



OFFICE OF THE PRIME MINISTER'S CHIEF SCIENCE ADVISOR

Professor Sir Peter Gluckman, ONZ KNZM FRSNZ FMedSci FRS
Chief Science Advisor

Rt Hon John Key
Prime Minister
Parliament Buildings
Wellington

September 10, 2016

Dear Prime Minister

Annual Report of the Office of the Chief Science Advisor: 2015 – 2016

Enclosed please find my annual report for 2015-2016.

Beyond reporting on my Office's major activities, I highlight the growing role and value of the departmental science advisors network in extending my Office's mandate and the work our Office does to support New Zealand's interests in science diplomacy and in particular the ongoing development of the Small Advanced Economies Initiative, both being initiatives which you have strongly supported. I focus on these two components because progress in these has been particularly notable in the past year.

I am grateful for the continued support that my Office has received from yourself and your Ministers and officials over the past year.

Yours sincerely

Sir Peter Gluckman ONZ KNZM
Chief Science Advisor

OFFICE OF THE PRIME MINISTER'S CHIEF SCIENCE ADVISOR

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ANNUAL REPORT 2015-2016

Preamble

The Office of the Prime Minister's Chief Science Advisor core roles are to:

- Advance the use of science to benefit New Zealand through promoting the use of evidence to inform policy development and evaluation,
- Provide advice as required to the Prime Minister and central agencies,
- Support the development of the increasingly effective and important network of departmental science advisors,
- Promote New Zealand's interests through science diplomacy
- Promote the public engagement with science
- Undertake other activities as agreed.

There is an increasing understanding across the policy community, both globally and domestically that science can inform and assist policy-making both in the long-term and short-term. This applies to all aspects of government activity including environmental, social and economic as well as diplomatic and risk-management domains.

The Office's role in assisting in both the social and environmental domains has grown over the last year. There is also increased interest in how 'big data' will change and inform policy processes. But at the same time the pace of change and development in technological innovation create opportunities. At the same time however, such opportunities must be balanced and framed in terms of an understanding of the limits that may need to be placed on the use of some technologies. Concepts of precaution, risk and innovation are growing in importance.

Over the last year the role of the Office in assisting the Government in using science to assist in reducing risk and promoting resilience and in the use of science in and around emergencies has grown significantly. In addressing these issues, the Office's work has been receiving increasing international interest and this, in turn, has been accompanied by a growing role of the Office in science diplomacy.

My Office's terms of reference are detailed in Appendix 3.

Enhancing the role of evidence in informing policy

A primary role of the Office is not to focus on giving specific advice on technical matters, but rather to promote the use of science to advance New Zealand through informing policy development, implementation and evaluation. Most technical input is of course developed through individual ministries. Central to this has been the progressive development of the network of Departmental Science Advisors (DSAs).

This network now includes science advisors from the Ministry of Primary Industries, the Ministry of Business, Innovation and Employment, Department of Conservation, Ministry for the Environment, Ministry of Education, Ministry of Social Development, Ministry of Health, and the Justice sector (including Police and Corrections); the latter two being appointed during this year. I provide advisory support to the Ministry of Foreign Affairs and Trade, and to the Ministry of Civil Defence and Emergency Management. I believe there is value in further DSA appointments from Te Puni Kōkiri and Transport, and developing further DSA support for those components of the Ministry of Business, Innovation and Employment beyond the science and innovation sector.

I chair the Departmental Science Advisors Committee. The Committee also includes the Government Statistician, the Chief Economist of Treasury, and the Deputy Chief Executive of the State Services Commission. The President and Chief Executive of the Royal Society of New Zealand are also invited to participate, except when sensitive matters such as budget-related are being discussed. The Committee acts as a peer review group for its members including myself. It deals with matters where its view is valuable or has been requested: these include aspects of the Integrated Data Initiative, risk management, and advice to MBIE on aspects of the evolution of the science system. Treasury is now working with the Committee on matters identified by them or the Minister of Finance such as the 40-year treasury forecast, and the evaluation of a number of items in the budget cycle, particularly as they relate to social sector initiatives.

