

Professional Engineers
and Geoscientists of BC

WOMEN IN ENGINEERING AND GEOSCIENCE TASK FORCE REPORT

June 3, 2013



INTRODUCTION:

Diversity in the workplace is recognized as a significant contributing factor for success. Organizations that include and support people of different genders, race and background are able to benefit from their broad spectrum of perspectives and experiences resulting in greater innovation and more effective problem solving. The business case supporting gender diversity is clear.

Gender diversity:

- Provides employers with access to a broader talent pool;
- Increases innovation potential and market development;
- Results in stronger financial performance;
- Improves organizational governance; and
- Enables a greater return on human resource investment¹.

The lack of gender diversity remains a significant issue in the professions of engineering and geoscience. The profession of engineering, and to a lesser extent geoscience, continues to:

- Recruit substantially fewer women than in other professions²;
- See more women leave these professions than seen in professions that require similar levels of education³; and
- Not adequately empower women to meet their full potential³.

The resulting lack of gender diversity has an impact not only on the workplace, but on the professions as a whole. The potential that women can bring to the profession is being missed, and it is strongly believed by the Women in Engineering and Geoscience Task Force that it is incumbent on professional

¹ Diversity in the Workplace, Presentation to Creating Connections Conference 2013, Dr. Elizabeth Croft, P.Eng, FEC, NSERC Chair, Women in Science and Engineering, BC/Yukon

² : “Right for Me: A Study of Factors that Shape the Attitudes of Young Women Towards Careers in Engineering and Technology”, 2009, Engineers Canada and Canadian Council of Technicians and Technologist

³ “Stemming the Tide, Why Women Leave Engineering”, 2011, Nadya A. Fouad, Ph.D, Romila Singh, Ph.D, University of Wisconsin-Milwaukee



organizations like APEGBC to do their part to foster the opportunities that make for the most meaningful and fulfilling contributions possible.

BACKGROUND:

The need to improve the gender imbalance in the professions of engineering and geoscience is a concern that has been raised by APEGBC's Council and others such as Engineers Canada (EC), the Association of Canadian Engineering Companies (ACEC), and the Association of Professional Engineers and Geoscientists of Alberta (APEGA).

There have been many studies that indicate a shortage of professional engineers is imminent in Canada and in fact this shortage is already being realized in rural communities. Increasing the number of women who enter and stay in the professions of engineering and geoscience will go a long way in alleviating this shortage. UBC through the NSERC chair has been consolidating and undertaking research into this area for a number of years.

The Division for the Advancement of Women in Engineering and Geoscience was established in the early 1990's and has been operating to promote women within the context of APEGBC. DAWEG, through its chair, has contributed to the Task Force review.

The Federal Government is taking a lead in this area with the development of an advisory council to promote the participation of women on public and private corporate boards. "Increasing opportunities for women to serve on corporate boards makes good business sense for Canadian women and for Canada's economy," said Minister Rona Ambrose. "Businesses with more women on their boards are more profitable and routinely outperform those with fewer. The role of the advisory council will be to advise our government on how industry can increase women's representation on corporate boards." ⁴

APEGA has moved forward on this issue with the establishment of the Women in APEGA Committee in December 2011⁵. This committee was specifically formed in order to provide strategic advice to Council on matters related to increasing diversity and the growth of representation of women at all levels in engineering and geoscience. As a matter of interest, APEGA also has a [Guideline for Human Rights Issues in Professional Practice](#) which specifically addresses appropriate workplace culture.

