



The Next Steps for Sustainable Science Advice in Canada

A Royal Society of Canada Position Paper

December 2018

www.rsc-src.ca/en/nextsteps

NB The RSC is indebted to the drafting team of David Naylor (chair), Paul Dufour, and Indira Samarasekera as well as for input on previous versions from the Presidents and other colleagues at the Canadian Academy of Health Sciences and the Canadian Academy of Engineering. The RSC assumes full responsibility for the Position Paper.

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List of Abbreviations

CAE	Canadian Academy of Engineering (est. 1987)
CAHS	Canadian Academy of Health Sciences (est. 2004)
CCA	Canadian Council of the Academies (est. 2004-05)
CSA	Chief Science Advisor (Canada unless otherwise specified)
CSTA	Council of Science and Technology Advisors (Canada 1996-2007)
FSR	Fundamental Science Review (2016-17)
NAE	National Academy of Engineering (US)
NAM	National Academy of Medicine (US)
NAS	National Academy of Science (US)
PCAST	President's Council of Advisors on Science and Technology (US)
RSC	Royal Society of Canada (est. 1882)
STAC	Science & Technology Advisory Committee (generic)
STIC	Science, Technology and Innovation Council (Canada 2007-16)

The RSC defines science inclusively across the arts, humanities, social sciences, life sciences, mathematical and physical sciences, earth, oceans and atmospheric sciences, the applied sciences, engineering and health. The RSC defines excellence as inclusive excellence including Indigenous ways of knowing.

The Next Steps for Sustainable Science Advice in Canada

Executive Summary

We live in an epoch of human history when social, technological and environmental changes are accelerating in ways that increase exponentially the complexity of policy-making and regulation. It is therefore more urgent than ever for governments to obtain sound expert advice before acting, especially in formulating public policies. Yet, paradoxically, falsehoods can now propagate globally in seconds, encouraged by a growing number of leaders around the world who actively disparage the sciences, their proponents and practitioners, and their conclusions.

In this context, governments must depend on a robust science capacity that can be brought to bear on the key questions of today, and to prepare for those of tomorrow. Fortunately for Canada, transformative federal leadership has underpinned the emergence and development since the 1970s of a world-class science capacity. This federal leadership has been significantly renewed since 2015, and Canada is internationally praised for the quality and breadth in fields across the natural and health sciences, humanities, engineering, arts, and social sciences. Moreover, this quality and breadth characterizes campuses and institutions across provinces and territories.

Unfortunately, though, a significant gap separates this world-class science capacity from actual government decision-making. Few clear pathways enable and facilitate engagement between those inside government and leading scientists and scholars across Canada, the vast majority of whom receive federal research funding. Decisions have been taken recently to coordinate and strengthen science inside government, as well as to improve collaboration across federal extramural research agencies. However, federal action has not been taken to close the internal-external gap. The result is that the federal government cannot effectively and efficiently call upon Canada's world-class science capacity to help address all the urgent social, technological and environmental challenges that face government decision-makers in the 21st century.

Recognizing this context, the RSC's Strategic Plan for 2018-2022 emphasized with increased urgency its historic position that expert, independent, and objective scientific advice is fundamental to policy development and decision-making. The RSC committed to the "implementation of a sharpened focus for contributing advice to policy and public discussion". That commitment builds on the RSC's Position Paper in 2015, which set out the vital importance of science advice, and the attributes that ideally characterize both such advice and the structures/personnel to deliver it.

The federal government responded quickly to recommendations from the RSC and others to follow through on a 2015 platform promise to re-establish the position of Chief Science Advisor. The platform in the same breath committed that the Chief Science Advisor would ensure "that scientific analyses are considered when the government makes decisions." The machinery to fulfill that promise, however, remains inadequate. It is now urgent that attention be focused on

closing the inside-outside gap through creation of explicit pathways that enable and facilitate external science advice. Specifically, the RSC suggests there are two crucial next steps:

1. The RSC recommends that Canada's Chief Science Advisor be formally recognized as the Government's key interlocutor connecting external science and government, and that this role be embodied in legislation. In particular, the Chief Science Advisor must be empowered to clarify and strengthen the Government's internal processes for determining an agenda of issues requiring external scientific advice.
2. The RSC recommends that the Government of Canada act expeditiously to create a high-level science and technology advisory committee, and that this committee be embodied in legislation. We further recommend that the CSA serve as co-chair (or chair) with an external co-chair (or vice-chair) selected from among the appointees by the Government of Canada. We further recommend that the presidents of the Royal Society of Canada along with the Canadian Academy of Health Sciences and the Canadian Academy of Engineering sit ex-officio on the new committee in order to strengthen government knowledge of, and access to, leaders across Canada's science communities.

