ENGINEERS GEOSCIENTISTS MANITOBA

30 by 30 Strategic Plan

- Updated October 2020 -

Contents

1.0 Introduction & Background

Engineers Geoscientists Manitoba (the Association) defines its owners as:

> Those Persons from whom the Council derives its legal and/or moral authority and to whom the council owes its ultimate allegiance; specifically Engineers Geoscientists Manitoba owners are the people of Manitoba.

The Association further supports this directive through its *Global End*, "The interests of the Public of Manitoba are protected, as they relate to the practice of engineering and geoscience and that the results should be worth the resources expended." As a matter of strategy and policy, the mandate of the Association is to protect the interests of Manitobans.

A key aspect of this mandate - as outlined in the detailed strategic priorities for the Association - includes improving diversity within its membership to remedy current underrepresentation of historically excluded or marginalized groups of Manitobans within the profession. As a moral imperative, but more purposefully to ensure the infrastructure, products and solutions designed by engineers in Manitoba consider diverse perspectives and therefore offer better outcomes, this helps to ensure the public interest is protected.

The 30 by 30 initiative, adopted nationally by Engineers Canada and by each of the provincial and territorial regulators, is represented in the Association's strategic end 5.2 to specifically increase the representation of women in engineering in Manitoba. This strategy has been developed to support efforts within Manitoba to achieve the goal of having 30% of newly licensed engineers be women by 2030. This strategy - spanning 12 years - started in 2019 and will conclude at the end of 2030, with the goal to have implemented changes that leave a legacy well past 2030 and in order to achieve gender parity over time.

This strategy completed the second phase of a multi-year plan forwarded by the Association that included:

- the development of a marketing plan;
- hiring of a dedicated team to support the initiative within the Association within the Government Relations division;
- development of the Engineering Changes Lives (ECL) Steering Committee with representation from government, industry, academia and education; and
- development of an environmental scan.

The strategy will be reviewed by the Engineers Geoscientists Manitoba's Department of Equity and Representation and CEO, and the Engineering Changes Lives Provincial Steering Committee on an annual basis.

Supporting 30 by 30 in Manitoba

Following completion of the second phase of the plan, the association created a new department within its organization dedicated to delivering End 5 – Practitioners reflect the diversity of the public. Under the leadership of the Director of Equity and Representation, this strategy will be implemented and updated. This department includes two full time employees who are supported by and have access to resources within the Association as well as specialized external resources in advertising, research and strategic planning and implementation. In addition, this team supports and is supported by the Engineering Changes Lives Steering Committee and its working committees: the Manitoba 2030 Coalition (industry employers) and the Education sub-committee.

Progress to Date

This strategic plan was preceded by a significant amount of work within the Association that included:

Phase One: (Approved October 2017)
A marketing plan was developed to guide a communications and advertising campaign to set the tone underlying the importance of engineering in society, and the vital role that diversity - women in particular - play in it. The ultimate goal of this marketing plan is to start a paradigm shift with respect to the understood value of diversity.

Phase Two: (Completed in December 2018)
A. Dedicated Staff – This initiative requires the attention and continuity that a full-time team can provide. To that end, two full-time staff members were hired for two-year terms to project manage and administer the initiative through the lead of the Department of Government Relations.

B. Engineering Changes Lives Steering Committee - The Association lead the formation of a steering committee representing industry, academia, government and education in order to ensure new voices are heard through the development and implementation of the plan. The steering committee has provided essential advice and guidance through the development phases of the marketing campaign, environmental scan, and strategic plan, and will continue to provide guidance to the development and execution of plan initiatives on a quarterly basis going forward.

C. Strategic Plan Development - A focused, well-researched strategic plan with measurable goals covering a 12-year timeframe to achieve the ultimate 30 by 30 objective. In addition, governance, reporting and processes to track implementation of the plan across the engineering ecosystem throughout Manitoba.

Phase Three: Implementation
Starting in January 2019 and along with the leadership of the ECL Steering Committee, this document has served as a guide to successful implementation of priority plan tactics, including:

- Establishing a metric baseline and annual tracking protocols;
- Further identifying and engaging stakeholders;
- Developing and executing Dear 2030 and Girl Power marketing campaigns to students, teachers, and employers;
- Development of Association’s Dismantling Bias webpages and social media strategy to inspire and equip students, parents, teachers, practitioners, and employers with current best practices to address bias and discrimination;
- Establishment of the Manitoba 2030 Industry Coalition with representation from Manitoba's largest employers of engineers strategising to recruit, retain, and promote women in the professions;
- Delivery of professional development to practitioners;
- Delivery of professional development to teachers;
- Submission of environmental scan and associated statement supporting the continuation and expansion of resourced interventions to gender and cultural bias to the Manitoba Commission on Kindergarten to Grade 12 Education;
- Establishment of an education sub-committee to increase awareness and address gender and cultural bias in Kindergarten to grade 12 teaching with a focus on engineering and geoscience pre-requisites;
- Increased staff support to the Women in Engineering and Geoscience Mentorship Program, MCWESTT, and CCWESTT events;

- Applying a gender lens to outreach activities and materials to students via career fairs, science symposiums, classroom presentations, Spaghetti Bridge competition, and University of Manitoba Engineering Society (UMES) outreach events;
- Advising on applying a 30 by 30 lens to established and ongoing Association marketing campaigns;
- Participation in Engineers Canada 30 by 30 conference calls and in-person meetings to grow the national campaign and networks and to share resources and strategies;
- Identifying and liaising with consultants specialising in organisational change.

The 2020 update was centered on the addition of data obtained from Manitoba Education, publicly available post-secondary data, and from the Association data base.

2.0 Plan Overview

Vision

Engineers Geoscientists Manitoba is the leader and a facilitator of the process that ensures excellence in engineering, geoscience and applied technology for the public of Manitoba.

Mission

To serve and protect the public interest by governing and advancing the practices of professional engineering and professional geoscience in accordance with The Engineering and Geoscientific Professions Act of Manitoba.

Core Values

- We practice our profession with integrity.
- We are dedicated.
- We exercise foresight.
- We are strategic and proactive.
- We are progressive.
- We are caring and we champion community building.
- We advocate for fairness and equality.

Strategic Ends

ENGINEERS GEOSCIENTISTS MANITOBA

Global End: The interests of the Public of Manitoba are protected, as they relate to the practice of engineering and geoscience and that the results should be worth the resources expended.

E-1 Individuals who are practicing engineering and geoscience are registered and licensed.	**E-2 Practitioners practice with competence and conduct themselves professionally.**	**E-3 Unqualified persons do not practice.**	**E-4 Stakeholders understand and value the contribution of the professions.**	**E-5 Practitioners reflect the diversity of the public.**	**E-6 Consumers have access to a reasonable supply of practitioners' services.**
E-1.1 Potential members experience efficient registration or licensure.	E-2.1 Practitioners demonstrate a high current level of knowledge and experience with the application of that knowledge.		E-4.1 Practitioners value and engage in a self-regulating profession.	E-5.1 Increasing indigenous membership.	E-6.1 Engineering and geoscience students enroll as interns.
E-1.2 Qualified professionals experience a seamless registration process across Canada and internationally.			E-4.2 The public understands and values the contribution of the professions and this is a priority. E-4.2.1 The public understands the competency and ethics of practitioners. E-4.2.2The public perceives the professions as having a leading role in protecting public interest.	E-5.2 By 2030, 30% of newly licensed engineers will be women and this is a priority.	E-6.2 Students in K to 12 view the professions as rewarding careers. E-6.3 Post secondary institutions and government are aware of the future needs of the professions.
E-1.3 Individuals practicing emerging technologies are integrated into the profession.	E-2.2 Practitioners and students develop as professionals throughout their careers.		E-4.3 Government and regulators understand and support self-regulation. E-4.3.1 The provincial government will provide clearly defined regulatory authority.		
E-1.4 Individuals practicing in academia are recognized as qualified for registration.			E-4.4 Government understands the issues impacting the public interest as they relate to the professions and this is a priority. E-4.4.1 Government seeks out the professions as stakeholders. E-4.4.2 Governments dialogue with the professions in developing legislation, regulation, public policy, codes and standards.		

Objective

The primary objective of the 30 by 30 strategy in Manitoba is to increase the participation of women in engineering and geosciences[1] long term and ultimately realize the benefits of a professional community that represents the population of Manitoba.

Specific measurable goals have been identified to track progress of the strategy and are outlined in detail below (see Goals).

High Level Strategic Direction & Approach

The 30 by 30 strategic plan is built on developing a clear understanding of the current state of intersectional gender representation within Engineering and mapping existing and planned programs and strategies within the engineering ecosystem in Manitoba and Canada. Additional work has been completed to understand the underrepresentation within geoscience where pathways converge with engineering – in implicit bias re: women in STEM, math and science entry requirements for universities, licensure and within industry. Where these points align, plan components will include both professions with the same goal to achieve 30% gender representation in annual newly licensed professionals by 2030. Additional resources ("Dear 2030" campaign, 30 by 30 Environmental Scan) have been integrated along with stakeholder feedback and data from Engineers

[1] Although the Engineers Canada 30 by 30 initiative is focussed on women in engineering, Engineers Geoscientists Manitoba is the regulatory body for both Engineers and Geoscientists and represents both professional groups. This strategy, therefore, is meant to consider and address the lack of gender parity in both Engineering and Geoscience in Manitoba. Where similarities exist – unconscious bias re: women in STEM, math and science entry requirements for universities, licencing and with industry employers – plan elements will speak to both groups.

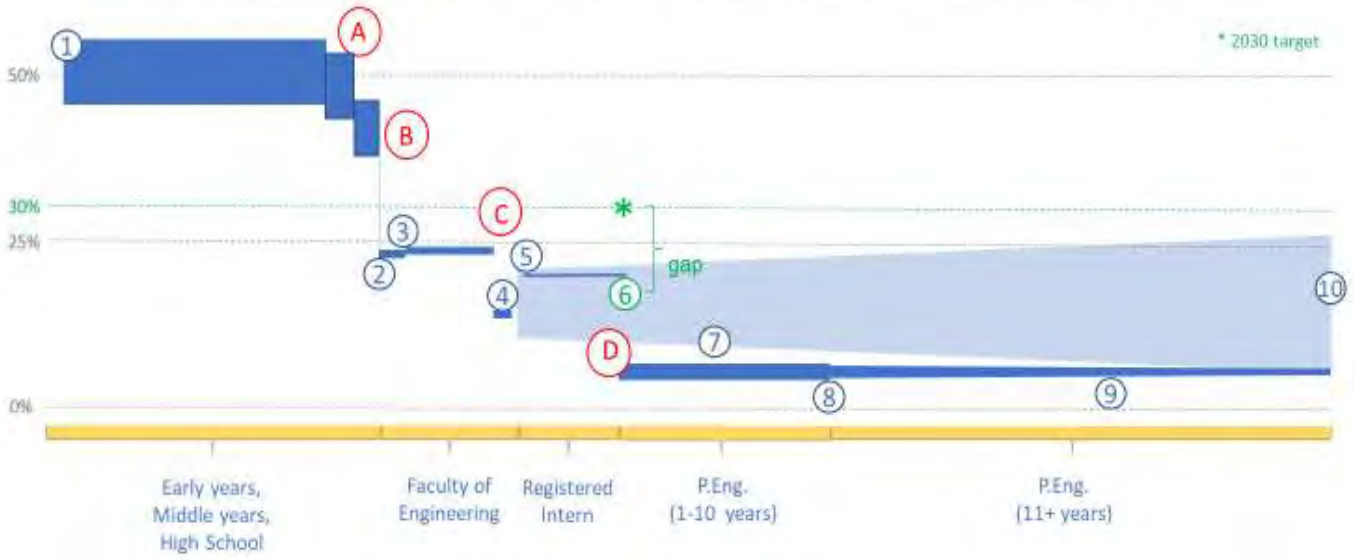
Geoscientists Manitoba (Committee to Increase the Participation of Women in Engineering, Engineering Changes Lives Provincial Steering Committee and others), the Faculty of Engineering - University of Manitoba (Internationally Educated Engineering Qualifications program, WISE Kid-Netic Energy, Engineer in Residence, Administration and others), and industry leaders within Manitoba (Friends of Engineering and some organizations employing large numbers of engineers).

The resulting picture of engineering and geoscience as career paths for girls/women in Manitoba supports the need for an aggressive, integrated strategy that acknowledges intersectional realities of systemic, institutional and interpersonal sexism, racism, xenophobia, homophobia, transphobia and socio-economic status to reach the stated goal of 30% of newly licensed engineers and geoscientists in Manitoba to be women by 2030.

Figures 1 and 2 provide a snapshot of:

- relative size of the group of participants who are girls/women along the path to becoming an engineer, geoscientist
- transition and decision points where data is gathered and where measuring binary gender representation is possible (for example, from ~50% of high school students to 11.2% of practicing engineers and 22.5% of practicing geoscientists)
- resulting “drop-off” points in the participation of girls/women in engineering/geoscience and the gap still to be addressed in achieving 30 by 30

Figure 1: Current path to a career in Engineering for girls/women in Manitoba



①
- ~50% (est.) of school-age Manitobans are girls (2017 = 91,665 (est.)/183,330)
- 44.8% of grade 11 high school physics students are girls (2017 = 2047/4,573)
- 42.3% of grade 12 high school physics students are girls (2017 = 1387/3277)

②
- 23.5% of direct entry applicants to Faculty of Engineering (U of M) are women (2017 = 111/473)
- 22.6% of 1st year Faculty of Engineering students (U of M) are women (2017 = 56/248)

③
- 20.6% of Faculty of Engineering undergraduate students (U of M) are women (2017 = 366/1777)
- *7.4* % of Co-op students are women (2017 = *2/27*)
- *23.1*% of engineering students registered with Engineers Geoscientists Manitoba are women (2017 = *188/813*)

④
- 20.4% of Faculty of Engineering graduates (B.Sc. / U of M) are women (2017 = 66/324)

⑤
- 19.2% of EIT applicants in Manitoba are women (2017 = 65/338)
- *22.4* % of EIT applicants from assessment in Manitoba are women (2017 = *30/134*)
- *17.3* % of EIT applicants from CEAB in Manitoba are women (2017 = *35/204*)

⑥
- 21.3% of newly licensed Engineers in Manitoba** are women (2017 = 35 /164)

⑦
- 10.2% of practicing P.Engs in Manitoba*** are women (2017 = 573/5608)

⑧
- *9.4*% of P.Engs in Manitoba (10+ years) are women (2020 = 240/2555)

⑨
- *TBD* % of Executive Leaders in Engineering in Manitoba are women

⑩
- *TBD* % of non-licensed Engineering graduates are women (estimate)

*includes assessment, IEEQ participants; does not include mobility applicants
** includes assessment and CEAB applicants; does not include mobility applicants
***does not include life members or retired members

Figure 1 is a 2017 snapshot of binary gender percentages on the path to a career in engineering. The data for 2017 was used as it is the year that includes available high school data. However, when looking at available data for 2000 to 2019 (see Appendix), the following observations can be made at decision points B,C, and D.

