Mission

Our mission is to facilitate innovation, collaborative research and technology development, demonstration and deployment for a responsible Canadian hydrocarbon energy industry.

Vision

Our vision is to help Canada become a global hydrocarbon energy technology leader.

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Message from the Board

Like the 13-mile marker in a marathon, 2012 denoted the mid-point in PTAC’s race to achieve the goals set out in our five-year plan. Established in 2010, this plan aims to tangibly increase the hydrocarbon industry’s capacity for innovation, research, technology development, demonstration and deployment (IRD3). To close the gap between planning and accomplishment, PTAC has pushed hard in 2012 to expand our thinking beyond established technology areas, build new partnerships outside our own industry, and explore projects that stretch the boundaries of what we have done before.

PTAC was founded on the belief that the application of new and better technologies will improve oil and gas recovery, lower costs, make operations safer, and reduce impact on the environment. We know that new research projects and technology solutions are best discovered when industry stakeholder groups work together in a structured way to identify problems and address them. With 17 years’ experience developing this collaborative approach to research and development, PTAC stands as a model for transforming challenges into opportunities within Canada’s hydrocarbon industry.

PTAC believes that in order to find the best technological solutions, we need to look not only at our own industry, but also beyond its margins. In 2012, we expanded our menu of established PTAC technology areas to include photonics, remote sensing, and geomatics. We also refocused existing technology areas to emphasize pipeline transportation under the value-added portfolio. Although these areas of interest fall outside the traditional focus, we believe bringing their unique perspective into the collaborative model will yield innovative solutions.

To solidify this 2012 expansion into new technology areas, PTAC forged strong relationships with several new partners: A Memorandum Of Understanding (MOU) with TECTERRA opens up opportunities for PTAC projects using geomatics and other related technologies to improve industry performance; an MOU with LOOKNorth targets the development of remote sensing technologies for oil and gas; and an MOU with the Canadian Energy Pipeline Association (CEPA) has launched a multi-year research program for sustainable development of the Canadian pipeline industry. Each of these MOUs propelled the creation of new opportunities for PTAC members to become involved in leading-edge research and technology development outside the mainstream production focus.

The scope of PTAC’s collaborative model also expanded in 2012. International climate change funding is usually awarded to international development banks, but a new precedent was set when PTAC was selected as Project Administrator for the Nationally Appropriate Mitigation Actions (NAMA) Project. This project brings together representatives from Canada, Mexico, and Colombia to develop real-world methods for

PTAC Technology Areas

**Improve Oil and Gas Recovery**
- Conventional Oil and Gas Recovery
- Enhanced Oil and Gas Recovery
- Coalbed Methane, Shale Gas, Tight Gas, and other Unconventional Gas
- CO₂ Enhanced Hydrocarbon Recovery
- Development of Remote Resources
- Enhanced Heavy Oil Recovery
- Enhanced Oil Sands Recovery
- Emerging Technologies to Recover Oil Sands from Deposits with Existing Zero Recovery
- Tight Oil, Oil Shale, and other Unconventional Oil
- Development of Arctic Resources

**Reduce Capital, Operating, and G&A Costs**
- Automation
- Reduce Operating Costs Related to Energy and Chemical Consumption
- Emerging Drilling and Completion Technologies
- Eco-Efficiency and Energy Efficiency Technologies
- Technologies to Reduce Waste Energy
- Surface Facilities

**Improve Value-Added Products**
- Gasification
- Hydrocarbon Upgrading
- Hydrogen Generation
- Integration Petrochemicals, Refining, and Value-Added Opportunities
- Pipeline Transportation
- Transportation

**Manage Environmental Impacts**
- Air Quality
- Alternative Energy
- Ecological
- Emission Reduction / Eco-Efficiency
- Energy Efficiency
- Resource Access
- Soil and Groundwater
- Water
- Wellsite Abandonment

**PTAC Technical Areas**
- e-Business
- Geosciences
- Health and Safety
- Instrumentation/Measurement
- Operations
- Production Engineering
- Reservoir Engineering
- Security
- Telecommunications
- Photonics
- Remote Sensing
- Geomatics
Reducing greenhouse gas emissions, enable implementation of mitigation action, and improve access to financing under future climate agreements.

Collaborative projects remained PTAC’s primary focus throughout 2012. In addition to completing projects such as the Stationary Engines Air Emissions Study and continuing the facilitation of numerous ongoing endeavours such as the CO₂ Purity Project, PTAC launched 38 new projects across a broad spectrum of portfolios from Improving Oil and Gas Recovery and Improving Value-Added Products to Reducing Costs and Managing Environmental Impacts. These projects were executed using PTAC’s proven collaborative model, accelerating the development and commercialization of new technologies at a fraction of the cost of pursuing this development solo. PTAC also continued to highlight the importance of field pilot projects including the Hot Water Vapor Process Project, the Shallow Gas Well De-watering Pump Consortium, the Zero Emissions Wellsite Project, and the Ultra-Light Weight Proppant Project. Additionally, the PTAC-facilitated Alberta Upstream Petroleum Research Fund (AUPRF) investigated best practices for industry and helped government agencies refine environmental policies and regulations.

In 2012, PTAC’s networks once again proved to be an effective means of managing the collaborative process. In 2012 PTAC added the Remote Sensing Technology Action Plan (RSTAP) to our roster of focused networks that also include the Clean Bitumen Technology Action Plan (CBTAP), the Resource Emissions Technology Action Plan (REMTAP), and the Tight Oil and Gas Technology Action Plan (TOGTAP). Staffed by creative and experienced volunteers, these networks serve as a place to articulate challenges, share current inventories of technologies, prioritize technology projects, and launch consortia for further work.

PTAC’s 2012 membership represents a broad spectrum of stakeholders: oil and gas producers, transporters, government bodies, research providers, venture capital firms, academic institutions, individuals, and service and supply companies. PTAC’s 30 producer members are responsible for the majority of Canadian hydrocarbon production. 148 Small and Medium Size Enterprise (SMEs) members make up over 70% of PTAC’s membership. These small businesses are often built upon innovation and the development of specific technologies. PTAC has bridged the gap between SMEs and producer members to ensure both stay abreast one another’s innovations while fostering collaboration to benefit the industry at large.

A critical component of PTAC’s project work is the ongoing communication of results and emerging opportunities. In 2012, PTAC hosted a variety of large and small events showcasing current technological innovations and sharing ongoing research developments. These 23 events served to encourage and sustain industry interest in IRD3 by engaging industry stakeholders in unique discussions and networking opportunities. Since inception, PTAC has successfully launched 396 industry-led projects that have helped develop technology, policy, and best practices, while the execution of over 450 PTAC events has helped identify challenges, investigate technology solutions, and disseminate research and technology results.

2012 has been a year marked by expansion into new technology areas, developing partnerships beyond traditional borders, and pursuing projects that surpass the conventional. In the midst of these new directions, PTAC has continued to foster a culture of sustainability in the Canadian hydrocarbon energy industry, actively encouraging development and production in equal consideration of environmental management, social impacts, profitability, economic prosperity, and security of global energy supply. The resulting synergy of these efforts has brought us closer to our vision of a future in which Canada is a global leader in hydrocarbon energy technology.

PTAC has had the privilege of sharing the triumphs and challenges of 2012 with over 300 volunteer technical experts serving 71 industry-led consortia and projects. We extend our sincerest gratitude to you, the PTAC members. It is your passion for innovation and your ongoing investment of time and talent that have enabled PTAC to explore beyond the ordinary and grow in new directions. We look with expectation to new opportunities on the horizon, confident we will overcome challenges by working together to facilitate innovation, collaborative research, and technology development, demonstration, and deployment for a responsible Canadian hydrocarbon energy industry.

Soheil Asgarpour, Ph.D., P.Eng.  Dave Rushford
President    Chairperson
Key Accomplishments

2012 was a year of significant accomplishments for PTAC; a year of pushing boundaries and meeting challenges through unexpected partnerships, efficient projects, expanding programs and compelling events.

Partnerships

2012 saw PTAC broaden the scope of their established Technology Areas to include new partners from areas of interest outside the usual purview of the organization’s established technology categories. MOUs solidified new partnerships and enabled the pursuit of more extensive project opportunities.

New Opportunities with Geomatics

PTAC signed an MOU with TECTERRA that has opened up opportunities to pursue PTAC projects focused on using geomatics to improve performance of the oil and gas industry. The first initiative for this partnership with TECTERRA will be a workshop in 2013 to identify projects, followed by the formation of several consortia to test and commercialize the application of geomatics technologies for the oil and gas industry.

From Outer Space to Underground

A small 2012 roundtable discussion with Dr. Steve MacLean, CEO of the Canadian Space Agency, introduced PTAC members to the potential for technology solutions derived from applying space industry technologies to the Canadian oil and gas industry. Intrigued and excited about these possibilities, PTAC investigated further and soon struck an MOU with LOOKNorth, targeting the development of remote sensing technologies for oil and gas. The first project born from this collaboration was the Airborne Microseep Mapping Project, investigating an innovative remote sensing technology to map oil and gas reservoirs and oil sands steam chambers. This technology could be used to more accurately locate oil and gas resources for significantly lower costs than current seismic survey methods and with virtually non-existent environmental impact.

