AGENDA OF THE

189th ENGINEERS CANADA BOARD MEETING

May 25, 2018

8:30 am – 4:30 pm

Delta Bessborough Hotel, Saskatoon SK
Adam Ballroom

Please refer to the Board Policy Manual and By-law

1	OPENING (8:30 – 8:45)
	1.1 Call to order and approval of agenda *THAT the agenda be approved and the President be authorized to modify the order of discussion.*
	1.2 Declaration of conflict of interest
2	EXECUTIVE REPORTS (8:45 – 10:00)
	2.1 President's Report to the Board – R. Kinghorn (attachment)
	2.2 CEO Report to the Board – G. McDonald (attachment)
	2.3 CEO Group Report to the Board – A. English
	2.4 Presidents' Group Report to the Board – K. MacLeod
3	CONSENT AGENDA (10:00 – 10:15) *Board members may request that an item be removed from the consent agenda for discussion.*
THAT the consent agenda motions listed below (3.1 to 3.5) be approved in one motion.	
	3.1 APPROVAL OF MINUTES (attachment) *a) THAT the minutes of the April 9, 2018 Board meeting be approved as presented.*
	3.2 QUALIFICATIONS BOARD DOCUMENTS *a) THAT the revised "Model Guide: Direct Supervision" be approved.* (attachment) *b) THAT the revised "Guideline: Principles of Climate Adaptation and Mitigation for Engineers" be approved.* (attachment)
	3.3 APPOINTMENTS TO QUALIFICATIONS BOARD (attachments) *THAT the following appointments to the Qualifications Board be approved.* *a) Ron LeBlanc, FEC, P. Eng. (Chair)* *b) Dennis Peters, PhD, FEC, SMIEEE, P.Eng. (Past Chair)*

	c) Mahmoud Mahmoud, PhD, FEC, P.Eng. (Vice-Chair) *d) Frank Collins, FEC, P.Eng. (Atlantic Region Representative)* *e) Amy C. Hsiao, PhD, P.Eng. (Atlantic Region Representative)* *f) Karen E. Savage, FEC, P.Eng. (British Columbia and Yukon Region Representative)* *g) Samer Inchasi, P.Eng., PMP (Member-at-large Representative)* *h) Quinn Zhao, PhD, P.Eng. (Member-at-large Representative)*
	3.4 APPOINTMENTS TO ACCREDITATION BOARD (attachments) *THAT the following appointments to the Accreditations Board be approved.* *a) Luigi Benedicenti, FEC, P. Eng. (Chair)* *b) Bob Dony, FEC, P.Eng. (Vice-chair)* *c) Wayne MacQuarrie, FEC, P.Eng. (Past-chair)* *d) Suzelle Barrington, FIC, ing. (Member representing Quebec)* *e) Emily Cheung, FEC, P.Eng. (member-at-large)*
Break – 10:15 – 10:30 (15 minutes)	
4	REPORTS TO THE BOARD (10:30 – 11:30)
	4.1 Accreditation Board Update – W. MacQuarrie (attachment)
	4.2 Qualifications Board Update – D. Peters (presentation)
	4.3 Compensation Committee update – C. Roney (attachment)
	4.4 Governance Committee update – S. Devereaux
	4.5 Funding Task Force update – D. Gelowitz
	4.6 Nominations Task Force update – C. Roney (attachment)
	4.7 Risk Register – G. McDonald (attachment)
5	BOARD BUSINESS/REQUIRED DECISIONS (11:30 – 12:00, 1:00 – 1:45) 75 min
	5.1 2019-2021 Strategic Plan – R. Kinghorn (attachments) *THAT the Engineers Canada Board recommend approval of the 2019-2021 strategic plan to the Members.*
	5.2 Board policy manual – S. Devereaux (attachments) *5.2a THAT the Engineers Canada Board approve the following policies:* a) Policy 4.2 *Directors' responsibilities* (attachment) b) Policy 4.3 *Code of conduct* (attachment) c) Policy 4.11 *Board management delegation* (attachment) d) Policy 8.2 *Diversity and inclusion* (attachment)

	5.2b THAT the Engineers Canada Board establish a Finance Committee and direct the Executive Committee to appoint members. The first task of the committee being to finalize its terms of reference in keeping with the example put forward by the Governance Committee. (attachments)
	5.3 Accreditation criteria changes – W. MacQuarrie (attachment) *THAT the Board approve the change of Accreditation criterion 3.4.5.1 d) to "The impact of technology and/or engineering on society."*
	5.4 Additional business (if any)
Lunch – 12:00 – 1:00 (1 hour)	
5	BOARD BUSINESS/REQUIRED DECISIONS, continued (1:00 – 1:45)
6	ANNUAL UPDATES FROM STAKEHOLDERS (1:45 – 2:15)
	6.1 Canadian Federation of Engineering Students – Z. Kripki (attachment)
	6.2 National Society of Professional Engineers – Tom Roberts
Break – 2:15 – 2:30 (15 minutes)	
7	ELECTIONS TO EXECUTIVE COMMITTEE – C. Roney (2:30 – 3:30)
8	NEXT MEETINGS (3:30 – 3:45)
	• June 18 – 19, 2018 Board Workshop (Picton, ON) • September 24 – 26, 2018 (Ottawa, ON) • December 2018 (exact date TBD) - teleconference • February 27 – March 1, 2019 (Ottawa, ON) • April 2019 (exact date TBD) - teleconference • May 23 – 25, 2019 (Quebec City, QC)
9	IN-CAMERA SESSION – Directors only (3:45 – 4:30)
	THAT the meeting move in-camera and be closed to the public at the recommendation of the Executive Committee. The attendees at the in-camera session shall include Board members, regulator staff and the regulator Presidents or their delegates.
10	CLOSING (motion not required if all business has been completed)

President's Report to the May 25, 2018 Board Meeting

Highlights of Meetings and Regulator Visits

This is not intended as a comprehensive listing of what happened at the events attended but rather the most important and/or most interesting points that arose.

Dec 18, 2017 Governance Committee teleconference

Dec 19, 2017 Board meeting teleconference
Appointed Gerard McDonald as CEO for Engineers Canada

Dec 19, 2017 Exec Committee teleconference

Jan 12, 2018 Board meeting – Ottawa

Jan 12-13 Governance Committee Workshop
Work on removing Carver from policy manual and change policies to the affirmative from the restrictive.

Consolidate results of consultations with Regulators on governance with respect to:

- Purposes
- Guiding Principles
- Responsibilities of the Board
- Board structure

Jan 24 Exec Committee meeting and workshop – Ottawa
Review what should be under consideration for the Strategic Plan consultations.

Jan 26 Governance Committee teleconference work on Policy Manual

Jan 31 École de technologie supérieure (ÉTS) – Montréal
Pierre Dumouchel, gave a presentation with Pierre Bourque, Dean of Studies and Brigitte Watier, , on the ÉTS education system. Kathy Baig and Stephanie Price attended.

The meeting was as a result of finding out that ÉTS has few entrance requirements yet its grads are in very high demand by industry. Of particular interest:

- The only entrance requirement is graduation from CEGIP (technologists training program)
- Professors MUST have at least one year of industrial work experience. An instructor may be hired without the experience but before teaching, they must go to work in industry for a year.
- Co-op is mandatory. Students cannot progress to their next year until they have achieved a term of co-op. Placement services are available to help the students find the co-op work.
- 60% of all research at ÉTS is industry-funded.
- Work placement for graduates is phenomenal. Jobs per graduate range from a low of about 0.9 to a high of OVER 8, depending on department. Only one department is less than 1. ÉTS is obviously meeting the needs of industry and the economy.

Jan 31 Dinner with OIQ Board and Stephanie Price – Montréal
Although this was an informal event, one suggestion of how Engineers Canada can support OIQ is in the area of methods to improve practice such that members do not compete for engineering work simply based on price. This is common across Canada even though there have been many efforts over the years to have members compete for work using Qualification Based Selection.

Feb 8-9 Engineers and Geoscientists BC Forum and Council Meeting – Vancouver
The forum was on what kind of CPD program to try to implement and how to do it as it will require legislative change.

The Council meeting included:

- Initiating developing a plan toward achieving 30 by 30
- A presentation on considering Engineering and Geoscience BC's role in considering the recommendations of the Truth and Reconciliation Commission. There are 94 recommendations of which several definitely apply. Taking on this initiative may also have some significant synergies with endeavours to improve indigenous participation in our professions.

Feb 14-16 Engineers Yukon Board Dinner and AGM – Whitehorse
Engineers Yukon now has 999 licensees which is very significant for a territory with a population of only 35,000. I had the honour of presenting FEC designations to Rob Savoie, Past President and Kim King, Executive Director.

Feb 26-28 Board Governance and Strategic Planning Workshops and Board Meeting – Ottawa

Mar 2 CEO Group Consultation on Strategic Plan – Ottawa

Mar 12 Engineers and Geoscientists BC Consultation on Strategic Plan – Vancouver
There was a strong voice asking for EC to consider facilitating the use of quality management in professional practice across Canada. Engineers and Geoscientists BC has already developed their Organizational Quality Management (organizations include companies, partnerships and **government ministries**) program which will likely also be used with corporate regulation in BC in the future.

Mar 14-16 NAPEG AGM, Conference and Awards Banquet

Mar 21-22 APEGA Service Awards and Life Member Banquet and Council Meeting
Ann English and Tony Chong gave a videoconference update on the BC Government's Professional Reliance audit of Engineers and Geoscientists BC. Final outcomes are still a few months away.

APEGA has a Permit to Practice designation (each corporate office must have this in order to practice Professional Engineering or Professional Geoscience in Alberta) on which it has been doing sample audits with mixed results. The Permit to Practice requires that each office maintain a Quality Management System which in turn mandates maintenance of CPD standards. Non-compliance with CPD standards was found but what was very positive is that the CEOs of organizations that weren't in compliance were very eager to correct the situation.

This indicates the tremendous value that maintenance of quality standards by a regulator has in proactively promoting good professional practices. Note that similar positive outcomes have been seen in EGBC's Organizational Quality Management (OQM) certification program where employers are asking that the program must be part of any corporate regulation in BC. In the employers' opinion the cost of OQM (it's a cost recovery model whereby the cost of auditing OQM certificates every 5 years is covered by the certificate holder) is minor compared to the value that it provides.

Mar 26 Executive Committee Teleconference

Mar 27 Engineers and Geoscientists NB Consultation on Strategic Plan – Fredericton

Apr 7-8 Canadian Engineering Qualifications Board Meeting – Gatineau

Apr 11-13 Accreditation Board for Engineering and Technology (ABET) – San Diego, CA
ABET is the accreditation body for engineering and technology education in the USA.

To correct some misinformation: ABET indeed DOES accredit engineering programs at Harvard, MIT and Stanford among some 800 engineering and other STEM institutions and accredits some 4,000 programs. **All** of the top schools in the US utilize ABET accreditation.

ABET accreditation relies completely on measuring the outcomes (Graduate Attributes) and demonstration of continuous improvement of the programs thus there is no problem accrediting programs with delivery methods such as on-line and project-based instruction.

Apr 24 Hill Day – Ottawa
Hill Day was a very busy time but incredibly well organized with special thanks to Joey Taylor and Emily Rowan of the EC staff. Two issues stood out for me:

- Several engagements identified that the federal government can include recruitment to engineering in cadet programs, particularly for young women.
- We talked about needing more "E" in STEM but the point was made that **we don't identify any K-12 courses as "engineering" but when students do apply science to do projects, they are indeed doing real engineering** in many instances. One MP noted that his understanding until adulthood was that science is the same as engineering. **Engineering is the *application of scientific principles*. If we pursue promotion of engineering in K-12 using that definition, young girls might have a better understanding of how they can change the world through engineering.**

Apr 27 Engineers and Geoscientists BC Council Meeting – Vancouver

May 2 Executive Committee Strategic Planning Workshop – Ottawa

FINAL WORD…. THE VALUE OF REGULATION

I've visited many regulators where there is angst about raising annual fees for license holders because they feel that those people question what they get for the money. Proper professional regulation requires the following components:

1. Only those who are qualified to do the work are allowed into the profession (licensure)
2. Those who are not qualified to practice are prevented from doing so (enforcement)
3. Licensees are disciplined should they do substandard work or do not act in a professional manner. Best practices proactively prevent a need for disciplining licensees include quality assurance programs, practice guidelines and continuing professional development.

These three components provide assurance that work in the profession is done in a manner that **protects the public** (first and foremost duty of all of our engineering Regulators in Canada). When the public is protected, the public sees value in the work of the profession as provided by licensees, those with the designation of Professional Engineer. Professional Engineers thusly derive huge value from the public perception of value to them.

The bottom line is that the good regulation of engineering in Canada provides great value to Professional Engineers; a much, much greater value than the cost of annual fees for licence holders. No Canadian engineering Regulator should feel that their fees are too high as that value is returned a hundredfold to their licensees.

It has been truly an honour to serve as your President for the past year, especially while so many of you (Board members, other volunteers, staff, Regulators and their staff and volunteers) have done so much to lay a new path for Engineers Canada, a path founded with transparency, focus and a true understanding of purpose.

I will now pass the gavel to Annette and pledge my support to her and the rest of you to continue to improve our path and to do the work of Engineers Canada in supporting good regulation of Professional Engineering in Canada.

I. Progress on the strategic plan – Q1 update

As indicated in the summaries contained in the Q1 report on the status of the Annual Operating Plan, the Goals and Programs laid out in support of the 2018 interim strategic direction are generally on-track. The 2018 plan is most challenged by the unusually high number of large projects (four of them - the Governance, Strategic Planning and Consultation (GSPC) project, the Space Program, the Accreditation Improvement Program and the Competency Based Assessment project) and the volume of other operational activities currently underway. The challenges reflected in the plan are most acute in the demand placed on common services resources such as Communications (including translation), Information Technology, Project Management and Business Analysis.

We remain confident that the new Strategic Plan and resulting work on the 2019 AOP emerging from the GSPC project at the end of Q2 will bring a sharpened focus on priorities from the Regulators and an improved commitment to more effective resource planning.

The full Q1 status report is contained in Annex A.

II. Financial updates: Q1 update

Category	Q1 budget	Q1 actuals	Variance
Revenue	5,649,142	7,102,270	1,453,128
Expenses	3,080,161	3,241,039	-160,878
Surplus/(Deficit)	2,568,981	3,861,231	1,292,250

The positive variance in the first quarter (Budget vs. Actual) of 1.2M is attributed to receiving the first portion of the TD affinity revenues which included 1M of unbudgeted revenues. Other, relatively minor variances, are due to changes in the timing of budgeted revenues and expenses.

Category	2018 Budget	Q1 forecast for 2018	Variance
Revenues	10,800,122	10,668,005	(132,117)
Expenses	12,380,148	12,247,604	(132,544)
Surplus/(deficit)	(1,580,026)	(1,579,599)	427

At present time, the decrease in forecasted revenues and investment income has increased the projected deficit by 140K.

This can be off-set by a combination of a reduction in operational spending, coupled with forecasted reductions in expenditures being used to draw down the unrestricted reserves. None of these forecasted reductions will result in reduction of scope or delivery of any of these projects.

2018 operating budget

As approved at the January 12, 2018 meeting:

2018 Revenue:	2018 Budget
1. Regulator assessment	3,091,000
2. Affinity and insurance sub-total, including	5,959,122
Home and automobile insurance	4,267,016
Term life and major accident protection	1,460,111
Critical illness	10,000
Professional retiree health and dental insurance	30,000
Sickness and accident insurance	119,595
Financial security	55,000
Professional liability insurance	12,500
Pet health insurance	4,700
Shipping services	200
3. Investment	365,000
4. Research and outreach	53,000
5. Secondary professional liability insurance	718,000
6. PIEVC and sustainability	431,200
7. Accreditation	5,000
8. National Council Deans Engineering & Applied Science	17,500
9. Rent revenue	28,800
10. Sponsorships	127,500
11. Other	4,000
Total	**10,800,122**

2018 Operating Expenses	2018 Proposed
12. CEO changeover	n/a
13. Board meetings	705,750
14. Board committees	111,100
15. CEO and presidents travel	102,000
16. Human resources	5,398,245
17. Finance and administration	496,190
18. IT and facilities services	
Rent	599,500
IT infrastructure	-
Other	320,154
19. Communications, awards, scholarships, galas	338,641

20. Affinity and insurance programs	892,500
21. Direct support of regulators	
Officials groups, their projects and the Framework for Regulation	154,000
National membership database and International Institutions and Degrees Database	79,600
22. Qualifications Board and its work	250,000
23. Accreditation Board and its work	360,000
24. Research	75,800
25. Globalization and international work	
Globalization operational committee	850
Mobility registers and accords, US mobility, National Society of Professional Engineers (NSPE), National Council of Examiners of Engineering and Surveying (NCEES), ABET	63,700
World Federation of Engineering Organizations (WFEO)	34,600
International Engineering Alliance (IEA), Asia Pacific Economic Cooperation (APEC) and Washington Accord	43,500
Union Panamericana de Asociaciones de Ingenieros (UPADI)	-
26. Outreach and promotion	265,900
27. PIEVC and sustainability	324,070
28. Federal government relations	61,604
29. Legal and brand protection	122,264
Sub-total, operational expenses	**10,799,968**
Excess/deficiency of revenue over expenses	154

III. 2018 projects funded from reserves

Status reporting legend

Indicator	Definition
C	Complete
G	No obstacles encountered and the project is running according to plan.
Y	Obstacles are being encountered that put progress and success at risk. Close monitoring and management is required by the project team to ensure that corrective actions are moving the project back to Green status.
R	Obstacles are being encountered that put progress and success at risk. Failure to address these areas could result in the failure of the initiative. Immediate action and support from the Project Sponsor is required.

Accreditation Improvement Program (AIP)

The Accreditation Improvement Program is comprised of the following inter-related elements:

- Data management system (including Enrolment and Degrees Awarded Database)
- Stakeholder communications and consultation process
- Training program and associated processes
- Continual improvement process

Project status report		**Current status**		**Trend**
Project:	Accreditation Improvement Program	**Cost**	Y	G
Reporting period:	April 2018	**Schedule**	Y	G
Project manager	Heidi Theelen, Project Manager	**Scope**	G	G
Program sponsor	Colin Brown, VP Operations	**Resources**	Y	G
Target completion:	Q4, 2022	**Risk**	G	G
Current project phase:	Execution	**OVERALL**	Y	G
Project budget:	$1.5M total over 4 years ($318,000 for 2018); **dependant on the forecast and approvals for variance**			
Rationale for overall project status				

The overall program status is YELLOW as the vendor selected could impact the overall timeframe and budget for data management system related progress. Once a vendor is selected and overall costs are confirmed as part of joint planning with the vendor, the project will return to GREEN status

Deliverables / outputs to date:

- Data management system:
    - Advisory Committee established in August 2017. Committee orientation completed October 13, 2017
    - RFP and vendor selection: RFP issued December 7, 2017. Bids reviewed by March 29, 2018. Grant of award to vendor issued April 16, 2018

- Stakeholder communication and consultation process:
    - Ongoing progress and update presentations to key stakeholder groups:
        - Update (presentation) to CEAB on February 10, 2018
        - Update (presentation) to Engineers Canada Board on February 28, 2018
        - Update (presentation) to CEO group on March 1, 2018
        - Update (presentation) to CFES on March 16, 2018
        - Update (presentation) to CEQB on April 7, 2018
        - Update (presentation) to Deans Liaison Committee on April 26, 2018
        - Update (presentation) to NCDEAS on April 27, 2018
    - Other communications initiatives
        - Website content reviews (ongoing)
        - Monthly email updates to subscribed stakeholders
        - Internal and external "pulse check" surveys for awareness of change
        - Completed the defined approach for stakeholder communication and consultation

- Training program (including volunteer management)
    - Completed the defined approach for training
    - Planned and delivered February 10, 2018 meeting of programs with team chairs
    - Staff participation on planning committees for regional GA/CI meetings
    - Successful workshop submission to CEEA 2018 conference

- Continual improvement process
    - Business process analysis and design
    - Internal AIP check-in and internal change readiness assessment

- Program management deliverables
    - Schedule
    - Budget
    - Tactical approaches for requirements management
    - Change control process
    - Business requirements documents
    - Process maps
    - Risk, action, issue, decision Log

Online Competency-Based Assessment (CBA)

Engineers Canada is funding the development of a nationally-available competency-based assessment framework and system. This work is focused on delivering the following outcomes in 2018:

- Deliverables D1 and D2 complete, with services provided to regulators as necessary
- Participating regulators satisfied with services sought from EC staff

Project status report			**Current status**	**Trend**
Project:	CBA	**Cost**	G	G
Reporting Period:	April 2018	**Schedule**	G	G
Project Manager	Kyle Smith, Manager, Assessments	**Scope**	Y	Y
Program Sponsor	Stephanie Price, EVP Regulatory Affairs	**Resources**	G	G
Target Completion:	Q2, 2020	**Risk**	Y	Y
Current Project Phase:	Execution	**OVERALL**	Y	G
Project Budget:	$1.07M over three years ($362,490 for 2018)			

Rationale for Overall Project Status

Overall project status is YELLOW, resulting from ongoing uncertainty in staff support expectation from participating regulators, iterative agile development approach leading to ongoing software requirements management, and the outstanding risk that the minimum required number of applicants per year will not be realized upon project completion. Once these items are resolved the project will return to GREEN status.

Project deliverables are currently on schedule and costs are under budget. The initial software deliverable from Engineers and Geoscientists British Columbia (EGBC) is expected to be delivered on time (April 24, 2018). This deliverable (titled D1) involves the separation of the CBA portion of EGBC's existing infrastructure to enable the system to be offered as a multi-jurisdictional software-as-a-service (SaaS). Once complete, development will begin to establish multi-jurisdictional applicant administration (assignment of assessors outside of BC). This deliverable (titled D2) is expected to be delivered in September 2018. On request from the project's User Steering Group (USG), development has been started ahead of schedule to offer multilingual (English/French) capabilities.

The USG continues to hold biweekly 90-minute teleconferences to discuss requirements, issues, and risks, to receive system demos, and to assist each other in the transition to CBA. In addition to contributing to an article published in the January edition of APEGS' The Professional Edge, the group has built an initial draft of a Pan-Canadian Competency Assessment Guide, which is intended to act as a foundation for participants to build their own guides.

Space Program

The Space Program is comprised of the following inter-related Program Elements:

1. Technical O365 transition & configuration
2. Information architecture design and roadmap
3. Clean and classify data/Information
4. File migration to SharePoint and other cloud-based services
5. Adoption of new tools.
6. Corporate technical architecture blueprint and standards
7. Support for migration of Engineers Canada business systems from on-premises technology

These elements are designed to:

- Improve the security, availability, usability, and integrity of Engineers Canada's corporate information.
- Provide enhanced capabilities to Engineers Canada employees in the delivery of services to clients and partners.
- Provide enhancements to the underlying information technology used to deliver those services.

Project status report			**Current status**	**Trend**
Project:	The Space Program	**Cost**	G	G
Reporting period:	April 2018	**Schedule**	Y	Y
Project manager	Frank Farrell, Project Manager	**Scope**	G	G
Program sponsor	Colin Brown, VP Operations	**Resources**	Y	Y
Target completion:	Q4, 2019	**Risk**	G	G
Current project phase:	Planning/execution	**OVERALL**	Y	Y
Project budget:	$293,200 over two years ($200,200 for 2018)			
Rationale for overall project status				

Overall project status is YELLOW resulting from ongoing technical issues slowing the migration of email server to the 365 cloud-based platform. As the email system is a foundational piece of the entire Office 365 implementation, all downstream program elements are dependent on this prerequisite. This has also impacted on availability of IT personnel critical to the program.

A new support vendor has helped resolve several issues. Mailbox moves have resumed, but we are proceeding cautiously to avoid disrupting users. We continue to work through issues to get this element back on track.

Planning continues, in parallel, for the remaining dependent program elements with emphasis on information architecture and clean and classify data.

Following resolution of the technical issues, schedules will be reviewed and adjusted and resources made available to move the program back to green status.

Deliverables / outputs to-date:

- Technical O365 transition & configuration
  - O365 - MS Office products
    - Complete
  - O365 - Outlook mail client
    - Complete
    - Implemented with MS Office. Will be activated with Exchange Mail server.
  - O365 - Exchange Mail Server
    - Underway
    - Delayed due to technical issues.
  - O365 – SharePoint
    - Delayed due to dependence upon Exchange Mail Server.
  - O365 - Additional collaboration and communication tools
    - Implemented and staged for later deployment.

- Information architecture design and roadmap
  - Initiation/planning underway

- Clean and classify data/information
  - High-level approach complete
  - Acquired an external specialist to assist start-up

- File migration to SharePoint and other cloud-based services
  - Preliminary approach complete.
  - Dependent upon information architecture design and roadmap

- Adoption of new tools
  - Initiation/planning underway

- Corporate technical architecture blueprint and standards
  - Preliminary approach under development

- Support for migration of Engineers Canada business systems from on-premises technology
  - IT has provided guidance to AIP project
  - IT has provided guidance to Finance related to new financial system

- Program management deliverables
  - Charter
  - Schedule
  - Budget
  - Communications website

Governance, Strategic Planning, and Consultation Project (GSPC)

The Governance, Strategic Planning, and Consultation Project was launched to support the Board's decision to seek an alternative governance model. The project was launched in May 2017 and will continue until July 2019. It consists of four work packages being conducted simultaneously over the life of the project:

- Updates to the governance model
- Development of a sustainable strategic planning process
- Development of an effective process for ongoing consultation with regulators, the CEO Group and other key stakeholders on behalf of the Board and Engineers Canada
- Capacity building in consultation and strategic planning processes with Engineers Canada staff

Project status report			**Current status**	**Trend**
Project:	GSPC Project	**Cost**	G	G
Reporting period:	April 2018	**Schedule**	G	G
Project manager	Jessica Christou, Change Practitioner, PMP	**Scope**	Y	Y
Program sponsor	Stephanie Price, P.Eng. Interim CEO	**Resources**	G	G
Target completion:	Q3, 2019	**Risk**	G	G
Current project phase:	Execution	**OVERALL**	Y	G
Project budget:	$1.25M over two years ($699,490 in 2018)			

Rationale for overall project status

Overall project status is YELLOW. The complete scope of "Governance 2.0" is still unclear and this has an impact on the scope of work for the Fall 2018 consultations. In the last month there has been some increased clarity but work remains to completely define it. This will have an impact on scope, schedule, and cost. This will be addressed after the strategic plan has been published, in June 2018. The focus of the project is to complete draft strategic plan, work with the Executive Committee to finalize that plan, and have it presented to the Members at the Annual Meeting of Members in May 2018.

The project will move to GREEN status once the scope of the governance work package is fully defined.

Deliverables	**Status**

Fall 2017 regulator consultation Topics: • Revised Guiding Principles • Revised Purposes of Engineers Canada • Defined responsibilities of the Board • Changes to Board structure • Plan to reduce Board size (2 options)	• All consultations completed • A motion to recommend the purposes of Engineers Canada approved at the February 2018 Board Meeting and will be put forward to the Members at the Annual Meeting of Members • Motions regarding all other matters were approved at the April 2018 Board meeting and have been adopted into Board policy • Plans for a smaller board size have been submitted to the members
Spring 2018 regulator consultations Topics: • 2019-2021 Engineers Canada Strategic Plan	• Consultations concluded on April 27th • A strategic plan was published on May 11th • A motion to recommend the 2019-2021 Strategic Plan is on today's agenda.

Fall 2018 regulator consultations
 	
Topics
• Governance 2.0
	• Upon the finalization of the governance recommendations in January, it became apparent that there remained other factors to be considered to have a "complete" governance model. Those additional elements have yet to be finalized. Finalizing what will be included in "Governance 2.0 "will be one of the project's key areas of focus after the spring consultations are completed.
	• Issues:
	  ○ The role of the Presidents Group within governance
	  ○ The role of the CEO Group within governance
	  ○ The role of the Officials Groups is still to be clarified
	  ○ The mandate of directors is still to be clarified
	  ○ Other governance issues may remain outstanding, and must be identified and addressed

Development of a sustainable strategic planning process	• After the 2019-2021 strategic plan is finalized, development of a new ***process*** will commence. This process is expected to have some key differences to the one used this year. In particular, longer timelines are foreseen to allow for strategic foresight and more review time by Members
Development of an ongoing consultation process (with regulators, the CEO Group and other key stakeholders)	• This work is in development, pending learnings from the fall 2017 and spring 2018 consultations
Operationalizing the consultation and strategic planning processes with Engineers Canada staff	• A group of staff early adopters has been formed to participate in the consultation process who will receive advanced training in facilitation and presentation.

Engineers Canada 2018

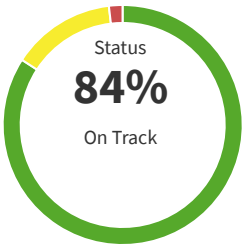
Executive Report

AOP 2018 Q1 May 1, 14:25

Strategic Plan Progress as of Mar 30, 2018

Created on: May 02, 2018

Strategic Plan Progress from Jan 02, 2018 to Mar 30, 2018



Total Status Count: 164

Total Initiative: 167

- On Track 84.1%
- Some Disruption 14.0%
- Major Disruption 1.8%

- In Progress 98.2%
- Completed 0.6%
- Discontinued 1.2%

Goal: 14 **Program:** 41 **Initiative:** 167

Summary

2018 AOP - First Quarter Executive Summary

As indicated in the summaries contained in the following report, the Goals and Programs laid out in the 2018 Annual Operating Plan are generally on-track. The 2018 plan is most challenged by the unusually high number of large projects (four of them - the Governance, Strategic Planning and Consultation (GSPC) project, the Space Program, the Accreditation Improvement Program and the Competency Based Assessment project, see footnote 1) and the volume of other operational activities currently underway. The challenges reflected in the plan are most acute in the demand placed on common services resources such as Communications (including translation), Information Technology, Project Management and Business Analysis.

We remain confident that the new Strategic Plan and resulting work on the 2019 AOP emerging from the GSPC project at the end of Q2 will bring a sharpened focus on priorities from the Regulators and an improved commitment to more effective resource planning.

Conclusions and Lesson Learned

· Better expectation management is required related to the impact of large projects on the organization. As an example, large projects usually conceived by senior leaders often turn to be far more complex, more costly and more difficult to deliver than was originally imagined. Good expectation management in planning of all initiatives large and small is the best method to mitigate disappointment in key stakeholders.

· Improved resource planning capability is required to ensure that staff has realistic and achievable objectives associated with their work.

· Continued effort is required on our prioritization approach (internally and at the Board level) to establish an accepted method to discontinue or defer work when required to assure delivery on the high value initiatives.

Notes to the reader for the following Executive Report generated from Envisio (see footnote 2)

The Annual Operating Plan for 2018 is described and tracked at three levels within Envisio. The three Levels are Goals, Programs and Initiatives. The structure of the Plan is consistent with the Interim Strategic Plan provided by the Board in June of 2017.

Goal

Defined at a strategic level, the ten Goals describe outcomes that Engineers Canada intends to achieve over a multi-year period in pursuit of its overall purpose.

Program

Aligned to Goals, Programs establish achievable targets for groups of activities and projects that will be completed within a one to three-year timeframe.

Initiative

Short-term, detailed groups of activities and deliverables that collectively capture all the work done by Engineers Canada in a twelve-month period. All Initiatives are aligned to specific Programs. For reporting purposes, all initiatives are further decomposed into milestones that are reported on by staff on a quarterly basis. Quarterly reporting occurs at the end of March, June, September and December.

Interpreting the Report

· The Status Pie Charts (coloured green, yellow and red) are generated by updates that are completed by initiative owners (staff responsible for completion of the work) at the end of every quarterly reporting period.

Note: Only initiatives that are In Progress or Overdue are tracked in the Status Pie Chart.

· The bold number in the Status Pie Chart represents the percentage of initiatives that are On Track for that Goal level.

· The Progress Pie Charts are populated based on the updates submitted by the initiative owners as well as the start and end dates of the initiative established during the planning process. Initiative owners can also adjust the progress of the actions (In Progress, Discontinued or Completed) during progress updates.