Women in Mining Canada partnered with the Mining Industry Human Resources Council to develop the first national study on women's careers in the mining industry. *Ramp-up: A Study on the Status of Women in Canada's Mining and Exploration Sector*. <http://www.mihr.ca/en/publications/resources/Ramp-UPFinal2010.pdf>. In addition, MiHR's *SHIFT: Changing the Face of the Canadian Mining Industry* initiative, was developed to assist employers in their

⁴News Release, Women in Canada, April 5, 2013 www.swc-cfc.gc.ca

⁵ <http://www.apega.ca/members/Women/toc.html>



efforts to attract and retain staff from specific pools of talent, including Aboriginal peoples, youth, women, new Canadians, mature/transitioning workers, and persons with disabilities. There are many synergies in these initiatives that can be used by APEGBC.

The issue of women in engineering and geoscience has been discussed at APEGBC Council meetings and at the 2012 Council Planning Session. At the 2012 AGM the following motion was unanimously passed: *That Council consider setting up a Task Force with sufficient financial and staff resources to support and promote improving the number of women in engineering.*

In March 2013, Council established the Women in Engineering and Geoscience Task Force (Task Force) to identify the causes of the gender imbalance, make recommendations as to how they could be addressed effectively by APEGBC, indicate metrics that would evaluate success, and provide estimated costing for each of the initiatives. Council, in approving the recommendations of the Task Force, would then undertake the recommendations as resources permit.

This report provides the reasoning for APEGBC involvement and makes recommendations on how APEGBC can immediately act to make improvement in this area. Longer term actions are also provided for consideration.

ANALYSIS:

1. Task Force

The Task Force work has significantly benefitted from the participation of leaders in industry, academe, regulatory organizations, and crown corporations. Access to previous work completed by the NSERC Chair for Women in Science and Engineering and the Mining Industry Human Resources Committee has been invaluable. The task force members and contributors are listed below.

- Donna Howes, P.Eng., Councillor, APEGBC (Chair)
- Anja Lanz, EIT, Chair, Division for the Advancement of Women in Engineering and Geoscience, APEGBC
- Catherine Roome, P.Eng., President and CEO, BC Safety Authority
- Diana Theman, Director, Organizational Effectiveness, BC Hydro
- Elizabeth Croft, P.Eng. PhD, Professor, UBC and NSERC Chair for Women in Science and Engineering (BC/Yukon)
- Francois Morton, Senior Vice-President BC, Saskatchewan, and Manitoba, Genivar
- Lianna Mah, P.Eng., Vice-President, Business Development, Associated Engineering
- Lisa Blackham, Chair, Women in Mining Sub-Committee
- Marg Latham, P.Eng., President, Aqua Libra Consulting
- Shiloh Carlson, P.Eng., Councillor, APEGBC
- Steve Frith, President, Urban Systems
- Tom Tiedje, P.Eng., PhD, Dean of Engineering, UVIC



- Courtney Hughes, Research Analyst, Mining Industry Human Resource Council
- Cameron Gatey, P.Eng., Urban Systems, Vice-President, ACEC-BC

The Task Force met four times between March and May 2013. The schedule was as follows:

March 15:	What do we know - Introduction and confirmation of issues?
April 11:	What is working? What needs to be done? What can APEGBC do?
May 1:	Develop Draft Strategy with actions and costs.
May 23:	Draft Strategy for Council approved by Task Force.

The Task Force spent considerable effort on understanding the research undertaken, current initiatives, and identifying gaps in order that APEGBC could provide meaningful support. An emphasis was placed on partnerships where combined efforts could produce a more effective result.

2. Strategy

The main issues were divided into **Recruitment** and **Retention** as there are separate reasons and research for these deficiencies.

A strategy was developed, discussed, refined and is now presented to Council as the next step. The detailed table which tracks the issues to the research and identifies actions is attached in **Appendix A. A high level outline** is shown as a diagram in **Figure 1**.

3. Findings

The outcome of the work of the Task Force identified that there is no time to waste. APEGBC needs to act now to catch up with other Associations and the Federal Government and provide leadership for its members. It was established that there has been significant research on this issue and there is sufficient evidence that supports the proposed action items. Other organizations and associations have produced work that can be easily reused by APEGBC which lowers the cost and saves time. The current momentum is expected to propel APEGBC to a position of governance leadership on this issue.

