THE CANADIAN ACADEMY OF ENGINEERING
Leadership in Engineering Advice for Canada

L'ACADÉMIE CANADIENNE DU GÉNIE
Chef de file en matière d'expertise-conseil en génie pour le Canada

NEWSLETTER / COMMUNIQUÉ

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

Inside this issue:

President's Message

I would like to express my profound gratitude for the honour and privilege of your trust in having been elected the president of the Canadian Academy of Engineering for the 2012/2013 term.

As we all know too well, we build on the shoulders of the giants that have preceded us and to this end, I intend to ensure the seamless continuation of the numerous important initiatives undertaken by the past eight presidents I have had the privilege to serve: Kim Sturgess, Michael Charles, Axel Meisen, John Leggat, Ravi Ravindran, John McLaughlin, Kathy Sendall, and Ron Nolan. Over the years, these stellar leaders have been the architects of many significant Academy initiatives which benefit us to this day, including:

- Implementing new Strategic Plans;
- Strengthening ties with sister Academies, both nationally and internationally;
- Strengthening the Academy's brand, in industry and the public at large;
- Advocating for new policy proposals;
- Nurturing innovative partnerships, such as the Council of Canadian Academies along with our sister Academies, and the Trottier Energy Futures Project, with the David Suzuki Foundation;
- And many more!

Unfortunately, despite the quality of its membership, the Academy remains challenged in its ability to make its vision a reality, a vision that states that it should: "… provide strategic advice on matters of critical importance to Canada." Why is this so?

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The Future of Manufacturing in Canada: The Way Forward

by Pierre Lortie, FCAE

(At the 2012 AGM, President-Elect Lortie announced the theme and location of the 2013 Annual Meeting)

"To live well, a nation must produce well"[1]

Manufacturing is a key component of the Canadian economy. In 2011, approximately 1.76 million Canadians were employed in the manufacturing industry. These jobs which represent about 10% of total employment are, on average, higher-wage jobs than what prevails in other sectors. However, the importance of manufacturing is much more pervasive. The sector is the main contributor to our exports. In 2011, the value of manufacturing exports amounted to $279 billion, about 56% of total Canadian exports. The services sector which gave employment to 13.5 million Canadians delivered only $42 billion in exports [9.22 million jobs in health, education and public services are excluded]. Despite the place the development of our natural resources has taken in the public debate, the fact remains that the export of manufactured goods is significantly greater - $279 billion vs $179 billion – than that of our natural resources.

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The Founding of the Canadian Academy of Engineering

by Andrew H. (Drew) Wilson, FCAE

In the 1970s, the idea that there should be an independent Academy of Engineering in Canada that would recognize individual distinction in engineering and provide opinions on matters affecting engineering was not new. Dr. Robert Legget, for example, was speaking in favour of it, but it appeared to lack the general support of engineers. So nothing was done by way of implementation until the Council of the Engineering Institute agreed on 21 March 1980 that the then president, Professor Colin diCenzo, and I should become a task force to study the idea and ensure that the Institute had a strong input into the establishment of such an institution in Canada.

We began extensive discussions and correspondence. Both of us had both been especially impressed by the work of the Academies established in Britain, the United States and Australia, with members of which we were in contact. We sought their help. We also sought opinions within Canada from individuals and from institutions such as the (then) Canadian Council of Professional Engineers and the Association of Consulting Engineers. Although the Canadian opinions were generally less than enthusiastic, we continued to explore the Engineering Academy possibility.

One of the options investigated was the possibility that the Canadian Academy might become the fourth Academy within the Royal Society of Canada. So representatives of the Institute, of which I was one, and CCPE met with the Development Committee of the RSC in January 1982. At this meeting, it became clear that the Academy IV idea would not 'fly' since admission to the Royal Society was based, inflexibly, on meritorious research and publication. Since the majority of engineers did neither, and no Engineering Academy could ignore them, it would have to be established as a separate entity. The Royal Society, however, formed an *ad hoc* committee to discuss our ideas further with us - but this committee never met.

Meanwhile, discussions continued within the Engineering Institute of Canada and between the Institute and CCPE and ACEC in a variety of contexts over the next year and more. As well, I had noticed that the U.K., U.S. and Australian Academies had each had the assistance of an existing institution during the period leading to their establishment. To me, the Royal Society of Canada was still the most appropriate one for us. So with this in mind and with the help of Dr. Donald Hurst, a member of the Society who is interested in our Academy idea, and Dr. Larkin Kerwin, then president of the National Research Council, I was able to persuade the president of the Royal Society to arrange for representatives of Academy III to meet with Dr. Hurst and myself early in 1984. As a result, it was agreed that a formal meeting would be set up between representatives of the Royal Society's Academy III and a chosen group of senior engineers who, with the agreement of the EIC and CCPE presidents, would participate as individuals and not as members of the Institute or the Council.

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Board of Directors 2012/2013

2012 New Fellows

Back row (standing) from left to right: Ken Croasdale, Pierre Berini, Ronald C. Gilkie, Jan Oleszkiewicz, Dennis K. Paddock, Omer L. Gulder, Bill Roggensack, Jim Montgomery, Sara Jane Snook, Lynne Cowe Falls, Robert Legros, Ajay Dalai, John C. Luxat, D. Grant Allen, Peter Mascher, Douglas Thomson, Ross D. S. Douglas, Andrew H. Wilson

Front row (seated) from left to right: Greg Lawrence, Gary S. Schajer, Jianping Yao, V. S. Sastri, Louis-A. Dessaint, Shamim Ahmed Sheikh, Brahim Benmokrane, Ravi Seethapathy, Michael Carter, E. Esmailzadeh, Raman Kashyap, Derek Martin, Waguih ElMaraghy, Xuemin (Sherman) Shen, Biao Huang, Jeffrey Packer, C. William Stanley, George A. Lampropoulos

New Fellows not in attendance: Daniel H. Bader, Jan Carr, Kevin S. Fraser, Aaron Gulliver, Peter A. Irwin, David Johns, Al MacDonald, Molly Shoichet, Ivan Stojmenovic, Paul Stuart, Robert Tremblay, Thierry Vandal

The Founding of the Canadian Academy of Engineering (cont'd)

(Continued from page 2)

For a variety of reasons, this meeting was delayed. However, in mid-May 1985 Professor diCenzo and I met with the Royal Society representatives and agreed that the Society would host, and support financially, a meeting with about a dozen senior engineers, the main purpose of which would be to confirm the desirability of establishing a Canadian Academy of Engineering and, subsequently, to take the initial steps to bring this about. This meeting took place on 19 August 1985 and the establishment of a CAE confirmed. A four-person founding executive was appointed, whose main duty was to take the necessary initial steps. It would also convene a group of about 20 potential founding members to assist with this work and to select the full list of 40 or so founding members. A tentative date for the inauguration of the Academy was set at May 1987, during the Centennial Conference of the Canadian Engineering Profession in Montréal.

Professor diCenzo was invited to join the '20' - which became the '26' and formed the Provisional Council of the Academy - and was subsequently inducted as a founding member. This Council formed committees to deal with objectives and by-laws, membership and finance. It met on three occasions and the National Research Council replaced the Royal Society as host. The inauguration and first inductions took place as scheduled. Appropriately, Dr. Legget was elected the founding president.

Energy Pathways Task Force Progress Report

by Clem Bowman, FCAE and Richard Marceau, FCAE

The Academy's Energy Pathways Task Force successfully completed this year's project of authoring a book entitled: "Canada: Winning as a Sustainable Energy Superpower". The book was officially launched on May 25, 2012 in a special eight-page supplement of the *Globe and Mail* which brought national recognition to the Academy and to the quality of its Fellows. The book's key message is that Canada needs – and has the ability – to move from being a "world energy superstore" to a "world-class sustainable energy superpower". The book demonstrates that Canada has a spectacularly successful innovation strategy that has historically been the foundation of its economic prosperity – Canada's Big Project Innovation Strategy – and makes the case for leveraging this same strategy to the same end with a particular focus on Canada's energy industry. Nine "Big Projects" are proposed which the Task Force believes can be accomplished over the next four decades.

The book is available electronically, free of charge, at the following website and consists of two volumes (i.e., Volume I provides an executive summary of the details found in Volume II): http://www.acad-eng-gen.ca/e/EPNews_.cfm

The special eight-page May 25th *Globe and Mail* supplement is also available, free of charge, at this website.

The hardcopy edition of the book is available (at $100 per copy) directly from Academy headquarters, or can be ordered at the following website: http://www.acad-eng-gen.ca/documents/OrderForm_EPBook.pdf

We hope you will enjoy reading this important contribution to our nation's future.