Ⓐ Drop in representation of girls in high school Physics classes.

Ⓑ Direct entry applicants to the U of M Faculty of Engineering who are women drops at this decision point, representing the largest drop-off of participants on the path to a career in engineering.

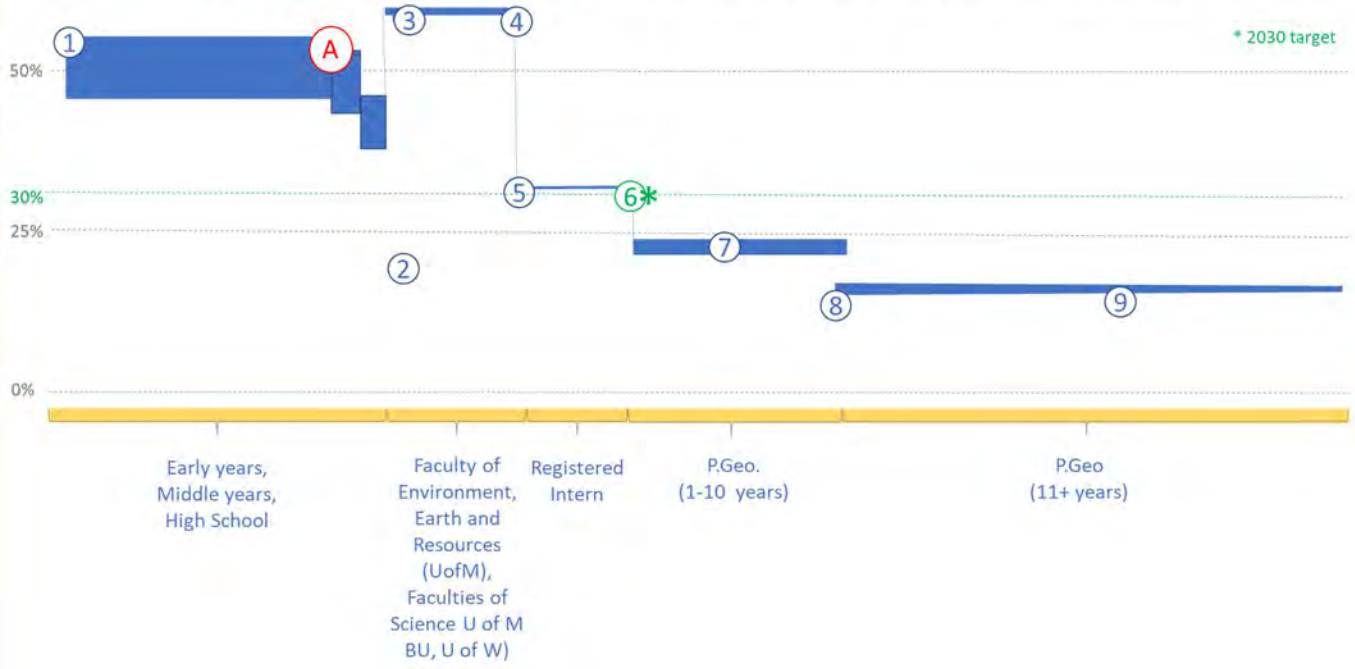
Ⓒ Persistence of women through the U of M Faculty of Engineering undergraduate program is strong, however, over a 20 year average, the percentage of CEAB women grads applying to the EIT program is lower than the percentage of women graduating from the U of M. Over the same time period, the percentage of women entering the EIT program from the Assessment program was higher than the percentage of women who are Assessment candidates. Indigenous women are significantly underrepresented at 0.2% (10/4906) of all EIT applicants over the past 20 years.

Ⓓ Over the last 20 years the percentage of women leaving the EIT program was slightly higher than the percentage of women applying to the program. However this trend has reversed over the past five years.

The percentage of women relinquishing their P.Eng. is significantly lower than the percentage of those applying but years of extremely low representation means that women still make up only 11% of P.Eng.'s as of 2019.

This may indicate that efforts to retain and advance women to licensure are most effectively directed at EITs. However, having professionals as role models and colleagues is critical and so the retention of licensed women is critically important.

Figure 2: Current path to a career in Geoscience for girls/women in Manitoba



①
- ~50% (est.) of school-age Manitobans are girls (2017 = 91,665 (est.)/183,330)
- 44.8% of grade 11 high school physics students are girls (2017 = 2,047/4,573)
- 42.3% of grade 12 high school physics students are girls (2017 = 1,387/3,277)

②
- 23% of Faculty of Environment, Earth and Resources students (U of M) are women

③
- 57.8% of Faculty of Science students in Mb are women (2017 = 3,388/5,863)
- *38.5%* of geoscience students registered with Engineers Geoscientists Manitoba are women (2017 = *5/13*)

④
- TBD% of Faculty of Science graduates in Mb are women (2017 = TBD)

⑤
- *21.4* % of new assessment* applicants in Manitoba are women (2017= *3/14*)
- *21.4%* of new total GIT applicants in Manitoba are women (2017 = *3/14*)
- 32.4% of geoscience Interns in Manitoba are women (2017 = 24/74)

⑥
- 75.0% of newly licensed Geoscientists in Manitoba** are women (2017 = 3/4)

⑦
- 22.7% of practicing P.Geos in Manitoba*** are women (2017 = 49/216)

⑧
- *13.0%* of P.Geos in Manitoba (10+ years) are women (2020 = 15/116)

⑨
- *TBD* % of Executive Leaders in Geoscience in Manitoba are women

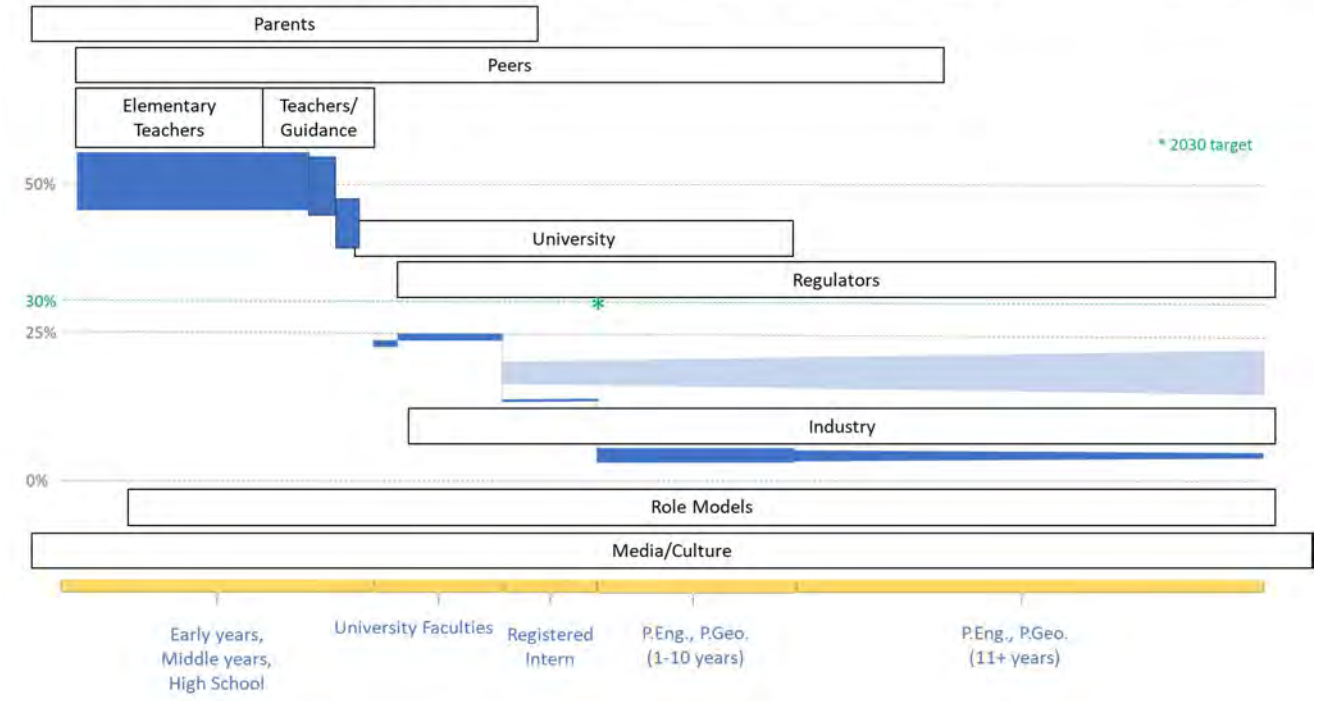
*includes assessment, IEEQ participants; does not include mobility applicants
** includes assessment and CEAB applicants; does not include mobility applicants
***does not include life members or retired members

This framework was used to narrow strategic focus to:

- Influencing cultural biases that nudge girls and women away from choosing a career in engineering or geoscience.
- Addressing specific points of reduction in representation of girls and women along the path to becoming a licensed engineer or geoscientist (P.Eng, P.Geo). Specifically, decision and transition points.
- Building a legacy of change that will ensure ongoing increases in representation of women in engineering, with gender parity as the ultimate goal.

Taking guidance from research used to develop the "Dear 2030" campaign, culprit groups [2](i.e., those groups or individuals who are likely to influence the decision to select and remain within the professions) must be considered when defining accountability for actions directed at addressing the multiple drop-off points of girls and women on the pathway to becoming an engineer or geoscientist.

Figure 3: Culprits along the paths to a career in Engineering or Geoscience for girls/women in Manitoba



Goals

The stated goal of the 30 by 30 strategy is to increase the number of newly licensed professional engineers (P.Eng) who are women to 30% by 2030, and by extension, to representative participation in the field longer term (i.e., 40 by 40, 50 by 50, etc.) This goal represents the understood importance of increased diversity within the engineering profession and the positive impacts on engineered products and solutions as a result.

[2] Feedback was received during the ECL Steering Committee strategy review that the term "culprit" made some feel disengaged from the initiative. This feedback, although considered, did not result in a change to the terminology used within the strategy as the intent is to clearly denote culpability of certain influencing groups along the path to becoming an engineer.

As the strategy spans 12 years, Key Performance Indicators (KPIs) have been identified throughout the path from childhood through to engineering leaders to track success and ensure planned progress within the strategy's timeframe. They include:

- % students (overall in Manitoba schools k-12) who are girls
- *NEW* % students taking Physics who are girls
- *NEW* % students enrolled in geoscience who are women (data available for U of M but not BU)
- % engineering direct entry applicants (U of M) who are women
- % students admitted to preliminary year engineering (U of M) who are women
- % engineering undergraduate students (U of M) who are women
- % engineering B.Sc. graduates (U of M) who are women
- % registered as interns who are women (including Indigenous and internationally educated interns)
- % of newly licensed engineers and geoscientists who are women (including Indigenous and internationally educated interns)
- % practicing professional engineers and geoscientists who are women
- % partners/CEOs/leaders/specialists who are women

A data gap exists on perceptive progress (i.e. changes in implicit and explicit bias) and preliminary research on how to generate the data shows that it is a sizeable task requiring specific expertise. It will be kept on the strategic plan as a future item.

Timeline

This strategic plan spans 12 years – January 2019 to Dec 2030 – with specific focus in each of the following timeframes:

- 2019 – 2020
- 2021 – 2023
- 2024 – 2030

3.0 Environmental Scan

A detailed literature review and environmental scan update was completed between May and November 2018 by the Association. A summary of the scan[4] trends, data and findings used to inform the 30 by 30 strategy are included in this section. In addition to the scan, feedback provided by various stakeholders within the engineering ecosystem in Manitoba during the information gathering phase of development informs the following summary.

Political

Support exists at both federal and provincial levels of government to address underrepresentation of women in male dominated sectors. Research and funding opportunities, public support of existing programs and resourcing supports have been made available through Status of Women departments, federally and provincially.

- In Manitoba, Hon. Rochelle Squires – previous Minister responsible for the Status of Women - has directly supported the Engineers Geoscientists Manitoba campaign "Dear 2030" by hosting multiple launch events

[4] The complete *30 by 30 Environmental Scan* document is an essential companion document to the strategy and is a valuable source of detailed research findings that provide a rich understanding of the context in which this strategy was formed and will launch.

at the Manitoba Legislature, bringing media and industry focus to the initiative. After the 2019 provincial election, Hon. Cathy Cox has been appointed as the new Minister responsible for Status of Women.

The Government of Manitoba has also dedicated representatives from Manitoba Education and Manitoba Infrastructure to participate in the Engineering Changes Lives Steering Committee struck in early 2018 that will guide the strategy through the next 12 years of implementation.

Federal support of research and stakeholder engagement initiatives delivered via local partnership with Tech Manitoba (Formerly known as Information Communications and Technology Association of Manitoba - ICTAM) included:

- Information and Communication Technologies Council (ICTC) employee/employer information gathering workshops
- wage gap round table discussion with Terry Duguid, Parliamentary Secretary for Status of Women within the last quarter of 2018 alone.
- Funding opportunities for entrepreneurs and for non-profit organizations supporting gender parity through Status of Women Canada under the leadership of Hon. Maryam Monsef.