APEGBC has the potential and obligation to be the lynchpin in establishing strong relationships to combine efforts to move this forward which will result in a more effective result and a higher possibility of success – essentially a win-win scenario.

“We are missing the potential that women can bring to our profession and society at large. We can choose to watch this continue or proactively participate in doing something about it.” **Steve Frith, President, Urban Systems**

“Each action, or inaction, today is only a footnote when measured by our present busy lives... but may be a headline when measured by those in the future. In the future, they will be right to ask whether we understood how a single small step can change the course of history”. **Catherine Roome, P.Eng., President & CEO, BC Safety Authority**



“Over 55% of students who study science at university are women yet less than 20% of engineering and geoscience students and only 11% of professional engineers and geoscientists are female - this must change. The future of our profession depends on drawing from the widest pool of diverse and talented young people and providing a welcoming environment that ensures their success”. **Elizabeth Croft, P.Eng. PhD, Professor, UBC and NSERC Chair for Women in Science and Engineering (BC/Yukon)**

“Our industry will benefit from a more gender balanced approach to our business and we need more women in engineering.” **Francois Morton, Senior Vice President BC, Saskatchewan, and Manitoba, Genivar**

"Encouraging and retaining women in engineering strengthens what we do by providing more expertise, encouraging balance, fostering inclusivity and keeping the profession relevant!" **Donna Howes, P.Eng., Chair, Women in Engineering and Geoscience Task Force**

RECOMMENDATIONS

There are a number of actions that APEGBC can undertake to improve gender diversity in the professions of engineering and geoscience; many of these require minimal initial financial resources. Some of the recommended activities can be advanced by partnering and supporting other organizations, others, such as the development of member conduct guidelines and assessment of return to practice policies, are uniquely the role of APEGBC.

The following is a summary of the recommendations of the Task Force. It is recognized that these recommendations will need to be implemented over a period of time. There are however many activities that can be undertaken immediately which are presented in **bold type**. As noted previously, the details for these recommendations can be found in **Appendix 1**.

In the area of OUTREACH/ RECRUITMENT, the Task Force recommends:

1. **Create or revise marketing materials/ branding of professions to better recognize what is important to women when choosing a career (e.g. Engineering and Geoscience helps people and communities).**
2. **Increase the number of women who do outreach visits in schools.**
3. Provide training to all engineers / geoscientists who visit schools to deliver activities and messages that empower girls to embrace science, technology, engineering and the tools used in these areas.
4. Train teachers to be more aware of careers in engineering and geoscience and how to communicate the careers in a way that is attractive to girls.
5. Support universities in recruitment efforts.



In the area of RETENTION, the Task Force recommends:

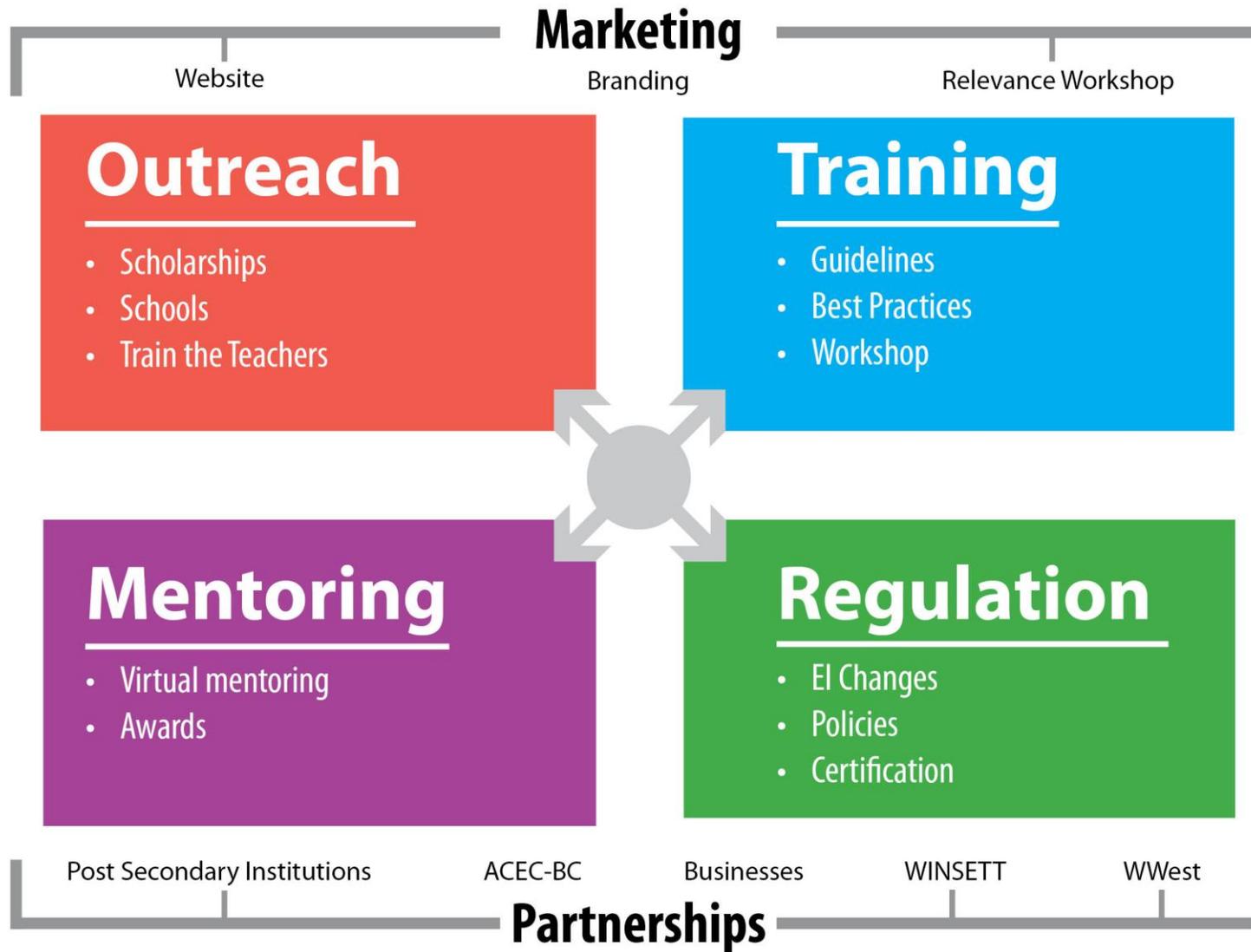
- 1. Encourage Engineers Canada, Geoscientists Canada, and ACEC to coordinate efforts and lobby the federal government to improve employment insurance provisions so benefits are not clawed back due to part time work while on parental leave.**
- 2. Assess APEGBC policies to ensure they do not create unnecessary barriers to retaining women in the professions (e.g. Return to practice policy).**
- 3. Support employers in building a gender diverse workforce by providing access to existing guidelines and workshops (e.g. post on APEGBC website, promote at APEGBC events, host events as appropriate).** In the longer term, create APEGBC gender diversity training programs and certify organizations that undergo training and adopt practices that support gender diversity.
- 4. Enhance mentoring programs by increasing the number of female mentors and providing non-traditional mentoring structures (e.g. virtual mentoring, speed mentoring, social networking, etc.).**
5. Develop professional standards of practice/ guidelines for APEGBC members similar to those of [APEGA](#) and [PEO](#).
6. Create a gender diversity award to recognize companies that promote and support gender diversity in their organization.