President's Report to the 2012 Annual General Meeting

Submitted by P. Kim Sturgess, FCAE — June 21, 2012 in Ottawa, Ontario

It is with great pleasure that I present my report as the outgoing President of the Academy for this year. When I assumed this role a year ago, I identified several goals for my Presidency, and these were summarized in my first President's report last summer. I summarize results against each goal.

Confirm Energy Pathways participation and next steps. As many of you know, Dr. Clem Bowman has led a dedicated group of Academy members over the last six years on an amazing journey to establish Canada as an Energy Superpower. At the start of my term, this project was very near completion, but needed an additional boost to complete it. On May 25th, the Energy Pathways book, written and edited by Clem Bowman and incoming President Richard Marceau, was launched with great fanfare in the *Globe and Mail*. All of you will receive a copy of this supplement at the annual meeting. Kudos to Clem and his team for their marvelous achievement, one of which we should all be very proud.

Confirm TEFP participation and leadership. The Trottier Energy Futures Project (TEFP) is the next big energy project being undertaken by the Academy. This project was launched two years ago at the Academy AGM. The progress over the first year was challenged by leadership changeovers. Over the last year, the Academy has actively participated in this project through the leadership of incoming President Richard Marceau and Executive Director Kevin Goheen. The management of this project is now in much better shape than a year ago. The successful completion of this project will be a key challenge for the Academy over the next two and a half years.

Launch one new strategic initiative in this year. This goal was not achieved. However, President-Elect Pierre Lortie has chosen the area of innovation and productivity in manufacturing as the topic for next year's Academy Symposium. I believe that it is the intention of the Board to move forward with this topic area as the next strategic initiative. This is well timed and an excellent choice. This issue is vital to all Canadians and one that is uniquely suited for the skills of Academy members.

Engage more industry participation in the Academy. This goal related to the implementation of the recommendations of the task force on this topic chaired by Past President Axel Meisen. Some of the recommendations from Axel's task force were implemented during the nomination process this year. Outgoing Fellowship Chair Michael Avedesian brought forward several of these recommendations this year as part of his Fellowship Committee report, and these will be implemented in next year's new member nomination process. Although I believe that we are seeing a better balance between academia and industry in our membership and leadership, this is an area that needs continuing attention in the years ahead.

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Special Events

2012 Dinner and Induction of New Fellows, Annual General Meeting, and Symposium on "Canada in Aviation and Space: Past, Present and Future"

On 20-21 June, the 2012 Annual Meeting of the Academy was held in Ottawa. It brought Fellows and guests together for the Dinner on the evening of 21 June and for the Symposium on 22 June. The Annual General Meeting was held prior to the Dinner on 21 June.

Dinner among the collection at the Canada Aviation and Space Museum

The Novotel Hotel was the location of the Annual General Meeting. Executive Director Kevin Goheen welcomed the Fellows in attendance and outlined his ideas on implementing the CAE's strategic plan. President Kim Sturgess, FCAE chaired the first part of the AGM and described in her report progress in the past year on the Energy Pathways Project, the Trottier Energy Futures Project, links to sister organizations and increased member engagement. She then described the work that still needed to be completed, such as launching a new strategic initiative and engaging more industry participation. The Fellows present approved a comprehensive set of by-law modifications and learned about new Board financial and membership policies. After the election of the new slate of Directors, President Richard Marceau, FCAE addressed the Fellows, focussing on his major thrust for the next year: increased member engagement through the creation of local Sections, with pilots the first year to be launched in Toronto, Montreal and Alberta. Finally, President-Elect Pierre Lortie, FCAE gave a comprehensive presentation on the state of the Canadian manufacturing sector as a prelude to announcing that theme for the 2013 Annual meeting, to be held in Montreal.

The Dinner took place in the Canada Aviation and Space Museum, where 125 attendees dined surrounded by numerous historic aircraft. There were a number of highlights this year. Former Executive Director Philip Cockshutt, FCAE was presented with the Léopold Nadeau Memorial Award for Distinguished Service for his years of devoted support to the Academy and his contribution to the creation of the Council of Canadian Academies. Another former Executive Director, Michael A. Ball, FCAE gave a short presentation on the occasion of the 25th Anniversary of the CAE, just prior to him receiving a departing memento from CAE President Kim Sturgess. The induction and welcome of the new Fellows was well-attended with 39 of the 49 newly-elected members able to attend the induction ceremony. During the dinner, a special slide presentation was shown that described the growth of the Academy. Dinner was followed by the Keynote Speaker Herb Saravanamuttoo, FCAE who gave the presentation: After the Arrow – Lessons Learned. The presentation included a dramatic recall of Black Friday, 20 February 1959, when 14,000 engineers were fired over the PA systems at A.V. Roe and Orenda.

Philip Cockshutt receives the Léopold Nadeau Memorial Award for Distinguished Service from President Kim Sturgess

Keynote Speaker Herb Saravanamuttoo gives his presentation: After the Arrow – Lessons Learned

Taking advantage of the Museum venue, the 2012 Symposium focused on "Canada in Aviation and Space: Past, Present and Future." The program appealed to engineers from all disciplines, as well as the many students from the University of Ottawa and Carleton University who attended thanks to the generosity of the Fellows. The symposium attracted over 100 participants.

Session 1, "Aviation – Now and the Future", as was all sessions, moderated by J. Moyra J. McDill, FCAE. The symposium started on a highly unusual note, with biologist Jeff Dawson of Carleton University giving a comprehensive presentation on the steering mechanism of insects. Dr. Peter Grant, University of Toronto, discussed his work with improving the fidelity of flight simulators for upset prevention and recovery training. The morning session was concluded with Dr. Roxana Zangor of the Technology Collaboration Office of Pratt & Whitney Canada Corp who presented ways in which that company helps Canadian universities in an aerospace R&D ecosystem.

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Trottier Energy Futures Project

Low-Carbon Scenario Takes Shape

With a strong foundation of research in place, the Trottier Energy Futures Project (TEFP) is shifting its focus to a mix of expert dialogue and intensive scenario-building to address the challenges on the road to an 80% reduction in Canada's energy-related greenhouse gas (GHG) emissions.

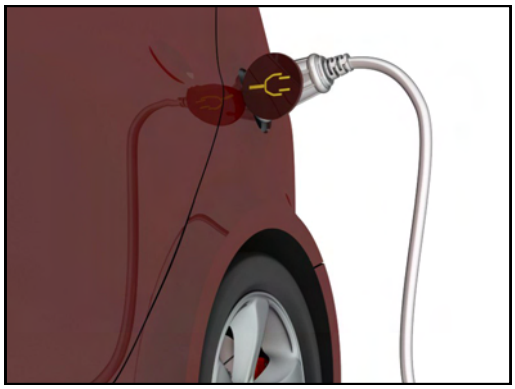
The project, a partnership between the Canadian Academy of Engineering and the David Suzuki Foundation, is made possible through a generous contribution from CAE Fellow **Dr. Lorne Trottier**.

In early July, CAE Fellow **Prof. Bob Evans**, freshly retired from the University of British Columbia, agreed to assist the TEFP with the modeling and scenario-building at the core of its mandate. His participation reinforces the valuable role that CAE Fellows can play in key aspects of the TEFP process—a connection that was front and centre when CAE and Suzuki Foundation representatives met at the Kingbridge Conference Centre earlier this year.

"The Kingbridge meeting was the first time we convened leading thinkers and practitioners from the two branches of science that drive this project, ecology and engineering, and I'm not sure either group knew exactly what to expect," said TEFP Managing Director **Ralph Torrie**. "The conversation was fascinating, often riveting, and we left the meeting with some great new ideas and a lot of common ground."

Participants from both organizations agreed that:

- The need to drastically reduce GHG emissions, in Canada and around the world, is a profoundly important challenge, perhaps the singular challenge of our generation.
- No sector of the economy has the resources or the ability to fully address the issue, and every sector has a key role to play.
- No single technology will be sufficient to balance the need for reliable energy services in a modern economy with the equally important imperative to stabilize the global climate by reducing GHGs.
- The climate challenge calls for an integrated strategy that embraces the complexity of Canada's energy economy and makes use of all the levers available to meet the 80% target—drastically increased efficiency, decarbonization of fuels and electricity, and better understanding and use of the underlying drivers in the economy that can either create or reduce energy demand.



"The thing that was most important to me was the progress that has been made [in] putting this project back on a firm footing," one CAE participant stated at the end of the meeting. "As a result of the discussion we've had, I'm very confident that this project will succeed. We'll broaden the engagement, heighten the discussion, and produce products that create new insights as to what kind of solutions can be brought forward to address the low-carbon future."

A Major Milestone

The TEFP's initial research is drawing to a close, with two papers in revision following peer review and two more nearing completion of first draft. A wide group of CAE Fellows have shared thoughtful comments on the first two papers:

- ***Low-Carbon Energy Futures: Review of Current Practices*** is the first attempt to synthesize and draw common themes and directions from the best of the low-carbon energy literature available around the world.
- ***A Low-Carbon Energy Budget for Canada*** is the first consolidated inventory of the low-carbon energy resources that will realistically be available to Canada by 2050.

