



NEWSLETTER / COMMUNIQUÉ

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**A newsletter for the
information of the
Academy, and a record
for other engineering
academies and
organizations**

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President's Message

The past year has been an active one for the CAE! Nearly two years ago, we began a journey of transformation from a largely honorific engineering society to an engaged organization by initiating the creation of local sections of the Academy. The year 2013 marked some significant milestones along this journey, with the formal creation of the Montreal Section, and active discussions in many parts of the country, most notably in Vancouver, Calgary, Edmonton, Toronto, and Ottawa. The interest in creating local sections has already translated in heightened interest in proposing Fellow candidate nominations for strengthening the existing critical mass of Fellows in key communities across the country. The Montreal Section also played an important part in the successful Annual Meeting held last June in Montreal under President-Elect Pierre Lortie's leadership.



But that's not all ... Fellows have indicated their interest in being more engaged in other ways as well. Under Fellow Ian Jordaan's leadership in St John's, a Task Force on Engineering in Canada's Northern Oceans was struck to explore the challenges and opportunities of developing and transporting mineral resources in Canada's northern regions. Subjects to be addressed will include facilities, infrastructure, ports, tankers, pipelines, sovereignty, the environment, human safety, and aboriginal communities, with a focus on engineering issues. The task force intends to report on its progress at the Annual Meeting in June.

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The New Champlain Bridge – What Needs to be Done?



by Saeed Mirza, FCAE, Professor Emeritus of Civil Engineering, McGill University & Past President, Canadian Society for Civil Engineering. A version of this article was published in the *National Post* on January 18, 2014.

Minister Lebel and the Government of Canada have correctly pledged to construct an aesthetically pleasing new Champlain Bridge by 2018. The structure will have a service life of at least 100 years, assuming routine maintenance. In view of the structural needs, environment, economy and aesthetics, two cable-stayed bridges – one from Montreal to Ile Notre Dame and the second from Ile Notre Dame to the South Shore, clearing the St. Lawrence Seaway would easily achieve the above goals, and would be much less costly than any other type of bridge.

The Champlain Bridge, opened in 1962, was originally designed by engineer Hugh Pratley entirely in steel; however, the Progressive Conservative Government of the day intervened and divided the project into smaller contracts. They left the part over the St. Lawrence Seaway in steel as originally designed, but adopted a cheaper French design version as an alternative for the rest of the bridge. This consisted of seven prestressed concrete girders with extended top flanges, in-filled with cast-in-place concrete and post-tensioned together to

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President's Message (cont'd)

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Also, under the leadership of Fellows Clem Bowman and Walter Petrychuk, the CAE's Energy Pathways Task Force held a conference in Sarnia last May entitled "Bitumen – Adding Value: Canada's National Opportunity" which explored the tremendous value and economic opportunity of upgrading bitumen in Canada rather than exporting it to the United States. Of particular importance was the conclusion that a Sarnia/Lambton bitumen upgrading project to produce refinery-ready crudes was identified as a high-priority national-scale project, with Ontario and Alberta governments committing to enhance their collaboration. This is evidence that the CAE, through the engagement of its Fellows, can – and does – provide a neutral ground for governments and industry to explore ideas of national significance. In the past eight months, in our capacity as co-chairs of this same Task Force, Clem Bowman and I have written a number of op ed articles published in the Ottawa Hill Times, emphasizing Canada's opportunity to strengthen its economy by leveraging its many natural energy-related resources into high value-added energy products, while simultaneously lowering its carbon-footprint. At our Annual Meeting next June, the Energy Pathways Task Force will also be reporting on its activities, and I would invite you to stay tuned for some very innovative initiatives!

In the past year, two other important CAE initiatives have progressed significantly, both of them aiming for greater Academy engagement in government policy construction and national dialogue around important topics. The first is the CAE's active involvement in supporting the renewal of government funding for the Council of Canadian Academies. Nine years ago, the federal government awarded ten years of funding for the creation of the CCA, a project spearheaded by all three national academies: the Canadian Academy of Engineering, the Canadian Academy of Health Sciences, and the Royal Society of Canada. The purpose of the CCA is to undertake evidence-based research to answer questions asked of it by the federal government. Over the years, the CCA has become highly respected for the quality and objectivity of its work, and provincial governments and other organizations have also availed themselves of its services. Because of this, the CAE has been highly supportive of its continued existence, though we have also been vocal advocates of its needing to provide more financial recognition for the support that it receives from all three national academies. After much constructive discussion, the CCA has agreed to this concept, and we are presently beginning to explore how this could be implemented in practice. In the meantime, the request for renewal has gone in to Industry Canada in October, with a strong letter of support from the CAE.

The second initiative is the CAE's partnership with the David Suzuki Foundation and the Trottier Family Foundation in the Trottier Energy Futures Project. The aim of this project is to explore how Canada could reduce its carbon footprint to 80% of its 1990 value, and do so by the year 2050. Originally, the main work was to be accomplished by the David Suzuki Foundation, with the CAE involved in providing peer-review of the project reports, and strategic direction at the Project Board level. This project has been proceeding for the past three years, financed by Fellow Lorne Trottier's Trottier Family Foundation. Since last June, given the complexity of the project and with the support of the David Suzuki Foundation, your Academy has actively

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Canada: Becoming an Energy Superpower

by Richard J. Marceau, FCAE and Clement W. Bowman, FCAE, Co-chairs, CAE Energy Pathways Task Force. This article was published in the Hill Times on September 16, 2013.