Next Steps for Sustainable Science Advice in Canada

Part I provides an overview of the current context within which the Government of Canada receives science advice. Part II details the rationales for the next steps in enhancing sustainable science advice in Canada.

Part I: The Advisory Process

The Landscape

Most governments or public agencies in Canada and internationally have internal scientific staff, and informal networks of external scientific experts from whom advice may be sought on an informal or semi-formal basis. Chief Science Advisors (however specifically titled) characteristically contribute to that advice function, and depending on their mandates, Science and Technology Advisory Committees (STACs) also come into play.

Matters become more complicated when a government or other relevant organization/agency seeks external advice involving substantive study, deliberation, and a formal report that will be published widely. How often this happens and how well the questions are framed will depend in part on the structure and culture of a given political administration or civil service.

In sorting through the issues where expert advice may be useful, a Chief Scientific Advisor (CSA) or equivalent is often a key interlocutor with a head of state or first minister and her/his immediate circle of officials. A STAC, usually working closely with the CSA, may also be involved. Ideally, the CSA works across multiple departments that may or may not have their own CSAs, helping to determine which queries are the highest priority for formal expert input. And with or without mediation by a CSA, individual departments may elect to frame and fund their own requests.

A further issue for the relevant government or public agency is determining the type of external advice. In this regard, the nature of the query is relevant. A simple taxonomy might be as follows:

BOX 1. 2015 RSC Position Paper

The RSC is concerned that the ability of science to contribute to the well-being of Canadians is not being fully realized.

We believe that expert, independent, and objective scientific advice is fundamental to policy development and decision-making.

We recommend that Canada establish the office of Government Chief Scientific Advisor in accordance with the world's wealthiest economies.

We recommend full implementation of Industry Canada's landmark reports on scientific advice: *Science Advice for Government Effectiveness* and *A Framework for Science and Technology Advice*.

We urge the government to fully integrate scientific advice in decision-making by processes that are transparent and accountable to Canadians.

A. Tell us what is known and not known (literature review and/or evidence synthesis admixed with varying degrees of expert judgment) and describe the resulting implications for the making of public policy. This is what constitutes an ‘assessment’ in current Canadian practice.

B. As above - and delineate policy options and recommendations for action. This is ‘policy advice’ as provided by external experts through arm’s-length machinery in most jurisdictions.

C. As above—and give us a blueprint for how that action should be taken. This type of detailed input is sometimes solicited from expert panels hand-picked by governments, because of the political sensitivities involved, but may also involve arm’s-length bodies for special projects.

Taken together, the science advice ecosystem is complex, advice takes several forms, and the process of soliciting and generating advice can occur through a variety of channels within almost all democratic states. A high degree of flexibility, trust, and open interchange is therefore essential for sound advice to be turned into sound policy by multiple actors in the policy realm. Trust in particular may be enhanced by a broad understanding on all sides that sound policy-making starts from a strong evidence base grounded in science.

The Canadian Context

In Canada, there have been and are significant examples of how science advice can positively contribute to government decision-making and therefore quality of life for all Canadians. Established in 1882, the RSC has from time to time offered science advice to Canadian governments, usually in response to requests from ministers. In recent decades, RSC advice (usually category B above) has addressed topics such as end-of-life decision-making (2011), oil-sands development (2012), the effects of climate change and fishing on marine biodiversity (2012), early childhood development (2012), the effects of radiofrequency fields (2014), and memory institutions in the digital age (2015).

These RSC reports illustrate the quite unique value of the RSC in bringing together all fields and multigenerations of science and scholarship, represented by an elected President and Board of Directors. Specifically, the RSC includes leaders in the arts, humanities, social sciences, life sciences, mathematical and physical sciences, earth, oceans and atmospheric sciences and the applied sciences and engineering. Across all fields, the RSC respects the complementary role of Indigenous ways of knowing. Moreover, the RSC includes leaders of the emerging generation of scientists and scholars, a unique advantage among major national academies around the world. With over two thousand rigorously selected members across research fields and generations, the RSC thus possesses a unique pan-Canadian science capacity. This robust capacity is now proving to be essential in addressing the complex problems increasingly recognized in the 21st century such as those of the environment and digital transformations.

