

Canada School of Energy and Environment
Corporate Plan
2009-10



Canada 

Message from the Chair

I am honoured to be serving as the Chair of the Board of the Canada School of Energy and Environment at this exciting time. Energy and environment are among the critical issues that dominate the public agenda. The creation of the Canada School was an opportune action that will catalyze dialogue, innovation and leadership, and help transform challenges into opportunities. As a Centre of Excellence with the participation of academia, government and industry, our institution supports emerging technologies, informs policy and facilitates knowledge exchange for the purpose of delivering clean energy, a healthy environment and sustainable prosperity.

On behalf of the Board, it is my pleasure to present the 2009-10 Corporate Plan. The history of the Canada School is short, but I am proud of what has already been accomplished. None of these achievements would have been possible without the commitment of our university members, government sponsors and industry partners, and the imagination, dedication and hard work of Bruce Carson and his excellent staff.

The proposed agenda is ambitious but necessary. It aims at making a real difference on pressing issues facing Canada and the world. I look forward to the years ahead with confidence that the Canada School will continue to deliver the valuable outcomes outlined in its mandate.

Yours truly,



Brian Heidecker
Chair of the Board of Directors



Board of Directors



Dr. William H. Cade was appointed President and Vice-Chancellor of the University of Lethbridge in July 2000. Currently serving his second five-year term, Dr. Cade has overseen the development of many initiatives including a five-year strategic plan and the launch of the institution's largest capital campaign.

Dr. Cade is a zoologist and entomologist by profession and holds degrees (BA, MA and PhD) from The University of Texas at Austin. A Professor of Biological Sciences, his primary research interests lie in the areas of evolution of insect behaviour, biogeography and biosystematics of African Orthoptera. Before coming to Alberta, Dr. Cade was Professor of Biology and Dean of the Faculty of Mathematics and Science at Brock University in St. Catharines, Ontario.



Brian Heidecker was appointed by the provincial government as Chair of the University of Alberta Board of Governors on July 1, 2006, and was recently reappointed for a second three-year term.

Mr. Heidecker, founded and operated from 1966 to 2006, Drylander Ranch Ltd., a large-scale cattle and forage operation in Coronation. He was named as one of Alberta's 50 most influential people by Alberta Venture magazine in 2005. He has served, and continues to serve, on many boards and councils. He served on the boards of the Alberta Treasury Branch (ATB) Financial and the Bank of Canada.

Mr. Heidecker completed The University of Toronto's Joseph L. Rotman School of Management/University of Alberta School of Business/Institute of Corporate Directors, Director Education Program and has received his ICD.D designation.



John (Jack) R. Perraton, C.M., Q.C., is the Chair of the Board of Governors of the University of Calgary.

Jack is a senior practitioner with Perraton Law and has a corporate commercial practice. He is very active in several professional associations and community organizations. A Member of the Order of Canada, Jack is the recipient of numerous awards, including the Alberta 2005 Centennial Medal, the Alumni Honour Award from the University of Alberta, and the Korean Canadian Heritage Award.

Jack is a recipient of the Golden Jubilee Medal for the 50th Anniversary of Queen Elizabeth II and was named Calgary Citizen of the Year for 1997. He was presented with a Presidential Citation by the Students' Union of the University of Calgary. Jack received his B.Comm and LL.B. from the University of Alberta.



Dr. Indira Samarasekera is the 12th president of the University of Alberta. Under her administration, many initiatives have been achieved, among them the development of a renewed vision, mission and academic plan; the establishment of the Killam Research Fund; the redevelopment of Enterprise Square; and the formation of the Schools for Energy and the Environment and Public Health.

Dr. Samarasekera is a member of the Prime Minister's Advisory Committee on Public Service and sits on the boards of the Conference Board of Canada, the Public Policy Forum of Canada, The Bank of Nova Scotia, MaRS Discovery District, and AHFMR. She has distinguished herself as one of Canada's leading metallurgical engineers. She earned an MSc from the University of California, and was granted a PhD in metallurgical engineering from the University of British Columbia. She is an Officer of the Order of Canada.



Robert J. Turner, Q.C. was appointed Chair of the University of Lethbridge Board of Governors in 2006 and reappointed for a second three-year term.

He is Vice-Chairman and Partner of Fraser Milner Casgrain LLP, in the firm's Corporate/Commercial section in Edmonton and provides advice in respect of corporate and government finance. He is a director, Corporate Secretary and General Counsel to Millar Western Forest Products. Much of his work has been in providing counsel to corporations in the natural resource sector. He is a director of a number of Canadian and U.S. corporations

He attended the University of Lethbridge (Economics and Commerce), the University of Calgary (Commerce) and the University of Alberta (Law).



Dr. Harvey P. Weingarten became the University of Calgary's 7th President and Vice-Chancellor in 2001. Since that time he has introduced major initiatives to enhance the student experience, to accelerate research momentum, and to launch the University into a \$1.5-billion capital expansion program. During his tenure, the University received funding for a new digital library, health research centre, health sciences program, faculty of veterinary medicine and a child development centre, as well as private donations to create two named schools: the Haskayne School of Business and the Schulich School of Engineering.

A distinguished scholar and researcher in the fields of psychology and medicine, Dr. Weingarten served as Provost and Vice-President (Academic) at McMaster University. Dr. Weingarten holds a BSc from McGill University, and MSc, MPhil, and PhD from Yale University.

Message from the Executive Director

The Corporate Plan for 2009-10 builds upon the successful implementation of much of the 2008-09 Corporate Plan and lifts off from the previous plan as we continue to grow and establish a path forward.

My term as Executive Director, while announced in August, 2008 did not actually begin until mid-October, 2008. However, a great deal has been accomplished in this short period and there is much to be done as we implement the outstanding matters from 2008-09 and move on to the work to be done under the 2009-10 Plan.

I wish to thank the Presidents of the three Universities which make up the CSEE, Indira Samarasekera, Harvey Weingarten and Bill Cade for their support and encouragement in this great and important venture.

It is my hope that 2009-10 will be an exciting time for CSEE as we continue the task of establishing the CSEE as the “go to” place for industry, academia and governments for knowledge relating to clean energy from all sources and enhancement and protection of our environment.



Yours truly,

A handwritten signature in black ink, which appears to read "Bruce Carson".

Bruce Carson
Executive Director

Executive Summary

The Canada School of Energy and Environment is a Centre of Excellence for technology and policy aimed at clean energy, a healthy environment and sustainable prosperity. The CSEE was created in 2007 by Universities of Alberta, Calgary and Lethbridge, and started operations in 2008, with the Executive Director becoming available full time only at the end of the year. The Executive Director proceeded to lead a process with the Board to examine the CSEE's mandate. The exercise established the understanding that, while technology innovation remains vital to resolving energy and environment challenges, the implementation of necessary solutions to our energy systems will require informed policy, appropriate regulations and public understanding. The mandate now reflects supporting and integrating these two related thrusts: technology development and commercialization, and support to policy development. The mandate is composed of five key elements:

- Create opportunities for national and international collaborations on policy issues;
- Provide advice to industry, academia and government;
- Coordinate research and academic programming;
- Facilitate technology transfer and commercialization; and,
- Facilitate the exchange of research findings and information and promote collaboration among the international community.