In 2019, the federally commissioned Final Report of the National Inquiry Into Missing and Murdered Indigenous Women and Girls was released and includes a chapter and five Calls to Justice for the extractive industries link between resource extraction projects and violence against Indigenous women is a serious problem that demands attention, and the importance of all resource-extraction and development industries to consider the safety and security of Indigenous women, girls, and 2SLGBTQQIA people (two-spirit, lesbian, gay, bisexual, transgender, queer, questioning, intersex and asexual) “at all stages of project planning, assessment, implementation, management, and monitoring”.

In addition, both federal and provincial governments are experiencing a shift in culture surrounding appropriate behavior in their own workplaces, with examples of inappropriate behavior towards women being called out and addressed publicly. Political institutions are themselves dealing with the same type of cultural transition required in other professional sectors, reflecting changing attitudes in what constitutes an inclusive work environment.

On the whole, there is growing political support for improving gender parity on ethical and economic grounds. Maintaining this momentum is key.

As some of the largest purchasers of engineering services, governments also play a role in defining elements in engineering workplaces. Through parameters set out in large competitive bid requirements federal, provincial and municipal governments have the opportunity to define elements that directly impact engineering workplaces. For example:

- models for competitive procurement processes create cost pressures that translate into work environments that don’t readily support a healthy work-life balance[5].
- setting requirements for proponent project teams to include specific representation of historically underrepresented groups, including women and Indigenous people, in order to qualify for consideration.

[5] Feedback from participants in the information gathering phase showed there is a reluctance for some consulting engineers who are women to recommend engineering to their daughters based on the excessive pressures this job places on their lives.

As large buyers, governments are key participants in the economy and can therefore act as culprits or champions in creating work environments that continue to exclude women or ensure progress towards gender parity.

Economic

As outlined in the Environmental Scan document, research shows that the inclusion of more of the population (in this case, women) in the workforce, results in economic growth. Simply put, the economy grows as more individuals earn wages that can then be put back into the economy by spending.

Severely underrepresented demographics in the professions mean that employers cannot be maximizing top talent.

In addition to a direct economic impact, when women work, childcare supports are required. This represents a pressure to secure childcare spots, but in doing so also drives the potential to augment current levels of childcare and provide increased employment in these key roles.

Social

Biases exist and are reflected within social norms and gender biases with respect to engineering differ around the world[6]. In North America, one of the largest barriers to reaching gender parity in engineering are the gender norms we assign. These "norms" permeate family life, education and work-life realities for all participants and are reinforced through media stereotypes regarding STEM.

Shifting these norms is foundational to achieving gender parity and important because better solutions are created for society at large when that society is consistently at the decision-making tables and processes. Land use, ergonomics, artificial intelligence, safety and access requirements, risk mitigation, and socio-economic impacts and benefits are examples of project components that can benefit from diverse teams delivering more considered, effective, safe and sustainable solutions.

Although critical mass theory does not support a single level of participation (i.e., 30%) as a turning point in shifting norms and behaviours in larger society, a key element to changing perception is actively working toward proper representation to more accurately reflect our society. The idea that "we can't be what we can't see" supports the need for visibly thriving representation in engineering for students to consider engineering as a career option – even if true parity is a more distant goal.

Technological

Our environment is increasingly technologically enabled. This provides opportunities for those with access to the networks that carry this technology and barriers for those without reliable access. Some impacts of the increasing reliance on technology in Manitoba include:

- limited access to reliable high-speed data connectivity is an issue for Manitoba's more isolated northern communities. For example, limited access to in-community educational resources for remote communities will reduce opportunities for members of these communities in ways not experienced in the south. This disproportionately impacts Indigenous communities and students;
- increased location flexibility for workforce participants where network connectivity is reliable. For example, networks can support video conference and secured connections foundational to

[6] The west (North America, Europe) represents some of the most gender-limiting views and biases within engineering.

successful work from home options. Covid-19 work from home options have demonstrated the feasibility and effectiveness of providing these options for employees when they are not required to be on site.

Increases in the reliance of technologically enabled solutions also highlights the need for technical solutions designed to serve a diverse population as discussed earlier in this section.

Environmental

The environmental impacts of industrial progress including the impacts of climate change on weather events and agriculture, finite natural resources and other environmental challenges are growing as the world's populations balloon and demand development. Environmental challenges will continue to demand new and innovative solutions that will require engineering skillsets to deliver. This demand creates an opportunity for growth in engineering as research has shown that women demonstrate a disproportionate interest in "helping" professions.

This is reflected in a few engineering disciplines where women are currently overrepresented. In Manitoba, women made up more than 50% of the registered interns from 2011 to 2017 in environmental (64.5%) and biomedical (56.5%) disciplines.

Highlighting the ways in which electrical, computer, mechanical and civil engineering are related to innovations and implementation of technologies and solutions for increasing energy efficiency, renewable energy, environmental protection and sustainability, will increase women's interest in these fields.

As the need for work in these areas grows, the opportunity for women in these discipline areas will grow and can increase the overall representation of women in engineering.

Legal

Legal implications for this strategy to consider exist within the relationship between social norms, human resources policy and workplace culture. Specifically, the changing treatment of sexual harassment and discrimination claims within the workplace. What previously was condoned workplace behavior (sexual harassment, discrimination, etc.) is now cause for dismissal, and with movements like #MeToo, have increased the confidence of survivors taking legal action.

Although extreme mistreatment of women because they are women is less common, the male-dominated culture within engineering and geoscience can still manifest in behavior that is hostile to women. Workplace behavior standards, culture, and policy vary greatly. Legal parameters will continue to evolve and engineering and geoscience employers will need to resource imbedding these changes into policy and living the policy into culture.

The ability to show leadership in adopting and developing successful workplace policies will become a competitive advantage in attracting diverse and skilled engineers to their organizations. Organizations and engineering sectors that struggle to adopt progressive and accountable human resource policies will incur an increased risk of legal action.

Threats

Bias – long standing sexism and bias is the primary threat to the successful increased representation of women in engineering. Biases that are implicit or systemic are the most persistent and difficult to address as they require

understanding and acknowledgement on a person-by-person basis as well as a willingness to restructure existing systems by leaders who are generally overrepresented in the engineering and geoscience workforce and may see systemic changes as a threat to their own power, advancement and success. Implicit bias exists within the population at large and within professional women themselves. As we are all products of our environment, we have internalized the biases ultimately responsible for nudging girls and women out of engineering and geoscience.

Acknowledging, understanding and shifting this bias requires a long view and clear interventions along the way. Multi-stage support for intervention initiatives will be essential to changing this bias and building a legacy of diversity and representation in engineering and STEM overall.

Opportunities

Momentum – a recent groundswell of discussion about the underrepresentation of women in STEM fields and leadership positions, as well as concrete actions within some North American jurisdictions to adopt policies and legislation to codify increased participation for underrepresented groups are raising the profile of gender parity. Examples include:

- Nobel Prizes in Physics and Chemistry for 2018 were both awarded to women which opened up the discussion around underrepresentation of women in STEM fields in Canadian media for the following week;

- The state of California passed a law on September 30, 2018, that requires publicly traded companies whose principle executive offices are located in California to have at least one woman on their board of directors by the end of 2019;

- Women's industry organizations are increasing their efforts. In Winnipeg within the month of October 2018 alone, the prairie chapter of Building Equity in Architecture launched, Maven (gender parity program of Tech Manitoba) launched a research program reaching out to women in the tech field to participate in focus groups, and Engineers Geoscientists Manitoba are meeting with Engineering industry leaders to build a coalition of leaders to help increase representation of women in Engineering;

- There are varying degrees of acceptance and understanding of the under-representation of women in engineering in Manitoba and the value of diversity in the engineering and geoscience workforce, but there are clear examples of leadership within the educational institutions, industry and regulators on which to build.

- Available public sector funding. An open call for proposals from the Government of Canada was launched in early 2019 "to fund proposals that will increase the capacity of eligible women's and Indigenous organizations whose initiatives contribute to a viable women's movement in Canada to advance gender equality. Funding will increase organizational capacity and help organizations work collectively to address gender equality issues." (https://swc-cfc.gc.ca/fun-fin/cfp-adp/2018-1/index-en.html). Although, as an organization whose central mandate is not to promote gender parity, Engineers Geoscientists Manitoba did not qualify for the round of 2019 funding, however, future opportunities to apply for gender parity grants will be monitored.

- Forced work-from-home options due to COVID-19 may create a permanent shift allowing parents and caregivers to manage caregiving and work responsibilities with greater ease. As, on average, women still carry a disproportionate amount of parenting and caregiving (elder and community)

labour vis-à-vis their (heterosexual) spouse, co-parent, and brothers, increased work from home time for all genders in a workplace may allow for:

-increased average participation of men in parenting caregiving duties

-increased participation and retention of mothers in the workforce

Conversely, where gender wage gaps and gendered divisions of labour already exist, women may be more likely to leave their positions, reduce their hours, and/or burnout at faster rates when children must stay home from school. Additionally, long-term impacts on the childcare sector may decrease available spots, disproportionately affecting women entering and remaining in the workforce and post-secondary institutions.

4.0 Strategic Plan

Approach

Development of this strategic plan started with a weeks-long information gathering phase. During this time, the team met with various stakeholder groups to gather insight into existing gender parity programming and to understanding the engineering ecosystem in Manitoba. Ultimately, this phase resulted in a clear picture of the primary pathways to engineering for girls/women, their transition and decision points, bottlenecks and barriers, potential metrics, as well as key resources to leverage within the strategy.

In addition to the detailed picture of the current state of women in engineering and geoscience in Manitoba, the 30 by 30 environmental scan, the 2018 marketing campaign ("Dear 2030") and taking guidance from the ECL Provincial Steering Committee, parameters to organize existing activities into strategies, identify gaps and assign accountabilities were developed.

Principles used to develop strategies:

- Consider all stages on the path and build a plan that follows the journey of new entrants through to leadership.
- Focus on bottlenecks, decision points and transition points to understand leaks.
- Link cyclical nature of four key pillars of activity: learn/investigate, build awareness, remove barriers, leave a legacy to build traction and ensure capacity is built along the path so as to not create new bottlenecks and leaks.
- Understanding differences is essential to overcoming a lack of gender parity. This also means that the dominant group – in this case white men – are also an integral part of dismantling barriers to change.

Criteria used to assess and group activities:

	Small	Medium	Large
Impact expected annualized increase in total # of participants who are women[7]	<.5 (less than 1 every 2 years)	.5 to 2 (between 1 and 4 every 2 years)	+2 (2 or more every year)
Span of Control of groups internal to Engineers Geoscientists Manitoba	Influence	coordinate	Lead
Speed to Market already in place vs develop from scratch	new, complex development	new, simple development	in place, leverage existing
Legacy effect one-time increase vs. creating a long-lasting change	one-time effect	repeatable effect with support	long-lasting change

[7] The average number of newly licensed engineers in Manitoba (CEAB and Assessment) from 2011 to 2017 is 181, 1% of which is 1.8/year.

Culprits and Champions:
Various groups along the path to engineering and geoscience are active in influencing decisions of potential entrants into the professions as well as whether to continue within the professions. Specific groups have been identified as nudging girls and women off of the path and out of engineering. These groups, being culpable of nudging in various ways – consciously and subconsciously – are referred to as ***culprits***[8] and are:

1. Parents
2. Early Years/Middle Years Teachers
3. Guidance Counsellors, High School Teachers
4. Peers
5. Role Models
6. Universities, Employers
7. Media, Culture
8. Governments, Associations[9]

Key actors have been identified within the engineering ecosystem in Manitoba as enablers of change along the path to becoming a professional engineer. These groups – within industry, government and throughout educational institutions – will drive the activity within the strategies where they are best positioned to do so.

The ***champions*** identified specifically within this strategy include:

- Engineers Geoscientists Manitoba (ECL Steering Committee, 30 by 30 team, Admissions/Licensing, Committee to Increase the Participation of Women in Engineering - CIPWIE, Government Relations, contracted talent: Juliet Creative, Blueprint Inc, etc.)
- Engineers Canada
- Industry (Manitoba 2030 Coalition, individual firms, Friends of Engineering)
- University of Manitoba – Faculties of Engineering and of Environment, Earth, and Resources (Admissions, IEEQ, WISE Kid-Netic Energy, etc.)
- U of M Engineering Student Groups (UMES | UMSAE | UMBMES | UMIEEE | UMATT | UMSATS | UMSERG | GNCTR)
- University of Manitoba/Winnipeg/Brandon - Faculties of Science
- University of Manitoba/Winnipeg/Brandon - Faculties of Education
- Government (Municipal, Provincial, Federal; Procurement, Minister Status of Women, Minister Workforce Innovation, Economic Development)

This strategy leverages champions in two ways: champions that exist within culprit groups, and champions who can influence change within culprit groups, but who do not belong to that group.

Key Performance Indicators and Targets

Gathering baseline metrics and key performance indicators is critical to understanding the gaps in representation of girls and women along the path to engineering and geoscience. Data gathered to date provides insights to trends from 2000 to 2020 (where available) and sets the baseline measures on which annual targets will build towards reaching the “30 by 30” objective. Annual reporting of key performance indicators will serve as an

[8] Listed in order they appear on the pathway to engineering
[9] Includes professional engineering regulators (Engineers Geoscientists Manitoba, Engineers Canada) and government (Municipal, Provincial, Federal) and were added as an eighth culprit group as a result of preliminary work on the 30 by 30 initiative in Manitoba.

essential tool to define areas of strategic priority and refocus as well as will inform plan adjustment through the life of the 12-year strategy.

Data at either end of the path – high-school metrics and engineering leadership metrics – as well as metrics measuring perception of girls/women in STEM still require sourcing or development[10]. These include:

- % partners/CEOs/leaders/specialists who are women
- Geoscience metrics from Brandon University (TBD)

Available data from 2000-2019, shown in Appendix A, serves to provide a clearer picture of the current participation of women (%) along the path to engineering and geoscience and defines the baseline measures as:

[10] Activity planned for 2019-2020.

