



Partnership Group for Science and Engineering (PAGSE)

Partenariat en faveur des sciences et de la technologie (PFST)

**SUBMISSION TO THE HOUSE OF COMMONS STANDING COMMITTEE ON
FINANCE
2016 PRE-BUDGET CONSULTATION**

Presented by the Partnership Group for Science and Engineering (PAGSE)
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SUMMARY

Canadians recognize the value of science, technology, and innovation (STI) as drivers of economic productivity and growth, and as providers of sustainable solutions to promote our social and environmental well-being. Canada is home to some of the world's leading researchers and an emerging innovation agenda that will help ensure our future prosperity and global competitiveness. The four recommendations presented here are key to fostering Canada's leadership in STI by supporting a stable foundation for the discovery-based research that fuels innovation, building infrastructure to accelerate productivity and resilience in northern communities, making talented students more mobile to facilitate knowledge sharing and address the skills gap, and modernizing the system of federal support for industrial research to accelerate progress through the ideas-to-impact pipeline.

The Partnership Group for Science and Engineering (PAGSE) recommends that the federal government:

- **Increase investments in science and technology to match those in comparator countries.** This recommendation addresses the Innovation Agenda theme of "Supporting global science excellence" as well as the 2017 pre-budget consultation focus on federal measures that would support the contributions of Canadians to economic growth (Focus 1).
- **Build smart grid technologies in northern communities to improve resilience and sustainability, and to lower energy costs.** This recommendation addresses the Innovation Agenda theme of "Accelerating clean growth" and the 2017 pre-budget consultation focus on federal measures that would ensure that remote communities can contribute to economic growth (Focus 3).
- **Establish Canada Opportunity Scholarships to facilitate graduate student mobility for training.** This recommendation builds upon Canada's impressive track record of investing in human capital through STI training

scholarships. It focuses on the Innovation Agenda theme of “Promoting an entrepreneurial and creative society” and “Supporting global science excellence”. It also addresses the 2017 pre-budget consultation focus on federal measures that would support the contributions of Canadians to economic growth (Focus 1).

- **Modernize the support system for industrial research.** This recommendation focuses on rebalancing the ratio of direct to indirect funding of industry research and highlights a strategy to accelerate the pathway from ideas to innovation by bringing applied research labs closer to key sources for cutting edge discovery. It addresses the Innovation Agenda theme of “Building world-leading clusters and partnerships” as well as the theme of “Improving ease of doing business”. Furthermore, it addresses the 2017 pre-budget consultation focus on federal measures that would assist Canadian businesses to contribute to economic growth (Focus 2).

INTRODUCTION

The Partnership Group for Science and Engineering (PAGSE) is an association of [twenty four professional and scientific organizations](#) representing more than 60,000 experts and innovators from academia, industry, and government sectors. PAGSE's mandate is to represent the Canadian science and engineering community to the Government of Canada and to advance research and innovation for the benefit of Canadians. Our flagship program, the monthly Bacon and Eggheads Breakfast lecture series, brings together experts in science and engineering with parliamentarians and others to showcase outstanding Canadian research and to inform and provide insights on timely scientific issues. This submission is based on consultations with the participating societies of PAGSE.

1) Ensuring stable and enduring funding for discovery-based research

Budget 2016 provided a welcome and much-needed investment of an additional \$95 million per year in funding to the granting councils. Such an investment in discovery-based research is essential for the continued and improved productivity of the country and the Canadian STI research community applauds the government for this important and transformative re-injection of funding. Of course, more needs to be done in order for Canada to compete globally in STI. The Scientific Advisory Board of the Secretary General of the United Nations suggests that national research and development (R&D) funding should be at 3.5 per cent of GDP.¹ This level of funding would put Canada on an equal footing with countries at the forefront of global innovation. PAGSE encourages the Government of Canada to continue its commitment to basic research and work toward investing 3.5 per cent of GDP to fund research and development by 2025 (Focus 1).

2) Developing renewable energy resources for Canada's North

Remote Northern communities in Canada are not connected to the large electrical power grids available in the south. They operate as small isolated micro-grids

supplying residential, business and industrial (e.g. mines) customers. Diesel fuel is used for generating electricity. Such fuel is expensive to produce and transport, and high generation costs are then passed on to Northerners. Furthermore, diesel's substantial environmental footprint, including greenhouse gas and black carbon production, compounds the problem in a region where climate change and its impact are especially troubling.

Rapid growth in the use of renewable energy sources like solar, wind, geothermal and hydro would offset such impacts. Combinations of renewable sources can be tailored to each community's needs and local availability of the energy source. For example, the Yukon and the Northwest Territories have abundant hydro potential but the large investments needed for hydro power projects are a barrier to their development in the North. Energy storage technologies, from hydro to large-scale battery storage, are the key limitation on renewable use. Smart grids are intended to work around that limitation by optimizing generation, delivery, and load of electricity.

Federal leadership in constructing smart grids is critical. Territorial governments have insufficient resources for exploring, testing and deploying renewable energy options. PAGSE recommends a 20% increase in investment towards renewable energy in Northern communities to improve energy efficiency, enhance the reliability of energy supply and reduce costs of living in the North. This change to northern infrastructure would also help to reduce greenhouse gas emissions, facilitate new economic developments, contribute to creating jobs and training opportunities for Northern residents, in particular for Aboriginal communities, and generally support the transition to sustainable development in the North (Focus 3).