Work is almost complete on the two remaining papers:

- ***Long-Term Dynamics of Canadian Energy Patterns: A Retrospective Analysis*** combines calibrated data back to

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A Reminder to CAE Active Fellows: Nominations for New Fellows 2013

The election of new Fellows into the Academy is critical to its long-term sustainability and mission. Now is the time for you to review your circle of engineering acquaintances, and to consider which of them may possess the qualifications to become CAE Fellows; that unique combination of outstanding professional achievements in their careers plus service to the engineering community. CAE Guidelines for Nominations are available in the Members' area of the CAE website.

Note that we have a modified process in 2013. Last year, the Fellowship Committee and Board recommended that the CAE Head Office implement a quality control process to improve the standards of the written nominations before they are reviewed by the Fellowship Committee. We will suggest to nominators how to fill gaps and improve the issues which make them a weak nomination.

As well, at the Strategic Planning Session of 11 April 2012, concern was expressed that our Fellowship is underrepresented with engineers from Industry, Government and NGOs, so nominations from those three sectors are particularly encouraged.

The cut-off date for the receipt of Nominations for 2013 is **October 31, 2012**; it invariably takes longer than anticipated to finalize a nomination, so please start the process IMMEDIATELY and avoid disappointment.

Special Events (cont'd)

(Continued from page 5)

The second session was focussed on Green Aviation. Dr. David Zingg, FCAE of the University of Toronto Institute for Aerospace Studies gave an overview of various technologies that are helping the civil aviation industry hit the ambitious targets on total fleet CO2e. Dr. Ömer Gülder, FCAE, also of UTIAS, presented on the challenges of biofuel in aviation. Dr. Gülder was inducted the previous evening as a new Fellow of the CAE; we believe that this is the first time a new Fellow has presented at the same Annual Meeting.

The luncheon presentation changed the focus from aviation to space. Bruce Burlton, Former Director of Satellite Operations at Telesat, described a very creative effort of control of Anik E2 from a ground system after its onboard attitude control system failed.

A special dessert was created to commemorate the CAE's 25th anniversary

Tim Barfoot, of the University of Toronto, discussed planetary robotics and various path planning algorithms

Session 3 began with Dr. Peter Radziszewski of McGill University, who through extensive use of multimedia, projected how mining might occur in Space. Dr. Johanne Heald of the Canadian Space Agency gave the audience an introduction to Dark Energy and its place in the cosmos. The last presentation was by Dr. Tim Barfoot of the University of Toronto, who discussed planetary robotics and various path planning algorithms. President Richard Marceau thanked the speakers for their contributions.

Founding member and former CAE President Philip Lapp

The Symposium closed with a summary of the key points by former CAE President Philip Lapp, FCAE who drew upon his extensive career in the sector to draw attention to the state of Canada's aerospace sector and its potential future. The Academy is grateful to the Symposium Program Committee composed of Chair J. Moyra J. McDill, Michael Avedesian, Michael A. Ball, André Bazergui, Michael E. Charles, Kevin Goheen and David Zingg, for putting together such an interesting program in a tremendous venue.

Deceased Fellows

The Canadian Academy of Engineering offers its condolences on the death of the Fellows listed below. If you are aware of the passing of a Fellow not listed, please contact Valérie Broadfoot at vbroadfoot@acad-eng-gen.ca.

Morrel P. Bachynski, elected in 1991, deceased March 21, 2012.
J. James Kinley, elected in 2000, deceased May 1, 2012.
James B. Morrow, elected in 1992, deceased May 4, 2011.
Wallace S. Read, elected in 2001, deceased August 16, 2011.
L. W. Shemilt, elected in 1987, deceased December 20, 2011.
Torstein Utigard, elected in 2010, deceased April 11, 2012.
George J.M. Zarzycki, elected in 1990, deceased June 12, 2012.

In Memoriam

Morrel P. Bachynski passed away peacefully at home with his family at his side, on March 21, 2012 at the age of 81. He received a B.E. in Engineering Physics in 1952, and a M.Sc. in Physics in 1953, both from the University of Saskatchewan. He then went on to obtain a Ph.D. from McGill University. Dr. Bachynski worked in RCA research labs in Montreal for a number of years and held various positions before he founded MPB Technologies Inc., in 1977 and he had served as President since that time. MPB Technologies achieved national and international recognition for its involvement in lasers and electro-optics, fusion research, millimeterwave radiometry and radar, space shuttle experiments, and international optical fibre telecommunications systems. Dr. Bachynski has authored more than 90 publications in recognized scientific journals as well as being the co-author of the text book titled "The Particle Kinetics of Plasmas". He has also been the recipient of numerous awards including Québec's highest scientific prizes [the Prix Scientifique du Québec and Prix Lionel Boulet], the Canada Award for Business Excellence [Entrepreneurial-Gold] and Honorary Degrees from a number of Canadian universities. Dr. Bachynski has served on the Board of Directors of a number of organizations since 1978. He started the Bachynski Family Foundation in 2009 to fund advanced optical equipment for the Montreal medical community. He was elected a member of the Canadian Academy of Engineering (CAE) in 1991. He served on the Board of Directors from 1998 until 2006 and served as President for the 2003/2004 term. In 2008, he received the CAE's Léopold Nadeau Memorial Award for Distinguished Service "for dedicated and outstanding services to the Canadian Academy of Engineering in developing the concept of a 5-year strategic plan for the advancement of the Academy and stimulating the involvement of members to implement the plan". He will be greatly missed by his friends and colleagues for his inspirational leadership, energy and enthusiasm, guidance and continual encouragement.

John James Kinley, ONS CD passed away on May 1, 2012. He was an engineer, industrialist and the 29th Lieutenant Governor of Nova Scotia since confederation. He was appointed by the Governor General, on the advice of Prime Minister Jean Chrétien, in May 1994. He was an engineering graduate of Dalhousie University, Nova Scotia Technical College and Massachusetts Institute of Technology. He has practiced professional engineering in business and the community for more than 50 years in executive positions at Lunenburg Foundry & Engineering Co. Ltd. and Lunenburg Marine Railway. He was the Honorary Chair for Life of the Nova Scotia Branch of the Canadian Manufacturers and Exporters, a former chair the Offshore Trade Association of Nova Scotia and a former director of the Canadian Foundry Association. Kinley served in a number of military offices. He served in the Canadian Merchant Marine and Royal Canadian Navy and in Canada's Naval Reserve and Retired as Lieutenant Commander in 1958. He was a president of Branch #23, Royal Canadian Legion in Lunenburg, former president of the Navy League of Canada, Honorary Colonel of the #14 Airfield Engineering Squadron, Canadian Air Force and the West Nova Scotia Regiment. He was appointed the first Grand President of The Nova Scotia Command, Royal Canadian Legion.

James B. Morrow died Wednesday, May 4, 2011. Jim attended Lunenburg Academy and Rothesay Collegiate in Rothesay, NB, through his high school years, followed by pre-engineering at Dalhousie University and graduated in Mechanical Engineering from the Technical University of Nova Scotia (TUNS) in 1950. Jim's engineering career began with four engineering firms in Nova Scotia and Ontario, after which he joined National Sea Products Limited in 1958 as Chief Engineer where he was responsible for the planning and construction of the Lunenburg Seafood Plant which opened in June of 1964. Jim retired as Executive Vice President and Director of the company, now known as High Liner Foods Incorporated, in May, 1991 and in 1992 became an Honorary Director of the company. Jim was a past Chairman of The Seafood Producers Association of Nova Scotia and became their first Honorary Director in 1988. He served for many years as a Nova Scotia representative on The Fisheries Council of Canada Board of Directors and a member of The Federal Fisheries Minister's Atlantic Advisory Committee, a past board member of both The Fisheries Research Board of Canada and The Fisheries Prices Support Board of Canada. He was President of The Atlantic Fishing Vessel Association. Jim was chosen to be a member of the 1962 Duke of

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In Memoriam (cont'd)

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Edinburgh's Study Conference held across Canada followed by becoming a Fellow of the Royal Commonwealth Society. He was a member of the TUNS Alumni Association and president of the Reunion Year of 1964. In 1979 he received an Honorary Doctorate of Engineering from TUNS. In 1992 he was appointed the Association of Professional Engineers of Nova Scotia (APENS) representative on the TUNS Senate. He also served on the TUNS Board of Directors in both Planning and Investment capacities. In 1991-1992, Jim was appointed President of APENS and in 1996 became an Honorary Life Member of APENS as well as receiving the APENS Gold Medal Award for exceptional and outstanding achievement in his profession.