	Preliminary year Faculty of Engineering Applicants	Preliminary Year Admissions to Faculty of Engineering	Undergrads at U of M Faculty of Engineering	BSc. Graduates Faculty of Engineering	New EIT Applicants in Manitoba	Total EITs in Manitoba	Newly Licenced P.Eng in Manitoba	P.Eng. Attrition	Total Practicing P.Eng. in Manitoba
2000	N/A	N/A	N/A	21.0%	11.5%	17.3%	15.5%	5.9%	4.0%
2001	N/A	N/A	N/A	21.3%	23.0%	19.0%	13.5%	4.3%	4.3%
2002	N/A	N/A	N/A	21.3%	19.9%	18.8%	22.7%	2.5%	4.6%
2003	N/A	N/A	15.6%	21.8%	20.9%	19.0%	19.6%	5.1%	5.1%
2004	N/A	N/A	15.9%	20.0%	19.7%	20.3%	16.0%	3.9%	5.4%
2005	N/A	N/A	14.8%	16.9%	15.5%	18.7%	24.3%	6.4%	5.9%
2006	N/A	N/A	N/A	16.0%	17.2%	18.0%	18.7%	5.8%	6.3%
2007	N/A	N/A	N/A	14.2%	16.0%	17.0%	15.5%	6.3%	6.7%
2008	N/A	N/A	13.2%	18.8%	15.6%	16.8%	15.3%	6.7%	6.9%
2009	N/A	N/A	15.5%	12.7%	15.9%	16.2%	17.8%	7.1%	7.1%
2010	N/A	N/A	16.9%	14.2%	17.4%	16.8%	12.7%	3.8%	7.2%
2011	N/A	N/A	17.6%	14.2%	16.1%	16.5%	15.4%	8.5%	7.6%
2012	N/A	N/A	17.7%	13.8%	11.7%	15.2%	17.0%	5.3%	7.9%
2013	N/A	N/A	18.3%	18.0%	18.4%	16.0%	12.2%	5.5%	8.2%
2014	N/A	N/A	18.5%	22.8%	17.4%	15.4%	23.5%	8.6%	8.9%
2015	N/A	N/A	18.4%	20.0%	19.5%	16.9%	14.0%	6.1%	9.5%
2016	N/A	N/A	19.7%	18.4%	19.3%	17.7%	14.8%	7.6%	9.9%
2017	23.5%	22.6%	20.6%	20.4%	19.2%	17.6%	20.9%	6.9%	10.2%
2018	21.0%	22.0%	21.4%	17.3%	20.2%	17.9%	17.0%	3.0%	10.5%
2019	N/A	N/A	N/A	N/A	21.7%	19.0%	17.4%	10.0%	11.0%
Average	*N/A*	*22.2%*	*17.8%*	*18.2%*	*17.9%*	*17.4%*	*17.0%*	*6.3%*	N/A

	Direct Entry Science Applicants	First Year Science Students	TOTAL Manitoba Science Students	New GIT Applicants in Manitoba	Total GITs in Manitoba	Newly Licenced P.Geo in Manitoba	Total Practicing P.Geo. in Manitoba
2000	N/A	N/A	N/A	16.7%	28.6%	13.5%	11.6%
2001	N/A	N/A	N/A	15.4%	17.6%	10.7%	11.2%
2002	N/A	N/A	N/A	20.0%	19.2%	N/A	11.6%
2003	N/A	N/A	N/A	50.0%	22.7%	0.0%	11.4%
2004	N/A	N/A	N/A	55.6%	32.0%	33.3%	11.9%
2005	N/A	N/A	N/A	50.0%	36.0%	100.0%	10.4%
2006	N/A	N/A	N/A	33.3%	39.1%	0.0%	10.2%
2007	N/A	N/A	N/A	20.0%	40.0%	50.0%	11.9%
2008	N/A	N/A	N/A	66.7%	48.1%	50.0%	12.3%
2009	N/A	N/A	N/A	61.5%	55.6%	50.0%	13.1%
2010	N/A	N/A	N/A	25.0%	58.6%	60.0%	14.7%
2011	N/A	N/A	N/A	50.0%	51.4%	57.1%	15.4%
2012	N/A	N/A	N/A	35.7%	48.9%	25.0%	16.2%
2013	N/A	N/A	N/A	13.3%	39.2%	42.9%	15.2%
2014	N/A	N/A	N/A	35.3%	34.4%	80.0%	16.6%
2015	N/A	N/A	N/A	33.3%	32.8%	50.0%	18.9%
2016	N/A	N/A	N/A	38.5%	35.8%	33.3%	20.5%
2017	N/A	N/A	N/A	21.4%	32.4%	75.0%	22.7%
2018	N/A	N/A	N/A	14.3%	32.9%	12.5%	21.6%
2019	N/A	N/A	N/A	26.7%	30.4%	30.0%	22.5%
Average	*N/A*	*N/A*	*0.0%*	*35.0%*	*36.9%*	*24.8%*	*15.0%*

	Newly Licenced P.Eng in Manitoba from CEAB	Newly Licenced P.Eng in Manitoba from Assessment	Newly Licenced P.Eng in Manitoba	Newly Licenced P.Geo in Manitoba
2000	18.0%	0.0%	15.5%	13.5%
2001	13.3%	14.3%	13.5%	10.7%
2002	25.8%	7.7%	22.7%	N/A
2003	20.8%	16.0%	19.6%	0.0%
2004	18.0%	0.0%	16.0%	33.3%
2005	23.1%	31.3%	24.3%	100.0%
2006	20.9%	12.5%	18.7%	0.0%
2007	14.0%	20.0%	15.5%	50.0%
2008	18.1%	8.1%	15.3%	50.0%
2009	21.6%	9.4%	17.8%	50.0%
2010	12.4%	13.5%	12.7%	60.0%
2011	18.6%	8.2%	15.4%	57.1%
2012	17.7%	15.4%	17.0%	25.0%
2013	10.7%	15.0%	12.2%	42.9%
2014	20.0%	35.0%	23.5%	80.0%
2015	10.4%	21.2%	14.0%	50.0%
2016	15.0%	14.3%	14.8%	33.3%
2017	17.9%	26.3%	20.9%	75.0%
2018	18.2%	15.0%	17.0%	12.5%
2019	19.4%	13.8%	17.4%	30.0%
Average	*17.4%*	*15.9%*	*17.0%*	*24.8%*

Annual representation of newly licensed women in engineering ranges between 12.7% and 24.3% in this timeframe with women making up 17.0% of newly licensed engineers over this 20 year period. But, as a result of decades of exclusion and low participation, once women become licensed engineers they enter a pool of professionals that includes only 11% women, up from 4% in 2000.

Annual representation of newly licensed geoscientists who are women fluctuates much more, ranging from 0% to 100%, given the much lower overall number of geoscientists, however they also enter a pool of professionals that includes only 22.5% women, up from 11.6% in 2000. The percentage of total practicing geoscientists who are women may therefore be a more appropriate KPI for the geoscience stream.

Additionally, the following observations from the tables in Appendix A are noteworthy:

- A minimum estimate of ~150 women graduates of the faculty of engineering did not apply to the EIT program (gender data is not available for 2019 or showing graduates from other provinces, therefore this number should be higher);
- 36 internationally educated women left the engineering Assessment program;

- 174 women have withdrawn or been written off of the EIT program with 60 of these attritions occurring in the past five years;
- 305 women have withdrawn or been written off of their P.Eng. with 133 of these attritions occurring in the past five years.
- Women consistently overrepresent in the Faculty of Science at the University of Winnipeg (ranging from 53.1% to 56.9% since 2008).
- Women consistently underrepresent in the Faculty of Science at the University of Manitoba (ranging from 43.8% to 48.8% since 2002).
- 17 women have withdrawn or been written off from the GIT program
- 42 women have withdrawn or been written off of their P.Geo.
- More men have withdrawn or been written off of their P.Geo. than have become newly licensed

Figure 4: 2030 Projections of Newly Licensed Engineers

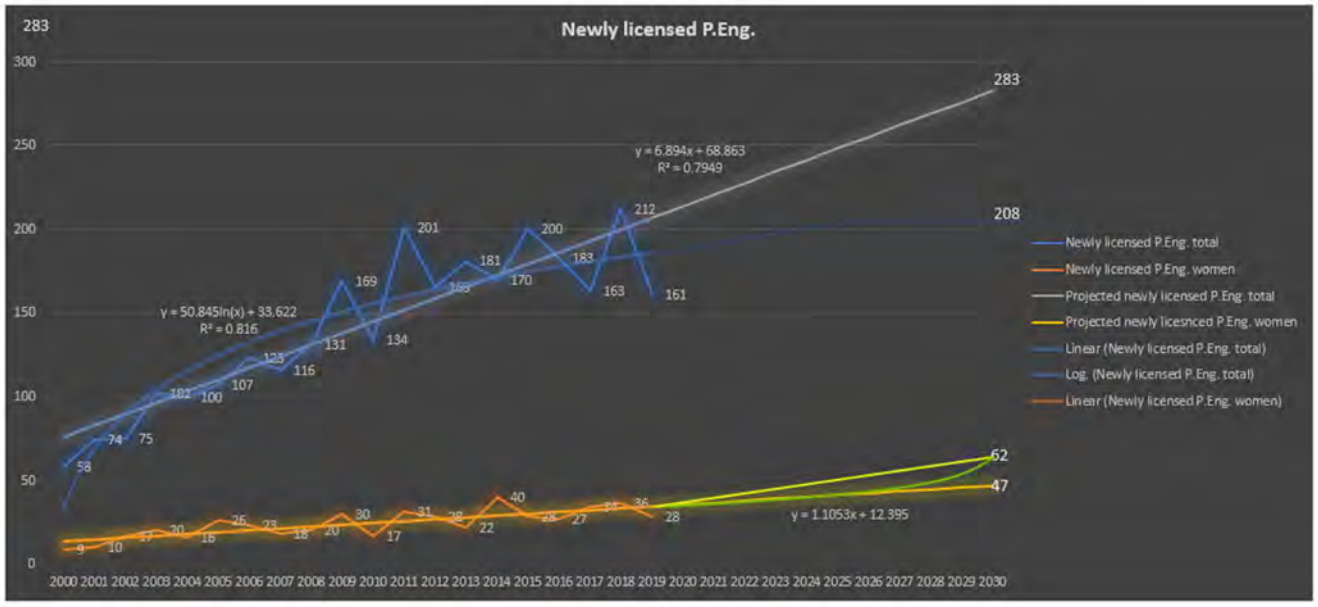


Figure 4, shown in larger format in Appendix B, shows the annual numbers of newly licensed engineers by binary gender from 2000 to 2019. The projected number of total newly licensed professional engineers in 2030 is 208 at a logarithmic growth rate, which most closely fits the curve. The projected number of professional engineers who are women in 2030 is 47, with a linear growth rate of just over 1 woman per year. 30% of 208 is 62, which requires a linear growth rate of 4.51, greater than four times the current 1.11. An increase of between 4 and 5 more women to become licensed per year is required to attain 30% by 2030, however, quadratic growth is perhaps more likely. A four to fivefold increase of the number of women registering will require interventions, however this order of magnitude is achievable.

On the whole, women are represented at a higher rate within geoscience in Manitoba, although gaps in data still need to be addressed along the geoscience path.

The baseline data illustrates the continued large gap between 2019 realities and the 2030 objective. Targets will be set and adjusted for each upcoming year based on the previous year-end results, but the 2030 target of 30% of

newly licensed engineers being women will remain the objective and results will need to progress over the 12 years of the strategy in order to reach 30%.

Strategies (2019-2030)

The strategies[11] outlined below have been developed in consultation with education and industry stakeholder groups, using existing data and information to build a collective and directed plan dedicated to increasing diversity in engineering. These strategies form the direction within which specific planning will continue throughout industry, educational and academic organizations across Manitoba, facilitated and supported by the Association.

1-Create influencers within each of the 8 culprit groups.

Tactic example: Identify and engage respected thought leaders within the culprit groups to act as champions to implement and promote effective tactics and to articulate proof points for others within the culprit group.

Progress here includes: Manitoba 2030 Coalition (industry) and Education sub-committees as well as Association organization and service additions like Department of Equity and Representation's Dismantling Bias webpages, resources, outreach and offering childcare at Association events.

2-Engage directly with girls/women on the path to engineering careers in order to identify and remove barriers true to their experience.

Tactic example: Survey junior high and high school students re: what they would like to know about the professions, importance of role models; work with student groups such as Women of Manitoba Engineering Network (WOMEN), EngiQueers, UMES and the new student equity officer. survey interns and professional engineers to determine perceived barriers to success/to remaining in the field; provide childcare for PD sessions, survey members to define additional barriers.

Progress here includes: the funding, development and launch of the Dear 2030 and Girl Power campaigns, the Student Dismantling Bias webpage, the Women in Engineering and Geoscience Mentorship program (spearheaded and developed by CIPWIE volunteers), inclusion of new ECL Steering Committee members to fill gaps in representation, participation in events and activities to promote engineering and geoscience to girls and women.

3-Consistently monitor path for supply shortage.

Tactic example: Identify caps at each transition stage and determine how increased # of women applying to the Faculty of Engineering will affect the cap. Are we creating an influx of interest where there is already a bottleneck re: total applicants? If so, how do we address this?

Progress here includes: Gathering and assessment of metrics to complete the view of girls and women along the path to engineering and geoscience and attainment of high school physics as a specific barrier to continuing on a path towards engineering.

4-Leverage existing groups/programs/associations to retain the momentum their programming has achieved, both inside and outside of engineering and geoscience.

[11] Strategy numbering does not reflect priority.

Tactic examples: Departmentalize CIPWIE programming and increase staff support; provide centralized administrative and program management support through the Association for committee work.

Progress here includes: integration of the Women in Engineering and Geoscience Mentorship program into core, staff-supported Association programming, coordination of Girl Power campaign delivery with WISE-kidnetic program plans and other related events and activities for girls in STEM; developing and presenting professional development for science and math teachers; submitting articles to existing publications with audiences in targeted culprit groups, sharing industry best practices identified through the Manitoba 2030 Coalition.

