

## THE ENGINEERING PROFESSION'S POSITION

- Increasing the representation of Indigenous people in post-secondary engineering education provides significant benefits to Canadian society and the economy by increasing innovation, addressing skills shortages, and increasing diverse perspectives to solve complex problems.
- Government support of Indigenous people's access to post-secondary engineering education programs is key to ensuring that Canada remains a leader in the provision of intelligent capital to the global market place.
- Increasing Indigenous representation in undergraduate programs begins in elementary school, requiring creation of grade school supports that introduce science topics in a manner consistent with traditional knowledge.
- Post-secondary programs dedicated to improving the representation of Indigenous people are critical in attracting and retaining Indigenous youth to the engineering profession.
- Engineers Canada is working with the provincial and territorial engineering regulators to ensure that the engineering profession reflects the demographics of Canadian society and continues to meet the needs of the Canadian economy.
- Providing increased representation is one means the engineering profession can respond to the Truth and Reconciliation Commission's calls to action.

### The challenge(s)

While Indigenous people make up more than 4.9 per cent of the Canadian population,<sup>1</sup> they only account for 1.2 per cent of total undergraduate enrolment in engineering programs. There are many barriers that keep Indigenous youth out of engineering programs, including socio-economic challenges, the intergenerational impact of residential schools, lack of access to engineering prerequisites, and lack of awareness of the option of engineering. Given the small number of Indigenous engineering students, the number of Indigenous people with engineering licences is also low.

The engineering profession can better understand, and therefore protect the public interest, if it is representative of the demographics of the Canadian public. However, accessibility and feasibility are not the same for all Canadians largely due to systemic barriers that disproportionately impact underrepresented groups, such as Indigenous people. Indigenous people's perspectives and traditional ways of knowing are often overlooked in both post-secondary engineering education and the profession. Including Indigenous people's perspectives in both post-secondary engineering education and the engineering profession is vital to achieving advances

in engineering and applied sciences. Including diverse peoples and perspectives in post-secondary engineering education, as well as the profession, fosters the capacity to solve problems, to be creative, to think critically, and to embrace cognitive complexity. A large component of promoting diversity and the perspectives of Indigenous people in post-secondary engineering education, as well as the profession, is the appeal to decolonize education and the [Calls to Action](#) made by the Truth and Reconciliation Commission (TRC).<sup>2</sup>

Infrastructure problems that are prevalent in many Indigenous communities may benefit from engineers who are Indigenous. Integrating engineering technology with the Traditional Knowledge may result in better and longer lasting solutions for Indigenous communities.

Engineering faculties in post-secondary institutions across Canada are preparing their students and researchers to be innovators and entrepreneurs; specifically, to work towards creating solutions to persistent problems facing society, as well as to support the next major technological advancements to ensure Canada remains competitive on the international stage.

In Canada, approximately one per cent of undergraduate engineering students enrolled in accredited engineering programs in Canada identify as an Indigenous person; a contrast from the more than 4.3 per cent of the Canadian population who identify as Indigenous.<sup>3</sup> For the engineering profession to continue to solve society's complex problems, it must be reflective of the demographics it serves. There is an opportunity for innovation to flourish in the engineering profession by ensuring traditional ways of knowing are reflected and accepted in post-secondary engineering education, resources and supportive networks are available to students, and Indigenous people are represented.

Unemployment, poverty, greater distances between home and school for those living in remote communities, insufficient high school education, particularly in remote communities where prerequisite science and math courses may not be offered, a lack of role models from within the community, and sparse information on career options, are all factors restricting access to post-secondary engineering education for Indigenous learners in Canada.

## How Engineers Canada has contributed

Before being able to address the need to increase the participation of Indigenous engineers in the profession, the engineering profession needs to acknowledge the past. There are many ways in which engineers and the engineering profession have and continue to interact with Indigenous Peoples, their communities and their ways of knowing. From pipeline and dam projects on Indigenous lands, to the creating workplaces free of discrimination for Indigenous Peoples, the engineering profession needs to recognize that the treatment of Indigenous communities has at times been harmful and steps need to be taken to mitigate the negative impact on Indigenous Peoples.

