



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

As 2011 draws to a close, there are many exciting changes happening at the Canadian Academy of Engineering. This is an opportunity for me to report on the status of the objectives that I outlined in the last newsletter for my year as your President. It has been a very busy six months since my election and I hope that you will agree that significant progress has been made on several fronts.

The biggest news is that as of January 1, 2012, the Academy will have a new Executive Director. By way of background, in the summer of 2010, Michael A. Ball announced his intention to step down as the Executive Director of the CAE. A Search Committee comprising the Executive Committee and two external members was formed to start the process of looking for a successor. In September 2010, an announcement was sent to all Academy members and publicly posted asking for candidates to fill the position. As of July 2011, eight candidates had indicated an interest in the position and were presented to the Search Committee. These candidates were ranked and two candidates were identified for follow up. One candidate was selected for in depth interview by three of the Search Committee members, and external references were checked. Based on this process, the Search Committee made the



**P. Kim Sturgess,
FCAE, P.Eng.**

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Trottier Energy Futures Project

CAE Partnership Seeks Low-Carbon Energy Future for Canada



The Trottier Energy Futures Project (TEFP), a unique partnership between the Canadian Academy of Engineering and the David Suzuki Foundation, is poised to break new ground in the quest for a viable, low-carbon energy future for Canada.

The partnership between the Academy and the Suzuki Foundation brings together two established branches of science—engineering and ecology—that share a common concern about climate change, but have often approached the problem from different perspective and traditions.

“Energy poses big challenges for Canada in the 21st century in terms of supply, environmental sustainability, climate change, and economics,” said CAE Fellow Lorne Trottier, FCAE, whose generous donation made the project a reality. “The Canadian Academy of Engineering and the David Suzuki Foundation, two highly respected organizations, bring different but complementary perspectives to the challenge.”

Building a Knowledge Base

The essential first step in the project was to launch a comprehensive research agenda, to get a realistic sense of Canada's low-carbon energy options through 2050.

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President's Message (cont'd)

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recommendation to the Board of Directors that Dr. Kevin Goheen be appointed as the new Executive Director. The Board approved this appointment on November 15th, and Kevin will assume the duties of Executive Director effective January 1, 2012. Kevin's profile is included in this Newsletter.

This also means saying thank you and good journeys to Michael A. Ball who will be stepping down on December 31st after several years of admirable service. We owe Michael a debt of gratitude for continuing to provide excellent service to the Academy for the additional time it took to find his replacement. We will have an appropriate acknowledgement for Michael at the next AGM in Ottawa in June, but in the meantime please join me in saying thank you again to Michael.

Another significant milestone is the approval of a Statement of Common Understanding between the Canadian Council of Academies (CCA) and the three members Academies, including the Royal Society of Canada, the Canadian Academy of Engineering, and the Canadian Academy of Health Sciences. By way of background, as you know the Council of Canadian Academies was formed five years ago. The three societies are members of the Academy, serving as board members. The CCA is undergoing a review of its direction and activities. This Statement of Common Understanding has been developed as a guide to how the member Academies will work together and with the CCA to achieve common goals and objectives. John Leggat, John McLaughlin, Michael Charles and I were all involved in developing and reviewing this Statement at various times over the last two years.

In August, the Academy hosted a delegation from the Chinese Academy of Engineering in Ottawa. Axel Meisen, Jacques Lyrette, Michael A. Ball and a host of others were involved in this very successful visit. Thanks to all who helped assemble this meeting on short notice.

The Trottier Energy Futures Project (TEFP) continues to be the focus of considerable Academy resources. As of September, Richard Marceau is the Academy's representative on the TEPF Project Board, which ensures good continuity for the next three years of the project. Michael A. Ball continues to work diligently on the TEPF Management Board. It is expected that the role of the Academy in this first phase of the project, as well as the follow on phases, will crystalize over the next few weeks. In the meantime, the Energy Pathways Task Force lead by Clem Bowman continues to move forward. We can expect to see a book published in the near future that brings together all the good work done by the Task Force over the last five years. Thanks to Clem and his team for their continuing hard work.

The planning for the 2012 AGM and Symposium is well underway, under the leadership of President-Elect Moyra McDill. The venue is Ottawa and will include the celebration of the 25th Anniversary of the Academy. Thanks to Michael A. Ball who is taking a leadership role in this celebration.

Over the next six months, we will focus on updating our governance structure, including the Committee structure, increasing member engagement through more regional initiatives, and developing new ways to engage industry interest and involvement in the Academy.

Finally thanks once again to Michael A. Ball for his many years of dedicated service to the Academy. I am confident that we will continue to benefit from Michael's continuing involvement as a dedicated Fellow of the Academy. We wish Michael all the best in his well-deserved retirement.

I wish all of you a Happy and Healthy Holiday and New Year!

P. Kim Sturgess



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Meet the New Executive Director

On January 1, 2012, Dr. Kevin Goheen will join the Academy as Executive Director. Kevin has an outstanding background in engineering, investment banking, teaching and communication. He has a Ph.D. in Mechanical Engineering as well as a Fourth Class Stationary Engineer Certificate and has advanced courses in university administration and financial securities.

Kevin held academic and administrative positions at Carleton University and Ryerson University, and then went on to be responsible for corporate finance and analysis activities for two of Canada's largest independent investment banks, focussing on the industrial technology, aerospace and wireless communications sectors. He later managed a high tech seed capital fund. He has been responsible for the financial control and technical aspects of various research and development projects for a wide variety of clients in the public and private sectors. He has prepared and delivered courses concerned with automation and advanced manufacturing.

Kevin is looking forward to working with the Board, Committees and all of the Fellows to advance the goals and influence of the Academy.



Several CAE Fellows Receive 2011 Ontario Professional Engineers Awards

Award winners include the five following CAE Fellows:

- **Michael E. Charles:** 'The Gold Medal' - The premier award of the profession is the Gold Medal, which is awarded only when there is an outstanding candidate. It is given to an association member who is recognized widely as a distinguished practitioner of the profession and has rendered outstanding public service in other fields on a federal or provincial basis. The recipient should be recognized by the public as a professional engineer and a dedicated public servant, who has made significant sacrifices of time and effort to benefit society.
- **Anton Davies:** 'The Engineering Medal – Management Category' - The Engineering Medal is given to association members who have contributed substantially to advancing the engineering profession in any of its branches. Recipients' achievements are significantly above the normally high standards of the profession. The Management category is recognition for managing and directing engineering projects or enterprises, where innovative management practice has contributed significantly to the overall excellence of the engineering achievement.



Gold Medal recipient
Michael E. Charles



The OPEA Awards Gala with the CAE awardees,
from left Anton Davies; Elizabeth Edwards;
David Zingg; Michael E. Charles; Douglas Perovic

- **Elizabeth A. Edwards**
- **Douglas Perovic**
- **David Zingg**

'The Engineering Medal – Research and Development Category' - The Engineering Medal is given to association members who have contributed substantially to advancing the engineering profession in any of its branches. Recipients' achievements are significantly above the normally high standards of the profession. The Research and Development Category is recognition for using new knowledge in developing useful, novel applications, or advancing engineering knowledge or applied science, or discovering or extending any of the engineering or natural sciences.

Fellows in the News

Norman Beaulieu, iCORE Wireless Communications Laboratory (iWCL) Research Chair, was invited by the European Embedded Control Institute (EECI), and the Networked Control Systems Laboratory, Center of Excellence DEWS, Department of Electrical and Computer Engineering at the University of L'Aquila in L'Aquila, Italy to give a Distinguished Lecturer Seminar (September 20, 2011). Dr. Beaulieu was also invited to give a Distinguished Speaker Seminar to the Massachusetts Institute of Technology (MIT), Laboratory for Information and Decision Systems (LIDS), Boston, MA (October 13, 2011). The seminar was titled "Exact Analytical Solution for End-to-End SNR Multihop AF Relaying Systems," and was presented at the University of L'Aquila on September 20, 2011 and at MIT on October 13, 2011.