· The bold number in the Status Pie Chart represents the percentage of initiatives that are Completed for that Goal. It does not reflect partially completed initiatives. For example, if a program contains two initiatives, one of which is complete and the other is in progress but only 25% complete, the bold number will only show 50%. It will only show 100% when the second initiative is fully complete.

· Goal Summaries and Program Summaries are written quarterly by Executive team members based on the updates provided by staff.

The format of this report will remain the same for remainder of 2018. The format of the 2019 Plan will be adjusted to reflect the structure of the new and emerging 2019 – 2021 Strategic Plan, as required.

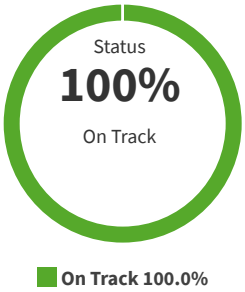
Footnote 1: At Management's discretion, a large project is typically characterized as having a budget of approximately $1M and a duration of approximately a year or more.

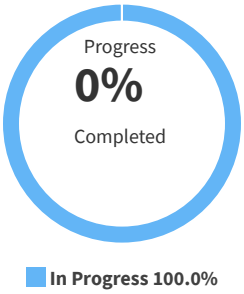
Footnote 2: Envisio is a proprietary application used by Engineers Canada to track progress against its Strategic and Annual Operating Plans (AOP)

Goal 1

Support the implementation to the governance model and policies

There is clarity and alignment on the fundamentals of governance and broad acceptance by the regulators and Board of the governance process.





Total Status Count: 1

On Track: 1

Total Initiative: 1

In Progress: 1

Program: 1 **Initiative:** 1

Summary

Goal Summary

The program supporting this goal is on track. There are currently no impediments to the achievement of this goal in 2018.

Program Status

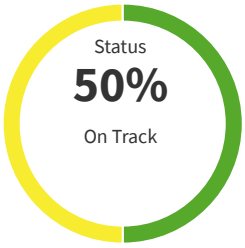
Program 1.1 Support the development of a review and clarification of fundamental Board Responsibilities

The Program is on track.

Goal 2

Develop and implement a consultation program that ensures direction from the regulators is heard and acted upon

Regulators report consistency and usefulness in the consultation process and they feel their views/requirements are heard and responded to. There is broad acceptance by regulators and directors that the process used by the Board, its committees, and Engineers Canada to engage regulators and the CEO Group is efficient and effective.



On Track 50.0%
Some Disruption 50.0%

In Progress 100.0%

Total Status Count: 2

On Track: 1 | Some Disruption: 1

Total Initiative: 2

In Progress: 2

Program: 2 | Initiative: 2

Summary

Goal Summary

The two programs supporting this goal are generally on track. The challenge of sustaining a high-quality consultation process will extend beyond the 2018 planning period.

Program Status

Program 2.1 Support the development of a new process for consultation on strategy and operations

The program is generally on track although some risk exists. Deadlines for development and delivery of the consultation process were deliberately delayed to allow focus on the strategic plan in Q1. The current risks are around quality: Engineers Canada has never had an effective, organization-wide consultation program. The development of a flexible, scalable program is a challenge.

Program 2.2 Organize and participate in consultations regarding the governance enhancement and Board Strategic Plan

The program is on track.

Goal 3

Facilitate the initiation and development of the 2019-2021 Board Strategic Plan and a repeatable strategic planning process

There is year-over-year consistency in the direction provided to Engineers Canada by the Board, with shifts only on an exceptional basis. Broad acceptance by regulators and directors that the Board is providing relevant and timely mid-to long-term direction to Engineers Canada. An effective process for measuring progress towards achieving the strategic directions set by the Board is in place.

On Track 100.0%

In Progress 100.0%

Total Status Count: 1

On Track: 1

Total Initiative: 1

In Progress: 1

Program: 1 | Initiative: 1

Summary

Goal Summary

The program supporting this goal is on track. There are currently no impediments to the achievement of this goal in 2018.

Program Status

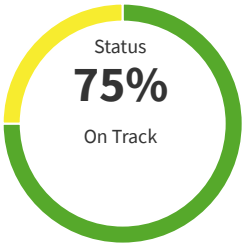
Program 3.1 Support the development of the 2019-2021 Board Strategic Plan

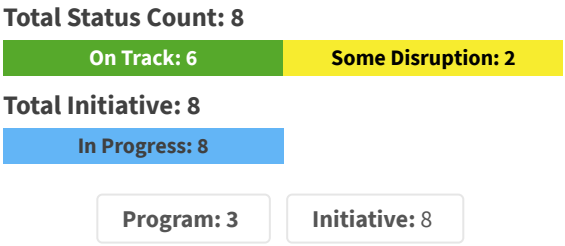
The program is on track.

Goal 4

Support the Accreditation Board and its work plan

The Accreditation Board has the support and expertise required to fulfill all Board requirements including conducting accreditation visits and substantial equivalency reviews; monitoring and improving accreditation criteria and procedures; mentoring Washington Accord partners; receiving and participating in Washington Accord monitoring visits; maintaining strong stakeholder relationships and communications; and participating in conferences and meetings to stay abreast with changes and improvements in engineering education.





On Track 75.0%
Some Disruption 25.0%

In Progress 100.0%

Summary

Goal Summary

The three programs supporting this goal are generally on track. Typical project risks are being managed within the Accreditation Improvement Program to assure the achievement of this goal in 2018.

Program Status

Program 4.1 Support the Accreditation Board and its committees and task force(s)

The program is on track.

Program 4.2 Organize and execute accreditation visits

The program is on track.

Program 4.3 Accreditation Improvement Program

The program is generally on track with respect to schedule and budget. Some ambiguity still exists in the area of scope relative to the technology solution. This is anticipated to be resolved once the detailed scope and deliverables within the vendor contract are established in Q2.

Goal 5

Support the Qualifications Board and its work plan

The Qualifications Board has the support and expertise required to fulfill all Board requirements as per their terms of reference.

Total Status Count: 13

On Track: 13

Total Initiative: 13

In Progress: 13

Program: 3 **Initiative:** 13

On Track 100.0% **In Progress 100.0%**

Summary

Goal Summary

The three programs supporting this goal are on track. There are no impediments to the achievement of this goal in 2018.

Program Status

Program 5.1 Support the Qualifications Board and its committees and task force(s)

The program is on track.

Program 5.2 Deliver the Qualifications Board's 2017-2019 work plan

The program is on track.

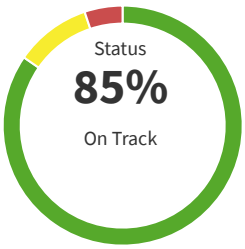
Program 5.3 Continue to improve the consultation process

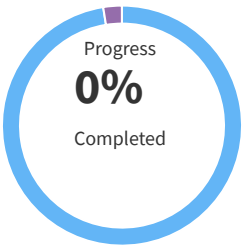
The program is on track.

Goal 6

Deliver national programs in support of regulation and of the engineering profession

Engineers Canada provides national support and national leadership to the engineering profession on behalf of its regulators, so as to promote and maintain the interests, honour, and integrity of the Canadian engineering profession both in Canada and internationally.





On Track 84.6%
Some Disruption 10.3%
Major Disruption 5.1%

In Progress 97.5%
Discontinued 2.5%

Total Status Count: 39

On Track: 33 | Some Disruption: 4 | Major Disruption: 2

Total Initiative: 40

In Progress: 39 | Discontinued: 1

Program: 10 | Initiative: 40

Summary

Goal Summary

The eleven programs supporting this goal are generally on track. Four programs are at risk, and their achievement in 2018 may be compromised. Of those four, two programs are at risk due to lack of resources (personnel) to complete the work. Two other programs are at risk as work has been put on hold pending a decision of the future direction of the Infrastructure Reliability Programs.

Program Status

Program 6.1 Support the officials groups and respond to regulator requests

The program is on track.

Program 6.2 Develop positions to add to the Framework for Regulation as requested

The program is on track.

Program 6.3 Facilitate mobility and foreign credential recognition (NMDB, CBA, Roadmap, IIDD, mobility agreements and register)

The program is generally on track. Some risk exists due to missed deadlines regarding the competency-based project (where development of a communications plan is behind schedule due to the Users' Group's desire to focus on the technical deliverables) and missed deadline regarding the use documentation for the NMDB. These delays will be addressed in upcoming quarters and the initiatives are still expected to be delivered on-time in 2018.

Program 6.4 Identify emerging areas of engineering practice

This program is at risk due to resourcing. There is no capacity to do this work without a researcher on staff. Until a replacement is hired, this initiatives will not progress.

Program 6.5 Conduct research regarding the engineering profession

The program is on track except for initiative 6.5.3, Monitor Canadian Engineering Regulators. This initiative is at risk, due to lack of delivery of a SharePoint site for information sharing, and a system for staff to report their regulator information. Resource constraints are the reason for this delay (VP, Regulatory Affairs). Support required: confirmation of the CEO role in and support for this initiative.

Program 6.6 Investigate globalization and maintain international partnerships

Of the two initiatives in this program, 6.6.1 is at risk and 6.6.2 is on track. Initiative 6.6.1, Infrastructure Resilience Professional Credential,

will be at risk until the decision is made regarding whether and how EC will proceed on the IRP.

Program 6.7 Federal government relations

The program is on track.

Program 6.8 Diversity and promotion

The program is on track.

Program 6.9 Deliver PIEVC to support public policy work and the practice of engineering in Canada and internationally

Of the 3 initiatives in the program, 2 are on track and 1 is at risk. Initiative 6.9.1, Federal Engineer Infrastructure Resilience Professional Program Scoping, is at risk because planning and work are suspended until the decision on the status of IRP for the 2019-2021 strategic plan.

Program 6.10

Management and oversight of trademark portfolio is progressing as required

Goal 7

Develop and publish annual operational plan and budget

Engineers Canada applies a repeatable and continuously improved process for the development of an AOP and budget. The AOP defines and consistently delivers results against the goals defined in the Board Strategic Plan.

On Track 100.0% **In Progress 100.0%**

Total Status Count: 3

On Track: 3

Total Initiative: 3

In Progress: 3

Program: 2 **Initiative:** 3

Summary

Goal Summary

Both programs supporting this goal are on track. There are currently no impediments to the achievement of this goal in 2018

Program Status

Program 7.1 *Maintain and improve the planning process cycle*

The program is on track.

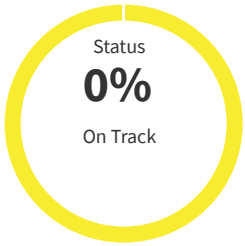
Program 7.2 *Implement new budgeting and monitoring software*

no significant issues or delays. Plan Guru is now being used as the forecasting tool.

Goal 8

Develop progress reporting mechanisms

Relevant, timely and effective management information is available to the Board and all levels of Engineers Canada management



Total Status Count: 1

Some Disruption: 1

Total Initiative: 1

In Progress: 1

Program: 1 **Initiative:** 1

Some Disruption 100.0% **In Progress 100.0%**

Summary

Goal Summary

The program supporting this goal is generally on track. Typical project issues associated with the deployment of a new reporting are being managed and overcome. All deliverables associated with this goal are anticipated to be achieved in 2018.

Program Status

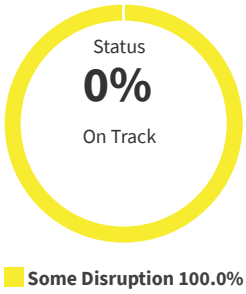
Program 8.1 Maintain and improve use of Envisio for development and monitoring of the AOP

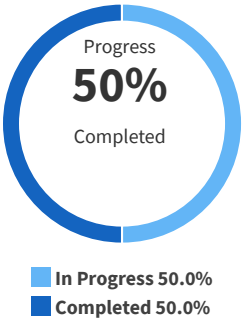
The program is generally on track. However, any delays in delivering the finished English version of the Q1 report on May 4 puts the quality and timing of the final deliverable in both official languages for the May Board meeting at risk. Anticipate the program to be in green in Q2 and for subsequent report deliverables.

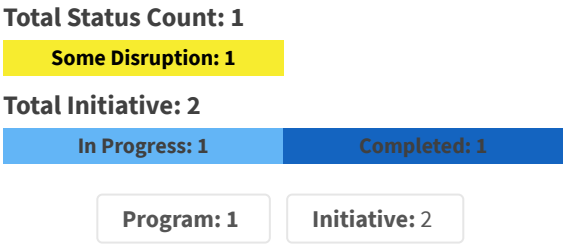
Goal 9

Support the on-boarding of the new CEO

The new CEO is educated and informed on the goals, plans, and operations of Engineers Canada using a documented, logical, and systematic approach.







Goal Summary

The goal is generally on track following the successful on-boarding of the new CEO. Some risk exists with regard to the schedule for completion of the Silver-level certification submission to Excellence Canada. The risk exists due to competing priorities for key resources. Status is expected to be green by the end of Q2.

Program Status

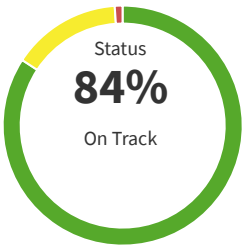
Program 9.1 Maintain and improve commitment to Excellence, Innovation and Wellness standard

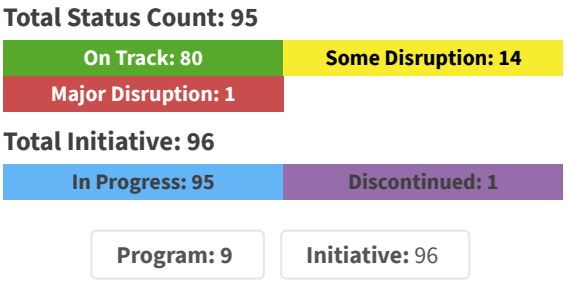
The program is generally on track following the successful on-boarding of the new CEO. Some risk exists with regard to the schedule for completion of the Silver-level certification submission to Excellence Canada. The risk exists due to competing priorities for key resources. Status is expected to be green by the end of Q2.

Goal 10

Provide internal support required for ongoing operations

Engineers Canada applies a systematic approach to the active management and continuous improvement to its key business processes and operations.





On Track 84.2%
Some Disruption 14.7%
Major Disruption 1.1%

In Progress 99.0%
Discontinued 1.0%

Summary

Goal Summary

The nine programs supporting this goal are generally on track. Typical challenges faced by common services departments are being managed on a day-to day basis as individual programs that support Regulators compete for common resources. Our ongoing commitment to improved planning processes and a clear direction and focus from the Board will assure the most effective use of common service resources.

Program Status

Program 10.1 Manage and grow affinity programs

The program is on track.

Program 10.2 Provide communications support to all work

Of the 18 initiatives in this program, 14 are on track, 3 are at risk, and 1 is postponed. The three initiatives at risk are: 10.2.3 - Social media engagement; 10.2.7 - Corporate communications services and brand management; and 10.2.11 - Online document publishing. All three are expected to be back on track by the end of Q2. Initiative 10.2.1, Audience identification project, is postponed pending the completion of the web refresh work to determine next steps.

Program 10.3 Provide program , project, change and process management to all work

The program is generally on track with two exceptions. Travel costs for the Board workshop and AV costs for the Fall Board meeting are anticipated to be more that budgeted. Mitigation will be in place by Q2.

Program 10.4 Provide IT and facilities support to all work

The program is on track.

Program 10.5 Maintain and improve human resource practices

All initiatives for Q1 were successfully completed with the exception of some elements of the Volunteer Management plan and Rewards and Recognition. These initiatives will be back on track in Q2 and the delays should not affect their delivery.

Program 10.6 Maintain and improve financial practices

No significant issues or delays. 2017 audit work has been completed and 2018 financial statements approved by the board. The only

remaining work is the planning in Q3 in preparation for the 2018 audit.

Program 10.7 Maintain and improve operational policies processes

Due to competing priorities milestones in the initiatives for improvement of the Major Meeting Process, the Vendor Management Process and the Operational Policy Review Process were not achieved. Work has been rescheduled for Q2. Green status is anticipated for Q3.

Program 10.8 Support and enable Board work

This program is generally on track. Risks that existed during Q1 have been recently addressed with the hiring of an additional person whose first priority is support of the President. With this resource in place, we expect to be able to move all initiatives to "on track" for the rest of the year.

Program 10.9 The Space Program - Ensure the security, availability, accuracy and integrity of Engineers Canada's corporate information while improving the effectiveness and sustainability of its underlying IT infrastructure

The program is generally on track with one exception. The transition to cloud-based email has occurred slower than scheduled due to an ineffective vendor and competing demands on IT resources. The vendor has now been replaced and progress against the schedule has improved. The program is anticipated to be fully back on track in Q2.

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UNAPPROVED MINUTES OF THE
188th ENGINEERS CANADA BOARD MEETING
April 9, 2018
Teleconference/Webinar

The following directors were in attendance		
R. Kinghorn, President	C. Roney, Past-President	
K. Baig	J. Boudreau	T. Brookes
D. Brown	L. Champagne	D. Chui
S. Devereaux	L. Doig	J. Dunn
G. Faulkner	D. Gelowitz	Z. Ghavitian
S. Gwozdz	J. Holm	W. Hunt
D. Jayas	D. Lynch	C. Parenteau
R. Shreewastav	R. Trimble	
The following director sent regrets		
A. Bergeron, President-Elect		

The following advisors sent regrets		
A. English (CEOG)	I. Puri (NCDEAS)	

The following staff were in attendance		
H. Anderson	G. McDonald	J. Monterrosa
S. Price	J. Southwood	

1. OPENING

CALL TO ORDER AND APPROVAL OF AGENDA

The President called the meeting to order at 2:02 and welcomed the members.

5690 **Moved T. Brookes, seconded J. Holm**

THAT the agenda be approved and the President be authorized to modify the order of discussion.

Carried

2. APPROVAL OF MINUTES

5691 **Moved C. Parenteau, seconded D. Jayas**

THAT the minutes of the February 28, 2018 meeting be approved.

Carried

3. APPROVAL OF 2017 FINANCIAL STATEMENTS

5692 **Moved T. Brookes, seconded D. Gelowitz**

THAT the Board approve the Engineers Canada financial statements for the year ending December 31, 2017, as audited by KPMG LLP, and that the financial statements be placed before the Members at the May 2018 Annual Meeting of Members.

Carried

The Audit committee met on March 21, 2018 with the auditors. This was a clean audit, therefore no management letter was presented.

4. BOARD POLICY MANUAL

5693 **Moved S. Devereaux, seconded W. Hunt**

THAT the Board approve the revised policies and Table of Contents for the new Board Policy Manual.

Carried

This is the same group of policies that were presented in February 2018, with corrections made as noted at that time. In addition, the Guiding Principles (Policy 1.2) and Board Responsibilities (Policy 4.1) have been added.

Concern was expressed on how we will enforce the competency profiles with the regulators. This item is noted for the development of the profiles.

It was suggested that Policy 5.2 (Treatment of Staff and Volunteers) follow CSA standards and that proper job descriptions be maintained for all staff to provide clarity and help avoid conflict.

5. PLANS TO REDUCE BOARD SIZE

5694 **Moved S. Devereaux, seconded J. Holm**
THAT the Board submit the attached plans giving two options to significantly reduce Board size by May 2020 to the Members.
Carried

The Board was reminded that the status quo was not presented as an option as it was not consulted on with the regulators and would not have met the requirements of the Members' motion. While some directors felt that a lengthier discussion was needed, the group was reminded that the plans have to be presented at the Annual Meeting of Members in May 2018 and the Members require adequate notice to review them.

Weighted voting was not proposed based on the feedback received from several regulators during the fall consultations. The implications for committee membership were taken into consideration. It was noted that non-Board members could sit on committees.

6. TERM LIMITS FOR DIRECTORS

6.1

5695 **Moved S. Devereaux, seconded R. Shreewastav**
THAT the Board recommend to the Members that a new section 4.6 be inserted into the Bylaws ***reading:***

4.6 Term Limits

(1) Directors shall be elected to the Board for a term of three (3) years.
(2) No Director may be elected to the Board for more than two (2) successive terms, or a lifetime maximum of six (6) consecutive years.
(3) The foregoing term limits shall not apply to a Director who is elected or confirmed, as applicable, to hold office as President-elect, President or Past-President prior to the expiration of their second term, in which case they may continue on the Board until they have finished serving as Past President.
(4) The Members shall have the authority to extend a Director's term beyond those described above, in extenuating circumstances, in order to ensure effective governance.

6.2

AND THAT the Board recommend to the Members that section 4.1 of the Bylaws ***be amended to state:***

4.1 Term Limits

(1) Each Member shall deliver a list of nominees, who are engineers in good standing, to the Secretary for consideration at the Annual Meeting of Members~~, such list to include a suggested term of 3 years~~.
Carried by two-thirds

7. CLOSING

Given that items on the agenda were completed, the Chair declared the meeting adjourned at 2:46.

Minutes prepared by H. Anderson for:

Russ Kinghorn, FEC, P.Eng.
President

Gerard McDonald, MBA, P.Eng.
Chief Executive Officer

Briefing note

For Board decision

Revised Model Guide: Direct Supervision			Agenda item 3.2a
Purpose:	Approve the Revised Model Guide: Direct Supervision		
Motion(s) to consider:	THAT the National Model Guide: Direct Supervision be approved for distribution.		
Vote required to pass:	X	Simple majority	
		Two-thirds majority	
		Two-thirds: 60% majority (refer to articles 5.7 and 5.8 of the bylaw.)	
Authority:	*The Board is approving updates to the existing 2011 National Model Guide: Direct Supervision*		
Transparency: *(all meetings, debates, and decisions shall be open, except for certain subject matters as described in GP-7.1)*	X	open session	
		In camera, reason (check all that apply):	
			The security of the property of the organization
			Personal matters about an identifiable individual
			The proposed or pending acquisition of assets by the organization
			Labour relations or employee negotiations
			Litigation or potential litigation
			The receiving of advice that is subject to solicitor-client privilege
			Another matter as the Executive Committee or Board determines
Prepared by:	Mélanie Ouellette, Manager, Qualifications		
Presented by:	Dennis Peters, Chair, Canadian Engineering Qualifications Board		

1. Problem/issue definition

In September 2016, the Qualifications Board adopted a Review Protocol for Guidelines and Model Guides. The goal of this protocol is to ensure that QB documents are kept up-to-date by triggering a mandatory review every five years. Given that the existing 2011 National Model Guide: Direct Supervision is over five years old, QB included its review in the 2017-19 Work Plan. This review was completed by the Engineer-in-Training Committee and approved by QB at its April 7th meeting.

There are no substantive changes to the document. The revised content includes the use of the new guidelines template and terminology as well as clarifications on:

- Adequate level of supervision of subordinates by engineers in the provision of engineering services; and,
- Ethical and legal use of the seal by engineers when sealing work and or documents prepared by subordinates.

The approval of the proposed changes will enable QB to provide up-to-date information on direct supervision to regulators, which they can reuse to develop their own guidelines.

2. Proposed action/recommendation

It is recommended that the Board approves the proposed changes so that an updated Model Guide is provided to engineers.

3. Other options considered:

N/A

4. Risks

The Engineers Canada legal counsel has reviewed the QB standard disclaimer to mitigate any legal risks associated with the use of guidelines, model guides, or white papers, including the following statement: "The national model guides do not establish a legal standard of care or conduct, and they do not include or constitute legal or professional advice."

5. Financial implications

N/A

6. Benefits

- Engineering regulators will be able to use the content of the Model Guide to develop their own guidelines, if relevant.

7. Consultation

Consultations held between September 25th and November 29th, 2017 included the following groups:

- Chief Executive Officers Group
- Engineers Canada Board
- National Admission Officials Group

Feedback was received from some individual regulators and their committees. The QB's response to each comment is available on the consultation page (log-in required) and was distributed to the National Admission Officials Group and every individual that provided feedback on the document.

The comments and suggested changes/edits received from the regulators during the review process were excellent and contributed what the Engineer-in-Training Committee considers to be a useful, high-quality document.

8. Next steps (if motion approved)

A communications plan was prepared to disseminate the Model Guide. It is expected that, in addition to being highlighted in the Engineers Canada newsletter, the Model Guide will be promoted on the Engineers Canada website, as well as Twitter and LinkedIn.

An individual email will also be sent to the Chief Executive Officers Group, the Engineers Canada Board, and the National Admission Officials Group to notify them of the final document.

9. Appendices

The Revised Model Guide: Direct Supervision is attached.

National Model Guide: Direct Supervision

BACKGROUND

Provincial or territorial legislation requires all persons practising engineering to be licensed by the provincial or territorial regulator. However, legislations usually include an exemption that allows unlicensed individuals to perform engineering, provided that an engineer directly supervises their work and assumes full responsibility for their work. Therefore, in practice, in many jurisdictions, a portion of engineering work can be carried out by unlicensed individuals, then sealed by supervising engineers who take full responsibility for the service or work.

By sealing a document, a supervising engineer certifies that he or she prepared the work, or that it was done under his or her direct supervision. A reasonable level of supervision should be provided, which does not require the supervising engineer to do everything in the way of monitoring the direction of works under charge.

By assuming responsibility for an unlicensed person's engineering work, the supervising engineer is subject to the same standards of professional conduct and competence as if this supervisor completed the services personally. As sealing indicates that the engineer takes full professional responsibility for the contents of the engineering work or document, it would be unethical for an engineer to seal documents that he or she has not adequately supervised or reviewed or is not adequately knowledgeable or competent to review.

Industry practice has evolved in such a way that engineering tasks are sometimes carried out by an engineer's unlicensed subordinates (hereinafter referred to as subordinates), and then given a final review by the supervising engineer prior to the supervising engineer sealing the work. This level of supervision is not sufficient to fulfill the supervisory requirements of provincial or territorial legislation. Supervising engineers are expected to conduct a thorough review of all engineering documents before affixing their seals if they have not directly supervised the work.

In instances where an engineer is requested to seal a document prepared outside of their regulator's jurisdiction, or by individuals who were supervised by another engineer, a full review of the work is expected by the supervising engineer at a level comparable to that required to prepare the original document.

The purpose of this model guide is to provide guidance on:

1. Adequate supervision of subordinates by engineers in the provision of engineering services;
2. Ethical and legal use of the seal by engineers when sealing work and or documents prepared by subordinates.

This model guide is intended to support regulators in developing their own guidelines on direct supervision for their members. It is not intended to establish the amount of review required by an engineer in cases where the document was not prepared under their supervision. While this model guide does not directly address the use of the seal, regulators are encouraged to provide guidance to their members on their use of the seal while supervising unlicensed subordinates. For more information on the use of the seal, please consult the Model Guide on Authentication of Engineering Documents.

GUIDING PRINCIPLES

A sealed document indicates that the document meets a certain professional standard and that an engineer has accepted responsibility for the work. When supervising the work of unlicensed subordinates, engineers are expected only to supervise work that they are competent to perform by virtue of their training and experience. They are also expected to adequately understand and monitor the work of subordinates before accepting professional responsibility for their work.

The supervising engineer ethically cannot seal a document that has been brought to them by subordinates for final approval if they have had no prior involvement with the document. In cases where prior or early involvement is minimal, the supervising engineer should conduct a full thorough review of the document, including any design issues and relevant calculations. Supervising engineers are encouraged to adopt clear and formal approval processes between themselves and their subordinates to ensure appropriate level of supervision.

The following elements should be considered when determining whether a supervising engineer has met this standard and has satisfied their duty to directly supervise subordinates.

1. **The supervising engineer must have knowledge of all stages of the project.**

The exemption clause contained in provincial or territorial legislation is intended for unlicensed individuals who assist an engineer in the performance of engineering. This exemption does not allow them to engage in engineering at a professional level unsupervised (i.e. are not able to act independently or take professional responsibility for the work).

Supervising engineers have an obligation to both direct and monitor the activities of their subordinates. While direction may be satisfied by involvement in the initial stages or concept development, monitoring implies an awareness of activities and work throughout the process. Therefore, supervising engineers who conduct only a final review of documents, and who are unaware of the work prior to those documents arriving on their desk, have not fulfilled their supervisory role.

Active involvement may be demonstrated through knowledge of the project, development/history of the project, input on earlier drafts, review of particular elements at earlier stages, or evidence of regular consultation throughout the project.

Indicators of appropriately supervised subordinates may include:

- Physical presence of both the supervising engineer and the subordinate at the same workplace (where this is not possible, regular and continuous communication between the two is necessary);
- Periodic documented reviews of the work, and/or consultation of the supervising engineer throughout the project, as opposed to only at the final stage; and
- Adequate documentation of the supervisory activities of the supervising engineer.

2. The supervising engineer must carefully instruct subordinates who carry out field reviews.
When a supervising engineer is directing a subordinate with respect to undertaking field review tasks, the supervising engineer must ensure that such work is carried out in a fashion which meets the definition of direct supervision. Direct supervision of a task that occurs outside the office is, by definition, difficult, and care must be taken to ensure that field reviews meet the standard expected of an engineer.

Direct supervision of a field review would typically take the form of specific instructions on what to observe, check, confirm, test, record and report back to the supervising engineer. Where circumstances go beyond this, or where engineering decisions or judgments are required, contact must be made with the supervising engineer so that the engineering decisions and judgments are made by him or her and, further direction and/or instruction can, at that point, be provided to the subordinate.

When relevant, adequately supervised field reviews will require the supervising engineer to:

- Consider all circumstances surrounding the project and determine whether or not it is appropriate to delegate one or more of the field reviews to a subordinate;
- Consider the level of complexity, or critical nature of the field review to determine whether the quality and accuracy of observations made by a subordinate may be relied upon;
- Consider whether the subordinate carrying out the field review has the appropriate level of training and experience (with consideration for the complexity of the project at hand);
- Discuss with the subordinate the level of effort to be exercised, the level of detail required when reporting, and specific aspects of the construction activities which are to be included in the field review; and
- Review the field reports and do follow ups as required.

When information is not based on the supervising engineer's own observations and investigations, the source of the information shall be clearly stated and cited. This should include exact reference to reports or records, the author and the degree of reliance placed on them. If possible, when the information is derived from unpublished reports or records, an authenticated copy of the source and certificate of the author's professional qualification should be appended.

3. The supervising engineer must have involvement in all engineering decisions made.
Supervising engineers are required to assist their subordinates. The supervised individual, therefore, should not make independent engineering decisions without consultation and approval of the supervisor. Instead, they should be working to carry out or implement the decisions made by their supervising engineer.

Responsibility for engineering decisions does not require that the supervising engineer actively makes each and every decision relevant to a project. Codes and standards of practice that are accepted by the supervisor can guide much of the detailed work. However, he or she must have turned their mind to the relevant issues, monitored the subordinate who carried out the work, given directions where applicable, reviewed and documented each decision and the reasons for making it.

Indicators of appropriately supervised subordinates may include the:

- Availability of the supervising engineer to answer questions regarding engineering decisions made during work on the project; and/or
- Supervising engineer's awareness of relevant design criteria, methods of analysis, selection of materials and systems, field conditions, design constraints, economics of alternate solutions, and environmental considerations.

4. The level of supervision may be adapted to reflect the nature of specific supervisor and subordinate relationships.
In engineering, the working relationship between a supervising engineer and subordinate (e.g. a technologist or engineer-in-training) may span a number of years, or the length of a career. It is likely that under these circumstances, the level of supervision required will evolve to reflect the relative experience of both parties. This is not to say that engineers may substantively waive their supervisory duties for a senior technologist or experienced engineer-in-training, it is intended simply to recognize the realities of the relationship.

As an engineer-in-training works his or her way through the competency building and training process, it is expected that he or she will enjoy increasing autonomy, independence and responsibility. While the level of supervision he or she receives may decrease, it should not disappear.

Indicators of appropriately supervised experienced subordinates may include:

- Assignment of broader or multi-stepped tasks with reviews at intervals of decreasing frequency, as subordinate experience increases; and/or
- Continued availability should the subordinate have questions or require further direction.