5-Rebrand engineering from the outside in and the inside out.
Tactic example: Engage marketing consultants in effective communication engagement; flood the culprit groups with training opportunities re: awareness of personal and institutional bias and related interventions.

Progress here includes: developing presentations and panel discussions on awareness, micro-aggressions and interventions at Ingenium, developing and launching Dear 2030, My Story and Girl Power 2020 campaigns and the Department of Equity and Representation's Dismantling Bias webpages.

6-Focus on populations that represent high-impact opportunities.
Tactic example: Investigate opportunity to focus on specific populations (are women overrepresented in international student base? In Indigenous student base? Faculty of Science students? Geographic parts of Winnipeg or Manitoba?); Previously licensed engineers who are women?

Progress to date: As discussed above, sourcing of available data since 2000 shows the numbers of women who have completed an engineering degree, left the path to licensure and may consider returning. Gender representation among science students is strong.

7-Leverage culprits to resource 30 by 30 initiatives.
Tactic example: Introduce 30 by 30 activity code and budgets within Manitoba 2030 Coalition to prove value; identify and apply for public sector funding at all levels of government.

Progress to date: Operationalized funding for 30 by 30 within the Association, paid childcare provided at Association events, Association-funded Girl Power campaign development, Manitoba 2030 Coalition lead and administered by industry, Education sub-committee led and administered by K-12 and post-secondary representatives.

8-Develop leadership/mentorship capacity within the existing base of interns, professionals and, leaders).
Tactic examples: Identify and reduce barriers to mentorship participation in existing programs to ensure students, interns and professionals are supported and see a path forward, improve leave return programs for EITs and P.Engs; offer / promote leave supports (i.e., Managing Transitions and Connect, Learn and Grow) to retain professional connections and value. Foster workplaces cultures that normalizes paternity leave.

Progress to date: Pivot to virtual mentorship program will reduce geographical barriers to participation, leave resources linked on Dismantling Bias for Employers webpage.

9-Engage culprits to be accountable for change where they are culpable.

Tactic examples: Manitoba 2030 Coalition producing inclusive change in employment practices and conditions; the Association to develop reskilling/reentry paths for women who were previously licensed.

Progress to date: Creation of Department of Equity and Representation within the Association, Manitoba 2030 Coalition lead and administered by industry, Education sub-committee led and administered by K-12 and post-secondary representatives.

10-Leverage the administrative and event strengths of the Association to facilitate plan implementation.
Tactic example: Track and analyze data, offer program management supports to volunteer committees like ECL Steering Committee, CIPWIE, CCWESTT etc.

Progress to date: integration of CIPWIE into Department of Equity and Representation, Association administrative support and hosting for ECL Steering Committee and sub-committee meetings, development of content (text, images, etc) to be used by volunteers and staff, development of 2 culprit-lead working groups, use of internal web development talent to deliver new website pages, development of metric-tracking process with Association Systems Analyst.

2019-2020 Plan

Objectives:
Learn/Investigate - through an intersectional lens, define and understand barriers girls and women face in Manitoba in school, in university and in the workplace through their eyes; gather data and insights to close knowledge gaps in the K-12 section of the pipeline.

Build awareness – increase evidence-based approaches for promotion of engineering to girls in grades 9-12, specifically.

Identify and remove barriers – identify barriers and increase support for licensure for existing engineering grads who are women.

Leave a legacy - increase collaborative engagement tools/teams to build and implement strategies; build awareness of implicit bias in classrooms and boardrooms across Manitoba; increase industry awareness of best practices resources

Barriers & Risks:
The first two years of this strategy include activities that will become the foundation for significant long-term change in the representation of women in engineering. Delays in implementation during this time period - specifically in activities meant to increase participation and interest of girls in STEM - will put the objective (30% of newly licensed engineers by 2030) at risk by not building the base of qualified applicants to the Faculty of Engineering to a level that can drive a 30% licensure rate by 2030. Simply put, an additional ~50 women currently in high school or a post-secondary program need to consider engineering as a career option, take the physics, chemistry, math and English pre-requisites, apply to and be admitted to the Faculty of Engineering at the University of Manitoba, graduate and advance through the EIT program to licensure to reach the objective. This represents a 47% increase over 2018 (most recent available data) application levels within 3 years. Therefore, the primary risk inherent in the 1 to 2-year plan is delay.

Based on this risk, the primary barrier in the 2019-2020 plan was a lack of secured funding for development activities. Non-core funding required to bolster school-age interventions and integrate bias interrupters in the initial stages of the plan is key to growing the base of interested and equipped applicants who are women to the Faculty of Engineering. An Association member due increase has secured funding beyond the initial two years of special project funding for two staff positions and the funding of strategies. Industry and government support at early stages is required to overcome this barrier.

February 2020 update:
Given the large amount of work assigned to the 2019-2020 plan, in early 2019 the Association asked the ECL Steering Committee to define priorities to direct the work. These priorities were outlined as:

1. Complete metric baseline, set targets; build out intersectional understanding
2. Develop and implement a communications plan
3. Engage additional stakeholders from underrepresented populations
4. Develop/launch a bias interrupter campaign
5. Develop 30 by 30 strategy management processes
6. Champion gender-parity best practices
7. Leverage CIPWIE programming
8. Develop a funding strategy
9. Engage with 30 by 30 Canada planning

See Appendix A for draft workplan

2021-2023 Plan

Objectives:
Learn/Investigate - increase understanding of university, and industry and licensure-based pipeline leaks.

Build Awareness - increase integration of bias interrupters throughout K-12 education; increase targeted promotion of engineering and geoscience to underrepresented groups.

Remove Barriers - build industry expertise in human resource policy and workplace culture best practices to hire, retain and promote women in the professions.

Leave a legacy - increase long-term university funding supports for underrepresented demographics.

See Appendix B for draft workplan

2024-2030 Plan

Objectives:
Learn/Investigate - understand and communicate changes in key performance indicators to direct focus to current barriers for achieving gender parity along the pipeline.

Build Awareness - increase engineering role model assets.

Remove Barriers - continue to increase bias interrupters in education; increase university and industry social/workplace supports for women in engineering and geoscience.

Leave a legacy - increase legislated family supports in the workplace; codify gender parity requirements for engineering and geoscience service providers to government buyers.

See Appendix C for draft workplan.

Ongoing Strategy Review and Plan Updates

The challenges that the continued success of this strategy will face will be because its long-view. Continuity of strategy champions will be challenged - Association staffing is likely to change, industry leaders currently engaged in driving the strategy forward will retire or change positions, government will shift. Momentum may wane as the movement becomes more commonplace; champions will need to guard against complacency.

These risks demand a process that retains and rejuvenates the leadership guiding the plan and the plan itself - a formalized process that allows for continued collaboration, new ideas and strategic refocus based on results.

The following elements are recommended to help maintain the plan going forward:

- Online submission tool open for all engineering and geoscience participants to provide ideas – to be developed following the launch of the Department of Equity and Representation's Dismantling Bias webpages.
- Biannual assessment of new ideas for placement onto the plan by Engineering Changes Lives Steering Committee – completed twice in 2019, to be reviewed once online submission tool is available. ECL Steering Committee met nine times in 2019 (January 29, February 26, March 26, April 30, May 28, June 25, September 24, October 29, November 26) and on January 28, 2020. Manitoba 2030 Coalition meets quarterly and the Education sub-committee, once officially struck, will determine its meeting frequency.
- Active succession planning for champion groups (Engineering Changes Lives Steering Committee, Manitoba 2030 Coalition, etc.) – ECL Steering Committee meetings are chaired by the Association and members are refreshed based on availability and when gaps are identified; Manitoba 2030 Coalition has defined positions and terms within Terms of Reference.
- Annual results reporting, target alignment and plan adjustment – included in this updated document.

5.0 Resourcing 30 by 30

To date, 30 by 30 planning in Manitoba has been largely funded through the Association. In 2017 $795,000 in special project funding was allocated to the Department of Government Relations over 2 years to complete an environmental scan, develop an initial marketing campaign and plan, develop the strategic plan and hire dedicated staff to implement and manage the plan going forward.

As of December 2018 - one year early - all elements of the proposed work had been delivered, with budget dollars still remaining for continued team staffing to 2020 and initial plan implementation supports up to December 31, 2019.

Ongoing 30 by 30 funding was approved by Council within the annual budget and an increase in fees was implemented to fund the required resourcing.

An overall budget approach includes leveraging funded and related programs to effectively meet targets, funding administration of sub-committee largely through appropriate culprit groups (i.e., industry providing meeting space and personnel time to attend meetings, educational institutions providing program supports through approved time of staff, etc.).

In addition to Association-funded work, the 30 by 30 strategy relies on resourcing from the engineering and geoscience community member, specifically:

- existing funding sources for programs like WISE Kid-Netic, Can U and other student outreach programs
- Government of Manitoba
- Government of Canada
- industry employers
- universities and student groups
- private program donors

6.0 Next Steps

Significant progress has been achieved in 2018-2020. In addition to staffing a dedicated 30 by 30 division, developing and implementing two marketing campaigns, completing an in-depth environmental scan and developing the strategic approach, developing and launching new web pages, the Association has leveraged its strong network of education, academic, industry and government partners to extend efforts to achieve our 30 by 30 objective.

Key next steps for 2020/2021 include:

- continue Girl Power 2020 campaign to reach 2000+ students in Manitoba
- Grow Education sub-committee and determine priorities and tactics
- continue working with Manitoba 2030 Coalition
- develop and deliver presentations and PD for practitioners

ENGINEERS GEOSCIENTISTS MANITOBA

30 by 30 Strategic Plan Appendix A: Available Binary Gender Data

- Updated September 2020 -

	Primary, Secondary School														
	Students in Manitoba Schools (source: Province of Manitoba) https://www.edu.gov.mb.ca/annualreports/docs/report.pdf p. 137			Grade 11 Students in Manitoba Schools (source: Province of Manitoba) https://www.edu.gov.mb.ca/annualreports/docs/report.pdf p.137			Grade 11 Physics MB (source: Province of Manitoba)			Grade 12 Students in Manitoba Schools (source: Province of Manitoba) https://www.edu.gov.mb.ca/annualreports/docs/report.pdf p.137			Grade 12 Physics MB (source: Province of Manitoba)		
Year	est. # girls	total #	% (assuming 50)	est. # girls	total #	% (assuming 50)	# girls	total #	%	est. # girls	total #	% (assuming 50)	# girls	total #	%
2000	101,209	202,418	50.0%	7,296	14,592	50.0%	N/A	N/A	N/A	12,874	25,747	50.0%	N/A	N/A	N/A
2001	95,551	191,102	50.0%	7,108	14,216	50.0%	N/A	N/A	N/A	8,597	17,193	50.0%	N/A	N/A	N/A
2002	94,609	189,217	50.0%	7,193	14,385	50.0%	N/A	N/A	N/A	8,420	16,840	50.0%	N/A	N/A	N/A
2003	94,249	188,498	50.0%	7,054	14,108	50.0%	N/A	N/A	N/A	8,498	16,995	50.0%	N/A	N/A	N/A
2004	93,334	186,668	50.0%	7,119	14,238	50.0%	N/A	N/A	N/A	8,140	16,279	50.0%	N/A	N/A	N/A
2005	92,249	184,498	50.0%	7,300	14,599	50.0%	N/A	N/A	N/A	7,840	15,680	50.0%	N/A	N/A	N/A
2006	91,093	182,185	50.0%	7,336	14,672	50.0%	N/A	N/A	N/A	7,876	15,751	50.0%	N/A	N/A	N/A
2007	90,723	181,446	50.0%	7,473	14,946	50.0%	N/A	N/A	N/A	7,964	15,927	50.0%	N/A	N/A	N/A
2008	90,049	180,098	50.0%	7,385	14,770	50.0%	N/A	N/A	N/A	7,943	15,886	50.0%	N/A	N/A	N/A
2009	89,901	179,802	50.0%	7,484	14,968	50.0%	N/A	N/A	N/A	7,927	15,854	50.0%	N/A	N/A	N/A
2010	89,988	179,975	50.0%	7,628	15,256	50.0%	N/A	N/A	N/A	8,224	16,447	50.0%	N/A	N/A	N/A
2011	89,013	178,025	50.0%	7,545	15,090	50.0%	N/A	N/A	N/A	8,404	16,807	50.0%	N/A	N/A	N/A
2012	89,177	178,353	50.0%	7,430	14,859	50.0%	N/A	N/A	N/A	8,606	17,212	50.0%	N/A	N/A	N/A
2013	88,940	177,880	50.0%	7,051	14,101	50.0%	N/A	N/A	N/A	8,630	17,260	50.0%	N/A	N/A	N/A
2014	89,189	178,377	50.0%	7,048	14,096	50.0%	N/A	N/A	N/A	8,286	16,572	50.0%	N/A	N/A	N/A
2015	89,791	179,582	50.0%	7,056	14,111	50.0%	N/A	N/A	N/A	8,353	16,705	50.0%	N/A	N/A	N/A
2016	90,881	181,762	50.0%	7,190	14,380	50.0%	N/A	N/A	N/A	8,391	16,781	50.0%	N/A	N/A	N/A
2017	91,665	183,330	50.0%	7,151	14,302	50.0%	2047	4573	44.8%	8,320	16,640	50.0%	1387	3277	42.3%
2018	92,501	185,001	50.0%	7,053	14,106	50.0%	N/A	N/A	N/A	8,442	16,884	50.0%	N/A	N/A	N/A
2019	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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Percentage over 20 years			50.0%			50.0%			N/A			50.0%			N/A
Percentage over last 5 years			50.0%			50.0%			N/A			50.0%			N/A

