



A Pre-Budget Submission to the
HOUSE OF COMMONS STANDING COMMITTEE on FINANCE

Executive Summary

The House of Commons Standing Committee on Finance is seeking expert consultation as it develops its economic strategy for 2017. The Committee has asked Canadians what federal measures in relation to education and training would maximize our country's economic growth. The Canadian Association of Physicists (CAP), as the voice of physics in our country, recommends two measures that are timely and achievable:

Recommendation 1: To keep pace with the growth of industrial and academic needs for the best and brightest highly qualified personnel, funding of merit-based NSERC Postgraduate and Postdoctoral Fellowship programs must be increased dramatically. The CAP recommends an increase of \$78 million per year,¹ phased in over 3 years, to boost Postgraduate Scholarships by 67% and Postdoctoral Fellowship awards by 130%.

Recommendation 2: To help rebuild a critical foundation for Canadian innovation capacity, the NSERC Discovery Grant program must be expanded to adjust for inflation, growth in GDP, and a growing national population. The CAP recommends that an increase at a rate of \$47M per year, for each of the next three years, will go a long way toward restoring these Discovery research funding needs.

We look forward to working with The Committee to help grow Canada's economy through judicious infusions of funding for science education and training.

Background:

In a June 3, 2016 press release, the House of Commons Standing Committee on Finance asked Canadians for input about what federal measures would help **Canadians** maximize, in the manner of their choosing, their contributions to the country's economic growth. Canada's international competitiveness

¹ For example, increase from 130 to 300 postdoctoral fellowships at \$45,000 per year for 2 years, and increase from 1500 to 2500 postgraduate scholarships at an average of \$21,000 per year for 3 years.



and capacity for sustained innovation depend on balanced support of research, including discovery-driven fundamental research. Fundamental research is critical to be competitive in identifying and developing technologies that are transformative, that is, so-called “disruptive technologies.”

The CAP, with 1700 members, is Canada’s national association for physicists working in industry, academia and government. The CAP strives to unleash the full potential of physics and physicists for the benefit of Canada. The CAP is recognized and respected for its science and technology expertise, and has testified at House of Commons Committees, including the Standing Committee on Industry, Science and Technology for a study on the “State of Disruptive Technologies” on June 9, 2015.

The CAP’s recommendations identify means of support for research that will attract and retain Canada’s best talent and will have positive impacts in Canada. This will develop a strong base that is essential for building a resilient and innovative workforce that will help drive Canada’s entrepreneurs, businesses, and international collaborations.

Recommendation 1:

One of the most important elements of Canada’s innovation landscape is the transfer of knowledge and skills from academic research environments to the private and government sectors via the flow of highly qualified people (HQP) into non-academic careers. A sense of the impact of HQP on the economy can be seen in a recent Stats Can report² that found that of doctoral graduates in 2005 trained in computer, mathematics and physical sciences, almost half were employed in non-academic careers. Similar trends were found in a study by the American Institute of Physics of doctoral graduates in physics in 2009 and 2010. These results reflect the value that the quantitative and analytical skills can bring to activities well outside a student’s academic discipline.

HQP impact the economy by stimulating and creating employment for others through innovations that create new spin-off companies or increase competitiveness, as confirmed by the OECD: “An economy’s ability to encourage research affects its capacity to create new knowledge and stimulate innovation. Increasing specialization and rapid growth in scientific production have made research professionals with advanced research degrees the cornerstone of modern science and innovation systems

² Statistics Canada. *Expectations and Labour Market Outcomes of Doctoral Graduates from Canadian Universities*.
www.statcan.gc.ca/pub/81-595-m/81-595-m2011089-eng.pdf



worldwide.”³ Yet Canada, with 8.2 doctorate holders per thousand population, trails countries like Switzerland (25), Germany (14), the United States (13.5), Great Britain (12.4), and Israel (9.7).⁴

In Canada, NSERC programs support the training of a large proportion of HQP in science.⁵ NSERC Postgraduate Scholarships and Postdoctoral Fellowships are the cornerstone programs that attract our brightest young people into a research career. However, the numbers of awards from these NSERC programs are dropping, rather than keeping pace with the growth of industrial and academic needs for these HQP. For example, comparing between 2010 and 2014, there was a drop from 2520 to 1510 post-graduate awards offered and a decline from 286 to 130 post-doctoral awards offered. This reduction in merit-based awards comes at a time when Canada has a strong need for outstanding HQP. For example, in academia alone, approximately 400 full-time university professors were appointed in engineering, math, and science in 2010-2011.⁶

Direct support for HQP in the form of long term merit based scholarships and fellowships that will attract the brightest students and support students throughout the duration of their program of studies must be given a high priority to close the gap between ourselves and our OECD competitors. These HQP will be Canada’s scientific and engineering leaders in the future, and increasing the number of merit-based awards above 2010 levels will help keep a sufficient number of the best and brightest Canadian trainees in Canada.

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³ The Organization of Economic Co-operation and Development (OECD) Science, Technology, and Industry Scoreboard 2013. dx.doi.org/10.1787/sti_scoreboard-2013-en.

⁴ OECD/UNESCO Institute for Statistics/Eurostat data collection on Careers of Doctorate Holders 2010. Cited by reference in footnote 2.

⁵ The training of HQP in science is supported by programs that fund trainees directly (the NSERC Undergraduate Student Research Award [USRA] program, a number of postgraduate scholarship [NSERC PGS, Alexander Graham Bell Canada Graduate Scholarships, Vanier Canada Graduate Scholarships] programs and postdoctoral fellowship [NSERC Postdoctoral and Banting Postdoctoral] programs), and programs in which there is a training component (the NSERC Discovery Grant Program and the NSERC CREATE Program, and MITACS).

⁶ 2012-2013 Canadian Association of University Teacher's Almanac.



increase of \$78 million per year,⁷ phased in over 3 years, to boost Postgraduate Scholarships by 67% and Postdoctoral Fellowship awards by 130%.

Recommendation 2:

One of the most important determinants of knowledge transfer from universities to businesses is the quality and breadth of the research that is pursued in academic settings where highly qualified people are trained before entering the private sector. While market-driven research can address specific issues for industries in the shorter term, it is the fundamental research, characterized by longer timelines and unexpected discoveries, that can generate and incubate unexpected technologies that will become transformative solutions to today's problems and incubate whole new industries of the future.

The core federal program that enables Canada's leadership in fundamental research is NSERC's Discovery Grants program. The 2016 Federal Budget provided an increase of \$30 million to NSERC, which it is using mainly for the Discovery Grants program. The CAP strongly supports this initiative because it is a good start toward mitigating the ongoing erosion of this program's capacity to meet the demands of the increasing numbers of excellent researchers that are supported by it.

Recommendation 2: To help rebuild a critical foundation for Canadian innovation capacity, the NSERC Discovery Grant program must be expanded to adjust for inflation, growth in GDP, and a growing national population. The CAP recommends that an increase at a rate of \$47M per year, for each of the next three years, will go a long way toward restoring these Discovery research funding needs.

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