The establishment in 1989 of the Canadian Academy of Engineering and in 2004 of the Canadian Academy of Health Sciences further expanded Canada’s scientific advisory capacity

also under the leadership of elected Presidents. The CAE includes the “most accomplished engineers, who have expressed their dedication to the application of science and engineering principles in the interests of the country and its enterprises.”¹ For its part, the CAHS was founded “to provide independent, objective, evidence-based analyses of health challenges that inform both public and private sectors in decision-making about policy, practice and investment.”² Recent expert reports of the CAE include the widely-cited “Engineering in Canada’s Northern Oceans: Research and Strategies for Development” (2016).³ Similarly, the CAHS has produced valuable reports such as on early childhood development (2012) (conducted jointly with the RSC), and “Improving access to oral health care for vulnerable people living in Canada” (2014).⁴

In addition, the RSC along with the CAHS and CAE founded in 2005 the Council of Canadian Academies, now known as the CCA, to undertake assessments funded by the federal government on topics proposed to it by the Assistant Deputy Minister Science and Technology Committee, now named the Deputies’ Committee on Science. Under the governance of a Board of Directors that includes representatives of the RSC, CAHS and CAE as well as four members proposed by the Minister of Innovation, Science and Economic Development, these assessments (category A above) do not make recommendations or offer policy options. The assessments are widely regarded as high quality, thanks to the CCA’s strong leadership and an outstanding staff that provides support to expert panels composed of members of the three Academies as well as other experts. Budget 2018 provided \$3M per year for three years to the CCA—an amount unchanged since 2005—to pre-fund three or more assessments annually through 2022. At the same time, the CCA was encouraged to increase the number of assessments each year by working directly with specific federal departments, and, as a result, a new operating model is being enthusiastically developed by the CCA Board of Directors.

The great extent of potential science advice in Canada has been further demonstrated this year when the RSC used its convening power to enhance Canadian government leadership at the global level. Specifically, the RSC contributed advice directly to the work of the Government of Canada throughout its G7 Presidency in 2018. The RSC led the collaboration of G7 national academies in the development of statements and the organization of multiple G7 Research Summits on Our Digital Future and Arctic Sustainability—two key themes of this year’s G7 meetings. This science advice was warmly welcomed and later acknowledged by government leaders as major contributions to the G7 Summit Communiqué as well as the seven Charlevoix commitments. These documents reflected, for example, RSC recommendations on ensuring ethical and human-centred approaches to AI, promoting lifelong learning and digital literacy and promoting research and development in ocean science.

¹ <https://www.cae-acg.ca/>

² <https://www.caHS-acss.ca/about/>

³ <https://www.cae-acg.ca/wp-content/uploads/2013/07/CAE-Northern-Oceans-Report-2016-May-12.pdf>

⁴ https://www.caHS-acss.ca/wp-content/uploads/2015/07/Access_to_Oral_Care_Executive_Summary_and_Recommendations_EN.pdf

Taken together, however, such examples of all three categories of science advice have resulted from relatively few requests by Canadian governments. Not only have requests for such science advice been limited by international standards, they have not been increasing with the greater complexity of recent years. Canada had a valuable roadmap described in the Canadian Science and Technology Advice 'Framework' (2000), but it fell into abeyance from 2007 to 2015. A recommitment to that framework or a modernized version thereof is still needed. Clearly, the potential for robust science advice is being only very partially exploited in Canada, despite its world-class science capacity. Without enabling and facilitating pathways between government needs and science advisory capacity, Canadian investments in top-quality research are not effectively and efficiently supporting government policies and decision-making for improved quality of life for all Canadians.

Part II: Rationales for The Next Steps

Recommendation 1: The RSC recommends that Canada’s Chief Science Advisor be formally recognized as the Government’s key interlocutor connecting external science and government, and that this role be embodied in legislation. In particular, the Chief Science Advisor should be empowered to clarify and strengthen the Government’s internal processes for determining an agenda of issues requiring external scientific advice.

Canada has taken significant steps forward since 2015 to lay the groundwork for efficient and effective external science advice to inform all government policies and decision-making. The RSC applauds the fact that mandate letters issued to newly-appointed Cabinet Ministers in November 2015 all indicated the Prime Minister’s expectation that “our work will be informed by performance measurement, evidence, and feedback from Canadians.” The Cabinet included a new Minister of Science with a PhD and a research resume, the Hon. Kirsty Duncan. Minister Duncan in turn promptly commissioned a wide-ranging review of federal support for extramural research. Released in early 2017, the Fundamental Science Review [FSR] called for major new investments in extramural research, along with new oversight, governance, and advisory mechanisms for the federal sphere.