CHECKLIST FOR SUPERVISING ENGINEERS
Supervising engineers should ensure the following pre-requisites have been satisfied before the work is started by their subordinates:

1. Assessment of the requirements of the work that is being considered for delegation with respect to the knowledge, experience and capabilities required of the subordinate who will perform the work and identify the tools and other resources required to successfully complete the work.
2. Assessment of the subordinate who is being considered to perform the work to determine whether there is a gap in knowledge, experience and capabilities of the individual compared to the requirements of the work.
3. Arrangements to make available the required tools and other resources identified in (1) or identification of the gaps between the required and available tools and other resources. This includes reasonable access to subject matter experts that must be consulted during the course of the work.
4. Identification of the means by which the gaps identified in (2) and (3) above will be mitigated either directly by the supervisor or by other individuals who have agreed to assist. For engineers-in-training, the supervisor should ensure that they are allowed the opportunity to expand on their existing skills, knowledge, experience and capabilities. The supervisor should delegate work that is identified as a gap to another individual; the process should involve letting the engineer-in-training perform unfamiliar work and have that work reviewed in detail with an engineer as a learning opportunity.
5. Establishment of a scope of work, duties, responsibilities and authorities of the subordinates and the limitations with respect to acting alone.
6. Creation of a plan for the review of the engineering work output of the subordinates, including the timing and method. A subordinate who is delegated engineering work should ensure that an engineer has been identified to assume the professional responsibility for the work and should regularly submit their work to that supervising engineer for guidance and approval.

POTENTIAL PROBLEMS

1. Supervising multiple subordinates

In some firms, senior engineers may find themselves supervising many subordinates; potentially making it very difficult to maintain an active level of supervision or involvement in each project. This is not a defence for inadequate supervision.

However, since subordinates with different levels of experience may require different levels of supervision and attention, a defined maximum number of subordinates per supervising engineer may be inappropriate. Nevertheless, supervising engineers should be careful not to take on responsibility for more subordinates than they can realistically supervise at one time. They should also be cognizant of how their supervisory activities compare to the indicators discussed above.

2. Supervising multi-disciplinary projects

In multi-disciplinary projects, one engineer may find themselves nominally “in charge” of the entire endeavour – they are the designated coordinating engineer. The supervising engineer should not seal documents outside of his or her area of competence and other supervising engineers should be clearly identified. The decision as to who will take responsibility for each section, and direct the work in each

area should be made prior to work starting. A record should be kept of each professional member's contribution and responsibility.

3. Conflict with industry practices

Industry practices may have developed in conflict with the guiding principles set out above and could lead to serious, and perhaps valid, opposition.

In the US, the National Society of Professional Engineers (NSPE) operates a Board of Ethical Review (BER) which reviews specific cases from the profession and publishes their findings as judgments. These cases are intended to be a set of guiding principles and educational tools in professional ethics. In a series of cases where the BER explored the level of involvement required for an engineer to ethically attach his seal to a piece of work, industry concern led to the modification and evolution of the initial holding.

Initially in case 86-2, BER considered the terms "direction" and "control" in the NSPE Code of Ethics and the National Council of Examiners for Engineering and Surveying (NCEES) Model Law, and interpreted them to suggest that an engineer "would be required to perform all tasks related to the preparation of the drawings, plans, and specifications for the engineer to ethically affix his seal." Using this approach, the BER concluded that it was unethical for a chief engineer to seal work they had not conducted themselves or given a detailed review of.

This finding was met with opposition from the engineering community as it was inconsistent with industry practices and left many people in violation of the codes. The issue was revisited in a later case, where the original decision was qualified by allowing that it was ethical to seal documents prepared by someone else, so long as they were checked and reviewed by the signing engineer in some detail. With this decision, the Board stressed the critical importance of the engineer being squarely involved either in the preparation of the work or being responsible for the work they ultimately seal.

Another case, 91-8, further clarified the standard; it concluded that it was ethical for an engineer to seal someone else's work, provided that in exercising direction and control, they perform a careful and detailed review of the material submitted by their staff.

The provincial/territorial procedures should consider the concerns and issues raised in the BER Cases. These procedures should be sufficiently accommodating to allow for a range of personal and industry practices while remaining clear and strict enough to further the engineering mandate to protect the public safety, health and environment.

CONCLUSION

The model guide provided guidance on the required supervision of subordinates and the associated ethical and legal use of the seal by supervising engineers. It is hoped that regulators will use the content of this document to develop their own model guides on direct supervision.

DEFINITIONS

"assist" means to give usually supplementary support or aid [1], to help, to act as an assistant in a subordinate or supportive function. An assistant contributes to the fulfillment of a need or furtherance of an effort or purpose [2].

"control" means to order, limit, instruct or rule someone's actions or behaviour [3]. Synonyms include manage, organize, be in charge of, have power over, be in command of, direct, and rule.
"conduct" means the act, manner or process of carrying on [4], controlling, or directing. It is also, skillful guidance or management [5].

"**delegation**" means directing subordinates, or practitioners who do not have sufficient knowledge and experience to work independently, to undertake certain engineering activities or make certain engineering decisions on behalf of an supervising engineer who retains professional responsibility for the work.

"direct supervision" means the responsibility for the control and conduct of the engineering work of a subordinate.

"**subordinate**" means any person, directly supervised by an engineer who assists in the practice of engineering but is not themselves a supervising engineer [6].

"supervising engineer" means a licensee who determines technical questions of design and policy; advises the client; directly supervises the work of subordinates; is the person whose professional skill and judgment are embodied in the plans, designs, surveys, and advice involved in the services; and who supervises the review of material and completed phases of construction. [7]

"supervision" means the action, process, or occupation of supervising; monitoring and directing (as of activities or a course of action) [8]. When supervising a person or activity the supervisor is to make certain that everything is done correctly, safely, etc. [9]

ENDNOTES

[1] "Assist." Merriam-Webster Online Dictionary. 2009
[2] "Assist." Wordnet. 2009
[3] "Control." Cambridge Dictionaries Online. Cambridge University Press 2009.
[4] "Conduct." Merriam-Webster Online Dictionary. 2009
[5] http://en.wiktionary.org/wiki/conduct
[6] Definition taken from the Nevada Board of Engineers and Architects
[7] Definition taken largely from the definition used by the Michigan Department of Consumer & Industry Services Board of Professional Engineers for "Person in Responsible Charge")
[8] "Supervision." Merriam-Webster Online Dictionary. 2009
[9] "Supervision." Cambridge Dictionaries Online. Cambridge University Press 2009.

Briefing note

For Board decision

Revised Guideline: Principles of Climate Change Adaptation and Mitigation for Engineers		Agenda item 3.2b
Purpose:	Approve the Revised Guideline: Principles of Climate Change Adaptation and Mitigation for Engineers	
Motion(s) to consider:	THAT the National Guideline: Principles of Climate Change Adaptation and Mitigation for Engineers be approved for distribution.	
Vote required to pass:	X	Simple majority
		Two-thirds majority
		Two-thirds: 60% majority (refer to articles 5.7 and 5.8 of the bylaw.)
Authority:	*The Board is approving updates to the existing 2014 National Guideline on Principles of Climate Change Adaptation for Professional Engineers*	
Transparency: *(all meetings, debates, and decisions shall be open, except for certain subject matters as described in GP-7.1)*	X	open session
		In camera, reason (check all that apply):
		The security of the property of the organization
		Personal matters about an identifiable individual
		The proposed or pending acquisition of assets by the organization
		Labour relations or employee negotiations
		Litigation or potential litigation
		The receiving of advice that is subject to solicitor-client privilege
		Another matter as the Executive Committee or Board determines
Prepared by:	Mélanie Ouellette, Manager, Qualifications	
Presented by:	Dennis Peters, Chair, Canadian Engineering Qualifications Board	

1. Problem/issue definition

The current National Guideline on Principles of Climate Change Adaptation for Professional Engineers was approved by the Board in June 2014. During the 2016 work plan consultation process, it was suggested that the issue of mitigation be addressed in a national guideline. As a result, an item was put on the QB work plan towards development a Guideline on Climate Change Mitigation. After careful consideration, QB decided to add the concept of mitigation to the existing Guideline and take this opportunity to update its content.

There are no substantive changes to the document. The revised content includes the use of the new guidelines terminology as well as:

- Introduction of the concept of improving climate resilience which is an increasingly accepted strategy for adapting to the changing climate
- Addition of two principles focused on mitigation of climate change:
    - Integrating climate mitigation into practice; and,
    - Emphasizing innovation in mitigation and adaptation.
- Updated links to reference materials and other forms of guidance in these practice areas
- Alignment with the 2015 World Federation of Engineering Organizations Code of Practice: Principles of Climate Change Adaptation for Engineers
- Additional reference materials from Ouranos and the American Society of Civil Engineers on methodologies for climate analysis and projection as well as integrating applications into day-to-day practice

The approval of the proposed changes will enable QB to provide up-to-date information on climate change adaptation and mitigation to engineers.

2. Proposed action/recommendation

It is recommended that the Board approves the proposed changes so that an updated Guideline is provided to engineers.

3. Other options considered:

N/A

4. Risks

The Engineers Canada legal counsel has reviewed the QB standard disclaimer to mitigate any legal risks associated with the use of guidelines, model guides, or white papers, including the following statement: "The national guidelines do not establish a legal standard of care or conduct, and they do not include or constitute legal or professional advice."

5. Financial implications

N/A

6. Benefits

- Engineering regulators:
    - Regulators will be able to direct their members to the Engineers Canada guideline to support their practice.
    - Additional content for continuing professional development of their members in a rapidly evolving area of practice.
- Engineering profession:
    - Engineers will have a Guideline that can support their practice.
- Others (public, government, higher education institutions, individual engineers, etc.):
    - The public will benefit from having engineers that have an increased understanding the principles of practice in climate change adaptation and mitigation.

- The public understands the role and responsibilities of engineers for dealing with the effects of extreme weather and future climate.

7. Consultation

Consultations held between September 25th and November 29th, 2017 included the following groups:

- Chief Executive Officers Group
- Engineers Canada Board
- Environment Officials Group
- Practice Officials Group

Feedback was received from some individual regulators and their committees. The QB's response to each comment is available on the consultation page (log-in required) and was distributed to the Environment Officials Group, the Practice Officials Group, and every individual that provided feedback on the document.

The comments and suggested changes/edits received from the regulators during the review process were excellent and contributed what the Environment and Sustainability Committee considers to be a useful, high-quality and current document.

8. Next steps (if motion approved)

A communications plan was prepared to disseminate the Guideline. It is expected that, in addition to being highlighted in the Engineers Canada newsletter, the Guideline will be promoted on the Engineers Canada website, as well as Twitter and LinkedIn.

An individual email will also be sent to the Chief Executive Officers Group, the Engineers Canada Board, and the Practice Officials Group to notify them of the final document.

A presentation on the guideline will be prepared for outreach and educational purposes that can be presented via webinar or on-site upon request of any regulator.

9. Appendices

The Revised Guideline: Principles of Climate Change Adaptation and Mitigation for Engineers is attached.

National guideline: Principles of climate adaptation and mitigation for engineers

Summary

The climate is changing. Historical climatic design data is becoming less representative of the future climate. Many future climate risks may be significantly under-estimated. Engineers cannot assume that the future will be like the past. Historical climate trends cannot be simply projected into the future for engineering planning, design, operations and maintenance of infrastructure.

The best available scientific evidence indicates that the global climate is changing at an unprecedented rate and that emissions of carbon dioxide and other greenhouse gases (GHGs) from human activities are contributors to this change. Recently recorded climate change is associated with more extreme weather events, and the frequency of these events is expected to increase over time. These events will intensify the damage and failure of infrastructure. Any mitigation of human-induced climate change is predicted to have multiple benefits, such as:

- Reduction in air-pollution
- Reduction in energy use that is anticipated to increase due to the changing climate
- Reduction in disruption of society through coastal hazards and extreme weather events, and, consequently, reduction in the amount of adaptation required
- Improvement of physical and mental well-being
- Biodiversity sustainability

Engineers have important roles and responsibilities in helping guide society to adapt to these changes and to reduce GHG emissions to mitigate climate change. Accelerated climate change presents new and evolving challenges, opportunities, and risks that will need to be considered by engineers in the fulfillment of their professional responsibilities.

Engineers Canada and its constituent associations (the engineering regulators) are committed to raising awareness about the continued releases of GHG emissions and the potential impacts of the changing climate as they relate to professional engineering practice. The commitment is to provide information and assistance to engineers in managing implications for their own professional practice. Engineers are encouraged to keep themselves informed about the changing climate and continued technological developments and to consider potential impacts on their professional activities.

This national guideline is intended to set out general concepts and principles to inform engineering professionals on why adaptation to and mitigation of climate change is relevant in professional practice. The guideline helps inform engineers of the guiding principles, how to address the implications of climate change in their professional practice, and most importantly, how to create a clear record of the outcomes of those considerations.

The guideline consists of eleven principles that constitute the scope of professional practice for engineers to mitigate climate change and initiate climate actions that support the sustainability and

resiliency of engineered systems, particularly for civil infrastructure and buildings. The principles are summarized into three categories:

Category #1 - Professional judgment

Principle # 1: Integrate climate adaptation and resiliency into practice

Principle # 2: Integrate climate mitigation into practice

Principle # 3: Review adequacy of current standards

Principle # 4: Exercise professional judgement

Category #2 - Partnerships

Principle # 5: Interpret climate information

Principle # 6: Emphasize innovation in mitigation and adaptation

Principle # 7: Work with specialists and stakeholders

Principle # 8: Use effective language

Category #3 - Practice guidance

Principle # 9: Plan for service life and resiliency

Principle # 10: Apply risk management principles for uncertainty

Principle # 11: Monitor legal liabilities

The principles support sound professional judgment for engineering practice. Mitigating and adapting to the changing climate presents beneficial opportunities to reduce costs, maintain levels of service, and protect public health and safety.

Use of language in this guideline

National guidelines use the word “should” to indicate that, among several possibilities, one is recommended as particularly suitable without necessarily mentioning or excluding others; or, that a certain course of action is preferred, but not necessarily required; or, that (in the negative form) a certain course of action is disapproved of, but not prohibited (“should” equals “is recommended that”). The word “may” is used to indicate a course of action permissible within the limits of the guideline (“may” equals “is permitted”).

Engineering regulators who wish to adopt a version of this guideline, in whole or in part, are advised to consider substituting the word “shall” for the word “should” to indicate requirements that must be

followed ("shall" equals "is required to"). Regulators are encouraged to reference and provide links to applicable provincial or territorial legislation, policies, and regulations that mandate consideration of the changing climate.

Engineering regulators who wish to reference, instead of adopting, these guidelines in whole or in part are cautioned that national guidelines are voluntary and not binding on engineering regulators or individual engineers.

1. Introduction

1.1 Background

The primary duty of engineers is to hold paramount the safety, health and welfare of the public, the protection of the environment, and health and safety within the workplace.

Current scientific knowledge concludes that the climate is changing and will continue to change, at a rate that is likely accelerated by anthropogenic releases of greenhouse gases. Furthermore, evidence suggests that climate change has led to changes in climate extremes such as heat waves, record high temperatures and, in many regions, heavy precipitation in the past half century (Intergovernmental Panel on Climate Change 2014). The IPCC, in its report *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (2012) notes that climate extremes, or even a series of non-extreme events, combined with social vulnerabilities and their exposure to risks can produce climate-related disasters [1].

Changing climate conditions, particularly weather patterns that deviate from historical climate ranges, may adversely affect the integrity of the design, operation, and management of engineered systems. In some cases, changing climate conditions can pose unaccounted for risks. It is the engineer's duty to take all reasonable measures to ensure that those systems appropriately anticipate the impact of changing climate conditions.

The engineer's job is to assess and minimize such risks within the scope of their work, which includes being a trusted advisor to the client while balancing client needs and the project budget. This understanding imposes a responsibility of due diligence on the engineering profession to address the issue of climate change within engineering works. This plays out in two ways. First, engineers and those who retain them for design of public facilities and infrastructure will have to accommodate climate change into their work to assure public health and safety. Second, engineers that do not exercise due diligence regarding changing climate may ultimately be held personally or jointly liable for failures or damages arising from climate impacts on engineered systems. Scientific literature indicates significant departures from historical climate averages occurring globally, and engineering designs must account for an expanded range of climate in their operating environments.

Engineers have an important role to play in mitigating the rate and magnitude of climate change, to the extent that is possible through reduction GHGs. In Canada, the federal and provincial regulatory environments mandate measures to decrease, monitor, and report GHG emissions and reductions, in

addition to the development of carbon pricing and market mechanisms. Engineers are central to the development and implementation of strategies and technologies that will lower carbon emissions.

Engineers have a wide diversity of occupations and responsibilities. Many are involved in different types of economic and product development that must be cost effective, as well as socially and environmentally responsible. Engineers develop new projects and public infrastructure and keep existing facilities operating effectively and efficiently. They explore resources and design economically and environmentally sustainable methods of developing these resources.

Engineers work as employees, employers, procurement and selection officers, researchers, academics, consultants, and in regulatory and managerial roles. They frequently work in environments where they must collaborate with other specialists as part of multi-disciplinary teams. An individual may or may not have control of, or be solely responsible for, a project. To the greatest extent possible, engineers should understand and manage the public health and safety aspects of the project.

Engineers are expected to exercise professional judgment and due diligence in the execution of their work. That expectation includes practising in accordance with the regulators' code of ethics for the jurisdiction in which they are licensed, complying with provincial and federal laws, restricting practice to areas of personal expertise, and practicing in accordance with established standards.

Engineers may or may not be directly managed by other engineers. Regardless, engineers will expect to be supported in making decisions that appropriately accommodate changing climate conditions even if data pertaining to these changes is sparse. Management and other team members also have a societal responsibility for the design, construction, operation, and management of safe engineered systems that may be impacted by changing climate.

Legislation and regulation in the field of climate change adaptation and mitigation is evolving rapidly. Concurrent with such regulation, engineers need guidance on how to address climate change in their professional work. This guideline is intended to fill this gap.

1.2 Limitations

While engineers have a duty to inform their clients or employers regarding matters related to climate change adaptation, mitigation, and resiliency that may impact the professional activities for which they are responsible, they are generally not in a position of authority to ensure that the appropriate action is taken.

Engineers are not expected to assume responsibility for considering the implications of climate change adaptation in engineered systems or mitigation efforts beyond the scope of their authority. The engineer is not responsible for implementing solutions that address climate change adaptation if it is not within the engineer's scope of authority. The scope of authority is provided by the client or the employer.

While the professional engineer presents the alternatives and rationale for implementing solutions that address climate change adaptation or mitigation, the decision on the form of such solutions remains with the client or employer. Nevertheless, in keeping with professional obligations, engineers can and should appropriately communicate the risks associated with ignoring recommendations related to climate change adaptation or mitigation to their employer or client. Such communications should be clearly documented in the appropriate files.

If warranted, due to the long-term implications to public safety and/or the environment caused by the engineer's recommendations being ignored, the engineer may have to communicate the concerns more broadly if all other means, including internal communication with the client or employer, are exhausted.

1.3 Scope

This National Guideline is strictly advisory in nature and intended to assist engineers to balance competing interests as an essential element of practice.

This document, through amplification and commentary of each principle, summarizes how engineers should strive to adjust their practice to anticipate the effects of a changing climate on engineered systems and ensure resilience.

International scientific knowledge on climate change has also advanced to the point where anthropogenic GHG emissions are known to accelerate climate variability, thereby necessitating climate mitigation efforts. Energy efficiency measures, adoption of renewable energy, and innovative low carbon technology are three principles that can specifically address climate change mitigation.

1.4 Purpose

The purpose of the national guideline is intended to inform, guide, and encourage engineers, Certificate of Authorization/Permit to Practice holders, and consulting engineering firms to proactively manage the impacts of a changing climate on engineered systems. The document also provides a basis for understanding and accepting definitions for key terms and concepts applied in assessing climate-induced risks. It suggests adopting energy efficiency measures, renewable energy options, and innovative low-carbon technologies and other strategies to reduce GHG emission and support efforts to reduce our future climate's rate of change and variability.

This guideline offers a considered interpretation of the responsibilities of engineers to adapt to a changing climate and mitigate the change. The application of the principles described in this guideline will always be a matter of professional judgment.

1.5 Definitions

This guideline uses terms that may not be used in an engineer's day-to-day practice. These are defined in Appendix A. As this document evolves, new definitions will be added as necessary.

2. Climate change and engineers

Engineers are bound by their code of ethics [3] to:

Hold paramount the safety, health, and welfare of the public and the protection of the environment and promote health and safety within the workplace

Furthermore, engineers are bound to:

Be aware of and ensure that clients and employers are made aware of societal and environmental consequences of actions or projects and endeavor to interpret engineering issues to the public in an objective and truthful manner

These expectations provide engineers with a duty of care and a foundation for addressing or discharging their professional responsibilities. That is, engineers must be mindful of the public health and safety aspects of their professional activities and are also bound to disclose issues that could compromise the integrity of their professional work.

Climate change imposes a new and evolving pressure on the practice of engineering. How does this play out in real professional practice?

Professionals can only be accountable for establishing that their work addresses concerns what could reasonably be identified given the state of knowledge at the time they executed the work. The word "reasonable" is used throughout this document. In engineering practice, "reasonable" is defined by the standard of practice. The expectation is that engineers should behave in a way that draws on the collective experiences of how members behave in the same or similar circumstances.

It is notable that this guideline does not require that the professional be an expert. Rather, it is based on how a typical engineer, with a normal level of professional experience and training, would discharge their responsibilities. However, this does not absolve engineers from keeping themselves abreast of climate science as it relates to their professional practice. In fact, it is incumbent on engineers to learn about future climate projections, adaptation and mitigation tools, and resources relevant to their work to be able to:

- hold paramount public health and safety;
- protect the environment; and,
- offer services in consideration of the changing climate to their clients where appropriate.

This learning can be through a combination of professional development events, conferences, courses, workshops, seminars, webinars, technical talks, and self-study. In engineering practice, when engineers identify areas of practice that are outside of the scope of their training and expertise, they are required to seek input and advice from other qualified professionals who do have that expertise.

It is important to recognize that engineers have a higher standard of practice than a layperson. They have more years of training and experience with engineering matters and are uniquely qualified to

identify and respond to issues that may compromise the public health and safety implications of their work. In this way, the engineer will normally be held to a standard of practice that exceeds that of a layperson but is somewhat less than that of an expert. This is not always clearly defined and is a source of regular review by professional engineering regulators and the legal profession. As the body of knowledge increases, new understandings developed by experts become generally adopted within normal engineering practice. As a result, the measure of a reasonable standard of practice will continue to evolve over time. This is the fundamental reason why codes and standards undergo regular review and revision.

The guideline offers a series of principles for engineers to incorporate into their practice to reflect an understanding that the climate is changing and that historical weather and climate information traditionally used by the professional may require adjustment. Such adjustments would account for the changing climate, based on scientifically defensible methods and projections that are documented as part of the engineering process. This guideline outlines principles for demonstrating due diligence by adjusting normal engineering practice to reasonably address climate risks given the current level of understanding of the issue.

3. National guideline principles

The principles that comprise the national guideline are divided into three categories. Within each category there are several principles that engineers should apply within their professional practice.

The eleven principles constitute the professional practice required to initiate climate change adaptation actions that will improve resiliency and reduce the rate and magnitude of change. Each principle is described in the following format:

- The principle defined;
- Amplification and commentary on the principle; and
- Suggested implementing actions with examples for reference and planning.

Engineers may identify additional actions or may decide that only a subset of the suggested actions is necessary or appropriate.

3.1 Principle # 1: Integrate Climate Adaptation and Resiliency into Practice

All engineers are responsible and need to be engaged.

Engineers should integrate an understanding of the impacts of climate change, weather, and resiliency into the normal, day-to-day design, operation, maintenance, planning, and procurement activities for which they are professionally responsible. These activities constitute the scope of engineering work.

3.1.1 Amplification

Engineers participate in many facets of the Canadian economy. Instituting meaningful change into professional practice requires recognition of this reality. Simply changing professional expectations in one element of the design, supply, construction, or operation chain will be difficult and ineffective. Ultimately, professionals can only institute adaptation measures when there is a broader acceptance that these actions are required.

Improving the resiliency of engineered systems such as civil infrastructure to the impacts of extreme weather and changing climate serves as the basis for broader acceptance of adaptation measures. According to the Intergovernmental Panel on Climate Change (2014), resilience is:

> "the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation."

It is noted that the terms "climate resilience" and "green resilience" are also part of current discussions relating to public sector emergency preparedness and management.

Asset failures result in service risks (disruptions) which in turn affect community risks pertaining to health, safety, economic, social, and environmental well-being. Community risks are reduced through redundancies and emergency preparedness. Infrastructure resiliency depends on the type of threat and the vulnerability of the asset to this threat, as well as recovery plans. Establishing resiliency objectives for infrastructure requires an assessment of:

- **Robustness**: the inherent strength or resistance in a system to withstand external demands without degradation or loss of functionality.
- **Redundancy**: system properties that allow for alternate options, choices, and substitutions under stress.
- **Resourcefulness**: the capacity to mobilize needed resources and services in emergencies.
- **Rapidity**: the speed with which disruption can be overcome and safety, services, and financial stability restored.

Engineers engaged in each sector of the Canadian economy should integrate climate adaptation and resiliency considerations into their professional work. It is unreasonable to place this entire obligation on the much smaller group of professionals that work specifically in design functions. Without support from the engineering profession, these practitioners may not be able to gain approval for adaptation measures that meet or exceed codes, standards, or professional guidelines, especially if those changes result in higher overall project costs.

Understanding the potential of adverse impacts from climate change is especially relevant for those engineers that are in significant decision-making positions with respect to incorporating adaptation measures. These professionals establish the environment within which other professionals must

function. They should establish organizational objectives that recognize how climate change may demand professional practice that exceeds codes, standards, and professional guidelines. Proper recognition and support of such organizational objectives may increase acceptance for higher project costs to address climate adaptation. By establishing this environment, the decision-maker enables their subordinates and contractors to take reasonable actions to address climate change in their professional works.

Similarly, those professionals that work in procurement positions that include setting project specifications and reviewing competitive proposals should include consideration of current and future climate impacts as a requirement on their projects. Achieving sustainable infrastructure that will last its whole service life without major damage or disruption will lower life-cycle costs.

Foregoing consideration of climate change impacts in project scope may not lead to life-cycle cost avoidance. The costs of future damage and disruption of service may far outweigh the incremental costs of anticipating the changing climate. Engineers engaged in and advising on infrastructure specification and procurement should recommend including climate considerations. Engineers in management positions or advising management should recommend the provision of sufficient financial resources or proposal evaluation incentives to support the integration of climate considerations.

Finally, those engineers in maintenance and operation functions see the progressive impact of creeping climate change. They should work to ensure the sustained operation of the systems for which they are responsible. They should also clearly identify the impacts to which they are responding to other professionals and managers/owners. These professionals have the capacity and experience to incorporate appropriate changes in policies and procedures as well as their professional works, codes, standards, and guidelines to reduce the impacts in the longer term.

Engineers rely on the work of other engineers and other professionals to support their work. It is critical that the entire profession creates an environment where adaptation to changing climate is not only an accepted part of daily practice, but also a guiding principle of professional practice.

3.1.2 Implementing actions

The following actions can help engineers integrate the consideration of, and adaptation to, climate into their scope of practice to improve resiliency. These considerations will vary widely across disciplines and the nature of the engineering works or tasks being performed. Not all engineers will need the same level of integration into their practice; however, virtually all engineers engaged in direct and indirect work associated with all types of civil infrastructure and built environments should be aware of climate change issues and always consider if and how their work could be affected by current and future climate.

For designers, the need to incorporate climate change through adaptation and resiliency considerations into engineering works can be realized through the following actions:

1. Listing the climate change predictions and potential impacts for the area where the project is located;
2. Discussing the aspects of the project the engineer believes could be impacted;
3. Detailing what has been done in the design to reduce those impacts;
4. Discussing the climate-relevant national, provincial, and municipal level codes, policies and bylaws establishing the level of acceptable risk, and identifying the client's level of risk tolerance;
5. Detailing what additional/revised operations and maintenance (O&M) and inspection procedures are recommended within the service life cycle of the project; and
6. Outlining policies and procedures to restore interruptions to service or loss of functionality, or to repair damages from extreme weather events.

All engineering disciplines should use professional judgment to modify the actions noted above to address the specific job or circumstance.

The following additional actions are suggested as good practices. Not all may be appropriate to every situation, nor is the list complete. The engineer is encouraged to give thought to these and other actions that may be appropriate to the situation. Any successful practices or improvements should be reported to the engineer's regulator and Engineers Canada. These can be incorporated into the next edition of this guideline.

- Maintain a record of actions undertaken within daily practice that facilitate addressing climate change issues.
- As appropriate, pursue education and training on climate and meteorology to provide a scientific grounding on the subject matter that forms a basis for climate change adaptation actions.
- If an engineer is responsible for specifying engineering work, the specification should explicitly include:
    - Considering the long-term sustainability and resiliency of the infrastructure over its anticipated service life
    - In procurement, allowing margins to accommodate climate adaptation measures
    - In management, being receptive to recommendations that address climate risk and improve resiliency
- Review operations, maintenance and management procedures and practices and adjust as necessary to accommodate future climate risks and ensure any reduction measures continue to function as originally designed.
- Consider using approaches that balance economic, environment, and social (sustainability) considerations in recommending and implementing adaptation measures.

- Explain to the client the solution in economic terms (i.e. through the use of net present value, incremental capital costs, and estimated avoided costs) to aid decision making.
- Explicitly identify the requirement for climate adaptation measures in contracted engineering work and reward proposals to include such recommendations.
- In defining environmental impact assessment terms and conditions, include the requirement to explicitly identify and explain the climate change implications to the proposed project.

3.2 Principle # 2: Integrate climate mitigation into practice

All engineers have a responsibility to reduce GHG emissions.

Engineers should investigate and evaluate options for minimizing GHG emissions whenever there is potential for such emissions from current operations and installations. For new installations, the availability and potential for enhancing energy efficiencies, adopting renewable energy options and/or substitution of low carbon technologies, and carbon sinks should be explored.

3.2.1 Amplification

There is mounting consensus that human behaviour is changing the global climate. Globally, reducing the annual 30 billion metric tons of carbon dioxide emissions [2] from stationary and mobile sources is a gigantic task involving both technological challenges and monumental financial and societal costs.

Mitigation, as defined by the United Nations Framework Convention on Climate Change (UNFCCC), is any intervention that seeks to either reduce the sources of, or enhance the sinks for, GHGs. Sources can be reduced in diverse ways, including using fossil fuels more efficiently, switching to renewable energy sources, and reducing the carbon footprint of buildings. Similarly, a sink refers to forests, vegetation, or soils that can absorb carbon dioxide.

Engineers identify, develop, and use the best technological solutions that affect the daily life of every citizen of the world. The present mitigation activities range from energy conservation, to carbon-neutral energy conversions, to advanced carbon combustion processes that produce no GHGs and/or enable carbon capture and sequestration, to other advanced technologies in renewable energies. The issues surrounding climate change mitigation involve multidisciplinary science and technology.

Engineers can and must provide leadership in mitigating climate change and moving society towards renewable energies. Energy will progressively cost more since the costs for carbon capture and storage or the detrimental effects of climate change are not currently factored into the cost of energy. All branches of engineering will need to work cooperatively to ensure faster progress. [4]

Controlling GHG emissions is the essential component of climate change mitigation. This may entail measures such as material substitution, process modification, process controls, alternative technologies, and innovation. Subsequently, mitigation is largely specific to the sector of interest.

Engineers need to consider the following for mitigating climate change [4]:

- Does the project generate GHG emissions or affect the removal of carbon dioxide from the atmosphere?
- To what extent have GHG emissions been accounted for in project planning?
- Can the project be adjusted to reduce adverse contributions to a changing climate?
- What measures could be taken to assess and improve climate performance during operation?

An engineering input to carbon mitigation would include a comprehensive approach to the identification and advancement of technologies under the following themes [5]:

- Energy saving or efficiency measures;
- Standards to encourage the use of sustainable materials and renewable energies;
- Alternative propulsion technologies and fuels;
- Electric propulsion, especially for vehicles;
- Electric transmission, distribution, and storage using smart grids;
- Environmentally sound carbon and capture technologies; and
- Nuclear waste management and next-generation nuclear power plants.

