



Open Call
Request for Proposal

**Infrastructure Resiliency Professional
(IRP) Credentialing Program**

Issued by:

Engineers Canada
300-55 Metcalfe Street
Ottawa, Ontario K1P 6L5

Issued: Monday, April 29, 2019

Submission deadline: Friday, June 28, 2019, 5:00 p.m. ET

Questions concerning this Request for Proposals should be directed to:

David Lapp, FCAE, FEC, P.Eng., IRP
Manager, Globalization and Sustainable Development
Engineers Canada
613.232.2474 x240
(C) 613-793-2203
David.Lapp@engineerscanada.ca

Request for Proposal

Infrastructure Resiliency Professional (IRP) Credentialing Program

Introduction

Engineers Canada is seeking an organization to assume the operation of our IRP Credentialing Program (Program). This Request for Proposal is not for services. It is to transfer the legal, financial, and operational responsibility to another organization that will invest in the program and sustain it.

The Engineers Canada Board has mandated the divestment of the Program. Engineers Canada is not seeking financial compensation for this divestment, but rather a commitment of the assuming organization to invest time and resources to ensure the Program is sustained and becomes a preferred credential or certification that engineers and other professionals seek.

This document is issued to assure that the divestiture process follows the principles of due diligence and transparent disclosure. The Program will be transferred in its entirety in accordance with conditions to be negotiated between Engineers Canada and the winning proponent.

Engineers Canada is issuing a separate Request for Proposal (RFP) to assume the legal, financial, and operational responsibilities for the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Program. The PIEVC RFP has been issued at the same time and with the same deadline as this RFP. Proponents who have responded to the Request for Expression of Interest to receive the PIEVC Program RFP are informed that Engineers Canada is open to proposals where one organization assumes the responsibilities for both programs.

Guiding principles

The divestment process will entail adherence to principles that will guide the interest of organizations in this opportunity and provide the basis for responding to this RFP as well as the selection of a preferred proponent and subsequent negotiations.

The following principles guide the process, noting that the use of the word “should” as opposed to “must” or “shall” is deliberately stated as appropriate to provide flexibility at various stages:

- Preference will be given to non-profit organization (NPOs) and non-government organizations (NGOs) that may include universities, community colleges, other educational institutions, or other forms of institutions that offer such training.
- Partnerships between organizations may be proposed. Engineers Canada recognizes that partnerships may be necessary to have the range of capabilities required to operate and sustain the Program.



- Financial compensation for the transfer is not required; however, an investment to enhance and sustain the program will be required and must be defined in the proposal.
- The integrity and intellectual property of the Program and its courses must be maintained and enhanced as needed to serve the growing market.
- Acknowledgement of Engineers Canada as the original developer of the IRP Program.
- The assuming organization must be financially and technically capable to invest in updating and upgrading the existing IRP courses and develop new ones.
- The assuming organization should be willing to offer a credential or possibly a certification that would continue the IRP brand (or provide a strong rationale to do something different).
- The assuming organization shall collaborate with Engineers Canada in the smooth transfer of the program and its components and to re-boot and invigorate the program at the earliest possible moment.
- The assuming organization should commit to providing the Program for at least five years following transfer from Engineers Canada.

Adherence to these guiding principles will be one of the elements evaluated for selection of a preferred proponent for negotiation.

Background

Engineers Canada is the national association of the 12 engineering regulators that regulate the practice of engineering in Canada at the provincial and territorial level. There are over 295,000 professional engineers registered across the 12 jurisdictions. Our role as the national body for the profession is to undertake work that supports our engineering regulators as well as the profession at large. For example, Engineers Canada accredits all undergraduate engineering programs offered in universities across Canada.

One of the major societal issues that has been tackled by Engineers Canada on behalf of the profession is climate change. Our organization has been engaged in climate change adaptation and infrastructure resilience work for over 15 years. In partnership with the federal government, specifically Natural Resources Canada, we developed an infrastructure vulnerability and risk assessment protocol known as the PIEVC Protocol (“the Protocol”) in three phases between 2005 and 2012.

The Protocol was developed as a flexible tool for engineers to assess climate risks and vulnerabilities of public infrastructure from extreme weather events and projected systemic changes in climate. In the development process the Protocol was applied to assess buildings, water resources (water supply and wastewater treatment), and roads and associated structures (e.g. bridges, culverts). As of 2019, the Protocol has been used to assess more than 65 different sizes and types of civil infrastructures in Canada and in several other countries. The types of infrastructures assessed have expanded to include electrical power transmission and distribution systems, coastal defence structures, parks, airports, and port facilities. It has provided engineers and other professionals with a tool and process that enables the



development and prioritization of adaptation actions to reduce climate risks and improve climate resiliency to an acceptable level by the society that the infrastructure serves.

Work with the Protocol has seen an increasing need and interest for clients of engineers to adapt their infrastructures to our changing climate that includes extreme events. Owners of infrastructure now see the need to understand their current and future climate risks to assure cost-effective and reliable operation and service over the long life cycle of these assets.

The capacity of the profession to respond to climate change services needs to be evaluated. The introduction of the Climate Lens requirement by Infrastructure Canada in June 2018 as a condition of approval for funding of infrastructure projects introduces a whole new level of demand which is to continue for the next 12 years of their program. Other federal departments such as Transport Canada and Public Works and Procurement Canada are now actively assessing their assets for climate risks and vulnerabilities as an input towards how these will be managed in the future. These departments are using the PIEVC Protocol as one of the primary tools for these assessments.

Engineers Canada's IRP Program

Building on the experience and success of the development and deployment of the PIEVC Protocol, Engineers Canada developed a program for engineers to provide training and recognize additional competencies in planning, designing, and managing climate resilient infrastructure assets and their components. The recognition of these competencies was considered outside of, and in addition to, engineering licensure. It was not a specialization or designation such as the Engineers and Geoscientists of BC "Designated Structural Engineer."

Originally Engineers Canada referred to the IRP as a certification. However, feedback from our 12 engineering regulators and an internal review suggested that its status as a certification did not meet an academic level considered to be a certification, since the courses are at an introductory level. However, the level was enough to consider it a credential that engineers could add as a designation on their business card and signature to indicate this additional body of knowledge acquired through completion of the program courses. However, this does not preclude the assuming organization from exploring the possibility that they could turn the IRP credential into a certification upon taking responsibility for the program should they so choose. The IRP credential is a recognition that an individual has acquired a focused body of knowledge sufficient to advise on measures to evaluate, specify, and recommend measures to increase the climate resilience of public infrastructure.

The Infrastructure Resilience Professional (IRP) Program was launched in June 2016 with the recognition of six Infrastructure Resilient Professionals (IRPs) who were considered to have the required competencies. These IRPs were permitted to add the designation IRP to their business



cards and other forms of address as a recognition of their competencies. The program is now in hiatus since July 2018, and Engineers Canada no longer offers the program or the designation.

As of April 2019, there are seven (7) IRPs. Given suspension of the Program, these individuals have been informed that they may continue to use this designation under the authorization of Engineers Canada until the end of 2019 or when another organization assumes the Program and becomes the authority to issue the credential - whichever occurs first.

In addition, there are 174 engineers who have completed some of the courses for the credential. These people have invested their time and resources to pursue the credential but are caught in the situation with the program is no longer being offered. Engineers Canada is hopeful that these people will be served by another organization assuming the program and recognizing their progress to date.

IRP Program courses

The current version of the Program consists of completing four short courses in the following subjects:

- Climate Law for Engineers (15 hours)
- Asset Management for Engineers (15 hours)
- Risk Management for Engineers (15 hours)
- PIEVC Protocol – Introductory Course (10 hours)

The course syllabi are included in Appendix A of this RFP. These courses were funded and developed by Engineers Canada working with consultants in these fields. Course content was developed by the consultants and reviewed through advisory committees consisting of subject matter experts and practitioners.

All courses except Climate Law were developed for on-line delivery over multiple two-hour sessions. These are organized for live delivery at a fixed time of day over a limited calendar period – typically 2-3 weeks. There is some flexibility to provide the materials for an individual session for off-line review for a limited time that typically ends at the completion of the live delivery period.

All courses include an evaluation of learning outcomes through quizzes and a final exam. All quizzes and exams are multiple choice and are drawn from a bank of questions developed by the consultants. The passing grade is 60 per cent and re-writes are permitted at an additional cost to the student. There have been no re-writes required to date.



The Climate Law for Engineers course is delivered on-site over a two-day period. This subject is best delivered in a live setting to better facilitate dialogue and questions among the group of professionals in a manner that is considered more effective than an on-line approach. On-line delivery could be considered as a future enhancement. The PIEVC Protocol introductory course is also available for on-site delivery as a one-day workshop that has been delivered this way since 2009.