Moving From Here to There

An MOU signed with the Canadian Energy Pipeline Association (CEPA) led to the launch of a multi-year research program for sustainable development of the Canadian pipeline industry. A multi-stakeholder steering committee consisting of representatives from the pipeline industry, the National Energy Board, and CEPA will oversee this program. The first priority of this program is to address pipeline abandonment, and to this end five projects are planned for launch through the program in 2013. PTAC, with support from CEPA and Alberta Innovates EES, will launch a technology roadmap focused on finding solutions for the transportation of Canada’s bitumen to existing and emerging markets.

Programs

PTAC continued to provide support services to Small and Medium Enterprises (SMEs) in collaboration with the National Research Council of Canada (NRC) Industrial Research Assistance Program (IRAP) and to facilitate the Alberta Upstream Petroleum Research Fund (AUPRF) in 2012. Once again, these programs yielded significant benefits for program participants, PTAC members, and the Canadian hydrocarbon energy industry.

Expanding the Reach of Environmental Research

In 2012, PTAC once again facilitated the Alberta Upstream Petroleum Research Fund (AUPRF), a program providing funding for peer-reviewed environmental research studies focused on air, ecological, soil and groundwater, and water issues. PTAC facilitated 29 AUPRF projects that were collectively awarded $2.1 million in Broad Industry Initiative (BII) funding, and subsequently leveraged additional funding for a total of over $8.6 million. PTAC’s successful leveraging of matching funding for the 2012 water projects freed up over $300,000 for additional research projects focused on the CAPP Hydraulic Fracturing Operating Practice principles. These additional projects are identified through the CAPP Water Task Force and the PTAC Water Innovation Planning Committee.

A key component of the AUPRF program has always been the dissemination of research results. Although PTAC’s four annual Environmental Research forums attracted 365 participants in 2012, the organization recognized the need for additional avenues of communication. In 2012 PTAC pursued expanded outreach, building closer ties with the CAPP Public Affairs department and also June Warren-Nickle’s New Technology Magazine to coordinate more effective coverage of research results. PTAC also struck an agreement with the Alberta Land-Use Knowledge Network to further disseminate project results and encourage translating research into industrial realities. PTAC submitted a Notice of Intent to the Networks of Centres of Excellence – Knowledge Mobilization Competition seeking support for a proposal to disseminate outputs of Canadian energy and environmental research to end users in industry and government. In addition, PTAC has established an agreement with the Society of the Petroleum Engineering (SPE) wherein results from various AUPRF projects may be published in the Journal of Canadian Petroleum Technology.
Breaking Down Barriers for SMEs

Small and Medium Enterprises (SMEs) are often at the forefront of innovation and development of emerging technologies. However, significant barriers often exist for these small companies trying to bring their ideas to market. With the support of IRAP, PTAC upheld their mandate to help SMEs overcome barriers and launch innovations to benefit the hydrocarbon energy industry.

Through the 2012 program, PTAC staff and contracted subject experts provided practical support, helping SMEs move their technologies forward in a value-added manner. This support included facilitating communication to help SMEs better understand industry needs and adapt their technologies accordingly, providing in-depth advice to guide SMEs marketing efforts for their technologies, and facilitating technology information sessions (TISs) for 12 PTAC SME members. In addition, PTAC subject experts and staff helped SMEs identify funding sources and opportunities for collaboration to advance their technology projects. PTAC’s 2012 conferences, forums, information sessions and technical steering committee meetings provided opportunities for over 50 SMEs to present their research and technologies to a broad gathering of industry stakeholders.

PTAC hosted the second annual SME Showcase of Technologies in March 2012. This event showcased ten new and emerging technologies and processes developed by Canadian entrepreneurs. The technologies presented specifically addressed innovative oil, gas, and oil sands applications for exploration, production, and environmental protection. Through this event, successful SMEs were able to increase their market share within the hydrocarbon energy industry.

Projects

Effective project management was at the heart of PTAC’s 2012 operations, leveraging collaborative expertise and funding to advance technology from pure research to industry application. 2012’s slate of projects spanned all phases of the process, from initial launch through ongoing discovery and finally completion and dissemination of results. PTAC launched 38 new projects in 2012. In addition, technical steering committees made extensive progress as they continued to facilitate ongoing projects and field pilots. Several other projects reached completion, including the Innovative Application of Electricity to the Oil Sands Project, Stationary Engines Air Emissions Study, the Evaluation of REMVue for Low Horsepower Engines and numerous AUPRF projects. Results for all completed projects were disseminated in accordance with the guidelines set out for each project.

New Project Highlights

Improve Oil and Gas Recovery

PTAC’s Altering Wettability Project was launched in December 2012 and is strategically positioned at the forefront of multistage hydraulic fracturing (MHF) research. MHF transformed the natural gas industry when new applications of this technology proved both economical and effective at extracting deposits from shale and tight gas formations. In the past year, MHF has also been applied successfully to tight oil deposits. During the course of 2012, PTAC worked diligently to identify industry needs and explore additional applications for this technology. Out of this research, PTAC launched the Altering Wettability Project spring-boarding from advancements made by 3M and the University of Texas. This project seeks to reduce capillary pressure and increase the mobility of liquids, increasing the relative permeability and production of gas, condensate, and liquids. A number of additional opportunities for collaboration are also being considered for 2013.

Manage Environmental Impacts

Within the 2012 ‘Manage Environmental Impacts’ portfolio, PTAC launched the groundbreaking Nationally Appropriate Mitigation Actions (NAMA) project as well as two additional projects under the direction of the TEREE Steering Committee.

In collaboration with Environment Canada, NRCan, Ecopetrol and Pemex, PTAC launched the NAMA project in January 2012 to address the impact of emissions from short-lived climate pollutants. The project seeks to develop nationally appropriate mitigation actions (NAMAs) for reducing greenhouse gas emissions – this means measurable and verifiable reductions to GHG emissions that will enable mitigation action and access to financing under future climate agreements. PTAC’s NAMA project is being managed and guided by two steering committees focusing their activities in Mexico and Colombia. These steering committees consist of representatives from Mexico and Colombia, Environment Canada, NRCan, and PTAC. The selection of PTAC as Project Administrator has set a unique precedent given that international climate change funding has historically gone to international development banks. Funding for the NAMA project is being managed using the Cancun Agreement Fast-Start financing mechanism. Environment Canada contributed $3 million to help reduce fugitive methane emissions in the oil and gas sector in Mexico and Colombia. $1.1 million of this contribution was marked for spending prior to March 31, 2012 and the remaining $1.9 million is to be spent from April 1, 2012 to March 31, 2013.

Under the TEREE steering committee, PTAC’s ambitious Zero Emissions Well Site Project is testing the use of solar energy in combination with high efficiency motors to operate pneumatic...
instrumentation and chemical injection pumps. If successful, the volume of emissions to operate these devices would be drastically reduced.

The Best Management Practice Summaries Project is examining the effectiveness of distilling existing Best Management Practices documents into field-friendly digital reference guides. The pilot is focused on converting the Efficient Use of Fuel Gas in Glycol Dehydrators BMP into a digital summary accessible through an app for tablets or smartphones. Should the pilot be successful, consideration will be given to resource the conversion of all BMPs to the new format.

Improve Value-Added Products
Stemming from the successful Clean Bitumen Technology Action Plan, PTAC’s Creating More Value from Asphaltenes Project is investigating methods to directly transform asphaltenes into more valuable products such as transportation or petrochemical fuels. In 2012, this project undertook a worldwide search for outside-the-box solutions from experts and companies both within and outside the petroleum industry.

Building upon their new partnerships and expanding interest in pipeline-related technologies, PTAC initiated the Transmission Pipeline Roadmap project working in collaboration with the Pipeline Engineering Centre at the University of Calgary.

Ongoing Projects
In their continuing efforts to develop an economical and sustainable solution to lift water for shallow gas, PTAC began bench-testing for the Shallow Gas De-Watering Pump Consortium project. Each of the cutting-edge pumping technologies developed by the five selected vendors were installed at C-FER test sites. The testing period will continue into 2013 to maximize the chance of success in field trials and accommodate facility availability. This project is set to be completed at the end of Q4 2013.

Work also continued on PTAC’s Hot Water Vapour Injection Process project, developing a new technology to reduce greenhouse gas (GHG) intensity while improving recovery from conventional and non-conventional resources. HWVP will result in lower GHG emissions, and minimize both water usage and land impact compared to alternative EOR approaches for heavy oil resources in Alberta and Saskatchewan. The successful commercialization of a new heavy oil EOR technology could open the door for adapting the same technology to cold-produced oil sands.