By adopting and implementing technologies that are currently available, the expected increases in carbon emissions due to population and economic growth could largely be offset. Best of all, many measures would help to offset increased energy costs [6].

Many technologies not only reduce carbon releases, but also other pollutants that contribute to atmospheric and water pollution. With an added emphasis on reducing carbon emissions, engineers can greatly contribute to the broader and more comprehensive objective of sustainability.

3.2.2 Implementing actions

Opportunities to reduce GHG emissions from all aspects of the project should be sought during the procurement phase of a project. While incorporating mitigation measures, such as increased energy efficiency or enhanced sinks for GHG emissions, may add to the initial project costs, the resulting energy savings over the lifecycle of the project could compensate for the higher initial cost.

The following actions would help engineers integrate mitigation into their scope of practice and contribute to the goals of sustainability. All engineering disciplines that perform design work need to take the potential for carbon releases into consideration, while civil, chemical, electrical, and mechanical engineers should consider climate mitigation in essentially all of their projects. The following actions are suggested for consideration in each project:

- Identify all potential sources of GHGs related to the scope of the project;
- Given the materials and processes on-site, quantify the potential releases of GHGs;
- Seek opportunities to improve energy efficiency or reduced energy consumption as well as evaluate renewable energy options;
- Compare the level of potential GHG emissions with alternative technologies and approaches;
- Suggest the use of technologies that minimize the release of GHGs;
- Examine options for controlling the GHGs if appropriate;
- Ensure recommended technologies will be aligned with other management requirements;
- Consider mitigation opportunities through material substitution, process modification, process controls, or other innovations.

All engineering disciplines should use professional judgment to modify the above actions to address the specific project. Not all actions are necessary or cost-effective in all cases.

The following additional actions are suggested as good practices. Not all may be appropriate to the situation at hand nor is the list complete. The engineer is encouraged to give thought to and implement other actions in addition to those listed here. Any successful practices or improvements should be reported to the engineer's regulator and Engineers Canada. These will be incorporated into the next edition of this guideline.

- Establish baseline or status quo GHG emissions prior to the start of any project.
- Estimate potential GHG emissions at the planning phase for projects.
- Build, install and operate systems to monitor and measure GHG emissions from the project start-up and ongoing operations.
- Investigate available cost-effective alternative clean technologies for given project requirements.
- As appropriate, pursue education and/or training on climate change mitigation developments and on the status of alternative technologies to form an informed recommendation on climate change mitigation measures.
- If an engineer is responsible for specifying engineering work, the specification should explicitly include:
    - Consideration of the long term GHG implications of the cost-effective approach versus cost implications of any alternative technologies that may ensure greater sustainability;
    - In procurement, allowing for margins to enable the selection of more sustainable solutions, such as enhanced energy efficiency;

    - In management, recommendations that minimize and eliminate GHG emissions and contribute to sustainable development.
- Review operations, maintenance, and management procedures and practices and adjust as necessary to minimize GHG emissions.
- Consider using approaches that balance economic, environment, and social (sustainability) considerations in recommending and implementing mitigation measures.
- Explicitly identify the requirement for climate mitigation measures in contracted engineering work and select proposals that enhance sustainable development.

In defining environmental impact assessment terms and conditions, include the requirement to explicitly identify and explain the climate change and sustainability implications of a project.

3.3 Principle # 3: Review adequacy of current standards

Review applicable codes and standards and advise stakeholders on potential revisions or updates.

Engineers should review the local design standards used within their professional practice from both an adaptation and a mitigation perspective. These standards should reasonably represent the current and anticipated climate that the engineered system will experience over its useful operating life. Standards—for example, those dealing with energy efficiency—should be assessed to determine if they are reflective of current technological capabilities or are based on less efficient technology.

3.3.1 Amplification

Given the potential impact of changing climate on engineering works, it may no longer be appropriate for professionals to simply rely on the veracity of codes, standards, and professional guidelines that include embedded assumptions about climate or available technology. The professional should actively work towards the adoption of any changes in codes, standards, and professional guidelines, as appropriate.

Engineers must adhere, as a minimum, to published codes and standards, even when evidence may suggest that designing below a code or standard is possible. Codes and standards serve as a minimum requirement and should be viewed as the starting point for application to the engineering work. Often these must be exceeded to assure safety or to accommodate a local condition of future climate considerations.

Engineers should routinely review and challenge the tools used in professional practice. This is an outcome of Principle # 1, but the focus here is broader than the assessment of an individual project or work conducted by the professional. It is to ensure that knowledge gained through ongoing review of the tools and processes is shared and ultimately universally represented in the tools of the professional discipline. Once an engineer has identified a deficiency in a code, standard, or professional guideline, he or she has an obligation to share the findings within the professional community. This will reduce the risk that the deficiency will creep into other professionals' work and create threats to public health and safety.

The obligation to review tools and processes also covers those used by engineers in their daily practice, including procedures, codes of practice, rules of thumb, etc. These should be evaluated within the context of each situation to which the engineer applies the tool on a routine basis. Small modifications should be documented and shared within the group of professionals who normally use them. For example, do historical return periods in available flood statistics accurately reflect recent trends in flooding? In many cases, a 1 percent (1:100 year) rain event from an older historical record may not reflect conditions where flooding has become more frequent in recent years.

3.3.2 Implementing actions

The following are some suggested actions engineers should undertake in their use of current codes and standards. Engineers should advise other engineers, as well as the governing bodies responsible for the specific codes and standards, when a code or standard warrants review based on evidence from ongoing practice.

Not all actions may be appropriate to the situation nor is the list complete. Engineers are encouraged to develop their own successful strategies. Notifying their regulator as well Engineers Canada will enable practice guidelines to be updated to reflect most current and best/better practices.

- Apply the most up-to-date revisions of relevant practice guidelines, codes, and standards, as a baseline from which climate change adaptation or mitigation measures are applied.
- Create a file of adjustments made to codes, standards, and assumptions to accommodate changing climate or reflect improvements in technology. As appropriate, communicate adjustments:
    - Within the department, division or organization;
    - To employers and clients;
    - To professional societies, associations or groups; and
    - To standards organizations and regulators who developed the codes and standards.

3.4 Principle # 4: Exercise professional judgment

Evaluate and document the impact of climate and achieving resiliency for engineering works, and consider opportunities for advancing climate change mitigation.

Engineers should apply a reasonable standard of professional judgment to consider changing climate conditions, resiliency, and mitigation opportunities within their professional practice.

3.4.1 Amplification

The overall intent of this principle is that engineers should consider the implications of climate change, both from an adaptation and a mitigation perspective, and from the perspective of improving resiliency in their professional practice. They should create a clear record of the outcomes of those considerations to provide the rationale for their professional judgement.

Inherent in engineering practice and professional judgment is the concept of the "factor of safety." How does an engineer determine an appropriate factor of safety? In some instances, such as pressure vessels, minimum factors of safety are mandated by codes and standards. However, this is often not the case with our changing climate.

The factor of safety is usually expressed as a ratio of the "load carrying capability" of the structure to the expected loading, which in this case is the climate loading. Loading may be static, impact, fatigue, wear/damage from extreme climate events, or a combination of these factors. The purpose of the safety factor is to assure that the design does not fail in the event of unexpectedly high loads or the presence of material or design defects. Factors of safety are applied to decrease the probability of failure, or in more positive terms, they increase the probability of success. They are applied in part due to inherent "ignorance" present in all designs. Ignorance stems from natural variability in materials and manufacturing processes, maintenance, and the uncertainty of future climate, including extreme weather events over the life or service cycle of the infrastructure. For civil infrastructure including buildings, the factors of safety will be higher if the following are not present:

- High quality and consistency of materials, manufacturing, maintenance, and inspection
- Good control or knowledge of the actual loads and environment over the life cycle e.g. climate loads
- Highly reliable analysis and/or experimental data

The degree of "ignorance" is not the only element that the engineer should use to determine appropriate factors of safety. The potential harm that failure can produce is also important. If failure would result in a mere inconvenience, then a smaller factor of safety may be acceptable. If failure would be expensive or life threatening, a larger factor of safety is justified.

The benefit of safe-life designs includes reducing the likelihood of unplanned maintenance failures. Benefits of fail-safe designs include being able to manage the unexpected and reducing damage if failure occurs.

There is no method to help determine which of these philosophies should be employed. Engineers must use their judgment on a case-by-case basis. The decision to use either of these philosophies is justified whenever the "cost" and likelihood of failure outweighs the "cost" of implementing either fail-safe or safe-life designs. "Cost" of failure may include:

- Physical harm to people or the environment;
- Loss of, or damage to, property or equipment;
- Loss of productivity or a reduced level of service or use of the failed "system" or device;

- Damaged reputation to the engineer, the client and the profession; or
- Likelihood of failure.

The engineer should always consider how likely a certain failure will be. In so doing, it is important to consider all potential loading conditions – even abusive loads. “Cost” of implementing can include:

- Increased expense and time for design and testing;
- Increased production costs; or
- Decreased product performance;

There are no formulas to help determine when fail-safe or safe-life designs should be employed. Airplane designs employ both concepts, making air travel one of the safest modes of transportation. Yet, it is not possible to make aircraft completely safe. There are always conditions that are prohibitive to guard against.

Engineers are held to a higher standard of reasonable care than the average layperson. From their professional training and experience, they are expected to apply a high level of expertise to issues that affect their professional practice. Professionals are expected to be aware of the limitations of their professional scope and access other qualified professionals to augment those areas where they may not be fully qualified to express professional judgment.

Through extensive media coverage, the average layperson is cognizant of the climate change issue and its potential for disruptive and serious impacts. Similarly, the average engineer must also be sensitive to the potential for changing climate conditions and appropriately apply these sensitivities to their professional practice, as well as considering the need for mitigative measures to reduce GHG emissions or enhance sinks for GHGs. Given the level of public awareness of the climate change issue, professionals cannot make the argument that they were unaware that climate change could potentially affect their professional work. Not considering these factors may lead to additional professional liability.

This should not be interpreted to mean that the engineer should become an expert on weather and climate issues. Rather, the expectation is that engineers will, as part of their normal practice, determine where climate information is embedded in codes, standards, and assumptions; evaluate how the information is applied in their professional work; and identify and assess opportunities for advancing climate change mitigation.

Engineers should challenge the information to assess if and how changing climate conditions may lead to a wider spectrum of operating environments and unanticipated outcomes from their professional works. To exercise due diligence, the engineer should document this analysis and the outcomes. As part of this documentation, professionals should outline their rationale for:

- Any decisions made regarding measures to reduce GHG emissions, such as consideration of energy efficiency, alternate fuels, or enhancing the potential for GHG removal from the atmosphere;
- Any adjustments made or not made to climate information embedded in the work;
- The rationale for changes that improve resiliency of the engineered work; and,
- Any other factor that may have been considered including, but not limited to, the results of consultations with outside experts on the climate change issues affecting the work.

3.4.3 Implementing actions

The following actions are suggested to aid professional judgment. Not all may be appropriate to the situation at hand nor is the list complete. As engineering practice in climate change adaptation evolves, the nature and range of examples to help guide future practice will no doubt increase and will be reflected in future updates to this guideline.

Techniques will depend on the type of failure condition that the engineered work is to be designed for and may include safe-life design or fail-safe design within more complex systems.

In “Safe-Life Design,” it is imperative that the component or system not fail within the predicted life time. Safe-life designs involve extensive testing and analysis (typically fatigue analysis) to estimate how long the component can be in service before it will likely fail. Since no amount of analysis and testing can assure how long an individual component will perform without failure, a generous factor of safety should be included to prevent catastrophic failure. The engineering work should be designed so that it can be easily inspected in service.

Techniques for “Fail-Safe or Safe-Fail Design” include redundancies (avoiding single point failures), use of back-up systems (if failure of a critical subsystem will cause severe losses), multiple load paths (if a structural element fails, the load it was carrying will be transferred to other members) or an “Intentional Weak Link”. The latter can be an inexpensive and easy to replace component used to prevent damage to an expensive or difficult to repair component. Fuses in electrical circuits are an example of this for electrical systems. Shear pins used on boat propellers are a mechanical example. If the propeller strikes an object, the shear pin is designed to fail before the propeller or shaft is damaged.

For professional judgment related to the consideration of climate, several actions are suggested:

- Develop a checklist of climate parameters with potential to impact performance of design.
- Develop a checklist of climate parameters and operations/maintenance processes that may affect resiliency to climate events.
- In the process of design, operation, procurement, management, and maintenance activities, confirm applicability of climate information, policies/procedures, and assumptions about available technology that may be embedded in codes, standards, guidelines, etc.
- In engineering working papers, spreadsheets, and other documents, note that the review has been completed and prepare an accompanying memo to file that the review was completed.

The engineer responsible for engineering activity should sign the accompanying memo. The content of the memo should include:

- If any changes to climate information embedded in the work were identified and the rationale for making or not making the changes;
- Assumptions and methods used in the design of the engineering work to account for changes in the climate and potential mode(s) of failure;
- Changes made or recommended to assure a level of resiliency of the design, operations and maintenance;
- Changes made or recommended to incorporate GHG mitigation in the design and operation;
- Any other factor that may have been considered including but not limited to the results of consultations with outside experts on the climate change issues affecting the work; and
- The date of the review.

3.5 Principle # 5: Interpret climate information

Consult with climate scientists and specialists

Engineers should work with climate and meteorological specialists/experts to ensure that interpretations of climatic and weather considerations used in professional practice reasonably reflect the most current scientific consensus regarding the climate and/or weather information.

3.5.1 Amplification

Climate refers to the weather conditions prevailing in an area over a long period of time. Planning for long-lived assets requires defining the climatic information for a given location. Definitions and use of terms can vary, but generally engineers need to consider historical climate, weather over the short term, and climate projections over the long term.

- Historical climatology is the study of historical weather and the seasonal variation considered over periods of 30 years or longer. Historical climate is generally not considered a reliable guide to future weather and climate in the face of our changing climate.

- Weather is the day-to-day conditions with seasonal precessions through the year. It is generally a combination of current conditions and the forecast for the next few days.

- Climate change projections are the long-term outlooks for future weather and associated seasonal variation that collectively determine the climate. They are based on potential socio-economic emissions scenarios and therefore include a range of potential conditions that should be considered for planning purposes.

Each of these areas is serviced by specialists who may not all be concerned with the data needs of engineers.

Most engineers do not have the extensive training or experience in managing and assessing climate and weather information that is necessary to be considered experts in the field. Historically, the professions have been consumers of such information, relying on government agencies and other authorities to package information into the formats used within their professional practice.

Assessing climate information can be a very subtle and technically demanding activity requiring a significant level of professional expertise. On the other hand, climate and weather specialists may not have a detailed understanding of the nature of tan engineer's area of practice and may find it difficult, without guidance, to provide climate and weather information that is meaningful within the engineer's area of practice.

These groups must work together to identify and develop the sorts of data that address the engineer's technical requirements. This may include the type, format, availability, and scenario basis for the information. There may also be some sensitivity analysis available (e.g. perhaps ensemble modelling) that speaks to the robustness of the dataset. Engineers should secure the technical expertise and support provided by climate scientists and experts.

Climate and weather information often may contain embedded uncertainties or sensitivities. Climate experts are aware of these issues and can help the engineer come to understand the overall quality of the information being provided. Furthermore, an uninformed engineer could apply climate and weather information in ways that are completely inappropriate based on the methodological limitations of the processes used to develop that information. The engineer should work with climate and weather specialists to gain a fulsome understanding of the strengths and limitations of the information they are using. Likewise, engineers will perform analysis where other sensitivities may emerge due to the interaction of the data and the system that they are designing. With this understanding, engineers will be equipped to incorporate appropriate measures within their own work to accommodate the quality of the information they are using.

A fundamental knowledge of historical and current climate conditions and how these have evolved is key to understanding future climate conditions.

While consulting with weather and climate specialists, it is important to develop a firm understanding of historic weather information to develop a baseline. Historic climatology is still an emerging field with revisions likely as climate data specialists trend for missing data and adjust for systemic data collection errors.

Engaging a specialist is even more important with respect to climate change information. Climate change projections are based on very sophisticated modelling and analysis derived from socioeconomic and GHG emission forecasts. These are not the same as weather forecasts. Climate change scenarios can have significantly different projections depending on the interaction of social, economic, and political factors.

A large number of models are available to use in developing climate projections and these have strengths and weaknesses. Due to the inherent uncertainty associated with modelling, current practice

is to apply an ensemble approach where more than one model is used to establish the boundaries of projected climate change.

Furthermore, the underlying emission forecasts and socioeconomic assumptions are often not stated when presenting climate change projection information.

While these factors introduce some uncertainty into climate projections, the uncertainty can be managed through appropriate data treatment and climate scenario development. These practices are typically outside of the experience of the engineer. It is therefore important that engineers consult with climate experts to ensure that they understand the overall integrity and limitations of the information they are planning to use and incorporate appropriate measures from their own professional discipline to accommodate these factors within their professional work.

Engineers can also conduct sensitivity analyses to account for the potential consequences of different climate change scenarios.

The OURANOS Consortium on Regional Climatology and Adaptation located in Montréal, Quebec, Canada has published a guidebook on climate scenarios and the use of climate information to guide adaptation research and decisions https://www.ouranos.ca/publication-scientifique/Guidebook-2016.pdf . Published in its second edition in 2016, the guide is a resource for climate change adaptation decision-making and research. The following is an excerpt from the Executive Summary (reproduced with permission):

> "This guide is a tool for decision-makers to familiarize themselves with future climate information. It is aimed at all actors involved in climate change adaptation, from those in the early stages of climate change awareness to those involved in implementing adaptation measures.
>
> The guide consists of three main sections. The first categorizes climate information based on its use and on its level of complexity. The second section presents a catalogue of different ways in which climate information can be presented to decision-makers, such as planners, engineers, resource managers, and government. Finally, a third section outlines key climate modelling concepts that support a good understanding of climate information in general.
>
> This document is not detailed enough to inform users on how to prepare different types of climate information, nor is it intended as a critical analysis of how the information is produced. Rather, it highlights the importance of working in collaboration with climate service providers to obtain climate information. The guide allows users to engage more easily with climate service providers and to become more critical of the information that is provided to them. It should be recognized that, at this point in time, the number of climate service providers is low relative to the demand for climate information.
>
> Using this guide will allow engineers to become more familiar with climate information products and hence better evaluate what climate information best suits their needs."

Key important messages emerging from the guide include:

- Climate information at different levels of complexity can be valuable, depending on the type of decision being made.
- More detailed information is not always necessary to inform better decisions.
- Climate information can be tailored into formats that best match the level of expertise of the decision-makers.
- Decisions should be based on a range of plausible futures, and a single best climate scenario does not exist.

It is important to understand the limitations of the climate information. Engineers are cautioned that climate information or methodologies used in their professional work should be considered scientifically defensible by the climate specialists they consult. More broadly this extends to defensible sources of data, uses of data, and the decisions arrived at and designs produced.

3.5.2 Implementing actions

The following are some suggested actions to aid engineers in interpreting and assessing climate information. Not all may be appropriate to the situation at hand nor is the list complete.

- List climate information needs in terms of parameters that are listed in codes, standards, guidelines, and “rules of thumb,” as well as other information that is not formally codified within codes, standards, etc. but is nonetheless relevant to the professional work.
- Develop the current climate profile based on analysis of historical weather data. Engineers should make sure that they are using data from the most current treatment of the subject.
- Estimate the changes in frequency and extreme values of relevant climate parameters based on scientifically defensible methods of future climate projections over the service life of the engineered system.
- Engage climate scientists and climate experts as appropriate to derive current and future extreme values and frequencies of relevant climate parameters.

For this climate information, seek the advice from climate scientists and climate experts to define the:

- Associated uncertainties with the information
- Assumptions made
- Data sources
- Relative differences between current climate data derived from measured metrological data and projected climate information based on modelling
- Scientific validity of the methods and data used to derive current and future climate parameter values and frequencies

- The criticality of the impact of the climate assumptions on the overall engineering design and function of the system
- Assumptions and factors that have undergone recent review/update due to climate change
- Assumptions and factors with climate experts to assess the applicability of the assumptions and factors over the anticipated service life of the design
- Appropriate safety factors or margins based on professional judgment to plans and designs to accommodate anticipated future climate conditions in relation to the current climate conditions, and, where applicable and available, the climate design parameters used in the original design
- Data requirements for resiliency planning to deal with both extremes (e.g. temperature and wind) and cumulative impacts (e.g. water tables and permafrost).

3.6 Principle # 6: Emphasize innovation in mitigation and adaptation

Seek collaborative, innovative strategies, technologies and/or new approaches.

Engineers should stay abreast of state-of-the-art developments in their respective fields that reduce or eliminate GHG emissions. They should understand emerging policy frameworks at all levels of government and implement innovative strategies and methods that adapt engineered systems to extreme weather and the future climate. This includes encouraging research and demonstration that support:

- climate resilient systems that are energy efficient
- energy efficient systems that are climate resilient

3.6.1 Amplification

Reducing GHG emissions to the levels required to slow the magnitude and rate of global temperature rise is a long-term challenge that requires the implementation of strategies, innovative technologies in several fields, and recognition of the importance of sustained, long-term commitments [7].

Turn-key engineering projects generally address a project from start to finish. In such cases, engineers can select the technology and materials that minimize the release of GHGs within stated financial considerations. For projects that seek changes or minor improvements to an existing process, the engineering contribution to climate change mitigation may be limited but still possible if the current GHG emissions are identified and means of controlling these releases are investigated.

Engineers can have the greatest impact in the design of new facilities. Such projects allow engineers to investigate possible methods for delivering the anticipated product using a combination of technologies that limit GHG emissions. Engineers can also use an innovative approach that may avoid any releases of GHGs and may in fact lead to sustainable development. In such instances, engineers need to be very familiar with state-of-the-art technological options and should further investigate current research findings in the given field.

In large-scale operations, where significant GHGs are emitted, engineers should also seek an excellent understanding of all the point and fugitive releases of GHGs within a facility. This would then permit the identification of key emission areas that would allow the investigation of GHG control options or alternatively the identification of a technology that would not produce GHGs in the first place. It should be noted that solutions may not be readily apparent to engineers responsible for the operation of a facility nor would the required resources be available to develop alternative technologies. In such cases, the engineers should raise the issue with management and cooperate with researchers in the field or within academia to explore options for minimizing GHG releases.

A good example might be the current effort in finding appropriate solutions for sequestering carbon emissions in oil sands operations [8]. Resources from such facility operators have been pooled together with public funding for supporting research organizations that explore various options. These could entail preventing GHG releases from certain operations to capturing such GHG releases for subsequent sequestration underground or in materials for possible re-use or stockpiling. Another approach may consist of extracting the oil in a way that does not release any GHGs or substituting the hydrocarbons for some other more sustainable or even renewable energy source. In any case, the solutions provided must address the resiliency of the project for its entire design life.

Naturally, such research takes years and possible solutions may not become economical until several other factors evolve over time. Market mechanisms and incentives within policy frameworks are likely necessary to sustain solutions long enough for them to have an impact. Engineers are encouraged to contribute to such policy discussions to assure that technically feasible and cost-effective solutions are available.

Innovation for successful climate change adaptation requires the development and application of good practices within an encouraging policy and fiscal framework that recognizes the service life and resiliency of engineered systems. Typically, climate change adaptation and mitigation have been considered as separate endeavours, but there are potential strategies that increase resilience to climate impacts while reducing GHGs. These strategies may be considered in areas including energy efficiency, green infrastructure, public transit and transportation, water use, buildings, and agriculture. Good practices extend from project definition, through to planning and procurement, design, construction, operations, and maintenance. It is the innovative combination of these processes that will enhance adaptation to our changing climate to achieve the intended service life and resiliency of the engineered system.

3.6.2 Implementing actions

As noted above, innovation can be supported in several ways. In Canada, innovative concepts and technologies for mitigating GHGs within municipalities for buildings and infrastructure are largely inspired by the Federation of Canadian Municipalities (FCM) using Green Municipal Funds provided by the federal government. Sustainable Development Technology Canada (SDTC) largely assists industrial research, which is also funded by the federal government. Cutting-edge innovation is largely done in partnership with provincial funds and industrial research organisations. A good example of such pooling

of resources is the effort on vehicle electrification at the Institut de Véhicule Innovant (IVI) in St-Jerome, Quebec.

This reflects a systems approach. It supports innovation by recognizing and strengthening the various stages of the innovation process to overcome existing barriers to the development and deployment of commercially viable technologies [8]. Within a systems approach, the linkages between technology areas and long-term goals and objectives are recognized. Science and technology objectives should then be aligned with the needs and opportunities for innovation.

A comprehensive analysis would follow for each initiative to identify technological innovation and engineering solutions required for GHG mitigation [9]. Areas of importance to Canada and globally are known from the numerous and detailed GHG emission inventories that have been prepared under IPCC. For each technological domain, the engineer should be aware of the best available information by undertaking the following actions:

- Identify known technologies and their status of development and implementation
- Investigate areas of current research and their potential to deliver GHG reductions
- Determine Canadian research expertise capabilities and its role in international endeavours
- Research enabling and breakthrough or transformative technologies for the longer-term
- Implement mechanisms for enhancing research and development of promising climate mitigation technologies that may have resilient co-benefits.

Similarly, innovation for climate adaptation is supported by policies, programs, and funding offered by all levels of government in Canada and non-government organizations such as the Federation of Canadian Municipalities.

Examples of innovation in policy include incorporating the requirement for climate change considerations in infrastructure procurement, and defining climate risk and impacts as part of environmental impact assessment. Incorporating changes in climate to infrastructure codes and standards is well underway and requires innovative thinking for practical definition and implementation. Engineers should contribute to these policy and related discussions to the extent that their time, interest, and support allows.

Innovative approaches for financing adaptive measures requires not only engineering solutions and alternative options, but new ways to raise capital that require the expertise of sister professions such as law and finance. Engineers should engage with these professions to develop fully integrated solutions that extend beyond the current focus of adaptation and move into mitigation.

3.7 Principle # 7: Work with specialists and stakeholders

Work with multi-disciplinary and multi-stakeholder teams.

Engineers should work with others, including those that are not engineers, to ensure that they have a full understanding of the implications of changing climate and weather on the engineered systems for

which they are responsible. This includes the development of integrated solutions with others that are technically feasible and cost-effective.

3.7.1 Amplification

Engineers normally work in multi-disciplinary teams. However, it is quite common for engineers to define those teams with respect to disciplines within engineering. To address climate adaptation, the definition of multi-disciplinary teams should be expanded to include a much broader spectrum of players. The need for climate specialists is outlined in Principle # 4. However, the impacts of climate change can be far reaching and outside of the scope of an engineer's normal practice. To accommodate this reality, the professional should structure project teams to ensure that, as a minimum, the team possesses:

- Fundamental understanding of risk and risk assessment processes;
- Directly relevant engineering knowledge of the system;
- Climatic and meteorological expertise/knowledge relevant to the region;
- Expertise in natural sciences such as hydrology, geology, forestry, biology, and other specialized sciences;
- Hands-on operation and maintenance experience with the system or similar systems;
- Hands-on management knowledge with the system or similar systems;
- Local knowledge and history, especially regarding the nature of previous climatic events, their overall impact in the region, and approaches used to address concerns; and
- High awareness of levels of process or design "minimum acceptable performance" for the community and stakeholders reliant on the design.

Additionally, the professional should also consider adding skills for the team in:

- Social impact analysis (social scientists and policy specialists)
- Environmental impact analysis
- Economic impact analysis
- Political decision makers
- Insurance specialists
- Environmental practitioners
- Community stakeholders
- Emergency planning and response specialists
- Other stakeholders as appropriate. This may include members of the public or at the political level (e.g. city councillor).

Additional strategies may also support climate change mitigation to achieve energy efficiency, use of renewable energy, carbon reduction, or reducing resource consumption to minimize GHG emissions. For mitigation opportunities, the GHG emissions can be modelled and various alternative reduction options can be evaluated. Mitigation modelling should consider potential operational changes that would accrue with climate change and therefore affect future emissions.

For most infrastructure projects the opportunities for mitigation, adaptation, and resilience are likely to be interrelated. It is important, therefore, that the team include these objectives as part of their project constraint management.

Practitioners may possess more than one of the requisite skill sets. Thus, teams may comprise a smaller number of individuals than the skills list may suggest. Engineers should evaluate the skills represented on their teams to ensure that the right balance of skill and experience is represented to reasonably anticipate climate change and incorporate reasonable adaptive measures into the project.

Where professionals do not have the skills outlined above, they should consult with other qualified professionals to augment the team's expertise, as they would normally do when they encounter issues outside of their professional scope of practice.

3.7.2 Implementing actions

The following actions can help engineers secure the requisite range of skills and expertise that are needed to identify potential climate risks and impacts as well as to develop acceptable adaptation solutions. Not all may be needed or appropriate as skill set needs depend on the situation at hand and the stakeholders that need to be involved.

The engineer is encouraged to give thought to and implement other actions or engage other stakeholders and expertise not listed in this guideline. These should be reported to their regulator and Engineers Canada. These will be incorporated into the next edition of this guideline.

- During the formation of multi-disciplinary teams, review the overall service life and operability requirements of the engineered system and ensure that the entire range of skills necessary to assess climate implications of the work are covered.
- In working papers and files maintain a written record of the team membership, skill sets, and training of each member of the multi-disciplinary team relative to the project/assignment.

3.8 Principle # 8: Use effective language

Communicate effectively.

Engineers should communicate about climate change adaptation and mitigation issues and recommendations using simple, unambiguous language.

3.8.1 Amplification

Engineers possess unique technical knowledge and skills necessary to plan and implement effective adaptation to changing climate conditions or to mitigate GHG emissions. However, engineers can only implement such measures when decision-makers approve these actions. Sometimes, decisions are politically motivated and arguments based on pure logic and cost analysis may not be persuasive.

In most circumstances, the engineer cannot implement adaptive or mitigation measures independently. This places a demand on the engineer to communicate effectively with the decision-maker about climate change adaptation issues and the associated risks or benefits of reducing carbon emissions. As part of this communication, the engineer should clearly communicate the costs and benefits of recommended actions and how those actions reduce the identified risks. It is important that the engineer clearly articulate the economic benefits of the adaptation measure and the potential costs of not adapting to the identified risks.

Engineers should ensure that the complexities and uncertainties inherent in this work do not cloud the necessity for action. Assessing climate change impacts demands a significant level of professional judgment that can be perceived to be subjective. However, professional judgment reflects a level of competence and knowledge of technical standards obtained through many years of training and professional practice in a specific area. Thus, the judgment applied by professionals on climate change should be based on a solid foundation of technical expertise and experience.

It is not unusual for expert practitioners to communicate using language embedded with technical terms. Even more perplexing, professionals may use common language with nuanced or very different meanings than understood by a layperson. Laypeople may not know the meaning of the language being used by the professional and may not fully understand the professional's message. In addition, they may not know that they do not fully understand and may interpret the professional's language incorrectly, resulting in inappropriate responses.

This is a very subtle problem. For their part, engineers may not realize that they have been misunderstood until the decision-maker takes decisions that do not seem to address the concerns the professional was attempting to convey.

Given the critical importance of these issues, it is engineers' duty to ensure that they have been correctly understood. They should alter their language so that an average layperson can understand the magnitude of the risks. In addition, the professional should understand how they may be using common language in different ways than the average layperson. This is a situation where the professional cannot afford to simply sound knowledgeable, but rather should focus on effectively communicating their knowledge and ensuring that they are appropriately understood.

When decision makers have a fulsome understanding of the issues they are facing, they are much better equipped to place the climate change adaptation concerns and mitigation actions in the broader context of the entire range of issues that the decision-maker is managing. With this context, they are better placed to advance appropriate, well-rounded decisions on climate change adaptation matters.

Professionals' obligation to communicate in clear and effective language also includes their interactions with the public. Professionals may sometimes be required to communicate to the public during consultations on behalf of a client or in representing their client or employer with media. In these circumstances, the professional should strive to clearly communicate the issue using language easily understood by the layperson. The public can influence decision makers to take either appropriate or

inappropriate actions in response to climate change adaptation or mitigation recommendations. The professional should strive to ensure that the public has a correct, if not comprehensive, understanding of the issues and recommended adaptive measures.