There are two other courses that were proposed for the program but were not developed before the program was suspended:

1. Climate Science (15 hours)
2. Policy and Procurement (15 hours)

All professionals should have a grounding in the basic science of climate change. Concepts around climate data and climate projections need to be understood sufficiently to utilize climate data and value-added services to implement strategies and measures for climate resilience. Engineers and other professionals need to work closely with climate scientists to specify and use this information in their work. There are many courses on climate science that could be considered equivalent and this could be adequate for this requirement in the short term. However, we suggest it should be a goal of the program to develop a course that is customized and optimized for this credential.

A short course on policy and procurement would be the sixth and final course to complete for the credential. Part of the challenge in the public sector for infrastructure climate resilience is how to specify the requirement in procurement processes. The policy context for climate resilience also needs to be understood. It differs between the three levels of government in Canada. The proposed course would cover these considerations for each level of government so the professional has grounding in the policy frameworks. Engineers Canada has developed a draft syllabus for this recommended course which is included as Appendix B to this RFP.

Engineers Canada owns the Intellectual Property of these courses but does not have training staff to deliver. The consultants that developed the courses are contracted to deliver the course content. Engineers Canada and the engineering regulators organize and promote the courses, including registration and issuing certificates of completion. Delivery by the consultants could serve as an interim measure until the assuming organization determines how it wishes to proceed in the longer term.

Registration fees are paid to Engineers Canada to cover the costs of the consultants as well as any material or communication costs. The objective has been to recover the costs of delivery, namely consulting fees. Administrative costs have not normally been covered except when registration exceeds the break-even point for payment of the consultants.

For on-site delivery, the costs of the venue, audio-visual and catering costs as well as consultant and guest speaker travel are included in the budget for achieving cost-recovery. These add additional costs to the budget which then requires a higher level of registration. This has been a challenge and in a couple of cases the Climate Law course has had to be postponed due to insufficient registration. In some cases, course registration fell short to achieve the break-even goal with the balance covered by the internal budget of Engineers Canada.

Engineers Canada has been much more successful with the PIEVC Protocol course on-site delivery. This course has been delivered on-site for almost 10 years and more than 50 times.

Registration fees have ranged from CAN\$ 600 to 900 per course. These have varied to attract professional engineers to become part of the program and take the series of courses. Attempts have been made to establish pricing points where the cost is considered reasonable by the participant and to ensure there is enough participation to cover costs. The pricing structure has been subject to change on a case-by-case basis as the level of interest by engineers is better understood and the market for this knowledge evolves.

A pricing strategy and structure for the courses has not been established and will be required to assure the program's financial sustainability.

Program operation and administration

The IRP was a very new program in Engineers Canada that was still evolving operationally and administratively when it was suspended. Limited financial and human resources were allocated for program development in the period between the June 2016 launch and suspension in July 2018.

The Program Charter proposed no annual membership fees for the first three years of the program to provide an incentive for engineers to pursue the credential, while its value to engineers and the marketplace would develop.

The analysis required to establish a pricing structure for membership has not been undertaken and will be required.

The IRP Program was administered and supported part-time by Engineers Canada's Manager, Globalization and Sustainable Development, with some administrative support for course promotion, registration, and financial management to collect revenue and pay consultants engaged under contract.



A database of the seven IRPs and the 174 IRP candidates who have taken some courses will be provided as part of the transfer of administrative files to the assuming organization, subject to privacy legislation.

Benefits of the Program

The IRP Program Charter approved by Engineers Canada in the spring of 2016 listed several benefits to offering the IRP credential. We believe these benefits are just as valid today and justify continuing the program. These benefits will be realized to a greater degree than originally conceived, given the fast-growing interest and urgency to manage public and private infrastructure to address climate-related risks and vulnerabilities.

The Program benefits the public, individual engineers, and the engineering regulators. Although used in the context of addressing climate resilience, the program could evolve to be tailored to any type of threat (e.g. seismic, cybersecurity, etc.).

1. An IRP credential instills enhanced confidence that the infrastructure engineer has the competencies to use the tools to assess future climate impacts.

The IRP provides infrastructure owners and operators and the public with enhanced confidence that the recommendations or approvals for design, operations, or maintenance of infrastructure have been made by an engineer who has advanced training and experience related to vulnerability assessment and risk management in addition to the licensure requirements.

2. An engineer with the IRP credential has the knowledge and competencies to apply a systems approach to threats on infrastructure services to maintain their safe operations.

The IRP engineer is more likely to identify interdependencies between infrastructure systems and/or components that may result in additional vulnerabilities and risks. They will have acquired a new body of knowledge related to risk assessment and management, as well as new and more varied tools to address risks and design for resiliency. This knowledge will be kept up-to-date through professional development learning required to maintain the IRP credential or certification.

IRPs can become part of a new community of practice, a valuable network of like-certified professionals that share their knowledge and support each other, thus benefiting their employers and clients alike.

3. Individual engineers with IRP credential have acquired and maintain additional competencies that increase their marketability and make them better multi-discipline team leaders.

For the individual, obtaining the IRP credential is a differentiator amongst the competition. The formal training acquired through the process will fill in the gaps from experience-only and self-study knowledge acquisition. The individuals who have enrolled in the program have indicated this is one of their goals in participating in the program. There is no other program with this specialty available in Canada.

The engineer with an IRP credential will have an augmented multi-discipline interaction capacity since risk assessment and design for resiliency requires greater awareness and teams that are outside of one engineering discipline and of engineering altogether. He/she will also have a better ability to mentor due to the enhanced multi-discipline knowledge and training the IRP credentialing process requires.

4. Obtaining and maintaining the IRP credential helps the engineer obtain professional development credits.

Engineering regulators require continuing education or professional development credits for maintaining an engineer's license. The Program offers the benefit of contributing to the required professional development units while obtaining or maintaining the credential.

5. The credential is outside of, and in addition to, licensure.

Like other certifications such as the Project Management Professional (PMP) the Program is positioned as an additional level of specialized knowledge that is an addition to, and not part of, the requirements for licensure. It does not interfere with, nor is it part of, the requirements for engineering licensure. In fact, Engineers Canada suggests that only professional engineers be eligible to take the program to make the message clear. It is also a voluntary process, not a requirement to maintain licensure.

6. May reduce the professional and legal exposure of professional engineers engaged in infrastructure procurement, design, construction and management.

The IRP Program addresses issues faced by professional engineers in view of climate change and infrastructure risks and responsibilities. There are several significant class action suits in progress in Canada related to flooding and associated damages (for example: Thunder Bay - \$320+ million and certified; Montreal – proprietary led by insurance; Mississauga - \$200+ million) that include statements about climate changes. The credential may provide some

additional protection for engineers and may reduce premiums for professional liability although this remains to be confirmed.

7. Reducing the risk to the public resulting from a changing climate is in the public interest.

The IRP provides evidence to governments and the public that engineers and engineering expertise address one of the most significant concerns regarding infrastructure. That concern has been clearly identified and stated by Public Safety Canada in their 2013-2014 Report on Plans and Priorities: “The rising cost of natural disasters and the financial burden on Ottawa [federal government] is the country’s biggest public safety risk...”

As such, the existence of an IRP Program that addresses extreme weather and climate related changes at no cost and with no involvement of governments, reinforces the benefits of self-regulation.

8. Consistency can improve mobility.

The IRP Program contributes to the consistency in how climate change impacts on infrastructure are addressed by engineers, contributing to their mobility. It demonstrates the continuing leadership of the engineering profession addressing multi-discipline problems and issues, and how the solutions developed by credentialed engineers support other infrastructure functions, for example, planning.

As such the Canadian engineering profession supports the continuation of the program and will promote its benefits to engineers, infrastructure owners, and the public, provided it remains a credible and sustainable program that evolves to meet the needs of engineers.

9. Applying what we know now and learning more.

The IRP Program formalizes the body of knowledge concerning climate change and its impacts on infrastructure and help, through the development of new knowledge (e.g. legal) to fill existing gaps to support the profession and its members. The Program helps with the widespread dissemination of and access to this consolidated and/or new knowledge and spur research for improvements. The credentialing program is building on what we have learned from over 50 completed PIEVC assessments in Canada and more than 50 training workshops held over the last 10 years.

10. Opportunities for engineering regulators.

Engineering regulators can directly engage with the assuming organization to schedule and deliver IRP courses to their members. Over time, courses may be delivered by their own trainers or the assuming organization may elect not to teach the curriculum to meet the requirements of the credential in whole or in part. In such cases it can ensure that the curriculum offered by third party organizations meets the requirements of the IRP credential Any third party that meets the criteria that will be developed may be offered the opportunity to offer training on behalf of the assuming organization, which could include engineering regulators or their training partners.