Two subgroups of the DSAs have been formed. The first is a social sector group, which along with myself, has been particularly engaged in dealing with evidential aspects of social policy development. This subgroup has engaged comprehensively with Treasury, the Social Investment Unit and the Minister of Finance. The second subgroup comprises natural resource sector DSAs who have, with my Office, been leading the development of the two science roadmaps. These are the Conservation and Environment Science Roadmap (CESR) and the Primary Sector Science Direction (PSSD). The DSAs, supported by my Office and the relevant ministries, have led officials' working groups who have developed, or are developing, the consultative documents in association with strategic advisory

groups comprised of academics, other experts, and stakeholders from civil society. Following the consultation phase, including specific Māori consultation, these groups will prepare the final reports to Cabinet. I chair the Strategic Advisory Group appointed by Ministers to support the CESR and my advisor, Prof Stephen Goldson, chairs the Strategic Advisory Group for the PSSD.

In late 2015 you asked me to consider a further report on enhancing the use of evidence in policy formation. We hope to present this by December 2016; it will include the following major elements:

- Optimising the role of Departmental Science Advisors
- The role of forecasting and horizon scanning in policy development
- The impact of big data on policy processes
- Addressing the perceived or real barriers to a greater interplay between the research/academic community and the policy community
- Capacity building at the science-policy interface

We have liaised closely with the Policy Project of the Department of the Prime Minister and Cabinet, and the other central agencies in undertaking the background work to prepare this report.

The DSAs have worked closely with Statistics NZ, Treasury and other agencies on the development and use of the Integrated Data Initiative. This initiative will become an essential tool in enhancing evidence-informed policy development. The work of the Data Futures Partnership will be important for effective social license to be established for the use of such data. My Office has engaged with the chair of the Partnership and the Privacy Commissioner on these issues.

Threaded through all of this are broader and more general issues related to all new technologies, both physical and biological. These include how social license can be achieved for the implementation of new technologies. This subject is a focus of the Small Advanced Economies Initiative and of the Advisory Group to the Science, Technology and Innovation division of the OECD, of which I am a member.

Understanding of risk and decision-making in the face of uncertainty

My Office is working on producing a series of reports on understanding decision-making in the face of uncertainty. Every societal decision about the use of, or limiting of technologies involves concepts of risk and precaution yet nothing about this is absolute - and without accepting some risk, innovation is impossible. Similarly, virtually every decision that a government makes involves some level of uncertainty. A better understanding of these components is needed across

society so that New Zealand does not fall into the trap of important decisions being made on the basis of extreme rhetoric fuelled by the echo chamber of social media.

In the past year, I have published the first in a three-part series on *Making Decisions in the Face of Uncertainty: Understanding Risk* (see http://www.pmcsa.org.nz/wp-content/uploads/PMCSA-Risk-Series-Paper-1_final_11May2016.pdf). In this paper, I considered not only how scientists come to know what they know, but also how they recognise what they do not or cannot know, and how inferences can be drawn within these parameters. The second paper in the series is due to be released in October 2016 and focused on decision making by individuals, and the third, which I hope to release early in 2017, will focus on the issues of collective decision making including that of government.

Science advice surrounding and during emergencies

It has been said that the most critical role for a science advisor is that which occurs in and around emergencies. 2015/16 was the year when this issue came into sharp focus via the UNISDR process which culminated in the Sendai report (see <http://www.unisdr.org/we/coordinate/hfa-post2015>). I have a growing role in this regard working closely with MCDEM and DPMC.

I sit on the government's Strategic Risk and Resilience Panel, which seeks to identify hazards and to help authorities consider and prepare for all types of eventualities that could affect New Zealanders' well-being.

More recently we have worked with DPMC and MCDEM on how my Office should interface with the National Crisis Management process. I am working to ensure more effective science communication to the public as well as continuing to enhance science inputs into the crisis management process; this becomes important when crises of a complex nature emerge and which crosses agencies.

Science in Society The government's strategic plan for science in society – *A Nation of Curious Minds* – is now fully into implementation through a number of cross-government programs (see www.curiousminds.nz). This plan was jointly developed by MBIE, the Ministry of Education and my Office and the initiative is managed via a steering group including myself and senior officials from MBIE and Education. The strategy comprises a number of initiatives - one of which, the Participatory Science Platform (PSP), is administered from my Office.