Finally, the professional may find that they have identified and communicated climate risks and adaptive measures, including potential mitigation measures, to non-receptive decision makers. The decision maker may opt to reject or ignore the professional's recommendations. In this situation professionals must assess the potential long-term implications of the decision maker's actions and decide if they are obliged, in the interest of public health and safety, to communicate their concerns more broadly. This situation is not unique to climate change, and the profession has a long history in managing such issues. The Code of Ethics holds the duty to the public welfare paramount in these situations, and the professional may be required to first advance the issue within their own organizations, and then finally externally with regulators and other responsible agencies.

The provincial regulators may provide guidance and advice to engineers who suspect that they are in such a situation. For climate change adaptation, the question is less certain as the case law on these matters is evolving. However, professionals should be aware that simply proposing actions to decision makers may not sufficiently protect them from disciplinary action or litigation if a case can be made that they did not sufficiently communicate a climate change risk to appropriate authorities. Additionally, their professional obligations regarding climate change risks may not be satisfied simply by proposing actions to decision makers. Increasingly, federal, provincial, and territorial governments are recognizing climate mitigation through mechanisms such carbon pricing or cap and trade. Implementing such measures requires reporting on emissions and reductions, which are roles where engineers can and should be involved.

With respect to resilience and climate change mitigation, these concepts are subtle, can be confusing to decision makers, and may be easily ignored or assumed to be dealt with. Engineers should ensure that concerns are brought forward and presented clearly to enable informed decision making.

3.8.2 Implementing actions

The following actions can help engineers review communication of climate risks, costs, and adaptation or mitigation actions to decision-makers and the public as necessary. Not all may be needed or appropriate for the situation.

The engineer is encouraged to give thought to and implement other actions that result in improved and effective communication or climate risk, impacts and adaptation actions. These should be reported to their home regulator and Engineers Canada. These will be incorporated into the next edition of this guideline.

- Review each piece of professional writing with an eye to the intended audience for the piece.
- In aid of clearly communicating the primary message of the piece, apply common language and expressions more likely to be understood by the audience.

- As necessary, discuss suitable language with the intended audience and come to an agreement regarding the definition of terms used in the writing.
- In situations where common language may not suffice, ensure that the piece contains sufficient background information and definitions to promote the audience's understanding.
- Where the professional does not have the skills or expertise to simplify the writing, consult with or engage suitably qualified communications professionals to revise the piece for more general, broader understanding.
- Consider hiring a communications consultant to redraft the language to convince the necessary decision-making audience(s).
- Assume that each piece of writing may be misunderstood and challenge the writing from different perspectives to identify areas where simplification or clarity may be necessary.
- Work with other members of the multi-disciplinary team and stakeholders engaged in the work for appropriate communication to different target audiences and stakeholders that will inform or trigger evidence-based decision-making with regards to climate change adaptation.
- It may be advisable to periodically remind the reader of the definition of terms that are not in common use and have the potential to be misunderstood.

3.9 Principle # 9: Plan for service life and resilience

Consider the level of service and resilience over the entire operating life of the engineering work.

Engineers should give reasonable consideration of the required length of service and resiliency of an engineered system from the impact of changing weather and climate conditions over its entire operating life. This requires incorporating life cycle costing and resiliency principles.

3.9.1 Amplification

Climate change is a long-term issue. Climate models project changes in climate parameters for twenty, forty, and even one hundred years into the future. The uncertainty in climate projections increases as their time horizon is extended farther into the future. Engineers develop and operate works that must be resilient to changing climate conditions over similar periods. Stable climate conditions observed in the past or even today may not be sustained throughout the entire operating life of a project.

Engineers may find this a daunting task. Many large infrastructure systems are designed for an extended service life. If climate conditions change over that service life, it can be difficult to adapt the engineered system to the new environment without wholesale changes to the system. However, the professional engineer is not being asked to make perfect decisions that correctly anticipate all future events. They are being asked, based on professional judgment, to make appropriate decisions within the context of current scientific, economic, and social constraints.

There are two facets to this issue. First, while it is difficult to anticipate climate change impacts forty or one hundred years hence, professionals must nonetheless contemplate the possible impacts of such change. Second, while projects may last for extended periods, they are normally subject to periodic

refurbishment and upgrading that will afford the professional opportunities to incorporate appropriate adaptive measures at various times over the life of the project. The benefit of adaptation measures is increased resilience at different scales that include individual, community, organisation, country and global. For example, road improvements to help withstand severe flooding increase the resiliency of the community as a whole.

The refurbishment of infrastructure allows for checkpoints throughout the service life of a system. If there are no refurbishment opportunities, then the evaluation of climate change in the initial design becomes more critical, as the system will have to stand for a very long time without any routine opportunities to adjust. Even in these cases, many climate risks can be addressed through enhancements in operations, maintenance, and management procedures and practices.

Engineers should capitalize on refurbishment opportunities to review, revise, and adapt during the life of a project. Replacement in kind may not be the appropriate professional response for refurbishing a system. The professional engineer should evaluate the possibility that climate change may have contributed to the observed wear and tear on the project and upgrade the system appropriately. Furthermore, the professional should consider not only the useful life of the project, but also the useful life of the refurbishment activities with respect to climate change impacts. Even if the system elements being refurbished are not presently seeing the impact of climate change, it is possible that they will experience those impacts before the next refurbishment is planned. The engineer should contemplate those impacts in refurbishment planning in the same way that professionals would consider these factors for a new project.

In some ways, anticipating climate change on a refurbishment plan is simpler than it would be for the entire life of a project. The climate change projections are for a shorter time horizon and therefore have much less uncertainty associated with them. This provides the engineer with much greater confidence to recommend appropriate adaptive responses.

Extending the service life of an infrastructure system may sometimes be viewed as an adaptation strategy. It deals with infrastructure deficit issues by deferring the need to spend on new infrastructure to a later date. It also defers decisions on building new structure into a timeframe where data may be more certain. Engineers can support this strategy by instituting monitoring and measurement programs to secure climate data that will help define evolving climate conditions. This climate information is less uncertain.

Refurbishment timeframes are typically shorter than the service life of the entire engineered system. Under these conditions, the engineer may be able to access sufficient climate data that can address the issue in less detail than a full climate projection. This can reduce costs and time.

Similarly, professionals in operations, maintenance, and planning functions should ensure that they allocate (or are allocated) appropriate resources to allow other professionals the scope to incorporate appropriate adaptive measures into their engineered works. Where the engineer does not have direct

authority to allocate resources, they should advocate decision-makers to delegate them sufficient authority to do so.

Projects that do not include consideration of climate in their scope may seem to be less costly for initial procurement. However, projects with no scope for incorporating climate risk are likely to incur much higher costs associated with renewing non-resilient designs over the life of the system. Allocating more resources at the beginning, along with good operations and maintenance practices, can reduce or avoid substantially higher costs of repair and replacement at some unexpected time later in the service life.

Civil engineers have always built ”demand flexibility” into systems – for example, by designing a bridge so that a span can be added as traffic flow increases. Now there is a need to add climate flexibility.

3.9.2 Implementing actions

The following actions can help engineers anticipate the impacts of changing climate by considering actions that address the service life of the infrastructure asset. Not all may be appropriate to the situation at hand nor is the list complete. The engineer is encouraged to give thought to and implement other actions that better manage identified risks of the service life. Any new practices or improvements should be reported to their regulator and Engineers Canada. These will be incorporated into the next edition of this model guideline.

- During the design phase of a project, maintain a record of any reviews of climate and/or meteorological assessment conducted during the design of the engineered system.
- Identify any adjustments made to the design based on climate considerations.
- Identify the basis for any adjustments made to the design based on climate considerations.
- Identify the economic impact of changes made to design based on climate considerations.
- Identify how the adjustments address the full-service life cycle of the engineered system.
- During and after the construction phase provide as-built drawings to verify that the project was executed as designed to support ongoing operations and maintenance as well as for assessing the need for and planning of refurbishments later in the service cycle.
- During the operations and maintenance period of the project, maintain operating records of climate events that caused damage or interruption of service. Ideally this would include the routine collection of site specific climate data (e.g. through an on-site meteorological station) that will inform the design of future refurbishment or replacements.
- During refurbishment planning and design, maintain a record of any reviews of climate and/or meteorological assessment conducted during the design/plan of the refurbishment.
- Identify any adjustments made to the refurbishment design/plan based on climate considerations.
- Identify the basis for any adjustments made to the refurbishment design/plan based on climate considerations.
- Identify the economic impact of changes made to the refurbishment design/plan based on climate considerations.

- Identify how the adjustments address the full-service life cycle of the refurbishment design/plan.
- Ask the climate specialist to recommend a range of alternative methodologies for projecting climate information over the shorter timeframes used for refurbishment service cycles.
- Develop, institute, review, and/or revise operations and maintenance policies, standards, and procedures to better ensure the infrastructure asset functions at the capacity it was designed to perform, including ability to respond to loadings imposed by future changes in climate.
- Extend service life beyond the design life, which means replacement or rehabilitation can be delayed, allowing re-allocation of human and financial resources to other priorities.
- Review and modify training and competency policies and standards on operations, maintenance, and emergency preparedness and response.

In some cases, engineers will have little choice but to armour structures against rare extreme events—for example, the 9.4-foot storm surge that Hurricane Sandy pushed into lower Manhattan in 2012. However, using a rare flood or storm as a design standard is expensive, since it may require building new structures or retrofitting existing ones with enough protective features to withstand stresses that may occur only once in a lifetime, if at all.

Designing projects so they are "safe to fail," on the other hand, is an option that may be cheaper and more efficient. For example, a community might opt to build a dam with capacity to contain a 100-year flood, and then develop a comprehensive evacuation plan for the surrounding area in the event of a more severe flood. This strategy anticipates that the dam may not control extreme flooding, but adds other protective measures for higher levels of safety.

Flexible adaptation strategies can be retrofitted into existing facilities in stages, as climate change impacts become clear in different locations. Examples include modular seawalls that can be raised as needed; prefabricated highway bridges that can be elevated as peak flows beneath them rise; and floating intake systems at water treatment plants, designed to rise and fall as reservoir levels change. An incremental approach has fewer social and environmental impacts than building huge structures in one phase if the operation can keep up with climate-induced changes. Flexible adaptation is a valuable alternative approach and will be appropriate in certain cases. When an engineer starts planning climate adaptation actions, the needs vary site by site according to vulnerability assessment results, analysis of alternatives, and timelines for each project.

3.10 Principle # 10: Apply risk management principles for uncertainty

Use risk management to address uncertainties.

Engineers should maintain a reasonable level of professional competence in risk management to assess the impact of changing climate on engineered systems where the engineer has professional responsibility. Where engineers do not have a sufficient level of this expertise, they should ensure that their activities are reviewed with professionals that do have such expertise.

3.10.1 Amplification

Assessing the resiliency of the infrastructure starts with evaluating risks ("risk assessment"), which in a risk management context entails:

- Identifying and defining the threat
- Assessing the vulnerability
- Establishing and prioritizing the risks
- Selecting and implementing the risk treatments
- Monitoring progress and reporting

Asset (infrastructure, buildings, and facilities) risks/failures can be structural (failure of the asset or one of its components) or operational (capacity of the asset cannot accommodate the demand).

Assessing climate change impacts on professional work is, by its nature, a risk assessment process. In this work, professionals project the future climate and assign measures of the likelihood of those projected futures and the seriousness of the impacts of those changes on systems for which they are responsible. This is the very definition of risk assessment. The engineer will find further guidance on risk management approaches in the Engineers Canada Model guide: Risk management.

International standards on risk management are published by the International Standards Organization (ISO) in its 31000 series as follows:

1. *ISO 31000:2009, Risk management – Principles and Guidelines* provides principles, framework, and a process for managing risk. It can be used by any organization regardless of its size, activity or sector.
2. *ISO/IEC 31010:2009, Risk management – Risk Assessment Techniques* focuses on risk assessment concepts, processes, and the selection of risk assessment techniques.
3. *ISO Guide 73:2009, Risk management - Vocabulary* complements ISO 31000 by providing a collection of terms and definitions relating to the management of risk.

These standards are revised periodically, and engineers should ensure they are referring to the latest versions for practice guidance going forward.

With this understanding, and to address potential climate change impacts, the engineer should develop a comprehensive understanding of risk assessment techniques or consult, as appropriate, with professionals who have those skills.

Engineers Canada, recognizing this reality, developed a tool that engineers may use to aid in these assessments [4]. The Public Infrastructure Engineering Vulnerability Committee Engineering Protocol

(the Protocol) guides professionals through the risk assessment process from project concept through to an evaluation of adaptation options in a manner that weighs social, environmental, and economic factors. The Protocol is one of the tools and methodologies developed to help professionals assess the impact of climate change through risk assessment. Not every engineer may be conversant with risk methodologies. In such cases, the engineer is urged to consult with those that do have risk assessment expertise and be guided through a robust evaluation of their professional work.

When considering the application of risk assessment methodologies in managing the impacts of a changing climate on engineered systems, engineers must follow relevant federal and/or provincial/territorial legislation regulating how such assessments are carried out.

The focus of this guideline principle is the application of standard risk assessment techniques to the question of climate change. The engineering profession has developed a body of work that can support this activity (https://www.pievc.ca). It is up to the engineer to access and apply that knowledge.

3.10.2 Implementing actions

The following actions can help engineers apply climate risk management principles and practices to plan and implement adaptations to their work to accommodate the impacts of current and future climate.

Not all actions may be appropriate to the situation at hand nor is the list complete. The engineer is encouraged to give thought to and implement other actions that better manage identified risks. Any new practices or improvements should be reported to their regulator and Engineers Canada. These will be incorporated into the next edition of this national guideline.

- First, develop competence in risk assessment.
- Establish awareness and knowledge of the range and applicability of risk assessment tools.
- Where appropriate, pursue professional development and training in risk assessment tools and approaches relevant to professional practice.
- Where the engineer does not have sufficient expertise in risk assessment, seek guidance from qualified professional practitioners that have such expertise.
- As appropriate, retain the services of professional practitioners with risk assessment expertise to advise and/or assist in the review of climate risks.
- Consider building risk assessment into all stages of the process – design, operation, maintenance, planning, procurement, management, etc.
- Different tools will be applicable in different stages and the engineer should apprise themselves of the risk assessment approaches that are appropriate at each stage of a project or engineering task.
- Consult with the broad range of stakeholders/users of the engineered system to assess their overall risk tolerance levels for the system.

Risk tolerance establishes the stakeholder/owner's willingness to trade off between a certain level of risk and the costs and complexity to reduce those risks by designing to a higher safety factor.

In addition, assessing different options with stakeholders that address the economic, environmental and social trade-offs is recommended. This will achieve buy-in of all parties to the final engineering solution.

3.11 Principle # 11: Monitor legal liabilities

Be aware of potential legal liability.

Engineers should be aware of any legal liability associated with reliance on historic climatic and weather information within their professional practice.

3.11.1 Amplification

Case law is presently evolving on this issue.

Engineers operate under both a professional and social license. The professional license is governed by other engineers and the regulators that license them. The social license is equally as important. The engineer should address the issues that concern the stakeholders under whose social license they are allowed to practice. In this case, if climate change is deemed to be a broad social concern, the profession neglects that issue at its peril. If engineers don't address this, they will be held accountable to a broader social group and ultimately may be sidelined as other professionals take up the task.

Engineers have always been held responsible for the effects of their works on public health and safety. With increasing understanding of the scope and impact of climate change, engineers may be held accountable for anticipating the impacts of climate change on their professional work.

Reliance on codes, standards, and professional guidelines that fail to reflect an understanding of the impact of climate change may not be sufficient to reduce the liability related to managing these impacts on professional work. This is especially the case where there is an evolving understanding that historic climate information may not be reflective of future climatic conditions. With this understanding, it will be difficult for an engineer to argue that an average professional in their discipline would not have known that climate change may impact the work. The standard of reasonable practice is evolving with society's increased awareness and understanding of potential climate change impacts as well as recognition by engineering regulators to establish defensible standards of practice. This is resulting in a corresponding evolution in the professional engineer's obligation to evaluate those potential impacts and address them in their professional work.

Engineers have a much more detailed understanding of the codes, standards, and guidelines that govern their professional practice than would a layperson. In this regard, the professional is much better placed to evaluate the implications of potential climate change impacts on climate, weather information, and assumptions embedded in their professional tools. Failure to consider these implications may be construed as professional negligence and could expose the professional engineer to professional sanctions and/or legal action. Considering that a standard may be deficient, it follows that merely adhering to this outdated standard could be considered a breach of a professional engineer's standard of care. Under certain circumstances, merely designing to meet minimum code requirements may still

be deemed negligent if the circumstances and the applicable standard of care dictate a design solution that clearly exceeds code.

As this is an evolving issue, it is important for the engineer and engineering regulators to remain apprised of decisions and case law governing societal expectations of reasonable professional practice. As a matter of self-interest, if for no other reason, the professional should periodically contact their regulator to determine if there have been any material changes in liability case law in this area, or if new or amended practice guidelines to reduce this risk for engineers are under development. In so doing, they will develop an appreciation of what their profession and society demands from them and take appropriate action to respond to those demands within their own professional practice.

3.11.2 Implementing actions

Engineers should take reasonable steps so that potential legal liability from their practice in general and to engineering work is understood. Below are actions engineers could undertake. Ensure that actions consider current and future climate and/or adjust the engineering work to accommodate, and document any steps taken.

Not all actions may be appropriate to the situation at hand nor is the list complete. The engineer is encouraged to review these and give thought to other actions that address the need to demonstrate due diligence of the issues at hand. Such documentation will help discharge professional responsibility for dealing with this aspect of practice:

- Consult with the regulator on any applicable case law that may apply to the general scope or responsibilities as a professional engineer, including projects, engineering work, or tasks that may be affected by climate considerations.
    - The regulators routinely report on disciplinary actions and will report on such cases as they arise
    - Regulators may develop practice guidelines specific to the topic of climate or include reference to it in the context of more specific areas of practice.
- Maintain a record of actions undertaken to address climate change issues within daily practice as appropriate or as part of the documentation of a completed task or project
- Pursue enough additional professional training on climate change and meteorology to increase knowledge of climate science, measurement, data, and definitions to enable review of climate analysis and advice provided by climate scientists and specialists.
- As appropriate, consult with climate and meteorological specialists to inform climate change adaptation measures
- In working papers and files, maintain written documentation of training and consultation on climate change and meteorology

4. Other Resources

In 2015, the American Society of Civil Engineers (ASCE) released a white paper providing considerable detail on adapting infrastructure and civil engineering practice to a changing climate https://ascelibrary.org/doi/pdf/10.1061/9780784479193. The executive summary describes the purpose and scope of this document as follows:

> The purpose of the white paper is to:
>
> - foster understanding and transparency of analytical methods necessary to update and describe climate, including possible changes in the frequency and intensity of weather and extreme events and for planning and engineering design of the built and natural environments
> - identify (and evaluate) methods to assess impacts and vulnerabilities caused by changing climate conditions on the built and natural environments
> - promote communication of best practices in civil engineering practice for addressing uncertainties associated with changing development and conditions at the project scale, including climate, weather, extreme environments and the nature and extent of the built and natural environments.
>
> It consists of the following sections:
>
> - Section 2: "Review of climate science for engineering practice," provides an overview of the current knowledge of climate and weather science, as well as its limitations and relevance to engineering practice.
> - Section 3: "Incorporating climate science into engineering practice," presents the challenges of incorporating climate change and weather science into engineering practice.
> - Section 4: "Civil engineering sectors," reviews the impacts of climate change on specific sectors, including codes and standards that may be affected and recommendations for action.
> - Section 5: "Research, Development and Demonstration needs," proposes research and other activities to advance civil engineering practices and standards to effectively address climate change impacts.
> - Section 6, "Summary, Conclusions and Recommendations," concludes the white paper with a discussion on near-term decision making and recommendations for research, development and implementation of improved practices."

Engineers active in planning and implementing adaptation actions are encouraged to consult this paper for the background science of climate and to gain further understanding of the issues facing engineers and what can be done to address them.

Bibliography

American Society of Civil Engineers “Adapting Infrastructure and Civil Engineering Practice to a Changing Climate” Committee on Adaptation to a Changing Climate; Edited by J. Rolf Olsen, Ph.D. , 2015, ISBN (print): 9780784479193

Engineers Canada, Canadian Engineering Qualifications Board, Model Guide: Risk Management, August 2012

Engineers Canada, Canadian Engineering Qualifications Board, Guideline on the Code of Ethics, April 2012

Engineers Canada, PIEVC Engineering Protocol for Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate – Principles and Guidelines, Revision PG-10.1, March 2013

Engineers Canada, Canadian Engineering Qualifications Board “National Guideline on Sustainable Development and Environmental Stewardship”, October 2016

Ouranos, “A Guidebook on Climate Scenarios - Using Climate Information to Guide Adaptation Research and Decisions”, 2016 Edition

Appendix A – Definitions

For the purposes of this guideline, the following terms and definitions apply.

Act: The applicable engineering act in the province or territory. Some acts include "geoscientists" or "geologists and geophysicists."

Adaptation to climate change: An adjustment in natural or human systems in response to actual or expected climatic changes, which moderates harm or exploits beneficial opportunities.

Associations/ordre or constituent associations: The 12 provincial and territorial associations that regulate the practice of professional engineering (in Quebec, the practice of engineering) in their respective jurisdiction. Now referred to as the "Engineering Regulators"

Adverse effect: Impairment of, or damage to, the environment, human health or safety or property.

Climate: The statistics of weather events over a long period of time. The term weather is used to describe discrete events in place and time.

Climate change: The statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. [5]

Climate information: Data, projections, and any other form of climate factor/assumption/etc. In other literature this may sometimes be called climate factors or parameters.

Climate scientist: Individuals engaged in the development of, or execution of, scientific climate projections based on one or more climate models.

Climate specialist: Any individual compiling, analyzing and/or interpreting meteorological and/or climatological data, producing or interpreting weather forecasts, or any other individual that may interpret climate information. The expressions "meteorologist" or "weather forecaster" refer to those individuals that provide climate information based on measured data. In this document, use of the phrase climate specialist is inclusive of all those individuals.

Climate risk mitigation: Actions taken to reduce the level of risk associated with changing climatic conditions. These can include changes in system designs or other procedural, operational, or management adaptations to reduce impacts from identified risks.

Cumulative effects: Individual effects that are incremental, additive or synergistic such that they must be considered collectively and over time, for a true measure of the total effect and associated environmental costs of an activity to be assessed.

Due diligence: The reasonable care that a person exercises under the circumstances to avoid harm to other persons, property, and the environment. In professional practice, engineers must document the steps that they have undertaken to demonstrate due diligence.

Engineered system: Any civil infrastructure including buildings or engineering work that interacts with or may be affected by climate.

Engineering vulnerability: The difference between an engineered system's capacity and the loads that the system is expected to have.

Green resilience: Strategies that increase the resilience of projects to extreme weather events and climate change while decreasing the greenhouse gas emissions from the project.

Liability: Legal responsibility to another or to society, which is enforceable by civil remedy or criminal penalty.

Mitigation: Within the context of this model guideline, mitigation refers to technological change and changes in activities that reduce greenhouse gas emissions or enhance removal of greenhouse gases from the atmosphere, thereby reducing the anthropogenic emissions causing climate change.

Professional engineer: The protected title given to a person licensed to engage in the practice of professional engineering under the applicable engineering act in a Canadian province or territory. In Quebec, the title of such a person is "engineer" or "ingénieur." Engineers use the designation "P.Eng.", or in Quebec "Eng." or "Ing."

Professional judgment: A level of competence and knowledge of technical standards obtained through many years of training and professional practice guided by practitioners with many more years of professional practice in a specific area of engineering practice. Typically, it takes four years of university, five years of practice under the guidance of licensed professionals, and then many more years of professional practice as a licensed professional before the profession would deem an individual fully qualified to express independent professional judgment.

Resiliency: The ability of a system to withstand stress, adapt, recover from a crisis or disaster, and move on. Resiliency is the societal benefit of collective efforts to build collective capacity and the ability to withstand stress including that caused by a changing climate.

Risk tolerance: The amount of climate change related risk the client is willing to accept.

Stakeholder: A person or organization that is directly involved with, or affected by, a development, product, or activity or has an interest in it.

Sustainability: The ability to meet the needs of the present without compromising the ability of future generations to meet their own needs, through the balanced application of integrated planning and the combination of environmental, social, and economic decision-making processes.

Sustainable development: Development that meets the social, economic, and environmental needs of the present without compromising the ability of future generations to meet their needs. [14]

Vulnerability: The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate, including climate variability and extremes or any other natural events or man-made activity.

Weather: Specific events that occur within a set of meteorological data. The term weather is used to describe discrete events in place and time. Unique pieces of data contribute to an overall statistical synopsis.

Endnotes

[1] Intergovernmental Panel on Climate Change (IPCC), 2012: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, UK, and New York, NY, USA, 582 pp.

[2] IPCC Press Release. http://ipcc-wg2.gov/SREX/images/uploads/IPCC_Press_Release_SREX.pdf

[3] Canadian Engineering Qualifications Board, Guideline on the Code of Ethics, Engineers Canada, 2012

[4] Engineers Canada, PIEVC Engineering Protocol for Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate, Version 10.1, June 2016 https://pievc.ca/sites/default/files/pievc-protocol-principles-guidelines-june-2016-part_1-e.pdf

[5] Intergovernmental Panel on Climate Change (IPCC), 2007: Summary for Policymakers. In: Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 7-22.

[6] IPCC, Summary for Policymakers, Climate Change 2007: Working Group III: Mitigation of Climate Change, 2007

[7] Climate Change: Engineers are More Important Than Governments, Professor Geoff Maitland, Institution of Chemical Engineers (IChemE), April, 2014

[8] The Need for Mitigation, United Nations Framework Convention on Climate Change (UNFCCC), November, 2006

[9] Low Carbon Energy Futures: A Review of National Scenarios, Trottier Energy Futures Project, 2013

[10] Cool it: The Climate Issue, National Geographic, November, 2015

[11] After Oil: Powering the Future, National Geographic, August, 2005

[12] Powerful Connections: Priorities and Directions in Energy Science and Technology in Canada, National Advisory Panel on Sustainable Energy Science and Technology, 2006

[13] The Need for Mitigation, United Nations Framework Convention on Climate Change (UNFCCC), November 2006

[14] Definition from: Brundtland Commission report

Briefing note

For Board decision

Title of agenda item: Nomination of QB members			Agenda item 3.3
Purpose:	To approve the new nominations for the Qualifications Board.		
Motion(s) to consider:	THAT the following appointments to the Qualifications Board be approved from July 1st, 2018 to June 30th, 2021		
Vote required to pass:	x	Simple majority	
		Two-thirds majority	
		Two-thirds: 60% majority (refer to articles 5.7 and 5.8 of the bylaw.)	
Authority:	Engineers Canada Board		
Transparency: *(all meetings, debates, and decisions shall be open, except for certain subject matters as described in GP-7.1)*	x	open session	
		In camera, reason (check all that apply):	
			The security of the property of the organization
			Personal matters about an identifiable individual
			The proposed or pending acquisition of assets by the organization
			Labour relations or employee negotiations
			Litigation or potential litigation
			The receiving of advice that is subject to solicitor-client privilege
			Another matter as the Executive Committee or Board determines
Prepared by:	Mélanie Ouellette, Manager, Qualifications		
Presented by:	Sandra Gwozdz, Chair of the Qualifications Board Nominating Committee		

1. Problem/issue definition

There are eight positions to fill on the Qualifications Board for Board approval:

- 3 executive committee positions (Chair, Vice-Chair, and Past Chair)
- 3 regional representative positions (2 Atlantic provinces and 1 British Columbia/Yukon)
- 2 members-at-large positions

The Qualifications Board Nominating Committee launched call for expression of interest on February 9th. For regional representative positions, the Chief Executive Officers from Engineers Nova Scotia, Engineers and Geoscientists New Brunswick, Professional Engineers and Geoscientists Newfoundland and Labrador, Engineers Prince Edward Island, Engineers and Geoscientists British Columbia, and Engineers Yukon were directly contacted. One of the QB members from the Atlantic provinces region was being recommended for renewal, which was approved by the Chief Executive Officer from Engineers and Geoscientists New Brunswick.

The Chief Executive Officer and President of Engineers and Geoscientists British Columbia were also contacted by a member of the Nominating Committee to ensure that they were in support of the nomination of Dr Mahmoud to the Vice-Chair position. For members-at-large positions, communications efforts were targeted toward women in engineering groups, regulators, and the general public.

2. Proposed action/recommendation

That the Engineers Canada Board approves the nominations:

- Ron LeBlanc, FEC, P. Eng. (Chair)
- Dennis Peters, PhD, FEC, SMIEEE, P.Eng. (Past Chair)
- Mahmoud Mahmoud, PhD, FEC, P.Eng. (Vice-Chair)
- Frank Collins, FEC, P.Eng. (Atlantic Region Representative)
- Amy C. Hsiao, PhD, P.Eng. (Atlantic Region Representative)
- Karen E. Savage, FEC, P.Eng. (British Columbia and Yukon Region Representative)
- Samer Inchasi, P.Eng., PMP (Member-at-large Representative)
- Quinn Zhao, PhD, P.Eng. (Member-at-large Representative)

All members are in good standing.

3. Other options considered:

No options were considered.

4. Risks

Should the Board choose not to approve the nominations, the Qualifications Board might not have the resources needed to deliver on its work plan.

5. Financial implications

The approval of the new members will not bring additional cost to QB as it is part of the regular expenses.

6. Benefits

The Qualifications Board will have support to deliver on its work plan and meet its timelines.

7. Consultation

Regulators of the respective nominees were contacted. Regional representatives received the approval from their jurisdictions. Members-at-large positions received no objections from the regulators of the home jurisdictions of each candidate.

8. Next steps (if motion approved)

The Qualifications Board Nominating Committee will notify the new members of their nominations. The Qualifications Board Secretariat will start their on-boarding process as of July 2018.

CONFIDENTIAL

TO: **Engineers Canada Board**

FROM: **Sandra Gwozdz, FIC, ing. Chair, Canadian Engineering Qualifications Board Nominating Committee**

DATE: **May 8th, 2018**

RE: **Appointments to the Canadian Engineering Qualifications Board Effective July 1, 2018**

The Qualifications Board (QB) Nominating Committee is seeking to fill the following eight positions:

- 3 executive committee positions (Chair, Vice-Chair and Past Chair)
- 3 regional representative positions (2 Atlantic provinces and 1 British Columbia/Yukon)
- 2 members-at-large positions

On the Executive Committee: The Nominating Committee is recommending that Ron LeBlanc, current Vice-Chair, be appointed to the Chair position, and that Dennis Peters, current Chair, be appointed to the Past Chair position. The Nominating Committee is recommending that Mahmoud Mahmoud, currently British Columbia/Yukon Regional Representative, be appointed as Vice-Chair. The Nominating Committee contacted the Chief Executive Officer and President of Engineers and Geoscientists British Columbia to ensure that they were in support of Dr. Mahmoud's nomination.

On the regional representative positions: On February 9th, the Nominating Committee contacted the Chief Executive Officers from Nova Scotia, New Brunswick, Newfoundland and Labrador, and Prince Edward Island. Three names were put forward. One of the QB members from the Atlantic provinces region was also being recommended for renewal, which was approved by the Chief Executive Officer from Engineers and Geoscientists New Brunswick. Given that Dr. Mahmoud was being recommended for the Executive Committee, the Nominating Committee contacted the Chief Executive Officers of British Columbia and Yukon to request candidates. 1 name was put forward, which is the candidate that the QB Nominating Committee is recommending in this process

On members-at-large positions: The call for expression of interest was launched on February 9th, 2017. The required qualifications were that candidates should be licensed to practice engineering in Canada and

have a keen interest in learning about regulators' legislation and practices as well as contributing to develop a national stance on key public policy issues and development of national guidelines. Assets for potential members included participation on a regulator's committee and belonging to a diversity group as identified by the Engineers Canada Board.