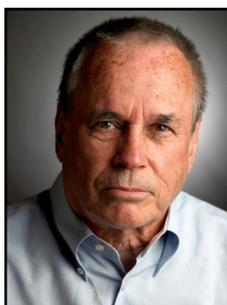
Norman C. Beaulieu and Post-Doctoral Fellow David Young received an IEEE (Institute of Electrical and Electronics Engineers) Best Paper Award for their paper, "Time-Hopped Ultrawide Bandwidth Receiver Designs Using Multiuser Interference Sensing." The paper was presented at the 2011 IEEE International Conference on Ultra-Wideband (ICUWB) in Bologna, Italy, Sept. 14-16, 2011. The IEEE ICUWB conference brings together the world's leading researchers from academia and industry working in UWB communications and networking technologies.

Norman C. Beaulieu, Professor and iCORE Research Chair in Broadband Wireless Communications at the University of Alberta, has been bestowed the IEEE Communications Society (ComSoc) Radio Communications Committee (RCC) 2011 Technical Recognition Award for "contributions to radio communications research and practice". The RCC Technical Recognition Award aims to promote radio communications research and development activities in both the academic and industrial community. This award is established as part of the RCC activities in which research and development takes place in areas related to radio communications. The award recognizes members of the IEEE Communications Society (ComSoc) who have made outstanding contributions to the technological advancement of radio communications.



Monique Frize has been elevated to IEEE Fellow, effective 1 January 2012, for contributions to clinical engineering and engineering education.

Gerald Hatch has been inducted into the Canadian Science and Engineering Hall of Fame. The Canadian Science and Engineering Hall of Fame is a central part of the Innovation Canada exhibition at the Canada Science and Technology Museum. Here, they honour individuals whose outstanding scientific or technological achievements have had long term implications for Canadians. There are currently 51 Canadian scientists, engineers and innovators recognized in the Hall of Fame.



Ian Jordaan has been honoured by the Royal Society of Canada (RSC) for his outstanding contributions to research and learning. Dr. Jordaan was recently named Fellow of the RSC's Academy of Science in recognition of his distinguished work to date. The RSC Fellowship citation described Dr. Jordaan as a pre-eminent engineer working on design of offshore structures in harsh environments. The author of over 200 papers and reports, as well as a book on probabilistic analyses for engineering, *Decisions Under Uncertainty*, he has pioneered the risk-based approach to offshore engineering and estimation of structural loads caused by ice. He has consulted on several major Canadian and international projects, including the Terra Nova, White Rose and Hebron developments offshore Newfoundland, and Prince Edward Island's Confederation Bridge. Dr. Jordaan was officially inducted into the Royal Society of Canada at a ceremony in Ottawa in November.

Dr. Jordaan entered RSC's Division of Applied Science and Engineering.

James R. McFarlane, founder and president of International Submarine Engineering Ltd., has been awarded the IEEE Vancouver Section Centennial Award for a lifetime of contributions to underwater vehicles and robotics and the Canadian advanced technology sector. This is Dr. McFarlane's third IEEE Award, following a Technical Achievement Award in 1987 and Engineer of the Year in 1998. *Photo: The award was presented to Dr. McFarlane by Charles Henley, the IEEE Centennial Awards Committee Chair on August 23rd 2011 at the celebration ceremony of IEEE Vancouver's 100th birthday.*

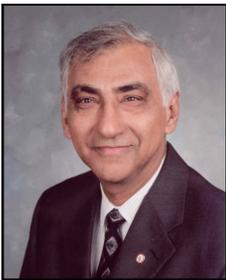


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Fellows in the News (cont'd)

(Continued from page 4)

James R. McFarlane, founder and president of International Submarine Engineering Ltd, received the Diver Certification Board of Canada's Lifetime Achievement Award for 2011 for his significant contributions to the underwater industry. The award was presented to Dr. McFarlane by Mr. Jonathan Chapple, DCBC's incoming Chairman and Senior Manager, Military and Professional with Aqua-Lung Canada Ltd at the Canadian Underwater Conference Awards Banquet on October 24, 2011. McFarlane was also a keynote speaker at the conference. "Jim's underwater-oriented technical contributions to Canada and the world are almost beyond compare," says David Parkes, Chief Executive Officer, DCBC. "In just one field of underwater work, Jim has been part of engineering teams that have designed and built over 400 robotic manipulators and over 200 vehicles." 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. In 2009, ISE was inducted into the Offshore Energy Center Hall of Fame and was also named as one of Canada's top 40 defence companies. *Photo: Dr. James McFarlane receiving the DCBC Lifetime Achievement Award from Mr. Jonathan Chapple, DCBC, and Dr. Phil Nuytten, Nuytco Research.*



S. Ali Mirza was selected to receive the 2011 A.B. Sanderson Award of the Canadian Society for Civil Engineering (CSCE). The A.B. Sanderson Award is presented to a person who has made particularly outstanding contributions to the development and practice of structural engineering in Canada. Dr. Mirza is internationally known for his work on structural safety, frame stability, and behaviour of reinforced concrete and composite steel-concrete structures. The presentation of the Award took place at the CSCE Awards Banquet held in Ottawa on June 16, 2011.

Kathleen E. Sendall has been appointed by the Council of Canadian Academies as Chair of the Expert Panel on the State of Industrial Research and Development in Canada. As Director of CGG Veritas, a leading international pure-play geophysical company; and Director and Vice Chair of Alberta Innovates - Energy and Environment Solutions, Ms. Sendall brings a wealth of expertise to the Council and to this assessment. As Chair of the Council's Expert Panel, Ms. Sendall will work with a multidisciplinary group of experts, to be appointed by the Council, to address the following question: What is the current state of industrial research and development (R&D) in Canada? The Council's assessment will examine existing and emerging areas of R&D strength across sectors, how these trends compare globally, and how strength is distributed regionally across Canada. The Council, under the guidance of its Scientific Advisory Committee, is now beginning to assemble an expert panel to complete this assessment.



News from the Council of Canadian Academies (CCA)



On September 22, 2011, the Council of Canadian Academies officially released the expert panel report, *Healthy Animals, Healthy Canada*. The report, sponsored by the Canadian Food Inspection Agency (CFIA), is an evidence-based, independent assessment of approaches to animal health risk assessment in Canada. [Read the full report.](#)

Coming up, the Council will be launching an expert panel report entitled *Integrating Emerging Technologies into Chemical Safety Assessment*, on January 17, 2012. For more information visit:

<http://www.scienceadvice.ca/en/assessments/in-progress/pesticides.aspx>

The Council also recently received five new questions for assessment; they are: [Harnessing Sciences and Technology to Understand the Environmental Impacts of Shale Gas Extraction](#); [Food Security Research in Northern Canada](#); [The Potential for New and Innovative Uses of Information and Communications Technologies \(ICTs\) for Greening Canada](#); [Memory Institutions and the Digital Revolution](#); and [Energy Prices – Impacts and Adaptation: Assessing Canada's Preparedness](#).

Visit the [Council's website](#) for continued updates and follow us on Twitter! @Scienceadvice

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

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.

Ion I. Inculet, elected in 1994, deceased November 5, 2011.

Gordon R. Slemon, elected in 1988, deceased September 26, 2011.



In Memoriam

Ion I. Inculet passed away in his 91st year on November 5, 2011. Ion was born in Iasi, Romania, and came to North America in 1947, educated as an Electrical Engineer. He recently retired, at the age of 90, from the UWO Faculty of Engineering, as Professor Emeritus, after 47 years at Western. He was Director of the Applied Electrostatics Research Centre, and an internationally renowned Inventor (27 patents), Researcher, and Academician. Free time was filled with family, the cottage on Georgian Bay, classical music, and repairing things with silicone glue and electrical tape. He will be missed for his love of life, family, and his dedication to his profession.

Gordon R. Slemon, past President of the Canadian Academy of Engineering (1998-1999) and Board Member from 1991 until 2001, died in Toronto on September 26, 2011. He was Professor Emeritus in Electrical and Computer Engineering at the University of Toronto where he served as Head of the Electrical Engineering Department from 1966 to 1976, and as Dean of its Faculty of Applied Science and Engineering from 1979 to 1986. He received bachelors and masters degrees from the University of Toronto, the DIC from Imperial College and PhD and DSc degrees from the University of London.

He was a co-founder and director of Vehicle Research Ltd., a company developing electric cars in the 1980s. In the same decade he established the Innovations Foundation at the University of Toronto to commercialize the results of university research. He was a co-founder and director of the company, Inverpower Controls Ltd., a director of the IDEA Corporation in Ontario and inaugural chairman of the Microelectronics Development Centre. He has been a consultant to some 70 industrial corporations and organizations.