Wallace S. Read passed peacefully away after a brief illness at Western Memorial Hospital, aged 81 years. He was born in Newfoundland and received his Bachelor of Engineering from Nova Scotia Technical College in 1951 before entering the pulp and paper and hydro-electric power industries in his native province. Between 1964 and 1984, he held senior positions with Newfoundland and Labrador Hydro and its subsidiary companies. In 1985 he joined the Canadian Electricity Association (CEA) serving as its first full time President. In that position, Read worked to promote the interests of Canadian electric utilities and the customers they serve. Upon retirement in 1995, Read formed REMAS Inc., a provider of electric power consulting services to utilities and governments. His professional affiliations include being a Life Member of the Association of Professional Engineers and Geoscientists of Newfoundland and Labrador, a Fellow of the Engineering Institute of Canada and a Life Fellow of the IEEE. He was inducted into the Canadian Academy of Engineers as a Fellow in 2001. In 1966 Read was elected President of the Institute of Electrical and Electronics Engineers (IEEE), the world's largest engineering professional society with over 370,000 members in 150 countries. Over the years, he has received numerous awards including IEEE's General A.G.L. McNaughton Gold Medal, the Engineering Institute of Canada's Julian C. Smith Medal, the CEA's Distinguished Service Award, the Canadian Standards Association's John Jenkins Award, the IEEE Power Engineering Society's Power Life Award, the Canadian Council of Professional Engineers Gold Medal, the IEEE Standards Association International Award and the Charles Proteus Steinmetz Award. In addition to these honours, Doctor of Engineering Degrees (Honoris Causa) were conferred upon him by the Technical University of Nova Scotia and by Memorial University of Newfoundland. In 2003 Dr. Read was elected a Member of the Order of Canada.

Leslie Webster (Les) Shemilt, Professor and Dean Emeritus of the Faculty of Engineering at McMaster University, died in St Joseph's Hospital, Hamilton, on Tuesday 20 December, five days short of his 92nd birthday, as a result of post- operative complications. He will be remembered with great fondness, respect and admiration for the wide variety of his interests and achievements, both professional and personal. Following his undergraduate studies in Chemical Engineering at the University of Toronto (1941), Les spent the war years working in Defence Industries Ltd. (Winnipeg), but returned post-war to advanced studies to secure his Master's (University of Manitoba, 1946) and PhD (University of Toronto, 1947) degrees before embarking on a highly distinguished academic career. A first professorship at the University of British Columbia (UBC) was followed by his appointment as the first Head and founder of the new Department of Chemical Engineering at the University of New Brunswick (UNB), in Fredericton. Following a decade in that capacity, Les accepted an appointment in 1970 as the Dean of Engineering at McMaster University, a position that he held proudly for another decade. His influence on the evolution of that faculty was enormous, and he took great pride in his continuing relationship with the University as an active Emeritus Professor until his passing. Les's academic and professional career extended well beyond the bounds of the university setting. He served on many national and international advisory councils and boards, including nearly two decades of service to the New Brunswick Research and Productivity Council, of which he was the founding Chairman; seventeen years as the Editor of the Canadian Journal of Chemical Engineering; service to various Boards of the National Research Council, and the Council of Royal Society of Canada; Chairmanship of a Technical Advisory Committee to Atomic Energy of Canada Limited (AECL) on the Nuclear Fuel Waste Management Program; and many others. His manifold services and accomplishments were recognized by his appointment as a Fellow of the Royal Society of Canada (1985), as a Fellow of the Canadian Academy of Engineering (1987), as an Officer of the Order of Canada (1991), and by the bestowing of three honorary doctorates, from St. Staszic University in Cracow, Poland (1992), McMaster University (1994), and the University of Waterloo (1996).

Torstein Utigard passed away on April 11, 2012 at the age of 57, after a courageous battle with brain cancer. Professor Utigard received his MASc and PhD from the University of Toronto in 1983 and 1985, respectively. After serving several years as a metallurgical research engineer in Switzerland and then at the Falconbridge Technology Centre in Sudbury, Ontario, he returned to the University of Toronto as an Assistant Professor of Metallurgy and Materials Science in 1989. Over his career, Professor Utigard established an international reputation as an outstanding researcher and educator in the science and technology of pyro-metallurgical processing of non-ferrous metals. With more than 150 publications and 11 patents, Professor Utigard pioneered numerous developments pertaining to the physical chemistry aspects of metals refining. At the University of Toronto, Professor Utigard supervised 22 MASc and eight PhD graduates, as well as seven researchers and post-doctoral

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Fellows in the News

John Bandler, Professor Emeritus, Department of Electrical and Computer Engineering, has been awarded the IEEE Canada McNaughton Gold Medal for 2012. The citation is "For pioneering contributions to optimization technology and microwave CAD." He received the award at the award ceremony in Montreal on April 30, 2012, at the 25th IEEE Canadian Conference on Electrical and Computer Engineering (CCECE). IEEE Canada remembers, through the A.G.L. McNaughton Award, General McNaughton's contributions to the engineering profession in Canada. Recipients of the McNaughton Award are outstanding Canadian engineers recognized for their important contributions to the engineering profession.

Norman Beaulieu, Alberta Innovates-Technology Futures AITF/*i*CORE Research Chair in Broadband Wireless Communications, has been elected Fellow of The Institution of Engineering and Technology (IET) of the United Kingdom. Founded 140 years ago, the IET is one of the world's leading professional societies for the engineering and technology community. The IET provides a global knowledge network to facilitate the exchange of ideas and promote the positive role of science, engineering and technology in the world. Fellowship may be awarded to members who have demonstrated superior individual responsibility, sustained achievement and significant professionalism during their career.

M. G. (Ron) Britton, Associate Dean of Design Education in the Faculty of Engineering at the University of Manitoba, was the recipient of the 2011 Champion of Engineering Education Award. This award was presented to Dr. Britton by the Association of Professional Engineers and Geoscientists of Manitoba, in recognition of his outstanding efforts to improve and promote engineering education.

Wagdi G. Habashi is one of 31 individuals awarded one of the three grades of the Ordre national du Québec, the most prestigious of honorary distinctions conferred by the Government of Quebec. He has been granted the title Chevalier. Wagdi George Habashi is recognized internationally for the formulation, modelling and application of finite element methods to computational fluid dynamics (CFD). He has developed applied mathematics solutions to a wide range of complex aerospace problems for aircraft, rotorcraft and jet engines. His unique approach to in-flight icing led to the development of software used in the aerospace industry worldwide. He is a professor, the Industrial Research Chair for multidisciplinary CFD and director of the Department of Mechanical Engineering's CFD laboratory at McGill University. He is also the founding president of Newmerical Technologies International, whose clients include major airframe and jet engine manufacturers all over the world.

James R. McFarlane, founder and president of International Submarine Engineering Ltd. received the Queen Elizabeth II Diamond Jubilee Medal on April 11th, 2012. Presented by The Honourable Steven Point, Lieutenant Governor of British Columbia, Dr. McFarlane received his medal at a presentation ceremony held at the HMCS Discovery in Vancouver. The Diamond Jubilee Medal was presented to Dr. McFarlane By Command of Her Majesty The Queen in commemoration of the sixtieth anniversary of Her Majesty's Accession to the Throne and in recognition of his contributions to Canada. Dr. McFarlane started ISE in 1974 and has been involved with the design, construction, and operation of manned, tethered and untethered Remotely Operated Vehicles as well as subsystems of these vehicles including manipulators and computer control systems. Since that time, Dr. McFarlane has been a part of engineering teams that have built over 400 robotic manipulators and over 200 vehicles.

Aftab Mufti was honored by the *International Society for Structural Health Monitoring of Intelligent Infrastructure* (ISHMII) at its December 2011 conference (SHMII-5), as it inaugurated the Aftab Mufti Medal for high achievement and innovation in civil structural health monitoring. Dr. Mufti is held in high esteem for his lifetime of influential engineering accomplishments and dedication to the development of structural health monitoring as a recognized field within civil engineering. Dr. Mufti is also the Editor-in-Chief of the *Journal of Civil Structural Health Monitoring.* His international leadership and vision has shaped the field globally. With colleagues in the Americas, Europe and Asia, Dr. Mufti co-founded ISHMII and became its first president. The initial recipients of the Aftab Mufti Medal are Dr. Urs Meier, past-Deputy Director General of EMPA, the Swiss Federal Laboratories for Materials Testing and Research, and Dr. Jan-Ming Koh, an Emeritus Professor of Structural Engineering of The Hong Kong Polytechnic University.