Growth is the theme in 2009-10 for the Canada School. Staff was recruited, with the Deputy Director coming on board in September. A number of activities were undertaken in fulfillment of the mandate. A major conference on climate change attracted over 100 high-level policymakers, academics, industry leaders and government officials. The conference provided an opportunity for information sharing and analysis ahead of the United Nations Climate Change Conference in Copenhagen in December 2009. The CSEE is deeply involved in the Clean Energy Dialogue (CED), the Canada/United States bilateral process for transforming our energy systems with focus on clean energy technologies, carbon capture and storage, and the North American smart grid. Meetings of the Major Economies Forum (MEF) were also attended. The Canada School is providing support to Environment Canada's federal-provincial climate change task forces on electricity and oil and gas, with the Executive Director chairing the latter. In partnership with Natural Resources Canada (NRCan), the CSEE is organizing a conference on fossil fuel research. Two rounds of Proof of Principle grants were completed and a third one initiated. These grants allow researchers at member universities to investigate promising early research results in order to develop the information necessary for commercialization. Funded projects ranged from solar energy and renewable plastics, to oil sands and CO₂ capture.

The past two years saw growth in staff and in the range of activities. The Canada School will hit its stride next year with a full staff complement, an expanded slate of events and programs, and established relationships with partners. An ambitious agenda is proposed.

Over five conferences or roundtables are planned on topics such as climate change, carbon management and Copenhagen; fossil fuel research; and Northern issues related to energy extraction. These events are targeted at current issues and respond to the needs expressed by partners and stakeholders. They are expected to be very well attended by influential academics, government officials and industry decision makers.

The Canada School will continue and deepen its support to government led policy processes at the national and international levels, including the CED, the MEF, and roundtables or task forces led by Environment Canada and NRCan. The 2011 CED conference will be held in Canada and the CSEE will endeavour to host this conference in Alberta.

During 2009, the Canada School worked closely with the Institute for Sustainable Energy, Environment and Economy (ISEEE) at the University of Calgary to establish Carbon Management Canada (CMC), a nation-wide, university-led, multidisciplinary research network that will develop the game-changing technologies and the business, social and policy frameworks necessary to rapidly “decarbonize” fossil fuel production and utilization. Partial funding is now in place with expectation of a successful outcome to a joint application to the Networks of Centres of Excellence. CMC is an excellent example of the outcomes contemplated by our vision and mandate. The Canada School will continue to support CMC as it grows and will partner with it to expand the reach, scope and impact of this institution.

Proof of Principle grants are expected to continue to be offered twice every year and accessibility may be expanded. The existing CSEE web presence will be complemented by a highly interactive website for sharing and collaborating on technology development and policy analysis.

The financial position of the Canada School is solid. Expenditures have ramped up in the past two years as the organization was developed, but will stabilize at a sustainable level as the CSEE becomes fully operational.

The Canada School is a unique institution that fills a gap for conveying, facilitating and coordinating participants at the intersection of government, industry and academia. No other institution in Canada meets this need on an ongoing basis as comprehensively as the Canada School. Energy and environment issues are not going away. If anything, challenges will grow in intensity and complexity and will require that the best minds in the nation regularly interact, investigate, analyze, and forecast matters related to energy and environment, as issues arise and evolve. Going forward, the need will be for more collaboration, not less, as global events and natural forces are unlikely to allow Canada the luxury of relying on isolated and fragmented efforts.



CSEE Climate Change Conference, June 2009 in Banff, Alberta

Introduction

In Canada, and throughout the world, society is facing questions of secure conventional energy reserves; water quality, use, and capacity; shortages of highly skilled workers; and a growing international concern about our environment and our future quality of life.

The Canada School of Energy and Environment is the world's gateway to an unparalleled centre of energy and environment research and education expertise. Founded by the University of Alberta, the University of Calgary, and the University of Lethbridge, the Canada School offers strategic, research-based, economically sound solutions that place Canada at the forefront of energy research, policy and technology. CSEE is a "Made in Canada" solution that brings together the best thinking in academia, industry, and government for the economic, social and environmental benefit of all Canadians.

History

The foundational ideas that led to the creation of the Canada School of Energy and Environment were first proposed in 2004 in a Memorandum of Understanding between the Universities of Alberta, Calgary and Lethbridge. A vision was outlined for collaboration and sharing of information, expertise and resources between the universities, particularly in the area of clean energy to promote "investment in energy innovation to ensure an abundant supply of environmentally responsible energy for the continuing prosperity and social well-being of Canadians."

The Canada School was enabled as a Centre of Research Excellence and Commercialization in the 2007 federal budget as part of the Science and Technology Agenda to expand Canada's research capacity in areas of national priority and to facilitate the translation of research findings to the marketplace. The \$15 million federal investment in the Canada School was articulated in a funding agreement with Industry Canada in 2008.

The founding universities developed the concept further in a second Memorandum of Understanding in 2007 and in a Tri-Party Agreement in 2008. The CSEE was established to be a repository and creator for knowledge on energy and the environment with international influence and impact, acting as a coordinating vehicle for research and academic programming, linking research institutes, researchers and student at the participating universities to undertake cutting edge research.

In 2008, Bruce Carson was appointed as the Executive Director and began exercising his functions late in the year. Under his leadership, CSEE's mandate was re-energized to include a crucial role in the elaboration of public policy on energy and environment as well as informing the climate change debate in Canada and internationally. In 2009, the term of CSEE's Funding Agreement with Industry Canada was extended to 2013-14.

Why a Canada School of Energy and Environment?

Canadians use energy every day when they heat their houses, fuel their vehicles and use electricity at home, school and work. Canadians want energy to remain affordable but they are also aware of its

environmental impact, particularly on climate change, and on water supply and quality. It is in this science and social nexus - the fact that energy and environmental issues are inextricably linked - that the Canada School aims to make a difference and contribute to one of the most pressing issues of the modern world: the need to balance sustainable energy development and environmental management.

The International Energy Agency (IEA) estimates that global energy demand will continue to grow at an annual pace of 1.6% between 2006 and 2030, for a total growth of 45% in that period¹. Most of that growth will be from developing nations seeking to raise the standards of living of billions of people.

Fossil fuels have powered economic development since the Industrial Revolution. They dominate the energy supply mix because they are reliable, abundant, low-cost and easily transported. Approximately 80% of global primary energy in 2006 was provided by oil, coal, and natural gas, and this percentage is expected to remain at about this level unless major technology or policy interventions are made. The recovery, processing and use of fossil resources produce most of the greenhouse gases that contribute to climate change. The IEA has projected that using fossil fuels to meet growing energy demand would result in a 50% increase in global CO₂ emissions by 2030.

Fossil fuels are by definition limited resources. Declining supplies of conventional oil and gas will continue to drive price volatility and adversely impact energy-intensive sectors such as manufacturing, forestry and agriculture. The need to increase energy supply has motivated a global movement to unconventional sources such as the oil sands, which typically have a larger environmental footprint and elicit claims of “dirty oil.”

Conservation, efficiency, renewable and alternate energy remain strategic solutions that could displace fossil resources and dramatically reduce greenhouse gas (GHG) emissions. Conservation and efficiency often have relatively low costs and are encouraged. They go beyond behaviors such as turning the lights off when not needed. They include sophisticated technologies ranging from compact fluorescent light bulbs to industrial cogeneration power plants. Demand management approaches are also gaining traction, enabled by advanced electricity meters, management software, energy education and audits, and innovative policy initiatives, such as the Ontario Energy Board conservation and demand management (CDM) programs for local power distribution companies.²

“...the future of human prosperity depends on how successfully we tackle the two central energy challenges facing us today: securing the supply of reliable and affordable energy; and affecting a rapid transformation to a low-carbon, efficient and environmentally benign system of energy supply. What is needed is nothing short of an energy revolution.”