The PSP has no direct parallel internationally, although several jurisdictions have or are introducing similar projects and following our work closely. It is centred on young people, particularly through schools, and is expressly designed to

connect scientists to local communities to work on community driven problems with demonstrable scientific, pedagogical and community integrity. Three pilots are well underway in Taranaki, South Auckland and Otago. Projects have ranged from restoring habitat for healthy salmon populations to investigating the potential for new 'dark sky' tourism locations and from developing new user-friendly technologies for indoor air quality testing to understanding the behaviour of domestic cats in pest-free zones. The projects have gained considerable profile in both regional and national media, as well as having maintained a vibrant social media presence.

In 2016/17 there will be an evaluation of the PSP so that Cabinet might consider extending this and other parts of the Nation of Curious Minds project.

Small Advanced Economies Initiative (SAEI)

This NZ-led initiative was established in 2011 and has grown considerably in impact and importance in the past twelve months. Its intent is to provide research analysis to support the work of senior policy makers from the member countries by sharing ideas and experience in areas where the small country size is likely to have a significant impact on policy options.

Switzerland formally requested membership and was accepted into the initiative during the year, thus joining Finland, Denmark, Ireland, Singapore, Israel and New Zealand.

The initiative is administered from my Office with club funding from NZ agencies and in kind and fiscal support from the other members. With the appointment of Mr Andrew Sweet, formally of DPMC, as the part-time coordinator for economic matters to the initiative, there has been a greater engagement of agencies. MFAT has appointed our WTO Ambassador, Vangelis Vitalis as special envoy to the SAEI.

The work programme is now operating under four major themes as follows:

- Science,
- Innovation,
- Economics,
- Trade and the issue of how do small nations have an effective voice in a world where the global architecture is changing.

While the work is coordinated out of our Office, member States contribute by leading on particular projects. In the past year there has been a growing cooperation with the OECD, and in April a joint workshop was held on economic

and innovation themes. The initiative generally works via two face-to-face meetings a year; one comprising officials working on specific projects and the other the Principals' meeting. In 2015/16 the NZ representation to the latter meeting was headed by the Chief Executive of MBIE. There are frequent working group teleconferences within each of these project areas.

Some of the projects currently under way are listed in Appendix 2. The 2016 Principals meeting will be held in Dublin in September. Senior officials from MBIE, MFAT and Treasury will attend.

Science and diplomacy

The Office, together with MBIE and MFAT, meets regularly to coordinate our various roles in international science and science diplomacy. In this role further support is provided by MFAT, and since 2011 I have been their Special Science Envoy. In February 2016, I was awarded the Science Diplomacy Prize by the American Association for the Advancement of Science (AAAS).

The New Zealand science advisory ecosystem, developed since 2009, has attracted attention from several countries as well as within international organisations.

Momentum for this work has been building since 2014 when, together with the International Council for Science (ICSU), and with the support of MFAT and MBIE, we held the first international conference on the role of science advice to governments in Auckland. Subsequently the International Network for Government Science Advice (INGSA) was formed and which I chair (www.ingsa.org). Since that time, INGSAs has established itself as the foremost grouping for thought leadership and agenda-setting in this area globally.

A number of New Zealand's bilateral relationships have been strengthened through science diplomacy this year. In late 2015 I visited Ottawa, Canada and gave a keynote address at the annual Canadian Science Policy Conference. Since that time, I have provided briefings on the New Zealand model of the science advisory ecosystem at the request of the Canadian Minister of Science and other Federal officials.

In February I hosted the incoming Chief Scientist of Australia, Dr Alan Finkel. This followed the announcements of yourself and the Prime Minister of Australia of the desire to strengthen the relationship between our two countries in science, technology and innovation. Together with MBIE and their Australian counterparts we have commenced discussions on the scope a formal agreement.

Our relationship with the United States of America was given an added boost by using the occasion of my AAAS Science Diplomacy award to showcase areas of New Zealand science such as Antarctic New Zealand, medical science and oceanographic research where we have close collaboration with the USA. The event, which I hosted with MBIE, was attended by senior USA officials provided an important opportunity to highlight and market our science and technological strengths.