Slemon's research specialty was magnetics as applied to electric machines and drives. In particular, he made contributions to the development of permanent magnet motors and high-speed magnetically-levitated and propelled interurban vehicles. He was a founding member of the International Conference on Electric Machines and of the Magnetics Society of the Institute of Electrical and Electronics Engineers. He served for several years on the Administrative Committee of the Magnetics Society, was its Distinguished Lecturer for two years and was granted its Achievement Award in 1997. Also, in the Institute of Electrical and Electronics Engineers, he was elected a Fellow in 1975 and was a Distinguished Lecturer for the Industrial Applications Society in 1991-6. He received the IEEE Centennial Medal in 1984, the Third Millennium Medal in 2000, the Nikola Tesla Award and Gold Medal in 1990. He was a fellow of the Institute of Electrical Engineers (UK) and was the fourth Canadian to be elected as an Honorary Fellow in 1995.

He was made a Fellow of the Engineering Institute of Canada in 1989 and twice received its Ross Medal. In 2011 he received the EIC's highest award, the Sir John Kennedy Medal. He played a major role in the establishment and early operation of the Canadian Academy of Engineering and was its President in 1998. He was among the founders of the Canadian Conference on Engineering Education and received its first Canadian Engineering Educator of the Year Award in 1992. He received the Canadian Centennial Medal in 1967, the Queen's Golden Jubilee Medal in 2002, and the Professional Engineers of Ontario's Engineering Excellence Medal in 2005. In 1995 he was made an Officer in the Order of Canada.

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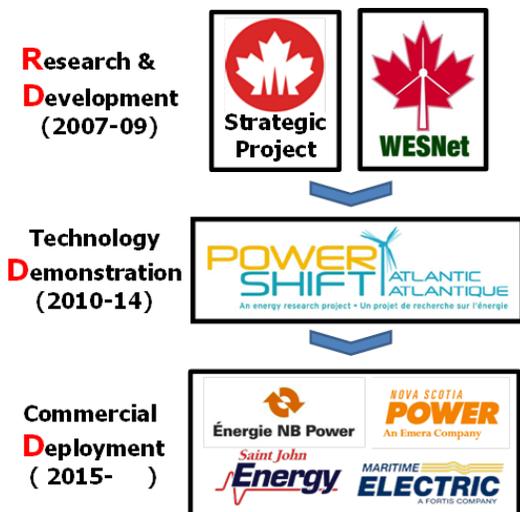
Opinion Piece RDDD Approach for Technology Innovation

by Liuchen Chang, FCAE, Professor, University of New Brunswick

It is well recognized that innovation is key for improving productivity and fostering economic growth in Canada. Innovation is regarded as the process through which new economic and social benefits are achieved based on knowledge and discoveries. Pathways and strategies for innovation in Canada have been laid out at the overall policy level.

In a narrower sense, the innovation chain includes different stages such as research and development of new knowledge and technologies, demonstration of the developed technologies, and commercialization in the market place. Various federal and provincial funding programs are commonly targeted to support particular stages in the innovation chain. For example, Sustainable Development Technology Canada (SDTC) supports the development and demonstration of innovative technologies for sustainable development. Researchers at Canadian universities traditionally focus on research and development (R&D) activities accounting for over one third of the total R&D expenditures in Canada. As such, tremendous opportunities exist for university researchers to play more active roles throughout the entire innovation chain, particularly considering the relatively low, and declining, R&D expenditures by industry and government sector in Canada. In my opinion, researchers should be encouraged to take an RDDD approach for technology innovation, i.e., to engage in **R**esearch, **D**evelopment, **D**emonstration and **D**eployment activities, in all stages of the innovation chain. By adopting this approach, researchers will take an active role in achieving economic and social benefits of technological innovations, and stronger partnerships among research community, businesses and government sector will be built.

In 2008, a group of researchers at the University of New Brunswick (UNB) started their R&D on a new concept of controlling aggregated domestic water heaters for power systems' synchronous reserve, frequency regulation and peak shaving under an NSERC strategic project. At the same time, they conducted research into methodologies for short term wind production forecasts, as one of 35 research projects under the NSERC Wind Energy Strategic Network (WESNet). The results of these early stage R&D initiatives revealed potential benefits to power systems in creating new system resources from customer loads without negative impact to the normal usage of customers, and thus attracted interests from utility companies. Subsequently a consortium of five companies and UNB was formed to build on the R&D results and expand into a large scale technology demonstration project named PowerShift Atlantic, partially funded by Clean Energy Fund. Led by NB Power Corp., PowerShift Atlantic is in the middle of a 4-year endeavor (2010-2014) to create power system ancillary services by shifting the power consumption of aggregated commercial and residential loads, using smart grid infrastructures for integration of wind energy into electric grids. Some PowerShift Atlantic consortium members are planning for large scale commercial expansion for power system optimization upon the successful technology demonstration. The entire innovation chain of the technologies is shown in the following diagram. Throughout the process, the researchers have been engaging with industry partners from early stage research and development, technology demonstration, to business case evaluation, and commercial deployment.



Engagement of researchers in research, development, demonstration and deployment stages fosters a close interaction and partnership between researchers and the business sector, enables fast-tracking of technological innovation and ensures the realization of economic and social benefits of the innovations to society.



Mark your Calendars!

**2012 AGM, Induction of New Fellows and Symposium
June 21 – 22, 2012 — Ottawa, Ontario**

The 2012 AGM Business meeting and lunch will take place on June 21 at the Novotel Ottawa. The Induction of New Fellows and Dinner will be held later that evening at the Canada Aviation and Space Museum among the collection. The Symposium will be held on June 22 in the new auditorium at the museum, with the theme of “Canada in Aviation and Space: Past, Present and Future”.



Photo: The Canada Aviation and Space Museum

Trottier Energy Futures Project (cont'd)

(Continued from page 1)

“This is an area where much of the knowledge base is still relatively new, and where many of the technologies are shifting, changing, and improving at a very rapid pace,” said TEPF Managing Director Ralph Torrie. “It was essential to make sure we had a clear, complete data set on low-carbon energy futures, from the perspective of technology, economics, policy and behavioural drivers, and the practicalities of implementation.”

The project’s Phase I research agenda included:

Low-Carbon Energy Futures: Review of Best Practices: This detailed survey of selected low-carbon scenarios from other jurisdictions reviews methodologies and synthesizes a variety of views on technology costs and performance and low-carbon implementation strategies.

A Low-Carbon Energy Budget for Canada: TEPF estimates the resource of low-carbon energy that Canada can reasonably derive by 2050 from solar, wind, biomass, geothermal, hydro, nuclear, fossil fuels, carbon capture and storage, and other sources.

Long-Term Dynamics of Canadian Energy Patterns: A Retrospective Analysis: Using energy, demographic, and economic data, this paper illustrates the technological and economic trends that have determined Canada’s pattern of energy supply and demand, and related GHG emissions, over the past 40 years.

Transformation to a Low-Carbon Energy System for Canada: The Challenge: Building on specially commissioned “seed scenarios” of an 80% GHG reduction in Canada by 2050, this paper 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.



Photo credit: Cajie via Flickr

These papers, which will be published through the first half of 2012, will provide the foundation for a recommended framework for the next phase of the project – a stakeholder dialogue process in which CAE members will play a central role. The goal will be no less than identifying practical, positive pathways for Canada to make a transition to a sustainable energy system in which carbon emissions are reduced to less than 20% of their current level.

Emerging Themes

In its review of best practices from other jurisdictions, TEPF identified several common themes that will be instructive in analysing Canada’s energy economy:

The technologies already exist to reduce greenhouse gas emissions by 80% or more, although support for this conclusion is uneven between sectors and end uses. The path to a low-carbon future is defined by implementation and deployment issues related to costs, information, education, logistics, institutional innovation, finance, and business strategies.

The process of rapid decarbonization is generally associated with an increase in the proportion of energy services demand met by electricity. This increased electrification is combined with a decarbonization of the electricity supply, with wide variations both within and between the studies in the relative reliance on renewable, nuclear, natural gas, and carbon capture and sequestration.

The prevailing method involves projecting a reference or “business as usual” scenario of future emissions, then assuming alternative levels of efficiency, low-carbon resources, and carbon sequestration to achieve a target emission level. The emphasis is in two areas: more efficient use of energy commodities, and higher shares of low-carbon and carbon-free energy commodities. The balance between these factors varies between the studies reviewed, but there is unanimity that a doubling or more energy efficiency is a necessary condition for bringing emissions down to very low levels.

