



PTAC

PETROLEUM  
TECHNOLOGY  
ALLIANCE  
CANADA



**ANNUAL REPORT 2018**

# SMALL BUT EFFECTIVE



**101**  
PROJECTS



**18** EVENTS



**8** STAFF



**221** MEMBERS

**\$6,590,494** REVENUE



**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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## BOARD OF DIRECTORS (As at December 31, 2018)

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## MANAGE ENVIRONMENTAL IMPACTS

- Air Quality
- Alternative Energy
- Ecological
- Emission Reduction/  
Eco-Efficiency
- Energy Efficiency
- Methane Detection, Reporting  
and Reduction Technologies
- Moving Towards a Sustainable  
Hydrocarbon Economy
- Orphan Wells
- Remediation and Reclamation
- Resource Access
- Water
- Wellsite Abandonment

## IMPROVE OIL AND GAS RECOVERY

- Bitumen Recovery from Carbonate Reservoirs
- CO<sub>2</sub> Enhanced Hydrocarbon Recovery
- Coalbed Methane, Shale Gas, Tight Gas, Gas Hydrates, and other Unconventional Gas
- Conventional Heavy Oil, Cold Heavy Oil Production with Sands
- Conventional Oil and Gas Recovery
- Development of Arctic Resources
- Development of Remote Resources
- Emerging Technologies to Recover Oil Sands from Deposits with Existing Zero Recovery
- Enhanced Heavy Oil Recovery
- Enhanced Oil and Gas Recovery
- Oil Sands and Enhanced Oil Sands Recovery
- Tight Oil, Shale Oil, and other Unconventional Oil

## REDUCE CAPITAL, OPERATING, AND G&A COSTS

- Overall Capital Cost Optimization
- Cost Reduction Using Emerging Drilling and Completion Technologies
- Cost Reduction Using Surface Facilities
- Digital Technologies: Automation, Artificial Intelligence, Blockchain, IOT, Analytics, Cyber Security
- Eco-Efficiency and Energy Efficiency Technologies
- Reduce Operating Costs Related to Energy and Chemical Consumption
- Technologies to Reduce Waste Energy

## IMPROVE VALUE-ADDED PRODUCTS

- Gasification
- Hydrocarbon Upgrading
- Hydrogen Generation
- Integration Petrochemicals, Refining, and Value-Added Opportunities
- Pipeline Transportation: Leak Detection, Spill Management, Nanotechnology for Flow Drag Reduction, Use of CO<sub>2</sub> as Diluent

## PTAC NETWORKS

- Alberta Upstream Petroleum Research Fund
- Clean Bitumen Technology Action Plan
- Consortium for Digital Innovation and Transformation
- Methane Emissions Reduction Network
- Pipeline Network
- Pipeline Technology Action Plan
- Remote Sensing Network
- Resource Emission Management Technology Action Plan
- Support for Small and Medium-Sized Enterprises
- Technology for Emissions Reductions and Eco-Efficiency
- Tight Oil and Gas Innovation Network

## ADDITIONAL PTAC TECHNICAL AREAS

- e-Business
- Digital Technologies
- Genomics
- Geomatics
- Geosciences
- Health and Safety
- Instrumentation/  
Measurement
- Nano Technologies
- Operations
- Photonics
- Production Engineering
- Remote Sensing
- Reservoir Engineering
- Security
- Telecommunications

# MESSAGE FROM THE BOARD

The oil and gas industry faces a myriad of issues including climate change, pipelines, abandonment liabilities, disruptive digital technologies, cost control, and economic growth. PTAC's collaborative model is a proven approach in developing the technologies needed to solve many of the problems the energy industry is facing today.

As a result of this careful alignment with industry priorities, PTAC experienced a surge in new member enrollment in 2018, culminating in the highest year-end member count in over a decade. This is a clear indication that industry stakeholders have confidence in the PTAC collaborative model and trust in our organization to help them tackle industry problems.

**Our 101 projects and 18 tailored events not only addressed the year's most relevant challenges, but laid the groundwork to capture future opportunities.**

Our 101 projects and 18 tailored events not only addressed the year's most relevant challenges, but laid the groundwork to capture future opportunities. Industry continued to face the key concerns of climate change and pipelines in 2018, leveraging our unique position as a trusted neutral-facilitator to unite diverse stakeholders around these issues.

Greenhouse (GHG) gas emissions are one of the most pressing concerns. Methane is the second-largest contributor to global greenhouse gas emissions, making up approximately 14 percent of Canada's GHG emissions. Over 100 years, each molecule of methane is 25 times more potent than carbon dioxide. However, methane only stays in the atmosphere for a fraction of the time that carbon dioxide does – a

dozen years as opposed to 200 – making methane 85 times more potent than carbon dioxide during its lifespan.

Methane mitigation strategies are among the most economic to implement, bring additional health benefits when combined with the reduction of related VOCs, and carry the possibility of improved operations and cost savings when identifying and fixing pipeline or equipment leaks.