—World Energy Outlook 2008 (IEA)

¹ International Energy Agency. (2008). World energy outlook 2008, p. 78. Online at <http://www.worldenergyoutlook.org/2008.asp> (Accessed 19 July 2009).

² Ontario Energy Board (2009). Online at [http://www.oeb.gov.on.ca/OEB/Industry+Relations/OEB+Key+Initiatives/Conservation+and+Demand+Management+\(CDM\)](http://www.oeb.gov.on.ca/OEB/Industry+Relations/OEB+Key+Initiatives/Conservation+and+Demand+Management+(CDM)) (Accessed 24 September 2009).

Wind energy has experienced exponential growth and Canada now ranks 12th in the world for installed wind generation. Wind farms are now operating in every Canadian province, the first time ever.

Renewable energy has made remarkable progress in recent years. Wind power is no longer a novelty and has seen exponential growth from 100 MW of installed capacity in 2000 to 3,159 MW in 2009.³⁴ Wind farms are now operating in every Canadian province, the first time ever. Wind electricity supplies 1% of Canadian demand and Canada ranks 12th in the world in terms of installed wind generation capacity. Solar, while still expensive, is receiving significant attention for its scalability and its ability to be deployed in cities, close to the load. Nuclear is also part of the mix and is enjoying a renaissance in some jurisdictions. Hydro projects,

whether run-of-the-river or conventional, are receiving development funds, particularly in northern regions.⁵

Connecting generation and demand is the role of the much-maligned electrical grid. The Montréal ice storm of 1998 and the major Eastern Seaboard blackout of 2003 are still a vivid memory for many. However, strategic grid reinforcements have been implemented. More importantly, the need for a smart grid has been recognized and is being acted upon. The smart grid concept refers to an array of enabling technologies for improving energy efficiency, reducing GHG emissions, lowering cost, and enhancing reliability. Major building blocks include new transmission line technologies, power electronics, digital technologies and North American interoperability standards.

Conservation, efficiency, and renewable and alternate energy also face challenges. Societal and behavioural barriers often stand in the way of large-scale implementation. As renewable energy sources achieve greater market share, they are likely to create new challenges such as competition for land use and food production, decreased biodiversity and local community opposition.

Most nations, including Canada, are therefore torn between the environmental imperative to decrease GHG emissions and the desire to maintain or increase energy production and utilization. The challenge, therefore, is to thoughtfully manage global demand for energy while balancing current and future energy needs with environmental stewardship.

The Canada School of Energy and Environment is an innovative research and educational collaboration involving the University of Alberta, the University of Calgary and the University of Lethbridge. It draws on the diverse knowledge, resources and expertise of the three institutions to create and advance research and teaching programs aimed at finding solutions for the energy and environment challenges being felt worldwide. Because of its collaborative, cross-disciplinary mission and approach, the Canada School can draw upon the best minds in Canada, in North America, and throughout the world in seeking solutions and creating opportunities from these contemporary challenges.

The current CSEE concept remains rooted in the original vision, first proposed in 2004, of a partnership among Alberta comprehensive research universities to ensure that integrated research and teaching

³ Natural Resources Canada (2006). Canada's Energy Outlook - The Reference Case 2006. Online at <http://www.nrcan-rncan.gc.ca/com/resoress/publications/peo/peo2006-eng.pdf> (Accessed 24 September 2009)

⁴ Canadian Wind Energy Association (2009). Press release: Canada's wind energy industry enjoys record year for 2009. Online at http://www.canwea.ca/media/release/release_e.php?newsId=63 (Accessed 24 September 2009)

programs lead quickly to practical applications of discoveries and that these integrated efforts are tightly tied to the energy and environment priorities of the province and the nation.

As the Canada School advances the understanding and availability of leading-edge knowledge on energy and the environment, it will provide the leadership and framework for collaboration among Canadian and international researchers in the field. This will foster the development of research into new applications that address our most pressing issues. It will stimulate development of new technologies to mitigate the environmental impact of current energy sources, while acting as a catalyst for development of sustainable alternate energy sources. In turn, development of these new technologies will offer new and extensive opportunities for commercialization – opportunities that will contribute substantially to entrepreneurial activities and economic growth.

Vision

The vision of the Canada School of Energy and Environment is to contribute to a future of abundant supplies of clean energy, a vibrant and healthy environment, and sustainable prosperity and social well-being for Canadians by informing and collaborating in policy development and by encouraging scientific research and technology commercialization.

Mandate

The original purpose for the CSEE was to focus on coordination and support of research and commercialization in energy and environment at the founding universities. An agenda of technology innovation remains a critical solution to society's energy and environment challenges. An emphasis introduced by the Executive Director is the understanding that technology, engineering and science are only part of the solution. Discoveries in these domains have to be integrated with sound legislation, informed policy, appropriate regulations and public understanding. The development and examination of solutions from the combined perspectives of natural sciences, engineering, business and social sciences is necessary for a prosperous and sustainable future.

The mandate of the Canada School of Energy and Environment is to:

1. **Create opportunities for national and international collaborations on policy issues** affecting energy and environment by entering into partnerships or through convening meetings, seminars or conferences that bring together leading participants from the energy industry, academia and government as well as other relevant stakeholders, in order to advance policy thinking and move towards policy solutions to the many and varied, complex issues that concern the areas of energy and the environment. This would result in CSEE being recognized as a leading institution influencing the development of public policy in the areas of energy and environment.

⁵ Canadian Broadcasting Corporation (2009). News release: Harper makes Yukon hydro expansion funding official. Online at <http://www.cbc.ca/canada/north/story/2009/08/21/harper-yukon.html> (accessed 24 September 2009)

2. **Provide advice to industry, academia and government** in order to facilitate the development of sound regulations and appropriate legislation to deal with energy development, and protection and enhancement of our environment and to encourage the undertaking of cutting edge research in both areas of energy and environment.
3. **Coordinate research and academic programming** in energy and environment at the three partner universities in Alberta, and work with similar energy and environment institutions across Canada and throughout the world to bring knowledge and scientific research to bear on these two fields of endeavour; so through coordination of activity, global energy development and environmental protection and enhancement may be addressed in a positive and coherent fashion.
4. **Facilitate technology transfer and commercialization** in the area of natural resources, energy development and environmental sustainability through proof of principle funding.
5. **Facilitate the exchange of research findings and information and promote collaboration among the international community** composed of academic and industry researchers, students, government, policy makers and opinion leaders on energy development and environmental research through a variety of leading edge communication tools, including the creation of an interactive website based at the Canada School of Energy and Environment.

Review of Accomplishments and Performance (2008 and 2009)

Corporate Development

During its short initial period, the Canada School established itself as an operating entity and accomplished a number of activities in fulfilment of its mandate. The CSEE was formed in 2008 as a Centre of Research Excellence and Commercialization with a Board composed of the presidents and the board chairs of the universities of Alberta, Calgary and Lethbridge. Bruce Carson was appointed as the Executive Director in August 2008 and began exercising his functions in October of the same year. Office staff was added, a web presence was established, and a number of activities and events were organized and delivered, as detailed below. In 2009, the mandate evolved to add an emphasis on policy development collaboration, the term of the Agreement with Industry Canada was extended to 2013-14, the deputy Director was recruited and the pace of activities quickened. Corporate developments and growth highlights for 2008 and 2009 were:

- The Contribution Agreement with Industry Canada was signed in 2008 and its term was extended to 2013-14 in 2009.
- The first Executive Director was appointed in 2008, starting late in the year.
- The Deputy Director, Zoë Addington, was recruited and started exercising her functions in September 2009.
- Office staff was hired: the office manager and an administrative assistant.
- Offices for CSEE are now located on the main campus of the University of Calgary and at the downtown Calgary campus of the University of Alberta.

