Chemical Institute of Canada | *For Our Future*
Institut de chimie du Canada | *Pour notre avenir*

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CHEMICAL INSTITUTE OF CANADA (CIC) SUBMISSION: HOUSE OF COMMONS STANDING COMMITTEE ON FINANCE 2017 PRE-BUDGET CONSULTATION

EXECUTIVE SUMMARY

The Chemical Institute of Canada (CIC) represents the interests and activities of the chemical sciences, engineering, and technologies across Canada. The CIC's 5,700 members — chemists, chemical engineers, and chemical technologists — are society's inventors and problem solvers, from advances in healthcare and pharmaceuticals, to energy, food and water. Chemical sciences and engineering are disciplines that are deeply linked to Canada's innovation system as they play both inventive and enabling roles in, for example, novel approaches to the use of natural resources, biotechnology, CleanTech, and advanced materials. 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 CIC is committed to advancing the chemical sciences and engineering in Canada and linking them to Canada's innovation system. **The Chemical Institute of Canada recommends that the federal government:**

- **1a Provide targeted fellowship funding in order to strengthen the innovation agenda of Canadian Industry (Focus 1)**
  PhD graduates are the drivers of innovation in both academic research and a knowledge-based economy. This recommendation includes: (i) 2000 p.a., fully funded MSc and PhD fellowships ($25K per student p.a.) engaged in natural sciences and engineering, and (ii) 500 fellowships p.a. of fully funded ($50K p.a.) postdoctoral fellows. 300 of the postdoctoral fellowships will be held in Canadian universities and 200 will be held in Canadian industry.
- **1b Revises the international student visa and permanent residence application criteria and processes to enable the best talent in the world to study and work in Canada on a permanent basis (Focus 1)**
  This includes investment into the human resource infrastructure that is necessary to reduce processing times from the current 6 months or more, to less than 6 weeks. (Cost: $10M p.a. over 5 or more years)
- **2 Increases funding to tri-council programs which support innovation-enabling fundamental research (Focus 2)**
  The three principal research councils (NSERC, CIHR, SSHRC) provide a robust interface between academic research and industry *via* a number of partnership programs, which provide a platform for the fundamental and applied research that is key to a sustainable innovation system. (Cost: $100M p.a. over 5 or more years)
- **3 Invests in the development, maintenance, and upgrading of world class science and technology infrastructure in regional, national, and international shared facilities (Focus 3)**
  Federal support of Canada's world class research facilities and major installations will provide Canadian innovators and entrepreneurs with the tools to ensure our nation's economic growth and prosperity over the next 25 years. (Cost: $200M p.a. over 5 or more years)

The CIC presents these four recommendations for consideration for inclusion in the 2017 Budget. Although the recommendations stem from the CIC, it is important to acknowledge some shared perspectives between this submission and those of the 2017 Canadian Consortium for Research (CCR) and the 2017 Partnership Group for Science and Engineering (PAGSE) submissions.

Focus 1: Federal measures that would help Canadians maximize their contributions to the country's economic growth

(a) Education and training: PhD graduates are recognized to be the drivers of innovation in both academic research and a knowledge-based economy. However, Canada's performance lags behind its competitors in one of the five key indicators: science and engineering doctoral degrees granted per 100,000 population. Although improving since 2006, in 2012 Canada ranked only 17th amongst the 28 OECD member countries on this measure. Direct initiatives must be taken to continue to improve this ranking if we are to compete with the top 5 OECD countries.

The federal government currently funds MSc/MEng, PhD and Postdoctoral Fellows (PDFs) through a number of research grants derived from programs of many types, as well as fellowship programs. The majority of research grant expenditures are associated with stipend/salary support of these trainees. It is important to note that the proposed initiative will serve to stimulate Canadian industry's quest for innovation and solidify its capacity to employ highly qualified graduates. This is a key component of a training-employment feedback loop, where trainees' eagerness to pursue given career paths in part depends on the existence of meaningful career opportunities in the private sector.

Recommendation #1a: Targeted fellowship funding will increase the quantity of applied and basic research undertaken in Canadian universities and in doing so will power the innovation agenda of Canadian industry. The recommendation includes: (i) 2000 p.a., fully funded MSc and PhD fellowships ($25K per student p.a.) engaged in natural sciences and engineering, and (ii) 500 fellowships p.a. of fully funded ($50K p.a.) postdoctoral fellows. 300 of the postdoctoral fellowships will be held in Canadian universities and 200 will be held in Canadian industry.
Cost p.a.: The proposed MSc/MEng and PhD fellowships will cost $50M p.a. (2000 @$25K p.a.) and the PDF fellowships will cost $25M p.a. (500 @ $50K).
Duration: 5 years or more