The Alberta CO₂ Purity Project continued throughout 2012 under the sound direction of the project steering committee and sub-committees. Establishing CO₂ purity principles and policy is a fundamental uncertainty facing the deployment of Carbon Capture and Storage (CCS). The nearly completed Phase 1 of the study investigates the optimal balancing point for purity as it pertains to four different stages - capture, transportation, EOR and sequestration. Currently over 40 organizations are participating in this study, providing superb financial leverage to individual participants. An increased scope has been developed for Phase 2 of the study, which will commence once funding has been secured.

Concluded Projects
Seeing a project through to completion is as much a part of PTAC’s project management strategy as launching new endeavors.

The Stationary Engines Air Emissions Study was completed in 2012 to establish a better understanding of the relationship between NOx and GHG emissions and fuel consumption for typical natural gas internal combustion engines used for gas compression in the upstream oil and gas industry. Of particular interest is the impact of various retrofit NOx reduction technologies on these parameters. The results of the research study will be used to help establish new NOx emission limits for this type of equipment.

The results report for the completed first phase of the Wellsite Abandonment Project was delivered to project sponsors in early 2012 with the goal of encouraging integration of this new information into operations.

In June 2012, PTAC completed the ‘Innovative Applications of Electricity in the Oil Sands’ study, a project that evaluated the technical and economic prospects of applying novel electricity-based technologies to SAGD bitumen production, bitumen upgrading and other emerging technologies for in situ bitumen production from oil sands. Results of the study are expected to be shared in late 2013, as per the project guidelines.

Events
PTAC is committed to communicating project results in a timely manner. PTAC’s 2012 events provided several opportunities throughout the year for industry and government stakeholders to learn about current and ongoing research while creating networking opportunities for members. In due course, feedback from these events was overwhelmingly positive.

During the course of 2012 PTAC facilitated:
• 12 Technology Information Sessions (TIS) attended by 415 participants
• Seven forums that attracted over 500 participants
• Four workshops that engaged 219 stakeholders in meaningful discussion.
Among these events was the first in a series of international workshops planned as part of the NAMA Project. This first workshop on reducing GHG emissions from oil and gas operations in Canada, Mexico, and Colombia focused on heavy oil operations and included a three-day classroom component simultaneously translated from English to Spanish as well as two organized site tours. Nine representatives each from Colombia (Ecopetrol) and Mexico (Pemex) attended the workshop. Additional personnel from NRCan’s CanmetENERGY research facility in Devon also attended.

PTAC also facilitated two sessions from the 2012 SPE Heavy Oil Conference, which was held in conjunction with the 2012 Global Petroleum Show. The conference brought together 850 participants from throughout the Canadian hydrocarbon energy industry to explore new opportunities for innovation and technology.

The overarching goal of PTAC’s five-year plan is to tangibly increase industry’s capacity for IRD3 (Innovation, Research, and Technology Development, Demonstration, and Deployment). As they race towards this goal, PTAC will maintain their strong pace by proactively assessing long term industry needs, identifying immediate challenges, and fostering collaboration to explore innovative technology solutions. In 2013, partnerships with innovators across an even wider variety of disciplines and expanded avenues of communication for research results will further strengthen PTAC’s position as the industry facilitator of choice for technology development projects.

Projects

Project management will remain at the forefront of PTAC’s 2013 activities with significant progress expected across PTAC’s entire roster of Technology Portfolios:

Manage Environmental Impacts
PTAC’s TEREE Steering Committee will continue to review and evaluate technology development opportunities, launching new projects that garner significant industry support. Technologies under active consideration include Organic Rankine Cycle devices, waste energy transformation, energy storage, and energy efficiency and measurement of air emissions. PTAC will also continue to collaborate with CAPP and the ERCB informing smart regulations for well abandonment and the facilitation of novel approaches.

Under the direction of the NAMA steering committee, PTAC will continue to facilitate the NAMA project in 2013. Field measurement campaigns in Colombia and Mexico are scheduled to be completed in the first quarter of the year. This bottom up approach will allow for the development of NAMAs that are based upon these comprehensive measurement studies, enabling the successful development of projects, programs or policies. As part of this project, PTAC will host the 2013 NAMA Workshop (the second Canadian project workshop). Twenty delegates from both Colombia and Mexico will participate in this five day workshop focusing on key areas to improve and demonstrate GHG reductions such as CO₂ for enhanced oil recovery, carbon capture and storage, and waste heat recovery. Relevant Canadian technology and service providers will have an opportunity to present their solutions to delegates. The workshop will include site visits to two Alberta facilities.
Phase II of PTAC’s successful CO₂ Purity Project is expected to launch in 2013 furthering research and technical analysis on various impurities to determine the optimum levels. Findings will be quantified economically as implications of impurities are directly related to cost.

**Improve Oil and Gas Recovery**  
Canada’s high-profile oil sands plays present ample challenges and opportunities – fertile ground for innovation and technology development. In 2013, PTAC will explore new well configurations, reservoir recovery methods, and issues related to the wind-down of SAGD projects. Intense interest is currently focused on improving surface facilities. PTAC industry committees have conceived of a number of potential solutions related to partial upgrading technologies and the value of limited pipeline shipments. These solutions are expected to result in collaborative technology development projects in 2013. At the same time, PTAC will continue to facilitate joint projects selected by operators in the highly competitive tight oil and gas segment.

**Reduce Capital, Operating and G&A Costs**  
2013 presents an array of exciting new technology trends poised to impact the petroleum industry. These technologies are expected to result in improved operational effectiveness and cost reductions, while others may yield value-added products and services. In 2013, PTAC will explore new applications of technologies such as cloud computing, geomatics, remote sensing, and photonics. PTAC’s 2013 projects will examine the application of these leading-edge technologies in safety, reservoir modeling, facilities, project development, and energy efficiency.

**Improve Value-Added Products**  
In the past year, bitumen pipeline capacity limitations have been recognized as a major challenge facing the industry. The technology community has responded with a number of novel concepts at varying stages of development, from initial ideas through to near-commercialization. In 2013, PTAC will review these proposed technologies, working closely with interested operators and PTAC committees to advance promising technologies. At the same time, much public attention is currently focused on the related opportunity for enhanced pipeline technology, especially the safe abandonment of pipelines and the reliable transportation of bitumen. PTAC is at the leading edge of these challenges, and in 2013 will continue to build upon the MOU with CEPA launching as many as five projects exploring safe pipeline abandonment. PTAC will also pursue the formation of a Centre of Excellence that would vastly expand the existing research, technology development and commercialization related to environmentally sustainable and safe delivery of hydrocarbon energy resources to existing and emerging markets.

**Programs**

In 2013, PTAC will continue to work closely with existing partners to facilitate the successful programs they have developed over the past years, ultimately enhancing value for their members through the modest expansions planned for these programs.

**AUPRF**  
PTAC will continue to promote and facilitate the AUPRF program with the launch of 30 environmental research projects in 2013. In addition to the annual series of events, PTAC will also begin rolling out research results through new channels of communication including industry journals.

**NRC-IRAP Small and Medium Enterprises (SMEs)**  
With the support of IRAP, PTAC will provide enhanced services to SMEs and form consortia to further develop, field test, and commercialize SME technologies. PTAC anticipates this expansion will lead to the formation of a Virtual Technology Commercialization Centre at PTAC. In the fall of 2013, PTAC will host the third SME Showcase of Technologies event, and in spring PTAC will offer SMEs an “Oil and Gas Principles 101” seminar/webinar focusing on challenges, opportunities, trends, and the future direction of the hydrocarbon energy industry.
Projects or New Project Phases Launched in 2012

In 2012, PTAC facilitated the launch of 38 new research projects and project phases to address industry challenges.

**Improve Oil and Gas Recovery**
- Altering Wettability

**Improve Value-Added Products**
- Creating More Value from Asphaltenes
- Pipeline Abandonment Research Program
- Transmission Pipeline Roadmap
- Geomatics Workplan
- Remote Sensing Technology Action Plan

**Manage Environmental Impacts**
- Zero Emissions Well Site
- Best Management Practices Summaries
- Nationally Appropriate Mitigation Actions (NAMA)

Among the 2012 projects, PTAC facilitated 29 AUPRF projects which were awarded $2.1 million in AUPRF funding. Additional funding from government, institutions, and stakeholders resulted in a consolidated value of over $8.6 million for the following projects.