Mandate Element: Create opportunities for national and international collaborations on policy issues

A key role of the Canada School is to serve as a convener of top talent from around the world, bringing the best minds to Canada to examine pressing issues related to energy and environment and to make their expertise available to policy makers, peers, the media and the public. The CSEE acts as a link and networking venue between industry, academia, and all orders of government, positioning itself as an international, Canada-based forum for information exchange and collaboration, and stimulating discussion regionally, nationally and internationally among researchers and decision-makers to guide and inform public policy on energy and environment issues.

The principal mechanisms for enhancing national and international collaboration on energy and environment policy development are (i) hosting of conferences, seminars, and workshops, (ii) inviting distinguished guest speakers, and (iii) participating and delivering speeches and presentations at international gatherings.

“The Search for a Canada-U.S. Climate Change Accord: The Road to Copenhagen and Beyond” was the topic of the CSEE’s inaugural conference, held in June 2009 and attended by over 100 high-level policy makers, industry leaders and government officials. The Conference was designed to produce concrete ideas and solutions to guide the work of policy-makers and international negotiations. It facilitated a lively, informed and intellectual dialogue of some potentially controversial topics with a focus on providing tangible policy outcomes. This conference, while dealing with scientific issues in relation to climate change, concentrated mainly on the architecture of a Canada-U.S. Agreement, as both countries move to the Copenhagen Conference in December 2009 – the new Kyoto Agreement. Specific topics were:

- The fundamentals and the multiple dimensions of the Canada - United States bilateral relationship.
- The possible architecture of a cap and trade system as a means for pricing carbon; including a call for a system that would be straightforward and "hard to game" and a recognition of the importance of a technology fund approach.



CSEE Climate Change Conference

- The importance of dialogue and harmonization between Canada and the United States with respect to the implementation of policies and regulations to transform and reduce the carbon content of energy systems.
- The role of technology in the Clean Energy Dialogue (CED) particularly as it relates to Carbon Capture and Storage (CCS), and to the smart electricity grid.
- The importance of national cohesion in the run-up to international climate change negotiations.

The CSEE provided financial support to the **International Student Energy Summit** held in July 2009. This global forum focussed on sustainable resource management and the role that students will play in defining the future of energy development. The event brought together 500 of the best and the brightest youth leaders from over 30 countries (multidisciplinary post secondary students in undergraduate and graduate studies), top-notch speakers and supportive sponsors, and created a network of driven individuals looking to make a difference in the energy sector.



International Student Energy Summit, July 2009

Guest speaker series were organized, with the financial support of the CSEE, by the associated institutes at member universities.

The Executive Director participated and spoke at the following conferences and events:

- 2009 Challenge North Conference on the subject of the need for a balanced approach to energy, the environment and sustainable development (hosted by the Northern Alberta Development Council and held in Cold Lake, Alberta). It is a tri-annual conference, which brings together between 225-250 leaders of northern communities, industry, service providers and government to discuss key northern issues.
- The Clean Energy Dialogue (CED) meetings held June 2009 in Washington, DC.
- Networks of Centres of Excellence (NCE) Conference in Winnipeg
- A two -day round table discussion hosted by the Canadian Association of Petroleum Producers on the development of a comprehensive energy policy for Canada
- The Canadian American Business Council (Washington, DC)
- The Major Economies Forum (MEF) meetings in Washington, DC. The MEF is composed of 16 countries representing 80% of global GHG emissions. It is an initiative of the President of the

United States, and aims to inform the broader United Nations proceedings on climate change policy. The Executive Director will continue to be an active participant in future meetings.

- The 2009 Joint Meeting of New England Governors and Eastern Canada Premiers. The Executive Director addressed a meeting on the principles anchoring Canada's climate change program.

Mandate Element: Provide advice to industry, academia and government

During his keynote address to the CSEE's June climate change conference, Dr. Harvey Weingarten, President of the University of Calgary, underscored the need for the Canada School to inform policy decisions and strategies by governments: "Good policy is informed policy" and "good decisions are informed decisions". The CSEE's mandate includes an advisory role to governments as they search for solutions which will reduce the environmental impact of energy production and utilization. The Canada School can call upon respected scholars from its member universities to serve as information resources and advise government and industry leaders in their decision-making processes.

The Canada School is deeply involved in the Clean Energy Dialogue, the bilateral process between Canada and the United States for reducing the carbon content of energy supplies. The three pillars of the CED are clean energy technology, carbon capture and storage, and the North American smart grid. The 2011 CED conference will be held in Canada. The CSEE will endeavor to host this conference in Alberta.

For example, the Canada School, through the Executive Director, has participated in the Clean Energy Dialogue (CED) underway between Canada and United States which is motivated in the fact that both countries believe that climate change is a global challenge requiring global solutions. The CED was created to enhance collaboration on the development of clean energy technologies to reduce GHG emissions and combat climate change. Common opportunities for reducing the carbon content of energy supplies and for transforming energy systems may be best approached through bilateral cooperation. Given the extent of the trade and energy relationships between Canada and United States and the success of past cooperation, alignment of energy and climate change policies, regulation and investments would be beneficial. Major elements of the CED include development of clean energy technologies, carbon capture and storage, as well as the creation of a North American smart electricity grid.

In addition, at the invitation of the Minister of the Environment, CSEE's Executive Director is chairing the federal-provincial oil and gas task force on climate change. He is also a member of the related task force for the electricity sector. The purpose of these task forces is to recommend policy to the Minister. They do not represent a material expenditure of CSEE funds, but provide an excellent opportunity for the Canada School to make a lasting impact on the development of Canadian policy. Being at the table opens an unmatched window on priority issues and provides unparalleled access for channeling highly relevant information and analysis from university research.

Mandate Element: Coordinate research and academic programming

World renowned scientists from the University of Alberta, the University of Calgary, and the University of Lethbridge are applying their talent and expertise, and the resources of their public and private supporters to identify and develop solutions to Canadian and global energy and environment challenges. At present, more than 260 researchers and nearly 7,000 students from Alberta's comprehensive

research universities are engaged in this endeavour. Building on an impressive track record of achievement, the universities reach across national and international borders, attracting new world-class talent and collaborating with the best minds in the field. Furthermore, investments are made for the future as more than 2,400 new academic spaces for energy and environment education have been added, training tomorrow's leaders and problem solvers.

The Canada School links the research and education enterprises of its member universities, providing a vehicle for coordination and for extracting synergies. The CSEE works closely with the Institute for Sustainable Energy, Environment and Economy (ISEEE) at the University of Calgary, the School of Energy and Environment (SEE) and the Oil Sands Research Information Network (OSRIN) at the University of Alberta, and water and environmental science researchers at the University of Lethbridge.