Canada's economic success has depended on being a trading nation. Our vast, largely untapped energy endowment provides an opportunity to trade value-added energy products, shifting from our previous status of an energy superstore to a true energy superpower. Here is the pathway proposed by the Canadian Academy of Engineering.

Electrical Power Exports

Electricity represents one of the highest value forms of energy. It has shed all of its formation history, and is ready to instantaneously power the modern industrial and social structure of civilization. Canada, however, has yet to take advantage of an outstanding nation-building opportunity. An East-West power corridor supplied from remote hydroelectric and nuclear sites could now be built with nodes for the sale of power North-South to the huge North American market. Canada has the potential to produce the lowest cost electrical power on the continent, based on the most advanced power generation and SMART grid technologies available, with no viable competition in this marketplace. A new national vision, based on a strategic alliance among provinces and existing and new power companies, could achieve this goal within two decades. This is not an objective for any single company or government working alone. It is the next stage of nation building.

Bitumen Exports

Value-added products in the form of fuels and chemicals from Alberta's oil sands are uniquely Canadian opportunities. Shipping raw bitumen outside Canada for processing and upgrading is not the pathway for success. As Jim Stanford has stated, our cycles of staples extraction and export have defined much of our past economic history. There is a danger that the pejorative term of "hewers of wood and drawers of water" will be expanded to "hewers of wood, drawers of water and scrapers of tar." The oilsands bitumen is not a tar; it is a complex mixture of hydrocarbons with a range of boiling points with the heaviest fraction composed of complex chemical ring structures with high economic potential. Selling bitumen as a low value-fuel is value-destruction on a huge scale, as noted by Frank McKenna. The recently-announced government/industry plan for a new West-East pipeline, and the expressed interest of various regions to upgrade bitumen, is an excellent start for a national strategic plan.

Low Carbon Exports

We must also pave the way to a lower-carbon future by taking advantage of Canada's huge land mass. A key element to such a future is to begin transitioning our needs for high-value-added carbon fuels and chemicals to renewable sources of carbon. Transforming biomass from our vast forest and agricultural residues into high value-added products is an important national goal.

East Coast Exports

The offshore oil industry in Newfoundland has registered impressive growth over the past decade, and recent exploration efforts have resulted in potentially significant new reserves. The offshore petroleum industry has driven high economic growth in Newfoundland and Labrador and the new findings are casting a new light on the future role of Atlantic Canada in exporting both crude oil and upgraded products to world markets. Canada is fortunate to have a team of visionaries who are pressing forward with the above opportunities, part of the Canadian Academy of Engineering's pursuit of 'Canada: Becoming a Sustainable Energy Superpower'.

New Engineering Centre



CAE Fellows Gerald Hatch, Kurt Strobele and Doug Barber have made major financial contributions to the Faculty of Engineering at McMaster University for the construction of the ExCEL (Engineering Centre for Experiential Learning) Centre.

Photo: Gerald Hatch (seated), founder and first president of the global consultancy, has joined with the company to commit \$3 million to the Engineering Centre for Experiential Learning (ExCEL). Hatch and his team join a cadre of McMaster supporters to have made major contributions to the project.

Fellows in the News

Yusuf Altintas received the ASME's 2013 Blackall Machine Tool & Gage Award, as co-author of the paper 'Discrete-Time Prediction of Chatter Stability, Cutting Forces, and Surface Location Errors in Flexible Milling Systems'. Prof. Altintas has also received the Engineering Science Special Award from the Scientific and Technical Research Council of Turkey (TUBITAK) – Turkey's highest science and engineering award – given annually to the scientist with the highest scientific recognition in engineering science who is Turkish but living outside Turkey.

Cristina Amon has been awarded the 75th Anniversary Medal of the ASME's Heat Transfer Division, in recognition of her work in the development of computational fluid dynamics for formulating and solving thermal design problems subject to multi-disciplinary competing restraints. Prof. Cristina Amon was also inducted into the Hall of Fame at the Hispanic Engineer National Achievement Awards Corporation conference in New Orleans, in October 2013. The annual honour recognizes a member who has achieved a level of excellence that opens doors to advances in science, technology, engineering and math, and opens minds about the contributions of Hispanics in these fields.

John M. Beck is one of the recipients of the Canadian Council for Public-Private Partnerships' National Awards for Innovation and Excellence in Public-Private Partnerships. Mr. Beck was cited for his more than 50 years of experience in the construction industry, in Canada and around the world and his service with P3s boards.

Clement W. Bowman and James E. C. Carter were inducted into the Canadian Petroleum Hall of Fame on September 26, 2013. The Canadian Petroleum Hall of Fame was created in 1997 to establish an annual process by which significant contributions to the industry can be recognized, honoured and celebrated.

Michael W. Carter has been elected Fellow of the Institute for Operations Research and the Management Sciences (INFORMS). Fellows have exemplified outstanding lifetime achievement in operations research/management sciences, have demonstrated exceptional accomplishments and made significant contributions to the advancement of the field.

Alfred Guenkel was recently presented with the 2013 APEGBC Meritorious Achievement Award for his work in innovative chemical technologies. Dr. Guenkel is a partner at Vancouver based NORAM Engineering and an adjunct professor at UBC.