11. Linkages to ISO-related standards

The current inventory of courses for the IRP have accounted for the following ISO standards considered relevant to the credential process:

- ISO 55000 (2014) Asset Management
- ISO 31000 (2009) Risk Management
- ISO 17024 (2012) Conformity Assessment (General requirements for bodies operating certifications of persons)
- ISO 9001 (2015) Quality Management

Enhanced linkages and conformity to these standards in the course materials would be an enhancement. In the medium- to longer-term some form of recognition of adherence by ISO or a Canadian entity would be desirable.

The opportunity

The package that comprises the Program consists of the following:

- Ownership of the Intellectual Property of the four courses as presently developed
- Draft syllabus for the proposed Policy and Procurement course
- All course materials, syllabi and files
- Administrative files
- Program operations manual (in draft)
- Database of IRPs and IRP candidates (subject to privacy legislation)
- Promotional documentation
- Endorsement of the program by Engineers Canada (following a review of the Program and completion of the re-boot)
- Facilitate access to and collaboration with our 12 engineering regulators to promote the program and courses to the 295,000 members across Canada



- Advice and consultation on course development, delivery, promotion by Engineers Canada staff on an as-required basis
- Facilitating access to engineers willing to volunteer as subject matter experts for course development/enhancement

The level of knowledge and evaluation of learning outcomes for the current Program is at an introductory level, but enough to consider it a credential. A certification-level credential will likely require a more comprehensive level of knowledge and application in these areas. Additions may include more instruction time to accommodate a wider and deeper quality of knowledge, assignments, and projects as well as more challenging quizzes, tests, and examinations. These enhancements would upgrade the quality and credibility of the IRP designation and potentially make it a more valued certification for engineers and owners of infrastructure. This will require a financial investment.

The IRP was developed by Engineers Canada for engineers. As such it could not be offered to other professions such as architects, planners, accountants, or lawyers. Engineers Canada has received inquiries about availability of the IRP designation and the courses from individuals in these other professions. Divestment of the IRP from Engineers Canada offers the opportunity to extend to other professions thereby expanding and extending the market for the designation. This will require an understanding of the needs of these other professions as well as the infrastructure owners they serve in their respective capacities. This may lead to course revisions or new courses to serve these new needs.

Engineers Canada was engaged in preliminary discussions with the federal government's Greening Government Operations on the potential to develop a customized federal IRP Program for federal engineers engaged in the procurement, specification, design, operation, and maintenance of federally owned infrastructures. These discussions have been suspended but there remains an interest to pursue this possibility that may include potential funding.

The federal IRP opportunity is an example of other possibilities to create customized IRP Programs for economic sectors which may contribute to the financial sustainability of the IRP Program.

Current and future needs of the IRP Program – what investment and work is recommended

The following factors will be informative for proponents in the preparation of their proposals and for Engineers Canada in the evaluation of the proposals.

1. Transfer of Intellectual Property and handover of program to assuming organization. Note that Engineers Canada does not have a trademark on the IRP and it has no separate logo.

2. Review and updating of existing course materials.
3. Identify and develop new courses if required. This may include the development of the Policy and Procurement course and possibly the Climate Science course in the longer term.
4. Translation of course materials, including syllabi, and program information into French – not currently available.
5. Developing a viable and sustainable model for course pricing and delivery (e.g. by consultants or in-house instructors).
6. Development of more formalized admissions policies and procedures.
7. Development of program operation policies and procedures including membership fees.
8. Completion of a program operations manual (now in draft form).
9. Policies and practices concerning governance of the program.
10. Program and course promotional strategies.
11. Recognition of Engineers Canada as the originator of the IRP Program.
12. Integration with existing programs and initiatives of the assuming organization.

Divestment schedule and steps

The steps include:

1. Issue RFP
2. Proponents submit proposals for evaluation
3. Evaluation and selection of a preferred proponent (assuming organization)
4. Negotiation and signing of a transfer agreement
5. Legal transfer of Intellectual Property and the IRP package to the assuming organization
6. Assistance to re-boot the IRP
7. Resume IRP program

The approximate schedule for the steps in the divestment process is shown in Figure 1.

The process will include an optional briefing teleconference with potential proponents on Tuesday, May 14, 2019, at 1:00 p.m. ET. Proponents are requested to indicate their interest in participating in the teleconference in advance by contacting the Engineers Canada representative.

Engineers Canada may accelerate this schedule following selection of a preferred proponent on request. The earliest possible resumption of the program is desirable to accommodate the 174 individuals who are partway through the program requirements and for the continuity of the credential for existing IRPs. However, steps are required to assure the viability of the program as well as its content and credibility to engineers and other professionals as well as infrastructure owners and governments.

Figure 1: Schedule of divestment steps

Divestiture Steps		Apr 2019	May 2019	June 2019	Jul 2019	Aug 2019	Sept 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020
1	Issue Request for Proposal	X									
2	Briefing teleconference with potential proponents; submission of written questions by proponents		X								
3	Proposal Submission			X							
4	Evaluation of Responses and Selection of Preferred Proponent			X	X						
5	Negotiate Transfer Agreement					X	X				
6	Signing of Transfer Agreement							X			
7	Complete Transfer of IP and Administrative Files								X	X	
8	New IRP Program Planning									X	X
9	IRP Program Re-Boot Preparations									X	X
10	IRP Program Re-Launch										X

Proposal submission requirements

Proponents are expected to submit a written proposal by the submission deadline. Failure to do so will result in disqualification and non-consideration of the proposal.

Proponents are required to address the following questions in their proposal:

- What is your interest in assuming the Program and how does it align with your organization’s mandate?
- What is your current expertise and experience in developing and maintaining and delivering education and training courses? Explain your experiences with on-line delivery.
- What is your current expertise and experience in climate change infrastructure resiliency and in the subject areas of the courses? If none, how would you ensure that you would gain it or have it available?
- What is your perspective and proposed strategy on the financial sustainability of the IRP and maximizing its requirement and use by organizations/governments/engineers?
- What is your perspective on growth potential of the Program and explain how do you think your organization can sustain it?
- If your organization were selected, what assistance would you expect from Engineers Canada’s and for what period of time?

Proposal structure

Proposals should not be more than 15 pages in length plus whatever appendices are required to provide adequate background information for evaluation purposes.

The structure of the proposal must cover the following items to provide enough level of depth to demonstrate an understanding of the opportunities, issues, and challenges of assuming the



legal, financial, and operational responsibilities of the program to assure its continued access to engineers.

We ask you to address the following items based on the information provided in this RFP and your organization's understanding of the current and potential market for the program by addressing the following:

1. Describe your **vision and mission statement** – How does your current mandate fit with the transition period, initial operation of the program, and a long-term sustainable and responsive IRP program that continues to be relevant and valued by engineers and infrastructure owners?
2. Describe your understanding of the **opportunities and challenges** in assuming this program.
3. **Value proposition** – What are the benefits and value to Engineers Canada, its engineering regulators and individual engineers of divesting the IRP to your organization?
4. **Marketing and 'sales' strategy** – Describe the market for IRP. How do you propose to reach out to them? How will revenue be generated? Who are potential competitors? What current infrastructure is in place to support the operation of the IRP program and what must be acquired or developed?
5. **Financial viability** - Proponents are expected to provide evidence of financial stability and sustainability of their organization.
6. **Strategic plan** - What are your organization's goals and how does the IRP program fit within them for the next two to five years? What are the variables that factor into the allocation of resources? What assurance will your organization provide so that the IRP remains a valued credential and remains at the forefront?
7. **Management team** – Who will champion and lead the divestment and transition process and assume leadership of the program? Is there an experienced team in place to operate the program and provide information on who they are and their qualifications to assume the proposed roles? That can develop a medium- to long-term viable and sustainable strategy and execute that strategy?
8. **Corporate experience** – What is your organization's experience and performance with similar products, and third party/industry recognition in the marketplace?

The proponent must also submit a preliminary two-year business plan in which it articulates a vision of success for the Program, and confirmation that the resources dedicated to the Program fit with the established funding priorities of the organization. This plan should be not more than 10 pages and provided in a separate appendix. Length may be shorter if the proponent can cover the requirements listed above.

Engineers Canada contact

Questions concerning this RFP should be sent by email to Engineers Canada:

David Lapp, FCAE, FEC, P.Eng., IRP
Manager, Globalization and Sustainable Development
Engineers Canada
E-mail: david.lapp@engineerscanada.ca

Proposal evaluation process

All questions concerning the RFP must be submitted in writing by email to the RFP contact. The questions and answers will be shared with all proposal submitters if there is more than one. The identity and affiliation of the questioner will not be provided. Questions will be received and answered up to five days before the proposal submission date.