- **ISEEE.** The Institute was established in 2003 to provide leadership and coordination for developing and implementing energy and environment related initiatives at the University of Calgary. The Institute develops and promotes a collaborative vision and strategic focus for expanded research and education in energy and environment. It provides leadership for engaging world-class, interdisciplinary and mission-based research which includes initiating and coordinating major collaborative research and academic initiatives and attracting funding resources. ISEEE is also a vehicle for integrating and coordinating research and education programs, and for collaboration within the University and at the local, national and international levels.
- **SEE.** Established in 2006 at the University of Alberta, SEE integrates disciplines to identify and address the social, political, industrial and economics implications of society's changing energy needs and resources. It pulls together the University's unique and extensive expertise in diverse areas, such as engineering, science, arts, agriculture, native studies, business, law, public health, and medicine to conduct research, offer interdisciplinary education, and cultivate and contribute to worldwide discussions on environment, energy and the economy. SEE acts as a facilitator for the continued development of research, teaching and scholarly activities in energy and environment. It promotes and disseminates, both within the University and with external communities and stakeholders, information on research and teaching in energy and environment.
- **OSRIN.** The purpose of OSRIN is to help ensure Albertans can reap the economic benefits of the oil sands without sacrificing the natural ecosystem or human health, with a focus on returning landscapes disturbed by oil sands mining, including tailings ponds, to a natural state. SEE received a \$3 million grant in 2008 through the Alberta Energy Innovation Fund to launch OSRIN to provide a structure for the allocation of research funds targeted towards facilitating development and implementation of new knowledge, technology and environmental systems to improve oil sands reclamation of land and water. OSRIN is currently assembling a database of research organizations and researchers, conducting six preliminary research projects and laying the groundwork for activities in public education and for supporting public policy development. Bruce Carson sits on the Board of OSRIN.
- **Water and environmental science research at the University of Lethbridge** is centred in the Alberta Water and Environmental Science Building (AWESB) which is home to the University's

core water research program and houses the offices and labs of twenty-two Principal Investigators from the Departments of Biological Sciences and Geography conducting research primarily in the areas of Aquatic and Ecosystem Science, Geomatics, and Hydrology. The AWESB facilitates the development of a collaborative and multidisciplinary research program that builds on existing strengths while seeking opportunities to expand and grow in synergy. Through this effort, the University will be able to achieve a number of objectives: (i) Create partnerships across government, industry and community; (ii) Commit to timely data sharing, interpretation and dissemination of information; (iii) Train high quality research personnel; (iv) Generate and translate knowledge; and, (v) Develop best practices and ideas that incorporate responsible water stewardship and sensitivity to public health concerns.

The Canada School supported activities of ISEEE, SEE, OSRIN and AWESB that fell within its mandate.

In 2009, the activities of the CSEE went beyond those proposed in the 2008-09 Corporate Plan, as the CSEE began to play an important role along with its university partners in seeking funding for research into carbon management. In particular, CSEE co-led with ISEEE the establishment of Carbon Management Canada (CMC), a nation-wide, university-led, multidisciplinary research network that will develop the game-changing technologies and the business, social and policy frameworks necessary to rapidly “decarbonize” fossil fuel production and utilization. In partnership with industry and government, CMC’s vision is to develop the insights and technologies necessary to cut Canada’s annual GHG emissions by 350 Mt CO₂e from the 1,100 Mt CO₂e business-as-usual forecast to 2050, or approximately 40% of the national GHG-reduction targets. In particular, CSEE provided critical resources for the preparation and presentation of the funding proposal for CMC to the 2009 Networks of Centres of Excellence (NCE) competition. Results will be announced in late 2009.

CSEE has also worked with members of the energy industry, individually and through the Canadian Association of Petroleum Producers to determine the research needs of industry.

Mandate Element: Facilitate technology transfer and commercialization

From a Canadian perspective, it is important that Canada is effective at translating knowledge into practical applications to improve the wealth, wellness and well-being of its citizens. It is also essential for Canada to build on its research and engineering strengths to generate new ideas and innovations while achieving excellence by global standards and cementing a position as a global leader in technological development. Success in these areas will help Canada develop, attract and retain the highly skilled people it needs to thrive in the global economy.

The Canada School plays an instrumental role to

Organic Solar Cells

By Dr. Curtis P. Berlinguette, University of Calgary

Converting sunlight into electricity is one of the few clean energy technologies capable of scaling to the level necessary to meet global energy demand. Breakthrough research into organic solar cells could replace current approaches based on expensive silicon wafers. This proof of principle project explores phosphorous base molecular dyes and nanostructured Titania concepts with the goal of eventually producing abundant, cost effective and environmentally benign clean energy.

Proof of Principle Grant Round 1 (2008)

Integration of Microwaves and Novel Molecular Sieves

by Dr. Zaher Hashisho, University of Alberta

Reducing greenhouse gas emissions to atmosphere is a crucial objective on the road to energy sustainability. This research proposes to explore the innovative combination of microwave heating and novel adsorbents for the efficient separation of CO₂ and ethane from natural gas. Benefits include energy efficiency, the potential for CO₂ capture and storage, and the recovery of ethane and other impurities as value added products for the manufacture of petrochemicals.

Proof of Principle Grant Round 2 (2009)

ensure that Canada is at the forefront of developing technologies by facilitating technology transfer and commercialization in the area of natural resources, energy development and environmental sustainability through its Proof of Principle Funding program. The objective is to advance initial research and technology results to the next level of impact on knowledge transfer, policy development or technology commercialization.

Many inventions made during the course of academic research are not sufficiently developed to be of interest to potential investors. Without additional targeted research, potentially valuable discoveries may never be commercialized or may take an inordinate amount of time to reach the commercialization stage. Traditional funding mechanisms are not well-suited to bridging the gap between raw technology and commercial opportunity. The goal of proof of principle funding is to fill this gap.

Proof of principle projects must refine or investigate a specific issue that is critical to the further development or adoption of policy, technology, or practice in one of the following areas:

- Reducing the environmental footprint of fossil energy exploration, extraction and processing;
- Alternative and renewable energy technologies;
- Energy efficiency and conservation technologies;
- Improved management of energy-related greenhouse gas emissions; and,
- Policies and practices leading to solutions for energy-environment challenges.

Applications are evaluated on the extent to which they effectively:

- Explain why the specific issue proposed for investigation is important as to whether a technology, policy, or practice can advance to the next stage of adoption or development;
- Outline the basic elements of a test plan, showing how it will achieve the proof of principle and defining what would constitute success or failure;
- Involve external partners (government, industry, or NGO's) as participants, where applicable, and discuss their roles and responsibilities;
- Address how the study will build value in a technology, or develop policy and practice, that would mitigate environmental impact of energy development, exploration, or use;
- Outline the follow-on steps that would be undertaken at the conclusion of the proposed project, in the case of a successful outcome; and,
- Demonstrate that the work can be completed within a one-year timeframe.

The adjudication committee consists of four individuals outside of the three CSEE partner universities, who have experience in research, development, and policy initiatives in one or more of the

Green Catalysts for Biodegradable Plastics from Renewable Resources

By Dr. Paul G. Hayes, University of Lethbridge

Bioenergy is well known, particularly the increasing use of bioethanol and biodiesel as transportation fuels. Less visible, but sharing the same momentum, are chemical products from renewable sources. Plastics can be grown! This is the goal of research into green catalysts for the preparation of polylactide, a plastic material that could be produced from crops such as beets and corn. Polylactide exhibits similar physical properties to plastics derived from petroleum feedstocks, but enjoys the critical advantage of being biodegradable. Polylactide will not litter the landscape. It is also biocompatible and could be used in medical applications. The technology being developed focuses on ring opening polymerization of lactide molecules and uses single site catalysts based on zinc, magnesium and calcium species.

Proof of Principle Grant Round 2 (2009)

competition's theme areas. The committee reviews project proposals in two separate classes: (i) those requesting \$50,000 or less; and (ii) those requesting more than \$50,000 to a limit of \$100,000. The Director of the SEE and the Executive Director of ISEEE serve as non-voting, advisory members on the adjudication committee.