Carl Haas has been elected to the US National Academy of Construction and is the only Canadian to receive the honour this year.

Ralph Haas received the US National Academies Transportation Research Board's highest honour, the Roy W Crum Award, "In Recognition of Outstanding Achievement in Transportation Research" at the Annual Conference in Washington, DC, on January 15, 2014. This is only the second time a Canadian has received the award in its 66 year history.

Charles Hantho received an honorary doctor of laws degree from the University of Alberta at its Convocation on November 20, 2013. He was cited for his leadership in the Canadian and international chemical industry and for his philanthropy.

Keith Hipel became the President of the Academy of Science, Royal Society of Canada in 2013. He will hold this position for two years and then will act for a year as the Past President. In addition to this, Keith received the following honours in 2013: Faculty of Engineering Teaching Excellence Award for 2012 from the University of Waterloo; Honorary Diplomat, Water Resources Engineers (Hon.D.WRE) in the American Academy of Water Resources Engineers (AAWRE); Doctor Honoris Causa from Obuda University; 2013 Group Decision and Negotiation Section Award within the Institute for Operations Research and the Management Sciences (INFORMS); and, Japan Society for the Promotion of Science (JSPS) Eminent Scientist Award.

Doug Hooton was presented the Frank E. Richart Award by ASTM International. Hooton has long been recognized as a leading figure in engineering research and leadership, currently serving as NSERC/CAC industrial research chair in durable and sustainable concrete. Dr. Hooton is also the 2013 Robert E. Philleo Award winner from the American Concrete Institute (ACI). The award, given by the ACI Foundation Concrete Research Council, honours exemplary teaching, research and service to the profession in the areas of durability of concrete, properties of concrete-making materials and preparation of standards and specifications.

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Fellows in the News (cont'd)

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Digvir Jayas has been appointed as a member of the Council of the Natural Sciences and Engineering Research Council of Canada (NSERC). Collectively, NSERC Council members represent the academic research and private sector communities in the natural sciences and engineering. In addition, Professor Jayas has been elected a Foreign Fellow of the National Academy of Sciences, India. He was cited for his contributions to global grain preservation, an important factor in food security. He is the VP (Research and International) at the University of Manitoba.

Tom Jenkins has been appointed to the Council of the National Research Council of Canada. Tom is the Chair of OpenText Corporation in Waterloo. In 2011, he chaired the Expert Review Panel on Federal Support for Research and Development.

Catherine Karakatsanis has been named one of Canada's 100 Most Powerful Women by the Women's Executive Network. She has also been appointed to the Hydro One Board of Directors.

John Leggat was one of four Royal Military College of Canada graduates honoured with a plaque on the school's wall of honour during a ceremony on September 28, 2013.

Om P. Malik was elected President-Elect of the Engineering Institute of Canada in September 2012.

John McPhee has received the NSERC Synergy Award. McPhee, Professor and NSERC/Toyota/Maplesoft Industrial Research Chair in Mathematics-based Modelling and Design at the University of Waterloo, and his research team developed the core technology behind Maplesoft's MapleSim software, which they used to develop new model-based designs and controllers for automotive systems.

Javad Mostaghimi has been awarded the 75th Anniversary Medal of the ASME's Heat Transfer Division, in recognition of his research in the area of thermal spray technology.

Eric Newell was named 'Canada's Greatest Oilman' by Alberta Oil magazine, recognizing both his contributions to the oil sands and his considerable work with the aboriginal community and with employment in the trades.

Congratulations to Kerry Rowe, awarded Queen's University's Excellence in Research prize for his work in geotechnical engineering.

Mohini Sain and his team at the University of Toronto are receiving major NSERC funding from Automotive Partnership Canada. The team is researching turning wood pulp into automotive components.

A.P.S. Selvadurai recently received two prestigious research awards: the Eric Reissner Medal of the International Conference on Computational and Experimental Engineering Sciences and the Maurice A. Biot Medal of the American Society of Civil Engineers.

Kathleen E. Sendall has been appointed to the Ernest C. Manning Awards Board of Trustees. The Ernest C. Manning Awards Foundation has been recognizing and supporting Canadian innovators of all ages since 1982. She also received an honorary degree from the University of Calgary on November 12, 2013.

Daniel W. Smith has been presented with the Arthur Sidney Bedell Award by the Water Environment Federation for his service in the areas of research and public relations.

Dawn Tattle has been appointed as an employer member to the Prevention Council. The 11-member council provides advice to the Ontario government on health and safety issues as they affect workers. Tattle, President of Anchor Shoring & Caissons since 1997, is a civil engineer and has been named one of Canada's "100 Most Powerful Women" both in 2008 and 2010.

Drew Wilson has recently been appointed to the new seven-member Engineering and Public Policy Committee of the ASME's Technology and Science Division, one of two Canadians.

Congratulations to Michael Worswick on receiving \$2M from NSERC for Aluminum forming research, which will benefit the Canadian auto parts sector.

New CAE Website Launched



We are pleased to announce that we have launched our updated website. Note that the address remains www.cae-acg.ca. The updates added a number of capabilities, including e-commerce, giving members the ability to pay their membership fees and to make donations online.

We are now providing more background information on our members. There are two levels of information that are being shared. For the general public, when a member's name is selected, it reveals that member's biography/citation, technical groups, functions, sectors and keywords. When a member is logged in, the same information as above is displayed, as well as the selected member's contact information. Therefore only members will have access to other members' contact information.