The benefits of improving the representation of Indigenous people and traditional ways of knowing in both post-secondary engineering education and the profession are not limited to innovation. This work is part of the journey towards reconciliation, understanding how the engineering profession needs to improve its practices and relations with Indigenous Peoples will benefit Indigenous and non-Indigenous people. A diverse and inclusive workforce that includes Indigenous people contributes to the engineering profession's efficiency and creates a competitive advantage on the international stage. A diverse workforce includes the creation of a positive voice for the profession in Indigenous communities and supports the development of Indigenous engineering role models for Indigenous youth interested in the profession; representation in post-

secondary engineering education and the engineering profession allows Indigenous youth to be more likely to choose it as a career as they see themselves represented.

In addition, the engineering profession can positively contribute to the improvement of quality of life in Indigenous communities through infrastructure improvement and other engineering projects. For example, understanding the needs and cultural traditions of Indigenous Peoples in Canada is important to engineering companies and consulting firms working with and for Indigenous communities.

Leveraging the best talent from all parts of society adds value to employers and provides a deeper understanding of project needs. For the engineering profession to reflect Canadian demographics, Indigenous students must enter and continue through post-secondary engineering education.

## Engineers Canada initiatives to increase Indigenous people's access to post-secondary engineering education

Engineers Canada supports programs that attract and retain Indigenous people into post-secondary engineering education. Engineers Canada is working with universities to raise the numbers of Indigenous graduates from engineering programs across Canada and to support Indigenous engineering students.

- Engineers Canada published the Indigenous people's access to post-secondary engineering programs: A review of practice consensus, which supports the development of engineering access programs for Indigenous people across Canada. The report identified and profiles programs that increase Indigenous people's access to engineering. Engineers Canada is working towards the expansion of these programs to raise the profile, as well as improve the image, of the engineering profession in Indigenous communities.<sup>4</sup>
- Engineers Canada's Indigenous People's Participation in Engineering working group, part of the Equitable Participation in Engineering Committee, is developing a national strategy to increase Indigenous participation in engineering, with a focus on increasing the number of Indigenous people graduating from engineering undergraduate programs across the country.
- Engineers Canada has been a key voice in the creation of the Canadian Indigenous Advisory Council (CIAC) to the American Indian Science and Engineering Society (AISES). CIAC provides meaningful guidance

to AISES to improve programming for Canadian members of AISES. Engineers Canada supported the establishment of the new Canadian region of AISES (.caISES) which works to provide support, mentorship, and networking opportunities for Indigenous people in STEM. The annual .caISES conference is a key event each year for our work to support the growing Indigenous engineering community

Engineers Canada has profiled the work of numerous post-secondary institutions that have made strides to decolonize their programs. For example, the University of Manitoba's Engineering Access Program (ENGAP) has been in existence for over 30 years and has graduated over 100 Indigenous students in engineering. As well as, the Aboriginal Access to Engineering at Queen's University, which provides tutoring and exam preparation, mentoring, and connections with employment opportunities, along with culturally relevant materials for teachers and parents of young learners to motivate their interest in math and science. These programs are required to close the gaps in educational opportunities prior to entering engineering education programs and to begin to equalize support throughout the engineering education experience.

Through the Canadian Engineering Accreditation Board, Engineers Canada has supported the provincial and territorial engineering regulators to ensure that standards for entrance to the profession and requirements for continuing competence and ethics are applied fairly.

To close the gap between Indigenous and non-Indigenous students' achievement of engineering degrees, the federal government must support the engineering profession's efforts in attracting Indigenous youth to post-secondary engineering education and support programs that foster environments where all students are welcomed and included.

## Recommendations to the federal government

Support from the Government of Canada in the advancement of Indigenous people in engineering is directly related to the Truth and Reconciliation Commission's Calls to Action regarding eliminating educational and employment gaps between Indigenous and non-Indigenous Canadians.<sup>5</sup>

To increase Indigenous people's participation in STEM, and specifically engineering, work needs to be done to increase the resources available to students, as well as enrollment in and graduation from post-secondary engineering programs. To support this work, the federal government should:

- Support Indigenous people's access to post-secondary engineering education programs through funding

directed to engineering faculties and engineering access programs.