The initial call for proposals for Proof of Principle Funding projects was completed in September, 2008. Proposals were adjudicated and funding was distributed in March 2009. Status reports were received in September 2009. Projects are for a one-year term and final results are expected in 2010. A second round closed on February 20, 2009. Proposals were adjudicated and funding agreements are in the process of being executed. A third round was recently initiated.

Mandate Element: Facilitate the exchange of research findings and information and promote collaboration among the international community

A clear path for deployment of research is through technology commercialization, where specific technical advances are de-risked by proof of principle projects and further developed into commercial realities by the private sector. However, the real value of research extends beyond technology

commercialization. Knowledge is used as the foundation for new technology investigations, as the underpinning of policy developments and as a raw material for education. Unlocking this immense value is a critical outcome sought by the Canada School.

A highly interactive website using the latest Internet technologies will be built by the CSEE, potentially in partnership with organizations such as OSRIN and CMC who are also planning interactive websites. It will greatly facilitate exchange of research results, ideas, data, analysis and projects among researchers at member universities and their industry and government partners. It will also provide an effective tool for outreach and collaboration beyond the confines of Alberta's research universities to include academic institutions across Canada and the world.

This interactive Internet platform will also meet the rising need for information and knowledge - knowledge that can help other nations help themselves in facing today's energy and environment challenges. Using the Internet as a platform to exchange the latest research and knowledge in energy and environment, CSEE will provide a gateway to new research and technology and new developments

in public policy and regulatory frameworks and demonstrate Canada's leadership in responding to international energy needs.

The CSEE highly interactive website will become a global basis for collaboration. It will provide real-time, interactive, international access and exchange of information through a powerful web-based environment that will allow the user community to engage, participate, and collaborate among peers and position Canada as a global power in advancing research and commercialization in the area of natural resources and energy development and environmental sustainability. It will also capture and guide public engagement related to these issues through features in the web environment tailored to public and media use and to education.

The establishment of the interactive website has proceeded at a slower pace than projected in the 2008-09 plan. There is great concern that if it is not planned properly it will not produce the anticipated results in a fiscally responsible fashion. Therefore more time has been and will be spent on initial planning. Once the CSEE Board of Directors is satisfied that this can be accomplished with the results envisioned and within budget, it will proceed to the construction phase.

The website will be developed over time according to the overall vision using a growth model that focuses on leveraging pillars of expertise to create increasing awareness and sustained interest in a continually expanding set of energy and environment topics.

The CSEE has concentrated its efforts in these early months on establishing its own website in order for it to gain recognition within the industry and scientific communities. The CSEE website is now almost complete and available on the Internet. This website contains information about CSEE, why it exists, its activities and stresses its relevance to the clean energy, environmental debate in Canada.

With regard to the interactive website, a new study was commissioned and received, building upon the 2008 study "CSEE Web-based Information Exchange System (CSEE-WIES) Project Charter". Our most recent study sets out a timeline and a workplan for the initial site development. A website committee will be established to oversee the initial stages of the development of this interactive website. The report recommends that the development and implementation of the interactive website be accomplished under the direction of a project manager, a project steering committee and a project oversight committee:

- Project manager – Oversees the website and deliver the project on time and on budget.
- Project steering committee – Assists in defining and reviewing the requirements of the website.
- Project oversight committee – Review the state of the project on a regular basis to determine that its goals and objectives are being met, that there is satisfactory progress towards project completion as defined by the project schedule and the project costs are in line with the project budget.

The CSEE Board of Directors will assess each step of the development of this website to ensure that the goals and objectives envisaged for it in the CSEE mandate are achieved in the most expeditious and cost-effective manner possible.

Plans for 2009 to 2014

Mandate Element: Create opportunities for national and international collaborations on policy issues

The CSEE will continue to be an active participant at the national and international levels. The Canada School will host a number of conferences, roundtables and workshops to advance the national energy and environment discussion. CSEE executives will also speak and contribute to national and international conferences and forums, presenting Canadian perspectives on a number of topics from impacts in the Arctic to proposed global climate change agreements.

Fall 2009 Pre-Copenhagen Workshop. The Canada School will facilitate the sharing of information and analysis that could be used to develop an understanding of national and provincial interests ahead of the United Nation Climate Change Conference in Copenhagen in December 2009 (COP15). The purpose of the workshop will be to provide an opportunity for Canadian governments, industrial participants and scientists to table their views with respect to strategy and national interest. This will allow all attendees, and particularly the Canadian team going to Copenhagen, to have a full understanding of the diversity of views on this crucial area of national policy.

Workshop on Northern Issues Related to Energy Extraction and Environmental Protection. This workshop, planned for late 2009 in Calgary is in the context of the broader strategic issue of "Canada's North: Challenges and Opportunities: Developing a Truly Integrated Northern Strategy". The purpose of the workshop is to bring together the most knowledgeable group of Canadians, leaders in their own fields, to discuss the issues that are most pressing in Canada's North relating to energy extraction and environmental protection and preservation. In addition, all of the related socio-economic issues will be on the table for discussion.

Spring 2010 Conference on Northern Issues. The results of late 2009 workshop will inform a much larger conference on northern issues to be hosted by CSEE in the Spring of 2010. The Conference will include, in addition to Aboriginal and Territorial leaders, relevant Federal and Provincial Cabinet Ministers as well as informed policy leaders with direct responsibility for northern issues. International leaders on northern issues would also be in attendance to help us, as Canadians, address challenges and develop solutions to the issues identified for discussion.

The G8 and G20 meetings will be hosted by Canada in 2010. This will offer an excellent opportunity for the Canada School to facilitate and assist with the presentation of Canada's position on climate change policy.

2010 Climate Change Conference: Post Copenhagen Developments. In the wake of the United Nations December 2009 Conference on Climate Change, clarity will have improved on some issues but much work will remain to be done. The purpose of this second CSEE conference on climate change will be to take stock of events and accomplishments, and start laying a foundation for future developments by facilitating a national discussion between Canadian governments, industrial partners and academia. One of the benefits will be to advance Canadian understanding and positions ahead of the 2010 G8 and G20 meetings, which are to be hosted by Canada.

Roundtable on Fossil Fuel Research. The pace of Canadian energy research is accelerating in response to opportunities such as oilsands, carbon capture and storage, bioenergy and fuel cells. In many areas,

Canadian scientists are developing technologies that offer the best answers to today's global challenges. The roundtable, to be held with leadership from Natural Resources Canada (NRCan), will allow academic researchers, government policy makers, and industry receptors to take stock of the state of the art, to identify gaps, and to define future R&D programs. The inaugural meeting will be held in November 2009. It is expected that the roundtable will be a series of focussed meetings on key research topics during 2010.

Carbon Management Conference. Carbon management is a suite of technologies aimed at reducing CO₂ emissions to atmosphere that may result from the production and utilization of fossil fuels such as oil, coal and natural gas. Decarbonization of fossil energy will transform energy systems as a result of developments of integrated technologies for carbon efficient recovery and processing, carbon capture, and carbon storage. CSEE will partner with CMC and ISEEE to host international caliber natural sciences, engineering, business and social sciences researchers, allowing them to share results, analyze outcomes and discuss policy implications.

The Canada School has accepted invitations to speak at the following events:

- CD Howe Institute Conference on Cap and Trade to be held in 2009
- Woodrow Wilson international policy conference on technology and climate change later this year in Washington, DC.