We will be adding new features to the website in the future, including event registration for the 2014 Annual Meeting. In 2015, we plan on holding the election of new Fellows online. We hope that you will enjoy the new website.

News from the Sections

Calgary: Under the interim leadership of Ross Douglas and Kim Sturgess, Fellows from Calgary met on 8 October. They organized and submitted 12 Fellowship nominations, primarily from the government and private sectors. During the summer, Fellows from the section formed the core of a group that wrote a report of flood mitigation measures for Southern Alberta.

Toronto: The section held an initial organizational meeting at Ryerson University on 11 September. A number of ideas for section activities were discussed. Michael Charles was appointed interim Chair. He has agreed to form a small group and recommend next steps. Thanks to Mohamed Lachemi for hosting the group.

Montreal: André Bazergui, President of the Montreal Section, reports that on December 5, the section was welcomed at FPIInnovations in Pointe-Claire. Pierre Lapointe, President and CEO, gave an excellent presentation on the new business model of the organization which now groups Paprican, Forintek, FERIC, and CWFC. FPIInnovations acts as the hub of the Canadian forest industry innovation system with an annual budget of \$95M and a staff of 600. Through its excellent lab facilities and expertise, FPIInnovations focusses is on the creation of new materials and processes in wood products, pulp and paper, chemicals, nanofibers, lignin, sugars, and energy. A number of University networks contribute to their work through collaborative research. The group had a chance to visit the facilities and was impressed by the quality of the equipment and the enthusiasm of its personnel. Many thanks to Ron Crotogino for helping to organize the event.

2014 Annual Meeting – Mark the Date!

The 2014 Annual General Meeting, Induction of New Fellows and Symposium will take place on Thursday, June 26 at the Sheraton Hotel Newfoundland in beautiful St. John's, NL. We hope that you will join us to welcome our new Fellows and to learn more about the CAE's current projects on energy and engineering in Canada's northern oceans.

Our tentative program can be found below. Should you wish to book a guest room at the Sheraton, please call 1-888-870-3033 and identify yourself as a part of the Canadian Academy of Engineering group to obtain the preferred rate of \$199.00. We plan to open event registration on our website in April. Stay tuned!



8:00 – 10:00 a.m.	Symposium Session 1: "Engineering in Canada's Northern Oceans"
10:15 – 11:15 a.m.	Annual General Meeting (CAE members only)
11:30 – 12:30 p.m.	Induction of New Fellows Ceremony
12:30 – 1:30 p.m.	Lunch & Speaker: Ed Martin, President & CEO, Nalcor Energy
1:45 – 3:45 p.m.	Symposium Session 2: "Canada: Becoming a Sustainable Energy Superpower"

Energy Pathways Task Force Update

The new book being undertaken by the CAE Energy Pathways Task Force 'Canada: Becoming a Sustainable Energy Superpower' is now in an advanced drafting stage, with public release planned at the Academy's 2014 Annual Meeting. The focus of the book is to move the nine big energy projects proposed in our previous book "Canada: Winning as a Sustainable Energy Superpower" into an implementation stage. The front section of the new book expresses the urgency to advance the level of upgrading inside Canada, stressing the impact on wealth generation and jobs. Case studies are presented on key projects which are underway or planned. The remaining section of the book peers deeper into Canada's energy future by providing a summary of hydroelectric, power transmission, nuclear energy and district energy opportunities.

The Academy has recently presented its views on Canada's energy system in two articles in the Hill Times on the importance of value-added exports and the public/private sector forces that drive the Canadian energy system.

The Academy intensified its investigations into Canada's energy system in 2005. Several hundred members of the Academy and energy experts have had active roles in CAE's investigations, reports, workshops and public presentations. Our ongoing target will be energy investment opportunities for the first half of this century. We are in for the long haul!

Trottier Energy Futures Project Update

In November 2013, agreements were signed for completing the first Phase of the TEF. The goal is to develop and select optimal plans for Canada reducing its greenhouse gas (GHG) emission by 80% by 2050, relative to 1990. The CAE is now serving as Executing Agency and project manager, for delivering this Project. The work to be performed will include a review of the Canadian economy sectors that contributes to production of GHG's and defining options for reducing GHG's, including selection of the most efficient cost reductions. These relations will be incorporated into two calibrated mathematical models for deriving the most economic combination of GHG reduction strategies.

The Project team includes members from GERAD and What If? Technologies, Robert Evans FCAE, and Professor Warren Mabee, Queen's University. Oskar Sigvaldason, FCAE is Project Manager. Kevin Goheen is Project Representative.

A four person Expert Review Panel has been appointed, to audit and report to the project review board at two month intervals. Its members are:

- Professor Andre Plourde; Professor of Energy Economics and Dean, Faculty of Public Policy, Carleton University (Panel Chair)
- John Leggat, FCAE; retired Assistant Deputy Minister (Science & Technology) and CEO for Defence R&D for Defence Canada (Rapporteur)
- Yvo De Boer; former (2006 to 2010) Executive Secretary of United Nations Framework Convention on Climate Change
- Professor Miguel Anjos; Canada Research Chair, Polytechnique Montreal

The CAE is now managing the TEF website (www.trottierenergyfutures.ca) and Twitter account ([www.twitter.com/TrottierEnergy](https://twitter.com/TrottierEnergy)). Fellows are encouraged to check these sites for updates.