In the fall of 2017, Dr Mona Nemer, an internationally-recognized scientist, was appointed as Chief Science Advisor and provided with an office to support a successful start to increasing science advice for government. More recently, Dr Nemer has been working with ministers and deputies to facilitate appointment of department-specific science leads, and to organize a government-wide committee of science advisors that would improve coordination and collaboration. Legislation to establish the CSA position is recommended given the fact that, dating back to the 1960s, the Government of Canada has institutionalized a CSA function in a series of arrangements that never lasted more than a few years. It should also be remembered that the post of the previous CSA was abolished in 2008—something few other countries have ever done.

In this context, the next step is to establish the CSA as the interlocutor with the external community of experts, working with her departmental colleagues, and consulting with deputies and ministers as to their priorities. In this way, the government would help close the inside-outside gap by creating explicit pathways that enable and facilitate external science advice.

This attention is more urgent than ever thanks to federal Budget 2018 that included very substantial investments in extramural research and researchers across disciplines, with a particular emphasis on funding investigator-initiated projects. These investments will further enhance the world-class quality of Canada’s science advisory capacity. Moreover, the ‘pre-funded’ assessments produced by CCA have been chosen since 2005 primarily by canvassing government departments through the Assistant Deputy Minister Committee on Science and Technology (recently re-named as the Deputies’ Committee on Science). This mechanism from multiple accounts has been considered less than ideal by all those involved. A better pathway to the CCA for these pre-funded assessments would be through the new CSAs Committee as

chaired by the CSA. Indeed, the original plan for the CCA anticipated that the then National Science Advisor would have such a role.

Recommendation 2: The RSC recommends that the Government of Canada act expeditiously to create a high-level science and technology advisory committee, and that this committee be embodied in legislation. We further recommend that the CSA serve as co-chair (or chair) with an external co-chair (or vice-chair) selected from among appointees by the Government of Canada. We further recommend that the presidents of the Royal Society of Canada along with the Canadian Academy of Health Sciences and the Canadian Academy of Engineering sit ex-officio on the new committee in order to strengthen government knowledge of, and access to, leaders across Canada’s science communities.

Several types of Science and Technology Advisory Committees have come and gone in Canada since the 1960s; descriptions of each can be found in Quirion, R. et al, *Reflections on Science Advisory Systems in Canada*, Palgrave Communications Collection on Scientific Advice to Government, 2016. The Science Council of Canada (1966-1992) had the widest mandate and was longest-lived. Later Canadian incarnations of a STAC had narrower mandates, smaller memberships, limited secretariat functions, and were sometimes split into two bodies for private and public advice. (see Appendix 1) Two such councils were consolidated into the Science, Technology and Innovation Council (STIC) in 2007.

STIC was tasked solely with providing confidential advice to the Minister of Industry along with issuing “biennial, public State of the Nation reports that assess and benchmark Canada’s STI progress and performance, particularly against that of international jurisdictions.” STIC’s mandate was far more limited than equivalent bodies elsewhere such as the UK Science and Technology Council (Box 3) or PCAST in the USA. STIC was wound down in 2016. While the government has funded CCA to complete periodic assessments of science and technology, no action has been taken on the recommendation of the FSR report for creation of a robust and more independent replacement for STIC. This situation makes Canada something of an outlier among major industrialized nations. It also weakens the position of Canada’s CSA, as any STAC would be expected to function in partnership with and support of the CSA.

Given any external science committee’s intermediary role, a relationship of trust and the capacity to give confidential advice must be preserved between the STAC and a given government. A further rationale for legislation, as outlined in the FSR report (2017), would be to give the new committee a limited mandate to publish periodic independent reports on federally-supported intramural and extramural science, including highlighting emerging areas that should be on the radar screen of parliamentarians and the public alike.

While it is heartening to see the positive federal stance and actions since 2015, the hard fact is that, throughout history, the Governments of Canada have repeatedly swept aside or hamstrung science advisory structures, vitiating any institutional continuity. This reality helps explain the characteristic limited government access to successive generations of world-class experts—inside and outside the Canadian academies—eager to serve their country as

volunteers. As Dufour has described in detail (The provinces, the feds and national S&T building', *Research Money*, 21 May 2010), discontinuities at the federal level have also historically undercut efforts to coordinate science advice and strategy on a national level through collaboration with the provinces and territories. Legislation to establish roles on STAC does not provide guarantees of continuity, but may provide a check on sudden politically-motivated restructuring.