An extension to the submission deadline will be considered provided it is received at least two weeks prior to the current deadline. An extension will be granted only once up to a maximum of two weeks and only if requested.

An evaluation team will review proposals that were received by the submission deadline.

How to submit a proposal

Proposals must be received electronically by 5:00 p.m. ET, June 28, 2019 (the “Proposal Submission Deadline”) to David Lapp, at David.Lapp@engineerscanada.ca. Late proposals will not be considered and will be deleted, unopened. An email confirming receipt will be sent to the Bidder of the proposal.

Confidentiality

Information submitted by Proponents will be treated as proprietary, held confidential, and used only for evaluating the ability of the Proponent to operate and sustain the Program. The details of any proposals will be shared only with the persons involved with the selection and approval process.

RFP terms and conditions

Process conditions

This RFP is not an offer by Engineers Canada to any person, and no written agreement of any kind whatsoever is formed between Engineers Canada and any Bidder upon the submission of a proposal in response to it.

For greater certainty, nothing in this RFP, including without limitation, the use of mandatory language, language reserving rights to Engineers Canada, or other language that might, but for this clause, be indicative of contractual intention, is intended by Engineers Canada to indicate an intention to be contractually bound to any Proponent in any manner whatsoever. Engineers Canada retains the right, in its absolute discretion, to consider and analyze the proposals, negotiate with any Proponent at any time, select a preferred Proponent, or enter a transfer agreement with a Proponent. Without limiting the foregoing, Engineers Canada may:

- Reject or accept any proposal, whether or not complete, and whether or not it contains all the required information;

- Require clarification of any proposal;
- Request additional information on any proposal;
- Reject any or all proposals without any obligation, or any compensation or reimbursement to the Proponents;
- Refuse to enter into an agreement with any of the Proponents;
- Conduct negotiations with one or more Proponents;
- Cancel and reissue the RFP;
- Extend any of the stated dates and deadlines and/or amend the procurement process;
- Re-advertise for new submissions or call for submissions for this opportunity
- Further, Engineers Canada may, in its sole discretion, independently verify any information in any proposal. The proposals submitted by Proponents must be offers made in good faith, and Engineers Canada reserves the right to make a choice from the various proposals, or not choose any. **Engineers Canada shall not be obligated in any manner until a written agreement relating to an approved proposal has been duly executed.**

Intellectual Property Rights Disclaimer

Engineers Canada does not accept any liability for claims related to intellectual property infringements made at any time before or after the transfer occurs and will not defend, indemnify, or hold harmless the assuming organization/Bidder from and against any or all claims, losses, damages, costs, expenses and other actions made, sustained, brought or prosecuted, in any manner based upon, occasioned by or attributable to any negligent acts or omissions, including claims related to the infringement of copyright, confidential information or any other intellectual property rights or the use of any other content for which permission was required.

Competitive process

With the issuance of this RFP, Engineers Canada is making a business opportunity available to select a Proponent having the experience and competence to enter into a transfer agreement.

Proposal revisions

All proposal revisions must be received by Engineers Canada prior to the Proposal Submission Deadline.

Cost of preparing proposals

Bidders are solely responsible for all costs they incur in preparing and submitting proposals.

Clarification of proposal

Engineers Canada reserves the right, but does not have an obligation, to request clarification of a proposal or request further information from any or all Proponents. In addition, if, in the opinion of Engineers Canada, any proposal contains a minor defect or irregularity or fails in some way to comply with any requirement of the RFP in a way that, in the opinion of Engineers Canada, can be remedied without providing an unfair advantage to one or more Proponents, the Engineers Canada contact person may request rectification from the Proponent(s).

Engineers Canada, upon receipt of appropriate clarification and/or rectification, may waive the minor defect or irregularity and accept the proposal. Failure by a Proponent to provide a written response that, in the opinion of Engineers Canada, properly clarifies or rectifies its proposal,



within the time specified in the request for clarification or rectification, may result in disqualification of the proposal.

Acceptance of RFP conditions

Receipt of a proposal by Engineers Canada will be considered acceptance by the Proponent of the RFP terms and conditions and will be incorporated in the Proponent's proposal.

Notification of success

A written Notice of Award shall be the only valid form of notification of success in response to this RFP.

Reservation of rights

Engineers Canada reserves the right, in its sole discretion, to:

- modify, cancel or suspend the selection process, or any or all stages of the selection process, including before or after provision of a Notice of Award, at any time for any reason;
- accept or reject any proposal as determined in the sole discretion of Engineers Canada;
- not accept any proposal; and
- reject or disqualify all or any proposal without any obligation, compensation or reimbursement to any Proponent

The full execution of a written transfer agreement will constitute completion of the transaction, the services, and no Proponent will acquire any legal or equitable rights or privileges relative to the Program until a written Notice of Award has been delivered and a written transfer agreement has been duly executed.

Limitation of damage

Each Proponent, by submitting a proposal, agrees that:

- In the event any or all proposals are rejected or disqualified, or the selection process is modified, suspended or cancelled for any reason, neither Engineers Canada, nor its employees, agents, officers or directors will be liable under any circumstances for any claim, or to reimburse or compensate any person in any manner whatsoever, including but not limited to costs of preparation of the proposal, loss of anticipated profits, loss of opportunity, or for any other matter; and
- The Proponent waives any claim for loss of profits or loss of opportunity if : (i) the Proponent is rejected or disqualified or is not successful in the selection process; or (ii) the selection process for the Program transfer is suspended, cancelled or modified at any time.

Proposal documents

All documents submitted by Proponents will become the property of Engineers Canada.



Appendix A - Course syllabi

Draft Syllabus for IRP Risk Management Module

RSI Team with support of Review Committee
Updated May 20, 2017



Course Design Assumptions

There are 10 modules (10th one is off-line final exam)

Each module constitutes approximately 2 hours

6 x 2 = 12 on-line learning modules

2 x 2 = 4 hours off-line reading

1 x 2 = 2 summary module

1 x 2 = 2 hours final exam

10 x 2 = 20 hours total

A single case study will be applied incrementally throughout the course to exemplify the core concepts.



Case Study – Integrated Risk Management of Urban Water Infrastructure Decision-Support

- Case Study of an anonymized Urban Watershed Context
 - Multiple concerns at play
 - Vulnerable assets and populations
 - Past history of adverse outcomes
 - Concern for both current and future climate
 - Multiple risk control measures available
 - Impact on frequency/consequence relationship
 - Budgetary constraints on total risk control budget
 - Economic return-on-investment for risk control

3

1) Introduction to Risk Management

- Important Frameworks describing Risk Management applied in Engineering and other Relevant Contexts
- Important Differences in Terminology and Focus
 - Enterprise Risk Management versus Public Risk Management
- Core Concepts: Hazard, Vulnerability, Risk
- Core Concepts: Event-based versus Chronic Risks
- Core Concepts: Estimating Risks vs. Comparing Decision Options
- Principles underlying Public Risk Management



4

1) Learning Outcomes

- Exposure to diverse RM frameworks, similarities and differences.
- Clarity in distinction between Hazard, Risk, Vulnerability
- Exploration and Understanding of Common Principles underling Public Risk Management

5

2) Exploring Trade-offs in the Risk Assessment Continuum

- Risk Assessment Principles
- Key Components of Risk Assessment
 - Hazard Identification/Failure Analysis
 - Exposure Assessment
 - Exposure-Consequence Assessment
 - Risk Characterization and Evaluation
- Fault Trees, Event Trees, Bowtie Analysis
- Dimensions of Validity in Risk Assessment
- Qualitative & Semi-quantitative Risk Assessment
- Deterministic and Probabilistic Risk Assessment
- Avoiding Pitfalls in the Design of Risk Assessments

6

2) Learning Outcomes

- Exploration and Understanding of Core Principles in Application of Public Risk Assessment
- Review of Key Stages in Risk Assessment
- Review of Core Analytical Tools like Fault Trees and Event Trees
- Understanding common human errors (including experts) in reasoning about probability and risk
- Understanding the tradeoff in Choosing RA methods
 - Simplified approaches can be easy, but can be very error-prone
 - Complex approaches may delay decisions but avoid errors and evidence distortion.