**AUPRF**

**Air**
- Emissions from Flares with Non-Hydrocarbon Liquids in the Flare Stream
- Understanding and Improving Management of VOCs from the Upstream Oil and Gas Industry
- Evaluation of Trace Emissions on Non-Criteria Air-Contaminants in the Upstream Oil and Gas Industry
- Evaluation of Air Emissions Associated with Hydraulic Fracturing
- Field Measurement of Black Carbon Emissions from Flares
- Development of an Updated Screening Model and Method for Routine and Non-Routine Flaring Spreadsheet Development of a Model to Predict Benzene Emissions from Glycol Dehydrators with Condensation Tanks

**Ecological**
- Cumulative Effects and Assessment: Predicting Direct and Indirect Effects of Energy Developments
- Removing the Wellsite Footprint - Phase II: Wetland Reclamation and Extended Monitoring of Upland Phase
- Assessing Spatial Factors Affecting Predation Risk to Boreal Caribou Calves: Implications for Management
- The Role of Predation in Woodland Caribou Declines in West Central Alberta (Year 2)
- Use of Anthropogenic Linear Features by Alternative Predators in Woodland Caribou Range
- Evaluating the Revegetation Success of Foothills Fescue Grassland
- Disturbance Zones of Influence on Boreal Songbird Communities in Northern Alberta
- White-tailed Deer Distribution and Density in Alberta’s Boreal Forest
- Evaluating the Ecological Risk of Oil and Gas Development on Ferruginous Hawks - Year 2
- Grizzly Bears and Pipelines: Response to Unique Linear Features
- Updated Industrial Revegetation Guidelines for the Mixed Grass Prairie Natural Subregion

**Soil**
- Synthesis of Boron Plant Toxicity Data, Irrigation Data, and Fate and Transport Modeling to Generate Boron Guideline Recommendations for Soil and Groundwater
- Validation of Petroleum Hydrocarbon Stratified Remediation Subsoil Criteria
- Implementation of Subsoil Sodium Adsorption Ratio Guidelines into the Alberta Environment Subsoil Salinity Tool
- Vapour Emissions During Ex Situ Remediation Activities: Model Calibration, Evaluation of Biofilters, and Screening Tool Development
- Eco-Toxicity of Sulphate Relative to Chloride
- Fresh Water Aquatic Life Chloride
- Alternative Process for Developing a Tier 2 SSRO

**Water**
- Regional Groundwater Assessment Monitoring
- Integrated Assessment of Water Resources for Unconventional Oil and Gas Plays, West-central Alberta
- Fracturing Fluid Additive Risk Assessment and Selection Tool
- Development of a Risk-based Criteria for the Treatment of Saline Water from Source Wells that would Allow Storage in Unlined Earthen Pits and Transportation via Overland Pipelines
- Socio-Enviro Impact of Increasing Water Use in the Duvernay Formation

**Project Expenditure**
Since inception in 1996, PTAC has facilitated the launch of 396 projects or new project phases with project costs equaling $178.7 M. Of those, PTAC facilitated 38 new projects or project phases with total project funding equaling $14.7 M in 2012. This year marks a milestone in PTAC’s history, with 2012 projects generating the highest revenue to date.
Technical Steering Committees

In 2012, PTAC facilitated 19 Technical Steering Committees, and 12 sub-committees.

**Enhanced Environmental Management**
- Air Research Planning Committee (ARPC)
- Soil and Groundwater Research Committee (SGRC)
  - Boron Working Group (BWG)
  - Salinity Working Group (SWG)
  - Fresh Water Aquatic Life Chlorides Group (FWAL)
  - Background Metals and Salinity Database Group (BMSD)
- Ecological Research Planning Committee (ERPC)
- Water Innovation Planning Committee (WIPC)
- Technology for Emission Reduction and Eco-Efficiency Steering Committee (TEREE)
  - Wellsite Abandonment Project Committee (WAPC)
  - Stationary Engines Testing Project Committee (SETP)
  - Low Horsepower Engines Project Committee (LHEP)
  - Best Management Practices Summaries Project Group (BMP)
  - Distributed Energy Efficiency Projects Platform Steering Committee (DEEPP)
- Alternative Energy Solutions Committee (AESC)

**Improved Oil and Gas Recovery**
- Artificial Reservoir Project Steering Committee (ARPSC)
- Altering Wettability Project Evaluation Committee (AWP)
- Hot Water Vapour Process Project Steering Committee (HWVP)
- Shallow Gas Well De-watering Pump Consortium Steering Committee (SGWPC)
- Ultra Lightweight Proppant Project Steering Committee (ULWP)
- Clean Bitumen Technology Action Plan Steering Committee (CBTAP)
  - CBTAP In Situ Recovery Committee (CBTAP SIR)
  - CBTAP Workshop Committee (CBTAP WC)

**Reduce Capital, Operating, and G&A Costs**
- Airborne Microseep Mapping Project Evaluation (AMMP)
  - CBTAP Innovative Applications of Electricity for Oil Sands Development Steering Committee (CBTAP IAEOS)

**Improve Value-Added Products**
- CBTAP Upgrading and Value-Added Committee (CBTAP UVAC)
- Creating More Value from Asphaltenes Steering Committee (CVA)
- Asphaltenes Conversion Project Evaluation (CVA Conversion Project)
- Pipeline Abandonment Research Steering Committee (PARSC)
- CO$_2$ Enhanced Hydrocarbon Recovery (CO$_2$ EHR)
- Nationally Appropriate Mitigation Actions (NAMA)
Member Services

PTAC offers a variety of services to its members, and provides a broad array of opportunities to become involved in IRD3 to further the Canadian hydrocarbon energy industry. For more information on the many benefits of PTAC membership please visit our new website at www.ptac.org.

Facilitating Projects

PTAC provides industry with a neutral forum to work in collaboration, leveraging collective experience and expertise to identify opportunities, challenges, and potential solutions that require research or technology development. These discussions can lead to joint-industry projects where PTAC, as a neutral facilitator, assists with soliciting proposals and launching projects through a fair and balanced process. PTAC also identifies existing R&D to raise industry awareness and minimize duplication.

Connecting Technology Information Sessions

As a service to members, PTAC facilitates Technology Information Sessions (TISs) for interested companies, providing benefits to both the presenting company and all those in attendance. The company presenting is provided a forum to solicit interest, gather feedback, invite participation or seek potential funding for new research and development projects. TISs may also serve to help a member company identify industry partners to complete proposed research or technology development such as field tests or pilot sites. TISs also provide a targeted opportunity to report back to industry on field test or pilot results and provide information on new technology-related services. For our service and supply members, a PTAC TIS can be an excellent method of marketing new technology to the Canadian oil and gas industry. Attending a PTAC TIS provides industry stakeholders with the opportunity to learn about new projects and ideas through a targeted, facilitated presentation.

Engaging Forums and Workshops

Focusing on broader needs or larger technical areas, PTAC forums are comprised of presentations detailing new technologies, case studies, and objectives and results of current research. Presentations always provide opportunities for questions and answers. The goal of PTAC forums is to bring together the most up to date information from across the industry into an enriching learning experience. PTAC workshops provide opportunities for participants to work collaboratively in focused groups to clearly define research and development issues, identify potential solutions, and select the best approach to move forward. Workshops provide a venue for Industry members to candidly share their needs so that R&D providers hear about issues firsthand. Solutions are formed by leveraging the collective expertise and ideas of all participants, while protecting proprietary interests. PTAC hosts all workshops and is pleased to provide the necessary facilitation, administrative support, and coordination to launch projects once identified.

Informing Knowledge Centre

The PTAC Knowledge Centre provides public access to nonproprietary technical information on commercially available oil and gas technologies pertinent to the hydrocarbon energy industry. The Knowledge Centre offers advice on access to technical databases to meet the educational, informational, and technical needs of the user community.
The Knowledge Centre Manager provides services to SMEs, technical steering committees, project performers, researchers, and others to help identify technologies and research needs, avoid duplicate research, and monitor industry trends. Services for PTAC members include advice on technical document and journal article retrieval and contact information for subject experts in industry, government, and academia. PTAC members are invited to provide non-proprietary technical information on their technologies to PTAC for display in the Knowledge Centre. Relevant materials are accepted on an ongoing basis.

Collaborating Technical Steering Committees

PTAC Technical Steering Committees consist of PTAC members representing various industry sectors, governments, and non-governmental associations. These technical steering committees help to identify opportunities for collaborative research and technology development, raise awareness of existing research and technology through planning events, find solutions to challenges through the process of soliciting proposals and launching new projects, and promote involvement by informing appropriate colleagues of Technical Steering Committee activities.

Communicating Member Communications

PTAC is committed to ensuring effective communication with members. The PTAC website, with a fresh new look and simplified interface, provides members with access to the most up-to-date information on PTAC projects, events, and activities as well as an extensive archive.

2012 Volunteer Recognition Awards

PTAC’s volunteers are second to none, and we are pleased to recognize the recipients of those who go above and beyond.

Corporate Leadership Award
Nexen Inc.

Chairman’s Award
Subodh Gupta, Cenovus Energy Inc.

President’s Award
Nestor Zerpa, Nexen Inc.

Air Quality Research Leadership Award
Brian Ross, Nexen Inc.

Air Quality Technology Leadership Award
Dave Bakker, Suncor Energy Inc.
Sean Hiebert, ConocoPhillips Company
Milos Krnjaja, Cenovus Energy Inc.

Ecological Leadership Award
Mark Sherrington, Shell Canada Energy

Soil and Groundwater Research Leadership
Susan Halla, Energy Resources Conservation Board

Water Innovation Leadership Award
Keith Minnich, Talisman Energy Inc.

Eco-Efficiency Leadership Award
Joe Dusseault, Cenovus Energy Inc.