Council of Canadian Academies News

The Council is gearing up for several report launches this spring and a busy year ahead. In 2014, there will be 13 panels hard at work, with upwards of 7 reports slated for release. The next expert panel report, on [the State of Knowledge of Food Security in Northern Canada](#), is scheduled for release in early spring. To learn more about our assessments and expert panels, please visit the [Assessments in Progress page](#) on our [website](#). In other assessment news, the Council is pleased to announce the recent appointment of two expert panel chairs. Andrew K. Bjerring was appointed Chair of the Expert Panel on Timely Access to Health and Social Data for Health Research and Health System Innovation, and Annette O'Connor, Chair of the Expert Panel on Effectiveness of Health Risk Communication.

Additionally, the Council is happy to announce the appointment of Graham Bell, FRSC, to its Board of Governors. He replaces outgoing member Marie D'Iorio, FRSC. The Council thanks Dr. D'Iorio for her dedicated service. The Council also issues a sincere thanks to Tom Brzustowski, FRSC, FCAE, for the fulfillment of his role as Chair of the Scientific Advisory Committee (SAC) since 2010. Susan A. McDaniel, FRSC, takes over as Chair of SAC.

Finally, in 2013, a three-member External Evaluation Panel concluded an independent review of the Council and determined that the organization provides important policy value for Canada. You can read the evaluation here: http://www.scienceadvice.ca/uploads/eng/performance_audit/external_evaluation_2013_en.pdf (PDF).

Ontario Professional Engineers Awards

The CAE was well represented at PEO's 2013 Ontario Professional Engineers Awards:

Stavros A. Argyropoulos, *Engineering Medal – Research and Development*

He has focused his research on aspects of the kinetics and recovery of assimilation of additions in liquid metals. He has made substantial and sustained contributions to the engineering profession through his pioneering research accomplishments, mentoring of young engineers, publications, productive interactions with industry and broad range of activities within technical societies.

Jesse Zhu, *Engineering Medal – Research and Development*

He has had a significant international impact in the field of fluidization and powder technology. His research has advanced the development of particle technologies for a wide variety of applications, some of which have been commercialized or are ready for licensing. These include an ultrafine powder technology for the automobile and materials industry, a dry powder coating technology for pharmaceutical solid dosage forms, a dry powder inhalation technology, and a fluidized bed bioreactor for efficient wastewater treatment.

APEGM Awards

The Association of Professional Engineers and Geoscientists of Manitoba (APEGM) held Ingenium, the association's conference, October 22-25, 2013. Two Fellows of the CAE were singled out for their achievements.

Don Whitmore won the Champion of Education Award, to be given to someone who has gone above and beyond to promote and/or improve engineering education in Manitoba.

Gerry Price won the Leadership Award, to be given to someone who has directly caused or influenced major engineering or geoscientific works, developments, or contributions to be realized, for the proven long-term benefit or improved quality of life for society. It is intended to recognize outstanding, long-range achievement(s) by an individual, usually in an upper management, executive, or governance role.

Royal Society of Canada

CAE Fellows Brahim Benmokrane, Ned Djilali, Praveen Jain, Raman Kashyap, Victor Leung and Aftab Mufti are members of the class of 2013 of the RSC – Congratulations!

IEEE Canada Awards

A number of CAE Fellows recently received awards from IEEE Canada:

Jamal Deen, *A.G.L. McNaughton Award* – For Pioneering contributions to modeling of semiconductor devices

Abdulmotaleb El Saddik, *C. C. Gotlieb Award* – For outstanding contributions to multimedia applications, computing & communications

ZhiZhang Chen, *R.A. Fessenden Award* – For contributions to electromagnetic modeling and communication devices & systems

Raj Rangayyan, *Outstanding Engineer Award* – For Pioneering contributions in Biomedical Engineering

Engineering Institute of Canada Awards

Four CAE Fellows are being recognized by EIC at the EIC Awards Gala at the Westin Hotel in Ottawa on March 15, 2014, as follows:

Hussein T. Mouftah - K.Y. Lo Medal for significant engineering contribution at the international level (IEEE)

Tarek Sayed - EIC Fellow (Canadian Society for Civil Engineering)

G. Ward Wilson - EIC Fellow (Canadian Geotechnical Society)

S. Chan Wirasinghe - EIC Fellow (Canadian Society for Senior Engineers)

Deceased Fellows

George C. Baker, elected in 1989, passed away on November 10, 2013. His engineering career included activities with the Canadian General Electric Company, the Kentville Electric Commission and the Nova Scotia Medical Care Insurance Commission. In 1971, George realized a lifelong dream to harness the tidal power of the Bay of Fundy by becoming a director and later vice-president of the Nova Scotia Tidal Power Corporation, a position he held until 1989. After leaving the corporation, he remained active in the field and developed an international reputation in tidal power and alternative energy sources.

Harry Hole, elected in 1997, passed away on July 3, 2013. He graduated from the University of Alberta in 1944 with a Bachelor of Science in Civil Engineering and then served with the Royal Canadian Engineers as a Lieutenant until discharge in 1946. He went on to become a gifted businessman, resolute community leader and philanthropist who donated tens of millions of dollars to organizations and initiatives he supported.