Recommendations that support both recruitment and retention are:

- 1. Support and promote leadership and diversity workshops such as those developed by WINSETT, and WWEST.**
- 2. Recommend to the Canadian Engineering Accreditation Board (CEAB) the adoption of a competency based approach for engineering undergraduate programs (e.g. *Graduate Attributes* - Appendix 2)**
- 3. Continue the APEGBC compensation survey, report the results based on gender, and assess how results can be utilized more strategically.**
- 4. Utilize volunteers to seek sponsorships to financially support gender diversity activities.**
- 5. Measure and report success by developing key performance indicators (e.g. number of women entering/ staying in the professions, compensation equity, career advancement, etc.) and reporting on outcomes in the APEGBC annual report.**



6. Form partnerships with other organizations to coordinate efforts and maximize each organization's unique role in supporting gender diversity.
7. Continue to research how gender diversity in the professions can be improved.



APPENDIX A – STRATEGY: [KEY – YEAR 1 – no shading, YEAR 2 - shaded]

RECRUITMENT

ISSUE	Discussed Options / Benefits	Current Status	Next Steps for APEGBC	Who Else to Involve	Cost
CAREER AWARENESS: ➤ Lack of awareness about type of work engineers and geoscientists do ➤ Career awareness during the young and formative years and before course selection	OUTREACH: need a more effective campaign to get professions into schools to talk about what they do; engage women engineers to talk to students; look at other groups such as girl guides, rangers and other female oriented groups; Use APEGBC Branches, ACEC Young Professionals group, as ambassadors to deliver message in schools	APEGBC has an outreach programme through the branches, but more resources need to be allocated in house to drive the programme: consistency of message, breadth of outreach, engagement of businesses, etc. Currently only 1/3 FTE allocated.	APEGBC to allocate one Full Time Equivalent (FTE) to career awareness (an addition of 2/3 of an FTE). APEGBC staff to drive the programme and co-ordinate with Branches. Need to focus material to make it of interest to women, encourage and train speakers from diverse backgrounds, get sponsorship from businesses. Enhance school speaker list with women from diverse disciplines/ support Science in the Schools initiative.	Branches, ACEC, Businesses, Schools	+2/3 FTE \$35K to \$45K <i>(currently 1/3 FTE allocated to career awareness)</i> Minor enhancement - can be absorbed. Major enhancement – requires extra staffing as noted above.
	TRAIN THE TEACHERS: Find ways to get on teachers’ agendas; Reach out to teaching students while they are still in the faculty of education – may be more accessible and receptive to message here;	APEGBC has not been involved. Universities have been involved in this initiative but recommend that APEGBC endorse the programme.	APEGBC to formalize endorsement with universities - suggest some \$ cost sharing. Work with relevant organizations to develop Professional Day seminar.	Universities Teachers Assn.	Effort could be undertaken by staff resource, cost sharing budget TBD.

	<p>RECRUITING: Work collaboratively with post-secondary institutions on recruitment to leverage effort; Provide resources to others who are promoting careers in engineering and geoscience: EWB, Actua, Science World, Destination Imagination, etc.</p>	<p>APEGBC has provided some sponsorship funding in the past as budgets permit.</p>	<p>Enhance sponsorship funding and look for other ways to support recruitment.</p>	<p>Post secondary institutions</p>	<p>+\$10K</p>
	<p>RESEARCH: Leverage research done by NSERC, AMEBC, MABC, Mining Industry Human Resource Council, Canadian Council of Academe</p>	<p>Just research done to support this project.</p>	<p>Build on other research</p>		<p>Cost can be absorbed within current budget. May require minor reallocation of staff time.</p>
<p>IMAGE:</p> <ul style="list-style-type: none"> ➤ Engineering is perceived as boring and solitary; ➤ Engineering is too difficult; ➤ Engineers and geoscientists focus on how “stuff” works not how people “work” or what they need, not a caring profession. ➤ Marketing and branding does not feature women often enough. 	<p>MARKETING/ REBRANDING: Change the way the professions are portrayed from working with “stuff” to working with “people” and contributing to communities in meaningful ways.</p>	<p>Materials have attempted to be inclusive of women, but have not emphasized the “people” aspect in a significant enough way.</p>	<p>To develop a meaningful brand of the engineering and geoscience professions that appeals to women and reflects the type of work that is undertaken.</p> <p>Develop marketing material focused to recruiting young women</p>	<p>ACEC-BC, EC</p>	<p>Creating a different focus (make them more interesting to women) for materials that are already budgeted has no cost. Undertaking of a significant rebranding campaign has very significant cost at should be looked at nationally.</p>