Resource Emissions Management Leadership Award
Doris Weiss, Devon Canada Corporation

Enhanced Oil Recovery Leadership Award
Kelly Edwards, Barrick Energy Inc.

Commercializing Technology Award
Monica Varga, NRC-IRAP

Completion Innovation Leadership Award
Brad Wilson, Murphy Oil Company Ltd.

Cost-Reduction Award
Joe Dusseault, Cenovus

Distinguished Service Award
Michael Gatens, Unconventional Gas Resources Canada
David Layzell, ISEE University of Calgary
Alex Ferguson, British Columbia Oil and Gas Commission
Chris Lehecka, ConocoPhillips Canada
Fred Hutchings, Maxxam Analytics
Board of Directors
(As at December 31, 2012)

Dave Rushford, Chair Senior Vice-President and Chief Operating Officer Quicksilver Resources Canada Inc.

Soheil Asgarpour, President, PTAC Petroleum Technology Alliance Canada

Randy Cormier, General Manager, Research and Development Nexen, Inc.

Mike W. Ekelund, Assistant Deputy Minister, Strategic Initiatives Division Alberta Department of Energy

Donna Garbutt, President Schlumberger Canada Limited

Eddy Isaacs, Chief Executive Officer Alberta Innovates – Energy and Environment Solutions

Paul Jeakins, Commissioner and CEO British Columbia Oil and Gas Commission

Mark Johnstone, Independent

Dan McFadyen, Chairman Energy Resources Conservation Board

Ken Putt, Independent

Randy Rudolph, Executive Vice President, Developing Markets Millennium EMS Solutions Ltd.

Earle Shirley, Past Chair, Independent

Kevin Stashin, President and CEO NAL Resources

Chuck J. Szmurlo, Vice President, Alternative and Emerging Technology Enbridge Inc.

Murray Todd, President and CEO Canada Hibernia

Committee Volunteers

• Salim Abboud, Alberta Innovates – Technology Futures (BMSD)
• James Agate, Canadian Natural Resources Limited (SGRC, FWAC)
• Ken Anderson, Shell Canada Resources (WAPC)
• Mark Anderson, Husky Energy Inc. (ARPC)
• Chris Allaway, Environment Canada (FWAC)
• James Armstrong, Encana Corporation (WIPC)
• Garth Ayres, Interpipeline Fund (CO, EHR)
• Mehaboob Azeez, Penn West Exploration (ULWP)
• Victoria Bachmann, Alberta Department of Energy (TEREE)
• Stefan Bachu, Alberta Innovates – Technology Futures (CO, EHR)
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• Dave Balke, Suncor Inc. (SETP)
• Blair Batchelor, Environment Canada (SETP)
• Richard Bean, Apache Corporation (WAPC)
• James Beck, Suncor Energy (ARPC)
• Lane Becker, Larcina Energy Ltd. (WAPC)
• Ashaf Beleke, Impenal Oil Resources (SGRC, BWG, SWG)
• Rodger Bernar, Husky Energy, (CBTAP Workshop Committee, CVA Conversion Project)

• Tara Bernat, Encana Corporation (ERPC)
• Luis Betancourt, Pemex (NAMA)
• Elise Bieche, CAPP (ARPC)
• Fauve Blanchard, Devon Canada Corporation (ERPC)
• Javier Bocanegra, Pemex (NAMA)
• Mark Bohm, Suncor Energy Inc. (TEREE)
• Daniel Booy, C-FER Technologies (SGWPC)
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• Mark Boulton, Suncor Energy (ERPC)
• Ken Bradley, Sky Hunter (AMMP)
• Don Bradshaw, Alberta Department of Energy (CO, EHR)
• David Braun, Shell Canada Resources Ltd. (ULWP, AWP)
• Mike Brennan, TransCanada Pipeline (SETP)
• Don Brick, Spartan Controls (TEREE, DEEPP)
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• Imad Brohi, Pengrowth Management Ltd. (CO, EHR)
• Stephen Bromley, Husky Energy Inc. (SGRC, BWG, FWAC)
• Ken Brown, Petroleum Technology Research Centre (ARPSC, CBTAP, CBTAP SIR, CBTAP UVAC)