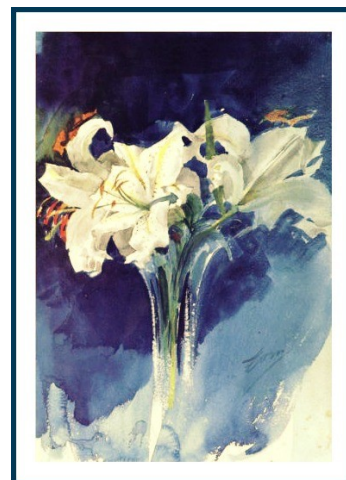
Leslie G. Jaeger, elected in 1998, passed away on August 20, 2013. Born in Southport, England, after graduating from Cambridge, Leslie served for two years as a lieutenant in the Royal Navy. He then taught at various universities, ending his career as Professor Emeritus, Dalhousie University. He was the author of 9 books and 180 refereed articles on earthquake engineering, advanced structural analysis and bridge design. Leslie was a patient mentor, inspiring teacher, daring researcher, outstanding applied mathematician and able administrator.

Earle J. Klohn, elected in 1993, passed away on July 22, 2013. In the mid-1950s, Earle was one of the founders of Ripley, Klohn and Leonoff in Vancouver. He was a pioneer of geotechnical engineering in Western Canada. Earle's skills encompassed the full range of geotechnical engineering from foundations to embankments to tailings dam engineering. Earle took his experience in designing dams in the steep, wet and seismic terrain of British Columbia to many projects around the world.

Philip A. Lapp, elected in 1987, passed away on September 25, 2013. The aeronautical engineer's list of achievements included helping to build Canada's first satellite; working on the early NASA capsules; leading the mechanical-engineering division on the famed Avro Arrow project; co-founding SPAR Aerospace, which built the first Canadarm; and co-authoring major space policy. He was a founding member of the Canadian Academy of Engineering and served as its second president for the 1988/1989 term.

Jacques Lyrette, elected in 1997, passed away on November 18, 2013. Serving as Secretary/Treasurer of the Canadian Academy of Engineering at the time of his passing, he was admired for his distinguished career in research development in the public sector; notably for his work as a top administrator at Canada's National Research Council who focused on technology and communications. More recently, as president and chief executive officer of Gestion Jacma Management, Lyrette applied his deep knowledge of federal and provincial policy to help organizations develop business models and strategies. He was also chief operating officer of Innovative Materials Technologies and chief executive officer of ADGA Group, an engineering consulting company with offices in Canada and overseas.

Benjamin B. Torchinsky, elected in 1998, passed away on December 23, 2013. His career in civil engineering included work with the University of Saskatchewan, Torchinsky Consulting, Western Caissons, and eventually Agra Industries, where he became a pioneer in vegetable oil processing, cable TV, medical diagnostics and recycling. Ben's awards for his engineering accomplishments included the 1997 Sir John Kennedy Medal from the Engineering Institute of Canada, the 2001 Beaubien Award presented by the Association of Consulting Engineers of Canada and an Honorary Doctorate in 2003 from his alma mater, the University of Alberta.



Alberta Economic Development Authority Board

James Carter, FCAE, former president of Syncrude Canada, and Brenda Kenny, FCAE, CEO of Canadian Energy Pipeline Association, are among the twelve business leaders appointed to the Alberta Economic Development Authority Board (AEDA). The AEDA is a unique partnership between the Alberta government and the province's private and public sectors, whereby government and industry work collaboratively to develop recommendations on economic development strategies and key economic issues. AEDA solicits the views of the province's business community, academia, regional stakeholders and individual Albertans concerning economic development policy and strategies.

President's Message (cont'd 2)

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spearheaded the preparation of a renewed work plan and project management approach to bring the project to fruition within a 12 month schedule. Under the leadership of Fellow Oskar Sigvaldason, with help from CAE Executive Director Kevin Goheen, this work plan exploits the respective strengths of both the Foundation and the Academy, and aims to achieve the technical goals of the project by the end of 2014. These involve generating a number of different scenarios for reducing Canada's carbon footprint to the stated goal, and quantifying the economic cost of each one. Following this, the David Suzuki Foundation will actively pursue bringing these results to the attention of the Canadian public. This will likely stimulate much public discussion, attract significant recognition of the CAE's work, and provide much food for thought to decision makers.

Finally, in response to the federal government's position paper entitled "Seizing Canada's Moment: Moving Forward in Science, Technology and Innovation", I have welcomed the opportunity to provide feedback to the Science and Technology Consultation presently underway by Industry Canada for the purpose of updating Canada's science and technology policy. Based on the book that Fellow Clem Bowman and I co-edited on behalf of the Academy in 2012 entitled: "Canada: Winning as a Sustainable Energy Superpower", I have pointed out that "Big projects" have provided our country the nation-building infrastructure that is the foundation of its wealth today. Massive projects such as the Victoria Bridge, the Canadian Pacific Railways, the St. Lawrence Seaway, and the many large hydroelectric complexes drive much of our present advanced technological environment. The TransCanada Microwave system, Canadian satellites, the Alberta oil sands, the Hibernia project, and many more, were the result of visionary undertakings, changing the economics and prosperity of Canada, in every case, for the foreseeable future. These projects were undertaken jointly by government and industry, not simply on the basis of market-driven considerations. Big projects undertaken in the past did not only drive the development of infrastructure. In every case, they created an innovation ecosystem which enabled a new value chain to emerge, thereby transforming the economy, the country's wealth, its technological and industrial platform, and influencing its ability to take on even larger projects at a later time. Canada's past big projects represent an innovation strategy which has driven innovation in this country, counter-balancing Canada's lack of critical mass of people and markets (except in some of its key cities such as Vancouver, Toronto and Montreal) which favors the more familiar US or European innovation strategy based on entrepreneurship and company start-ups. It is therefore the Academy's recommendation that government provide greater leadership, and risk sharing incentives for encouraging "big projects". If anyone has any doubt over the potential impact of big projects today, one has only to look no further than the Hibernia project in Newfoundland. The creation of the offshore petroleum industry, despite sub-arctic conditions and exposure to icebergs and ice sheets, and continuing harsh conditions, has transformed Newfoundland from a "have not" to a "have" province.