In addition to several Engineers Canada newsletter articles, the call for expression of interest was posted on the Engineers Canada website, as well as Twitter and LinkedIn. In addition to the Engineers Canada Board and the QB, an email was also distributed to the CEOs Group and the 30 by 30 distribution list. The closing date for receipt of nominations was March 23rd. The outcome was that 20 excellent candidates were put forth for consideration by the QB Nominations Committee, including six women.

After due consideration, and in accordance with Engineers Canada's procedures for appointments to the QB, the Nominating Committee has asked me to forward to you the following nominations. I would like to highlight that it has been confirmed that their regulators are in support of regional representatives and have no objections for other nominations. All are in good standing within their home jurisdictions:

Name	Office	Change	Term
Ron LeBlanc, FEC, P.Eng.	Chair	First Term	01-07-2018 to 30-06-2019
Dennis Peters, PhD, FEC, SMIEEE, P.Eng.	Past Chair	First Term	01-07-2018 to 30-06-2019
Mahmoud Mahmoud, PhD, FEC, P.Eng.	Vice-Chair	First Term	01-07-2018 to 30-06-2019
Frank Collins, FEC, P.Eng.	Atlantic Region Representative	Second Term	01-07-2018 to 30-06-2021
Amy C. Hsiao, PhD, P.Eng.	Atlantic Region Representative	First Term	01-07-2018 to 30-06-2021
Karen E. Savage, FEC, P.Eng.	British Columbia and Yukon Region Representative	First Term	01-07-2018 to 30-06-2021
Samer Inchasi, P.Eng., PMP	Member-at-large Representative	First term	01-07-2018 to 30-06-2021
Quinn Zhao, PhD, P.Eng.	Member-at-large Representative	First term	01-07-2018 to 30-06-2021

It is respectfully recommended that the appointments be approved by the Engineers Canada Board.

_____

Sandra Gwozdz, FIC, ing.
Chair, CEQB Nominating Committee

Cc: CEQB Nominating Committee
Dennis Peters, PhD, FEC, SMIEEE, P.Eng., Chair, CEQB
Paul Blanchard, FEC, P.Eng., Past Chair, CEQB
Mélanie Ouellette, MA, MBA, Secretary, CEQB

Briefing note

For Board decision

Title of agenda item: Appointments to the Accreditation Board		Agenda item 3.4
Purpose:	To approve the nominations or extensions for the Accreditation Board.	
Motion(s) to consider:	*THAT the following appointments to the Accreditation Board be approved for the following dates:* *Chair, vice-chair, and past chair - July 1st, 2018 to June 30th, 2019 (1-year term)* *One member-at-large - July 1st, 2018 to June 30th, 2021 (3-year term)* *One member representing Quebec - July 1st, 2018 to June 30th, 2021 (3-year term)*	
Vote required to pass:	x	Simple majority
		Two-thirds majority
		Two-thirds: 60% majority (refer to articles 5.7 and 5.8 of the bylaw.)
Authority:	Engineers Canada Board	
Transparency: *(all meetings, debates, and decisions shall be open, except for certain subject matters as described in GP-7.1)*	x	open session
		In camera, reason (check all that apply):
		The security of the property of the organization
		Personal matters about an identifiable individual
		The proposed or pending acquisition of assets by the organization
		Labour relations or employee negotiations
		Litigation or potential litigation
		The receiving of advice that is subject to solicitor-client privilege
		Another matter as the Executive Committee or Board determines
Prepared by:	Lynn Villeneuve, Manager, Accreditation	
Presented by:	David Brown, Chair of the Accreditation Board Nominating Committee	

1. Problem/issue definition

There are five positions to fill on the Accreditation Board for Board approval:

- 3 executive committee positions (chair, vice-chair, and past chair)
- 1 regional representative position (Quebec)
- 1 member-at-large position

The Accreditation Board Secretary reached out to the following regulators to ensure that they were in support of the nominations recommended by the Accreditation Board Nominating Committee at their March 29, 2018 teleconference:

- One regional representative position representing Quebec: request sent to Mme Brigitte Letourneur, adjointe à la présidente de l'Ordre des Ingénieurs du Québec on February 2, 2018.
    - Confirmation of approval was received on February 2, 2018

- One member-at-large position: request sent to Ms. Ann English, Chief Executive Officer and Registrar, Engineers and Geoscientists British Columbia on February 1, 2018.
    - Confirmation of approval will only be received after the EGBC Council meeting on April 28, 2018.

- Past chair and chair positions: As stated in the "2017 Accreditation Board Criteria and Procedures" under criterion 1.5.10:
    - The chair automatically becomes past-chair following the completion of their term. The terms of office may be extended to a maximum of two years. Appointments are effective July 1 of the year of appointment. The vice-chair is normally appointed chair following his or her term as vice-chair.
    - Confirmation of approval for the chair position was received from Mr. Andrew McLeod, Chief Executive Officer, Association of Professional Engineers and Geoscientists New Brunswick on April 13, 2018.

- Vice-chair position: One Vice-chair position: sent to Mr. Zuccon, Interim Registrar, Professional Engineers Ontario (PEO) on April 3, 2018.
    - Confirmation of this approval will only be received after the PEO Council meeting on April 21, 2018.

2. Proposed action/recommendation

That the Engineers Canada Board approves the nominations:

- Luigi Benedicenti, FEC, P. Eng. (Chair)
- Bob Dony, FEC, P.Eng. (Vice-chair)
- Wayne MacQuarrie, FEC, P.Eng. (Past-chair)
- Suzelle Barrington, FIC, ing. (Member representing Quebec)
- Emily Cheung, FEC, P.Eng. (member-at-large)

3. Other options considered:

No options were considered.

4. Risks

Should the Board choose not to approve the nominations, the Accreditation Board might not have the resources needed to deliver on its mandate.

5. Financial implications

The approval of the new members will not bring additional cost to Accreditation Board as it is part of the regular expenses.

6. Benefits

The Accreditation Board will have support to carry its mandate.

7. Consultation

As described under section 1.

8. Next steps (if motion approved)

The Accreditation Board Nominating Committee will notify the new members of their nominations. The Accreditation Board Secretariat will start their on-boarding process as of June 2018.

CONFIDENTIAL

TO: **Engineers Canada Board**

FROM: **David Brown, P.Eng.**
Chair, Accreditation Board Nominating Committee

DATE: **April 12, 2018**

RE: **Appointments to the Canadian Engineering Accreditation Board Effective July 1, 2018**

In accordance with Engineers Canada's procedures for appointments to the Canadian Engineering Accreditation Board, the Nominating Committee has asked me to forward to you the following nominations:

These nominations are for:

Name	Office	Change	Term Expires
Luigi Benedicenti, FEC, P.Eng.	Chair	First term	2019-06-30
Bob Dony, FEC, P.Eng.	Vice-chair	First term	2019-06-30
Wayne MacQuarrie, FEC, P.Eng.	Past-chair	First term	2019-06-30
Suzelle Barrington, FIC, ing.	Member (OIQ)	Second term	2021-06-30
Emily Cheung, FEC, P.Eng.	Member-at-large	Second term	2021-06-30

It is respectfully requested that the appointments be made by the Engineers Canada Board.

Approved by David Brown via teleconference

David Brown, P.Eng.
Chair, Accreditation Board Nominating Committee

cc: Accreditation Board Nominating Committee

Briefing note

For information

Accreditation Board update	Agenda item: 4.1
Purpose:	To update the Board on the status of the work of the Accreditation Board
Motion(s) to consider:	**No motion/decision required**
Prepared by:	Lynn Villeneuve, Manager, Accreditation on behalf of Wayne MacQuarrie, Chair, Accreditation Board

1. Background

Since 1965 the Accreditation Board has been mandated by Engineers Canada to grant accreditation to Canadian undergraduate engineering programs that meet or exceed educational standards acceptable for professional engineering registration in Canada. The Accreditation Board also provides valuable information to help the Engineers Canada Board make decision on matters relating to engineering education and accreditation both in Canada and in other countries.

The work of the Accreditation Board contributes to the continual improvement of the quality and to the relevance of engineering education in Canada. All Accreditation Board members are engineers licensed to practice in Canada. There are academic and industry members representatives on the Accreditation Board. There is representation from various disciplines. 35% of Accreditation Board members are women and 50% of members are bilingual. More about the Accreditation Board, including the list of members and sub-committees can be found at https://engineerscanada.ca/accreditation/accreditation-board

2. Status update

Engineers Canada's accreditation activities fall into three areas:

- The ongoing work of accreditation led by the CEAB with support from Engineers Canada staff
- The Accreditation Improvement program led by Engineers Canada staff, and
- The work of the AU Task Force, which is a collaboration of CEAB members, NCDEAS and regulator representation

Ongoing work of accreditation

Accreditation visit cycles begin each fall and end on June 30th. During the 2017/2018 cycle, there were visits to 65 programs at 14 higher education institutions. Six of the 65 programs are new (currently unaccredited). Accreditation decisions will be made on June 2 and 3, 2018. Accreditation visits are a

peer review process. Engineering programs receive valuable feedback from experienced engineers in the visiting team report. The accreditation decisions also include feedback about compliance with accreditation criteria. This contributes to the continual improvement of engineering education.

In this cycle, two Engineers Canada directors, as well as the Engineers Canada president and the president-elect, participated on accreditation visits. Two regulator staff members also participated on visits as team members.

Accreditation Board members shared information about CEAB activities to the councils of EGBC and APEGS, to the CEO group, to the CEQB, and to the NCDEAS. Highlights of these events were shared in the Engineers Canada CEO monthly updates to Engineers Canada directors and in the Engineers Canada newsletters.

The CEAB's Policies and Procedures Committee members continue to review accreditation documentation and consider continual improvement in the accreditation process. These reviews seek to identify and eliminate duplication and are designed to provide additional clarity or instructions. Committee members have regular exchanges with the NCDEAS and in April each year meet with the Deans Liaison Committee of the NCDEAS to discuss accreditation matters.

Accreditation Improvement Program (AIP)

This staff-led initiative seeks to make the best use possible of resources while enabling the continual improvement of engineering education in Canada. The four elements of the AIP are:

- Data management system for accreditation and enrolment
- Consultation and communication
- Training
- Continual improvement

Selecting and implementing an improved data management system will ensure that the technical side of accreditation optimizes everyone's use of time throughout the accreditation cycle.

Improving our stakeholder communication and consultation process will ensure that the accreditation system is transparent and open to the input of those to whom it matters most.

Developing a training program will improve consistency across accreditation visits by providing volunteers and educators the information they need in a timely and repeatable way.

Introducing a process for continual improvement will ensure that the accreditation system stays responsive to the evolving needs of Canada's engineering profession.

The AIP webpage is at: https://engineerscanada.ca/accreditation/accreditation-improvement-program
Regular updates were shared in the Engineers Canada CEO weekly updates to Engineers Canada directors and to subscribers of the monthly update. To subscribe go to: http://eepurl.com/cU9jIX

AU Task Force

At their February 28, 2018 meeting, the Engineers Canada Board received the report of the AU Task Force. Recommendations of the Task Force include broad stakeholder consultation on the recommendations in the report. This consultation was officially launched on March 21 and will continue until the end of May. For more about the AU Task Force and the consultation, see: https://engineerscanada.ca/accreditation/consultation-AU-task-force

3. Appendices

The criteria and procedures report of the Accreditation Board is published annually in the fall. It also contains a list of all programs that are, or have been, accredited. It is located at https://engineerscanada.ca/sites/default/files/accreditation-criteria-procedures-2017.pdf

Working documents for accreditation are also provided on the Engineers Canada website at https://engineerscanada.ca/accreditation/accreditation-resources

Briefing note

For information

Compensation Committee		Agenda Item 4.3
Purpose:	To update the Board on the status of the work of the Compensation Committee.	
Motion(s) to consider:	**No motion/decision required**	
Transparency:	**X**	Open session
		In camera
Prepared by:	Chris Roney	

1. Background

1. The purpose of the Compensation Committee, as outlined in Board Policy 6.5, "Compensation Committee Terms of Reference," is to assist the Board in establishing performance goals for the CEO and in its review of the CEO's performance. It is also charged with advising the Board on current executive market conditions.
2. The Committee has the following composition:
   - Chris Roney — Chair, Past-President, Director from PEO
   - Russ Kinghorn — President, Director from EGBC
   - Annette Bergeron — President-Elect, Director from PEO
   - Zaki Ghavitian — Director from OIQ
   - Connie Parenteau — Director from APEGA
   - Dwayne Gelowitz — Director from APEGS
   - Sarah Devereaux — Director from Engineers Nova Scotia
3. At its in-camera meeting held February 23, 2016, the Board passed a resolution that external consultancy assistance be provided annually to the Compensation Committee and appropriate funding for this purpose be included in the annual budgeting cycle each year.
4. An RFP was issued on May 23, 2017 by the CEO Search Committee in connection with the recruitment of a new CEO. The RFP included the following in the scope of services to be provided:
   - *Annual consultation and support services for Engineers Canada's Compensation Committee, for a 3-year term, including the following:*
     - *Assistance with the preparation of annual performance goals for the CEO;*
     - *Assistance with the annual evaluation of the CEO's performance against the established goals; and*

- *Assistance with the determination of appropriate annual incentives and salary adjustments for the CEO.*

5. The firm of Boyden Canada was retained to provide the annual consultation and support services to the Compensation committee, as described above, for a period of three years commencing in 2018. All costs for these services were included in the fees paid within the executive recruitment services contract.
6. At part of the service that Boyden offers, they shall conduct a direct, 360-degree integration review of our new CEO within the first six to twelve months, in which they shall survey those who work closely with him, summarize the results of the interviews, and personally give feedback to the individual, including specific recommendations regarding what behaviour is working and what needs to change, if anything. There shall be no additional cost for this integration review as it was included as part of the executive recruitment services.

2. Status update

1. The Compensation Committee is scheduled to meet on May 2, 2018 together with our CEO, a representative from Boyden, and Engineers Canada's Director of Human Resources to establish the CEO's performance goals for the coming year.
2. At the time of the preparation of this Briefing note, the above meeting had not yet taken place. The Chair of the Compensation Committee shall provide a verbal update to the Board at its May 25, 2018 meeting.

3. Next steps

1. The current membership of the Compensation Committee will expire as of the Annual General Meeting and will be reconstituted in accordance with the Board Policy (6.5). Russ Kinghorn shall take over the position of Chair from Chris Roney, as per the policy.
2. A direct 360-degree integration review of the CEO will be carried out during the period between September 2018 and January 2019.
3. The Compensation Committee will monitor the performance of the CEO over the coming year and shall provide a report of its findings and recommendations to the Board at its Spring 2019 meeting.

Briefing note

For information

Nominations Task Force report		Agenda Item 4.6
Purpose:	To update the Board on the status of the work of the Nominations Task Force.	
Motion(s) to consider:	**No motion/decision required**	
Transparency:	**X**	Open session
		In camera
Prepared by:	Chris Roney	

1. Background

- The Nominations Task Force was created by Board motion #5632 on May 26, 2017 with a mandate to review the Board's nominating procedures, composition, term limits, and succession planning for the CEAB and the CEQB.
- The Task Force has the following composition:
  - Chris Roney — Chair of the task force, past-president, director from PEO
  - Justin Dunn — Director from Engineers PEI
  - Zaki Ghavitian — Director from OIQ
  - Jeff Holm — Director from EGBC
  - Connie Parenteau — Director from APEGA
  - Rakesh Shreewastav — Director from PEO
  - Richard Trimble — Director from Engineers Yukon

2. Status update

- The Task Force met by teleconference throughout the late summer and fall of 2017 to consider the issues at hand.
- The Task Force released a consultation report on January 29, 2018 that includes draft recommendations that address the issues identified within their mandate.
- Regulators and other stakeholders (including the National Council of Deans of Engineering and Applied Science) have been invited to provide comments on the draft recommendations.
- The Chair of the Task Force has met with the CEAB, the CEQB, and the CEO Group to review the report and receive their input.
- Written responses have been received from individuals, regulators, the CEO Group, the CEAB, and the CEQB.
- The consultation period closed on April 30th.

3. **Next steps**
   - The Nominations Task Force will meet in June to review all comments from the consultation and will then update their report and recommendations prior to submitting it to the Board for approval.

Risk register
Prepared by Gerard McDonald, CEO
April 2018

Engineers Canada maintains a risk register so that we can manage our risks, make sure that we are taking appropriate action, and are adequately prepared.

The risk register was updated with the input of staff with responsibility for managing specific risks in April 2018. In addition, the annual review of the list of all risks was completed by the Senior Leadership Team.

Overall view

All risks are scored in terms of likelihood and impact, and mapped to a chart with the following scores:

		IMPACT				
		Insignificant/ *Négligeable* 1	Minor/ *Mineur* 2	Moderate/ *Modéré* 3	Major/ *Majeur* 4	Catastrophic/ *Catastrophique* 5
LIKELIHOOD / *PROBABILITÉ*	Extremely likely/ *Extrêmement probable* 5	5	10	15	20	25
	Likely/ *Probable* 4	4	8	12	16	20
	Moderate/*Modérée* 3	3	6	9	12	15
	Unlikely/ *Improbable* 2	2	4	6	8	10
	Low/*Faible* 1	1	2	3	4	5

Engineers Canada Board Risks

During our review we evaluate some risks that are the responsibility of the Board. Since February 2018 the following risk scores have changed:

#1	Lack of vision, strategy or direction	likelihood decreased
#3	Succession planning for CEO	likelihood decreased

IMPACT						
LIKELIHOOD / *PROBABILITÉ*		Insignificant/ *Négligeable* 1	Minor/ *Mineur* 2	Moderate/ *Modéré* 3	Major/ *Majeur* 4	Catastrophic/ *Catastrophique* 5
	Extremely Likely/ *Extrêmement probable* 5					
	Likely/ *Probable* 4					
	Moderate/ *Modérée* 3			28	3	26
	Unlikely/ *Improbable* 2			35, 34	1	
	Low/*Faible* 1				5	

We have described all Board risks and suggested a response plan and monitoring methods in the following table. Engineers Canada staff will support the Board in managing these risks, as requested.

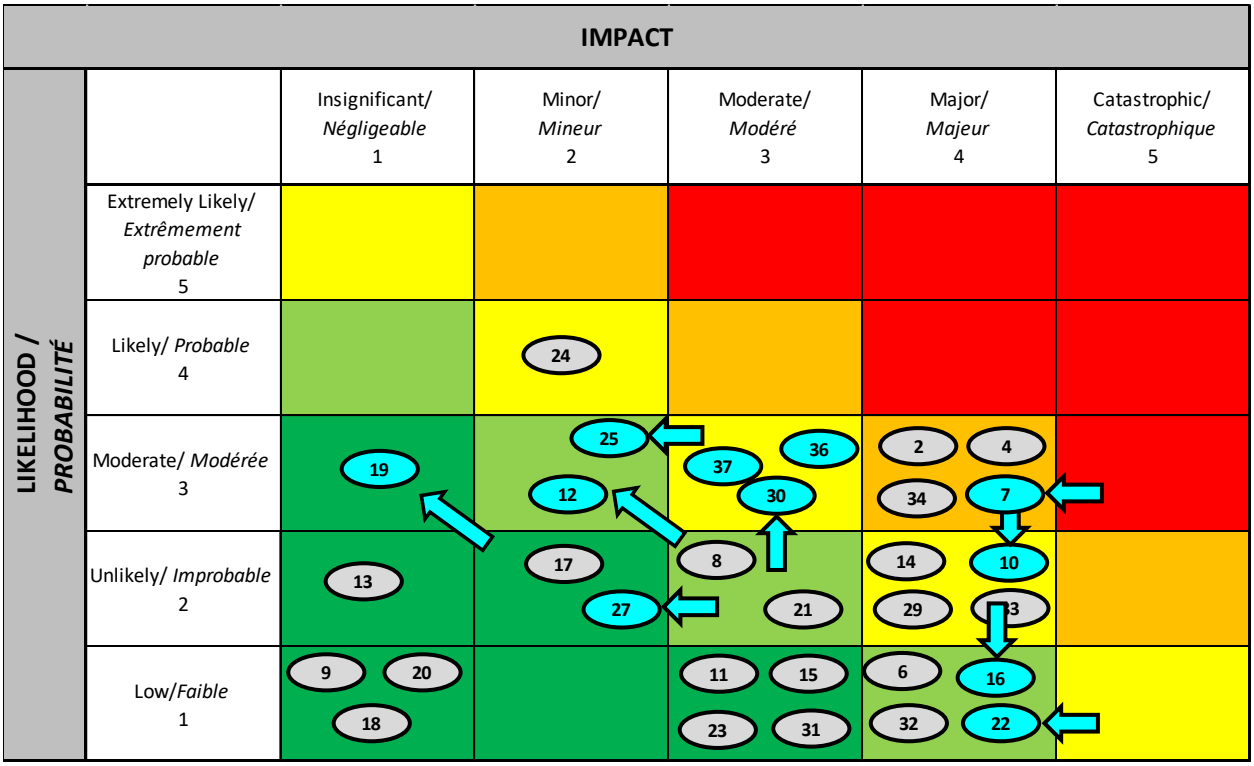
Risk #	Risk category	Title	Description	Symptoms	Risk response plan	Response plan	Monitoring method
1	Strategic	Vision or strategy	A lack of vision, direction or strategy for Engineers Canada would result in owners' needs not being met	Diminished confidence by the owners Diminished engagement of owners Decreased staff morale and productivity	Prevention	Board is working on new purpose and strategic plan	Stakeholder feedback
3	Operations	Succession planning for CEO	Without effective succession planning, loss of the CEO would compromise Engineers Canada's ability to deliver due to lost knowledge	CEO leaves with no clarity in how this role will be filled Key duties are neglected	Prevention	Succession plan in place for CEO Job description kept up-to-date	
5	Strategic	Duty of care - Board	Inability to meet the required duty of care would lead to ineffective decision making and legal liability for directors	Lack of preparation to inform decisions Length of time to make decisions is unnecessarily long Lack of preparation or knowledge	Prevention	Training for all new directors	Self-evaluation and performance monitoring of directors, by directors
26	Strategic	Accreditation process	An ineffective accreditation process would cause loss of confidence by key stakeholders and withdrawal of higher education institutions from the accreditation process	HEI or regulator withdraws from accreditation Dissatisfaction of regulator with accreditation	Mitigate	Focus on system improvement Additional resources for Accreditation Team Ongoing stakeholder engagement Coordination of activities to ensure alignment of all efforts.	Stakeholder feedback
28	Operations	AB and QB oversight	Lack of oversight of AB and QB could lead to disengagement with purpose and strategic direction of Engineers Canada	Board observers do not contribute to AB and QB Board does not engage with AB and QB reports AB and QB not in alignment with Engineers Canada strategic direction	Prevention	Board actively engages with AB and QB. Protocol for approval of work plans Operational Policy sets out support for Board, Board Committees, and Officers Terms of Reference for Board reps on AB and QB to be developed.	
34	Operations	Qualifications Board	QB work that is not aligned or is in conflict with the work of the AB would	Disagreement between QB and AB	Prevention	Observers of QB at AB and vice versa Oversight by Board	AB and QB reports to the Board

Risk #	Risk category	Title	Description	Symptoms	Risk response plan	Response plan	Monitoring method
			undermine the value of accreditation			Information sharing between support staff	
35	Strategic	Holism of the federation	If any engineering regulator chooses to leave Engineers Canada, the value of the organization as a whole is diminished.	Dissatisfaction of the regulators Lack of engagement of the regulators Lack of participation of regulator staff or their volunteers or their directors	Prevention	Directors actively work to educate their regulator Board sets direction to deliver value to all	Stakeholder feedback Relationship management

Engineers Canada – Organizational risks

The risks which are under Engineers Canada's control are ranked below. Since February 2018, the following risk scores have changed:

#7	Delivering value to regulators	impact decreased to major
#10	Staff retention	likelihood decreased to unlikely
#12	Travel policy	likelihood increased to moderate, impact decreased to minor
#16	Financial planning and monitoring	likelihood decreased to low
#19	Financial, revenue	likelihood increased to moderate, impact decreased to insignificant
#22	Not-for-profit status	impact reduced to major
#25	Poor adoption of change	impact reduced to minor
#27	Internal support to staff	impact reduced to minor
#30	Legislative compliance	likelihood increased to moderate
#34	Shadow IT systems	new entry!
#35	PIEVC contracting	new entry!



Full details of all of these risks are on the following pages.

Risk #	Risk category	Title	Description	Symptoms	Risk response strategy	Response plan	Monitoring method
2	Operations	Resource utilization	Loss of a key operational resource who is the single expert or point person for a program would lead to delays or decrease in services from Engineers Canada.	Loss of staff or reduction in ability to perform work	Prevention	Staff engagement Health, Safety, & Wellness Program Business continuity planning	Employee engagement survey
4	Operations	Succession planning for executive team	Without effective succession planning, loss of an executive team member would compromise Engineers Canada's ability to deliver due to lost knowledge	Executive team member leaves with no clarity in how this role will be filled Key duties are neglected	Prevention	Succession plan in place for VPs Job descriptions kept up to date for all staff Staff engagement Health, Safety, & Wellness Program Business continuity planning	
6	Strategic	Duty of care - all staff	Inability to meet the required duty of care would lead to poor performance and inability for Engineers Canada to deliver	Lack of ability to perform on the job	Prevention	Regular performance reviews and conversations	Performance conversations
7	Strategic	Delivering value to regulators	Inability to deliver value to the regulators would lead to lack of support and potential withdrawal from Engineers Canada	Lack of alignment with regulator imperatives Lack of support or participation by regulators Regulator disengagement Lack of demonstrated accountability Lack of reporting to regulators / information sharing	Prevention	Consultation program	Stakeholder feedback
8	Operations	Contracting	Ineffective processes to select and manage partnerships and suppliers would lead to unanticipated contract costs and complications, and failure to deliver on initiatives.	Onerous terms and conditions Liabilities for non-performance	Prevention	Improve partner and supplier processes Contract guidelines and procedures Procurement process and policies Contracts reviewed by Legal Counsel and Controller Strategy to ensure partnerships and collaborations match EC strategies.	Contract reviews

Risk #	Risk category	Title	Description	Symptoms	Risk response strategy	Response plan	Monitoring method
9	Operations	Asset management	Improper asset management and depreciation leads to inaccurate financial reporting	Improper accounting	Prevention	On-site assets are protected through secure building site Annual review of the capital asset list IT assets are tracked by IT staff. Assets capitalized, written off, or depreciated as per GAAP	Annual audit
10	Operations	Staff retention	High levels of overall staff turnover would lead to low productivity and morale	Projects / initiatives delayed Morale declines	Mitigate	Human resources strategy and HR Professional Implementation of People Excellence Practices via Journey to Excellence	Employee engagement results used to improve practices
11	Operations	Staff recruitment	Ineffective recruitment process would lead to low morale and a loss of productivity	Poor job performance of new hires	Mitigate	Procedures established for hiring and onboarding new staff	Check-ins with supervisor and HR through onboarding process
12	Operations	Travel policy	Ineffective travel policy would fail to protect individuals (where they travel, health, and safety) and EC financially, and in terms of risk of joint travel	Lack of travel policy Increasing travel costs	Prevention	Volunteer expense policy in place Insurance for volunteers in place Travel policy updated in 2017	Annual audit
13	Operations	Liability	Legal claims against Engineers Canada would cause financial hardship and reputational damage	Lawsuits filed or threatened	Transfer	D&O and E&O insurance in place Property insurance in place	
14	Operations	Breach of privacy	Breach of private data could lead to legal action and/or reputational, physical, financial, etc. harm to Engineers Canada and to individuals whose personal information is accessed.	Data breach	Prevention	Internal privacy assessment conducted every year in Q4 Privacy training is provided to staff annually Third party contracts are reviewed to ensure that Engineers Canada and partners follow and respect applicable privacy legislation	Annual privacy survey done by staff

Risk #	Risk category	Title	Description	Symptoms	Risk response strategy	Response plan	Monitoring method
15	Operations	Inadequate internal controls - Fraud	Poor internal financial controls would lead to undetected misappropriation of assets and or other illegal activities	Management override of internal controls Inability to get a clean audit opinion	Prevention	Financial and operational controls documented and followed External auditor reviews financial controls annually	Monthly review to ensure internal controls are being followed prior to releasing internal financial statements by Controller
16	Reporting	Financial planning and monitoring processes	Ineffective financial planning and monitoring processes would lead to fiscal jeopardy	Overspending Underspending Budget items do not match priorities	Mitigate	Financial and operational controls documented External auditor reviews financial controls annually Planning and monitoring process that ties planning to budget cycle Board review and approval of budget	Approval of budget and annual operating plan Annual audit
17	Operations	Investment market risk	Excessive risk in Engineers Canada investments would impact the fair value of future cash flows of reserve or investment funds	Low market value of investments Low rate of return of investments	Transfer	Investment management firm in place Disclosure annually provided in Note 5 of financial statements	Monthly investment statements Annual audit
18	Operations	Foreign currency risk	Exposure to foreign currency risk with respect to United States currency holdings and investments in United States or other foreign equity mutual funds would impact the fair value of future cash flows of reserve or investment funds	Market value of US currency investments	Transfer	Managed as part of the investment portfolio	Monthly investment statements Annual audit
19	Operations	Financial	Loss of a key income source would disrupt financial plans	Withdrawal of regulator Insolvency of affinity provider	Prevention	Active affinity relationship management, including regulators	
20	Operations	Borrowing strategy	A poor borrowing strategy would lead to excess interest payments and /or destabilization of cash flow	Interest payments Variations in cash flow	Monitor	Prudent borrowing strategy as advised by Controller	Monthly investment statements Annual audit

Risk #	Risk category	Title	Description	Symptoms	Risk response strategy	Response plan	Monitoring method
21	Strategic	Adverse publicity	Adverse publicity about Engineers Canada would lead to lack of confidence in the organization.	Negative press coverage Negative social media comments	Prevention	Relationship with PR experts Communications input on key image decisions Communications approval of public materials and media relationship management Social Media Policy and Media Relations Policy can assist with a response Crisis communications plan, when completed, would also be a response tool	
22	Compliance	Not-for-profit status	Failure to comply with to the Canadian Not for Profit Corporations Act would lead to a compromise or loss of the not for profit status	Filings not made or improperly made Reserve levels too high	Monitor	Current major projects will deplete reserves	Monthly financial statements
23	Reporting	Financial reporting and remittances - HST	Failure to make government remittances would lead to unexpected financial penalties and or additional audit scrutiny from the federal government	Indications that HST will not be remitted Indications that payroll taxes will not be remitted	Prevention	Control systems in place 3rd party ADP payroll service remits source deductions	Monthly financial statements
24	Strategic	Accuracy of website	Inaccurate information on the public website would lead to negative public perceptions of Engineers Canada, confusion and/or reputational damage	Complaints from stakeholders, including members, Board, volunteers, staff, and others is reported	Prevention	Communications team follow web content process Periodic review of content by content owner User feedback mechanisms made available	Web Content Process, ticketing system, page contacts listed, ongoing communication with key stakeholders
25	Strategic	Poor adoption of change	Lack of change management in Engineers Canada projects or change initiatives would compromise their success and implementation	Lack of engagement with projects / programs Failure of projects / programs Inadequate understanding of projects / programs	Mitigate	Change practitioner participates in all major projects Incorporating change management into all major initiatives Staff to be trained on fundamentals of change management	Success rate of projects After action reviews / lessons learned for projects Results of communications plans

Risk #	Risk category	Title	Description	Symptoms	Risk response strategy	Response plan	Monitoring method
27	Operations	Internal support to staff	Insufficient levels of common resource support (communications, IT, etc.) would lead to ineffective use of the primary resources assigned to programs or projects	Staff doing non-core work (communications, IT, etc.)	Mitigate	Prioritization of initiatives Active supervision of staff and initiatives	
29	Operations	Business continuity	Unclear processes, protocols, and communications in the event of an emergency would lead to Engineers Canada not being able to operate and/or injuries to staff or volunteers.	Missing policies Lack of training for new staff	Mitigate	Creation of a plan that includes processes and protocols to deal with emergencies, including communication and training plans. Draft plan will be created by the end of Q3, 2018	Operational policy review
30	Compliance	Legislative compliance	Failure to comply with legislation would lead to fines and/or legal proceedings against Engineers Canada	Filings not made, or improperly made, HR policies not completed, and staff not trained on policies	Prevention	Avoid risk through compliance: Legal to diarize key filing dates, keep abreast of corporate, regulatory, employment and other legislative updates Register of applicable/relevant legislation HR to complete HR policies and conduct staff training	
31	Strategic	Trade-mark risks	Failure to police use of trade-marks leads to loss of rights	Trade-marks used improperly by others Trade-marks not used by EC	Mitigate	In-house and external counsel monitors TM use and defends against marks that are misleading or confusing with Engineers Canada marks.	
32	Operations	IT Strategy	Failure of IT infrastructure would cause service disruption	Unavailability of IT infrastructure Lack of reliability of IT infrastructure	Prevention	Backup strategies to data sets where possible Selection of reputable cloud vendors that offer a suitable degree of redundancy	Backup sets send email notifications on failure Cloud vendor found to backup Office365 content
33	Operations	Cyber attack	A cyber attack (hacking) would damage data integrity	Loss of data Threats or extortion regarding data	Mitigate	Development and implementation of a Cyber Risk Response Plan Scheduled to be completed in Q2, 2018	

Risk #	Risk category	Title	Description	Symptoms	Risk response strategy	Response plan	Monitoring method
36	Operations	Shadow IT	Use of IT by staff that is not known or controlled by our IT team leads to risk of continuity and privacy of the information shared on those platforms (e.g. staff sets up Google drive for work team)	Multiple websites where EC information is stored	Prevention	Stop use of shadow IT and move data to IT staff-approved sites and services	Supervisors to actively monitor and suppress establishment and use of such sites
37	Strategic	PIEVC contracting	Many PIEVC-related contracts put organization at risk of agreeing to terms that are unfavourable to us Many PIEVC-related contracts include terms requiring post-event information sharing to manage the intellectual property. Follow up is currently delayed.	Rushed contract drafting and compromised negotiating positions Lack of follow-up on contract conditions	Prevention	Need to consider future approach to PIEVC and licensing of the protocol	Contract reviews

Briefing note

For Board decision

2019-2021 Strategic Plan			Agenda item 5.1
Purpose:	To recommend approval of the 2019-2021 Strategic Plan to the Members		
Motion(s) to consider:	THAT the Engineers Canada Board recommend approval of the 2019-2021 strategic plan to the Members.		
Vote required to pass:		Simple majority	
	X	Two-thirds majority (refer to articles 5.7 and 5.8 of the bylaw.)	
Authority:	The Board is delegated responsibility to develop the Strategic Plan in order to direct the organization so that it may achieve what the Members require. Approval of the strategic plan must be given by the Members to ensure that the activities of the organization meet their needs.		
Transparency: *(all meetings, debates, and decisions shall be open, except for certain subject matters as described in GP-7.1)*	X	open session	
		In camera, reason (check all that apply):	
			The security of the property of the organization
			Personal matters about an identifiable individual
			The proposed or pending acquisition of assets by the organization
			Labour relations or employee negotiations
			Litigation or potential litigation
			The receiving of advice that is subject to solicitor-client privilege
			Another matter as the Executive Committee or Board determines
Prepared by:	*Stephanie Price, Executive VP Regulatory Affairs*		
Presented by:	*Russ Kinghorn, President*		

1. Problem/issue definition

- The strategic plan is the Board's tool to direct the organization and ensure that it achieves what the Members need.