• Frank Brunner, Fekete Associates Inc. (ULWP)
• Jon Bryan, Devon (HWVP)
• Ian Bryden, Penn West Exploration (CO, EHR)
• Cesar Buitrago, Ecopetrol (NAMA Committee)
• Victoriano Calderon, Pemex (NAMA Committee)
• James Callbeck, Husky Energy Inc. (HWVP)
• Jamie Callendar, Encana Corporation (TEREE)
• Kelly Campbell, Devon Canada Corporation (TEREE, DEEPP)
• Scott Cantwell, Maxxam Analytics (BWG, SWG, BMSD)
• Shauna Cartwright, Energy Resources Conservation Board (SGRC)
• Pierre-Yves Caux, Environment Canada (TEREE)
• Chi Chen, Alberta Environment Sustainable Resource Development (BMSD)
• David Chittick, TransCanada Pipelines (PARSC)
• Bill Clay, Enerplus Corp. (SGWPC)
• Paul Clark, Vision Gain Consulting (CBTAP UVAC)
• Todd Cole, MEG Energy Corp. (TEREE)
• Gary Cook, Capital Power (CO₂, EHR)
• Bob Corbet, Access Analytical Laboratory Inc. (BWG, SWG, BMSD)
• Randy Cormier, Nexen Inc. (CBTAP, CBTAP SIR, CBTAP IAEOS)
• Gokhan Coskuner, Husky Energy Inc. (HWVP)
• Cal Coulter, Suncor Energy (AMMP)
• Kathy Cox, Enerplus Corporation (SGRC, FWAC)
• Robert Craig, Integrated CO₂ Network (CO₂, EHR)
• David Cuthill, Laricina Energy Ltd. (ARPSC)
• Ted Cyr, Alberta Department of Energy (TEREE)
• Gur Dhaliwal, Alberta Department of Energy (TEREE)
• Alex Dickson, CETAC West (TEREE)
• Gordon Dinwoodie, Alberta Environment Sustainable Resource Development (SGRC, BWG, SWG, FWAC)
• Randy Dobko, Alberta Environment Sustainable Resource Development (ARPSC)
• Cam Dowler, Spartan Controls (TEREE, LHPR DEEPP)
• John Drennan, Trident Exploration (WAPC)
• Keith Driver, The Prasino Group (DEEPP)
• Bonnie Drozdowski, Alberta Innovates – Technology Futures (BMSD)
• Russ Duncan, Sky Hunter (AMMP)
• Bruce Duong, Alberta Innovates – Technology Futures (CBTAP IAEOS)
• Joe Dusseault, Cenovus Energy Inc. (TEREE)
• Kelly Edwards, Harvest Operations (CO₂, EHR)
• Goel Edworthy, Nexen Inc. (CBTAP IAEOS)
• Curtis Eickhoff, Maxam Analytics (BWG, SWG, BMSD, FWAC)
• Russell Engelman, Suncor (ARPSC)
• Carol Engstrom, Husky Energy Inc. (ERPSC)
• Henry Ewa, Energy Resources Conservation Board (ARPSC)
• Craig Fairbridge, Natural Resources Canada (TEREE, CBTAP UVAC)
• Mark Fawcett, LOOKNorth (AMMP)
• Christeen Finzel, Alberta Environment (CO₂, EHR)
• Allison Fisher, Shell Canada (ARPC)
• Glynn Fox, BC Oil and Gas Commission (BWG, SWG)
• Geoff Frazer, Devon Canada Corporation (TEREE, SETP, LHEP)
• Larry Frederick, Husky Energy Inc. (CBTAP SIR)
• Ian Freeland, Devon Canada Corporation (HWVP)
• Sarah Fulton, Penn West Exploration (WAPC)
• Chris Garfield, 3M Canada – Oil and Gas Division (ULWP, AWPC)
• Genaro Gelves, 3M Canada – Oil and Gas Division (ULWP, AWPC)
• Bob Gerwung, Athabasca Oil Corporation (TEREE)
• Greg Gill, Kinder Morgan (PARSC)
• Patricia Gilles, Environment Canada (FWAC)
• Marc Godin, Fortis Energy (TEREE, CO₂, EHR)
• Shirley Graham, AGAT Laboratories Ltd. (BWG, SWG, BMSD)
• Bruce Greenfield, Energy Resources Conservation Board (ERPSC)
• Martyn Griggs, CAPP (CBTAP WC)
• Scott Grindal, ConocoPhillips Canada (ERPSC)
• Rodney Guest, Suncor Energy (WIPC)
• Karin Guiquer, Franz Environmental Inc. (BWG, SWG, BMSD)
• Anil Gupta, Alberta Environment Sustainable Resource Development (WIPC)
• Subodh Gupta, Cenovus Energy Inc. (ARPSC, CBTAP SIR, CBTAP IAEOS, CBTAP UVAC)
• Nicole Haakenson, Nexen Inc. (ERPSC)
• Susan Halla, Energy Resources Conservation Board (SGRC, BWG, SWG)
• Maggie Hanna, Suncor Energy Inc. (TEREE)
• Michael Harrass, Borax (BMSD)
• Brent Harrison, Encana Corporation (WAPC)
• Brian Harshnitz, JACOS - Japan Canada Oil Sands Limited (CBTAP)
• John Harvey, Encana Corporation (TEREE)
• Phil Heaton, Maxam Analytics (BWG, SWG, BMSD)
• Greg Heffel, PennWest Exploration (ULWP)
• Larry Hegan, Natural Resources Canada NRCan (CO₂, EHR)
• Jackson Hegland, ARC Resources Ltd. (TEREE)
• Brad Herald, CAPP (WAPC)
• Sean Hiebert, ConocoPhillips Canada (TEREE, SETP, LHEP)
• Andrew Higgins, Canadian Natural Resources Limited (SETP)
• Scott Hillier, ConocoPhillips Canada (WIPC)
• Wayne Hillier, Husky Energy (SETP)
• Lars Hinrichs, Devon Canada Corporation (AMMP)
• Garrett Hoelsema, Talisman Energy Inc. (ARPSC)
• David Hoffman, Enbridge Inc. (PARSC)
• Christopher Holly, Alberta Department of Energy (TEREE, ARPSC, CBTAP, CO₂, EHR)
• Greg Huber, Equilibrium Environmental Inc. (BWG, SWG, FWC)
• Brent Hughes, Nexen Inc. (WAPC)
• Eddy Isaacs, Alberta Innovates – Energy and Environment Solutions (TEREE, CO₂, EHR)
• Alex Isings, 3M Canada – Oil and Gas Division (ULWP)
• Sanjay Jain, Husky Energy Inc. (SETP)
• Scott Johnston, Husky Energy Inc. (ERPSC)
• Mark Johnstone, Suncor Energy Inc. (CBTAP, CBTAP SIR, CBTAP IAEOS, CBTAP UVAC)
• Andrew Jones, Calgrena Energy Services (WAPC)
• Don Jones, Apache Corporation (WAPC)
• Adam Judd, Nexen Inc. (ERPSC)
• Lavertu Karine, Environment Canada (SETP)
• Stephen Kaufman, Suncor Inc (CO₂, EHR)
• Tom Keelan, Energy Resources Conservation Board (CBTAP SIR, CBTAP WC, CBTAP UVAC)
• Jerry Keller, Alberta Environment (TEREE)
• Steven Kelly, Husky Energy Inc. (ULWP)
• James Kenny, Cimmaron Engineering (CO₂, EHR)
• Jody Klassen, Environment Canada (FWAC)
• Timothy Klone, Cenovus Energy Inc. (SETP)
• Anthony Knafla, Equilibrium Environmental Inc. (BWG, SWG, FWC)
• George Koh, Cenovus Energy Inc. (SETP)
• Prit Kotecha, Suncor Energy (SGRC)
• Orest Kotello, Canadian Natural Resources Ltd. (WAPC)
• Glenda Kowlessar, Encana Corporation (ARPSC)
• Milos Krajaca, Cenovus Energy Inc. (TEREE, LHEP, SETP, DEEPP, BMP)
• Steve Kullman, Husky Energy Inc. (SGRC, FWAC, BMSD)
• Bob Kutzaik, Nexen Inc. (WIPC)
• Andrea Lamond, Encana Corporation (TEREE)
• David Lamont, ConocoPhillips Canada Ltd. (CO₂, EHR)
• Ergun Larsen, Cenovus Energy Inc. (WAPC)
• Michael Layer, Natural Resources Canada NRCan (ARPSC, NAMA)
• Chris Lebecka, ConocoPhillips Canada (CBTAP)
• Don Leung, Canadian Natural Resources Limited (SETP)
• Anita Lewis, Energy Resources Conservation Board (WAPC)
• Frank Lin, Husky Energy Inc. (CO₂, EHR)
• Darlene Lintott, Exova (BWG, SWG, BMSD)
• Joanne Little, Alberta Environment Sustainable Resource Development (FWAC)
• Les Little, Alberta Innovates – Energy and Environment Solutions (CBTAP SIR, CBTAP IAEOS)
• Ted Little, Natural Resources Canada (CBTAP UVAC)
• Shunlan Liu, Alberta Innovates – Energy and Environment Solutions (CVA, CVA Conversion Project)
• Warren Lloyd, Encana Corporation (WAPC)
• Sandra Locke, Alberta Department of Energy (CO, EHR)
• Barry Loescher, Maxxam Analytics (BWG, SWG, BMSD)
• Herb Longworth, Energy Resources Conservation Board (CO, EHR)
• Howard Loseth, Saskatchewan Ministry of Energy and Resources (CBTAP)
• John Lucic, Nexen Inc. (WAPC)
• Richard Luhning, Enbridge Pipelines Inc. (CO, EHR)
• Dave Lui, Murphy Oil Corporation (ULWP)
• Stuart Lunn, Imperial Oil Resources (SGRC)
• Neil MacAlpine, Alberta Land Use Knowledge Network (BMP)
• Bill MacFarlane, Nexen Inc. (CBTAP IAEOS)
• Ryan Mackenzie, PennWest Exploration (ULWP)
• Rob Maclean, Ceilidh Environmental Ltd. (BWG, SWG)
• Keith Madsen, Apache Corp (LHEP, SETP)
• Waseem Mahmood, Alberta Department of Energy (TEREE)
• Monty Malik, 3M Canada – Oil and Gas Division (ULWP)
• Julian Mamo, Penn West Exploration (WAPC)
• Vivianne Mansour, Nexen Inc. (ARPC)
• Margaret Marra, Shell Canada (ERPC)
• Adam Martinson, Cenovus Energy Inc. (ERPC)
• Anna Maslowski, Alberta Department of Energy (CO, EHR)
• Nathan Maycher, ConocoPhillips Canada (SETP)
• Sean McCarr, Enmax (CBTAP IAEOS)
• Richard McFarlane, Alberta Innovates - Technology Futures (CBTAP UVAC)
• Doug McMillan, Canyon Technical Services Ltd. (ULWP)
• Michael McMurray, Transgas (SETP)
• Sean Meehan, Penn West Exploration (WAPC)
• Chris Meloche, Husky Energy Inc. (SGRC)
• Mike Miller, Fellete Associates Inc. (ULWP)
• Kathryn Milne, Nexen Inc. (ERPC)
• Keith Minnich, Talisman Energy Inc. (WIPC)
• Ole Mrlaks, ConocoPhillips Canada (SGRC, FWAC)
• Marty Muir, Husky Energy (AWP)
• Tony Nakamura, JACOS -Japan Canada Oil Sands Limited (TEREE, ARPC, CBTAP SIR)
• Rekha Nambiar, Suncor Energy (ARPC)
• Ted Nason, Alberta Environment Sustainable Resource Development (ERPC)
• Clint Nerbas, BP Canada Energy Company (WAPC)
• Stewart Neuman, Calmena Energy Services (WAPC)
• Eugene Ng, Shell Canada Resources Ltd. (WAPC)
• Leigh Noton, Alberta Environment Sustainable Resource Development (FWAC)
• Monica Nowierski, Natural Resources Canada (FWAC)
• Garnet Olson, Canyon Technical Services Ltd. (ULWP)
• Filiz Onder, Encana Corporation (ARPC)
• Koray Onder, ConocoPhillips Canada (ARPC)
• Gerald Palarca, Energy Resources Conservation Board (TEREE, CBTAP)
• Lynn Patenaude, Environment Canada (SETP)
• Shane Patterson, Alberta Environment Sustainable Resource Development (ERPC)
• Pat Payne, Energy Resources Conservation Board (SGRC, BWG, SWG, FWAC)
• Erin Peachey, CAPP (WAPC)
• Bill Pelech, Alberta Environment Sustainable Resource Development (BWG, SWG, FWAC)
• Teresa Pena-Bastidas, 3M Canada – Oil and Gas Division (ULWP, AWPC)
• Alan Pentney, National Energy Board (PARSC)
• Chris Perkins, Cenovus Energy Inc. (WAPC)
• Jeanine Phené, Penn West Exploration (ULWP)
• Krista Phillips, CAPP (SETP)
• David Picard, Clearstone Engineering (NAMA)
• Kelly Piets, C-FER Technologies (SGWPC)
• Jorge Plautch (NAMA Committee)
• Tyler Prediger, Equilibrium Environmental Inc. (FWAC)
• Silviu Potlog, Husky Energy Inc. (ULWP)
• Murray Pow, Husky Energy (AWP)
• Mike Powell, Penn West Exploration (ULWP)
• Rob Power, Alliance Pipeline (PARSC)
• Ron Quick, CETAC West (TEREE)
• Al Rasmussen, Nexen Inc. (TEREE, SETP)
• James Rau, ConocoPhillips Canada (WAPC)
• Jon Remmer, Encana Corporation (ARPC, TEREE)
• Farid Remtulla, Enhance Energy (CO, EHR)
• Bill Reynolds, Natural Resources Canada (CO, EHR)
• George Rhodley, Rhodley and Associates (CBTAP WC, CBTAP UVAC)
• Zoe Robson, Nexen Inc. (WIPC)
• Matthew Robinson, Cenovus Energy Inc. (SETP)
• Brian Ross, Nexen Inc. (ARPC, TEREE)
• Glenn Rovang, Syncrude Canada Ltd. (CBTAP)
• Natasha Rowden, Canadian Natural Resources Limited (ARPC)
• Ziad Saad, Canadian Energy Pipeline Association (CPEA (PARSC)
• Pooja Saint, Suncor Energy Inc. (TEREE, CVA, CVA Conversion Project)
• Roger Saint Fort, Mount Royal University (BWG, SWG, FWAC)
• Jennifer Saldana, Husky Energy Inc. (WIPC)
• Curtis Salz, Nexen Inc. (SETP)
• Cour Sandau, Chemistry Matters (BMSD)
• Gary Sargent, CAPP (ERPC)
• Dave Sask, Encana Corporation (SGWPC)
• William Sawchuck, ARC Resources Ltd. (CO, EHR)
• Dennis Schmitt, Encana Corporation (TEREE, SETP)
• Danny Scott, Encana Corporation (WAPC)
• Jerry Scoular, Husky Energy Inc. (TEREE, DEEPP)
• Jerry Shaw, Devon Canada Corporation (TEREE)
• Mark Sheirington, Shell Canada (ERPC)
• Ken Shewan, Frontier Ltd. (WAPC)
• William Shoykty, University of Alberta (BMSD)
• Tyler Simpson, Devon Canada Corporation (WAPC)
• Surinder Singh, Alberta Innovates – Energy and Environment Solutions (TEREE, CBTAP IAEOS)
• Song Sit, Cenovus Energy Inc. (CBTAP, CBTAP SIR, CBTAP UVAC, CVA, CVA Conversion Project, CO, EHR Committee)
• Harold Slater, Penn West Exploration (WAPC)
• Paul Slobodnik, ConocoPhillips Canada (TEREE, SETP, LHEP, BMP, DEEPP)
• Al Smandych, ERCB - Energy Resources Conservation Board (TEREE)
• Scott Smith, Cenovus Energy Inc. (TEREE, CBTA SIR, CBTA UVAC, CVA Conversion Project)
• Sandeep Solanki, Laricina Energy Ltd. (ARPSC)
• Lisa Solomchuk, Shell Canada Resources Ltd. (SETP)
• Kevin Sonnenberg, EPCOR (WIPC)
• Jim Spangelo, ERCB - Energy Resources Conservation Board (TEREE)
• Steffen Spoelstra, Energy Resources Conservation Board (FWAC)
• Michael St. James, Praxair Canada Inc. (CO2 EHR)
• Darlene Stokes, Talisman Energy Inc. (BWG, SWG)
• Dale Struksnes, Fekete Associates Inc. (ULWP)
• Jack Suggett, Athabasca Oil Sands Corp. (CBTA, CBTA SIR, CBTA WC)
• Charles Szmurlo, Enbridge Pipelines Inc (CO2, EHR)
• Rudy Tamayo, Chevron Canada Limited (WIPC)
• Kali Taylor, Integrated CO2 Network (CO2 EHR)
• Tyler Terry, enmax (CBTA IAEOS)
• Arasu Thirunavukarasu, Government of Saskatchewan (FWAC)
• Steven Thomas, Energy Resources Conservation Board (CO2 EHR)
• Bill Tubbs, Spectra Energy (SETP)
• Shaun Tymchynshyn, Murphy Oil Corporation (ULWP)
• Greg Urraut, Talisman Energy Inc. (ARPC)
• Carolyn Ussher, Nexen Inc. (ARPC)
• Brian Van Vliet, Spartan Controls (TEREE, DEEPP)
• Sanjay Vithal, Shell Canada Resources Ltd. (ULWP, AWP)
• Kurt Uhrich, BP Canada Energy Company (CBTA IAEOS, CO2 EHR)
• Scott Wagner, Nexen Inc. (ERPC)
• Clint Wasyliw, Devon Canada Corporation (SETP)
• Brian Watt, Husky Energy Inc. (CO2 EHR)
• Doris Weiss, Devon Canada Corporation (TEREE, SETP, LHEP, BMP, DEEPP)
• Jill Weiss, Energy Resources Conservation Board (BMSD)
• Ryan Williams, Enmax (CBTA IAEOS)
• Shawn Willetts, ConocoPhillips Canada (SGRC)
• Jeffrey Willick, Canadian Natural Resources Ltd. (WAPC)
• Brad Wilson, Murphy Oil Corporation (ULWP, AWP)
• Malcolm Wilson, Petroleum Technology Research Centre (HWVP)
• Adam Winter, Cap-Op Energy (DEEPP)
• Cody Wollen, Husky Energy (AMMP)
• Nevin Wolf, Talisman Energy Inc. (WAPC)
• Cindy Wolle, ConocoEnergy Inc. (SGWPC)
• Kirby Wright, Alberta Land Use Knowledge Network (BMP)
• Michelle Wright, Cenovus Energy Inc. (BWG, SWG)
• Edgar Yanez, Ecopetrol (NAMA)
• KC Yeung, Dover Operating Corp. (CBTA, CBTA WC)
• Michelle Young, Imperial Oil Resources (SGRC, FWAC)
• Stephen Yeung, Alberta Environment Sustainable Resource Development (WIPC)
• Carri Zeller, Equilibrium Environmental Inc. (FWAC)
• Todd Zerbin, Shell Canada (AWP)
• Nestor Zerpa, Nexen Inc. (CBTA IAEOS, CBTA UVAC, CVA, CVA Conversion Project)
• John Zhou, Alberta Innovates – Energy and Environment (CO2 EHR)
Indepandant Auditor’s Report

