine areas adjacent to national parks. We don't support off-shore oil drilling. The risks are to great and the response to the Rena grounding has highlighted the challenges we face due to our size and location in responding to maritime disasters and the state of local resources available to respond. A spill the size of the Gulf disaster would have catastrophic impacts on large parts of our coast. We don't see the potential gains as worth the risk."

LABOUR: *Did not respond.*

NATIONAL: "We have introduced legislation to manage the environmental effects of activities in New Zealand's oceans. The Exclusive Economic Zone and Continental Shelf (Environmental Effects) Bill puts in place a framework that classifies activities as prohibited, discretionary, or permitted, gives the consenting function to the new Environmental Protection Agency (EPA) and enables public consultation on significant activities like drilling for petroleum.

“The proposed new law will protect New Zealand’s oceans from the potential environmental risks of activities like petroleum exploration, mining, marine energy, and carbon capture developments. The new system will work alongside existing legislation that manages fishing and maritime transport. It has also been carefully designed to ensure it is consistent with New Zealand’s international obligations.

“The Government has also beefed up regulation of the petroleum industry by the Labour Department with the new High Hazards Unit with four new inspectors. Additional interim measures were announced last month for the coming year requiring operators to work to the latest drilling safety rules developed in the United States following the Gulf of Mexico disaster, and environmental impact assessments to be submitted to the EPA.”

10: Genetic engineering

Scientists are using genetic modification to develop new varieties of forage grasses they predict could have potential to increase productivity and moderate pollution from pasture-based farms in New Zealand. What view does your party have on changing the HSNO Act to make introduction of GE pastures easier, or supporting, say, a conditional release of GE pasture plants to boost the research effort?

ACT: “ACT supports the use of GE. We acknowledge that there is little evidence worldwide of the concerns and sometimes outright scaremongering around GE being realised. Given the increase in demand for food around the world and the role that New Zealand could play in it, ACT believes that we should be rational and scientific about genetic engineering, and we believe that the current evidence favours greater use of GE.”

GREEN: “We support keeping GE in the lab. Once released into the environment we cannot remove it and as such we support a precautionary approach. Our clean green brand is one of our countries most valuable assets we support protecting it.”

LABOUR: *Did not respond.*

NATIONAL: “We have no plans at this stage to make changes to the HSNO Act to loosen up the rules around Genetically Modified Organisms.”