

Engineers Canada's Pre-Budget Submission to the House of Commons Standing Committee on Finance

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Executive Summary

Engineers Canada believes the most effective way to maximize Canadians' participation and overall contribution to Canada's economic growth and competitiveness is to:

- invest in infrastructure climate vulnerability assessments;
- support the inclusion of professional engineers across federal departments;
- attract and retain women and Indigenous peoples in post-secondary engineering education and in the engineering profession;
- invest in labour market data collection; and
- improve the current maternity and parental leave system.

Overview

Engineers Canada is the national organization of the 12 provincial and territorial associations that regulate the practice of engineering in Canada and license its 290,000 professional engineers. Together, we work to advance the profession in the public interest.

Engineers drive much of Canada's economy. Natural resources, manufacturing, technology, and most other sectors all rely on the capability of engineers. As one of the top five exporters of engineering services in the world, the expertise of Canada's engineers contributes to both the Canadian and international economies.

Engineers Canada and the country's 290,000 professional engineers stand ready to support the federal government's initiatives towards a productive, competitive, and prosperous nation.

Recommendations to the federal government

Recommendation #1: Invest in infrastructure climate vulnerability assessments

Resilient infrastructure is the driving force behind productive societies and stable sectors. Climate resilient infrastructure "is the right approach to delivering and maintaining transport, housing, energy, water, and communication infrastructure that is essential to create a strong and competitive economy..."¹ Yet the [Canadian Infrastructure Report Card](#) outlines that much of Canada's current infrastructure is vulnerable to the effects of extreme weather, which is becoming increasingly frequent and severe. This presents a risk not only to public safety, but also to Canada's economy, as individual and business productivity depends heavily on resilient infrastructure. Extreme weather events on existing vulnerable infrastructure can have devastating immediate effects to communities, and can also

¹ McKinsey & Company Canada. (2013). "Infrastructure Productivity: How to Save \$1 trillion a year." Retrieved July 7th, 2017, from: <http://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/infrastructure-productivity>.

have consequential impacts on crucial sectors of the global supply chain, such as energy, water, and transportation.²

For example, the 2016 wildfires in Fort McMurray, AB, had clear immediate impacts to community buildings and infrastructure systems. However, the wildfires also hampered the productivity of local businesses and industries post-event. In total, the direct and indirect costs of the wildfires is estimated to reach about \$10 billion, and include the expense of rebuilding infrastructure, evacuation costs, lost oilsands production, lost provincial and municipal government revenues, and environmental damage, amongst other costs.

While not all costs of an extreme weather event can be avoided, the direct and indirect costs could be lessened by building more climate-resilient infrastructure. The federal government must therefore invest in climate resiliency by requiring climate change vulnerability and risk assessments of infrastructure projects. Professional engineers in Canada are leaders in adaptation and are ready to work collaboratively with the federal government to provide unbiased advice regarding climate change and its impacts on infrastructure. For example, Engineers Canada, in conjunction with Natural Resources Canada, has developed a climate risk assessment tool that would greatly enhance the resilience of infrastructure, increase public confidence, and decrease the severity of impact on individual and business productivity following an extreme weather event. The Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol gives engineers, geoscientists, as well as infrastructure owners and managers, a tool to design and construct infrastructure that will withstand today's climate, while also taking into account expected future climate changes. The Protocol has been applied to a wide range of infrastructure systems more than 40 times in Canada and internationally.

Tools such as PIEVC need to be a condition for funding approvals, accepting environmental impact assessments, and approving designs for infrastructure projects involving rehabilitation, re-purposing, maintaining, and decommissioning existing infrastructure. This will ensure public safety and health, decrease the direct and indirect cost of extreme weather events on infrastructure, and strengthen individual and business productivity to the benefit of all Canadians.