Through the INGSA initiative, I provided a capacity-building workshop for some 15 African countries, in close collaboration with MFAT and the Academy of Sciences of South Africa in February this year. The workshop was held in partnership with the South African Government. South Africa's position in the Square Kilometre Array project makes it an important partner for New Zealand.

Specifically, at the request of the European Commissioner for Research, I advised officials who had been tasked to establish the new Science Advisory Mechanism for Europe. I also arranged high level briefings by New Zealand technical experts for European officials in two areas: the use of big data to design new models of investment in social services; and the emerging field of 'precision agriculture.' New Zealand is internationally recognised for its growing expertise in these areas and I envisage specific partnerships in each being developed: indeed in both significant progress has subsequently been made.

Science diplomacy also involves working with multi-lateral organisations globally to help advance New Zealand interests through such channels. It also helps ensure that we continue to play our international role in addressing the global challenges to which we are committed, and to do so in conditions that make sense for New Zealand. I delivered the Keynote Address to the Science-Policy Forum of the General Assembly Meeting of the United Nations Environment Program (UNEP) in Nairobi, Kenya in June 2016. I focused on the issue of how domestic and international science advisory mechanisms must mesh.

I continue to chair the APEC Chief Science Advisors' and Equivalents group, which met in September 2015 in Malaysia. As a result the APEC leaders in their meeting in Manila in November 2015 asked the group to propose APEC-relevant recommendations for the use of science advice in national and regional emergencies. The recommendations have been developed by my Office in consultation with all APEC economies and will be considered in the 2016 cycle of meetings. The other focus of discussion was that of indigenous and local knowledge and its relationship to scientific knowledge.

I have been appointed to the newly formed Science Technology and Innovation Advisory Group of the OECD, mandated to identify and explore emerging issues in

national science and innovation systems and how their performance is measured, managed and improved.

I have completed my role as Co-Chair of the WHO's Commission on Ending Childhood Obesity and in May 2016 I delivered the Commission's report which was approved by the World Health Assembly (<http://www.who.int/end-childhood-obesity/publications/echo-report/en/>).

I continue to chair the granting committee for the New Zealand Fund for Global Partnerships in Livestock Emissions Research and the research continues to develop and show promise with very important collaborations being fostered.

Science system

I have met frequently with MBIE officials and have offered advice and assistance as requested. The Committee of DSAs has been consulted by MBIE on aspects of implementation of the National Statement of Science Investments.

Looking ahead

In the next few months I will publish the second and third reports in my series on Risk and Decision Making in the Face of Uncertainty and deliver my third report on the Use of Evidence in Public Policy Formation.

My Office will be launching a new initiative – the Science Policy Exchange – for emerging policy professionals and scientists. The SPE is designed as a case-based learning opportunity to teach the challenges and nuances of the science-policy interface to a new generation of professionals in both the supply and demand sides of evidence-informed advice. We intend that the participants work on real issues to assist the Office.

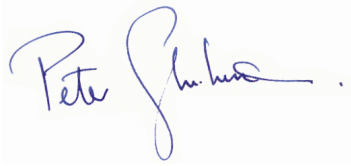
Administration of the OPMCSA

The Office continues to operate within its budget with 0.7FTE of my own time seconded from the University of Auckland, together with 2 FTE for office and technical support and 1.5 FTE contract researchers who are employed on specific projects. A continuing partnership with MFAT, MBIE, DPMC and partner countries of the Small Advanced Economies Initiative (SAEI) provides for 1.5 FTE, while a separate envelope of MBIE funding supports the Participatory Science Platform with 1 FTE National Coordinator for this project. The INGSa coordinator (0.5 FTE) is supported by a grant from the Wellcome Trust (UK).

The Committee of Departmental Science Advisors supports the work of the PMCSA and extends the science advisory model to through individual Ministries. Those positions are independently filled and resourced by their respective ministries.

Acknowledgements

I am grateful for the continued support of members of Cabinet, and the CEs of Government Ministries, Agencies and of DPMC. In particular, I wish to thank Mr Andrew Kibblewhite, Ms Barbara Annesley, Dr Arati Waldegrave, and Mr John Scott of DPMC. I also acknowledge the work and diligence of Ms Kristiann Allen, my chief of staff, Professor Stephen Goldson, my strategic advisor (part-time), Mr Julian Tollestrup, research and policy coordinator and Mr Andrew Sweet for their support of the SAEI, Dr Anne Bardsley, my principal research analyst, and Ms Lara Cowen, coordinator for INGSAs. The work of the Departmental Science Advisors, their support, advice and peer review of my work is invaluable. I also thank the staff at MFAT and MBIE, and Ms Megan Stünzner in my Office for their assistance throughout the year.