	University																	
	Preliminary year Faculty of Engineering Applicants (source: Faculty of Engineering - conversation with Dean)			**Preliminary Year Admissions to Faculty of Engineering** (source: Uof M website: http://umanitoba.ca/admin/oia/students/)			**Undergrads at U of M Faculty of Engineering** (source: U of M website: http://umanitoba.ca/admin/oia/students/3503.html, includes Ft and PT students)			**BSc. Graduates Faculty of Engineering** (source: Uof M website: http://umanitoba.ca/admin/oia/students/1433.html#Degrees, Diplomas, and Certificates Conferred - by			**Master's students at Uof M Faculty of Engineering** (source: Faculty of Engineering)			**Doctoral students at Uof M Faculty of Engineering** (source: Faculty of Engineering)		
Year	**# women**	**total #**	**%**	**# women**	**total #**	**%**	**# women**	**total #**	**%**	**# women**	**total #**	**%**	**# women**	**total #**	**%**	**# women**	**total #**	**%**
2000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	43	205	21.0%	39	206	18.9%	11	92	12.0%
2001	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	47	221	21.3%	44	225	19.6%	11	77	14.3%
2002	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	46	216	21.3%	62	243	25.5%	12	99	12.1%
2003	N/A	N/A	N/A	N/A	N/A	N/A	172	1103	15.6%	34	156	21.8%	69	265	26.0%	15	118	12.7%
2004	N/A	N/A	N/A	N/A	N/A	N/A	170	1066	15.9%	37	185	20.0%	61	235	26.0%	16	131	12.2%
2005	N/A	N/A	N/A	N/A	N/A	N/A	164	1105	14.8%	26	154	16.9%	46	198	23.2%	16	148	10.8%
2006	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	29	181	16.0%	41	170	24.1%	19	148	12.8%
2007	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	22	155	14.2%	27	156	17.3%	22	155	14.2%
2008	N/A	N/A	N/A	N/A	N/A	N/A	147	1117	13.2%	41	218	18.8%	28	150	18.7%	21	155	13.5%
2009	N/A	N/A	N/A	N/A	N/A	N/A	190	1227	15.5%	22	173	12.7%	35	184	19.0%	21	168	12.5%
2010	N/A	N/A	N/A	N/A	N/A	N/A	213	1259	16.9%	34	240	14.2%	42	180	23.3%	35	154	22.7%
2011	N/A	N/A	N/A	N/A	N/A	N/A	230	1309	17.6%	30	211	14.2%	40	187	21.4%	34	205	16.6%
2012	N/A	N/A	N/A	N/A	N/A	N/A	265	1497	17.7%	26	189	13.8%	49	214	22.9%	39	213	18.3%
2013	N/A	N/A	N/A	N/A	N/A	N/A	301	1644	18.3%	38	211	18.0%	57	228	25.0%	42	214	19.6%
2014	N/A	N/A	N/A	N/A	N/A	N/A	305	1653	18.5%	56	246	22.8%	67	248	27.0%	44	214	20.6%
2015	N/A	N/A	N/A	N/A	N/A	N/A	317	1722	18.4%	47	235	20.0%	61	245	24.9%	50	240	20.8%
2016	N/A	N/A	N/A	N/A	N/A	N/A	351	1785	19.7%	50	272	18.4%	58	262	22.1%	49	231	21.2%
2017	111	473	23.5%	56	248	22.6%	366	1777	20.6%	66	324	20.4%	75	278	27.0%	48	227	21.1%
2018	106	505	21.0%	63	287	22.0%	351	1639	21.4%	53	306	17.3%	85	278	30.6%	53	217	24.4%
2019	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	267	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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Percentage over 20 years			N/A			22.2%			17.8%	747	4365	18.2%			23.7%			17.4%
Percentage over last 5 years			N/A						20.0%			19.0%						

Notes:
Counting Intern applications approved between January 1 and December 31 each year.
Dual Members (engineer AND geoscientist) are counted as Geoscientists
The Licensed tables are only counting 'practicing' type status, including Practicing, Honorary Life, Suspended, and On Leave; not Retired or Life Members
The Intern Expertise breakdown is for all applications received from Jan 1, 2011 to Dec 31, 2017, for both engineers and geoscientists

	Internship																							
	Assessment Candidates Engineering (source: EGM)			Attrition of Assessment Candidates Engineering (source: EGM)			New EIT Applicants in Manitoba (source: EGM)			New EIT Applicants from CEAB (source: EGM)			New EIT Applicants from Assessment (source: EGM)			New Indigenous EIT Applicants in Manitoba (source: EGM)			Attrition of EITs in Manitoba (source: EGM)			Total EITs in Manitoba (source: EGM)		
Year	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%
2000	9	33	27.3%	1	13	7.7%	17	148	11.5%	15	133	11.3%	2	15	13.3%	0	1	0.0%	7	48	14.6%	97	560	17.3%
2001	2	50	4.0%	1	19	5.3%	37	161	23.0%	34	144	23.6%	3	17	17.6%	0	1	0.0%	9	47	19.1%	112	591	19.0%
2002	6	60	10.0%	2	25	8.0%	31	156	19.9%	29	129	22.5%	2	27	7.4%	0	3	0.0%	8	28	28.6%	120	637	18.8%
2003	8	69	11.6%	2	18	11.1%	28	134	20.9%	26	112	23.2%	2	22	9.1%	0	0	N/A	7	36	19.4%	121	636	19.0%
2004	15	107	14.0%	2	43	4.7%	37	188	19.7%	29	158	18.4%	8	30	26.7%	0	2	0.0%	9	35	25.7%	133	655	20.3%
2005	13	100	13.0%	6	35	17.1%	30	194	15.5%	25	150	16.7%	5	44	11.4%	0	3	0.0%	7	28	25.0%	128	683	18.7%
2006	14	85	16.5%	4	29	13.8%	31	180	17.2%	26	137	19.0%	5	43	11.6%	0	1	0.0%	8	35	22.9%	132	732	18.0%
2007	19	95	20.0%	2	8	25.0%	30	187	16.0%	21	138	15.2%	9	49	18.4%	1	3	33.3%	5	18	27.8%	130	763	17.0%
2008	24	106	22.6%	2	10	20.0%	40	257	15.6%	29	185	15.7%	11	72	15.3%	0	0	N/A	8	35	22.9%	147	875	16.8%
2009	26	156	16.7%	3	23	13.0%	35	220	15.9%	24	150	16.0%	11	70	15.7%	0	1	0.0%	6	27	22.2%	147	905	16.2%
2010	27	141	19.1%	2	12	16.7%	50	288	17.4%	26	196	13.3%	24	92	26.1%	1	2	50.0%	10	39	25.6%	171	1018	16.8%
2011	24	161	14.9%	3	9	33.3%	46	285	16.1%	34	199	17.1%	12	86	14.0%	0	0	N/A	7	41	17.1%	177	1070	16.5%
2012	29	131	22.1%	1	4	25.0%	35	299	11.7%	19	197	9.6%	16	102	15.7%	1	7	14.3%	9	39	23.1%	176	1159	15.2%
2013	40	205	19.5%	3	10	30.0%	52	283	18.4%	26	191	13.6%	26	92	28.3%	0	1	0.0%	8	52	15.4%	196	1225	16.0%
2014	34	172	19.8%	1	7	14.3%	53	304	17.4%	34	188	18.1%	19	116	16.4%	2	2	100.0%	6	53	11.3%	202	1310	15.4%
2015	38	223	17.0%	0	2	0.0%	51	262	19.5%	35	164	21.3%	16	98	16.3%	1	2	50.0%	7	57	12.3%	229	1352	16.9%
2016	46	255	18.0%	0	3	0.0%	63	326	19.3%	39	202	19.3%	24	124	19.4%	1	2	50.0%	13	61	21.3%	257	1454	17.7%
2017	40	197	20.3%	0	0	N/A	65	338	19.2%	35	204	17.2%	30	134	22.4%	1	3	33.3%	9	60	15.0%	277	1572	17.6%
2018	43	222	19.4%	1	1	100.0%	65	322	20.2%	40	206	19.4%	25	116	21.6%	1	5	20.0%	9	78	11.5%	289	1617	17.9%
2019	50	261	19.2%	0	1	0.0%	81	374	21.7%	51	221	23.1%	30	153	19.6%	1	2	50.0%	22	109	20.2%	331	1741	19.0%
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Percentage over 20 years			17.9%	36	272	13.2%	877	4906	17.9%	597	3404	17.5%	280	1502	18.6%	10	41	24.4%	174	926	18.8%			17.4%
Percentage over last 5 years			18.7%			14.3%			20.0%			20.1%			20.0%			35.7%			16.4%			17.9%

Notes:
Counting Intern applications approved between January 1 and December 31 each year.
Dual Members (engineer AND geoscientist) are counted as Geoscientists
The Licensed tables are only counting 'practicing' type status, including Practicing, Honorary Life, Suspended, and On Leave; not Retired or Life Members
The Intern Expertise breakdown is for all applications received from Jan 1, 2011 to Dec 31, 2017, for both engineers and geoscientists

	Internship																	
	Assessment Candidates Geoscience (source: EGM)			Attrition of Assessment Candidates Geoscience (source: EGM)			New GIT Applicants in Manitoba (source: EGM)			New Indigenous GIT Applicants in Manitoba (source: EGM)			Attrition of GITs in Manitoba (source: EGM)			Total GITs in Manitoba (source: EGM)		
Year	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%
2000	1	2	50.0%	0	0	N/A	1	6	16.7%	0	0	N/A	0	1	0.0%	2	7	28.6%
2001	1	13	7.7%	0	1	0	2	13	15.4%	0	0	N/A	0	1	0.0%	3	17	17.6%
2002	1	4	25.0%	0	1	0	2	10	20.0%	0	0	N/A	1	3	33.3%	5	26	19.2%
2003	3	4	75.0%	1	1	1	2	4	50.0%	0	0	N/A	2	3	66.7%	5	22	22.7%
2004	5	9	55.6%	0	2	0	5	9	55.6%	0	0	N/A	2	6	33.3%	8	25	32.0%
2005	5	9	55.6%	0	2	0	4	8	50.0%	0	0	N/A	0	2	0.0%	9	25	36.0%
2006	3	6	50.0%	0	1	0	1	3	33.3%	0	0	N/A	0	1	0.0%	9	23	39.1%
2007	5	14	35.7%	0	1	0	1	5	20.0%	0	0	N/A	0	0	N/A	8	20	40.0%
2008	9	19	47.4%	0	0	N/A	10	15	66.7%	0	0	N/A	0	1	0.0%	13	27	48.1%
2009	6	13	46.2%	0	0	N/A	8	13	61.5%	0	0	N/A	2	7	28.6%	20	36	55.6%
2010	1	8	12.5%	0	0	N/A	1	4	25.0%	0	0	N/A	1	2	50.0%	17	29	58.6%
2011	10	19	52.6%	0	0	N/A	7	14	50.0%	0	0	N/A	0	0	N/A	18	35	51.4%
2012	7	21	33.3%	0	1	0	5	14	35.7%	0	0	N/A	1	2	50.0%	22	45	48.9%
2013	6	20	30.0%	0	1	0	2	15	13.3%	1	2	50.0%	2	2	100.0%	20	51	39.2%
2014	7	13	53.8%	0	0	N/A	6	17	35.3%	0	0	N/A	0	3	0.0%	21	61	34.4%
2015	4	21	19.0%	0	0	N/A	5	15	33.3%	0	0	N/A	1	7	14.3%	21	64	32.8%
2016	7	21	33.3%	0	0	N/A	5	13	38.5%	0	0	N/A	3	6	50.0%	24	67	35.8%
2017	5	15	33.3%	0	0	N/A	3	14	21.4%	0	1	0.0%	0	3	0.0%	24	74	32.4%
2018	3	12	25.0%	0	0	N/A	1	7	14.3%	0	0	N/A	1	5	20.0%	23	70	32.9%
2019	5	17	29.4%	0	0	N/A	4	15	26.7%	0	0	N/A	1	7	14.3%	21	69	30.4%
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2030																		
Percentage over 20 years			36.2%	1	11	9.1%	75	214	35.0%	1	3	33.3%	17	62	27.4%			36.9%
Percentage over last 5 years			27.9%						28.1%			0.0%			21.4%			32.8%

	Professional Designation																	
	Newly Licenced P.Eng in Manitoba (source: EGM, includes CEAB and Assessment, does not include mobility)			Newly Licenced P.Eng in Manitoba from CEAB (source: EGM, includes CEAB, does not include Assessment and mobility)			Newly Licenced P.Eng in Manitoba from Assessment (source: EGM, includes Assessment, does not include CEAB and mobility)			Newly Licenced Indigenous P.Eng in Manitoba (source: EGM)			P.Eng. Attrition (source: EGM, includes written off or withdrawn, does not include deceased)			Total Practicing P.Eng. in Manitoba (source: EGM, includes all practicing P.Eng's - CEAB, Assessment, Mobility- does not include retired or life members)		
Year	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%
2000	9	58	15.5%	9	50	18.0%	0	8	0.0%	0	0	N/A	12	202	5.9%	135	3395	4.0%
2001	10	74	13.5%	8	60	13.3%	2	14	14.3%	0	0	N/A	7	164	4.3%	137	3181	4.3%
2002	17	75	22.7%	16	62	25.8%	1	13	7.7%	0	1	0.0%	3	118	2.5%	149	3222	4.6%
2003	20	102	19.6%	16	77	20.8%	4	25	16.0%	0	3	0.0%	7	136	5.1%	170	3309	5.1%
2004	16	100	16.0%	16	89	18.0%	0	11	0.0%	0	0	N/A	5	129	3.9%	180	3348	5.4%
2005	26	107	24.3%	21	91	23.1%	5	16	31.3%	0	1	0.0%	9	140	6.4%	204	3466	5.9%
2006	23	123	18.7%	19	91	20.9%	4	32	12.5%	1	2	50.0%	7	120	5.8%	228	3600	6.3%
2007	18	116	15.5%	12	86	14.0%	6	30	20.0%	0	3	0.0%	7	111	6.3%	253	3786	6.7%
2008	20	131	15.3%	17	94	18.1%	3	37	8.1%	0	1	0.0%	14	208	6.7%	275	3966	6.9%
2009	30	169	17.8%	25	116	21.6%	5	53	9.4%	0	2	0.0%	13	184	7.1%	299	4192	7.1%
2010	17	134	12.7%	12	97	12.4%	5	37	13.5%	1	2	50.0%	8	209	3.8%	319	4440	7.2%
2011	31	201	15.4%	26	140	18.6%	5	61	8.2%	0	1	0.0%	23	272	8.5%	355	4658	7.6%
2012	28	165	17.0%	20	113	17.7%	8	52	15.4%	0	1	0.0%	13	244	5.3%	378	4775	7.9%
2013	22	181	12.2%	13	121	10.7%	9	60	15.0%	0	1	0.0%	14	255	5.5%	410	4985	8.2%
2014	40	170	23.5%	26	130	20.0%	14	40	35.0%	1	2	50.0%	30	349	8.6%	463	5180	8.9%
2015	28	200	14.0%	14	134	10.4%	14	66	21.2%	2	5	40.0%	22	358	6.1%	508	5367	9.5%
2016	27	183	14.8%	19	127	15.0%	8	56	14.3%	0	3	0.0%	29	380	7.6%	550	5548	9.9%
2017	34	163	20.9%	19	106	17.9%	15	57	26.3%	1	2	50.0%	24	350	6.9%	573	5618	10.2%
2018	36	212	17.0%	24	132	18.2%	12	80	15.0%	1	4	25.0%	13	440	3.0%	617	5870	10.5%
2019	28	161	17.4%	20	103	19.4%	8	58	13.8%	0	2	0.0%	45	452	10.0%	644	5832	11.0%
2020																		
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2022																		
2023																		
2024																		
2025																		
2026																		
2027																		
2028																		
2029																		
2030																		
Percentage over 20 years	480	2825	17.0%	352	2019	17.4%	128	806	15.9%	7	36	19.4%	305	4821	6.3%	N/A	N/A	N/A
Percentage over last 5 years			16.6%			15.9%			18.0%			25.0%			6.7%	N/A	N/A	N/A