7

3) Risk-based Decision-Making

- Different purposes in the use of “risk-based” and “risk-informed”
- Risk-based versus Rule-based design and verification
- Examples from Design, Inspection, Priority-Setting and Resource Allocation
- From simple risk sorting to the systematic use of incremental cost-effectiveness analysis
- Priority-setting and comparative risk assessment
 - Based on risk, risk reduction, cost-effective risk reduction

8

3) Learning Outcomes

- Understanding the societal need for risk-based decision-making
- Understanding the risk-based and rules-based continuum
- Distinction between pure risk estimation and analytical decision-support

9

4) Risk Communication: Understanding Risk Perception, and Risk Tolerability

- Understanding what influences non-expert perception of risk
- Principles of Risk Communication
- The do's and don'ts of Risk Communication
- Understanding public and societal risk tolerance
- The concept of societal risk governance

10

4) Learning Outcomes

- Understanding findings from social sciences with respect to public understanding of an evaluations of situations involving risk
- Practical advice with respect to public risk communication
- Understanding the nuanced nature of public risk tolerability
- Understanding multi-institutional risk management (risk governance())

11

5) Reading Assignment 1 (To be Done by Participants Off-line)

- Intended to support previous modules (50%)
- Intended to support upcoming case study (50%)

12

7) Reading Assignment 2 (To be Done by Participants Off-line)

- Intended to support previous modules (50%)
- Intended to support upcoming case study (50%)

13

9) Putting the Parts back Together

- Review of Core Elements of Risk Management
- Review of Core Elements of Risk Assessment
- Review of Core Elements of Risk Communication and Tolerability

14

10) Final Exam (To be Done by Participants Off-line)

To be developed once core course materials are 90% done.
Question: which types of concepts are “testable” in an exam context and ones which certificate-holders should be expected to be knowledgeable.

15

Next Steps

Conference Call to Discuss Draft Course Materials
Week of June 5th



Asset Management for Engineers

Course Syllabus

June 2017

Course Overview

Infrastructure assets in Canada are valued to more than \$1.5 trillion. In terms of municipal assets, which comprise nearly 60% of all infrastructure in the country, a large proportion was built in the post-war era and thus are reaching the limits of their service life.

Asset management (AM) is viewed by many as a necessary tool to manage the infrastructure debt that has accumulated over the past decades due to lack of investments in rehabilitation and maintenance.

The course explores the challenges faced by the core physical infrastructure systems municipalities own and operate: potable water systems, waste and storm water collection and treatment, roads and sidewalks, bridges, and overpasses.

Course Objectives

This course is designed to fulfill one of the knowledge requirements of Engineers Canada's Infrastructure Resilience Professional (IRP) certification program. Students will be presented with the context of decision-making in a public (municipal and public utility) environment. The elements of asset management systems such as inventory, diagnostic and condition assessment, performance and prediction, valuation, planning and life-cycle analysis, risk assessment and management, and prioritization of interventions will be evaluated.

Learning Outcomes

By the end of the course, students will be able to:

- Demonstrate an understanding of the principles of asset management applied to community infrastructure and of the benefits and challenges of infrastructure asset management.
- Describe the steps in developing and implementing an asset management strategy and plan for infrastructure, and understand how to apply AM principles to water and wastewater systems, building facilities, to roads, culverts, bridges and overpasses, and to other community assets such as solid waste, parks and recreational facilities.
- Link asset management to other functions related to and impacting infrastructure such as land use planning, operations and maintenance, accounting requirements, investment planning and risk management.

Course Format

The 15 hours of lectures in this course will be presented online, in 2-hour sessions, twice weekly. The last session includes a 1 hour allocation for the course test.

Students will be assigned readings and other assignments to complete between classes (more details in the “Learning Assessment” section below). Although the lectures will be recorded for review or in the exceptional case of absence, students are expected to attend the lectures and participate in online discussions during the class.

Course Requirements

The course is targeted to licensed professional engineers but registration is open to any professional or university level student. There are no course or diploma pre-requisites for this course; an understanding of engineering principles related to infrastructure design, construction, operations and/or maintenance will help obtain the most benefits from this course.

Learning Assessment

Reading Assignments (40%)

Students will be required to find and read 5 articles (minimum 5 pages each) related to asset management in technical journals or trade publications and submit at the end of the course the list of articles read, copies of the articles, and a maximum 100 words summary of each article (not the article’s abstract) and the student’s impression in terms of usefulness, strong and weak points, key results, etc. The reading assignments will be due at the end of the day of the last day of classes.

Multiple choice test (60%)

A 30 question multi-choice test that covers all material covered will be administered at the end of the course. Students will be given 1 hour to complete the test.

The passing grade for the course is 60%. Students will receive a Pass or Fail report once they have completed all the required course work (Reading assignments and multiple choice test).

Course Topics and Schedule

The topics covered by the course and a preliminary schedule are presented in the table below.

Topic	Hours
1. Introduction <ul style="list-style-type: none"> • Review of course format, schedule and learning assessment. • Context • Historical review of AM in Canada and internationally • General definition and principles of asset management • Benefits of AM • Links between AM, accounting and financial management 	2 hrs
2. The Asset Management Framework <ul style="list-style-type: none"> • Introduction of common AM frameworks • AM strategy and AM plan 	1 hr
3. Types and characteristics of asset classes <ul style="list-style-type: none"> • Assets commonly managed by municipal governments • Linear versus vertical assets 	1 hr
4. Steps in Developing an Asset Management Plan <ul style="list-style-type: none"> • Inventory • Valuation • Condition and needs assessment • Life-cycle analysis • Risks and critical infrastructure • Planning: <ul style="list-style-type: none"> • Maintenance, repairs, rehabilitation, decommissioning • Financial plans • Risk management 	8 hrs
5. AM tools and systems	1 hr
6. Examples of asset management plans	1 hr
7. Review and wrap-up	1 hr
8. Test	1 hr

Recommended Reading (Prior to the course)

Students are encouraged to prepare for this course by reading the following material (provided once registered):

Selected InfraGuide best practice documents
2014 CIRC AM primer

Resources

There is no assigned textbook for this course. Useful references include:

- *Public Infrastructure Asset Management*, W Uddin, W. Hudson and R. Haas, Second Edition, 2013
- IPWEA/INGENIUM *International Infrastructure Management Manual*, latest version 2015
- *Asset Management: Whole-life Management of Physical Assets*. Edited by Chris Lloyd, Thomas Telford Publishing, 2010
- ISO 55000 – Asset Management standards

Material for this course has partially been extracted from the Best Practices published by InfraGuide (see <http://www.fcm.ca/home/programs/past-programs/infraguide.htm>). The documents can be downloaded free of charge and provide an extensive library of best practices in:

- Decision making and investment planning
- Urban roads
- Potable water
- Storm and wastewater
- Environment

Students are asked to download these documents and use them to complement the course notes.

A number of journals publish articles related to infrastructure assets management, including:

ASCE: Journal of Construction Engineering and Management
Journal of Infrastructure Systems
Journal of Performance of Constructed Facilities
Journal of Management in Engineering

CSCCE Canadian Journal of Civil Engineering

APWA-Sage Journal of Public Works Management and Policy

Some useful websites:

- www.irc.nrc-cnrc.gc.ca NRC's Institute for Research in Construction: urban infrastructure research program information (some of the latest research in the field) + publications
- www.infrastructure.gc.ca : Infrastructure Canada's website
- www.IPWEA.org : Australia's Institute of Public Works Engineers (publishers of the International manual)
- http://www.pir.gov.on.ca/userfiles/HTML/cma_4_35659_1.html Ministry of Public Infrastructure Renewal, Ontario
- <http://www.fhwa.dot.gov/infrastructure/asstmgmt/resource.htm> US Federal Highway Administration asset management office
- Asset Management BC - <http://www.assetmanagementbc.ca/>
- US-EPA – Check-up program for small (water) systems : <http://water.epa.gov/infrastructure/drinkingwater/pws/cupss/index.cfm>
- Canadian Network of Asset Managers (CNAM) – <http://www.cnam.ca/> (Note: membership in CNAM also gives you membership in the UK Institute of Asset Management and their publication Assets)

Other websites and references will be provided to the students during the course

About the instructor:



Dr. Guy Félio, P.Eng., FCSCE, IRP (Climate)

Senior Advisor, Asset Management Solutions and Infrastructure Resilience, Stantec Consulting Ltd., Ottawa (Canada)

Dr. Félio is a civil engineer with a Ph.D. from Texas A&M University. He has more than 30 years of experience in the field as a university professor, researcher, consultant and policy advisor.

At Stantec, he provides expertise and support in the areas of asset management and adaptation of the built environment to climate change.

He recently worked at Engineers Canada on climate change impacts to infrastructure, including the application of the PIEVC Engineering Vulnerability Assessment Protocol and was key in designing the Infrastructure Resilience Professional (IRP) certification program. During his career at the National Research Council, he led the Urban Infrastructure Research group, focusing on technological and management improvements for municipal infrastructure. He launched *InfraGuide* – a program that produced 55 best practices to support municipalities manage their assets, and provided expert advice to Federal infrastructure programs.

In addition to serving as advisor to public agencies for the development of infrastructure strategies and policies, he is very active on professional associations' boards and committees, and in knowledge transfer through university education and professional training. Dr. Félio was the Project Coordinator and principal author for the first *Canadian Infrastructure Report Card* published in September 2012, and Councillor in the City of Clarence-Rockland (Ontario) from 2010 to 2014.