The potential for innovative technologies and changes in the underlying drivers of energy service demand represents a “third family” of factors that is underemphasized in most low-carbon futures analysis. There is however an emerging

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Jenkins Report

by Michael E. Charles, FCAE, CAE Past President

The recent report of the Expert Panel established to review Federal Support to Research and Development is far-reaching and welcome. Now known as the “Jenkins Report” after Tom Jenkins FCAE (Open Text Corporation) the Chair of the panel, it highlights several calls for action which are consistent with the brief submitted by our Academy in February of this year.



The Jenkins Report calls for the Scientific and Experimental Development (SR&ED) Program to be modified to focus more directly on direct labour costs and to include downstream activities such as engineering design. The panel recognized the importance of support for the process of engineering design in order to increase the likelihood of success of the innovation chain.

Perhaps the most dramatic call is to reposition the institutes of the National Research Council into three categories. It is recommended that the “business-oriented institutes” become “independent collaborative research organizations, intended to be focal points for sectoral research and innovation strategies with the private sector”. They would thus assume a role akin to the Fraunhofer Institutes which have played such an important role in building the German economy, a point made in our brief to the Panel.

The remaining NRC institutes, depending on their mission, would either become affiliates of universities or be transferred to the most relevant federal department or agency.

It is to be hoped that the proposed Industrial Research and Innovation Council will be established promptly and will maintain the momentum articulated in panel’s report.

For copies of the Report and the CAE Submission, go to <http://rd-review.ca>.

Trottier Energy Futures Project (cont’d 2)

(Continued from page 8)

trend to incorporate integrative design and engineering techniques that take a whole system perspective for providing human needs and amenities with environmentally sustainable and low carbon technologies.

An increase in distributed generation is a characteristic of most low-carbon scenarios, including those that rely primarily on central power plants. The future of the electricity grid, the role of storage, and load balancing are acknowledged as central issues.

Transportation and the demand for high-temperature industrial process heat present difficult challenges to the achievement of a low-carbon future. Most scenarios turn to biomass feedstock for liquid fuels, acknowledge the sustainability challenge this presents, but generally lack any integrated strategy for the sustainable development of bioenergy resources. The drive to develop corn-based ethanol in recent years has illustrated the risk of a singular focus that sub-optimizes on a particular objective, highlighting the need to integrate the low-carbon objective in a broader sustainability strategy.

The papers vary in the extent to which they identify social marketing or community and stakeholder engagement as success factors for a low-carbon strategy.

The Road Ahead

In 2012, the Trottier Project will shift its focus from research to stakeholder deliberation and scenario-building, beginning with a planning meeting in January or early February. Several CAE members will take part in the meeting. Working with a professional facilitator, participants will design a process for engaging subject matter experts from all the key economic sectors that will shape future demand for fuels and electricity.

In future newsletters, we’ll report on the development of the Phase II process, and on the dialogic learning process that TTEFP will use to reach a broader set of solutions to Canada’s energy and climate change challenges.

Opinion Piece - Candidates for the Canadian Academy of Engineering - Honours and Obligations

by Peter R. Frise, Ph.D., FCAE, FEC, P.Eng.

The Canadian Academy of Engineering was founded nearly 25 years ago by a group of leading Canadian engineers to foster thought, debate and service to our country and to recognize excellence in engineering. As almost every winner of an Oscar says, being recognized by one's peers is the best form of recognition and being invited to become of Fellow of the Academy is indeed such an honour. However, such an invitation is much more than just being granted the right to add a few more letters after one's name and other professional designations. Becoming a Fellow of a distinguished group such as the CAE also represents an obligation to contribute and in the case of the Academy, that obligation is to contribute to the engineering profession and to the development of Canada through service on Academy initiatives as well as through other engineering works.



Accordingly, I believe (and would hope that other Academy members would agree) that we need to seek engineers who are likely to recognize that obligation to serve – rather than simply regard a CAE Fellowship as merely another honorific or designation among many. To find those special individuals, we must seek those engineers whose accomplishments go beyond what is expected in their particular field of endeavour.

For example, people in the private sector are *expected* to strive to be business leaders and to be financially successful and likewise, people in academe are *expected* to apply for grants, carry out research and publish the results.

Thus, judging people based only on those areas of endeavour which are *expected* in their respective fields could generate a ballot composed mainly of the wealthiest business leaders and academic researchers with the longest list of publications – and these may not necessarily be the most eminent engineers in our country or those who have made the largest contributions. More importantly, they may not be the people who will provide the best service to Canada through the work of the Academy in the future.

Rating the Candidates

During the time I served on the CAE Fellowship Committee which reviews nominations, we used a scale of 1-10 to rate each of the candidates. Most members of the committee used a rating of 7 or 8 out of 10 as the cut-off below which a given candidate would not be included on the ballot which was distributed to all Academy members for voting. In reviewing each set of candidates, I used the following points as guidelines:

For candidates whose careers are primarily in industry, I looked for people whose careers were more than a record of business, professional and financial success. I sought people who had committed substantial time and effort to the service of the engineering profession, the community and/or to human kind and particularly those whose contributions include significant philanthropy (for those whose financial success has been of a high order). I particularly looked for contributions in Canada, rather than abroad, although work abroad is often a characteristic of successful people as I am sure everyone can appreciate.

For candidates whose careers are primarily in academe, I looked for individuals whose careers went beyond a large record of research funding and publications. People whose careers included doing something genuinely unique such as strong contributions in teaching as well as service to the profession, to their university and to the community at-large were rated highly. I especially valued teaching because in Canadian engineering schools, this type of activity has often been under-appreciated over the years, as many CAE Fellows will attest.

With respect to the academic candidates, I have noted a large number of nominations of people with large research records but little if any service or other contributions of the type described above. Populating the Academy with people whose chief interest is academic research will not likely enable the organization to make the type of impact envisaged by the founders nor, in my experience, will it attract leading people from the private sector.

Professional Status

Without wishing to offend anyone, I would also like to respectfully raise the issue of licensure, an area that has been discussed previously within the confines of the Fellowship Committee and more widely in the Academy. I know that there is a range of views on this matter and a hallmark of a learned organization is that all views should be listened to, and treated with respect.

So – I must say that when I joined the Fellowship Committee, I was surprised to discover that possession of a license to practice as a professional engineer in Canada was not a requirement for successful candidacy as a Fellow of the Canadian Academy of Engineering. Perhaps the Academy could consider offering honorary memberships or some other construct to

(Continued on page 12)

New Publication

Ethics For Bioengineers

by Monique Frize, O.C., FCAE, P. Eng., Distinguished Professor, Carleton University, Professor Emerita, University of Ottawa

The publisher is Morgan & Claypool and the book is expected out in the Winter Term.



Increasingly, biomedical scientists and engineers are involved in projects, design, or research and development that involve humans or animals. The book presents general concepts on professionalism and the regulation of the profession of engineering, including a discussion on what is ethics and moral conduct, ethical theories and the codes of ethics that are most relevant for engineers. An ethical decision-making process is suggested. Other issues such as conflicts of interest, plagiarism, intellectual property, confidentiality, privacy, fraud, and corruption are presented. General guidelines, the process for obtaining ethics approval from Ethics Review Boards, and the importance of obtaining informed consent from volunteers recruited for studies are presented. A discussion on research with animals is included.

Ethical dilemmas focuses on reproductive technologies, stem cells, cloning, genetic testing, and designer babies. The book includes a discussion on ethics and the technologies of body enhancement and of regeneration. The importance of assessing the impact of technology on people, society, and on our planet is stressed. Particular attention is given to nanotechnologies, the environment, and issues that pertain to developing countries. Ideas on gender, culture, and ethics focus on how research and access to medical services have, at times, been discriminatory towards women. The cultural aspects focus on organ transplantation in Japan, and a case study of an Aboriginal child in Canada; both examples show the impact that culture can have on how care is provided or accepted. The final section of the book discusses data collection and analysis and offers a guideline for honest reporting of results, avoiding fraud, or unethical approaches. The appendix presents a few case studies where fraud and/or unethical research have occurred.

Engineers Canada Receives Funding to Improve the Application Process for Engineers Educated in other Countries

On December 5, 2011, the Honourable Diane Finley, Minister of Human Resources and Skills Development, announced a Government of Canada investment to help foreign-trained engineers get jobs in Canada faster. Engineers Canada received over \$785,000 to improve the application process for engineers educated in other countries.