Intern Expertise Distribution
2011-2017

	Total	# Women	% Women
MECHANICAL	497	41	8.2%
Not Specified	453	78	17.2%
CIVIL	442	87	19.7%
ELECTRICAL/ELECTRONIC	370	60	16.2%
GEOLOGY	81	29	35.8%
COMPUTER	51	8	15.7%
INDUSTRIAL/MANUFACTURING	45	9	20.0%
CHEMICAL	42	21	50.0%
STRUCTURAL	37	5	13.5%
OTHER ENGINEERING SECTORS	32	9	28.1%
ENVIRONMENTAL	31	20	64.5%
METALLURGICAL/MATERIALS	28	8	28.6%
AGRICULTURAL	27	6	22.2%
BIOMEDICAL	23	13	56.5%
AERONAUTICS/AEROSPACE	20	1	5.0%
GEOLOGICAL	18	4	22.2%
MINING	12	1	8.3%
GEOPHYSICS	5	1	20.0%
ENGINEERING PHYSICS	2	0	0.0%
GEOTECHNICS	1	0	0.0%
FIRE PROTECTION	1	0	0.0%
PETROLEUM	1	0	0.0%

	Professional Designation																	
	Newly Licenced P.Geo in Manitoba (source: EGM, includes CEAB and Assessment, does not include mobility)			Newly Licenced P.Geo in Manitoba with degree from CEAB (source: EGM, includes Canadian trained, does not include Internationally trained and mobility)			Newly Licenced P.Geo in (source: EGM, includes Internationally trained, does not include Canadian			Newly Licenced Indigenou (source: EGM)			P.Geo. Attrition in (source: EGM, includes all practicing Geoscientists, does not include retired or			Total Practicing P.Geo. in (source: EGM, includes all practicing Geoscientists, does not include retired or		
Year	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%
2000	14	104	13.5%	14	104	13.5%	0	0	N/A	0	0	N/A	1	3	33.3%	23	198	11.6%
2001	3	28	10.7%	3	28	10.7%	0	0	N/A	0	0	N/A	0	8	0.0%	25	224	11.2%
2002	0	0	N/A	0	0	N/A	0	0	N/A	0	0	N/A	0	7	0.0%	25	216	11.6%
2003	0	4	0.0%	0	1	0.0%	0	3	0.0%	0	0	N/A	0	3	0.0%	25	219	11.4%
2004	1	3	33.3%	0	2	0.0%	1	1	100.0%	0	0	N/A	1	3	33.3%	26	219	11.9%
2005	1	1	100.0%	0	0	N/A	1	1	100.0%	0	0	N/A	3	8	37.5%	23	221	10.4%
2006	0	3	0.0%	0	2	0.0%	0	1	0.0%	0	0	N/A	1	15	6.7%	23	225	10.2%
2007	3	6	50.0%	1	2	50.0%	2	4	50.0%	0	0	N/A	0	6	0.0%	27	227	11.9%
2008	3	6	50.0%	0	0	N/A	3	6	50.0%	0	0	N/A	0	5	0.0%	29	236	12.3%
2009	2	4	50.0%	0	0	N/A	2	4	50.0%	0	0	N/A	1	11	9.1%	33	252	13.1%
2010	3	5	60.0%	1	1	100.0%	2	4	50.0%	0	0	N/A	4	13	30.8%	37	251	14.7%
2011	4	7	57.1%	0	0	N/A	4	7	57.1%	0	0	N/A	0	10	0.0%	39	254	15.4%
2012	1	4	25.0%	0	0	N/A	1	4	25.0%	0	0	N/A	6	21	28.6%	40	247	16.2%
2013	3	7	42.9%	0	0	N/A	3	7	42.9%	0	1	0.0%	4	20	20.0%	35	231	15.2%
2014	4	5	80.0%	0	0	N/A	4	5	80.0%	0	0	N/A	4	15	26.7%	37	223	16.6%
2015	5	10	50.0%	0	0	N/A	5	10	50.0%	1	2	50.0%	3	25	12.0%	44	233	18.9%
2016	1	3	33.3%	0	0	N/A	1	3	33.3%	0	0	N/A	2	17	11.8%	46	224	20.5%
2017	3	4	75.0%	0	0	N/A	3	4	75.0%	0	0	N/A	5	12	41.7%	49	216	22.7%
2018	1	8	12.5%	0	0	N/A	1	8	12.5%	0	0	N/A	3	20	15.0%	50	232	21.6%
2019	3	10	30.0%	0	1	0.0%	3	9	33.3%	0	0	N/A	4	23	17.4%	53	236	22.5%
2020																		
2021																		
2022																		
2023																		
2024																		
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2026																		
2027																		
2028																		
2029																		
2030																		
Percentage over 20 years	55	222	24.8%	19	141	13.5%	36	81	44.4%	1	3	33.3%	42	245	17.1%	N/A	N/A	N/A
Percentage over last 5 years			37.1%			0.0%			38.2%			50.0%			17.5%	N/A	N/A	N/A

	U of M Science Students																							
	Undeclared major (3 and 4 year)			Biological Sciences			Biochemistry			Biotechnology			Chemistry			Genetics			Microbiology			Physics and Astronomy		
	OIA			OIA			OIA			OIA			OIA			OIA			OIA			OIA		
Year	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%	# women	total #	%
2000																								
2001	733	1,537	47.7%	7	11	63.6%	17	32	53.1%	2	5	40.0%	9	18	50.0%	17	28	60.7%	70	120	58.3%	2	20	10.0%
2002	840	1,716	49.0%	6	12	50.0%	20	43	46.5%	1	2	50.0%	8	16	50.0%	21	34	61.8%	76	120	63.3%	4	22	18.2%
2003	931	1,865	49.9%	13	19	68.4%	16	35	45.7%	3	3	100.0%	8	20	40.0%	24	36	66.7%	89	145	61.4%	4	15	26.7%
2004	966	2,055	47.0%	18	22	81.8%	21	47	44.7%	1	4	25.0%	7	24	29.2%	21	31	67.7%	97	157	61.8%	5	17	29.4%
2005	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2006	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2007	988	1,877	52.6%	25	33	75.8%	24	50	48.0%	2	3	66.7%	11	30	36.7%	28	41	68.3%	97	168	57.7%	3	18	16.7%
2008	1,004	1,934	51.9%	22	39	56.4%	26	62	41.9%	2	3	66.7%	16	42	38.1%	35	48	72.9%	116	175	66.3%	3	20	15.0%
2009	1,031	2,015	51.2%	69	115	60.0%	34	78	43.6%	3	8	37.5%	18	47	38.3%	29	42	69.0%	122	203	60.1%	2	23	8.7%
2010	1,050	2,028	51.8%	111	190	58.4%	32	73	43.8%	5	14	35.7%	19	55	34.5%	36	56	64.3%	125	213	58.7%	3	27	11.1%
2011	1,180	2,278	51.8%	132	218	60.6%	29	69	42.0%	9	22	40.9%	12	47	25.5%	55	94	58.5%	98	182	53.8%	3	29	10.3%
2012	1,376	2,761	49.8%	125	198	63.1%	26	59	44.1%	9	17	52.9%	16	54	29.6%	58	97	59.8%	89	152	58.6%	5	30	16.7%
2013	1,479	2,998	49.3%	132	196	67.3%	20	46	43.5%	15	29	51.7%	16	54	29.6%	54	93	58.1%	73	138	52.9%	5	25	20.0%
2014	1,691	3,286	51.5%	107	177	60.5%	15	42	35.7%	9	24	37.5%	22	56	39.3%	66	100	66.0%	69	130	53.1%	4	28	14.3%
2015	1,816	3,397	53.5%	98	174	56.3%	17	40	42.5%	14	23	60.9%	21	57	36.8%	73	117	62.4%	68	119	57.1%	5	36	13.9%
2016	1,652	3,222	51.3%	166	263	63.1%	37	74	50.0%	18	26	69.2%	20	53	37.7%	91	137	66.4%	81	135	60.0%	6	38	15.8%
2017	1,611	3,186	50.6%	175	275	63.6%	39	87	44.8%	12	17	70.6%	20	47	42.6%	97	158	61.4%	94	140	67.1%	13	59	22.0%
2018	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2019																								
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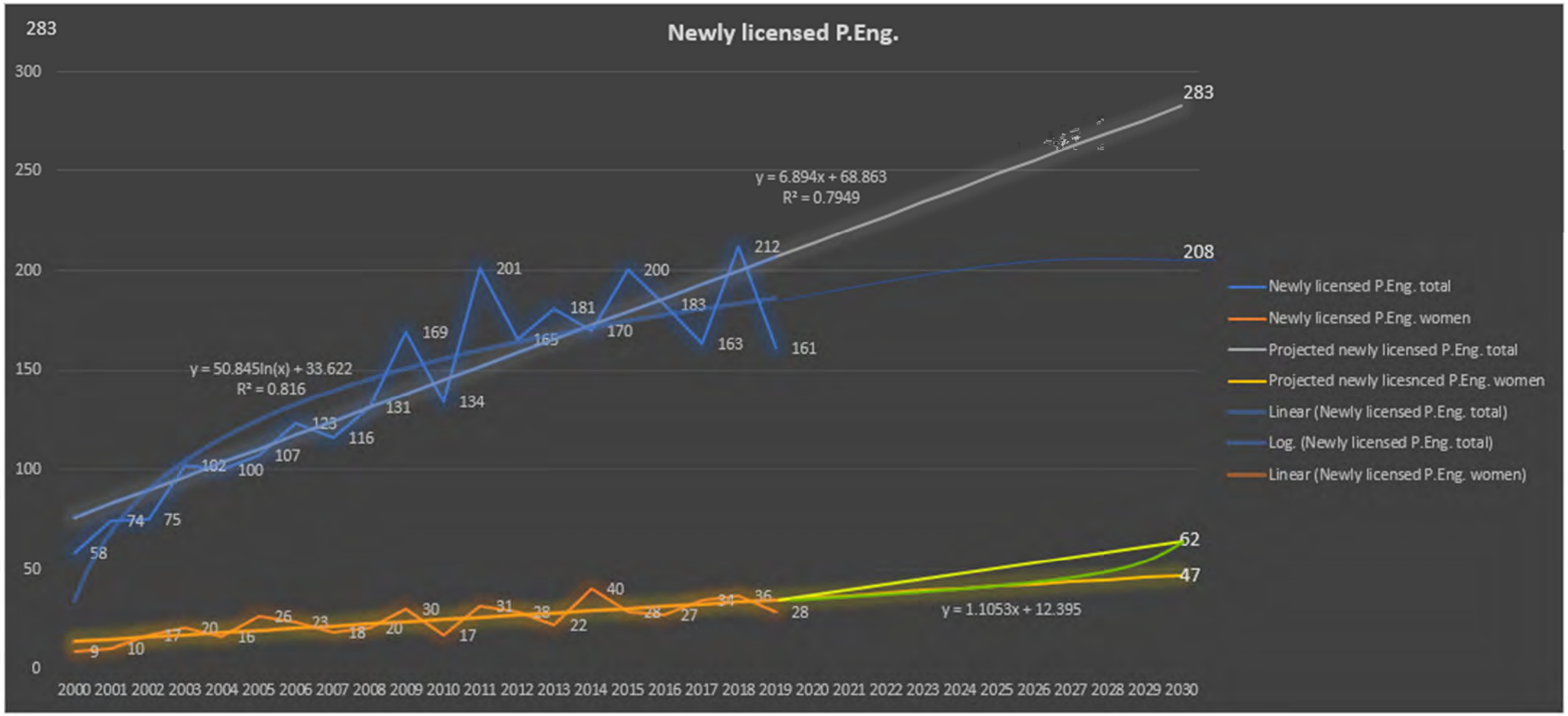
2028																								
2029																								
2030																								
			50.7%			62.1%			44.6%			52.5%			36.0%			63.4%			59.4%			16.5%

ENGINEERS GEOSCIENTISTS MANITOBA

30 by 30 Strategic Plan Appendix B: 2030 Projections of Newly Licensed Engineers

- Updated September 2020 -

Figure 4: 2030 Projections of Newly Licensed Engineers



Logarithmic growth for total P.Eng.