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Fellows in the News (cont'd)

(Continued from page 10)

C. Ravi Ravindran is the 2012 recipient of the Chancellor's Award of Distinction from Ryerson University. This award recognizes a Ryerson educator who has demonstrated a life-long career commitment to teaching and learning excellence through an outstanding and sustained record of educational leadership. Ravi's passion for teaching is reflected by his enthusiasm and extraordinary ability to motivate and energize his students. His teaching philosophy is one of total engagement, virtually transporting students to the real world, synthesizing ideas, analysis, and critical thinking, enabling problem solving and development of processes and products. Based on his own real-world experience and sabbaticals at the MIT and IIT, he encourages his students to be unconventional in their thinking. For Ravi, the learning process and the student-professor interaction permeates the classroom, office, laboratories, tutorials, projects, coffee shops, and throughout the career of the student. Ravi has also been awarded 2012 Engineering Medal for Research and Development from Professional Engineers Ontario**.** This medal honors substantial contribution to the application of engineering knowledge in developing useful and novel applications or advancing engineering knowledge or applied science, or discovering or extending any of the engineering or natural sciences. The award will be presented at the Ontario Professional Engineers Awards Gala on November 17.

David Sanborn Scott received an Honorary Doctor of Engineering degree from the University of Victoria on June 20, 2012. He joined UVic in 1989 after 22 years at the University of Toronto and created the Institute for Integrated Energy Systems, focusing on fuel cell systems, cryofuel liquefaction and energy systems analysis. IESVic includes more than 60 UVic faculty, graduate students and staff. Currently vice-president (for the Americas) of the International Association for Hydrogen Energy, Scott holds a doctorate in mechanical engineering and astronautical sciences from Northwestern University in Chicago.

Rocky Simmons received an Honorary Doctor of Engineering degree from the University of Toronto on June 13, 2012. He was honoured for his contributions to engineering research and technology that have enhanced environmental and economic sustainability.

Colin Smith, past president of the Association of Professional Engineers and Geoscientists of B.C. (APEGBC), was recognized by the Pacific NorthWest Economic Region (PNWER) for his work on cross-labour mobility at the annual PNWER Summit, July 13-19, in Saskatoon. Each year, PNWER presents an award to a business leader who has gone beyond his own interests to promote regional and bi-national cooperation. The award, "Robert Day Memorial Award," was named in memory of Robert Day of Calgary, an exemplary leader in his role with TransCanada in bi-national collaboration. "Colin has traveled to each of PNWER's 10 jurisdictions (which include Pacific Northwest states and provinces/territories in western Canada) over the past two years to encourage bi-national cooperation, and as co-chair of our workforce development group, he has helped develop a project to reduce barriers for labour mobility on both sides of the border." Specifically, the project Smith has helped to develop is encouraging skilled American tradespeople from Pacific Northwest states in the U.S. to seek work in Northern Alberta. While unemployment has remained high in U.S. states such as Oregon and Washington, this area of Alberta has had a significant labour shortage due to gas and oil development.

Kim Sturgess, CEO and founder of Alberta WaterSMART, was honoured on March 8, 2012 at the Consumer Choice Awards 2012 Calgary Gala, as she was named Business Woman of the Year.

President's Message (cont'd)

(Continued from page 1)

There are three reasons for this. Our Academy's membership is small. This should come as no surprise … The Academy aims to celebrate only the very best among Canadian engineers. Our Academy lacks financial means. Contrary to most other national engineering academies, it is subsidized by its members only, and our membership is modest in comparison to others. Finally, our Academy lacks the volunteer organization it needs to achieve its aims.

Now, let's take these points one at a time. As for our low membership, there is little we can do. If we are to continue to celebrate the most senior, accomplished and successful of all Canadian engineers, our membership will necessarily remain modest. As for our financial means, there is a limit to what a single Executive Director can do at Academy Headquarters in Ottawa. However, as for our volunteer organization, there is a great deal that we can do which, in time, will impact the other two!

If, for a moment, we are candid about ourselves, we meet essentially once a year, deliberate, have a good time, resolve to do more to advance the mission of the Academy, and then return to the four corners of Canada to more immediate preoccupations … Fellows of the Academy, we can do better! If the Academy is to be accountable to its founding vision, if the Academy is to have real impact on our country as it was founded to do, we must do better! If we look back at every successful outcome that we have achieved as an Academy, the engagement of individual Fellows has been the cornerstone of our every success!

Let us consider the following example. Many of you have recently seen the May 25th, 2012 edition of the *Globe and Mail* where an eight-page supplement launched the Academy's publication entitled: "Canada: Winning as a Sustainable Energy Superpower"! When we dissect this successful initiative, we see that it came to fruition thanks to a group of Academy Fellows from all over Canada who came together around a common purpose, gave themselves ambitious goals and, with the Board's approval, worked tirelessly to achieve their objective! Clearly, the Academy has the capability to contribute powerfully to national dialogue when our Fellows put their minds to it!

Now, what if we had not one, but three, five or even ten teams working on ambitious projects at any given time, on a variety of topics! Would the Academy not achieve real visibility, and would it not have real impact on national policy and direction over time? Over the 2011/2012 term, with the unflagging support of our Past President, Kim Sturgess, and that of the entire Board, I have actively pursued the project of defining a framework for significantly enhancing the engagement of Academy Fellows. A pilot project, now approved by the Board, aims to go forward in creating three local volunteer Sections which will host workshops, conferences, luncheon meetings, seminars, annual meetings of the Academy, or take on special projects on behalf of the Academy. The intent is to explore the feasibility of this approach.

I deeply believe in this initiative. In so doing, the Academy's footprint will eventually extend across Canada. More Academy activities will take place, enhancing public awareness, raising the Academy's profile, facilitating recruitment of high-quality Academy candidates from both industry and academia and over time, and providing badly-needed direction to our nation! As we all know, much remains to be done to strengthen Canada's sovereignty, to support its economic prosperity, to further its unity, to ensure its quality of life, to reduce its carbon footprint, and to continue to build our nation for the benefit of future generations. And we need not be shy of the notion of building our country: we have only to look at many countries in Asia today to see that there is still much nation-building going on in the world in the 21st century! Engineers have a great deal to contribute on all of these topics, and the Academy has a tremendous opportunity to fill this space!

Over the 2012/2013 term, on behalf of the Academy, I will partner with Fellows wherever they may be, and help create local Sections of the Academy in willing communities, in the hope of inaugurating a new era, one characterized by a more vital and active Academy, a truly "Canadian Academy of Engineers"!

If there is anything here that might have caught your interest, I invite you to meet with me or connect with me at any time to participate in this new phase of the Academy's journey!

I remain grateful for your generous support, and look forward to meeting all of our members, in time.

Richard J. Marceau, FCAE, P.Eng., Ph.D.

Fellows Appointed to the Order of Canada

Congratulations are due to the following Fellows of the Canadian Academy of Engineering who have recently been appointed to the Order of Canada:

P. Thomas Jenkins (Officer): "For his innovative contributions to the development of the high technology industry in Canada."

Hugh A. Krentz (Officer): "For his contributions to the development of standards in the construction industry, leading to safer infrastructures for Canadians."

Hadi Mahabadi (Officer): "For his internationally recognized innovations in the field of polymer science and his commitment to promoting scientific development in Canada."

Samuel Pierre (Member): "For his contributions to the field of wired and wireless communications networks, and for his volunteerism within Quebec's Haitian community."

Kathy Sendall (Member): "For her contributions to the advancement of women in engineering and in the corporate sector."

Several CAE Fellows Honoured by APEGA

Eleven awards were presented on April 19, 2012 by The Association of Professional Engineers and Geoscientists of Alberta (APEGA) celebrating environmental sustainability, community service, mentorship, early accomplishment, technical and educational achievement, service to the professions, distinguished service to the association and superior leadership. Now in its 22nd year, the Summit Awards® recognize excellence across a broad range of engineering and geoscience endeavors and salute the efforts of these professionals as they work to ensure public safety and well-being. Summit Award® recipients are leaders who have a significant positive impact in Alberta.

Among the winners receiving their awards from APEGA President Jim Smith were the following Fellows of the Canadian Academy of Engineering:

Elizabeth Cannon: The Centennial Leadership Award • *for highest distinction as an executive or director of a continuing enterprise*
University of Calgary president Dr. Cannon is a prominent and admired national leader in engineering. An advocate of women in engineering and science, she has made significant international contributions to the field of geomatics engineering.

Neil Windsor: The L.C. Charlesworth Professional Service Award • *for diligent service to the professions and the association*
Windsor is a strong, visionary leader and advocate for the engineering and geoscience professions in Alberta. He served APEGA from 1996 to 2012, as executive director and registrar and later as chief executive officer. He worked on numerous initiatives at the provincial, national and international levels. His work and dedication increased awareness of the professions by government, industry and the public.