Verifying work experience can be a significant barrier to employment for foreign-trained professionals. With the support of the Foreign Credentials Recognition Program, Engineers Canada will compare foreign work experience with Canadian standards so applicants can demonstrate that they have the experience necessary to obtain a provincial or territorial licence. This builds on the progress that Engineers Canada has already made to help foreign-trained engineers get jobs in their fields faster.



The Honourable Diane Finley, Minister of Human Resources and Skills Development



Season's Greetings

Best wishes for the holidays and the coming new year

The CAE office will close on December 23, 2011
and will reopen on January 3, 2012

Energy Pathways Task Force Update

by Richard Marceau, FCAE and Clem Bowman, FCAE

The CAE Energy Pathways Task Force has made progress on three major initiatives, a continuation of its energy work over the past five years:

1. Phase 2 of East-West Grid (Big Project #1). Previous reports on this topic by the Task Force defined the benefits of improved east-west electrical connectivity, such as access to stranded power and improving the business case for renewable power generation. The Task Force has now developed a scenario for connecting a cluster of distant, hydroelectric and tidal power stations in several provinces with new 735 kV transmission lines as a step toward a national grid and for eventually connecting to continental power networks. Funding to support further engineering evaluations and transmission scenarios is being sought.
2. Phase 2 of the Upgrading Project (Big Project #2). The issue of upgrading Canada's energy resources has taken on increased importance with the delay in the Keystone pipeline, intended to ship bitumen from the Alberta oil sands to Texas. By 2019, it is estimated that Canada will lose more than \$60 billion per year in value-added products by not upgrading this bitumen in Canada. Members of the Task Force are involved in a joint Alberta/Ontario value-added upgrading initiative exploring this issue. An analysis is underway investigating the incentives for a world scale upgrading plant in Ontario at Sarnia/Lambton, where there is underutilized industrial capacity. This would give access for Alberta products to a market of 150 million people in the east, and also relieve some of the pressures on the Alberta construction industry.
3. CAE Book – 'Canada -Winning as an Energy Superpower' - The Task Force has convened a group of energy experts to define what Canada should do to become a sustainable energy superpower, a vision that is now receiving increased attention. Twelve previous major Canadian infrastructure projects have been reviewed to understand the role of visionaries who were responsible for both the vision and the implementation of the vision. Building on this foundation, a series of new infrastructure projects is being evaluated which would enable Canada to show leadership in the effective stewardship of its unequalled endowment in energy resources, both renewable and non-renewable. Draft electronic copies of the book are expected to be available early in 2012. The book includes a discussion of the following topics: defining an energy superpower, Canada's energy assets and capability, climate change and prosperity, hydroelectricity, Canada's big projects, Alberta oil sands, coal and biomass gasification, nuclear energy, interconnecting Canada, bio-energy, technology commercialization, search for the next big projects, and imagining our energy future.

Candidates for the Canadian Academy of Engineering - Honours and Obligations (cont'd)

(Continued from page 10)

people who do not hold licenses to practice but who have made substantial contributions to Canadian engineering.

In my opinion, it is illogical to recommend for full membership in the Academy, candidates who have not demonstrated sufficient commitment to the profession of engineering in Canada to gain a license to practice that profession here.

I would submit that this could be seen as an affront to the over 200,000 Professional Engineers in Canada who **have** earned and maintain a licence in good standing. I feel that if we seek to portray ours to be an organization of the leading **engineers** in Canada, it should be a rule rather than a guideline that all candidates submitted to the membership for election as Fellows will possess a license (or be retired licensees) to practice **engineering** in Canada. In doing so, I would ask members to consider whether Canada's medical profession would place a person in their highest echelons who was not qualified to practice medicine in Canada or whether the legal profession would do so within its professional community.

Either Canada's engineering profession and its governance structures mean something – or they do not.

If the Canadian Academy of Engineering does not support those structures, then it is not reasonable to expect that the government, the public or other engineers will do so and if this is the case then the stature of our profession will continue erode in Canada.

Best wishes to you all for a safe and happy holiday season.

PAGSE Annual Activity Report 2011

The Partnership Group for Science and Engineering (PAGSE; www.pagse.org) is a cooperative association of 26 national organizations in Science and Engineering. It was formed in June 1995 at the invitation of the Academy of Science of the Royal Society of Canada. The national organizations that comprise PAGSE represent approximately 50,000 individual members from industry, academia, and government sectors. 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. PAGSE is *not* a lobby group. It does not seek an audience in order to advance the cause of specific science and engineering initiatives. Rather, its intent is to address the broader issues of science and engineering policy at the national level. To be truly representative of the science and engineering community in Canada, PAGSE must ensure that individual members of member societies and associations are aware of the activities that are undertaken in their name. While details may be found on the PAGSE website, PAGSE also provides a periodic summary of activities.

PAGSE Representatives: A full list of PAGSE representatives can be found at www.pagse.org/en/links.htm.

PAGSE Membership: PAGSE welcomed a new society as a member this year: Canadian Council of University Biology Chairs

Bacon & Eggheads

PAGSE, in partnership with the Natural Sciences and Engineering Research Canada (NSERC), sponsors a monthly breakfast meeting held on Parliament Hill, and known as “Bacon and Eggheads”. Speakers at the meetings inform parliamentarians about recent advances in science and engineering. In 2011 PAGSE organized the presentations listed below. Two breakfasts were postponed in Spring 2011 due to the federal election.

When failure is not an option: lessons for making Canada’s buildings and bridges safer: Denis Mitchell, McGill University - Thursday February 3, 2011

The Amazing, Changing, Aging Brain: Allison Sekuler, McMaster University - Thursday March 3, 2011

Switching to Green Chemistry: Philip Jessop, Queen’s University - Tuesday October 4, 2011

Bringing Power to the People – Smart Grids and the Future of Renewable Energy: Liuchen Chang, University of New Brunswick - Thursday October 27, 2011

Green forests, green dollars: rebuilding Canada’s forest products industry leadership through innovation: Sophie D’Amours, Université Laval - Thursday November 24, 2011

SciencePages

SciencePages is a new initiative by the Partnership Group for Science and Engineering (PAGSE) to provide short science and engineering briefing notes on topical issues for Canadian Parliamentarians.

With the support of NSERC and CFI, PAGSE undertook the pilot “proof-of-principle” issue on the topic of biodiversity. The first SciencePages issue was launched on October 28th, 2010 during the Bacon and Eggheads breakfast on the same topic. A second issue, on Smart Grids, was launched on October 27th 2011, during the Bacon & Eggheads breakfast on the same topic. Pdf versions of both issues can be downloaded from the SciencePages website <http://www.sciencepages.ca/index.html>. A third issue on Toxicology will be released in February 2012.

SciencePages is written by a team of interns with backgrounds in science, policy and communications, and then reviewed by a multi-disciplinary team of experts in both the science and the policy related to the topic. PAGSE’s goal is to see SciencePages, supported by both the PAGSE Executive and an Advisory Group to help set direction, become a fixture on the Canadian science-policy landscape as a quarterly publication.

PAGSE Monthly Meetings

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. During the last year PAGSE has welcomed the following guests:

(Continued on page 14)

PAGSE Annual Activity Report 2011 (cont'd)

(Continued from page 13)

January 18, 2011: **John R. McDougall**, President, National Research Council

February 24, 2011: **Dr. Gilles Patry**, President, Canada Foundation for Innovation

March 31, 2011: **Valerie La Traverse**, Deputy Director, Bilateral S&T Relations, Innovation, Science & technology Division, Foreign Affairs & International Trade Canada

June 16, 2011: **Dr. Suzanne Fortier**, President, Natural Sciences and Engineering Research Council

September 22, 2011: **Geoff Munro**, Chief Scientist and Assistant Deputy Minister, Natural Resources Canada, Innovation & Technology Sector, and Co-Chair, ADM Science & Technology Integration Board.

October 20, 2011: **Mehrdad Hariri**, Chair, Canadian Science Policy Conference

December 6, 2011 (scheduled): **Mr. Russell Williams**, President, Canada's Research-Based Pharmaceutical Companies

Submissions to Parliamentary Committees

House of Commons Finance Committee

PAGSE submits a brief each year to the House of Commons Standing Committee on Finance (HCFC).