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 1 – Topics 1 & 2					
1	Climate 101 <ul style="list-style-type: none"> • 10 questions developed. 	<ul style="list-style-type: none"> • Weather vs Climate • Canada Observed Historical Trends • Global Cycles and Natural Variability • Recent Anomalies (Polar Vortex) • Some Regional Climate Trends • Observation of Weather – Environment Canada and Climate Change network • Can we see a Climate Change Signal? • Extremes and Hazards • Climate Change Introduction • Public Concern and Opinion of Climate Change • Communication of Climate Change • Intergovernmental Panel on Climate Change (IPCC) as the 'expert' • Sophisticated Climate Models are our best available tool • Model development over time • Greenhouse Gas emissions 	40	<ul style="list-style-type: none"> • Further Background Information and Reading <ul style="list-style-type: none"> ▪ Engagement on site monitored 	20

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 1 – Topics 1 & 2					
	<ul style="list-style-type: none"> • Generations of Projections since 1995 • Model Ensembles and Uncertainty from the models • Global versus Regional Models • Using the Model Data – Best Options • Characterizing Uncertainty • Extreme Variables and their Difficulty • Sources of Climate Change Data • The Climate Change Assessment Approach – Use of Data • Climate Change Summary • The Future of Climate Projections and What is Coming 				
Student Participation	<ul style="list-style-type: none"> • Q&A • Polling 	20	<ul style="list-style-type: none"> • Quiz <ul style="list-style-type: none"> ▪ Mandatory pass to proceed to next self-directed module 	10	
Total Topic Time Allocations			60	30	

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 1 – Topics 1 & 2					
2	Climate Hazards and Threshold Values	<ul style="list-style-type: none"> • Engineering design thresholds <ul style="list-style-type: none"> ○ Where do we find threshold values <ul style="list-style-type: none"> ▪ Codes ▪ Standards ▪ Rules of thumb • Using climate parameters in engineering design • Differentiating between design values and real-world experience • Establishing climate thresholds for PIEVC assessment <ul style="list-style-type: none"> ▪ Using forensic evidence to establish a threshold ▪ Observations from site visits ▪ Input from operations and maintenance staff • Adjusting study thresholds to accommodate climate data exigencies 	50	<ul style="list-style-type: none"> • Further Background Information and Reading • Engagement on site monitored 	10

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing (min)	Content	Timing (min)
Session 1 – Topics 1 & 2					
Student Participation	<ul style="list-style-type: none"> • Q&A • Polling 	10	<ul style="list-style-type: none"> • Quiz <ul style="list-style-type: none"> ▪ Mandatory pass to proceed to next self-directed module 	10	
Total Topic Time Allocations			60		20
Total Session Time			120		50

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 2 – Topics 3 & 4					
		<ul style="list-style-type: none"> Recap Session 1 Homework Review Q&A 	15		
3	Acquiring Climate Information	<ul style="list-style-type: none"> Main sources for different types of climate information Obstacles and opportunities <ul style="list-style-type: none"> Data gaps Unconfirmed meteorological data Scalability of climate projections Differentiating between the need for precision and accuracy in climate data 	40	<ul style="list-style-type: none"> Further Background Information and Reading Engagement on site monitored 	20
	Student Participation	<ul style="list-style-type: none"> Q&A Polling 	10	<ul style="list-style-type: none"> Quiz <ul style="list-style-type: none"> Mandatory pass to proceed to next self-directed module 	10
Total Time Allocations			65		30

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 2 – Topics 3 & 4					
4	Principles of Risk Assessment – quiz materials, and deck questions.	<ul style="list-style-type: none"> • Guiding Principles • Defining Engineering Vulnerability • Using Integrated Approaches • Concepts about standard engineering methodologies • The past does not represent the future • Defining hazards • Defining vulnerability and resiliency • Impact of climate change on mean and variance of climate data <ul style="list-style-type: none"> ▪ Focus on impact on engineering thresholds • Observations regarding changes of mean and variance on engineering vulnerability • Defining risk • Risk concepts • Differences between vulnerability and risk • Graphical presentation of risk mitigation through adaptation • Why assess risk? 	40	<ul style="list-style-type: none"> • Quiz <ul style="list-style-type: none"> ▪ Mandatory pass to proceed to next self-directed module 	10

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 2 – Topics 3 & 4					
		<ul style="list-style-type: none"> ▪ Value for decision-making ▪ Clarity about <i>who</i> may be exposed, affected <ul style="list-style-type: none"> ▪ Enterprise risk ▪ Public risk 			
	Student Participation	<ul style="list-style-type: none"> • Q&A • Polling 	15		
	Total Time Allocations			55	10
	Total Session Time			120	40

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 3 - Topic 5 – Part I					
		<ul style="list-style-type: none"> Recap Session 2 Homework Review Q&A 	15		
5	The PIEVC Assessment Process Part I	<ul style="list-style-type: none"> Concept Elements 	10		
	Infrastructure Response Analysis	<ul style="list-style-type: none"> The need to consider and evaluate feasibility of relevant infrastructure responses The focus on components within scope of established study boundaries Infrastructure responses – definition and mechanisms Infrastructure Response Considerations as provided in PIEVC <ul style="list-style-type: none"> Structural Design Performance Considerations (PCs) Functionality PCs Serviceability PCs Watershed, Surface Water and Groundwater PCs 	10		

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 3 - Topic 5 – Part I					
		<ul style="list-style-type: none"> ▪ Operations, Maintenance and Materials Performance PCs ▪ Emergency Response PCs ▪ Insurance Considerations ▪ Social Effects Considerations • Environmental Effects Considerations 			
	Yes/No Analysis	<ul style="list-style-type: none"> • Intentions for the Yes/No Analysis <ul style="list-style-type: none"> ○ Screening Level Exercise ○ ID and screen out irrelevant interactions from deeper analysis ○ Increases efficiencies in Risk Scoring Efforts deeper into PIEVC ○ Identifies climate/infrastructure component interactions that could conceivably occur • Will this component “notice” or be affected by exposure to a given climate hazard in a significant way, 	10		

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 3 - Topic 5 – Part I					
		within any PIEVC Performance Considerations?			
Defining an Infrastructure Inventory	<ul style="list-style-type: none"> • The Purpose of the Infrastructure Inventory • The Need for Asset Owner and Assessment Team to Work Together to develop Infrastructure Inventory. • The importance of Defining Assessment Scope prior to Infrastructure Inventory development • Defining your Infrastructure Asset into logical systems and corresponding sub-components • Identifying and Proposing Components with Relevance to Climate Impacts • Techniques for Screening Out Components with non-relevance to Climate 	15			
Case Study	<ul style="list-style-type: none"> • Establishing the boundary conditions for the infrastructure assessment 	15			

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 3 - Topic 5 – Part I					
	<ul style="list-style-type: none"> • Workbook (PDF) for case 	<ul style="list-style-type: none"> • Infrastructure Inventory • Infrastructure Response • Y/N Analysis 			
	Establishing Climate - Parameters.	<ul style="list-style-type: none"> • PIEVC’s Climate Parameter List • Climate information sources, portals, tools • CCHIP 	15		
	Probability Scoring	<ul style="list-style-type: none"> • Defining Probability in the PIEVC context • Options for Probability Approaches in PIEVC • Applying Method A or Method B • Considerations factored into Changing Climate Probabilities <ul style="list-style-type: none"> ○ Changes during time horizon of assessment? ○ Thresholds triggered more, same, less in future time horizon of assessment? ○ Will change bring likely impacts? ○ Relationship between climate events and impact-triggering thresholds 	10	<ul style="list-style-type: none"> • Further Background Information and Reading Engagement on site monitored 	30

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 3 - Topic 5 – Part I					
		○ Robustness of the climate projections?			
Student Participation		<ul style="list-style-type: none"> • Q&A • Polling 		<ul style="list-style-type: none"> • Quiz <p>Mandatory pass to proceed to next self-directed module</p>	10
Total Time Allocations			120		40
Total Session Time			120		40

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 4 – Topic 5 – Part II					
		<ul style="list-style-type: none"> Recap Session 3 Homework Review Q&A 	15		
5	Severity Scoring	<ul style="list-style-type: none"> The approach to Severity Scoring in PIEVC Two Methods within PIEVC for Severity Scoring Other Methods can be factored into PIEVC Method D and E for severity. Examples of other applicable Severity Scoring Criteria. The process of assigning Severity Scores, Workshop Input, Using multiple perspectives to achieve a consensus value for Severity Score. 	15		
	Establishing a Risk Profile	<ul style="list-style-type: none"> Calculating Risk Scores Reviewing Special Cases Prioritizing Climate Interactions by High, Medium and Low Risk Threshold Values to define Risk Levels. Using Risk Levels to assign action Paths forward for each Risk Level in PIEVC 	20		