Mandate Element: Provide advice to industry, academia and government

Governments across the world are facing difficult decisions on the energy and environment files that could affect the health and prosperity of the present and of future generations. Energy and environment issues, while generally understood by the public, are highly technical and require expert analysis. Good policy is informed policy. The Canada School will continue to play a key role in supplying the federal and provincial governments with credible, factual information to support policy development.

In particular, the CSEE will remain deeply involved in the Clean Energy Dialogue (CED) between Canada and the United States. The Executive Director participated in 2009 CED meetings and will continue to participate in 2010 deliberations. The 2011 CED conference will be held in Canada. The CSEE will endeavor to host this conference in Alberta. The Canada School will also assist in meeting the needs of the CED for factual information and analysis on carbon capture and storage by coordinating the involvement of scientists, engineers and policy analysts from ISEEE at the University of Calgary and SEE at University of Alberta.

During 2010, the Canada School is planning to hold a series of seminars across Canada on the results of the December 2009 United Nations Climate Change Conference in Copenhagen and on Canadian climate change policy.

Mandate Element: Coordinate research and academic programming in energy and environment

Public investment in postsecondary education and research is significant. Every effort needs to be expended to ensure effectiveness and to extract synergies. The Canada School is ideally placed to offer coordination and collaboration opportunities to its member universities. The CSEE's board is composed of the senior executives of the universities of Alberta, Calgary and Lethbridge. The Canada School has

partnered with energy and environment institutes and networks such as ISEEE, SEE, OSRIN at the Universities of Alberta and Calgary and with water and environmental science researchers at the University of Lethbridge. While this important role will be sustained and enhanced, the Canada School will explore similar opportunities with energy and environment institutes, centres and networks from academic institutions across Canada. Facilitating coordination and collaboration on a national basis promises huge rewards in terms of improved utilization of knowledge assets, human capital, and infrastructure.

In 2009, the Canada School was instrumental, in partnership with ISEEE, in establishing CMC, a nationwide multidisciplinary research network. CMC is a perfect example of the outcomes sought from CSEE's mandate. The Canada School will support CMC as the network builds on the foundation laid by CSEE and ISEEE. The Canada School will partner with CMC in organizing conferences and workshops, in creating opportunities for collaborative research projects, and, potentially, in establishing an interactive web presence on topics of mutual interest.

Carbon Management Canada was established by the Canada School in partnership with ISEEE. CMC is a nationwide multidisciplinary research network for the purpose of "decarbonizing" fossil fuels such as natural gas, oil, and coal, including the oil sands. CMC is a superb example of the outcomes targeted by the CSEE's mandate.

Mandate Element: Facilitate technology transfer and commercialization

The CSEE's Proof of Principle Funding program is designed to advance research and technology concepts from the stage where initial results show promise to a stage where rigorous testing indicates that commercialization should be attempted. In other words, the program aims at taking laboratory results and progressing them into a technology package that would be attractive to investors.

The first two rounds (2008 and early 2009) attracted high quality submissions which were reviewed by the adjudication committee. Successful proposals are now in the implementation phase and results of the first round are expected in 2010. A third round was initiated in late 2009, in response to strong interest expressed by the academic community.

In the coming year, the Canada's School will consider building on the success of its proof of principle funding program and expand accessibility to other academic institutions across Canada. This outreach effort could be linked and integrated with plans to develop coordination and collaboration research and education opportunities at universities beyond Alberta.

The Canada School, potentially in collaboration with partners, will explore the development and use of advanced Internet technologies, such "virtual laboratories" (with NRCan), and highly interactive websites (with CMC and OSRIN).

Mandate Element: Facilitate the exchange of research findings and information and promote collaboration

In 2009, the CSEE established an Internet presence with its website, which provides information about the Canada School, and its events and programs, such as Proof of Principle Funding. Plans for a highly interactive website for sharing technology and policy information on energy and environment topics also progressed. A study was completed providing recommendations for the implementation of this major project.

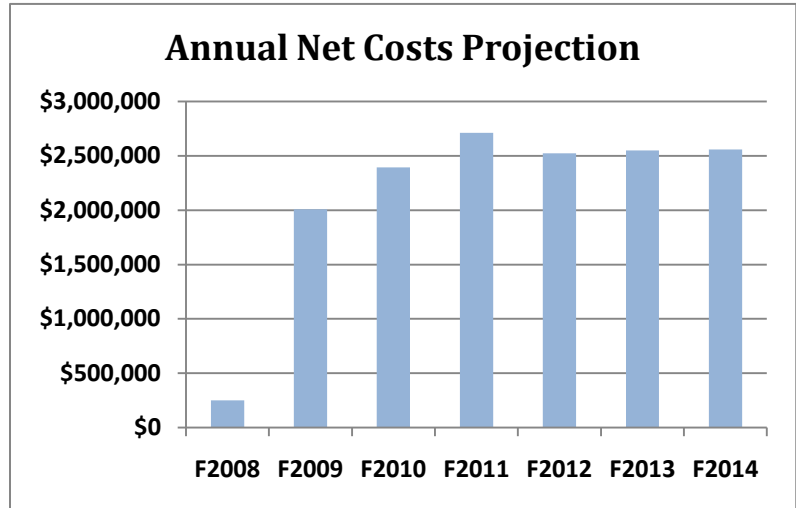
Related Internet endeavors by CSEE partners are also in the planning

stage. NRCan has discussed with the Canada School its interest in exploring web technology for "virtual laboratories". This approach, being pioneered by the United States Department of Energy, allows scientists at remote locations to effectively collaborate to a degree not possible with telephones, video links and email. CMC will also be undertaking a major website project for information sharing with respect to carbon management technology and policy developments. The Canada School will explore possibilities to gain speed of execution and cost synergies by collaborating with NRCan, CMC and other partners on the development and construction of advanced Internet information exchange platforms.

Financial Position and Expectations

The Canada School was funded with \$15 million from Industry Canada. These funds were invested in cash equivalent instruments and the balance sheet of the CSEE was not negatively affected by the dramatic stockmarket downturn of 2008 and 2009. These secure investments provide interest revenues that helped the CSEE meet some of its current expenditures.

The Financial Plan is presented in the following table and accompanying graphic. Total expenditures for the first two years of operations (2007-08 and 2008-09) were \$250,205 and \$2,008,375 respectively, below expectations due to the slower than expected ramp up in activities. For the current year (2009-10), total expenditures are expected to be \$2,393,735, reflecting the acceleration of the pace of events and activities.



The extension of CSEE's term to 2013-14 meant spreading the initial \$15 million grant over a longer period, resulting in higher total costs in some categories and smaller annual amounts in others.

Expectations are that the CSEE will hit its stride next year with a full complement of staff, the Proof of Principle Funding program, and with established working level partnerships with universities in Alberta and across Canada. The sustainable expenditure level for the next four years is estimated at \$2.5 million per year, with a slightly higher amount planned for in 2010-11 due to the one time cost of constructing the interactive website. The fact that the Canada School intends to implement its Internet strategy in cooperation with partners, allowed reducing the budget for this expense.

CSEE has been pursuing funding from the Alberta government. While the Alberta government has already supported the advancement of CSEE in all three participating universities through the Enrollment Planning Principle, we believe that future direct funding from the Alberta government may be anticipated.