Zhenghe Xu: The Frank Spragins Technical Award • *for recognized integrity, expertise and outstanding accomplishments*
Dr. Xu is a world-renowned expert in mineral and oilsands processing. As a scholar, scientist and mentor at the University of Alberta's Faculty of Engineering, he is known for his ethics and integrity. He is a pioneer in the use of science and technology to advance mineral processing and improve bitumen recovery in the oilsands.

The Future of Manufacturing in Canada: The Way Forward (cont'd)

(Continued from page 1)

But this is not all. Manufacturing plays an outsized role in innovation through R&D investments and patents. Canadian manufacturers invest more than 50% of total business expenditures in research and development. Manufacturing facilities produce significant agglomeration spillover effects in the communities and with the firms around them. The evidence shows conclusively that the tight linkages between innovation and manufacturing production are critical to our competitiveness, to our exports, to rapid economic growth and the high standard of living of Canadians.

Unfortunately, we have taken a relatively benign view of our manufacturing capabilities and of the deterioration of its relative performance. For instance:

- During the 2002-2010 period, according to the U.S. Bureau of Labor Statistics, manufacturing unit labor costs in Canada have increased by 67.6%, placing us in the tenth position out of eleven industrialized countries. In contrast, during the same period in the U.S., unit labor costs declined by 10.8%. This has occurred even as U.S. hourly compensation in manufacturing has grown during the period, fully compensated – and more – by a rise in productivity.
- Between 2000 and 2010, the contribution of manufacturing to our GDP has decreased by 16%. In 2010, there were 571,550 less manufacturing payroll employments than in 2000, a 28% decline.
- Productivity in Canadian manufacturing is only 73.2% of that of the U.S. even though machinery and equipment intensity is 91.1% of the U.S. Most telling, information and communication technologies intensity stands at only 36.6% of the U.S.[2]

The proposition that manufacturing is bound to decline in importance in developed economies and shed thousands of jobs in the process – much as what has occurred in the agricultural sector – has become accepted wisdom in many circles. The relatively poor performance of the Canadian manufacturing sector during the last decade is regarded as conclusive evidence.

The substantial body of economic evidence published in recent years debunks this myth and makes it increasingly clear that a strong manufacturing sector creates broad spillover benefits, making manufacturing an essential component of a competitive and innovative economy.

For example, rigorous empirical studies show that:

- Gains in productivity do not lead to job losses in manufacturing; rather, increases in the rate of productivity growth are associated with increases in the rate of job growth[3].
- Manufacturing efficiency, innovativeness and competitiveness are highly dependent upon an environment where innovative know-how, design competencies, process engineering capabilities and skills required for innovation in many industries, form an ecosystem within and around manufacturing[4].
- The establishment of a large manufacturing plant in a community gives rise to "knowledge spillovers" which actually increase the productivity of firms in the surrounding area[5]. These spillover benefits are a direct function of proximity[6] and are primarily intra-national in scope[7].

It is increasingly recognized, particularly in the U.S., that the offshoring of manufacturing production undermines the process engineering expertise, drains the innovative capacity and deprives the firm (and the country) of the know-how required to develop the next generation technologies, e.g. the loss of consumer electronics manufacturing is singled out as the main factor that prevented the U.S. from becoming a leader in advanced batteries, including lithium-ion batteries, flat panel display technology and LED lighting.

Manufacturing is first and foremost the domain of engineering. It calls upon all the disciplines. Several of our engineering faculties have programs that address the future of manufacturing in different sectors. The time is long past to bring this expertise in the limelight and for engineers to move the discussion concerning the future of our manufacturing capabilities on the public agenda. Our Board of Directors has concluded that the future of manufacturing in Canada is a matter of great importance and that it should be the topic of the conference coinciding with next year's Annual Meeting. Hence, the theme will be ***The Future of Manufacturing in Canada: The Way Forward***.

In the coming weeks, we intend to consult with members of the Academy who are confronted by the challenges of manufacturing in Canada and academic leaders who have demonstrated a keen interest in the subject, on the content of the sessions and the topic of papers that would serve as a basis for the discussions. We also want to solicit the active support of other Academies, in particular the American, German and Japanese academies, which have also made manufacturing a subject of their preoccupation. Finally, our intention is to publish a summary of the discussions to ensure broad dissemination of the material and ideas debated during the forum and promote follow-up initiatives.

The Annual Meeting will be held in Montreal. This will be the first time since 2008, ensuring a rotation between the provinces.

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Several CAE Fellows Honoured by the Engineering Institute of Canada

The Engineering Institute of Canada celebrated its 125th anniversary this year with two awards events. The first took place at the Westin Hotel in Ottawa on Saturday, February 25, 2012. The second was a joint event with the Canadian Society for Civil Engineering who is also celebrating the same anniversary. It took place at the Shaw Convention Centre in Edmonton, Alberta, on June 7, 2012. At the Ottawa event, in addition to the induction of eleven Fellows and the award of two senior medals, the K Y Lo and Julian C. Smith medal, five outstanding engineering achievements in Canada were recognized by the induction of the four companies currently responsible for them into the institute as Honorary Members. The engineering achievements are: TRIUMF; Confederation Bridge; The CN Tower; RADARSAT I & II and CANADARM. At the Edmonton event, ten Fellows were inducted and three senior medals, a Julian C. Smith, the K Y Lo and the John B. Stirling medal were awarded in a ceremony that included CSCE awards. EIC President Tony Bennett presided at the Ottawa Awards Banquet and Jean Zu, President-elect, presided on the EIC's behalf in Edmonton.

Among the 2012 senior award recipients are the following Fellows of the Canadian Academy of Engineering:

Ronald Kerry Rowe

Sir John Kennedy Medal
(the senior award of the Institute for outstanding service rendered to the engineering profession or noteworthy contributions to the science of engineering)

M.A.J. Fred Matich

Julian C. Smith Medal
(for achievement in the development of Canada)

Javad Mostaghimi

Julian C. Smith Medal
(for achievement in the development of Canada)

Phillip (Rocky) Simmons

K.Y. Lo Medal
(for significant engineering contributions at the international level)

Derek Martin

John B. Stirling Medal
(for leadership and distinguished service at the national level within the Institute and/or its Member Societies)

The Future of Manufacturing in Canada: The Way Forward (cont'd 2)

(Continued from page 14)

1. Michael L. Dertouzos, Richard K. Lester, Robert M. Solow, and the MIT Commission. 1989. *Made in America: Regaining the Productive Edge.* Cambridge, Mass.: The MIT Press.
2. "State of the Nation 2010": Report by the Science, Technology and Innovation Council.
3. William Nordhaus, *The Sources of the productivity rebound and the manufacturing employment puzzle*, Working paper 11354, National Bureau of Economic Research, May 2005 and Susan Helper, Timothy Krueger, Howard Wial, *Why Does Manufacturing Matter? Which Manufacturing Matters? A Policy Framework*, Metropolitan Policy Program, Brookings, February 2012.
4. Gary P. Pisano, Willy C. Shih, *Restoring American Competitiveness*, Harvard Business Review.
5. Michael Greenstone, Richard Hornbeck, Enrico Moretti: *Identifying Agglomeration Spillovers: Evidence from Winners and Losers of Large Plant Openings*, April 2010.
6. Wolfgang Keller, *American Economic Review*.
7. Lee Branstetter, *Is foreign direct investment a channel of knowledge spillovers? Evidence from Japan's FDI and the United States*, Columbia Business School, June 2005.

Trottier Energy Futures Project (cont'd)

(Continued from page 6)

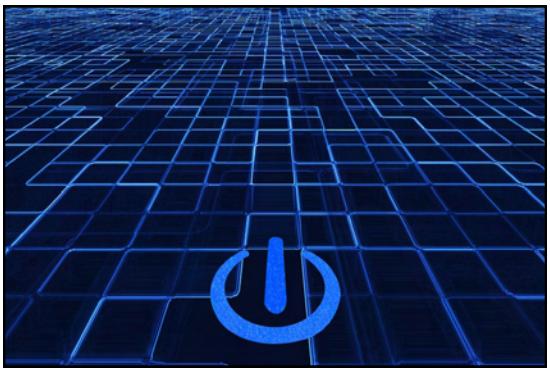
1978 with a proprietary database back to 1926, to identify and compare the key influences on Canadian demand for fuels and electricity. The analysis traces two-thirds of the improvement in energy productivity in the last three decades to drivers outside the energy system, and suggests promising ground for further significant energy savings.

- ***Transformation to a Low-Carbon Energy System for Canada: The Challenge*** builds on specially commissioned "seed scenarios" of an 80% GHG reduction and provides a quantitative exploration of the different combinations of efficiency, productivity improvements, low-carbon supply, and variations in upstream demographic and economic drivers that could lead to a sustainable, low-carbon future.