Topic	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 4 – Topic 5 – Part II					
Case Study	<ul style="list-style-type: none"> Calculating a risk profile Carry on with the case analysis set up in Session 3 Plenary Discussions 	30			
Engineering Analysis	<ul style="list-style-type: none"> Characteristics of Climate Interactions Earning Engineering Assessment Drivers that impact extent of Engineering Analysis Determining Total Loads on the Infrastructure Determining Total Capacity of the infrastructure Using Loads and Capacities to determine Vulnerability and Adaptive Capacity for the Infrastructure System Data Sufficiency and Data Quality 	30	<ul style="list-style-type: none"> Further Background Information and Reading <p>Engagement on site monitored</p>	30	
Student Participation	<ul style="list-style-type: none"> Q&A Polling 	10	<ul style="list-style-type: none"> Quiz <ul style="list-style-type: none"> Mandatory pass to proceed to next self-directed module 	10	
Total Time Allocations			120	40	
Total Session Time			120	40	

Session	PIEVC On-Line Lesson Plan				
	In Class via Webinar			Self-Directed On-Line	
	Topic	Content	Timing	Content	Timing
			(min)		(min)
Session 5 – Topic 5 Completed – Course Summary and Wrap Up					
5		<ul style="list-style-type: none"> Recap Session 4 Homework Review Q&A 	15		
	Case Study	<ul style="list-style-type: none"> Conducting Engineering Analysis Plenary Discussion Q&A 	30		
		<ul style="list-style-type: none"> Making Recommendations 	20		
		<ul style="list-style-type: none"> Building a PIEVC team 	20		
		<ul style="list-style-type: none"> Recap of Course Key Take Aways 	20		
	Student Participation	<ul style="list-style-type: none"> Q&A Polling 	15	<ul style="list-style-type: none"> On Line Exam <ul style="list-style-type: none"> Results used to establish credit towards IRP 	15
Total Time Allocations			120		15

Engineers Canada
Climate Change Law for Engineers and
Other Professionals

Infrastructure Resilience Professional
Certification Program

Course Outline

Copyright © 2018 by Engineers Canada

All rights reserved. These materials are protected by Canadian copyright law. Except as otherwise provided for under Canadian copyright law, these materials may not be copied, published, distributed, downloaded or otherwise stored in a retrieval system, transmitted or converted, in any form or by any means, electronic or otherwise, without the prior written permission of the copyright owner.

Course Outline

- Course Modules
 - Module 1 - Legal Framework for Climate Change Mitigation
 - Module 2 - Legal Framework for Climate Change Adaptation
 - Module 3 - Professional Responsibility and Avoiding Negligence
 - Module 4 - Corporate Disclosure of Climate Change Risks
- Course Material
 - 1 outline and PowerPoint presentation per module
 - 1 in-class assignment per module
 - 1 quiz per day (per two modules) – 10 questions each
 - 1 final exam (out of class) – 30 questions each
- Time Breakdown
 - 15 hours total
 - 3.75 hours each module
 - 2.25 hours of lecture
 - 1.5 hours of in-class exercises
- Reading Material
 - Suggested for each module

**Module 1 – Legislative Framework for Climate Change Mitigation
Outline**

- **Understanding Mitigation (Global Problem) (15 mins)**
 - Intergovernmental Panel on Climate Change
 - Recent findings
 - Responses to Climate Change: Mitigation and Adaptation
 - Understanding legally required and/or voluntary drivers to mitigate and adapt
- **International Response (20 mins)**
 - Historical International Policy Developments
 - United Nations Framework Convention on Climate Change
 - Kyoto Protocol
 - Bali
 - Copenhagen Accord
 - Paris Agreement
 - Kigali Amendment to the Montreal Protocol
 - Recent International Policy Developments
 - COP 21 in Paris
 - Complementary Initiatives
 - COP 22 in Marrakech
 - COP 23 in Bonn
- **Legal Requirements to Reduce GHGs (35 mins)**
 - Command and Control – Regulatory Options to Mitigate
 - Greenhouse gas emission limits
 - Emission reporting requirements
 - Renewable Portfolio Standards/incentives for green energy
 - Performance Standards
 - Clean fuel standards
 - Low-carbon fuel standards
 - Fuel or other types of efficiency standards
 - Pricing Carbon
 - Pricing Carbon (voluntary carbon credits as pre-compliance option)
 - Carbon tax
 - Cap and Trade
 - Carbon Credits
 - Offsets
- **Canada's Action (50 mins)**
 - Federal
 - Overview
 - Vancouver Declaration
 - Pan-Canadian Framework on Climate Change
 - Environmental Assessments
 - Federal Carbon Pricing
 - Updating Codes and Standards
 - Provincial
 - Nova Scotia and Maritimes
 - Ontario
 - British Columbia
 - Alberta
 - Quebec
- **Regional/International Initiatives (15 mins)**

Engineers Canada
Climate Change Law for Engineers and Other Professionals
Infrastructure Resilience Professional Certification Program Outline

- Global Carbon Markets
 - European Union Emissions Trading System (EU ETS)
 - Western Climate Initiative (WCI)
 - Regional Greenhouse Gas Initiative (RGGI)
-

Suggested Reading Material

- Deep Dive on a Performance Standard - Federal Coal Regulation:
<http://www.ec.gc.ca/lcpe-cepa/eng/regulations/detailReg.cfm?intReg=209>
- Carbon Pricing Overview: World Bank Website:
<http://www.worldbank.org/en/programs/pricing-carbon>
- Pan-Canadian Framework on Clean Growth and Climate Change:
<https://www.canada.ca/content/dam/themes/environment/documents/weather1/20170125-en.pdf>
- COP 22 Report: Outcomes of the U.N. Climate Change Conference, World Federation of Engineering Organizations, prepared by Zizzo Strategy: http://www.wfeo.org/wp-content/uploads/stc-environment/Cop_22_Report-Zizzo_Strategy.pdf
- Overview of Nova Scotia's proposed Cap and Trade System:
<https://climatechange.novascotia.ca/proposed-cap-and-trade-program>
- ISO 14065 <https://www.iso.org/obp/ui/#iso:std:iso:14065:ed-2:v1:en>

**Module 2 – Legal Framework for Climate Change Adaptation
Outline**

- **Climate is Changing (Potential Impacts) (30 mins)**
 - More Frequent and Extreme Weather Events
 - Finch washout 2005
 - Floods of 2013
 - Predicted to continue
 - Spotlight on stormwater systems
 - Economic Costs of Climate Change
- **Law Guides Adaptive Response**
 - **Legislative / Regulatory Liability (Explicit and Implicit Responsibilities) (40 mins)**
 - Complex regulatory environment with many stakeholders, regulators and regulated entities
 - Nova Scotia
 - Ontario
 - British Columbia
 - Other Jurisdictions
 - **Common Law (30 mins)**
 - Introduction to Common Law
 - Negligence
 - Elements
 - Inspections, Permitting and Enforcement
 - Other Torts
 - Riparian rights
 - Nuisance
 - Class Actions
 - Defences

Suggested Reading Material

- CVC Report re: Stormwater Management: http://www.creditvalleyca.ca/wp-content/uploads/2014/05/Stormwater-Management-in-Ontario_Legal-Issues-in-a-Changing-Climate_2014.04.29.pdf
- ZS blog post “U.S. Establishes New Federal Flood Risk Management Standard to Account for Climate Risks”: <http://zizzostrategy.com/1357/u-s-establishes-new-federal-flood-risk-management-standard-to-account-for-climate-risks/>
- ZS blog post “All U.S. Government Agencies Must Now Consider Climate Change in Decision-Making”: <http://zizzostrategy.com/2831/all-u-s-government-agencies-must-now-consider-climate-change-in-decision-making/>
- *Infrastructure for Jobs and Prosperity Act, 2015 (IIPA) (2015)*: <http://www.ontario.ca/laws/statute/15i15>