2011 Summary of the Submission:

The global economic recovery hangs in the balance. Although Canada has so far fared better than others, sustained economic growth in the long term requires a commitment to constructing an innovation pipeline that brings the best ideas and products to market, quickly and effectively. Investing in basic research and the people who do it is crucial to ensuring a steady supply of ideas for the innovation pipeline, and Canada has been improving in this regard. However we continue to struggle to translate ideas into effective solutions and products that create wealth and jobs. In effect, there are leaks in the innovation pipeline that prevent the best ideas from realizing their full economic potential.

This brief presents three ideas for mending the Canadian innovation pipeline. The government can stimulate innovation and shorten the time required for the best ideas and products to get to market through co-localization of education, research and business organizations in innovation clusters, provide jobs and incentivize innovation by rewarding Canadian businesses for hiring highly qualified Canadian graduates, and catalyze productivity by making data, especially that generated through publicly funded research, freely available online. These actions are essential for building the knowledge economy on which Canada's future economic growth depends.

The Partnership Group recommends that the Government:

- **Promote the creation of innovation clusters to catalyze the generation and transfer of knowledge between the public and private sectors;**
 - **That the Government implement incentives for businesses to hire Canadian advanced research graduates and reduce the level of tax credits for research and experimental development;**
- That the Government develop a national policy on data accessibility and management that contains a commitment to long-term access and protects intellectual property.**

For further information on activities, please visit the PAGSE website www.pagse.org

Nominations for New Fellows

REMINDER TO ALL CAE ACTIVE FELLOWS

The election of new Fellows into the Academy is critical to its long term sustainability and mission. It is never too early 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. Once you have identified strong candidates, please download the Nomination Form also found in the Members area and proceed to assemble the nomination case. You may wish to approach your nominee for CV-type information in order to complete or enhance the nomination; however it is important that the Citation (Section 3) be drafted by yourself, in conjunction with the Fellows you select as seconders. It is important that you spend the time and effort to produce a quality nomination that properly reflects the quality of your candidate as this is the sole information on which the members of the Fellowship Committee make their recommendations.

It invariably takes longer than anticipated to finalize a nomination, so please start the process early, don't leave it to the last minute. The deadline for the receipt of Nominations for 2013 is **October 31, 2012**.

Greater Productivity through Leadership Education in Engineering

by Professor Doug Reeve, PhD, FCAE, PEng
Director, Institute for Leadership Education in Engineering, University of Toronto
doug.reeve@utoronto.ca, www.lot.engineering.utoronto.ca



The Engineering Leadership Project aims to transform engineering in Canada. We are seeking partners—front-rank, engineering-intensive enterprises—to join us in this urgent mission. We believe that leadership education will increase the capacity of engineers to make significant team-based contributions to urgently needed productivity improvements for both individual enterprises, and the Canadian economy as a whole.

Engineering Leadership Education

The academies of engineering in the US, Australia and the UK have reported a growing realization that engineering education is producing graduates who are technically proficient but are lacking other skills needed to “get the job done;” call them professional skills or “soft skills” or leadership skills. In response, engineering schools, particularly in the US, are developing programming to fill this need. Another sign of the urgency of this matter is the significant number and size of contributions by donors, in the US and Canada, supporting change in engineering education.

Engineering leadership education at the University of Toronto has been growing for ten years, providing transformative learning opportunities for undergraduates and graduate students. We are the first in Canada and among world leaders in engineering leadership education.

The Engineering Leaders of Tomorrow (LOT) program was founded at the University of Toronto in 2002. Since 2006, LOT has been providing faculty-wide curricular, co-curricular, and extra-curricular leadership education to undergraduate and graduate students. LOT presently offers five for-credit leadership courses—two for undergraduates, and three for graduates. LOT's extra-curricular programming is also expanding rapidly. In 2006, LOT organized 50 events that were attended by 1,000 students. Last year, we hosted 288 events attended by over 8,000 students.

The Institute for Leadership Education in Engineering (ILead) was formed in 2010 to increase our capability in programming, research, and outreach. Program development and delivery will continue to expand through LOT. ILead is undertaking research and scholarship on the pedagogy of engineering leadership education; we have taken on our first graduate student and won our first research grant. We are building a “community of practice” around engineering leadership.

We invite you to visit our web site www.lot.engineering.utoronto.ca and watch our three-minute video (you can also watch it on YouTube – search for: “Engineering Leaders of Tomorrow”).

The Engineering Leadership Project

The Engineering Leadership Project is under development now and will be officially initiated May 1, 2012. Partner companies in the Project will benefit during the two-year study period through the investigation of best practice in leadership culture and development specifically focused on engineers. We will establish an ongoing community of leadership practice for engineering-intensive enterprises. Companies will have outstanding access to engineering leadership students.

Partners are asked to commit funding for each of the two years of the project, 2012-2014. We will survey leadership practices in the partner company, requiring a relatively modest commitment of time from partner personnel. We will invite company representatives to participate in the emergence of new tools for engineering leadership education and on-the-job leadership development.

We welcome the opportunity to contribute to Canada's engineering-intensive enterprises.

Please join us in this important and urgent endeavour.

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.



Comment A Notable Exception

by Ron Crotogino, FCAE, President and CEO of ArboraNano



In the Academy's Newsletter Number 67, Tom Brzustowski presented an Opinion Piece advocating for a new systematic approach to innovation in Canada. He noted that the Canadian private sector is lagging in innovation, a point made repeatedly by the numerous studies and reports that have been published in recent years. However, he also mentioned that there are "some notable exceptions", and it is one of these exceptions that I want to focus on in my commentary.

The Canadian forest products industry has for many years been the largest contributor to Canada's positive balance of trade. It has slipped to second place recently behind the oil and gas industry, but it still has a direct employment of nearly 0.25 million and pays wages that are 9% above the Canadian national average. This industry has been involved in a monumental struggle to stay competitive while facing a declining demand for some of its traditional products, and fierce global competition from producers who benefit from higher growth rates and lower labour costs. Higher efficiency, leading to lower production costs, have been the primary focus in this struggle, which has had an inevitable impact on employment in the industry. This is the classic environment in which innovation is abandoned.

While the majority of the corporate R&D Centres that were so prevalent in the Canadian forest products industry during the post-war era have now been closed, the industry has continued to maintain a lifeline to innovation through three industry R&D consortia, Paprican, FERIC and Forintek, which were amalgamated on April 1, 2007 into one organization, FPIInnovations. This new institute has now become the launching pad for the renaissance of the Canadian forest products industry. With the support of the Forest Products Association of Canada (FPAC), the Canadian Forest Service (CSF) of Natural Resources Canada (NRCan), and a number of other Federal and Provincial agencies, FPIInnovations has undertaken some exemplary initiatives aimed at transforming this industry to extract more value from every tree harvested and become a leader in the rapidly growing market for innovative bioproducts, which is estimated to grow to \$200 billion by 2015.

Well designed programs for risk-sharing by industry and government can be a very powerful catalyst to accelerate innovation. In 2007 NRCan provided funding support through its Transformative Technologies Program (TTP) to develop and adapt emerging and breakthrough technologies, such as those related to forest biomass harvesting and conversion, nanotechnology and next-generation forest products. This program, which is scheduled to wind down in 2012, has created some remarkable results.



The CelluForce demonstration plant in Windsor, Québec is getting ready for business. This plant will produce one tone per day of nanocrystalline cellulose (NCC) for use by its customers in the manufacture of a wide range of new high-value products.

Nanocrystalline Cellulose (NCC), a nanoparticle that can be extracted from wood, has long been a laboratory curiosity thought to have some considerable potential for a wide range of novel products. Its strength and its ability to self-assemble into structures that exhibit interesting optical properties were intriguing. However, this potential was hard to evaluate with the small quantities (grams/week) that could be extracted in university laboratories. In 2005 Paprican undertook to scale up the process to extract NCC, but progress was slow until the TTP funding gave this initiative a shot in the arm. Scale-up to a pilot plant producing several kilograms per week was quickly accomplished and the potential of this material to create some fascinating new products was confirmed. Scale-up to a 1 tonne/day demonstration plant was undertaken. With funding from other federal and provincial sources, the CelluForce plant (a Domtar/FPIInnovations joint venture) in Windsor, Quebec is now in its commissioning phase. Meanwhile, FPIInnovations has continued to work on finding applications for this material. It also initiated the application for funding under the new Business-Led Network of Centres of Excellence programs (BL-NCE), and ArboraNano was launched

(Continued on page 17)

The Royal Society of Canada (RSC) Honours Several CAE Fellow

The RSC has honoured a number of CAE Fellows this year:

Keith W. Hipel is the recipient of the **Sir John William Dawson Medal** for important and sustained contributions in two domains of interest to RSC or in interdisciplinary research. Keith W. Hipel is globally renowned for his unique interdisciplinary research in systems engineering on the development of conflict resolution, multiple criteria decision analysis, time series analysis and other decision-making methodologies for addressing challenging system of systems problems lying at the confluence of society, science, technology and the environment.