2. Proposed action/recommendation

- It is recommended that the Board recommend approval so that the members can be asked to provide final approval and the organization can start to deliver the work requested by the members.

- Operational plans and budget will be established based on this strategic plan.
- Performance indicators will be established and set before the end of 2018 so that the Board can hold the CEO and the chairs of the CEAB and the CEQB accountable for their work.

3. Other options considered:

- None were considered. Engineers Canada needs a strategic plan to provide directional stability.

4. Risks

- The strategic plan was developed with extensive consultation, and reflects the requirements of the federation of regulators. Failing to document and deliver on those requirements would negative impact the Board's relationship with the owners.
- Operating without a strategic plan is a risk as the Board has no basis for accountability.

5. Financial implications

- The strategic plan is the basis for all future planning. Final financial implications will not be known until operating plans and budgets are produced.
- Annual updates to the plan, and the development of future strategic plans are activities that will need to be resourced on a continuous basis going forward.

6. Benefits

- Engineering regulators:
  - Provides clarity regarding what they can expect from Engineers Canada.
- Others (public, government, higher education institutions, individual engineers, etc.):
  - A public strategic plan provides clarity about our mandate, our activities and creates a wider sense of accountability and transparency.

7. Consultation

- Consultations were held with every regulator, with the CEAB, with the CEQB, and with the CEO Group. All provided extensive input which has been reviewed and incorporated by the Executive Committee.

8. Next steps (if motion approved)

- The strategic plan will be placed before the Members for approval.
- The Board will meet with the CEO and the Chairs of CEAB and CEQB to begin discussions about operational plans and performance indicators in June.
- The CEO, CEAB, and CEQB will produce annual operating plans by year's end.
- The CEO will produce a supporting budget and submit it for Board approval in December 2018.

9. Appendices

The 2019-2021 Strategic Plan is attached.

DRAFT

Engineers Canada Strategic Plan 2019-2021

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Table of Contents

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Introduction

Engineers Canada is an organization in transformation. This strategic plan is both a product of, and a guide to, that change. In its specifics, it tells the story of what Engineers Canada will do for the next three years. In its totality, it reflects a deliberate, consultative approach to focusing Engineers Canada's direction.

This document is a distillation of a nation-wide collaboration. These pages reflect the result of over 65 hours of direct consultation with the engineering regulators and intensive efforts to align those perspectives to carve a clear path for the organization moving forward.

When we seek and amplify common ground we can accomplish great things. We can develop stronger, more robust initiatives that benefit a greater number of people impacted by our profession.

This strategic plan represents a focus on what unites the engineering regulators. It delineates a portfolio of work for the next three years that serves the regulators and promotes and maintains the interests of the profession.

The structure of this plan is a shift from the past. As the Board began to examine our governance structure, we identified that we had broadened the scope of our work to the point of strain, failed to meaningfully consult with our members, and had tied ourselves up in a governance model that impeded our ability to achieve deliberate, focused outcomes.

This, by contrast, is a 100 per cent plan. It outlines everything we as a whole organization are going to do for the next 36 months. From staff, to Board, to volunteers, this plan aligns Engineers Canada towards well-articulated, outcome-oriented priorities. We will measure our performance against the plan, and every year we'll revisit it to ensure it remains aligned with the reality of the day. If a course correction is necessary, we will make it. We will do this transparently and base our decisions on solid evidence. Our regulators will have a voice in those decisions, and we will listen carefully to what they say.

Our course is set. Our eyes are facing ahead. Let us move forward, together.

Russ Kinghorn
President

Annette Bergeron
President-Elect

"When we seek and amplify common ground we can accomplish great things. We can develop stronger, more robust initiatives that benefit a greater number of people impacted by our profession."

Structure

This strategic plan documents the actions the Board will take to fulfill the direction of the engineering regulators as expressed in the regulator-approved Purpose of Engineers Canada.

Engineers Canada is defined as including the Board and all of its committees, including the Accreditation Board, the Qualifications Board, as well as the CEO, staff, and operational committees. Therefore, this plan provides direction to:

- The CEO and Engineers Canada staff and operational committees
- The Accreditation Board
- The Qualifications Board
- The Board itself

The 2019-2021 Strategic Plan is structured to provide regulators with a 100 per cent view of all activities undertaken by Engineers Canada. This structure is a deliberate approach intended to reinforce the trust of the regulators and to provide clarity and full transparency to the regulators for all actions being undertaken by Engineers Canada. When these goals are achieved, Engineers Canada will embark on a more traditional approach to strategic planning with the Board's 2022-2025 Strategic Plan.

This plan includes:

- strategic priorities
- operational imperatives
- internal enablers
- Board responsibilities

Strategic priorities

The 2019-2021 Strategic Plan differs from a traditional strategic plan in that the key "strategies" are not guided by vision and aspirational goals. In this plan, the Board feels it is essential to identify those *high priorities for change* that are essential to re-stabilize the organization and provide an adequate foundation for aspirational goals in subsequent plans.

In particular, strategic priority is used herein to express:

- The need to complete, and if possible close out, large projects that were initiated before the development of this plan so that future endeavours may be evaluated from concept to completion within the Board's strategic planning process.
- The need to review, clarify, and potentially revitalize the objectives of any significant program that might be faltering.
- The need to codify and complete any action plans whose completion the Board considers urgent and which may benefit from additional attention at this time.

Operational imperatives

In this plan, the ten operational imperatives are defined by the ten tenets of the Purpose of Engineers Canada. These tenets define and constrain the operation of Engineers Canada. This provides a direct one-to-one mapping of the operations of Engineers Canada to the requirements defined by the regulators in the Purpose of Engineers Canada.

Internal enablers

The internal enablers list all of the support functions provided by Engineers Canada staff.

Board responsibilities

The board responsibilities codify the accountability of the Board within the governance process.

Performance measurement

The 2019-2021 Strategic Plan will be reviewed annually based on agreed-upon performance measures that will be defined by the end of 2018. The intention at this point is for the regulators and the Board to assess the performance of the organization. This new performance measurement scorecard must convey the degree to which the evaluators consider the intended outcomes were or were not achieved in the previous evaluation period.

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Strategic priorities

Strategic priority 1: Accreditation Improvement Program

The Accreditation Improvement Program (AIP) is a coordinated effort to improve the delivery of accreditation for engineering programs. The Accreditation Improvement Program (AIP) is comprised of the four elements intended to improve the logistics and the workload for higher education institutions (HEIs) and Engineers Canada that is associated with the accreditation process. These elements are:

- Improving the stakeholder communication and consultation process.
- Developing a training program for Accreditation Board members, visitors, HEIs, and Engineers Canada staff in order to improve consistency across accreditation visits.
- Introducing a process for continual improvement to ensure that the accreditation system remains responsive to the evolving needs of Canada's engineering profession.
- Implementing an improved data management system for accreditation and the Enrolment and Degrees Awarded Survey.

Rationale

The AIP is designed to ensure that accreditation continues to be delivered in the most effective and efficient manner possible. Accreditation is dependent upon the work of hundreds of expert volunteers and staff, and their time must be used in the most effective manner possible. HEIs invest significant resources to have their programs accredited. This includes collecting the data necessary to show compliance with accreditation criteria and completing all of the preparations required to receive a visit. The AIP seeks to make the best use possible of resources while enabling the continual improvement of engineering education in Canada. This program will ultimately contribute to a strong and sustainable engineering profession and enhanced international mobility of engineering graduates.

Engineers Canada also works with the faculties of engineering and applied science to acquire and maintain information on student enrolment and graduation from engineering programs. Some of the information contained in these records is also required for accreditation. To streamline both processes, Engineers Canada is investing in updating the Enrolment and Degrees Awarded Survey concurrently with the improvements to the accreditation process. This way, these systems can share common information and reduce duplicated input of data for all users.

Intended outcomes

- Improved performance of the Accreditation Management Process.
- Improved performance of the Enrolment and Degrees Awarded Survey Process.
- Improved stakeholder consultation process associated with Accreditation Management and Enrolment and Degrees Awarded Survey Processes.
- Improved user experience(s) associated with accreditation management and the Enrolment and Degrees Awarded Survey. This includes both operationally and for those stakeholders directly involved in these processes.
- Improved reliability of accreditation and the Enrolment and Degrees Awarded Survey.
- Users are enabled to more quickly adopt changes to the Accreditation Management and Enrolment and Degrees Awarded Survey Processes.
- Sustainable methods are established to ensure ongoing operational continual improvement.

Accountability

Engineers Canada CEO

Annual objectives

2019	➤ Release of the new data management system for the collection of enrolment and degrees awarded data. ➤ Training for all affected stakeholders.
2020	➤ Extension of the new data management system to the Accreditation Management Process ➤ Training for all affected stakeholders. ➤ Capture and incorporate improvements from the first release.
2021	➤ Update the data management system based on lessons learned from the prior releases. ➤ Training for all affected stakeholders. ➤ Capture and incorporate ongoing improvements.

Strategic priority 2: Accountability in accreditation

Rationale

The Accreditation Board understands the need to offer greater evidence-based transparency to the Board, regulators, and deans. They must also demonstrate that the accreditation criteria and procedures system is robust, while acknowledging and addressing weaknesses in a data-driven, fact-based manner. There has been a perspective that the work of the Accreditation Board is a complicated, unknowable "black box" process in which surprises happen and autonomous decisions are a regular occurrence. This perception must be addressed through a documented, annual performance measurement process, better communication, documented continual improvement processes, and greater transparency.

Intended outcomes

- The criteria established by the Accreditation Board are data-driven, reflect the requirements of the regulators, and support excellence in engineering education.
- Engineering regulators are provided with annual, data-driven reporting that demonstrates that the accreditation system measures transparency and effectiveness, enabling clarity of conversations around potential improvements and changes.
- Higher education institutions:
  - ➤ Understand and recognize that the Accreditation Board is taking them through a structured, rigorous, and fair process.
  - ➤ Feel supported in their efforts to incorporate educational innovation into their programs in a timely manner.
  - ➤ Report greater knowledge and predictability of accreditation visits and decisions, and satisfaction with the Accreditation Board's collaborative approach to change.

Accountability

Accreditation Board

Annual objectives

2019	➤ Assessment process to assess transparency and effectiveness of accreditation system to be designed collaboratively with stakeholders. ➤ A new permanent committee to be struck that is responsible for this assessment process and the continual improvement of the accreditation system. ➤ The issue of the required number of AUs is addressed to the satisfaction of all stakeholders, based on data and collaboration with all stakeholders.
2020	➤ A first annual measurement of the accreditation system is conducted, based on the process established in 2019. ➤ Results of the first measurement cycle are communicated to all stakeholders, including both quantitative and qualitative measures. ➤ Both the measures and the measurement process itself are reviewed, refined, and updated based on lessons learned and feedback from stakeholders.
2021	➤ Annual measurement continues. ➤ Actions to respond to the 2020 measurement results are developed and in progress.

Strategic priority 3: Recruitment, retention, and the professional development of women in the engineering profession

Rationale

Engineers Canada is working to increase the representation of women within the engineering field, primarily through its 30 by 30 initiative. This initiative has a goal of raising the percentage of newly licensed engineers who are women to 30 per cent by the year 2030. Nationally, this figure has remained at approximately 17 per cent for the last three years, when measurement started. Thirty per cent is held as the tipping point for sustainable change—reaching 30 by 30 will help drive cultural change in the engineering profession, supporting even greater involvement of women in the profession.

While the objective is that at least 30 per cent of newly licensed engineers will be women, the Board is expanding the initiative to include retention and professional development of women within the profession.

This strategic priority is aimed at ensuring that, in partnership with the regulators, action plans are developed and implemented to achieve this expanded scope.

Intended outcomes

- A national program with high visibility among targeted stakeholders.
- Engineering regulators are provided the opportunity to fully participate in the program.
- Barriers to entry and retention for women in the profession are understood and mechanisms

for addressing them are developed to be applied both nationally and with regulators in their provinces and territories.

Accountability

Engineers Canada CEO (with the Board's 30 by 30 Champion)

Annual objectives

2019	➤ Publish baseline data—out to 2030—that accurately models our current understanding of the percentage of women on the engineering pathway. ➤ Establish new goals for each aspect of the expanded mandate. ➤ Develop new action plans for each aspect of the expanded mandate. ➤ Obtain support of the regulators for the new program.
2020	➤ Full implementation of all action plans. ➤ Report on progress.
2021	➤ Ongoing review and refinement of actions to demonstrate progress towards objectives.

Strategic priority 4: Competency-Based Assessment Project

Engineers Canada is funding the development of a nationally-available online competency-based assessment framework and system which will to be made available to all regulators. This system provides:

- A set of standard competencies for the assessment of engineering work experience for licensure.
- A national online tool and onboarding information available to all regulators.
- A customizable engineer-in-training (EIT) integration program and training materials.

Rationale

Adopting competency-based assessment improves the assessment of engineering work experience for both domestic and international applicants and brings the engineering profession in line with best practices. This best practice was approved by the Board in 2013 based on support from a majority of regulators.

Using a common set of competencies for the assessment of engineering work experience in the licensure process will:

- Increase harmonization between regulators.
- Provide better clarity for of the engineering work experience requirement licensure.
- Increase transparency in the work assessment process.
- Allow for more specific feedback to applicants.
- Improve consistency of licensure decisions.
- Increase the confidence of volunteer assessors in their assessment decisions.

Using an online system:

- Allows applicants to report from anywhere in the world.
- Reduces administrative burden for regulator staff.

Intended outcomes

- The administrative burden of processing applicants is reduced for regulator staff.
- Applicants have greater clarity regarding the engineering work experience requirement and how to report their work experience.
- Applicants and validators report greater confidence in their own assessments.
- Application processing resources are refocused on only those applicants requiring additional assistance.

Accountability

Engineers Canada CEO

Annual Objectives

2019	➤ The online competency-based assessment system is available in English.
2020	➤ The online competency-based assessment system is available in English and French. ➤ Project completion and closeout.

Operational imperatives

Engineers Canada exists to serve the regulators and strengthen the profession by fulfilling the mandate described by the regulators in the Purpose of Engineers Canada. Operational imperatives reflect the Board's interpretation of what is required over the three-year period to meet the regulators' current expectations regarding the tenets of the Purpose of Engineers Canada.

Each operational imperative will be further clarified by the designated authority in the annual operating plan. It is the responsibility of the CEO of Engineers Canada to liaise and collaborate with the Board, its committees, the Accreditation Board, and the Qualifications Board so that their workplans are integrated into a single, integrated, and coordinated annual operating plan for Engineers Canada.

Operational imperative 1: Accrediting undergraduate engineering programs

Rationale

Accreditation is the highest priority of regulators.

Accreditation of undergraduate engineering programs is currently the most efficient path to ensure Canadian engineering graduates meet the academic requirements necessary for licensure as engineers. The accreditation process must remain useful and relevant.

Intended outcomes

To fulfill this responsibility, Engineers Canada will:

- Ensure the Canadian accreditation process is credible in the eyes of regulators, higher education institutions, and engineering students to effectively and efficiently accredit Canadian undergraduate engineering programs.

Accountability

Accreditation Board

Sub-initiatives

- Conduct accreditation business: visits and decisions
- Develop and maintain accreditation policies
- Complete the work of the AU Task Force

Operational imperative 2: Facilitating and fostering working relationships between and among the regulators

Rationale

A key operational priority, and one of the core reasons the association was created, is for Engineers Canada to ensure the efficient sharing of ideas and best practices between and among the regulators. Engineers Canada proactively engages and facilitates communication among regulators to ensure the greatest degree of alignment possible, given the varying regional mandates and resources.

Intended outcomes

To fulfill this responsibility, Engineers Canada will:

- Sustain a high level of trust, engagement, and commitment between and among the regulators.
- Facilitate the information exchange necessary to support a well-informed federation of regulators that is able to act proactively in the best interests of engineering regulation in Canada.
- Support and facilitate the work of the CEO Group and the National Officials Groups in the regulation of the profession.

Accountability

Engineers Canada CEO

Sub-initiatives

- Establish and implement an ongoing communication strategy and plan with regulators.
- Enable networking opportunities for the regulator presidents within the context of regular Board meetings.
- Support an orientation program about Engineers Canada for the regulator presidents, and other Engineers Canada and regulator staff and volunteers.
- Support the CEO Group and their initiatives.
- Support the national officials groups and their initiatives.

Operational imperative 3: Providing services and tools that: enable the assessment of engineering qualifications, foster excellence in engineering practice and regulation, and facilitate mobility of practitioners within Canada

Rationale

This is a high priority for regulators and a core function of Engineers Canada.

Intended outcomes

To fulfill this responsibility, Engineers Canada will:

- Enable the assessment of engineering qualifications.
  - Through the Qualifications Board, develop work products that enable the assessment of engineering qualifications (i.e., white papers, model guides, and guidelines) and maintain examination syllabi, ensuring that both are timely and serve the needs of the regulators and applicants for licensure.
  - Provide research into emerging areas of practice in support of regulators in their decision making.
- Foster excellence in engineering practice and regulation.
  - Through the Qualifications Board, develop work products that foster excellence in engineering practice and regulation (i.e. white papers, model guides and guidelines), ensuring that they are timely and serve the needs of the regulators and of practicing engineers.
  - Recognize and support the exemplary accomplishments of engineers by administering effective fellowship and scholarship programs.
- Facilitate mobility of practitioners within Canada.
  - Maintain, within the constraints and preferences of the regulators, a shared database of engineers in Canada for the purposes processing inter-provincial/territorial applications.
  - Through the Qualifications Board, develop work products that facilitate mobility (i.e. white papers, model guides, and guidelines), are timely, and serve the needs of the regulators.

Accountability

Accountability is divided between the Qualifications Board and the CEO as identified in the sub-initiatives.

Sub-initiatives

The Qualifications Board shall:

- Maintain examination syllabi
- Develop and maintain model guides, guidelines, and white papers

The CEO shall:

- Maintain the National Membership Database for those regulators who choose to update and/or access it.
- Conduct research into emerging areas of practice and advise regulators on the impacts.
- Conduct a review of the scholarships program and update and maintain it thereafter.
- Discontinue the current Engineers Canada Awards program immediately.

Operational Imperative 4: Offering national programs

Rationale

National programs are intended to make use of Engineers Canada resources to deliver programs that benefit the engineering regulators. These programs should benefit from the economies of scale that could not otherwise be achieved by a single or small group of regulators.

Intended outcomes

To fulfill this responsibility, Engineers Canada will:

- Within the period of this plan, divest itself of programs which the regulators consider are not within its mandate or which may be best served by other organizations. This includes the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol and Infrastructure Resilience Professional (IRP) training. In the future, it would be desirable if PIEVC and IRP were available to Canadian engineers, but provided by more appropriate organizations.
- Affirm that Engineers Canada is not a certification body and stop offering IRP certification.
- Make available training materials and content on ethics and professionalism for regulators' use in the development of their continuing professional development programs.
- Engage the regulators in an active dialogue to identify future national programs of interest to regulators.

Accountability

Engineers Canada CEO

Sub-initiatives

- Facilitate and coordinate the collection and distribution of ethics training content for regulators use.
- Develop and execute a plan to divest Engineers Canada of the responsibility to maintain the PIEVC Protocol by 2021.
- Cease offering IRP credentials immediately.
- Develop and execute a plan to divest Engineers Canada of the responsibility to offer Infrastructure Resilience Program (IRP) training by 2021.

Operational Imperative 5: Advocating to the federal government

Rationale

Engineers Canada is uniquely positioned to provide advocacy services on behalf of regulators to the federal government.

Intended outcomes

To fulfill this responsibility, Engineers Canada will:

- Advocate to the federal government to promote and advance the enactment of new demand-side legislation and prevent the erosion of existing federal legislation.
- Engage and educate parliamentarians, senior federal officials, and all relevant agencies within the federal government to gain their confidence and develop their awareness of:
  - The responsibility of engineers to safeguard the public.
  - The benefits of engineering input into federal policy.
  - The positions and concerns of the engineering profession.
- Inform regulators of Engineers Canada's federal government advocacy activities and progress through a newly developed reporting mechanism.

Accountability

Engineers Canada CEO

Sub-initiatives

- Submit an analysis, rationale, and recommended strategy to the Board by September 2019 on how best to advocate to the federal government. The strategy will:
  - Define the objectives of advocacy to the federal government by Engineers Canada.
  - Review all current advocacy efforts and assess their relevance and effectiveness at achieving the stated objectives.
  - Define what demand-side legislation needs to be addressed.
  - Make recommendations on new or existing initiatives most likely to be effective at achieving the recommended objectives within available resources.
  - Establish a process for the identification and development of public policies supported by the engineering regulators.

Operational imperative 6: Actively monitoring, researching, and advising on changes and advances that impact the Canadian regulatory environment and the engineering profession

Rationale

Engineers Canada has a role to play in proactively identifying, investigating, and explaining trends and changes that are likely to have an impact on the engineering regulators and on the engineering profession. This information must be communicated to the regulators on an ongoing basis as an input to their own decision-making and direction-setting.

Intended outcomes

To fulfill this responsibility, Engineers Canada will:

- Establish a lean and effective research-based monitoring and reporting capability that provides regulators with foresight and early warning of potential changes and advances in the Canadian regulatory environment and the engineering profession. The information provided will help inform regulatory decision making.

Accountability

Engineers Canada CEO

Sub-initiatives

- Submit an analysis, rationale, and recommended strategy to the Board by February 2020 on how best to conduct research leading to information that informs and advises the regulators on changes and advances that impact the Canadian regulatory environment and the engineering profession. The strategy will:
  - Define the objectives of research targeted to the needs of regulators.
  - Review all current research initiatives, reports, and surveys to assess their relevance and effectiveness at achieving the updated objectives.
  - Make recommendations on the new or existing initiatives most likely to be effective at achieving the recommended objectives within available resources.
  - Be ready to implement within 90 days of Board approval.
- Scope requirements for a possible task force on the future of the engineering profession. In addition to other requirements yet to be defined, this task force should be positioned to examine potential threats to self-regulation.
- Actively monitor and advise regulators on the work of Engineers and Geoscientists BC and Engineers Geoscientists Manitoba with respect to the Truth and Reconciliation Commission report.
- Withdraw sponsorship and end participation in the Engineering Change Lab immediately.

Operational Imperative 7: Managing risks and opportunities associated with mobility of work and practitioners internationally

Rationale

As the national body representing the engineering regulators, Engineers Canada is well positioned to define the risks and opportunities associated with the mobility of work and practitioners internationally, as this impacts all regulators. Further, by recommending actions to the regulators that manage and respond to these impacts, Engineers Canada can help to inform the regulatory decisions in each jurisdiction.

Intended outcomes

To fulfill this requirement, Engineers Canada will:

- Provide regulators with a timely and accurate assessment of the risks and opportunities associated with mobility of work and practitioners internationally.
- Maintain international mobility agreements and mutual recognition agreements in accordance with regulator needs.
- Provide timely and accurate information to regulators on the impact of international trade agreements.
- Provide online information for internationally trained engineers that describes the process for becoming an engineer in Canada.
- Maintain current information on international institutions and degrees for use by the regulators.

Accountability

Accountability is divided between the Accreditation Board and the Engineers Canada CEO as identified in the sub-initiatives.

Sub-initiatives

The Accreditation Board shall:

- Represent regulators' interests with respect to international agreements and timely reporting to the Board on developments.
- Conduct substantial equivalency visits as requested, at no financial cost to Engineers Canada and with no increase in staff resources.

The Engineers Canada CEO shall:

- Submit an analysis, rationale, and recommended strategy to the Board by September 2020 on how best to manage risks and opportunities associated with mobility of work and practitioners internationally. The strategy will:
  - ➤ Define the objectives to be achieved by Engineers Canada with regards to international mobility
  - ➤ Review all current efforts and assess their relevance and effectiveness at achieving the updated objectives.

- In particular, the review will describe the international mobility agreements, including their benefits, obligations, interdependencies and processes, and determine the regulator's support for maintaining or withdrawing from each agreement.
- Until a new international mobility strategy is approved by the Board, Engineers Canada will:
  - Maintain mutual recognition agreements.
  - Maintain the Roadmap to Engineering website.
  - Provide advice to regulators on international trade agreements.
  - Maintain the International Institutions and Degrees Database (IIDD) while implementing the recommendations of the National Admissions Officials Group.

Operational imperative 8: Fostering recognition of the value and contribution of the profession to society and sparking interest in the next generation of engineering professionals

Rationale

Although not a top priority, regulators consider fostering recognition of the profession by society and sparking interest in the next generation of engineers to be an important part of the Engineers Canada mandate.

Although regulators often mention national ad campaigns and similar marketing efforts to address this requirement, this is simply not achievable within resources. Achieving a meaningful outcome will require finesse. A minimalist strategy that can still demonstrate tangible value is required.

Intended outcomes

To fulfill this requirement, Engineers Canada will:

- Leverage existing opportunities to foster recognition of the value and contribution of the profession without embarking on cost-prohibitive endeavours.
- Leverage partnerships and joint ventures that can spark interest in the next generation of engineering professionals without developing or wholly sustaining such programs internally.

Accountability

Engineers Canada CEO

Sub-initiatives

- Submit an analysis, rationale, and recommended strategies to the Board by February 2020 on how best to:
  - Foster recognition of the value and contribution of the profession to society.
  - Spark interest in the next generation of engineering professionals.
- The strategies will:
  - Define achievable objectives for fostering recognition of the profession by society and sparking interest in the next generation of engineering professionals.

- Review all current efforts within the two domains above and assess their relevance and effectiveness at achieving the updated objectives.
- Make recommendations on the new or existing initiatives most likely to be effective at achieving the recommended objectives within available resources.
- Be ready to implement within 90 days of Board approval.

Operational imperative 9: Promote diversity and inclusion in the profession that reflects Canadian society

Rationale

Regulators consider the promotion of diversity and inclusion within the profession to be the highest non-regulatory priority (after accreditation, qualifications, and fostering working relationships within the federation). Therefore, the Board will seek to elevate the profile and results achieved within this mandate.

Intended outcomes

To fulfill this responsibility, Engineers Canada will:

- Demonstrate progress towards diversity and inclusion targets through consistent effort and innovative, highly-leveraged programs that increase the number of women and Indigenous people entering, thriving, and remaining in the profession.

Accountability

Engineers Canada CEO

Sub-initiatives

- Submit an analysis, rationale, and recommended strategy to the Board by September 2019 on how best to promote diversity and inclusion in the profession that reflects Canadian society. The strategy will:
  - Be bounded by the Board's diversity and inclusion policy. Specifically, the strategy will address:
    - The recruitment, retention, and the professional development of women in the engineering profession in Canada.
    - Bridging and/or support programs that facilitate Indigenous people entering and graduating from undergraduate engineering programs in Canada.
  - Define achievable objectives for increased diversity and inclusion within the guidelines set by the Board's diversity and inclusion policy.
  - Review all current related efforts and assess their relevance and effectiveness at achieving the objectives.
  - Leverage the branding and marketing investment in the 30 by 30 program through re-use of the recognition the program has achieved so far.
  - Make recommendations on the new or existing initiatives most likely to be effective at achieving the recommended objectives within available resources.

- Be ready to implement within 90 days of Board approval.
- Demonstrate—by May 2019—that early wins are achieved on Strategic Priority 3 and provide semi-annual progress reports at the September and May Board meetings thereafter.

Operational imperative 10: Protect any word(s), mark, design, slogan, or logo, or any literary, or other work, as the case may be, pertaining to the engineering profession or to its objects

Rationale

Engineers Canada has protected the officials marks of the engineering profession to protect against unauthorized use of the terms and to ensure that federally-incorporated companies respect engineering legislation in Canada.

Intended outcomes

To fulfill this responsibility Engineers Canada will:

- Protect the official marks from unauthorized use.
- Ensure that federally-incorporated companies respect provincial and territorial engineering legislative requirements.

Accountability

Engineers Canada CEO

Sub-initiatives

- Protect the official marks from unauthorized use and ensure that federally-incorporated companies respect provincial and territorial engineering legislative requirements.

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Internal enablers

A portion of the staff reporting to the Engineers Canada CEO perform what are termed "internal enablers." These are duties that enable the organization to conduct daily operations and provide system-wide support and enablement.

Appropriate staffing is in place to enable professional **planning and organizational management**, including all aspects of strategic and operational planning, performance measurement, risk, change management, and project and program management.

A **consultation program** is in place to enable all parts of Engineers Canada to engage meaningfully and appropriately with designated stakeholders on an as-required basis. The consultation program scales to ensure that all stakeholders are appropriately engaged in each of the initiatives undertaken by Engineers Canada.

As a national service organization that enables 12 regional regulators to work together, Engineers Canada provides **communications and translation services** to support the work of the organization.

To support continual improvement in planning and organizational management, Engineers Canada is pursuing the Excellence Canada Excellence, Innovation, and Wellness Standard through its **Journey to Excellence program**. Participation in this program will steadily raise the maturity of all elements of the organization, in line with industry best practices.