(b) Labour Mobility: The innovation system that Canada aspires to requires, amongst other things, access to the best talent that exists worldwide. The worldwide competition for the best scientific talent (graduate students, postdoctoral fellows, and skilled and highly educated professionals) is fierce. The 2012 report of the Advisory Panel on Canada's International Education Strategy (the Chakma Report; *International Education, a Key Driver of Canada's Future Prosperity*) and the 2012 and 2014 STIC Reports emphasize the value that international students bring to the innovation ecosystem in Canada. Indeed, the 2012 STIC Report states: "*Clearly many of the international students who come to Canada are interested in staying. In 2008, 33 percent of international students in Canada changed their immigration status to stay on in Canada, mostly for work purposes. This positioned Canada first among selected OECD countries on this measure*." The value of international

students to the economy is also well recognized to extend to foreign-trained talent who comes to Canada to work in the innovation ecosystem.

However, Canada can only compete in the international talent market if its entrance and retention procedures facilitate, rather than inhibit, these people from choosing Canada as their place to learn, work, and contribute. Both the academic and industrial sectors are at a competitive disadvantage if they do not have access to the best international talent. The current visa and permanent resident application procedures faced by this talent pool (and their potential employers in universities and business) are complex, with long (many months) application assessment times and high application fees. Each of these individual factors discourages those interested in joining our innovation economy and any combination of these factors proves to be highly inhibiting.

Recommendation #1b: The CIC recommends that the Government of Canada revises the international student visa and permanent residence application criteria and processes to enable the best talent in the world to study and work in Canada on a permanent basis. The CIC further recommends investment in the human resource infrastructure that is necessary to reduce processing times from the current 6 months or more, to less than 6 weeks.
Cost p.a.: $10M
Duration: 5 years or more

Focus 2: Federal actions that would assist Canada's businesses to meet their expansion, innovation and prosperity goals, and thereby contribute to economic growth in the country

Research, both fundamental and applied, initiates and sustains innovation. Research is thus a key element in Canadian businesses being able to achieve their innovation, expansion, and prosperity goals. However, the 2014 STIC Report identified some significant problems: (i) Canada continues to show disappointing results in terms of the key indicators of research and development investment by businesses, licensing, and spin-off companies (ii) Canada's private sector adsorption of research talent is poor and decreasing. Effective interfaces between university research and industry, particularly those involving industrial access to university research capabilities and spin-offs of university research, are needed to reverse these trends.

The research councils (NSERC, CIHR, SSHRC) in fact provide a robust interface between academic research and industry *via* a number of their partnerships programs. These programs support the fundamental research that enables the technological innovations that industries require to be competitive in the international context. They also greatly facilitate the adsorption of research talent into the private sector. Increased funding is therefore recommended to programs that enable graduate research trainees and postdoctoral fellows to bridge academic and industrial innovation. Programs which support innovation-enabling fundamental research, graduate training program grants linked to industrially-driven research priorities, and pre-competitive prototyping are particularly recommended for increased funding.

Recommendation #2: Increased funding to tri-council programs which support innovation-enabling fundamental research
Cost: $100M p.a. to the three principal research councils directed toward innovation-enabling fundamental research.
Duration: 5 years or more

Focus 3: Federal measures, in relation to infrastructure that would ensure that businesses expand, prosper and serve domestic and international customers in order to contribute to growth

Economic growth and prosperity in Canada over the next 25 years is going to be deeply rooted in our ability to bring innovations to the export market. A "Made-in-Canada" innovation often requires the catalyst of early stage government support. An essential element in bringing an idea to market is ensuring that the idea is scientifically and technologically robust, and has early stage champions with international credibility. Research infrastructure in both the university and private sectors plays a key role in this scientific and technological validation process.

The pace and extent of discovery in pure and applied science is closely linked to researchers having access to the tools of discovery and innovation — state-of-the-art scientific instrumentation. Canada's commitment to support outstanding research has been well demonstrated in the Canada Foundation for Innovation (CFI) and Canada First Research Excellence Fund (CFREF) programs. The development, maintenance, and access to world-class CFI-funded regional, national, and international shared facilities puts Canada in a position to be a global leader in science and technology. However, this leadership position depends on these world class facilities having high levels of sustained funding to ensure reliable operation. To do so requires direct cost support to facilities and major installations, plus support for costs associated with conducting the research itself.

Recommendation #3: Investment directed to the development, maintenance, and upgrading of world class science and technology infrastructure in regional, national, and international shared facilities.
Cost: $200M p.a.
Duration: 5 years or more

The CIC thanks the House of Commons Standing Committee on Finance (FINA) for welcoming input as part of its pre-budget consultation and looks forward to working with the federal government as they move forward with Canada's Innovation Agenda.

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