Among the newly elected Fellows of the RSC are the following CAE Fellows:

Cristina Amon: For pioneering contributions to CFD algorithms, concurrent thermal designs, innovations in electronics cooling and nano-scale transport in semi-conductors and biological systems.

Nemkumar Banthia: Nemkumar Banthia is a Canada research Chair in Infrastructure Rehabilitation and a leading international expert on structural health monitoring, strengthening for seismic, blast and other catastrophic events and low carbon footprint construction materials. One of the most cited in the field, Dr. Banthia's research has enhanced the safety and sustainability of civil infrastructure all over the world.

Michael P. Collins: Michael P. Collins is a structural engineer whose research concerns the basic shear transfer mechanisms of reinforced concrete under extreme loads. His research has improved the safety of buildings, bridges, nuclear containment structures and offshore oil platforms.

Ian Jordaan: Ian Jordaan is a pre-eminent Canadian engineer working on design of offshore structures in harsh environments. His work is founded on a deep and discerning knowledge of probability and mechanics. He has pioneered the risk-based approach to offshore engineering and estimation of structural loads caused by ice.

Chul B. Park: Chul B. Park, world leader in plastic foaming, identified fundamental mechanisms of cell nucleation and growth of polymer foams and developed foaming technologies that significantly improve plastic products, reduce manufacturing costs and replace ozone-depleting blowing agents with inert gases.

A Notable Exception (cont'd)

(Continued from page 16)

April 1, 2009, with a mandate to create partnerships with other industry sectors to develop novel forest nanoproducts. Numerous innovation partnerships have now been formed with other industry sectors, such as aerospace, automobile, chemicals, plastics, oil and gas, pharmaceutical, textile, coatings, packaging. As a result of these initiatives, the Canadian forest product industry is the world leader with a significant head-start in the manufacture and application of NCC.

Another initiative that grew out of the TT Program is FPIInnovations' partnership with the Centre for Research and Innovations in the Bio-Economy (CRIBE), which is now operating a pilot plant producing up to 100 kg of lignin/day for the development of new bio-products. Other demonstration plants to produce new forest bio-materials for the manufacture of novel bio-products are now on the drawing board and will become reality even more quickly than the NCC example.

There are many other initiatives that are now being undertaken by the forest products industry in partnership with the federal and provincial governments, such as the Pilot Scale Demonstration (PSD) program, that in the past two years has given the go-ahead for 15 pilot projects. The NSERC Forest Sector R&D Initiative has created six new university based Networks of Centres of Excellence. The list continues to grow.

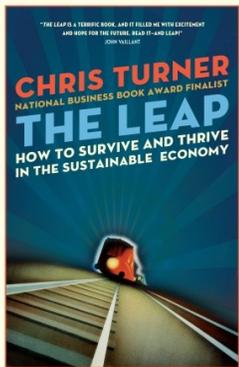
The Canadian forest products industry is not waiting for handouts or bail-outs to keep non-viable operations alive. Instead, it has demonstrated clearly that it will respond enthusiastically to risk-sharing partnerships with governments in order to renew an industry that creates prosperity from a valuable Canadian resource, its forests. This industry is poised to reassert its leadership among the world's major producers of forest product. The Canadian forest product industry is a "notable exception" worth emulating by other Canadian industries.

Have You Read?

Note that the following titles are listed for the interest of members; they are not endorsed in any other way by the CAE.

The Leap: How to Survive and Thrive in the Sustainable Economy

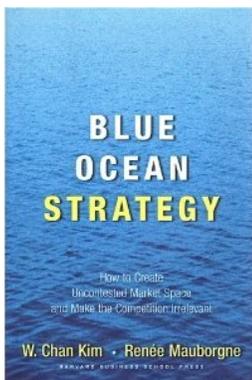
by Chris Turner – Published by Random House, September 2011



The most vital project of the twenty-first century is a shift from our unsustainable way of life to a sustainable one—a great lateral leap from a track headed for economic and ecological disaster to one bound for renewed prosperity. In *The Leap*, Chris Turner presents a field guide to making that jump, drawing on recent breakthroughs in state-of-the-art renewable energy, cleantech and urban design. From the solar towers of sunny Spain to the bike paths and pedestrianized avenues of the world's most liveable city—Copenhagen, Denmark—to the nascent "green-collar" economies rejuvenating the former East Germany and the American Rust Belt, he paints a vivid portrait of a new, sustainable world order already up and running. In his 2007 book, *The Geography of Hope*, Chris Turner wrote about an emerging world of cleantech possibility. This led to a two-year stint as sustainability columnist for the *Globe and Mail*, during which many of the fringe developments covered in his book became vital. By the time those two years were up his reporting tracks were being retraced by mainstream outlets like the *New York Times*. In *The Leap*, he once again charts the world's near-future course.

Blue Ocean Strategy: How to Create Uncontested Market Space and Make the Competition Irrelevant

by W. Chan Kim and Renée Mauborgne – Published by Harvard Business School Press, January 2005

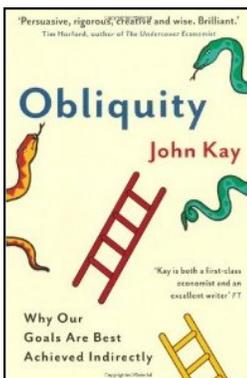


Companies have long engaged in head-to-head competition in search of sustained, profitable growth. They have fought for competitive advantage, battled over market share, and struggled for differentiation. Yet in today's overcrowded industries, competing head-on results in nothing but a bloody "red ocean" of rivals fighting over a shrinking profit pool. In a book that challenges everything you thought you knew about the requirements for strategic success, W. Chan Kim and Renée Mauborgne contend that while most companies compete within such red oceans, this strategy is increasingly unlikely to create profitable growth in the future. Based on a study of 150 strategic moves spanning more than a hundred years and thirty industries, Kim and Mauborgne argue that tomorrow's leading companies will succeed *not* by battling competitors, but by creating "blue oceans" of uncontested market space ripe for growth. Such strategic moves—termed "value innovation"—create powerful leaps in value for both the firm and its buyers, rendering rivals obsolete and unleashing new demand. *Blue Ocean Strategy* provides a systematic approach to making the competition irrelevant. In this frame-changing book, Kim and Mauborgne present a proven analytical framework and the tools for

successfully creating and capturing blue oceans. Examining a wide range of strategic moves across a host of industries, *Blue Ocean Strategy* highlights the six principles that every company can use to successfully formulate and execute blue ocean strategies. The six principles show how to reconstruct market boundaries, focus on the big picture, reach beyond existing demand, get the strategic sequence right, overcome organizational hurdles, and build execution into strategy. Upending traditional thinking about strategy, this landmark book charts a bold new path to winning the future.

Obliquity: Why our goals are best achieved indirectly

by John Kay – Published by Penguin Press, April 2011



If you want to go in one direction, the best route may involve going in another. This is the concept of 'obliquity': paradoxical as it sounds, many goals are more likely to be achieved when pursued indirectly. Whether overcoming geographical obstacles, winning decisive battles or meeting sales targets, history shows that oblique approaches are the most successful, especially in difficult terrain. Pre-eminent economist John Kay applies his provocative, universal theory to everything from international business to town planning and from football to managing forest fires. He shows why the most profitable companies are not always the most profit-oriented; why the richest men and women are not the most materialistic; and why the happiest people are not necessarily those who focus on happiness. John Kay is a visiting professor at the London School of Economics and a fellow of St John's College, Oxford. As research director and director of the Institute for Fiscal Studies he established it as one of Britain's most respected think tanks. Since then he has been a professor at the London Business School and the University of Oxford, where he was the first director of the Said Business School. He is a regular columnist for the *Financial Times* and the author of numerous books.