Finance and administrative services are provided, including finance, facilities management, information technology services, internal legal services, and human resources expertise.

Affinity programs fund a significant portion of Engineers Canada's activities and provide insurance, financial, and other services to the engineering regulators and their membership.

Secretariat services, administrative support, expertise, and development of all work plans are provided on an ongoing basis to the Board and all its committees, as well as secretariat services to the NCDEAS.

Board responsibilities

There are six responsibilities of the Board. The following outlines how the Board intends to fulfill each of its responsibilities. Each committee of the Board will develop workplans that will be integrated into the overall annual operating plan of Engineers Canada.

Board responsibility 1: Hold itself, its directors, and its direct reports accountable

This Board responsibility contains two elements, led by separate committees.

The Executive Committee shall:

- Establish and use competency profiles for directors and all committee chairs, as well as for the Board as a whole.
- Manage the CEO and committee chairs through the use of competency profiles and performance measurement against the achievement of the operational and strategic plans.

The Compensation Committee shall:

- Be responsible for performance management of the CEO

Intended outcomes

It is the expectation of the Board that significant effort will be put into codifying and regularizing this new and more structured means of measuring and understanding the progress-against-plan of the organization. It is a core expectation of the Board that concrete and well-communicated action will address gaps, weaknesses, and failings in any part of the plan, as measured through national, transparent performance measures.

This Board responsibility will be achieved when the Board is confident that it has an accurate and complete awareness of its own performance as well as that of its directors and committee chairs. With this information, the Board will act to recognize success and offer appropriate guidance when needed to achieve objectives.

Board responsibility 2: Sustain a process to engage with regulators through regular communication that facilitates input, evaluation, and feedback

The President-elect shall:

- Provide oversight and guidance to the Engineers Canada consultation process with regulators and other key stakeholders whose input is vital to the Board's work.

Intended outcomes

It is the expectation of the Board that regulators and all key stakeholders will come to appreciate and value the engagement process. The engagement methodology used must be cost-effective and make efficient use of the time of all those asked to engage in Engineers Canada's consultations.

This Board responsibility will be fulfilled when the regulators and other key stakeholders are satisfied that their views and requirements are understood and considered before action is taken.

Board responsibility 3: Provide ongoing and appropriate strategic direction

This responsibility sets clear structural expectations for how the Board will provide strategic direction to all elements of Engineers Canada.

The Executive Committee shall:

- Develop an annually updated, three-year strategic plan that considers emerging trends and challenges.
- Ensure that annual operating plans and budgets are developed that specify the actions and resources necessary to achieve the strategic plan.
- Ensure the use of a continual improvement process to track, report, and when necessary, correct, performance against set objectives of:
  - The strategic plan
  - The annual operating plan

Intended outcomes

It is the expectation of the Board that significant effort will be put into codifying and regularizing this new and more structured means of providing strategic direction, including ongoing and clear communications to all stakeholders as to the progress-against-plan, as well as mitigation strategies put in place to counter any areas of gaps or weaknesses.

This Board responsibility will be achieved when the regulators agree and have confidence that the Board's strategic plans meet their needs, and that the annual operating plan delivers on those needs.

Board responsibility 4: Ensure the development and periodic review of Board policies

This Board responsibility is shared among three groups:

The President shall:

- Implement the Funding Task Force recommendations.

The Governance Committee shall:

- Maintain effective governance principles and policies.
- Perform ongoing governance improvements.
- Implement Nominations Task Force recommendations.

The Finance Committee shall:

- Ensure external and direct inspection and monitoring of fiscal policy and responsibilities.

Intended outcomes

It is the expectation of the Board that all reviews and revisions to Board policies will continue on a timely basis, with specific focus on recommendations flowing from activities within this Board responsibility.

This responsibility will be fulfilled when the Board and regulators are satisfied that:

- All Board policies are current and relevant to established requirements.
- Action plans with clear objectives are established based on the recommendations of any task force established by the Board.
- Action plans to implement recommendations are integrated with the Board's plans.

Board responsibility 5: Ensure the CEO maintains and acts on a robust and effective risk management system which reflects the Board's risk tolerance level and directs Board-approved mitigation strategies

The Audit Committee shall:

- Ensure the Board is wholly accountable for risk management and for directing the CEO through clear and timely mitigation strategies.
- Monitor the risk register and ensuring the Board is aware and able to take timely action on all relevant risks.

The responsibility to maintain the risk register and to enact Board approved risk mitigation strategies resides with the CEO.

Intended outcomes

This responsibility will be fulfilled when the Board and regulators are satisfied that they are fully aware of any relevant potential risks, have clearly established appropriate levels of risk tolerance, and are satisfied that any necessary risk mitigation strategies are defined and acted upon.

Board responsibility 6: Provide orientation of new directors, and continuing development of directors and others who work closely with the Board

The President-elect shall:

- Develop and deliver orientation materials and programs that facilitate the effectiveness of directors. The Board's orientation program will take into account the challenges of onboarding individuals new to their function and provide opportunity for the ongoing of development of those continuing in their term.

Intended outcome

It is the expectation of the Board that the quality of orientation provided to new directors will improve over the course of this strategic plan period, especially once the roles of directors, members, and presidents are clarified as a part ongoing governance work in the fall and winter of 2018-19.

This responsibility will be fulfilled when directors express their satisfaction with the effectiveness of the Board orientation program.

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Briefing note

For Board decision

Board policy manual		Agenda item 5.2a
Purpose:	To approve policies to be included in the Board policy manual	
Motion(s) to consider:	THAT the Engineers Canada Board approve the following policies: a) Policy 4.2 Directors' responsibilities b) Policy 4.3 Code of conduct c) Policy 4.11 Board management delegation d) Policy 8.2 Diversity and inclusion	
Vote required to pass:	X	Simple majority
		Two-thirds majority (refer to articles 5.7 and 5.8 of the bylaw.)
Authority:	The Board needs clear policies to direct its actions. The Diversity and Inclusion policy, in particular, will provide insight into Board expectations and goals in this area.	
Transparency: *(all meetings, debates, and decisions shall be open, except for certain subject matters as described in GP-7.1)*	X	open session
		In camera, reason (check all that apply):
		The security of the property of the organization
		Personal matters about an identifiable individual
		The proposed or pending acquisition of assets by the organization
		Labour relations or employee negotiations
		Litigation or potential litigation
		The receiving of advice that is subject to solicitor-client privilege
		Another matter as the Executive Committee or Board determines
Prepared by:	Stephanie Price, Executive VP Regulatory Affairs	
Presented by:	Sarah Devereaux, Chair of the Governance Committee	

1. Problem/issue definition

- The Governance Committee is working to re-establish a complete set of policies. 32 policies have been approved and approximately 20 remain to be developed and approved.
- Two new policies were added to address gaps:

    - Principles of board management delegation were embedded in other policies, but a clear statement was lacking and has been added for clarity
    - Diversity and inclusion have been defined so that all parts of Engineers Canada, know which aspects of diversity and inclusion are expected and required by the Board
  - Two policies have been updated and clarified. There was some overlap and confusion between director responsibilities (what directors must *do*) and code of conduct (how directors must *act*) which has been removed.

2. **Proposed action/recommendation**
   - Approve two new policies regarding Diversity and Inclusion and Board management delegation
   - Approve two revised policies regarding Director responsibilities and Code of conduct

3. **Other options considered:**
   - None

4. **Risks**
   - Operating without a full set of policies introduces legal and compliance risks for the organization

5. **Financial implications**
   - None

6. **Benefits**
   - Engineering regulators:
     - Clarity regarding how their organization runs and is governed
   - Engineering profession:
     - Creates a public statement of support regarding diversity and inclusion in the engineering profession.

7. **Consultation**
   - The Governance Committee relied on the expertise and input of Engineers Canada staff in the development of these policies

8. **Next steps (if motion approved)**
   - Policies to be added to the website and to the overall Board Policy Manual.

9. **Appendices**
   - Two new policies are attached:
     - 4.11 Board management delegation, and
     - 8.2 Diversity and inclusion
   - Two revised policies are attached:
     - 4.2 Direction responsibilities, and
     - 4.3 Code of conduct

4 Role of the Board

The Board will conduct its activities in a manner that emphasizes strategic leadership, proactivity, long term impacts, and a clear distinction between the Board and staff roles and responsibilities.

4.2 Directors' responsibilities

Date of adoption: April 9, 2018 (Motion #5693)	*Review period: Annual*
Date of latest amendment: April 9, 2018 (Motion #5693)	*Date last reviewed: April 9, 2018*

In order to fulfill their purpose as a board, individual Directors shall:

1. Know the business of Engineers Canada.
2. Be informed of issues affecting, or likely to affect Engineers Canada and the Regulators.
3. Abide by all terms of the Code of Conduct.
4. Contribute to the Board's decision-making process by:
    a. Discussing all matters freely and openly at Board meetings.
    b. Working towards achieving a consensus which respects divergent points of view.
    c. Respecting the rights, responsibilities and decisions of the Regulators.
    d. Participating actively in the work of the Board including by serving on committees or task forces.
5. Each director to be responsible for bringing the views and concerns of their Regulator to the Board and to make sure that all points are considered and understood within the course of discussion, and to be responsible for bringing the views, concerns and decisions of the Board to their Regulator.
6. Directors shall be knowledgeable of the rules, regulations, policies and procedures governing the Regulator that nominated/elected them.
7. Directors shall be informed and knowledgeable about issues at their Regulator.
8. Directors shall review their Regulator's council/board briefing books and the minutes of all council/board meetings, and attend council/board meetings.
9. Directors shall advise their Regulator of issues to be discussed by the Board and seek input so as to be able to communicate their Regulator's position to the Board.
10. Directors shall be fully aware of the Board's *Confidentiality Policy*.

4 Role of the Board

The Board will conduct its activities in a manner that emphasizes strategic leadership, proactivity, long term impacts, and a clear distinction between the Board and staff roles and responsibilities.

4.3 Code of conduct

Date of adoption: April 9, 2018 (Motion #5693)	*Review period: Annual*
Date of latest amendment: April 9, 2018 (Motion #5693)	*Date last reviewed: April 9, 2018*

1. The Board shall conduct itself in an ethical, professional and lawful manner. This includes proper use of authority and appropriate decorum. Board members and members of Board committees shall treat one another and staff members with respect, co-operation and a willingness to deal openly on all matters.
2. Board members and members of Board committees recognize that they have no individual authority over the organization except as specifically delegated by the Board.
3. Board members and members of Board committees must act honestly and in good faith with a view to the best interests of the corporation in accordance with s. 148 of the Canada Not-for-profit Corporations Act.
4. Directors shall discharge their duties honestly and in good faith and in accordance with s. 148 of the Canada Not-for-profit Corporations Act.
5. Directors have an ongoing obligation to disclose conflicts of interest in accordance with s. 141 of the Canada Not-for-profit Corporations Act.
6. Board members and members of Board committees shall not use their Board position to obtain employment at Engineers Canada for themselves, family members, or close associates. Board members must resign from the Board before applying for employment with Engineers Canada.
7. Board members and members of Board committees shall not attempt to exercise individual authority over the CEO or staff unless authorized by the Board.
8. Board members and members of Board committees shall not interact with the public, press or other entities or speak on behalf of the Board except to repeat explicitly stated Board decisions unless authorized by the Board.
9. Board members and members of Board committees, except the CEO, will not express individual judgments of performance of the CEO or staff other than during participation in Board deliberations.
10. Board members and members of Board committees shall be familiar with the incorporating documents, by-law, policies and legislation governing Engineers Canada as well as the rules of

procedure and proper conduct of meetings so that decisions of the Board may be made in an efficient, knowledgeable and expeditious fashion.

11. Board members and members of Board committees will support the legitimacy and authority of Board decisions regardless of their personal position on the issue, and shall not discuss the varying opinions of individual members in accordance with s. 147 of the Canada Not-for-profit Corporations Act.

12. Board members and members of Board committees shall participate in Board educational activities that will assist them in carrying out their responsibilities.

13. Board members shall attend meetings on a regular and punctual basis and be properly prepared to participate in Board deliberations.

14. Board members and members of Board committees shall ensure that unethical activities not covered or specifically prohibited by the foregoing or any other legislation are neither encouraged nor condoned and are reported.

15. A Board member or a member of a Board committee who is alleged to have violated this Code of Conduct shall be informed in writing and shall be allowed to present his or her views of such alleged breach at the next Board meeting. The complaining party must be identified. If the complaining party is a Board member, he or she and the respondent Board member shall recuse themselves from any vote upon resolution or censure or other action by the Board. Board members that are found to have violated the Code of Conduct may be subject to the following sanctions and/or discipline:

    a. requirement to discontinue or modify his or her conduct giving rise to the complaint;
    b. resign his or her position as a Board or committee member;
    c. a report to the Board member's Regulator;
    d. termination of position on the Board or the committee with or without notice; or
    e. such other reasonable and prudent sanction as appropriate in the circumstances.

16. Upon appointment, Board members and members of Board committees shall sign an acknowledgment of the Confidentiality Policy.

17. Upon appointment, Directors shall sign the Oath of Office.

4 Role of the Board

The Board will conduct its activities in a manner that emphasizes strategic leadership, proactivity, long term impacts, and a clear distinction between the Board and staff roles and responsibilities.

4.11 Board management delegation

Date of adoption: Date (Motion #?)	*Review period: Annual*
Date of latest amendment: Date (Motion #?)	*Date last reviewed: Date*

1. The Board's sole official connection to the operational organization, its achievements, and conduct, will be through the Chief Executive Officer (CEO). Accordingly:

    a. Only the Board acting as a body can employ, terminate, discipline, or change the conditions of employment of the CEO.

    b. Decisions or instructions of individual directors, officers, advisors, or committees are not binding on the CEO except in rare instances when the Board has specifically authorized such exercise of authority. (as per point 2 of Policy 4.3, Code of Conduct)

    c. Directors, officers, advisors or committees (including the CEAB and the CEQB) may request information or additional assistance but the CEO can refuse such requests that require, in the CEO's opinion, a material amount of staff time or funds or that are disruptive.

2. All Board authority delegated to staff is delegated through the CEO, so that all authority and accountability of staff is the responsibility of the CEO. Where authority and accountability has been delegated to staff, the Board authorizes the CEO to make all decisions required to develop and administer the activities within the policy direction which has been set by the Board. The Board will receive regular progress reports on any delegated area from the CEO. Accordingly:

    a. The Board will refrain from giving instructions to persons who report directly or indirectly to the CEO.

    b. The Board will refrain from evaluating, either formally or informally, any staff other than the chief executive officer.

    c. The Board will not express individual judgments of performance of the CEO or staff other than during participation in Board deliberations.

    d. The Board shall not speak on behalf of the Board except to repeat explicitly stated Board decisions unless authorized by the Board.

3. The Board will instruct the CEO through its Strategic Plan and written policies that prescribe the organizational goals to be achieved, and describe organizational situations and actions that form the boundaries of the CEO's authority. Accordingly:

    a. The Board will develop a Strategic Plan instructing the CEO to achieve certain results.

    b. The Board will develop policies that prescribe the duties and limit the latitude the CEO may exercise in achieving the results specified in the Strategic Plan. These Executive Duties and Limitations policies will describe those practices, activities, decisions and circumstances that the Board would find unethical or imprudent, and therefore unacceptable, even if they were to be effective. The Board will never prescribe organizational means delegated to the CEO.

    c. As long as the CEO stays within the bounds set by Executive Duties and Limitations Board policies, the CEO is authorized to establish all further policies, make all decisions, take all actions, establish all practices and develop all activities. Such decisions of the CEO shall have full force and authority as if decided by the Board.

    d. The Board may change its Strategic Plan and Executive Duties and Limitations policies, thereby shifting the boundary between Board and CEO domains. By doing so, the Board changes the latitude of choice given to the CEO. But as long as any particular policy is in place, the Board will respect and support the CEO's choices. This does not prevent the Board from obtaining information from the CEO about the delegated areas, except for data protected by privacy legislation.

8. Issues Policies

8.1 Diversity and inclusion policy

Date of adoption: Date (Motion #?)	*Review period: Annual*
Date of latest amendment: Date (Motion #?)	*Date last reviewed: Date*

Engineers Canada believes in diversity and values the benefits that diversity can bring to the engineering profession. Engineers Canada recognizes the critical importance of a diverse engineering profession with an inclusive climate for the future of the engineering profession. Engineers Canada supports and encourages the equitable opportunity for all qualified people to participate within the engineering profession.

1. Engineers Canada will promulgate and implement programs designed to advance the profession by promoting a diverse and inclusive climate in the profession.
2. Engineers Canada's programs regarding diversity and inclusion are focused on greater participation of women and Indigenous people in the engineering profession.
3. Engineers Canada recognizes the strategic and critical importance of a diverse Board. Engineers Canada is committed to a diverse Board and Board committee composition, with an inclusive culture, which solicits multiple perspectives and views and is free of conscious or unconscious bias and discrimination.
4. Engineers Canada seeks to maintain a Board and Board committees comprised of talented and dedicated directors with a diverse mix of gender, Indigenous status, expertise, experience, skills and backgrounds from a diversity of Canadian locations. In particular, the Board and Board committees strive to include at least 30% women.
5. Engineers Canada will deliver ongoing information, training and resource support to help the Board, the CEAB, the CEQB, other committees, volunteers and staff to develop capacity to address diversity and inclusion issues in their work.
6. Engineers Canada will provide guidance to staff and volunteers about their roles in implementing this policy and in developing ways to incorporate specific, measurable diversity provisions in their work.

Briefing note

For Board decision

Establishment of a Finance Committee		Agenda number 5.2b
Purpose:	To establish a Finance Committee to provide policies and advice to the Board regarding fiscal and risk management	
Motion(s) to consider:	THAT the Engineers Canada Board establish a Finance Committee and direct the Executive Committee to appoint members. The first task of the committee being to finalize its terms of reference in keeping with the example put forward by the Governance Committee	
Vote required to pass:	X	Simple majority
		Two-thirds majority (refer to articles 5.7 and 5.8 of the bylaw.)
Authority:	The Engineers Canada Board must establish policies, and committees to monitor those policies, to direct the organization.	
Transparency: *(all meetings, debates, and decisions shall be open, except for certain subject matters as described in GP-7.1)*	X	open session
		In camera, reason (check all that apply):
		The security of the property of the organization
		Personal matters about an identifiable individual
		The proposed or pending acquisition of assets by the organization
		Labour relations or employee negotiations
		Litigation or potential litigation
		The receiving of advice that is subject to solicitor-client privilege
		Another matter as the Executive Committee or Board determines
Prepared by:	Stephanie Price, Executive VP Regulatory Affairs	
Presented by:	Sarah Devereaux, Chair of the Governance Committee	

1. Problem/issue definition

- The Board must establish and monitor policies regarding fiscal and risk management
- At present, these responsibilities are assigned to no single committee, and there is a lack of policies in this area
- Establishing a Finance Committee, with proper terms of reference, will allow for the oversight of this key responsibility and ensure that the Board, as a whole, meets its fiduciary duty to Engineers Canada

2. **Proposed action/recommendation**
   - It is proposed that the Board establish a Finance Committee
   - The Executive Committee shall be asked to appoint members to the Finance Committee
   - The Finance Committee shall be directed to finalize terms of reference, based on the example that was previously used at Engineers Canada

3. **Other options considered:**
   - The Governance Committee discussed assigning responsibilities for fiscal and risk management to existing committees
   - Such option was not recommended since a board of this size has the resources to dedicate solely to this important task
   - If, in future, there are fewer directors, it may be worthwhile to review this decision

4. **Risks**
   - Inaction continues a long-standing risk– the Board lacks solid fiscal and risk management policies

5. **Financial implications**
   - Additional resources will be required to support this committee and its meetings. Such resources are estimated at less than $50,000 per year

6. **Benefits**
   - Engineering regulators:
     - Proper fiscal and risk management of Engineers Canada provide assurance of oversight in this key area

7. **Consultation**
   - n/a

8. **Next steps (if motion approved)**
   - Members of the Finance Committee to be appointed
   - Terms of Reference to be finalized and approved by the Board at the September meeting

9. **Appendices**
   - Terms of Reference of the 2012 Engineers Canada Finance Committee are attached and should form the basis for the new Finance Committee's terms of reference

6 Engineers Canada Board committees and task forces

6.7 Finance committee terms of reference

Date of adoption: Date (Motion #?)	*Review period: Annual*
Date of latest amendment: Date (Motion #?)	*Date last reviewed: Date*

1.0 Mission

1.1 To assist the Board in meeting its fiscal and risk management responsibilities through the provision of advice with respect to financial policies and issues affecting the organization.

1.2 To ensure the annual operating budgets developed by the CEO are consistent with board policies.

1.3 To assist the CEO, as requested, through the provision of advice on financial operating issues.

2.0 Expected outcomes

2.1 Financial planning for any fiscal year shall not deviate materially from the Board`s strategic priorities, risk fiscal jeopardy, or fail to be derived from a multi-year plan.

2.2 The annual budget is developed in accordance with the policies, business plan, and process approved by the Board.

2.3 Advice on matters pertaining to fiscal and risk management issues as requested by the CEO.

3.0 Functions and responsibilities

3.1 Develop and recommend fiscal and risk management policies for consideration by the Board, including review of existing policies.

3.2 Review the business plan and supporting annual budgets on behalf of the Board, including any changes to the assessment fee.

3.3 Review and recommend changes to the investment policy to the Board.

3.4 Review fiscal and risk management matters, at the request of the CEO, on an ad hoc basis.

Briefing note

For Board decision

Accreditation criteria change			Agenda item 5.3
Purpose:	The CEAB recommend a change be made to requirements for complementary studies content requirements for accredited programs		
Motion(s) to consider:	That CEAB criterion 3.4.5.1 d) be changed to read "The impact of technology and/or engineering on society" and « L'impact de la technologie et/ou de l'ingénierie sur la société » in French.		
Vote required to pass:	X	Simple majority	
		Two-thirds majority (refer to articles 5.7 and 5.8 of the bylaw.)	
Authority:	1. Accrediting undergraduate engineering programs		
Transparency: *(all meetings, debates, and decisions shall be open, except for certain subject matters as described in GP-7.1)*	X	open session	
		In camera, reason (check all that apply):	
			The security of the property of the organization
			Personal matters about an identifiable individual
			The proposed or pending acquisition of assets by the organization
			Labour relations or employee negotiations
			Litigation or potential litigation
			The receiving of advice that is subject to solicitor-client privilege
			Another matter as the Executive Committee or Board determines
Prepared by:	Lynn Villeneuve, Manager, Accreditation		
Presented by:	Wayne MacQuarrie, FEC, P.Eng. Chair, CEAB		

1. Problem/issue definition

In September 2016 the Engineers Canada Board made several amendments to the accreditation criteria Some of the amendedments were considered "housekeeping" changes. Motion 5594 read as follows:

> ***On a motion by L. Staples, seconded by J. Holm, it was resolved***
> ***THAT the proposed changes to criteria of a "housekeeping" nature (identified as housekeeping in consultants' report) and the procedure changes to provide additional clarity regarding existing practices be approved***
> ***Carried***

One such change was to the criterion describing the content for the complementary studies component of the curriculum. The relevant part of the criterion read as follows:

2015 text	Changes approved in 2016
3.4.5.1 While considerable latitude is provided in the choice of suitable content for the complementary studies component of the curriculum, some areas of study are essential in the education of an engineer. Accordingly, the curriculum must include studies in the following: a. ….. d. The impact of technology on society e. …	3.4.5.1 While considerable latitude is provided in the choice of suitable content for the complementary studies component of the curriculum, some areas of study are essential in the education of an engineer. Accordingly, the curriculum must include studies in the following: a. … d. The impact of engineering on society e. …

The change was made to better align this criterion with terminology used in graduate attributes in section 3.1. However, shortly after the change was published, the CEAB received comments from deans that the change from "impact of technology" to "impact of engineering" has the potential to create significant issues for institutions and students. By explicitly referring to engineering it implies that the courses would have to be designed and delivered in-house within engineering faculties. This takes away some of breadth and variety that programs can offer to students (allowing them to take approved courses from other faculties) and limits diversity of thought. This also requires significant lead time if changes are expected, as programs may have 3–4 years worth of students in varying stages of their program who have met this requirement under the 2015 (and earlier) wording.

2. Proposed action/recommendation

The issue was discussed by the Accreditation Board in February 2017. It was noted that on it's own, referring only to "the impact of engineering on society" is not sufficiently comprehensive. It was also noted that "engineering" can be considered an action, whereas "technology" is the outcome of those actions. Both can impact society. It is better to use both to be inclusive of all possibilities.

After discussion by the Accreditation Board, the following motion was carried:

MOTION:

"That the Accreditation Board recommends that criterion 3.4.5.1 d) be changed to "The impact of technology and/or engineering on society" and « L'impact de la technologie et/ou de l'ingénierie sur la société » in French.

CEAB recommends that this change be approved by the Engineers Canada board of directors. The relevant criterion would now read:

3.4.5.1 While considerable latitude is provided in the choice of suitable content for the complementary studies component of the curriculum, some areas of study are essential in the education of an

engineer. Accordingly, the curriculum must include studies in the following:
a. …
d. The impact of technology and/or engineering on society
e. …

3. Other options considered:

Not applicable

4. Risks

Failure to bring clarity to the criterion wording may negatively impact the delivery of complementary studies curriculum content

5. Financial implications

Not applicable

6. Benefits

Engineering regulators, the public at large, and the profession all benefit from additional clarity in the accreditarion criteria

7. Consultation

Engineering educators, through discussions with the Deans Liaison Committee of the NCDEAS, raised the issue in April 2017. The matter was discussed by the CEAB Policies and Procedures committee in April 2017 and in October 2017, with regulator representatives in attendance at both meetings. It was discussed again in open session of the CEAB's February 10, 2018 meeting with opportunity for observers to comment. Observers in February 2018 included regulator representatives, engineering educators, and CFES representation. No significant objections or concerns were raised.

8. Next steps (if motion approved)

Implementing changes to the published criteria of the CEAB will occur in the fall of 2018. The change will also be communicated to Higher Education Institutions through the NCDEAS and any other appropriate means.

9. Appendices

Current CEAB criteria are at:
https://engineerscanada.ca/sites/default/files/accreditation-criteria-procedures-2017.pdf

Briefing note

For information

Update on the work of the Canadian Federation of Engineering Students		Agenda item 6.1
Purpose:	The purpose of this update is to inform the Directors and Advisors of the Engineers Canada Board and the Members of Engineers Canada on work of the CFES since the February Board Meeting that we feel is relevant and on our growth towards becoming an informed, committed, and active stakeholder in the engineering community.	
Motion(s) to consider:	**No motion/decision required**	
Transparency: *(all meetings, debates, and decisions shall be open, except for certain subject matters as described in GP-7.1)*	x	open session
		In camera, reason (check all that apply):
		The security of the property of the organization
		Personal matters about an identifiable individual
		The proposed or pending acquisition of assets by the organization
		Labour relations or employee negotiations
		Litigation or potential litigation
		The receiving of advice that is subject to solicitor-client privilege;
		Another matter as the Executive Committee or Board determines
Prepared by:	Zenon Kripki, President, Canadian Federation of Engineering Students	

1. Background

The Canadian Federation of Engineering Students unites the undergraduate engineering student societies across Canada and indirectly represents and supports the nearly 85,000 engineering students. This update should be relevant to the Engineers Canada Board of Directors as it outlines our work towards mutual goals, including improving the inclusion and retention of minority groups in the engineering community and ensuring a strong and effective Canadian engineering education, and demonstrates our capabilities in providing a researched and representative national student voice.

As a reminder, the update presentation I gave at the September Board Meeting can be found here. General information on the CFES can be found on our website.

2. Status update

CFES National Student Survey Results Published

As promised in our last update, we have completed and published our final report on the results of the National Student Survey we sent out last final. It should have been distributed to the Engineers Canada Board of Directors in April; you can also find it on our website if you're interested in reading: http://cfes.ca/wp-content/uploads/2018/04/2017-CFES-National-Student-Survey-Report.pdf

The recommendations from the report are captured in our Stances (equivalent to Engineers Canada National Position Statements) put forward at the General Assembly at our Congress in January. They were also ratified and published this month.

Stances Published

At our Congress in January, 5 Stances were proposed to our members on the following topics:

1. Engineering Accreditation
2. Language Electives
3. Quality of Engineering Internships
4. Student Mental Health & Workload
5. Sustainability

They have since been formally ratified and published on our website. Each Stance includes our official position(s), the research we've conducted, what we're doing or plan to do towards any issues, and recommendations to relevant stakeholders. Three of these stances include recommendations to Engineers Canada and the CEAB:

Stance on Student Mental Health & Workload

Stance: The Canadian Federation of Engineering Students believes that engineering students confront negative mental health outcomes at rates exceeding the general population as a consequence of the structure and workload demands of their programs. All stakeholders, including faculty, accreditors, and student leaders, have a responsibility to review and amend their practices to give students a healthy and effective learning environment.

Recommendation:

- The CFES calls on Engineers Canada and the NCDEAS to partner with the CFES on research related to student mental health and workload, with the intention of clarifying the specific impacts of workload on the mental health of engineering students, and the best procedures for improving student mental health in engineering programs.
- The CFES calls on the CEAB to investigate changes to accreditation criteria that better account for the full burden of student workload, and that require access to basic mental health services for all undergraduate engineering students.

Full Document: http://cfes.ca/wp-content/uploads/2018/04/EN-Student-Mental-Health-Workload.p

Stance on Engineering Accreditation

Stance: The Canadian Federation of Engineering Students believes that the accreditation system for Canadian engineering programs should protect the interests of engineering students by ensuring a high and consistent standard for the quality of their education and by involving student voices in the process of accreditation visits and the development of accreditation criteria.

Recommendation:
- The CFES calls on the CEAB to update its accreditation visit practices in order to incorporate more valuable and active student feedback.
- The CFES calls on the CEAB to pursue a change to the Accreditation Unit system that better reflects learning outcomes and total learning time.
- The CFES calls on the CEAB to include CFES student representatives as equal stakeholders in all relevant projects, committees, and task forces related to accreditation.

Full Document: http://cfes.ca/wp-content/uploads/2018/04/EN-Engineering-Accreditation-1.pdf

Stance on Language Course Elective Eligibility

Stance: "The Canadian Federation of Engineering Students believes that as the future engineers of a global society, Canadian engineering students should have the opportunity to take elective language skills courses as part of their undergraduate degree program."

Recommendation:
- The CFES calls on the Canadian Engineering Accreditation Board to assist institutions with the interpretation of their existing policy on complementary electives by publishing an official interpretive statement on the subject.

Full Document: http://cfes.ca/wp-content/uploads/2018/04/EN-Language-Electives.pdf

Spring Meeting with Engineers Canada and the CEAB

We had our annual transition meeting March 16-18 in Ottawa, and spent our first day at the Engineers Canada office to go over our 2018-2021 Strategic Plan and the priorities we've set this year with Jeanette Southwood and her team. We also had the opportunity to hear about Engineers Canada's current direction and your priorities for this upcoming year.

Part of the meeting also included a consultation with Lynn Villeneuve and Mya Warken on the AU Task Force recommendations that were presented at the February Board meeting. The consultation went well according to both sides, and I would like to thank Wayne MacQuarrie, Lynn Villeneuve, and Mya Warken for considering our input as a stakeholder. We look forward to continuing to provide the national student perspective to the accreditation system and process and any proposed changes being brought to the table.

2018-2019 Events Dates

Dates for our events this fiscal year are listed below. If you would like to get involved in any capacity, we are always looking for speakers, panelists, and judges.

- CFES Conference on Diversity in Engineering 2017 – November 9-11 in Toronto
- CFES Congress 2018 – January 2-7 in Montreal
- CFES Conference on Sustainability in Engineering – February 22-24 in Prince George
- Canadian Engineering Competition – March 1-4 in Waterloo

3. Next steps

We hope to begin working on an official partnership agreement with Engineers Canada over the summer, and continue work set out in our Stances. We also plan to finalize a Stance on Diversity and Inclusion that includes our support for Engineers Canada's 30 by 30 initiatives.

If anyone has any questions or comments regarding anything I've presented here, please don't hesitate to reach out to me at president@cfes.ca. Thank you!