"The fourth and final paper is a major milestone," Torrie said. "We've known that a complete, calibrated model for testing the energy and GHG implications of different economic and societal choices would be of central importance to the work ahead of us." The paper will be available for peer review through the summer, and will be one of the cornerstones of the TEFP's final report.

A Starting Point for Dialogue

At the Kingbridge meeting, the Trottier Project tabled a list of a dozen key issues that will have to be addressed if Canada is to achieve a low-carbon, sustainable energy future. With input from CAE Fellows and representatives of the David Suzuki Foundation, the list was adapted into the following inventory of emerging challenges:



- Challenge #1: Toward net zero buildings
- Challenge #2: Decarbonizing electricity and the future of the grid
- Challenge #3: Bioenergy and the bioeconomy in a low-carbon Canada
- Challenge #4: Canada's fossil fuel industry in a low-carbon world
- Challenge #5: Goods movement and freight transportation
- Challenge #6: Low-carbon access and personal mobility
- Challenge #7: The energy-intensive industries
- Challenge #8: General manufacturing and integrative industrial design
- Challenge #9: Education and training
- Challenge #10: Finance and investment in the low-carbon future
- Challenge #11: Industrial strategy and Canada's clean technology sector.

"Finding sustainable, low-carbon solutions for each of these challenges will require that we not only identify the technologies we need, but also explore the public policies, business strategies, and individual behaviours that will accelerate the deployment of those technologies to meet our low-carbon target," Torrie said. The Trottier Project is looking at different dialogue strategies that are tailored to the expertise, communities, and interests associated with each of the challenges.

For example, the TEFP is working with CAE Fellow **Dr. Eddy Isaacs**, CEO of Alberta Innovates – Energy and Environment Solutions, to engage experts and business interests in the petroleum industry in exploring the potential to reduce GHG emissions from fossil fuel production. On bioenergy and the bioeconomy, the TEFP is organizing a stakeholder dialogue that will take place in October or November. And the TEFP is working with CAE Fellow **Dr. Andreas Athienitis**, Scientific Director of the NSERC Solar Buildings Research Network at Montreal's Concordia University, to develop a detailed plan for a study of archetypes and thermodynamic concepts for net-zero energy communities and clusters.

Dialogues on other challenge topics are expected to take shape as funds become available.

"This mix of topics and dialogue strategies is part of what we envisaged when we mapped out our work plan for the Trottier Project," Torrie said. "It's exciting to see the reality take shape."

CAE Fellows who would like to participate in the creative dialogue around any of these challenges are encouraged to contact Ralph Torrie, rtorrie@trottierenergyfutures.ca, or TEFP Deputy Director **Mitchell Beer**, mbeer@trottierenergyfutures.ca.

News from the Council of Canadian Academies (CCA)

The Council of Canadian Academies is enjoying one of its busiest years to date, with 15 evidence based assessments in progress. The Council's most recent report launches include the expert panel assessment, *Informing Research Choices: Indicators and Judgment*, which was released on July 5th, and the workshop report, *40 Priority Research Questions for Ocean Science in Canada,* released on July 17th. At the end of July the Council posted its 2011/12 Annual Report, *Evidence First.* All of these reports are available for download, in both official languages, from the Council's website, www.scienceadvice.ca

This fall the Council will be launching the report of the expert panel on the State of Science and Technology in Canada. This assessment is an update to the Council's 2006 report on the same subject. The Council will also release the report of the expert panel on Women and University Research. To learn more about these assessments or any of our other ongoing projects visit: www.scienceadvice.ca/en/assessments/in-progress/science-tech.aspx

To stay up-to-date on the Council's work follow us on twitter @Scienceadvice or sign up for our mailing list which can be found on the home page of our website, www.scienceadvice.ca.

Finally, the Council would like to wish everyone a safe and happy summer!

President's Report to the 2012 Annual General Meeting (cont'd)

(Continued from page 4)

Engage new Executive Director. One of the most important goals for this year was to replace our long serving Executive Director Michael Ball, who had indicated his desire to retire after many years of excellent service. After an exhaustive process, we are very fortunate to have engaged Dr. Kevin Goheen who assumed the position of Executive Director on January 1, 2012. Since assuming his position, Kevin has undertaken numerous updates of the Academy systems, including launching a Facebook page for the Academy. Along with Valerie Broadfoot, the Academy is in excellent hands with our management team. Welcome to Kevin and thanks again to Michael Ball for all his hard work over many years.

Strengthen links to sister organizations. The Council of Canadian Academies is a key partner for the Academy. The Council is our landlord, and the Academy is a founding member of the Council. This year, the Council, and Academies of Engineering and Health Sciences, and the Royal Society, signed a Memorandum of Understanding summarizing their commitment to collaboration. This is a milestone agreement for all four organizations. With this success, it is important to reach out to other related organizations in Canada (Engineers Canada) and around the world (CAETS).

Increase member engagement. Over the last year, the executive has worked diligently on a plan to bring Academy interests to more local communities by establishing Academy groups in several Canadian cities. Over the last year, a strategy document was prepared by Richard Marceau and reviewed in detail by the executive. It is our intention to implement this plan over this coming year. The target cities for testing this concept are Toronto, Montreal and Calgary (I expect to extend this to Alberta). I expect that we will see regional meetings starting shortly.

Increase the visibility of the CAE in the community at large. This objective has been achieved in several ways. First, the Academy website has been updated and modernized. Second, at the Annual Meeting, we are celebrating the 25th Anniversary of the Academy, a celebration that I expect will continue for the rest of 2012. Third, we have participated in several international events this year, including a visit by the Chinese Academy of Engineering, and supporting the Silver Jubilee of the Indian Academy of Engineering. Fourth, the special feature in the *Globe and Mail* on the Energy Pathways work was an excellent profiling of the Academy. We have much more to do in this area, but we are well on our way.

During this year, the board assessed the Strategic Plan that was reviewed by the membership at the AGM in 2009. The board concluded that overall the Strategic Plan is still relevant and provides good guidance for the Academy. However, there is a need to focus on operationalizing the plan over the next year. To that end, several specific actions were identified that will be discussed by incoming President Richard Marceau in his remarks.

Finally, I am particularly happy with the updates and improvements we have made in the procedures and practices of the Academy. Modernizing of By-Laws and streamlining of meeting agendas and practices are not glamorous but they are essential to improving the operation of the Academy. Thanks to Kevin and Valerie for providing focus and attention to these important issues.

This has been a very busy but rewarding year for me as your President. Thanks to departing executive members Moyra McDill and Michael Charles, as well as departing board member Michael Avedesian. All have served you with distinction over many years. Best wishes to incoming President Richard Marceau, who has an exciting and challenging year ahead!

New Publication

Innovation Reinvented: Six Games that Drive Growth
by Roger Miller, FCAE and Marcel Côté, published by University of Toronto Press – Rotman-UTP Publishing

Since its humble launch as a two way pager handling e-mails in 1998, the smart phone has been the subject of thousands of innovations, spawning several multi-billion dollar companies. What does that innovation gusher have in common with the emergence of the Cirque du Soleil, or the development of an anti-cancer drug? Roger Miller and Marcel Côté explain the diversity of innovation in ***Innovation Reinvented***. A global survey of more than 800 innovative businesses, reinforced with 50 case studies, provided them with the unique perspective of innovators, greatly enriching our understanding of innovation.

Innovation Reinvented identifies six basic patterns or "games of innovation", each associated with a set of competencies, best practices and success factors. The six games are defined along two dimensions: market maturity and product architecture.

- Innovation patterns and strategies in emerging markets – the first 15 to 25 years of a new product – differ significantly from those in mature markets. Not only is the rate of innovation different, but the nature of innovation is different, as an emerging products gets defined and its customer base gets established.
- The authors identify three different product architectures, stand-alone products, such the ubiquitous Nespresso machine, platform-based systems such as the smart phone, where the benefits to the consumers come jointly from the platform and modules, or closed systems such as an aircraft, where all parts must fit together and where an innovation in one component demands an adjustment in the whole system.

Innovations occur as part of a "game" where companies compete on the basis of innovations in their products and processes. Almost all innovations are incremental and are improvements of existing products, processes, and less frequently, business models. Although highly visible, the innovations that create new markets are rare. Excelling at incremental innovations is the hallmark of truly innovative companies.

CAETS News

The CAE is a member of CAETS (International Council of Academies of Engineering and Technological Sciences, Inc.), an independent nonpolitical, non-governmental international organization of engineering and technological sciences academies, one member academy per country, with the objectives, amongst others, to advise governments and international organizations on technical and policy issues related to its areas of expertise and contribute to the strengthening of engineering and technological activities to promote sustainable economic growth and social welfare throughout the world.

The CAE is involved with CAETS on a number of fronts. John Leggat, FCAE is a member of the Noise Control Technical Committee, which in the autumn of 2011 made presentations to the Japanese Ministry of Environment and the European Parliament on noise exposure from transportation. The CAETS' opinion is that emission noise limits need to be driving the technology, not slowly following, which has been the case for decades.