To the Board of Directors of PTAC Petroleum Technology Alliance Canada:

Report on the financial statements
We have audited the accompanying financial statements of PTAC Petroleum Technology Alliance Canada, which comprise the statements of financial position as at December 31, 2012, December 31, 2011 and January 1, 2011, and the statements of operations, changes in net assets and cash flows for the years ended December 31, 2012 and December 31, 2011, and a summary of significant accounting policies and other explanatory information.

Management’s responsibility for financial statements
Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor’s responsibility
Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audits to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor’s judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity’s preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity’s internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion
In our opinion, the financial statements present fairly, in all material respects, the financial position of PTAC Petroleum Technology Alliance Canada as at December 31, 2012, December 31, 2011 and January 1, 2011 and the results of its operations and its cash flows for the years ended December 31, 2012 and December 31, 2011, in accordance with Canadian accounting standards for not-for-profit organizations.

Thompson, Penner & Lo LLP  April 10, 2013
Certified General Accountants
Calgary, Alberta, Canada

PTAC Petroleum Technology Alliance Canada
Statements of Operations
For the Years Ended December 31, 2012 and 2011

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REVENUE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project and service revenue</td>
<td>$4,822,269</td>
<td>$3,563,930</td>
</tr>
<tr>
<td>Membership revenue</td>
<td>563,256</td>
<td>579,431</td>
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<tr>
<td>Event revenue</td>
<td>229,348</td>
<td>297,806</td>
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<tr>
<td>Rental revenue</td>
<td>63,824</td>
<td>117,335</td>
</tr>
<tr>
<td>Interest income</td>
<td>54,307</td>
<td>54,653</td>
</tr>
<tr>
<td>Miscellaneous income</td>
<td>2,146</td>
<td>1,140</td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td>$5,735,350</td>
<td>$4,614,495</td>
</tr>
</tbody>
</table>

|                      |         |         |
| **EXPENSES**         |         |         |
| Direct project and service costs | $4,113,428 | 3,035,220 |
| Salaries and benefits | 924,619 | 759,266 |
| Rent                 | 176,660 | 224,852 |
| Direct event costs   | 50,384  | 60,106  |
| Consulting and professional fees | 45,409 | 13,476 |
| Office and equipment leases | 29,001 | 28,987 |
| Amortization         | 17,942  | 14,158  |
| Marketing            | 16,932  | 14,848  |
| Bank charges and credit card discounts | 15,617 | 11,792 |
| Computer and website | 11,841  | 4,040   |
| Insurance            | 8,066   | 6,742   |
| Printing and publications | 5,054 | 6,150   |
| Volunteer recognition| 4,887   | 4,391   |
| Training             | 4,501   | 12,071  |
| **Total Expenses**   | $5,424,341 | 4,196,099 |
| **Excess of revenue over expenses** | $311,009 | $418,396 |
## PTAC Petroleum Technology Alliance Canada