Recommendation #2: Support the inclusion of professional engineers across federal departments

Public safety is threatened when professional engineers are not included in federal decisions surrounding work that requires the application of engineering principles. In order to promote the participation and productivity of professional engineers in Canada, the federal government must ensure that legislation referring to engineering work requires the participation of a professional engineer. Communities are better protected by the consistent application of safety and siting procedures where professional engineers are involved in decisions.

The direct involvement of professional engineers in federal departments, such as transportation, infrastructure, and communities are apparent; however, the inclusion of engineers in other

² European Commission (2014). "Climate Vulnerability of the Supply-Chain: Literature and Methodological review." Retrieved July 5th, 2017, from: <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC93420/lb-na-26994-en-n%20.pdf>.

departments, such as status of women, and employment and social development, are less apparent but no less crucial. Engineers bring innovative and diverse ideas to solve complex problems. This diversity is required to support Canada's innovative agenda and global competitiveness across departments. The federal government must therefore support the inclusion and participation of professional engineers as decision-makers across federal departments.

Recommendation #3: Attract and retain women and Indigenous peoples' in post-secondary engineering education and the engineering profession

Women and Indigenous peoples remain severely underrepresented in both post-secondary engineering education and the engineering profession. Women make up over 50 per cent of the Canadian population and yet comprise less than 14 per cent of practising professional engineers, and only 20 per cent of undergraduate engineering students. The percentage of Indigenous peoples in engineering education is even lower. While 4.3 per cent of the total Canadian population identifies as Indigenous, only approximately one percent of undergraduate engineering students identify as Indigenous peoples (First Nations, Métis, and Inuit peoples).^{3,4}

Advancing the equality and participation of women and Indigenous peoples in Canada's high-productivity sectors has the potential to add \$150 billion to Canada's GDP by 2026, or an annual increase of 0.6 percent to the country's GDP growth.⁵ Strengthening diversity in engineering is critical to promoting Canada's innovation agenda, promoting productivity, and addressing future skilled labour needs. But the benefits of diversity extend beyond innovation as well; welcoming and retaining more women and Indigenous peoples into engineering creates a positive voice for the profession in communities, and encourages engineering role models for future generations.

There are many factors that deter women and Indigenous peoples from becoming or remaining engineers. For women, the lack of role models, misunderstanding of the profession, and the stereotype that engineering is a male-dominated profession send the message that engineering is not a career for women. For Indigenous peoples, the reasons are even more complex. Unemployment, poverty, insufficient high school education—particularly in remote communities where prerequisite science and mathematics courses may not be offered—and sparse information on career options, are all factors restricting access to post-secondary engineering education.⁶

But information on these deterrents is mostly anecdotal. Federal research funding that is specific to engineering is required to properly identify barriers and their interventions. This will be a critical first

³ Engineers Canada (2016). "Enrolment and Degrees Awarded Survey." Retrieved July 7th, 2017, from: <https://engineerscanada.ca/reports/enrolment-and-degrees-awarded-report>.

⁴ Statistics Canada. (2013). "Fact Sheet - 2011 National Household Survey Aboriginal Demographics, Educational Attainment and Labour Market Outcomes." Retrieved July 7th, 2017, from <https://www.aadnc-aandc.gc.ca/eng/1376329205785/1376329233875>.

⁵ McKinsey & Company Canada. (2017). "The Power of Parity: Advancing Women's Equality in Canada." Retrieved July 5th, 2017, from: <http://www.mckinsey.com/global-themes/women-matter/the-power-of-parity-advancing-womens-equality-in-canada>.

⁶ Engineers Canada. (2016). Indigenous Peoples' Access to Post-Secondary Engineering Programs: A Review of Practice Consensus Practices. Retrieved July 25th, 2017 from <https://engineerscanada.ca/reports/research/review-practice-consensus-indigenous-peoples-access-post-secondary-engineering-programs>.

step for relevant parties and policy-makers to implement appropriate interventions to eliminate barriers to underrepresented groups' full participation in Canada's engineering workforce.