In 2018 PTAC celebrated that, through our consortia and initiatives, we developed the collective technology capacity to reduce overall sector methane emissions by more than 30 percent. But there is no question that the work is still far from complete.

Throughout 2018 and still today, PTAC continues to help industry work towards the government's methane emission reduction target of 45 percent by 2025. Much of this work is completed through the PTAC-facilitated Methane Emissions Reduction Network (MERN), which champions projects and initiatives to reduce methane emissions and identify and address technology gaps. In August, funds granted by Alberta Innovates' Climate Change Innovation and Technology Framework (CCITF) allowed MERN to expand its scope to include events. The Network organized forums, workshops, and Technology Information Sessions to share the latest developments in methane detection and mitigation technology, as well as raise awareness and increase uptake of innovative, cost-effective oil and gas practices. Information on MERN activity is disseminated via the Methane Hub.

Continuing our focus on managing methane emissions, PTAC launched the Fugitive Emissions Management Program Effectiveness Assessment (FEMP-EA) Phase II project in August 2018. FEMP-EA is a world-class applied research project focused on methane leak detection, quantification, and repair.

Immense in scope, FEMP-EA covers 2,500 square kilometers in the Red Deer region and includes

**FEMP-EA is a world-class applied research project focused on methane leak detection, quantification, and repair.**



participation from 30 producing companies and nearly 200 oil and gas facilities. More than 400 oil and gas producers provided funding for this project through PTAC's Alberta Upstream Petroleum Research Fund (AUPRF) program. The project will improve understanding of fugitive emissions from Alberta's upstream oil and gas operations and provide the robust data needed to guide industry decisions. The project is expected to be completed in the third quarter of 2019.

In 2018, AUPRF proved that sustainability and cost-reduction go hand in hand. In fact, four recently completed AUPRF projects resulted in industry cost savings estimated between \$25M and \$45M annually. To compare, the total funds provided for all projects since AUPRF inception is \$25 million dollars. This is a huge win for both the environment and for industry.

PTAC also continued our positive relationship with the Clean Resource Innovation Network (CRIN) in 2018. CRIN unites Canada's oil and gas industry, innovators, technology vendors, academia, research institutes, financiers, and government to help position Canada as a global leader in low-emission hydrocarbon energy from source to end use. We furnished the committee with administrative support through our subsidiary, the PTAC innovation ecosystem. In addition, PTAC managed CRIN's methane portfolio, served as an active member of the CRIN Executive Steering Committee, oversaw the CRIN website and LinkedIn accounts, and continued to play a key role in expanding the network's industry outreach.

In partnership with CRIN, PTAC hosted the Synthetron event in June 2018. This online workshop examined PTAC's Methane Innovation Roadmap and gathered feedback from a wide range of innovation and methane stakeholders using the unique Synthetron crowdsourcing platform. The results of this session not only provided valuable information about the existing innovation roadmap and the technology, but also allowed PTAC to generate many innovative ideas.

Canadian oil and gas companies continued to struggle with the challenges of resource transportation and access to new markets in 2018. Although it seems on the opposite side of the spectrum from GHG reduction, this challenge is closely tied to the environmental

management of pipelines. PTAC's Pipeline Abandonment Research Steering Committee (PARSC) facilitated 11 projects in 2018 to encourage innovation and conduct applied research, technology development, demonstration, and deployment to address knowledge gaps identified by industry, and to develop best practices and recommended practices.

It would be disingenuous to say that 2018 was not a challenging year. The mood within the industry was often one of austerity. However, the PTAC collaborative model ensures that our members are not facing these challenges alone. Bringing together the knowledge and expertise of more members than ever before, PTAC aligned new project launches and events with the most critical industry concerns, and spurred continued innovation and technology development while building a foundation for long-term research and development.

Our success in 2018 is a credit to the many organizations that joined our membership, and the dedicated volunteers who served on PTAC's Board of Directors, technical steering committees, and networks. Working together, we will continue to drive innovation, applied research, and technology development, demonstration, and deployment for a sustainable, responsible, and economically-feasible hydrocarbon energy industry. We remain committed to helping Canada become a global leader in hydrocarbon energy technology; not only for today but for generations to come.

**Soheil Asgarpour**  
President

**Kevin Stashin**  
Chairperson



# KEY ACCOMPLISHMENTS

Responding to industry needs, PTAC encouraged increased stakeholder participation with germane opportunities for collaborative research and innovation. We carefully aligned programs and projects with current industry needs to build a growing foundation of innovation and technology R&D that will drive our industry's long-term success.

## PROGRAMS

Working with our partners, PTAC continued to facilitate the Alberta Upstream Petroleum Research Fund (AUPRF), the Pipeline Abandonment Research Program, and the Small and Medium-sized Enterprises (SME) Innovation Program. Each of these programs helped launch new projects and encouraged collaboration that benefitted the Canadian hydrocarbon energy industry.

