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SUBMISSION TO HOUSE OF COMMONS STANDING COMMITTEE ON FINANCE 2014 PRE-BUDGET CONSULTATION: The Chemical Institute of Canada

Executive Summary:

The Chemical Institute of Canada presents three recommendations for consideration in the 2014 pre-budget consultations.

Recommendation #1: Targeted fellowship funding will increase both the quantity of applied and basic research undertaken in Canadian universities and will power the innovation agenda of Canadian industry. The recommendation includes (i) 1000 fellowships p.a., for 4 years, of fully funded PhD students engaged in natural sciences and engineering and (ii) 300 fellowships p.a., for 2 years, of fully funded postdoctoral fellows.

Recommendation #2: Increased funding to tri-council programs which support innovation-enabling fundamental research.

Recommendation #3: Investment in the development, maintenance, and upgrading of world class science and technology infrastructure in regional, national, and international shared facilities.

Context and Overview:

The Chemical Institute of Canada (CIC) represents the interests and activities of the chemical sciences, engineering, and technologies across Canada. The CIC's 5700 members – chemists, chemical engineers, and chemical technologists – are society's problem solvers, from advances in healthcare and pharmaceuticals, to energy, food and water. Through its three constituent societies (the [Canadian Society for Chemistry \(CSC\)](#), the [Canadian Society for Chemical Engineering \(CSChE\)](#) and the [Canadian Society for Chemical Technology \(CSCT\)](#)) – the Chemical Institute of Canada is committed to advancing the chemical sciences and engineering in Canada.

In the following, the Chemical Institute of Canada presents three recommendations for consideration for inclusion in the 2014 Budget. Although these recommendations stem from the Chemical Institute of Canada, it is important to acknowledge important shared perspectives with this submission and those of the 2014 Canadian Consortium for Research (CCR) and the 2014 Partnership Group for Science and Engineering (PAGSE) submissions.



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Recommendation #1: Targeted fellowship funding will increase both the quantity of applied and basic research undertaken in Canadian universities and will power the innovation agenda of Canadian industry. The recommendation includes (i) 1000 fellowships p.a., for 4 years, of fully funded PhD students engaged in natural sciences and engineering and (ii) 300 fellowships p.a., for 2 years, of fully funded postdoctoral fellows.

The federal government currently funds PhD and postdoctoral fellows (PDFs) through a mosaic of research grants derived from research programs of many types, as well as fellowship programs. In Year 1 the proposed PhD fellowships would cost \$25M, the PDF fellowships would cost \$15M, and associated program funding will cost \$2K per trainee p.a., or \$2.6M. These additional fellowship allocations would flow into successful existing programming including the Canada Graduate Scholarships (CGS) and NSERC/MITACS Postdoctoral Fellows programs. 50% of the postdoctoral fellowships will be held in Canadian universities and 50% will be held in Canadian industry. These funds could be borne by the Jobs programs under the Canada's Economic Action Plan.

The visionary 2012 report of the Advisory Panel on Canada's International Education Strategy (aka the Chakma Report; International Education, a Key Driver of Canada's Future Prosperity), concludes that Canada must use competitive scholarships to recruit top talent from around the World. The Chakma Report notes that foreign students energize educational institutions and are also net contributors to the economy.

This initiative directly addresses a critical problem identified in the 2012 STIC Report: *The State of the Nation, Canada's Science, Technology and Innovation System: Aspiring to Global Leadership*. PhD students and graduates are recognized to be the drivers of innovation in academic research and a knowledge-based economy. Canada's performance lags far behind its competitors in one of the five key indicators: science and engineering doctoral degrees granted per 100,000 population. In 2010, Canada ranked only 15th in the OECD on this measure. Strong initiatives must be taken to improve this ranking if we are to compete with the top 5 OECD countries. It is important to note that this initiative will serve to stimulate the private sector's thirst for innovation and solidify its capacity to employ highly qualified graduates. This is a key part of a training-employment feedback loop, where trainees' eagerness to pursue given career paths depends on the existence of meaningful career opportunities in the private sector.

Cost p.a: \$42.6 M

Duration: 5 or more years



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Recommendation #2: Increased funding to tri-council programs which support innovation-enabling fundamental research

Canada has recently adopted an aggressive approach to identifying and supporting outstanding research leaders, particularly through the Canada Research Chairs and Canada Excellence Research Chairs programs. These marquee programs help address gaps between Canada and the United States, Europe, and Asia in terms of attracting and retaining highly accomplished researchers. The CIC recognizes that the federal government has continued to make investments in Canada's federal granting councils, including the most recently announced Canada First Research Excellence Fund that promises over \$ 1billion in funding for science and technology over the next decade. The CIC awaits further details about this Fund and encourages use of a peer-review allocation process in its implementation.

The research councils provide a robust interface, via strategic partnerships programs, between universities and industries. These programs support fundamental research necessary to meet the technology innovations that industries require to be competitive on the international scale. Increased funding to these programs, particularly those which enable graduate research trainees and postdoctoral fellows to be the bridges between academia and industrial innovation is recommended. Select programs, particularly those which provide for the support innovation-enabling fundamental research, graduate training program grants linked to industrially- driven research priorities, and pre-competitive prototyping would receive increased funding. The funds necessary to support these programs could be borne by a modest carbon tax on fossil fuel exports to be initiated under the Canada's Climate Change Action Plan.

This initiative directly addresses a critical problem identified in the 2012 STIC Report. Canada ranked seventh among comparator countries on the measure of business funding of higher education and Canada continues to show disappointing results in terms of the key indicators: research investment by business and licensing and spin-off companies. A more effective interface between university research and industry needs, particularly those involving industrial access to university research capabilities and spin-offs of university research, is needed.

Economic prosperity in Canada over the next 25 years is going to be deeply rooted in the ability to bring innovations to the export market. A convergence of all the factors necessary to bring an idea to market is only possible if the idea is scientifically and technologically robust, and has early stage champions with international credibility. A "Made-in-Canada" innovation requires the catalyst of early stage government support.

Cost: \$50M p.a. to the three principal research councils directed toward innovation-enabling fundamental research

Duration: 5 years or more



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Recommendation #3: Investment in the development, maintenance, and upgrading of world class science and technology infrastructure in regional, national, and international shared facilities.

Research infrastructure is vital to discovery and innovation in science and technology, both in universities and the private sector. The development, maintenance, and access to world-class regional, national, and international shared facilities puts Canada in a global leadership position in science and technology. The successes of the Canada Foundation for Innovation (CFI) in creating world-class, nation-wide research facilities need to be sustained, as the pace of discovery in pure and applied science is intimately linked to access to the tools of discovery and innovation. Research infrastructure however is very dynamic, and requires both ongoing support for servicing and upgrades as well as an infusion of entirely new, often *avant-garde*, installations. It is thus imperative that the federal government continues to invest in the maintenance of world-class research infrastructure and facilities in Canada. To do so requires both direct cost support to facilities and major installations plus the inevitable indirect costs support, for those costs associated with conducting research itself.

Cost: \$100M p.a.

Duration: 5 years or more