	Promote APEGA video game (Engenious), seek to rebrand other materials already created for this purpose by other jurisdictions; Create stronger links between the study/work that is done and the tangible work done in communities.	APEGBC has provided input into the development of Engenious and has its own career awareness video. The APEGBC website is undergoing a complete update.	Website updates - Look at using parts of other videos, using pictures with women in them. Co-ordinate with Relevance Workshop outcomes.	Other associations, ACEC, Engineers Canada, Geoscientists Canada	\$3K to \$10K depending on types of materials rebranded.
PARTNERSHIPS	COORDINATION OF EFFORT: WINSETT has on-line resources and leadership program that could be promoted/ supported by APEGBC. Other programmes by WWEST can also be co-ordinated.		APEGBC to sponsor WINSETT/WWEST programmes	WINSETT WWEST	Requires reallocation or new staff resource

RETENTION

ISSUE	Discussed Options / Benefits	Current Status	Next Steps for APEGBC	Who Else to Involve	Cost	
BARRIERS IN THE WORK PLACE: <ul style="list-style-type: none"> ➤ Real or perceived barriers to women participating fully in the professions ➤ Lack of facilities in the field; ➤ Lack of flexibility despite the technology; ➤ Women underrate their skills. 	CHANGE THE LAW: Combined effort needed to lobby the federal government to change Employment Insurance to allow parents to remain engaged in the workforce. Change in EI benefits from binary to graded would better enable part time work while on parental leave.	No action.	APEGBC to encourage Engineers Canada and Geoscientists Canada to take the lead in moving this forward together with other associations, institutions to the Fed level.	ACEC-BC, Businesses , Engineers Canada, Geoscientists Canada	Effort could be absorbed within existing staffing levels	
	REVIEW APEGBC POLICIES: Ensure APEGBC policies around return to practice and fees are not creating unnecessary barriers for women.			Review policies with this perspective in mind.		Reallocation of staff time or potential activity for summer student.
	WORKSHOPS: Educate employers on the type of culture that supports women, about the barriers and provide education tools to assist them in eliminating them, circulate guides; educate on benefits of gender diversity; include diversity content in Law and Ethics Seminar, educate employers on encouraging advancement for Women	Full day session held at 2012 Annual Conference.		APEGBC to host workshops as part of professional development program. Need to support leadership training for Women. APEGBC to adapt guides if needed.	ACEC-BC, businesses , NSERC chair, WINSETT, WWEST	Could be revenue neutral. \$2K to \$25K depending on level of effort required to adapt.