Part III: Conclusion

While favorable developments have occurred since the 2015 RSC Position Paper on advisory capacity was released, serious concerns about the state of science advice persist. The appointment of an outstanding individual as Canada's new CSA is a very important step, but needs to be reinforced by the creation of a dynamic external science advisory pathway to close the gaps in the current science advice ecosystem.

The next steps presented in this RSC Position Paper respond to this urgent need. By establishing Canada's Chief Science Advisor as the inside-outside science interlocutor, by establishing a robust science advisory committee with direct representation from Canada's three academies, and by positioning the CSA as the co-chair or chair of this committee, an effective and efficient pathway would be forged to enable and facilitate flows of science advice to support government policies and decision-making.

What makes these next steps particularly promising is that the RSC along with the CAHS and CAE remain a comparatively untapped reservoir of voluntary advisors eager to share their considerable expertise. This internationally-recognized capacity could enhance policy making, help raise our nation's profile and reputation as forward-thinking and innovative, and help position Canada as a destination for investment and talent. The proposed structure would also give Canada the capacity to stay in closer touch with what is occurring in other parts of the world as regards evidence-based public policy.

Appendix

A Brief History with International Comparisons

A number of published sources recapitulate the history of science advice in Canada. A concise summary can be found in the 2016 article by Quirion, R. et al, Reflections on Science Advisory Systems in Canada, Palgrave Communications Collection on Scientific Advice to Government, 2016. Box 2 is adapted from the Fundamental Science Review report and briefly “tabulates some of the key bodies inside and outside government that have been engaged in advising the federal government over the course of more than 100 years.”

Box 2. Timeline of Institutional & Governmental Sources of Science Advice

Time Period	Sources of Science Advice
1882–	Royal Society of Canada
1916–	National Research Council (Honorary Advisory Council on Scientific & Industrial Research)
1964–1971	Science Secretariat of the Privy Council Office
1966–1992	Science Council of Canada
1987–1996	National Advisory Board on Science and Technology
1988–1993	National Forum of Science and Technology Councils
1996–2007	Advisory Council on Science and Technology
1996–2007	Council of Science and Technology Advisors
2003–2008	National Science Advisor to the Prime Minister
2005–	Council of Canadian Academies (formerly Canadian Academies of Science)
2007–2016	Science, Technology and Innovation Council
2017–	Chief Science Advisor, Government of Canada

Notable here is the Science Council of Canada, established in 1966 by an Act of Parliament to provide independent advice on directions for science and technology.⁵ Its legislated remit gave the Science Council wide scope to respond to government and initiate its own studies. The Council’s contributions were numerous, and included:

- stimulating and actively contributing to parliamentary and public discourse on topics as varied as emerging technologies and urban transportation;
- addressing politically sensitive topics such as the impact of federal R&D programs and investments, and the state of provincial science education;

⁵ Kinder, Jeff and Dufour, Paul (eds.) A Lantern on the Bow: A History of the Science Council of Canada and Its Contributions to the Science and Innovation Policy Debate, Invenire, 2018

- undertaking studies at the request of government and engaging in international assessments (e.g. future of neuroscience, a space agency for Canada, Canada's role in science and international affairs); and
- synthesizing public input and expertise from a wide cross section of eminent Canadians, leading to many forward-looking reports on grand challenges in health, energy and environmental issues.

In the 1990s Canada actively engaged with peer nations in conceptualizing how governments might best seek and use external scientific advice. A 1999 report from the CSTA at the time, entitled 'Science Advice for Government Effectiveness', was foundational, and was followed by a framework document that set out "Principles and Guidelines for the Effective Use of Science and Technology Advice in Government Decision Making". The framework was adopted by the Cabinet in 2000, but fell into abeyance after 2007. Per its 2015 Position Paper, the RSC believes an updated version of the 2002 framework could become a useful roadmap for the CSA and the federal government more generally.

By the early 21st century, Canadian incarnations of a Science and Technology Advisory Committee had narrower mandates, smaller memberships, limited secretariat functions, and were sometimes split into two bodies for private and public advice. The consolidation of two such councils into the Science Technology and Innovation Council [STIC] in 2007 further constrained the role and mandate of Canada's STAC functions. In particular, STIC was tasked solely with providing confidential advice to the Minister of Industry along with issuing "biennial, public State of the Nation reports that assess and benchmark Canada's STI progress and performance, particularly against that of international jurisdictions."