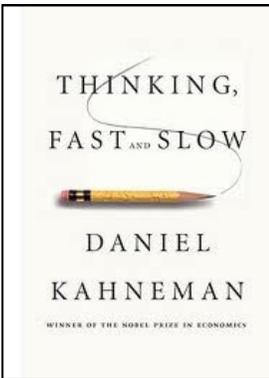
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Have You Read? (cont'd)

(Continued from page 18)

Thinking, Fast and Slow

by Daniel Kahneman – Published by Doubleday Canada, November 2011

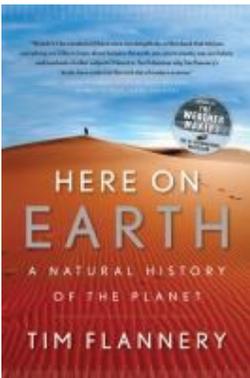


Daniel Kahneman, recipient of the Nobel Prize in Economic Sciences for his seminal work in psychology that challenged the rational model of judgment and decision making, is one of our most important thinkers. His ideas have had a profound and widely regarded impact on many fields—including economics, medicine, and politics—but until now, he has never brought together his many years of research and thinking in one book. In the highly anticipated *Thinking, Fast and Slow*, Kahneman takes us on a groundbreaking tour of the mind and explains the two systems that drive the way we think. System 1 is fast, intuitive, and emotional; System 2 is slower, more deliberative, and more logical. Kahneman exposes the extraordinary capabilities—and also the faults and biases—of fast thinking, and reveals the pervasive influence of intuitive impressions on our thoughts and behavior. The impact of loss aversion and overconfidence on corporate strategies, the difficulties of predicting what will make us happy in the future, the challenges of properly framing risks at work and at home, the profound effect of cognitive biases on everything from playing the stock market to planning the next vacation—each of these can be understood only by knowing how the two systems

work together to shape our judgments and decisions. Engaging the reader in a lively conversation about how we think, Kahneman reveals where we can and cannot trust our intuitions and how we can tap into the benefits of slow thinking. He offers practical and enlightening insights into how choices are made in both our business and our personal lives—and how we can use different techniques to guard against the mental glitches that often get us into trouble.

Here on Earth: A Natural History of the Planet

by Tim Flannery – Published by Harper Collins Publishers Ltd., March 2011



We stand at a crossroads, where comprehension of our place in nature of our true abilities and of our history is supremely important. We have formed a global civilization of unprecedented might, driven forward by the power of our minds a civilization that is transforming our Earth. We are masters of technology, and of comprehension, but it's what we believe that may, from now on, determine our fate. Tim Flannery's first major book since the #1 bestselling *The Weather Makers* charts the history of life on our planet. *Here on Earth*, which draws its points of departure from Darwin and Wallace, Lovelock and Dawkins, is an extraordinary exploration of evolution and sustainability. Our success as a species has had disastrous effects on many of the Earth's ecosystems and could lead to our downfall. But equally, Flannery argues, we are now equipped as never before to explore our true relationship with the planet on which our biological, economic and cultural futures depend. Tim Flannery is an internationally acclaimed scientist, explorer and conservationist. His award-winning books include *The Weather Makers* and its adaptation for younger readers, *We Are the Weather Makers*. He is the Australasian representative for National Geographic and a professor at Macquarie University in Sydney, and he was the chair of the Copenhagen Climate Council.

Chinese Academy of Engineering Visit Ottawa

On August 22 and 23, 2011, the CAE hosted a delegation from the Chinese Academy of Engineering (CAE-China) who were on an overseas survey for their project "Research on National Engineering Science and Technology Think Tank Construction". The purpose of the visit was to learn from Canadian policy research and consultancy institutions on how they work to provide science and engineering advice to government and various sponsors. After the Ottawa visit, the Chinese delegation went to meet the U.S. National Academy of Engineering (NAE) in Washington, D.C.



From left: ZHANG Shaoxiong, KANG Jincheng, MA Guoxin, LIU Baicheng, Jacques Lyrette, WU Hequan, Axel Meisen, Tom Brzustowski, WANG Qiming, Michael A. Ball

Executive Director's Report

Since the last newsletter you will see that many activities have taken place in recent months and many more are planned for 2012. I draw your attention to the "Opinion Pieces" on pages 7 and 10 and "Comment" on page 16. Hopefully these will spark interest, provoke comment, and maybe generate some action!

Many Fellows are actively involved in the planning and organizing of the CAE 2012 Annual Meeting under the leadership of President-Elect Moyra McDill, forging ahead with the Trottier Energy Futures Project, some significant Energy Pathways activities, continuing involvement with our Canadian Engineering Leadership Forum partners, and ongoing collaboration with the Council of Canadian Academies (CCA), to name a few. 2012 marks the 25th Anniversary of the founding of the Academy whose first meeting was held in Montreal on May 20, 1987. It is planned to recognize this milestone with some specific activities during 2012.

Included with the mailing of this newsletter you will have received the Directory of Members 2011/2012 and a letter from President Kim Sturgess regarding 2012 Dues and the accompanying invoice.

In the continuing effort to improve communications to our Fellows we have plans to enhance Academy's website www.acad-eng-gen.ca which provides the latest news and information regarding not only CAE Fellows and CAE related activities but also other events, activities and information of interest. I also encourage you to visit the websites of our CAETS sister academies which can be found by going to LINKS on the CAE website www.acad-eng-gen.ca/e/link_.cfm. Several of the CAETS member academies have very informative and interesting publications that can be downloaded for free.

Many months ago I informed the Academy's Board of Directors that I wished to step down from the position of Executive Director of the Academy. At that time I had given my undertaking to the Board that I would continue as Executive Director until a suitable replacement was found. That time has now come, and as noted in this Newsletter, Kevin Goheen will become the new Executive Director on January 1, 2012; I wish Kevin all the best in his new position.

I have very much enjoyed my term as Executive Director and I thank the many of you who have helped me in my role, and have contributed wisely in assisting me to enhance the Academy's visibility and influence. Particularly, my sincere thanks go to CAE Office Manager Valérie Broadfoot, who has assisted me greatly, and who handles the office administration and day to day enquiries in a super-efficient fashion.

As I step down as the Executive Director of the Academy I reflect on many matters, one particularly close to my heart, and to many others that I know, is the lack of recognition that is given to the importance of engineers and engineering in our everyday lives. All too often in media reporting, announcements, news releases from governments, etc., etc., we hear of science and technology, innovation, and the activities of scientists, rarely is engineering mentioned. Technology is a disembodied concept and has no voice. Engineering is a profession and speaks with the voice of several hundred thousand professionals in Canada who design, innovate, and develop technology. All too often it is claimed that the broad use of the word "science" includes engineering. This is simply wrong. The creative activity of science is research. For engineering, it is design, a totally different activity. Every day our country faces important questions related to engineering and technology. I would like to draw your attention to the Mission of the Canadian Academy of Engineering which is shown below:

The Mission of the Canadian Academy of Engineering is to provide leadership in engineering advice and to enhance, through the application and adaption of scientific and engineering principles, the promotion of engineering, the well-being of Canadians and the creation of wealth in Canada. Specifically, the Academy:

- *speaks out on issues of importance to Canada and abroad to highlight emerging issues in which engineering has a role and to comment on their importance and their implications, and more generally to provide an understanding of the need for engineering excellence in professional practice, research, development, innovation and education in Canada's economy.*
- *provides advice in the appropriate form to government, industry, academia and Canadians at large on specific issues where engineering considerations play a role,*
- *promotes recognition of engineering excellence by electing Fellows of the Academy from among Canada's most experienced and outstanding engineers, and thus highlighting the contributions of engineers to the well-being of Canadians and the economic development of Canada.*
- *participates appropriately, actively, and effectively with like-minded national and international organizations in developing a common voice on issues important to Canada and the world.*

I urge all Fellows to be actively involved in promoting their membership in the Academy, thus recognizing the honour of being a Fellow. By using our collective intellect, knowledge, and wisdom for the benefit of Canadians and humanity more broadly, let's strive to "engineer" a better world together.

As we go forward, I plan to continue to be an active contributing Fellow of the Academy.

I wish you all season's greetings, best wishes for the holidays and a happy, healthy and prosperous New Year.

Michael A. Ball, FCAE, FEC, P. Eng.