Module 3 – Professional Responsibility and Avoiding Negligence
Outline

- **Role of Engineers and Other Professionals in Mitigation and Adaptation (15 mins)**
- **Regulatory Requirements to Quantify and Verify Emissions (30 mins)**
 - Verification Standards Under ISO
 - GHG Reporting Regulations
 - Role of Quantification and Verification in Both Compliance Systems and Voluntary Offset Projects
 - Conflicts of Interest (Cannot Quantify *and* Verify)
- **Role of Design Professionals and Potential for Negligence (1 hour)**
 - Negligence: Review
 - Public negligence
 - Special test
 - Policy vs operational
 - Standard of Care
 - Standard at time of act
 - Reasonableness
 - Statutory requirements considered, not determinative
 - Custom and industry standard considered, not determinative
 - Special Issues
 - Inspection schemes
 - Permitting
 - Enforcement
 - Case examples
 - *Oosthoek v. Corporation of the City of Thunder Bay*
 - Farmers Insurance
 - *McLaren v. Stratford (City) (2005)*
 - Sector-Specific Examples
 - Road/highways
 - Electricity
 - Stormwater management
 - Drinking water
- **Design Professionals' Professional Responsibility (30 mins)**
 - Heightened standard of care
 - Due diligence defences of others may offload responsibility to experts / professionals relied upon
 - Industry standard itself could be negligent
 - Professional Code of Conduct
 - Procurement documents – new trends and responsibility to go beyond what is explicitly requested by clients
 - Example Adaptation Strategies

Suggested Reading Material

- Section of ECO 2014 report regarding climate change and potential legal liability (pages 7-8): <http://eco.on.ca/wp-content/uploads/2015/07/2015-GHG.pdf>
- Patricia Koval, "Climate change risk: Is liability lurking for professional engineers?" http://www.peo.on.ca/index.php/ci_id/20321/la_id/1.htm
- Understanding Canadian Electricity Generation and Transmission Sectors' Action and Awareness on Climate Change and the Need to Adapt https://uwaterloo.ca/school-environment-enterprise-development/sites/ca.school-environment-enterprise-development/files/uploads/files/understanding_canada_electricity_generation.pdf

Module 4 – Corporate Disclosure of Climate Change Risks Outline

- **Corporate Implications from Climate Change (5 mins)**
- **Securities/Financial Disclosure (40 mins)**
 - General disclosure requirements and “materiality”
 - What constitutes “material information”
 - *Canadian Securities Association Staff Notice 51-333*
 - *National Policy 51-201 (51-201)*
 - Types of Climate Risks Businesses Need to Consider
- **Mergers, Acquisitions and Other Corporate Transactions (10 mins)**
 - Technical role/requirement in transactions
 - Transfers of liability with assets
 - Examples:
 - Contaminated sites
 - Homeowner disclosure of flooding
- **Directors’ Obligations (10 mins)**
 - Duties
 - *BCE* case and “Good Corporate Citizen”
- **Asset Management (25 mins)**
 - General
 - Pension Fund Requirements
- **Climate Trends in Financial Markets (35 mins)**
 - Decarbonization of Investments
 - Low Carbon Indexes
 - Shareholder Engagement
 - Integrating Climate Change into Investment Strategies
 - Reporting in Other Jurisdictions
 - EU Directive
 - Australian Securities Exchange (ASX) Corporate Governance Council
 - French Energy Transition Law
 - Voluntary disclosure
 - GRI
 - CDP
 - Task Force on Climate-Related Disclosure
- **Where Do Engineers and Other Professionals Fit In? (10 mins)**

Suggested Reading Material

- ZS blog post “Climate Change is Transforming the Financial Landscape through Disclosure, Divestment and Duty”: <http://zizzostrategy.com/2047/2047-2/>
- ZS blog post: “Three Reasons Organizations and Investors Should Care About Climate Risk”: <http://zizzostrategy.com/2625/three-reasons-organizations-and-investors-should-care-about-climate-risk/>
- *Canadian Securities Association Staff Notice 51-333*:
https://www.osc.gov.on.ca/documents/en/Securities-Category5/csa_20101027_51-333_environmental-reporting.pdf
- Recommendations of the Task Force on Climate-related Financial Disclosures:
<https://www.fsb-tcfd.org/publications/recommendations-report/>



Appendix B - Draft syllabi

Climate Smart Policy, Procurement and Purchasing

Course Syllabus - DRAFT

April 2019

Course Overview

Procurement and purchasing policies are being revised across Canada to help achieve climate goals including both carbon mitigation and increasing climate resilience. A wide range of procurement-related documents ranging from best-practice guidelines to requirements are rolling out from various levels of governments, non-profits, and large corporations. This course helps make sense of these changes for infrastructure¹ planning. Participants will gain an overview of climate-smart procurement strategies including specifications, key language, and other considerations.

An overview of key climate policies from all three levels of government will be introduced to set the stage. This will help participants understand the public policy framework and related decision-making mechanisms that should be included in future climate-smart procurement. The course will then go on to categorize, compare, and presents key best practice resources to procurement professionals to ensure they are well-versed in current trends and best practices. The course is designed for a broad audience including both engineers and non-engineers, procurement professionals, suppliers, and purchasers.

This information will help them most effectively and efficiently identify and implement the right approach for their organization or to create a custom infrastructure procurement solution that is climate smart.

Course Objectives

This course is designed to highlight the key concepts and best practices around procurement goals, process, management, and follow-through. Participants will understand how to understand, develop, and respond to procurement for infrastructure in line with climate-related policies of carbon mitigation and increased resilience.

Learning Outcomes

By the end of the course, participants will be able to:

- Demonstrate an understanding of the policy principles of climate-smart procurement applied to community infrastructure and buildings and of the benefits and challenges of a robust procurement policy
- Describe the steps in developing and implementing a climate-smart procurement strategy for infrastructure
- Review best practices for procurement policies and processes that addresses climate considerations
- Link procurement to other functions related to and impacting infrastructure such as operations and maintenance, asset management and risk management.
- Empower purchasers to implement and update procurement policies.
- Empower suppliers to better understand and be able to respond to evolving climate-smart procurement specifications

¹ In this course, infrastructure includes traditional infrastructure like roads, bridges, sewers, water and wastewater systems, and also green infrastructure and buildings. The course mainly deals with public infrastructure, but some aspects of private infrastructure may be explored.

Course Format

The 15 hours of lecture in this course will be presented online, in seven two-hour sessions, twice weekly. Each week will cover one module, presented in two parts. There will be several quizzes throughout. The last session includes a 1-hour allocation for the course test.

Although the lectures will be recorded for review or in the exceptional case of absence, participants are expected to attend the lectures and participate in real-time online discussions during the class. These recordings will be available for the limited time of the course delivery period and will be removed after the last class.

This represents the current practice for Engineers Canada IRP courses, but is open to revision.

Course Requirements

This course is designed to fulfill one of the knowledge requirements of Engineers Canada's Infrastructure Resilience Professional (IRP) program. Participants will be presented with the context of climate-smart procurement and purchasing decision-making in a public (municipal and public utility) environment.

Various elements of procurement will be presented including policy context, request for proposals, specification, work statement, contract management, valuation, responding to and assessing bids, planning and life-cycle analysis, risk assessment and management.

Learning Assessment

Quizzes (40%)

Several quizzes will be held throughout the course to confirm the progression of learning throughout the course.

Multiple-choice exam (60%)

A multi-choice test that covers all material covered will be administered at the end of the course. Students will be given 1 hour to complete the test.

The passing grade for the course is 60%. Students will receive a Pass or Fail. Those delivering the course may wish to consider revisions to assessment weighting, or inclusion of reading assignments at their discretion.

Course Topics

The topics covered by the course are presented in the table below.

Module	Hours
Module 1: Introduction to climate-change goals and policy <ul style="list-style-type: none"> - Federal goals and policy - Provincial goals and policy - Municipal goals and policy - How these policies can be met through climate smart procurement 	4
Module 2: Carbon mitigation through smarter procurement: carbon and life-cycle impacts <ul style="list-style-type: none"> - Introduction to life-cycle thinking - How procurement decisions can affect life-cycle carbon and costs - Best practices and examples 	4
Module 3: Climate adaptation through resilience assessments <ul style="list-style-type: none"> - Introduction to resilience assessments - Resilience assessment tools, including PIEVC, and how they relate to procurement - Best practices and examples 	4
Module 4: Putting it all together: Best practices and example approaches <ul style="list-style-type: none"> - Federal case study / example - Provincial case study / example - Municipal case study / example - Multiple-choice exam 	3

Recommended Reading (Prior to the course)

Students are encouraged to prepare for this course by reading the following material (provided once registered):

- [The National Guide to Sustainable Municipal Infrastructure: Innovations and Best Practices \(InfraGuide\)](#)
- Infrastructure Canada's Climate Lens
- Federal Sustainable Development Strategy
- Greening Government Strategy
- City of Toronto

Resources

There is no assigned textbook for this course. Useful references include:

[The National Guide to Sustainable Municipal Infrastructure: Innovations and Best Practices \(InfraGuide\)](#)

Material for this course has partially been extracted from ... The documents can be downloaded free of charge and provide an extensive library of best practices in:

- INSERT

Some useful websites:

- INSERT
- www.infrastructure.gc.ca: Infrastructure Canada's website

Other websites and references will be provided to the students during the course.