A handwritten signature in blue ink that reads "Peter Gluckman". The signature is fluid and cursive, with a period at the end.


Sir Peter Gluckman, KNZM FRSNZ FMedSci FRS
Prime Minister's Chief Science Advisor

Appendices follow

APPENDIX 1:

Published essays and speeches July 1 2015 – June 31 2016 (reverse chronological)

 [Sir Peter Gluckman's address to ESOF 2016 Manchester](#)


 [Sir Peter Gluckman's address to the 20th anniversary of the signing of the Australian and New Zealand Food Treaty](#)

 [Sir Peter Gluckman Blog: Thoughts from Nairobi - Science advice from international to national and back again](#)

 [Sir Peter Gluckman presentation to the UNEA Science Policy Forum](#)


 [Sir Peter Gluckman Blog: Knowledge, values and worldviews: implications for science communication](#)

 [Making decisions in the face of uncertainty: Understanding risk](#)

 [Sir Peter Gluckman Blog: The evolving nature of science advice](#)

 [Sir Peter Gluckman Blog: The conservation and environmental science roadmap](#)


 [Sir Peter Gluckman speech to AAAS Integrating Science into Policy session](#)

 [Sir Peter Gluckman's address to open the NZ Embassy science reception in association with the AAAS Meeting in Washington DC](#)


 [Remarks for Keynote Panel on Science Advice to Governments - 2015 Canadian Science Policy Conference](#)

 [Sir Peter Gluckman's Address at the SuPERU Childhood Obesity Seminar](#)


 [Address to INGSA Workshop at World Science Forum Budapest](#)

 [Opening address: Third Meeting of APEC Chief Science Advisors and Equivalents](#)

 [Media release - National Statement of Science Investment](#)

 [Sir Peter Gluckman's address to IPANZ on *The science of stewardship and the stewardship of science*](#)

 [Sir Peter Gluckman's address to the RMLA: The Salmon Lecture](#)

 [Sir Peter Gluckman's address at the Launch of the PPS Programme](#)

 [Sir Peter Gluckman's address to the IGPS Symposium](#)

APPENDIX 2:

Small Advanced Economies Initiative

The Small Advanced Economies initiative brings together officials from Denmark, Finland, Ireland, Israel, New Zealand, Singapore, and Switzerland to explore policy issues where the implications of country size influence decision-making. The focus of the initiative has been on three inter-related work streams: economic policy; science, technology and innovation; and foreign and trade policy

The Office of the New Zealand Prime Minister's Chief Science Advisor currently serves as the secretariat for the initiative in general and, in particular, leads the science, technology, and innovation focused work within the group. The foreign and trade policy-related elements are coordinated by the Secretariat and led by the New Zealand Special Envoy for the SAEI.

The initiative's value proposition is multifaceted. As large nations often dominate global policy analyses, trends in small economies are commonly overlooked; the SAEI counters this trend by coordinating analysis specific to small nations, considering matters influenced by such issues as limited resources, critical mass, and market vulnerability. Furthermore, the initiative considers policy issues where the scale of small countries provides a unique advantage in the collection and analysis of information and where such countries can act as 'test beds' for new policy approaches. For this reason, the initiative's audience extends beyond small nations alone.

The primary focus of the initiative are informal meetings held twice annually; one bringing together high level principals from each of the 7 countries to discuss topical issues, and the other which focuses at a more technical level on specific policy questions, including with a view to help prepare the agenda for the meeting of Principals. On-going research and analysis is also undertaken by the group with oversight from the Secretariat to inform discussion within the initiative and provide policy resources for the group's members.

Current areas of work

The following are projects that are currently underway within the Initiative's economics and innovation, technology and science policy streams.