	<p>BEST PRACTICES – CODE OF CONDUCT: develop a standard for best practices in diversity set professional standards with respect to work place culture and what is acceptable professional behavior with respect to workplace culture and discipline if not adhered to.</p>	<p>Issues currently dealt with through Code of Ethics. No specific guideline exists for APEGBC. APEGA and PEO have Human Rights Guidelines for members.</p>	<p>Develop a standard for best practices in diversity (similar to APEGA and PEO human rights guidelines). This would be a professionally produced document that is user-friendly outlining background, research, resources, best practices and case studies. This should be promoted and readily available on the website. APEGBC to develop this like other practice guidelines.</p>	<p>ACEC, businesses</p>	<p>\$20K - \$50K (amount to be confirmed)</p>
<p>ISOLATION:</p> <ul style="list-style-type: none"> ➤ Women feel isolated as they may be the only female in their workplace or one of few 	<p>MENTORING: Develop a focus on mentoring women as part of the mentoring program, perhaps enhanced by virtual mentoring, speed mentoring, social networking.</p>	<p>APEGBC does provide some support 1/3 FTE. There is a mentoring committee but more resources need to be allocated in-house to drive the programme.</p>	<p>APEGBC to allocate more staff time to mentoring. APEGBC staff to drive the programme and co-ordinate with Branches. Need to focus material, encourage female mentors with diverse backgrounds to be on the list, get sponsorship from businesses. Test virtual mentoring.</p> <p>Encourage employers to value the mentoring that their employees do in and out of the workplace.</p>	<p>Women in Mining, Businesses</p>	<p>+1/2 FTE (\$25K to \$30K) (currently 1/2 FTE allocated to mentoring in 2013/14 budget)</p>
<p>LACK OF WOMEN LEADERS:</p> <ul style="list-style-type: none"> ➤ Leadership traits that are valued are more aligned with typical male traits than female; 	<p>TEACH THE STUDENTS: Teach diversity/ professionalism at the postsecondary level; women bring a different contribution to the table which is a benefit for success</p>	<p>APEGBC is not involved at this time.</p>	<p>Partner with the postsecondary institutions to train students to understand diversity before they start working.</p>	<p>Post secondary institutions</p>	<p>No cost to APEGBC unless provide sponsorship.</p>

<ul style="list-style-type: none"> ➤ Glass ceiling still exists as people promote people who look like them; ➤ Compensation discrepancy still exists particularly at the higher levels; ➤ Lack of advancement opportunities 	WORKSHOPS: (as listed above)				
	BEST PRACTICES - CODE OF CONDUCT (as listed above):				
	DIVERSITY AWARDS: Give out gender diversity awards at Annual Conference to recognize organizations that are role models in this area.		APEGBC to propose this award based on criteria. Could also be an initiative of ACEC – BC.	ACEC-BC	\$3K
ASSESSMENT OF PROGRESS	MEASUREMENT: there is a need to measure outcomes of the effort so that APEGBC can track impact of initiatives and see where success is being achieved.	Annual compensation survey that reports total compensation based on responsibility and gender.	<p>Continue to administer the compensation survey and report the results based on gender to raise awareness</p> <p>Develop a survey to track the retention of women and promotion of women in the work place. This would be a partnership with businesses through ACEC-BC.</p> <p>An annual report is to be compiled which identifies progress – a few key measurements to track the progress of these initiatives. Are more women entering engineering? ? Is the rate of attrition from engineering decreasing? Are more women registered as engineers? Are</p>		<p>No additional cost</p> <p>Effort could be absorbed within existing staffing levels.</p> <p>To be included in current annual publications</p>

			more women being promoted to leadership roles? Year over year progress could be shown graphically for impact.		
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APPENDIX 2: GRADUATE ATTRIBUTES

Provided by the Dean of Engineering, University of Victoria

The institution must demonstrate that the graduates of a program possess the attributes under the following headings. The attributes will be interpreted in the context of candidates at the time of graduation. It is recognized that graduates will continue to build on the foundations that their engineering education has provided.

1. A knowledge base for engineering: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.
2. Problem analysis: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.
3. Investigation: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.
4. Design: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
5. Use of engineering tools: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
6. Individual and team work: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
7. Communication skills: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
8. Professionalism: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.
9. Impact of engineering on society and the environment: An ability to analyze social and environmental aspects of engineering activities. Such ability includes an understanding of the interactions that engineering has with the economic, social, health, safety, legal, and cultural



aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.

10. Ethics and equity: An ability to apply professional ethics, accountability, and equity.
11. Economics and project management: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of engineering and to understand their limitations.
12. Life-long learning: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.