3) Supporting the mobility of emerging leaders in research and innovation

Recent data from the OECD show that 31% of Canadian companies have difficulty finding employees with the right skill set to meet their needsⁱⁱ. Along with the increasing demand for STI training, mobility was also cited as a key factor. Trainees can often be separated from the world-class training opportunities offered by Canadian universities and colleges by great distances and an uneven playing field in terms of cost of study. PAGSE recommends creating a fund to reduce mobility as a barrier to training our emerging leaders.

A Canada Opportunity Scholarship Program for Canadian citizens, permanent residents, and visa students would make it possible for the best students from any part of Canada to pursue research and innovation at the graduate level (MSc and PhD) anywhere in Canada. Tuition fees vary significantly across Canada but costs of living vary dramatically. We propose 1000 Canada Opportunity Scholarships of \$5,000 be funded per year for two years of study for any advanced degree in science and technology, including graduate work in science, technology, engineering and mathematics (STEM) fields. The annual program costs in the first year would peak at \$5 million per year and costs in subsequent years would then have an annual maximum of \$10 million (Focus 1).

4) Modernizing government support for industrial R&D

The \$3B/yr Scientific Research and Experimental Development (SR&ED) program was created to encourage Canadian businesses of all sizes, in particular small to medium enterprises and start-up firms, and in all sectors of industry to conduct R&D in Canada. This program is among the most generous in the world but concerns persist due to the fact that Canadian businesses remain near the bottom of their peer group in terms of investment in innovation (15th out of 16 comparator countries).ⁱⁱⁱ

This program should be reviewed with the aim of streamlining the administration. One roadblock to the uptake of these credits by businesses is that they can only apply for credits retroactively, that is after the R&D has been completed, with CRA determining if eligibility criteria have been met. Moreover, appeal of CRA assessments is virtually non-existent and require resorting to Tax Court. In order to alleviate these impediments to businesses, PAGSE recommends the establishment of an authority that is independent of CRA, potentially linked with the granting councils or NRC, to provide the technical eligibility assessments at the concept stage of the project, and to provide redress processes.

PAGSE also recommends re-targeting some portion of tax credits to operating costs that co-localize industrial R&D facilities with universities and government research laboratories. Co-localization would promote interaction and more seamless scientific exchanges with researchers in different research fields in academia, government and industry, oriented towards cutting-edge research innovation for Canadian and global markets. Unlocking innovations 'trapped' in universities would give Canadian companies a competitive edge and would provide a needed complement to existing MITACS and NSERC programs. Overall, this would greatly accelerate the timeframe from idea-to-impact. The emphasis on infrastructure similarly complements Canada Foundation for Innovation efforts. These facilities would serve as science and engineering hubs/focal points for collaboration and attracting partners from Canada and around the world to draw upon the Canadian R&D capabilities and expertise.

Finally, while Canada ranks highly in terms of indirect support for industrial R&D, it lags behind comparator countries when direct support is examined. Canada's 6:1 ratio of indirect to direct support of industry R&D^{iv} is out of balance compared to the OECD average of 1:2 indirect to direct support. Sharing the risk with companies through peer adjudicated grants would encourage industry to invest more boldly in quality, leading edge, transformative R&D. PAGSE recommends re-balancing the ratio of indirect to direct support for industrial R&D to match the OECD average by 2022 (Focus 2).

CONCLUSION

Canada's federal government has signaled a vital role for a thriving research enterprise in strengthening Canada's economy with their bold innovation agenda, recent increased investments in NSERC, CIHR, and SSHRC, and their ongoing consultations on federal support for fundamental science. There are clear opportunities to integrate innovation in northern development, to improve the mobility of trainees to help address the nation's skills gap, and to modernize and refocus support for industrial research. Most importantly, the science and engineering research community is unanimous in our belief that an enduring commitment to support basic research is paramount to our ability to generate the ideas that drive innovation and for the continual supply of young innovators graduating from our universities. PAGSE urges the government to continue to invest in this critical basic research.

ⁱ UN Report 2015 "Science, Technology and Innovation: Critical Means of Implementation for the SDGs" https://en.unesco.org/un-sab/sites/un-sab/files/Final_SAB_PB_MOI.pdf

ⁱⁱ OECD Report 2016 "Getting Skills Right: Assessing and Anticipating Changing Skill Needs" DOI:10.1787/9789264252073-en

ⁱⁱⁱ Conference Board of Canada, Business Enterprise R&D Spending <http://www.conferenceboard.ca/hcp/details/innovation/berd.aspx>

^{iv} State of the Nation report, 2014 "Canada's Science, Technology and Innovation System" [http://www.stic-csti.ca/eic/site/stic-csti.nsf/vwapj/STIC_1500_SON_Report_e_proof4.pdf/\\$file/STIC_1500_SON_Report_e_proof4.pdf](http://www.stic-csti.ca/eic/site/stic-csti.nsf/vwapj/STIC_1500_SON_Report_e_proof4.pdf/$file/STIC_1500_SON_Report_e_proof4.pdf)