For x=31 years (2000 to 2030, inclusive), y=208 total P.Eng. in 2030

30% of 208 is 62, requiring a rate of increase of 4.51, not 1.11 for x=11 years remaining

Therefore need a linear increase of 4 to 5 more women per year to reach 30 by 30 or more likely, quadratic growth curve (green line)

ENGINEERS GEOSCIENTISTS MANITOBA

30 by 30 Strategic Plan Appendix C: Workplan Strategies

- Updated September 2020 -

Strategy: 1-Create influencers within each of the 8 culprit groups.
Strategy: 2-Engage directly with girls/women on the path to engineering and geoscience careers in order to identify and remove barriers true to their experience.
Strategy: 3-Consistently monitor path for bottlenecks.
Strategy: 4-Leverage existing groups/programs/associations to retain the momentum their programming has achieved, both inside and outside of engineering.
Strategy: 5-Rebrand engineering from the outside in and the inside out.
Strategy: 6-Focus on populations that represent high-impact opportunities.
Strategy: 7-Leverage culprits to resource 30 by 30 initiatives.
Strategy: 8-Develop leadership/mentorship capacity quickly within the existing base of engineering participants (EIT, P.Eng, Leaders).
Strategy: 9-Engage culprits to be accountable for change where they are culpable.
Strategy: 10-Leverage the administrative and event strengths of the Association to facilitate plan implementation.

June 2019 to January 2020, the Association will work within existing resources/funding to drive plan priorities.

June 2019 to January 2020 Work Plan Priorities
Develop 30 by 30 strategy management processes
Complete metric baseline, set targets
Develop & implement communications plan
Build Out Intersectional Understanding
Develop Funding Strategy
Engage additional stakeholders
Leverage CIPWIE programming
Engage with 30 by 30 Canada Planning
Develop/launch Bias Interrupter Campaign
Champion gender parity best practices

Status l Bar Legend:

not started yet
on track
nearly on track, monitor status closely
off track, needs mitigation

S.	T.	Description	Status	Year	Additional Funds Required	Next Steps	Champion	Culprit(s)	KPI	Focus areas
		Review and expand Association salary survey and member survey tracking gender		2019		Gender splits available on previous salary survey questions; data received 20 May 2020	Association	Universities, Employers, Association	% practicing professional engineers who are women	Complete metric baseline, set targets; Build out intersectional understanding
2	2	Obtain and compare the national rates of licensure (EIT, then P.Eng.) for both men and women to the Manitoba rates to determine if there is a difference in the funnels post-graduation.		2020		Data updated; Once Eng CA data available, next step is to compare EngGeoMB & Eng CA data	Association	Universities, Employers, Association	% registered as Interns with the Association who are women; % practicing professional engineers who are women	Complete metric baseline, set targets; Build out intersectional understanding

3	2	Survey professional engineers and geoscientists as to intersectional issues/barriers they have experienced in the workplace that have made them want to leave.		2020		next steps - organized presentation by APEGA, evaluate feasibility of similar survey	Association	Universities, Employers, Association	% practicing professional engineers who are women	Complete metric baseline, set targets; Build out intersectional understanding
2	5	Host town halls with students to investigate the intersectional barriers they experience to pursue STEM		2021	Yes		Association, University	Universities, Employers, Association	% practicing professional engineers who are women	Complete metric baseline, set targets; Build out intersectional understanding
2	6	Integrate geographic data for Faculty of Engineering applicants and students		2021	Yes	Talk to Randy Herrmann re his process and contacts	Association	EY/MY Teachers, High School Teachers/ Guidance counsellors	% students in Grade 11, 12 engineering qualifying classes who are girls	Complete metric baseline, set targets; Build out intersectional understanding
6	2	General member survey results		2019			Association	Universities, Government	% high school graduates who attend university in MB - STEM who are girls/women	Complete metric baseline, set targets; Build out intersectional understanding
		Requested additional statistics on gender differences within Manitoba students enrolled in all sciences, grade 11 & 12 from MB Education and Indigenous Services Canada. (MFNERC does not keep this data. ISC doesn't have data by courses.)		2019		Michelene Reiniger provided additional statistics on August 13, 2019.	Association			Complete metric baseline, set targets; Build out intersectional understanding
9	8	Investigate differences between provincially funded and federally funded schools to understand issues specific to schools on reserves. [Manitoba First Nations Education Resource Centre]		2019		Nicole and Lisa met with Dr. Nora Murdock and Rocky McKay of MFNERC and they will participate in IPIC	Association, Government	Universities, Employers, Association	may result in NEW Key Performance Indicator	Complete metric baseline, set targets; Build out intersectional understanding
9	9	Highlight early wins and culprits who make them happen to create fast follower behaviour in order to secure funding (internal)		2020			Association, Government	Government	% high school graduates who attend university in MB - STEM who are girls/women	Complete metric baseline, set targets; Build out intersectional understanding
1	2	Highlight early wins and culprits who make them happen to create fast follower behaviour in order to attract and retain staff (external)				Coalition E-news update completed January 2020; addition to Coalition webpage?	Association	Universities, Employers	TBD - perception	Develop communications plan
5	2	Increase support on social media support (i.e., INWED)				Social media content posted for Girl Power campaign (x2), INWED, My Story campaign, Scavenger Hunt	Association			Develop communications plan
5	4	Publish articles in Keystone Professional		2020		Next submission on Girl Power Campaign	Association	Media, Culture	TBD - perception	Develop communications plan
10	9	Build out 30 by 30 on Association website		annually		Webpages launched early 2020	Association/ CIPWIE	Universities, Employers	TBD - perception	Develop communications plan

9	1	Create Infographic on value of licensure		2020		Engineers Canada item	Association	Universities, Employers	% registered as Interns with the Association who are women	Develop communications plan
		Recruit additional employers in engineering and geoscience as Coalition members				Pacific Rail rep asked to support and has been added to Coalition, otherwise not actively recruiting as per discussion with Coalition	Coalition			Engage additional stakeholders
		Meet with Southern Chiefs Organization (SCO)		2020		SCO settling from election and staff changeover. Meeting on hold for now	Association	Employers	% registered as Interns with the Association who are women; % practicing professional engineers who are women%; engineering direct entry applicants (U of M) who are girls/women; % geoscience direct entry applicants (U of M) who are girls/women	Engage additional stakeholders
		Reach out to P.Geos and GITs to join ECL				GIT joined the steering committee effective May 2019, P.Geo became councillor	Teachers		% engineering direct entry applicants (U of M) who are girls/women; % geoscience direct entry applicants (U of M) who are girls/women	Engage additional stakeholders
2		Participate in Tech Manitoba/MAVEN consultation		2019 stake-holder engage-ment		on plan - Winnipeg consultation was in 2018 Maria Neufeld and Tamara Kuly attended; Lisa met with MAVEN coordinator, collaborated for K-12 review of STEM and plan to collaborate re de-linking parental leave from EI				Engage additional stakeholders
4	8	Look into Verna Kirkness Science and Engineering Program		2019		Nicole and Lisa had meeting with Patrick Lauzon re sponsoring students; 2020 program canceled for COVID19	Association	All	% of Geoscientists who are women	Engage additional stakeholders
6	9	Engage directly with communities to develop intersectional approaches within the strategy for underrepresented groups (Black, Indigenous, People of Colour, newcomer Canadians, 2SLGBTQ and others)		Combined bucket		Occuring under specific tactics: continue relationship building with U of M student groups, Chapters, stakeholders, IPIC, ACOMI, community orgs	Association	University	% high school graduates who attend university in MB who are girls/women	Engage additional stakeholders

9	3	Science Teacher STAM day		2019		workshop on interrupting gender bias in teaching delivered to 20+ teachers	Association		TBD - perception	Engage additional stakeholders
9	3	Sub-committees on steering committee that represent 8 culprits - beginning with Education sub-committee		2019		Co-chairs established. First chair meeting	Association	Universities, Employers, Association	% high school graduates who attend university in MB - STEM who are girls/women	Engage additional stakeholders
5	5	Introduce bias interrupters		2019		Girl Power campaign launched in Feb 2020	Association	Association	TBD - perception	Engage additional stakeholders
9		Childcare at Association events and meetings - 36% of general member survey respondents indicated that they have chldren under the age of 12 and 29% indicated that they would be able to attend more Association events if childcare was provided		Ongoing	Yes	Offered at May 9/19 MLA Information Session and Ingenium 2019 but no sign-ups; Mentorship program had childcare	Association	All	% high school graduates who attend university in MB - STEM who are girls/women	Develop/launch bias interrupter campaign
9	7	Develop and share a "how to offer childcare at events and meetings" resource for member organizations; post on Association website		2019		Resource on Employer webpage	Association	Association	% practicing professional engineers who are women	Champion gender parity best practices
10	7	PD events for all members on intersectional gender related workplace issues - 41% of general member survey respondents said they would be interested		Ongoing		next steps - PD sessions delivered at Ingenium; looking to develop PD on MMIWG2S report re extractive industries reached out to possible trainers (Manitoba Human Rights Commission, Amina Leadership; staff training held at Association with Diversity Essentials who are also presenting at Ingenium 2020	Association	Industry	% practicing professional engineers who are women	Champion gender parity best practices
		Develop presentation on microaggressions				Completed. Customized for Ingenium, Council. Faculty retreat canceled for COVID19				
		Presentation on importance of diversity in design for public safety				Delivered to Manitoba Hydro				
10		Develop a 30 by 30 approach to career fairs		2021		next steps: re-doing Association outreach materials with 30 by 30 lens for use by companies at career fairs	Association			Champion gender parity best practices
10		Develop online Tactics/Ideas funnel for the 30 by 30 strategy		2021		next steps - develop form with Andrew - reevaluate based on current capacity and number of tactics underway				Champion gender parity best practices

1	6	Annual Association Award Nominations		2019		Completed for Ingenium	Association	All	Multiple	Develop 30 by 30 strategy management processes
2	3	Support Girl Guides engineering badge day		Annual		Event was canceled for 2019 due to lack of response from Girl Guides	Association/CIPWIE	Universities, Employers	TBD - perception	Leverage CIPWIE programming
4	7	CCWESTT conference 2020 Host		2020		Conference canceled for COVID19 - now a speaker series in Nov 2020	Association/ CCWESTT committee	Role Models/ Mentors	% students in Grade 11, 12 engineering qualifying classes who are girls	Leverage CIPWIE programming
4	2	Annual Committee Report		Ongoing		Completed for 2020	Association/CIPWIE, Universities, Employers	Association	% partners/CEOs/Leaders who are women	Leverage CIPWIE programming
5	11	CIPWIE Family Event		Ongoing		Outdoor self-led Scavenger Hunt developed and launched - little participation	Association/ CIPWIE	Association	Multiple	Leverage CIPWIE programming
7	6	Welcome to P.Eng Wine and Cheese Networking Event		Annual		on plan, postponed for COVID19	Association/ CIPWIE	Media, Culture	TBD - perception	Leverage CIPWIE programming
10	5	MCWESTT 2020		Ongoing		EDI Director for Rady Faculty of Health Sciences, Jackie Gruber	Association/ CIPWIE	Employers	% practicing professional engineers who are women	Leverage CIPWIE programming
10	3	Outreach Coordination		Ongoing		next steps - Training for engineers and geoscientists on talking points with Engineering Changes Lives lens, possibly with Coalition	Association/ CIPWIE	Universities, Employers	% practicing professional engineers who are women	Leverage CIPWIE programming
7	5	United Way model to second employees to work on 30 by 30		Ongoing		underway via Coalition	Association/ CIPWIE	All	Multiple	Leverage CIPWIE programming
7	2	Company participation in mentoring female youth that are interested in Engineering, ex. Bring your daughter to work day, scholarships and bursary for female engineering students to apply for post-secondary funding while at the University of Manitoba, summer jobs for those scholarship/bursary recipients and paired with a female engineering mentor in the company in the area of interest.		2021		propose Coalition as lead post-COVID19	Universities, Employers, Association	Universities, Employers	% engineering direct entry applicants (U of M) who are girls/women	Develop funding models
9	8	Reviewing CRTC guidelines for programming				next steps - TBD	Association	University, Employers, Association	Multiple	Engage with 30 by 30 Canada planning
9	1	Campaign to Broadcasters and Netflix for more shows with women as engineers		2021		next steps - TBD	Association	Media, Culture	TBD - perception	Engage with 30 by 30 Canada planning
2	2	Measure who attends job fairs		2021			Engineers Canada and US equivalent	Media, Culture	TBD - perception	Engage with 30 by 30 Canada planning

2	1	Survey Faculty of Engineering students on intersectional inclusiveness of student groups					TBD	Universities, Employers	% registered as Interns with the Association who are women	Non-Association Tactics
	4	Look at geographic split of MB entrants into Faculty of Engineering to determine underrepresented areas/gender split					Faculty of Engineering, Student Groups	Universities, Employers	% engineering B.Sc. graduates (U of M) who are women	Non-Association Tactics
4	1	Faculty of Engineering adopt Athena SWAN Charter https://www.ecu.ac.uk/equality-charters/athena-swan/					Faculty of Engineering	High School Teachers/ Guidance counsellors	% engineering direct entry applicants (U of M) who are girls/women	Non-Association Tactics
4	1	Can U					Universities	Universities	% engineering undergraduate students (U of M) who are women	Non-Association Tactics
4	3	Increase capacity of WISE Kid-Netic Energy					University	Parents, EY/MY Teachers, High School Teachers/ Guidance counsellors	% students in Grade 11, 12 engineering qualifying classes who are girls	Non-Association Tactics
5	4	Media literacy for kids					Universities, Employers	EY/MY Teachers	% students in Grade 11, 12 engineering qualifying classes who are girls	Non-Association Tactics
6	8	Complete leaky pipeline research		2019		KA defended Master's thesis and will present to Association	TBD	Media, Culture	TBD - perception	Non-Association Tactics
7	1	Companies to school open doors					Employers	EY/MY Teachers, High School Teachers/ Guidance counsellors	% students in Grade 11, 12 engineering qualifying classes who are girls	Non-Association Tactics
	4	Connect with School Divisions to develop gender bias free curriculum and/or to train teachers/students on unconscious bias				Eduction sub-committee chairs established	Province of Manitoba, Faculties of Education	All Teachers	% high school graduates who attend university in MB - STEM who are girls/women	Non-Association Tactics