Clearly, your Academy is moving! Much has been accomplished, but so much more needs to be done! I invite each and every one of you to think about how you could become more engaged in the CAE, either by becoming involved in your local section or by initiating a task force on a topic of national interest.

In the meantime, permit me to offer you my very best wishes for a New Year filled with health, success and much personal satisfaction.

As a final note, I wish to acknowledge the untimely passing, last November, of Jacques Lyrette, the CAE's Secretary-Treasurer. His experience, wisdom, intelligence, patience and humour will be sorely missed.

Richard J. Marceau, FCAE, P.Eng.
President, The Canadian Academy of Engineering (2012-2014)

Order of Canada

Congratulation to the members of the Canadian Academy of Engineering who were appointed to the Order of Canada in an announcement made on December 30, 2013:

Louis Audet (C.M.): "For transforming the family business into one of the top Quebec telecommunications companies and for supporting a wide range of community organizations."

Daniel W. Smith (O.C.): "For his contributions as an environmental engineer designing water and energy management systems in northern Canada."

Mamdouh Shoukri (C.M.): "For his contributions to the flourishing of Ontario's academic institutions as both an engineer and an administrator."

The New Champlain Bridge – What Needs to be Done? (cont'd)

(Continued from page 1)

form an integral unit with seven girders and a continuous top flange, along with the diaphragms for improved load distribution between the girders. Unfortunately, this alternative did not permit easy, routine maintenance, and it was very difficult and almost impossible to replace any element, such as a girder. Also, because of the lack of drainage on the superstructure, which was not considered in the original design, the exterior girders got quite severely damaged because of the use of de-icing salt for traction during winters. Initially, it was planned to use ashes for traction during winters as had been the practice in Quebec at that time. Under normal circumstances, it would have been possible to stop the traffic briefly in a couple of lanes over a weekend, and replace the girder. However, the unusual design completely eliminated this option and these girders had to be strengthened at an exorbitant cost because of the design adopted due to the Government intervention.

The current Champlain Bridge was designed with a specified concrete strength, and it was found to be adequate; however, its permeability (the ease with which salt solutions or any other fluids find ingress into the concrete) was not a part of the original specifications and was not checked. Because of poor drainage, the salt solution caused extensive corrosion damage to the edge girders, girder ends, bearings, pier caps and piers, requiring very expensive rehabilitation. This has led to large repair and rehabilitation expenditures, many times the original cost of the Champlain Bridge which was about \$30 million. The cost of the current super-beam repair alone is estimated to be about \$3 to \$4 million. It is therefore imperative that unlike the present practice of designing for the lowest construction cost without taking into consideration future maintenance and any rehabilitation, when needed, the engineers must design any infrastructure facility, not just for the initial construction costs, but also for its maintenance and any needed changes, and rehabilitation over its entire service life, and provide a maintenance plan to the owner, as is the current practice with automobile dealers. The engineer would also be wise to plan a mid-life structural integrity audit, as many of us have with our doctors for a complete check-up when we reach the age of 45-50 years.

In planning the new structure, we must not repeat the past errors committed with the design, construction and maintenance of the present Champlain Bridge, along with the unwise government interventions. The announced service life of 100 years would require a design life of about 150 years for the ultimate limit state (involving minimum strength and durability of the system). Tools are presently available to ensure that a well-designed concrete bridge, constructed using excellent quality control and proper inspection and maintenance, will last for about 150 years. Properly installed barriers or jackets of fibre-reinforced polymers, which can inhibit or at least slow down considerably the ingress of the deleterious substances into the concrete, can easily increase this service life to approximately 200 years.

Is the user paying for the full cost of maintenance, repair and rehabilitation of the Champlain Bridge? Certainly not directly. The Government of Canada pays for these activities from the taxes paid by the Canadian tax-payers. Therefore, it is still paid by the user but from a different pocket. In fact, the infrastructure operations are subsidized considerably by the different levels of government; however, the fact remains that finally it is the user that pays for the upkeep and operations of infrastructure facilities. Presently, depreciation of infrastructure assets is not considered in the costs to the user, with the result that once the infrastructure asset reaches the end of its useful life, different levels of government are scrambling to find funding source(s) to pay for the replacement. How will the total costs of owning, maintaining, operating and demolition and disposal at the end of the service life be paid? Presently, the user pays for it directly through user fees, or indirectly through the government. The logical thing is to accept that the user must pay for all of the costs involved – technical, environmental, economic, social and any other costs. The governments would have to decide subsidizing the users who are unable to pay part of the total cost. This includes tolls on highways and bridges. The Federal Government should also consider relinquishing more tax fields to the municipalities; the municipalities enjoy only 8% of the tax dollar in Canada, while they own and are responsible for more than 50% of all infrastructure assets in Canada.