CSEE Financial Plan								
	ACTUAL		BUDGET					Total to F2014
	F2008	F2009	F2010	F2011	F2012	F2013	F2014	
COSTS								
CSEE Operations								
Salaries and benefits	\$10,000	\$163,590	\$551,242	\$624,500	\$624,500	\$624,500	\$624,500	\$3,222,832
Recruitment costs	\$73,362	\$10,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$93,362
Office rent			\$76,800	\$76,800	\$76,800	\$76,800	\$76,800	\$384,000
Office operating expenses	\$11,827	\$128,468	\$110,000	\$110,000	\$110,000	\$110,000	\$110,000	\$690,295
Travel		\$2,861	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$402,861
Legal fees	\$34,270	\$3,189	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$87,459
Conferences and knowledge dissemination			\$240,000	\$240,000	\$235,000	\$235,000	\$235,000	\$1,185,000
Websites, Internet strategy and related equipment and software	\$47,442	\$9,598	\$14,397	\$240,000	\$22,000	\$22,000	\$22,000	\$377,437
Proof of Principle Fund and technology transfer		\$587,773	\$554,675	\$500,000	\$500,000	\$500,000	\$500,000	\$3,142,448
Total CSEE Operations	\$176,901	\$905,479	\$1,639,114	\$1,883,300	\$1,660,300	\$1,660,300	\$1,660,300	\$9,585,694
Institutes associated with CSEE								
University of Alberta site costs		\$76,500	\$194,700	\$194,700	\$194,700	\$194,700	\$194,700	\$1,050,000
University of Calgary site costs	\$12,153	\$153,115	\$236,946	\$236,946	\$236,946	\$236,946	\$236,946	\$1,350,000
University of Lethbridge site costs		\$14,539	\$3,092	\$3,092	\$3,092	\$3,092	\$3,092	\$30,000
Administrative support for institutes	\$61,151	\$1,023,481	\$442,074	\$442,074	\$442,074	\$442,074	\$442,074	\$3,295,000
Supplies and materials for institutes		\$135,955	\$27,809	\$27,809	\$27,809	\$27,809	\$27,809	\$275,000
Total for institutes	\$73,304	\$1,403,590	\$904,621	\$904,621	\$904,621	\$904,621	\$904,621	\$6,000,000
TOTAL COSTS	\$250,205	\$2,309,069	\$2,543,735	\$2,787,921	\$2,564,921	\$2,564,921	\$2,564,921	\$15,585,694
Less interest revenues		\$300,694	\$150,000	\$75,000	\$40,000	\$15,000	\$5,000	\$585,694
TOTAL NET COSTS	\$250,205	\$2,008,375	\$2,393,735	\$2,712,921	\$2,524,921	\$2,549,921	\$2,559,921	\$15,000,000

CSEE is also actively pursuing funding from other government and industry sources through proposals to establish CMC, a research entity to deal with the issue of Carbon Management within Canada.

CSEE also believes that as its work becomes more and more relevant to both industry and government that it will attract substantial funding from both sources.

Short and Medium Term Outcomes

The Canada School offers a range of activities, events and programs aimed at supporting technological innovation and policy understanding in energy and environment. Outputs include conferences, roundtables, technology information, policy analyses, funding of innovative research, and a highly interactive information sharing website. These timely outputs will lead to the following outcomes, consistent with the CSEE's mandate:

- Enhanced collaboration and information sharing opportunities by hosting (and participating in) conferences, workshops, roundtables, etc. where the best minds in Canada and across the world consider pressing energy and environment challenges and opportunities;
- Informed support the Canadian policy developments by channelling fact-based information and analyses from Canadian universities;
- Improved convergence of Canadian views on matters of national and international scope by creating opportunities for interaction and exchange between government, industry and academia;
- An increase in Canada-led coordination, collaboration and engagement of top researchers at Canadian institutions and internationally that facilitates more rapid advancement toward realizing national and global energy and environment goals;
- The development and commercialization of new advanced technologies that deliver energy with low attendant environmental impact, through Proof of Principle Funding;
- Assistance to international clean energy and sustainable environment efforts by sharing relevant and critical information and technologies using a highly interactive website;
- The advancement of the Canada School's reputation and profile in Canada and internationally, among researchers, industry, government, students and the media; and,
- Enhancement of the international profile of Canadian researchers, policy makers and corporate sector.

Risk Mitigation and Performance Assessment Strategy

The Canada School acknowledges that unforeseen events and circumstances may affect performance and the achievement of outcomes. The CSEE's strategy for risk mitigation and performance assessment is summarized below and will allow the early identification and resolution of unanticipated issues.

Risk Type	Risk Description	Risk Mitigation
Human resources	<ul style="list-style-type: none"> Acquisition, retention and succession of key personnel 	<ul style="list-style-type: none"> Recruitment of a highly respected Executive Director; Build the reputation through the implementation of targeted communications strategies aimed at researchers, industry and government.
	<ul style="list-style-type: none"> Scientific leadership of the CSEE 	<ul style="list-style-type: none"> An Advisory Board will be engaged in creating the future CSEE organization design. This initiative will ensure that future directions of research on energy and environment will focus on issues that are of critical importance.
	<ul style="list-style-type: none"> CSEE administrative staff 	<ul style="list-style-type: none"> Our organizational design initiative will ensure that the roles and responsibilities of the administrative team are clear, fulfilling and rewarding; Our organizational design initiative will also incorporate succession planning for administrative staff.

Risk Type	Risk Description	Risk Mitigation
Corporate governance	<ul style="list-style-type: none"> Ensuring partner institutions are advancing the common objectives of CSEE. 	<ul style="list-style-type: none"> A Board of Directors with representatives from all 3 founding institutions will provide broad guidance, to ensure appropriate partnerships are formed and effective stakeholder relationships are developed; An Executive Committee, consisting of the three Presidents of the founding Universities, will direct research strategies and outcomes; An Operations Committee will be accountable for reporting back to the Executive Committee on progress, outcomes and operations and will formulate and manage the CSEE business plan.
	<ul style="list-style-type: none"> Insuring stakeholder alignment with CSEE objectives 	<ul style="list-style-type: none"> Collaborative development and communication of a clear, comprehensive CSEE Scientific Plan.
Relevance of the Scientific Plan	<ul style="list-style-type: none"> Ability to ensure that the Scientific Plan is relevant, cutting edge, and achievable within the given resources 	<ul style="list-style-type: none"> Annual review of the Scientific Plan by the International Scientific and Commercialization Advisory Committee; Incorporation of the International Scientific and Commercialization Advisory Committee recommendations into our Scientific Plan.

Implementation of the Scientific Plan	<ul style="list-style-type: none"> • Ensure that the Scientific Plan is being implemented as written 	<ul style="list-style-type: none"> • Close monitoring of the implementation of the Scientific Plan via semi-annual Advisory Board scrutiny.
	<ul style="list-style-type: none"> • Some of the planned projects may fail to achieve their desired outcomes 	<ul style="list-style-type: none"> • If it becomes apparent that a pilot project is unlikely to achieve its outcome, it will be terminated and replaced with other relevant and potentially more productive projects.
Financial	<ul style="list-style-type: none"> • Ability to attract the funding required for long-term CSEE sustainability 	<ul style="list-style-type: none"> • Communication of positive outcomes resulting from CSEE initiatives; • Build strong partnerships with the private sector to ensure relevance.
	<ul style="list-style-type: none"> • Controls to insure responsible management of currently available resources 	<ul style="list-style-type: none"> • Development and Implementation of a comprehensive set of financial management controls to monitor CSEE finances; • An Audit and Financial Committee consists of the three Board of Governor Chairs of the founding Universities will oversee funds and accounting measures.