- Support digital technologies that support new formal and informal educational opportunities for continued learning in remote Indigenous communities.
- Support Indigenous people's access to post-secondary engineering education programs through capacity building with Indigenous communities.
- Address shortcomings in Indigenous communities which prevent Indigenous students from completing advanced math, science, and English courses necessary for entry to engineering programs.
- Fund research into the solutions to barriers to entry and inclusion of Indigenous youth in engineering programs.
- Fund the development of a network of Indigenous service providers from engineering faculties to facilitate knowledge sharing across institutions and increase the rates of Indigenous student enrollment and retention.
- Fund the development of integrating Indigenous ways of knowing and being into engineering education.
- Support paid post-secondary engineering co-op programs for Indigenous students.
- Support subsidized employment programs with new and existing employers to get Indigenous graduates into the workforce.

To facilitate more inclusive workplaces and improved relations between the engineering profession and Indigenous communities, Engineers Canada and engineering regulators are working to understand the best tactics and opportunities available to the profession. To enhance the success of these recommendations, the federal government should:

- Support meaningful consultations with Indigenous communities for the development of pilot programs for new professional conduct training for engineers on the intersections between Indigenous communities and the engineering profession.
- Fund the development of guidelines for engineers on addressing the Truth and Reconciliation Commission's 94 Calls to Action.

Finally, it is imperative that the federal government support the engineering profession's efforts to attract and retain talented individuals from Indigenous communities in Canada. This includes funding the creation of an Indigenous professional engineering association that can

support outreach, access, bursaries, mentorships, and work-integrated-learning opportunities for Indigenous engineers in Canada.

## How Engineers Canada will contribute

Engineers Canada will continue to support the profession in attracting and retaining Indigenous people, both into post-secondary engineering education programs and into the profession, as well as working to understand how engineers can better serve and interact with Indigenous communities. Engineers Canada is working with our provincial and territorial engineering regulators and other similar organizations to facilitate best practices and support outreach programs that encourage Indigenous youth to learn and participate in engineering education.

Specifically, we will:

- Conduct a series of consultations on the development of a strategy for the attraction, recruitment, and inclusion of Indigenous people to engineering.
- Continue to promote and support programs that facilitate Indigenous people entering and graduating from undergraduate engineering programs in Canada. This includes working with the federal government and keeping the government and stakeholders informed about what is needed.
- Set a goal for the participation of Indigenous people in the engineering profession and track progress towards this goal.
- Support staffers at post-secondary institutions who are responsible for supporting Indigenous students in engineering programs.

- Continue to be a member of the CIAC to offer advice to AISES' programming in Canada.
- Support student participation at .caISES.
- Feature Indigenous engineers and students in our publications.
- Work with engineering regulators to collect data on the number of Indigenous professional engineers practising in Canada.
- Continue to build partnerships with relevant stakeholders and Indigenous associations.
- Work with the post-secondary institutions to encourage them to collect data on the number of Indigenous students enrolled in their engineering programs.
- Support engineering regulators in their work to engage Indigenous communities and improve professional practices.

1 Statistics Canada, 2018. Canada. Aboriginal Population Profile. 2016 Census. Statistics Canada Catalogue no. 98-510X2016001. Ottawa. Released July 18, 2018

2 The Truth and Reconciliation Commission of Canada. (2015a). Calls to Action. Winnipeg, MB.

3 Engineers Canada (2018). "Indigenous Peoples' Access to Post-Secondary Engineering Programs: A Review of Practice Consensus." Retrieved February 28, 2019 from: <https://engineerscanada.ca/reports/research/review-practice-consensus-indigenous-peoples-access-post-secondary-engineering-programs>.

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5 Truth and Reconciliation Commission of Canada (2015) "Truth and Reconciliation Commission of Canada: Calls to Action." Retrieved September 6, 2018, from: [http://www.trc.ca/websites/trcinstitution/File/2015/Findings/Calls\\_to\\_Action\\_English2.pdf](http://www.trc.ca/websites/trcinstitution/File/2015/Findings/Calls_to_Action_English2.pdf)