This mandate was clearly more limited than equivalent bodies in the UK or, as another example, the President's Council of Advisors on Science and Technology in the US. Indeed, the latter body in some form dates back to President Truman. It was established in its current form by President George H. W. Bush in 1990. It was last in abeyance during the Presidency of Richard Nixon and is again in abeyance pending appointment of a new council by Donald Trump.

The relationship between the US National Research Council and US national academies is quite different from that of their Canadian counterparts. The US Academies produce science advice reports that include both assessments and policy options and recommendations containing advice as defined above. The US academies govern national research with the National Academy of Science (RSC's G7 counterpart) president as chair and the other two presidents (National Academy of Medicine and National Academy of Engineering) as vice chairs of its governing body. Many science advisory reports are clearly identified with one of the three US national academies. In 2017 US federal departments requested and funded a wide variety of advisory reports, paying the US national academies US \$212M in direct costs only; substantial additional funds flow to cover indirect costs.

France is illuminating because science advice is provided without a formal Science and Technology Advisory Committee or a Chief Science Advisor or, indeed, any brokering structure. The structure of the RSC at inception was patterned in part on the model of the five French academies (Daley and Dufour, *Creating a Northern Minerva: John William Dawson and the Royal Society of Canada*, HSTC Bulletin, 1981). France has experimented over time with various governmental structures to provide advice including a national council for science and one for the social sciences and humanities. Latterly the government has chosen to rely more heavily on issue-specific agencies and committees to develop strategies for science and innovation. However, many advisory functions now devolve to the Académie des Sciences in particular (RSC's G7 counterpart).

The Académie subscribes to a definition of expertise framed in 1997: "...the expression of knowledge formulated in answer to a demand from those that have a decision to make, knowing that this answer is intended be integral to the decision process." A 2012 Académie charter highlights the different elements involved in framing comprehensive advice, with due emphasis on objectivity, multiple disciplinary perspectives, ethics, and minority opinions. Each of its reports is framed with tight specifications as to objectives, a timetable, expertise needed, a communications strategy, and potential funding sources. This step is very similar to the advance work done by the National Research Council as the US academies' operating arm for science advice. Last, like the US academies, the French Académie also initiates a certain number of its own studies, drawing on foundations and other sources to support inquiries into major public issues.

Taken together, these and other international comparisons make clear that Canada is currently something of an outlier among major industrialized nations with respect to the substantial internal-external gap in its science advisory ecosystem.

The UK Council is interesting in that its wide-ranging membership includes leaders with relevant expertise from diverse sectors. The FSR report recommended a similar breadth for any Canadian analogue. Successive UK Prime Ministers have elected to retain ex-officio seats on the Council for all four academy presidents (the British Academy, Royal Academy of Engineering, Academy of Medical Sciences, and Royal Society). These seats span the same disciplines as would be encompassed in the three Canadian academies. In short, the recommendation for ex-officio seats on a new STAC for the Canadian academy presidents creates an effective and efficient connection to thousands of recognized experts across generations, their colleagues, their partners in industry and civil

BOX 3. UK Council on Science and Technology

We advise the Prime Minister on:

-the opportunities and risks that science, technology and disruptive innovation present; using horizon scanning to highlight issues about:

- ^ research and science capability
- ^ innovation and the economy
- ^ health and quality of life within the UK
- ^ sustainable development and resilience

-how science, engineering, technology and mathematics (STEM) can be developed and sustained in the UK; this can be through education and skills, and the promotion of international co-operation

-what the government's high-level priorities for science and technology should be

society, and their mentees and students who represent a great trove of future talent to build a better Canada.

Finally, the mixed record of the subnational jurisdictions in Canada further emphasizes the importance of federal action. Ontario, a science powerhouse, appointed its first CSA in 2017; a few months later she was dismissed by a new government and the position remains vacant. Conversely, in the three territories, a pan-Northern research strategy is being implemented under the guidance of science advisors for those jurisdictions. In Quebec the Chief Scientist role has survived several administrations and the incumbent continues to play a key role in the provincial government's long-term science, research and technology strategy. Indeed, the Chief Scientist of Quebec and provincial government will be hosting the next major meeting of the International Network of Government Science Advice in Montreal in 2020. In Alberta, however, a Chief Scientist has been in place only since 2016, focusing on environmental issues, and drawing on both a scientific advisory panel and an Indigenous Wisdom advisory panel. Whether that position will survive a change of government is uncertain. Taken together, precedents and international comparisons emphasize that if science advice is to grow and become sustainable for the benefit of Canadians, all jurisdictions must better inform decision-making through concerted effort.