At one time, there were tolls on the Champlain and Jacques bridges and some Quebec highways, such as the Laurentian and the Eastern Autoroutes. There was a toll on the Victoria Bridge when the current truss form structure was put in operation in 1900. Many financially constrained governments around the world have successfully resorted to Public-Private-Partnerships, (PPPs or P3s), under which the private entrepreneur finances, designs, builds and operates the system for an agreed period of time, during which the cost of financing, design, construction, maintenance, etc., are recovered by the entrepreneur. These costs are paid principally by the user through tolls or user fees. The Confederation Bridge between Prince Edward Island and New Brunswick is an example of a PPP project. Whatever the mode of financing, finally it is the user who pays for all of the expenditures involved. Therefore, we must keep politics out, and bite the bullet and accept the tolls, which along with other funds, will enable the bridge to be maintained well to serve our grand-children and their grand-children for the next 100 years and more.

Executive Director's Message



In the brief moments of spare time that I have, I enjoy nothing more than reading a good detective story. My favourite author is Ian Rankin, whose novels are set in modern day Scotland. One of his characters is Detective Inspector Malcolm Fox, who heads an internal Complaints and Conduct Department, aka "The Complaints." In these novels, he and his fellow investigators are universally detested by every other police officer in Scotland. Through this character, Rankin has pointed out an interesting asymmetry between the workload and diligence required of and the potential ramifications to the immoral and those charged with preventing such behaviour.

Engineering ethics are suddenly front page news, with both the OIQ's quick and decisive reaction to the Quebec construction industry scandals, and the PEO's work with the Elliot Lake mall roof collapse. Professional Engineers are legally bound by codes of ethical behaviour. Your colleague, Ron Britton, of the University of Manitoba, has written extensively on this topic:

"Self-governing professions have been granted the privilege and responsibility to regulate the practice of their specific professions. While public opinion varies widely regarding both the need for and operation of professional "self-regulation", some detractors suggest that we accept the privileges, but shirk the responsibilities. Assuming that the rationale behind the self-governing concept is valid, each professional organization must strive to meet the expectations of those who granted us the privilege. It is an obvious fact that professional organizations are populated by individual professionals. It follows that an action by any one of those professionals reflects, not only on that individual, but on the profession as a whole. When that action is positive, the reflected impression is, and should be, celebrated. If the action is negative, it needs to be dealt with promptly and openly."

Like in policing, ethics in engineering and business in general, (and by extension in day-to-day life) should be simple. Follow the spirit and the letter of the written rules and, in their absence, follow the obligation from the ritual of the calling of an engineer "My Reputation in my Calling I will honourably guard; but I will in no way go about to compass or wrest judgement or gratification from anyone with whom I may deal." However, we all know that it is never this simple. Unfortunately, in life, it happens that we are faced with individuals who conduct themselves in an unacceptable professional manner, and at that point, the above fore mentioned asymmetry kicks in.

When confronting such circumstances, fact gathering and checking, and due process are essential, and must occur. This takes time and can be a drain on the time resources of those who take on the responsibility of disclosing unacceptable professional behaviour. Additionally, bringing charges to the attention of authorities rarely wins you any accolades, and never makes you friends. I have taught engineering and engineering technology courses more or less continuously since 1987 (part time since 1996) and have noticed a slow and steady decline in ethical behaviour amongst the students. Technology has made it easier for some students to plagiarise and collaborate during tests (though apparently age-old methods have never gone out of style, such as fishing unmarked assignments out of the submission bin with a coat hanger and chewing gum, then changing the cover page and submitting them as their own), to the point where I would estimate half of my time on lower level courses is taken preventing and ferreting out alleged cheating and filing reports on the soon to be Professional Engineers. Faced with this massive increase in work, it would be easy for me to turn a blind eye. But, I will continue because I know it helps educate young engineers, and through them, the future of the profession, the vast majority of PEngs, and ultimately the public.

Our own Bylaws also address these issues. Membership in the CAE is designed to recognize "professional integrity as well as for engineering accomplishments." Our Bylaws state that a "... Fellow may be removed from the Academy by action of the Council, for conduct or activities that are deemed potentially injurious to the stature and reputation of the Academy. Prior to any such action, provision shall be made for an appropriate hearing with the individual involved."

My experience at the CAE has been virtually untouched by anything remotely resembling unethical behaviour. However, I occasionally have discussions with Fellows during our yearly Fellow Candidate elections who think of bringing forward allegations concerning individual candidates without wishing to substantiate their claims. If you wish to make such allegations, may I remind you of your obligation to have your facts clear and documented, and to have the moral conviction to witness your allegation, should the situation need resolution. "Innocent until proven guilty" is an essential foundation of Canada's judicial system, and the Academy can and will not pursue any issue based on undocumented allegations or sloppy administrative procedures. As we approach election time this year, I would therefore urge the Fellows to remain diligent and, like a member of "The Complaints", if you feel compelled to bring forward an allegation of professional ethics, I would request that you mentally prepare yourself for the additional work and lack of thanks that will probably occur.