Bob Evans, FCAE has been a contributor to a CAETS study being led by the Australian Academy of Technological Sciences and Engineering (ATSE) on Analysis of Strategies to Accelerate the Deployment of Low Emission Energies for Electric Power Generation in Response to Climate Change. Building on a preliminary study, the aim of this enhanced study is to identify those technologies that can most efficiently and effectively reduce carbon emissions for stationary power generation in both technical and financial terms.

Under the leadership of Ravi Ravindran, FCAE, the CAE is jointly organizing a workshop on Clean Coal Technology with the India National Academy of Engineering, to be held in New Delhi in December 2012.

The 2012 CAETS meeting, this year on the theme of transportation is being held in late August in Zurich. A small CAE delegation is attending and will be reporting on its experiences in the next newsletter.

Reminder to CAE Fellows

Fellows are reminded to inform Valérie Broadfoot of any change of address or status.

Please send your new contact information to vbroadfoot@acad-eng-gen.ca.

News from the Partnership Group for Science and Engineering (PAGSE)

The Partnership Group for Science and Engineering (PAGSE; www.pagse.org) is a cooperative association of 26 national organizations in Science and Engineering, including the Canadian Academy of Engineering. They work collectively to represent the Canadian science and engineering community to the Government of Canada, and to advance research and innovation for the benefit of Canadians. Recently, PAGSE has been involved in three different types of activities.

PAGSE, in partnership with the NSERC, sponsors a monthly breakfast meeting held on Parliament Hill, known as *"Bacon and Eggheads"*. Speakers at the meetings inform parliamentarians about recent advances in science and engineering. In 2012, PAGSE has organized the following presentations:

Decision-making in an uncertain world
Daniel Krewski, University of Ottawa, February 9, 2012

Geoscience as a Key to Canada's Economic Competitiveness, Wealth and Development
James Franklin, Franklin Geosciences Ltd., March 1, 2012

The Lowdown on the Meltdown
Richard Peltier, University of Toronto, March 29, 2012

Alternate futures for the oil sands industry: from the age of steam to the age of biology
Stephen Larter, University of Calgary, May 3, 2012

SciencePages is an initiative by PAGSE to provide short science and engineering briefing notes on topical issues for Parliamentarians, with the support of NSERC and the Canada Foundation for Innovation (CFI). The most recent issue was on toxicology and was released in February 2012. Pdf versions of all issues can be downloaded from the SciencePages website: www.sciencepages.ca.

Guests, representing science and engineering in the government and industry sectors, are invited to monthly PAGSE meetings to present their perspectives on science and engineering in Canada, on the activities of their organizations, as well as the potential issues and challenges that they would like to see PAGSE address. Members also consider federal activities and reports and how best to promote and sustain Canada's scientific base. The meetings are held at the University of Ottawa. Since the beginning of the year, PAGSE has welcomed the following guests:

- January 31, 2012: **Dr. Pierre Meulien**, President & CEO Genome Canada
- February 28, 2012: **Dr. Chad Gaffield**, President, Social Sciences and Humanities Research Council
- March 27, 2012 : Business Meeting Only
- April 24, 2012: **Dr. Alain Beaudet**, President, Canadian Institutes of Health Research
- May 31, 2012: **Dr. Suzanne Fortier**, President, Natural Sciences and Engineering Research Council

In Memoriam (cont'd 2)

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fellows, along with numerous undergraduate students in the areas of mineral processing, thermodynamics, kinetics and the sustainable extraction and processing of metals. Professor Utigard held the Gerald R. Heffernan Chair in Materials Processing since 1999, and was a Fellow of the Canadian Academy of Engineering, as well as a Fellow of the Canadian Institute of Mining, Metallurgy and Petroleum.

George J.M. Zarzycki passed away peacefully on Tuesday June 12th, 2012. Dr. Zarzycki directed the acquisition and management of geographic information, photogrammetric mapping, remote sensing, railway location, geodetic and resource surveys in Canada, South America, Africa, the Middle East, Australia and the Caribbean. He provided leadership and pioneered the development and implementation of digital methods in photogrammetry, automated cartography, Geographic Information Systems and integration of digital mapping with remote sensing and GIS technologies. In 1981 Dr. Zarzycki became the first non US citizen to be elected as President of the American Society of Photogrametry and Remote Sensing in addition to his position as the President of the Canadian Institute of Geomatics. He was very proud to have been awarded the Officers Cross of the Order of Merit of the Republic of Poland.

Executive Director's Report

I came to the ED position with a varied career as a Professor, a University administrator, a corporate R&D tax expert, an investment banker and a venture capitalist. I have now been in the Executive Director position for only 6 months, but have been through six executive meetings, three board meetings, eight meetings of the Trottier Management Board and one of its Project Board, one strategic planning session, three meetings of the Nominating Committee, two fellowship committee meetings and a vote counting session, four meetings of the AGM planning committee, numerous briefing teleconferences with members of the Board and countless meetings with partners and suppliers. These were all very educational, in that amongst other things, I have learned how much the Academy is doing but also how much needs to be done.

Being the Executive Director is a tremendous honour and an opportunity to work again with engineers who are high achievers. I have inherited a position that has been well-managed for 25 years. However, I hope the employees, the Executive, the Board, and the Fellows will embrace some changes to allow us to perform to the best of our collective ability. We have always had a great base of talent and a clear strategic direction which was articulated in 2009 and which recently was re-endorsed by the Board with minor changes. We must now focus to its execution to achieve our mission. As the sporting goods company Nike tells us, "Just Do It."

We must adopt a sense of urgency and a razor-sharp focus on our core activities, as time, people and financial resources are limited. We must also respect the work of our colleagues and ask ourselves: if a previous Board or Committee has made a decision, why are we revisiting the question for the 'nth' time? Have circumstances changed dramatically or are we smarter than our predecessors? The answer is most likely "no."

I have also learned in six months that we have much more to do than 1.5 staff persons can achieve on their own. Elsewhere in this newsletter, you will read about new opportunities to volunteer. The volunteers we have are great: diligent, creative and willing to dig into their contact lists to help the Academy. We just need more of them! The CAE has had a great history of volunteerism and I would challenge all of you to cheerfully accept jobs when asked and, like the professional engineers that you are, to perform them on time and to the best of your abilities. In the past, if you haven't been asked to help, that's our fault and we are going to rectify it, as I feel the healthiest organizations are those with the greatest degree of member involvement. Otherwise, why are we here?

So far, I have been focussing on improving internal processes, such as cleaning up the By-Laws, moving our meetings to an efficient Consent Agenda format, rewriting financial and membership policies, and making clear the procedures around the Fellowship ballots. This year will also see a new step in the Fellowship election process, where our office will be expected to review Nominations as they arrive and send them back to the Nominators for rewrite if they do not meet CAE quality standards. In particular, the 100-word citation has to be very well thought out, as this is the only item which the voters see and, if the citation is not good, otherwise worthy nominations can easily fail.

While there is still a great deal to accomplish on internal processes, I now want to focus more on members' communication. So far this year, we have started a Facebook group (www.facebook.com/CanadianAcademyOfEngineering) and very recently those of you with valid email addresses received an invitation to join our LinkedIn group (search for "The Canadian Academy of Engineering" when you are in LinkedIn). I see the two efforts as complementary. The former is more useful for posting news, and I have also found good uptake for it amongst engineering students. The latter is a closed group of CAE Fellows and is very good for introducing topics of discussion, such as determining what engineering initiative, beyond energy, that we should next tackle. Of course, the CAE website (www.acad-eng-gen.ca) will remain the primary source of information. We hope to undertake a major technology upgrade of the site this year, while at the same time updating its look and functionality, including e-commerce and on-line registration.

Finally, 2012 marks the CAE's 25th Anniversary. Those Fellows who attended the Induction Dinner heard a presentation by my predecessor, Michael A. Ball, FCAE, on our history and Michael, Drew Wilson, FCAE and I compiled a presentation on our past which was shown during the dinner. The next few newsletters will include a series of historical articles. I am very pleased that Drew, who was inducted at the June 2012 ceremony, has penned an interesting article about our founding to kick off the series. Drew has also been instrumental in helping us archive our historical documents at the University of Ontario Institute of Technology, the library which also holds the archives of many other Canadian engineering societies.

I have met a few of you either at our Annual Meeting or in other venues and have spoken with some of you on the phone. This year, I hope I can attend some of our new Section meetings and meet even more of you. And of course, if you are in Ottawa, please visit our offices in the downtown core, or otherwise please send me an email or phone. I would love to hear your opinion on what the Academy should be doing in its next 25 years.

Kevin Goheen, PhD, P.Eng.