The federal government must also support Indigenous engineering access programs across post-secondary institutions to further encourage the participation of Indigenous youth in the profession. Existing access programs have encountered great success; the University of Manitoba's Engineering Access Program, for example, has existed for over 30 years and has graduated over 100 Indigenous students in engineering. Federal funding to assist in the development of similar programs at other post-secondary institutions would work to close the gap between Indigenous and non-Indigenous students' achievement of engineering degrees.

Recommendation #4: Invest in labour market data collection

Information that revolves around the engineering labour market, such as an increased demand for emerging engineering disciplines, unemployment rates, changes in skill requirements, and skills shortages within the profession, need to be up-to-date and readily available in order for policy-makers, industries, students, and educational institutions to develop appropriate strategies to eliminate barriers to participation. In Canada, the current data sources "have shortcomings, including their relatively short-term nature."⁷ With fragmented and unreliable labour market data, Canadians—specifically underrepresented groups such as women, newcomers to Canada, and Indigenous peoples—and students, are unable to make informed decisions about Canada's workforce, thereby hindering their ability to fully participate in the national economy.

Engineers Canada supports several initiatives that were outlined in Budget 2017 to support the entry and participation of underrepresented groups in Canada's labour market. These include stronger recruitment policies, investments in skills training, employment counselling, and job training. However, promoting initiatives that rely on accurate and up-to-date labour market data may inadvertently prolong the exclusion of underrepresented groups within Canada's labour market and may jeopardize investments made towards training and skills development that may be deemed obsolete in the future. Federal initiatives and investments that support increased labour market participation must be based on reliable labour market data, therefore labour market data collection should be accelerated given that is time of the essence.

The federal government must invest in better labour market data collection so that policy-makers, industries, and educational institutions have a true understanding of the national and regional labour market needs. Up-to-date labour market data will inform underrepresented groups of their prospects of securing meaningful employment, specifically within the engineering profession.

⁷ Finnie, R., et al. (2016). "Barista or Better? New Evidence on the Earnings of Post-Secondary Education Graduates: A Tax Linkage Approach –Executive Summary." Retrieved April 26, 2017, from: https://static1.squarespace.com/static/5557eaf0e4b0384b6c9b0172/t/5796ca2be58c6252c0d41d3b/1469499948298/EPRI-ESDC+Tax+linkage_Exec+Sum.pdf.

Recommendation #5: Improve current maternity and parental leave system

Women are unable to be as productive in the engineering profession when compared to their male colleagues due to occupational barriers that obstruct their prospects for career progression. Inflexible maternity and parental leaves are seen as contributing factors to the attrition of women in the engineering profession as they are more likely to take leave when compared to men.⁸

Inflexible leave options and limited regulated opportunities for alternate work arrangement are detrimental to a professional woman's ability to balance her career with the demands of family care. Often, the options available to a woman are at the employer's discretion and are inflexible enough to cause women not to return from maternity leave, or drop out of the workforce altogether.

Having access to maternity and parental leave is a privilege that is available to Canadian parents. At the same time, engineering is predominantly a project-based environment. It is therefore difficult for women to step away from key projects for twelve months. However, having the option of leaving for 18 months, as suggested in Budget 2017, could be a major career impediment for women in the engineering profession. This extension, without the addition of flexible work options, will hinder women's contribution to and advancement of the profession, especially if multiple leaves are taken during their career.

To improve the participation of women in the engineering profession, the federal government should broaden the proposed extension of maternity and parental leave to include flexible alternatives, such as working part-time, teleworking or job sharing. Any individual should have the option to have flexible work opportunities to be able to participate in the Canadian workforce while being able to care for their families.

⁸ Statistics Canada. (2017). "Women and Paid Work." Retrieved June 26th, 2017, from: <http://www.statcan.gc.ca/pub/89-503-x/2015001/article/14694-eng.htm>.