**Statements of Financial Position As at December 31, 2012 and 2011 and January 1, 2011**

<table>
<thead>
<tr>
<th>ASSETS</th>
<th>2012</th>
<th>2011</th>
<th>Jan 1, 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and cash equivalents</td>
<td>$2,771,459</td>
<td>$5,566,232</td>
<td>$4,576,178</td>
</tr>
<tr>
<td>Short term investments</td>
<td>2,122,149</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Accounts receivable and accrued receivables</td>
<td>1,929,991</td>
<td>1,415,638</td>
<td>1,348,697</td>
</tr>
<tr>
<td>Goods and services tax recoverable</td>
<td>42,327</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Prepaid expenses</td>
<td>27,891</td>
<td>25,761</td>
<td>57,757</td>
</tr>
<tr>
<td><strong>Total Current</strong></td>
<td>6,894,017</td>
<td>7,007,631</td>
<td>5,982,632</td>
</tr>
<tr>
<td><strong>Property and Equipment</strong></td>
<td>50,841</td>
<td>42,957</td>
<td>32,101</td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td>6,944,858</td>
<td>7,050,588</td>
<td>6,014,733</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIABILITIES</th>
<th>2012</th>
<th>2011</th>
<th>Jan 1, 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts payable and accrued liabilities</td>
<td>$1,719,773</td>
<td>$1,681,406</td>
<td>$310,190</td>
</tr>
<tr>
<td>Goods and services tax payable</td>
<td>-</td>
<td>29,138</td>
<td>62,933</td>
</tr>
<tr>
<td>Deferred membership revenue</td>
<td>573,159</td>
<td>571,275</td>
<td>385,140</td>
</tr>
<tr>
<td>Deferred contributions</td>
<td>1,978,738</td>
<td>2,406,590</td>
<td>3,312,687</td>
</tr>
<tr>
<td><strong>Total Current</strong></td>
<td>4,271,670</td>
<td>4,688,409</td>
<td>4,070,950</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NET ASSETS</th>
<th>2012</th>
<th>2011</th>
<th>Jan 1, 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invested in property and equipment</td>
<td>50,841</td>
<td>42,938</td>
<td>32,101</td>
</tr>
<tr>
<td>Unrestricted</td>
<td>1,400,000</td>
<td>1,400,000</td>
<td>1,400,000</td>
</tr>
<tr>
<td>Internally restricted funds</td>
<td>1,222,347</td>
<td>918,221</td>
<td>511,682</td>
</tr>
<tr>
<td><strong>Total Net Assets</strong></td>
<td>2,673,188</td>
<td>2,362,179</td>
<td>1,943,783</td>
</tr>
<tr>
<td><strong>Total Liabilities</strong></td>
<td>6,944,858</td>
<td>7,050,588</td>
<td>6,014,733</td>
</tr>
</tbody>
</table>

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**Project and Service Revenue**

![Bar chart showing Project and Service Revenue for 2010, 2011, and 2012]
PTAC’s 2012 membership was comprised of 207 active members at year-end 2012.

**Members**

- Futures University of Calgary Learning Institutions (3)
  - Murray Todd
  - Robert Tasker
  - Earle Shirley
  - George Rhodey
  - Dwayne Hooper
  - Derry Eddy

- Environment Solutions
  - Alberta Innovates - Energy and Resources (CRA)
  - Environmental Solutions

- Government (4)
  - British Columbia Oil and Gas Commission
  - CRA Canada Revenue Agency - Calgary CTSO SR & ED
  - Saskatchewan Ministry of Energy and Resources
  - Alberta Innovates - Energy and Environment Solutions

- Individuals (9)
  - Derry Eddy
  - Dwayne Hooper
  - Eric Lloyd
  - Ken Putt
  - George Rhody
  - Earle Shirley
  - Robert Tasker
  - Murray Iddo

- Learning Institutions (3)
  - SAIT
  - University of Alberta
  - University of Calgary

- Research Providers (10)
  - Natural Resources Canada
  - Alberta Innovates - Technology Futures

- Producers (30)
  - ARC Resources
  - Athabasca Oil Sands Corp.
  - Barrick Energy
  - BP Canada Energy Company
  - Cenovus Energy Inc.
  - Chevron
  - ConocoPhillips Canada
  - Devon Canada Corporation
  - Dover Operating Corp
  - Encana Corporation
  - Enplus Corporation
  - Husky Energy Inc.
  - Imperial Oil Resources Ltd.
  - Japan Canada Oil Sands Limited (JACOS)
  - Larcina Energy Ltd.
  - Murphy Oil Company
  - NAL Resources
  - Nexen Inc.
  - Pengrowth Energy Corp.
  - Penn West
  - Quicksilver Resources Canada Inc.
  - Shell Canada Limited.
  - Suncor Energy
  - Sunshine Oilsands
  - Syncrude Canada Ltd.
  - Talisman Energy Inc.
  - Terra Energy
  - Total Exploration & Production Ltd.
  - Unconventional Gas Resources Canada Operating Inc.

- Service and Supply (148)
  - Alberta Sulphur Research Ltd.
  - CPI – Canadian Institute for Photonic Innovations
  - Deloitte – Research and Development, Tax
  - El DuPont Canada
  - PTRC
  - Saskatchewan Research Council
  - TIPM Laboratory (Perm Inc.)
  - IFP Technologies (Canada) Inc.

- Transport/Midstream (2)
  - Keyera Energy Ltd.
  - Enbridge Inc.

- Venture Capital (1)
  - Magna Electric Corporation

- **PTAC’s 2012 membership was comprised of 207 active members at year-end 2012**

- Delta C Technologies Inc.
  - E3P Technologies Inc.
  - EBA Engineering Consultants Ltd. – Research Department
  - Econothenm Canada
  - Enefit Energy Efficiency Engineering Ltd.
  - ENFRA
  - Enhanced Recovery Services Inc.
  - EnvironetVault Canada Ltd.
  - EnviroSoft Products Inc.
  - Envirotech Engineering
  - Ernst & Young LLP
  - ETX Systems Inc.
  - Exponent
  - Exprio Group Canada Inc.
  - Extreme Telematics Corp.
  - Fekete Associates Inc.
  - Fliucia Inc.
  - Fracturing Horizontal Well Completions Inc.
  - Fugro Corporation
  - Gas Liquids Engineering Ltd.
  - Genalta Power Inc.
  - geolOGIC Systems Ltd.
  - GEOEIS Inc.
  - GHG Solutions Corp.
  - Global Energy Services Ltd.
  - Go Technologies
  - Gowlings
  - Green Line Energy Solutions Inc.
  - GreenPath Energy Ltd.
  - Ground Effects Environmental Services Inc.
  - GuildOne, Inc.
  - Gushor Inc.
  - H2O Systems Inc.
  - Halliburton – Production Enhancement
  - Harber Coatings
  - Hatch Ltd.
  - HiFi Engineering Inc.
  - Horizontal Well Testing Ltd.
  - HydraPump Technologies Ltd.
  - Hydro Pacifics Inc.
  - Hydrogeological Consultants
  - INO
  - Insight Emissions Management Inc.
  - Jacktek Systems Inc.
  - Katch Kan Limited
  - Kenilworth Combustion Ltd.
  - KMPG High Technology Practice Group
  - Land Environmental Software
  - LuxMux Technology Corporation
  - McCarthy Tetrault LLP – Technology Group
  - Meridian Environmental Inc.
  - Millenium EMS Solutions Ltd.
  - Mundle Anchors
  - MWH Canada Inc.
  - Mycell Technologies
  - Neak Slotting Inc.
  - Nelson Environmental Remediation, Ltd.
  - New Paradigm Engineering Ltd.
  - Newalta
  - Nine Sigma
  - Norton Rose (formerly Macleod Dixon)
  - Newco Tank Corp
  - Norton Rose Canada LLP
  - N-Solv Corporation
  - Oasis Emission Consultants Inc.
  - Oilflow Solutions Inc.
  - Omega Well Monitoring
  - OXand Canada Inc.
  - Pason Systems Inc.
  - Portfire Associates
  - PriceWaterhouseCoopers LLP Technology (TICE) Practice
  - Process Ecology Inc.
  - PT Brands LLC
  - Pure Elements
  - RC Energy Inc.
  - REM Technology Inc.
  - Remediation Consulting Group Inc.
  - Resource Energy Solutions
  - Revive Energy Corp.
  - RJ Oil Sands Inc.
  - RDoped Air
  - Safenergy
  - Samson Pump LLC
  - Scanimetrics
  - Schlumberger Canada Ltd.
  - Siemens Product Lifecycle Management Software Ltd.
  - SLR Consulting (Canada) Ltd.
  - SNC Lavalin - Studies and Developmental Projects
  - Source Rock Energy Partners
  - Spartan Controls Ltd – Efficiency Group
  - Stantec Consulting Ltd.
  - Steep Energy
  - Synodin Inc.
  - Technod Engineering Ltd.
  - Terratek Ltd.
  - Terra Water Systems LP
  - Terrapro Group
  - Total Combustion Inc.
  - Trans Pacific EnviroEnergy Inc.
  - Trican Well Service Ltd.
  - Trido Industries Inc.
  - Tundra Boiler and Instrumentation Ltd.
  - Turbo Trac USA, Inc.
  - Wave Control Systems Ltd
  - Weatherford Canada Partnership
  - Winterhawk Technologies Ltd.
  - Yabuchi Enertec Group Inc.