- **Policies to promote BERD**
 - *What are the unique challenges and opportunities that small countries must consider when designing supports and the overall policy mix to stimulate business expenditure on R&D?*

- **GVCs and productivity**
 - *What opportunities exist for governments to assist national firms to integrate more deeply into global value chains (as a means to enhance overall productivity growth)? How can recent work such as the revised TiVA database and the OECD's work on the micro foundations of productivity be used to uncover new insights in this area?*
- **Facilitating competitiveness in small economies**
 - *Over and above openness to trade and investment and good regulatory settings, what extra steps can governments in small countries take to enhance levels of competition in key domestic sectors, particularly with respect to non---tradeable goods and services?*
- **Regional Development / Inequality**
 - *How should governments in small countries look to balance support for less well performing regions on the one hand, with the desire to maximise the extent that the (typically small number of) large cities can act as engines of growth. And how can they maximise the extent to which the benefits of growth in large centres flows over into regions?*
- **Commercialisation of R&D / Innovation**
 - *What are the unique challenges and opportunities that small countries face in commercialising their publically funded R&D? What are the most effective policy mechanisms in this regard?*
- **Role of key opinion leaders in science and innovation systems**
 - *What role can (and do) key opinion leader scientists (i.e. high profile and academically outstanding researchers) play in facilitating commercialisation and attracting foreign R&D? How can policy makers in small countries harness this opportunity?*
- **Helping firms internationalise**
 - *As a result of smaller domestic markets, firms in small countries typically begin to export when smaller and younger than their counterparts in larger countries. What should be the implications of this on the nature of the supports for internationalisation provided by government?*
- **Internationalisation of private sector R&D**
 - *With the increasing trend in the externalisation of private R&D, what challenges and opportunities do small countries face in retaining and attracting R&D activity?*

- **‘Stickability’ / maximising value retention**
 - *How best can governments capture value resulting from publicly funded innovation and R&D supports and prevent the leakage of such value to larger markets offshore?*
- **Impact of technology on employment**
 - *What role can and should governments in small countries play in managing the impact of technological change on labour markets?*
- **The changing nature of public science in small advanced economies**
 - *In what ways have public science systems changed in recent history? What are the external drivers of this change, what challenges and opportunities do they present, and what are the implications of this on the role of government?*

The following are themes and issues currently being considered in the Initiative’s foreign and trade policy work stream.

- **Multilateralism and ‘Open plurilateralism’**
 - *How can small states best position themselves to support multilateralism, while engaging in the emerging global trade policy dynamic of plurilateral trade blocs?*
- **Implementation, enforcement, upgrading, and promotion of trade agreements**
 - *Sharing implementation experiences and strategies to communicate outcomes to business and to civil society more broadly.*
- **Small states and superpowers**
 - *How can and do SAEI member economies relate to the ‘super powers’ whether emerging, or existing, in foreign and trade policy?*
- **Small state foreign ministry issues**
 - *How should small state foreign/trade ministries with limited (absolute) resources be conceiving of their personnel needs, network structure, representation*

APPENDIX 3:

Terms of reference – Office of Prime Minister’s Chief Science Advisor

Science in Society and Government

- a. To promote the understanding of science by public, policy makers and elected officials including clarification of issues of high public concern. To assist in the understanding of where science can benefit New Zealand, and the uses and limits of various scientific technologies.
- b. To undertake activities that promote Science and Technology education.
- c. To undertake activities that enhance the use of science and evidence in policy formation and evaluation across government.
- d. To chair and mentor the network of departmental science advisors and oversee their collective programme of activities.

Science system and public policy advice

- e. To act as a sounding board for science and innovation policy and provide advice to relevant ministers and the Prime Minister as requested.
- f. To contribute to the government’s processes around risk identification and management.

Science diplomacy

- g. To assist in promoting New Zealand’s interests internationally through science and to assist MFAT by acting as New Zealand’s science envoy.
- h. To represent NZ at APEC CSA meetings and other appropriate forums

Technical advice

- i. To provide advice and reports on specific scientific matters as requested from time to time by the Prime Minister
- j. To be a member of appropriate boards and panels (e.g. Defense Technology Advisory Board, Strategic Risk and Resilience Panel, Science and Society Steering committee)

Other duties

- k. To be a point of contact for the science community, industry and others on scientific matters where the government has an interest or role.
- l. To undertake other relevant tasks as agreed with the Prime Minister.