### Alberta Upstream Petroleum Research Fund

PTAC continued to manage the Alberta Upstream Petroleum Research Fund (AUPRF) Program in 2018. This program brings together not only world-class research providers and academics, but strong environmental leaders and quality technical teams familiar with the practical challenges industry is facing. The program's holistic approach to collaborative research reduces costs, increases ease of operations, improves social license, and reduces regulatory impact on risk. The program champions science-based decision making, fast-tracks development activities, eliminates unnecessary cost and adversarial hearings, and helps regulators understand the environmental impact of hydrocarbon development.

Addressing high-priority issues in Alberta's oil and gas industry, AUPRF facilitated 34 peer-reviewed environmental research projects on air, water, remediation and reclamation, biodiversity, and well-abandonment.

PTAC and the AUPRF applied research program adhere to the philosophy that there need not be a trade-off between financial and environmental performance – using collaborative innovation, industry can achieve both simultaneously. In 2018, PTAC's Remediation and Reclamation Research Committee

(RRRC) facilitated four projects that collectively reduced annual industry cost by \$25-45M. That is a massive return on investment, given that just these four projects saved industry as much money as they contributed to the more than 397 AUPRF projects over the past 17 years. These projects clearly demonstrate how the AUPRF program helps industry effectively minimize their environmental impact while continuing to operate economically.

In October 2018, PTAC and the AUPRF Remediation Reclamation Research Committee (RRRC) received the Environmental Services Association of Alberta (ESAA) Environmental Innovation award at the Remediation Technologies Symposium. This annual award recognizes members of Alberta's environmental industry that demonstrate excellent leadership in the area of environmental innovation. ESAA bestowed this honour on PTAC and the AUPRF RRRC in recognition of the program's success including committee members' teamwork, innovation, and commitment to minimize environmental impact from industry operations.

AUPRF continued to prioritize scientific studies that support the development of methane-related regulations. Working directly alongside the Alberta



Energy Regulator, AUPRF's highly-regarded technical team of experts developed and supported several methane detection and quantification projects. This world-class research will help industry manage and mitigate emissions.

Launched in August 2018, AUPRF's Fugitive Emissions Management Program Effectiveness Assessment (FEMP-EA) Phase II project is PTAC's largest applied research project to date. More than 400 oil and gas producers provided funding for the project that will

improve understanding of fugitive emissions from Alberta's upstream oil and gas operations and provide the robust data needed to guide industry decisions. Immense in scope, FEMP EA covers 2,500 square kilometers in the Red Deer region and includes participation from 30 producing companies and nearly 200 oil and gas facilities. The project is expected to be completed in the third quarter of 2019.

## Small and Medium Sized Enterprises (SMEs) Program

Some of the industry's most ground-breaking innovations flow from the SME sector, yet these small companies often face significant barriers in bringing their ideas to market. PTAC continued to facilitate the Small and Medium-Sized Enterprise (SME) program in collaboration with the National Research Council-Industrial Research Assistance Program (NRC-IRAP) to bridge the gaps and help these agile organizations transform ideas, technologies, and knowledge into products and services industry is seeking.

The program provides SMEs in the oil and gas industry with innovation support, particularly for the demonstration and deployment of near-commercial or deployment-ready technologies that improve environmental performance and reduce costs.

Specifically, PTAC's goals are to:

- Connect oil and gas producers with SME technology providers;
- Allow SME oil and gas producers to learn about successful implementations of innovative environmental by senior producers;
- Increase market penetration/uptake of technology provider SMEs, improving the overall financial and environmental performance of the oil and gas industry.

Overall, the SME projects facilitated by PTAC totaled \$4.5M in 2018. These projects leverage additional projects currently underway in other PTAC technology areas including digital technology and methane.

During 2018, the program supported 47 SMEs in collaboration with IRAP and launched the 'Multilateral Junction Testing and Field Trial for Permanent and Scalable Methane Emissions Reductions' project in collaboration with PTAC's TERE committee.

PTAC also facilitated the 'Innovation Showcase: Deployment-Ready New Technologies for Cost Reduction and Environmental and Efficiency Improvements in Oil and Gas Operations'. This event featured exhibits from more than 25 technology and service providers. Stakeholders from across the industry were introduced to the benefits of a variety of cost-effective, deployment-ready environmental and efficiency-improvement technologies.



## Pipeline Abandonment Research Program

PTAC's Pipeline Abandonment Research Program, overseen by the PTAC Pipeline Abandonment Research Steering Committee (PARSC), is a multi-year research program focused on the sustainable development of the Canadian pipeline industry. In 2018, PARSC published four research studies and launched four new projects in addition to continuing work on three ongoing projects.

## PROJECTS

The PTAC collaborative model effectively leverages both funding and the varied expertise of a diverse membership to rapidly move technologies from conception to implementation. PTAC's 2018 projects incorporated a variety of disciplines and formats, but all remained focused on overcoming the year's most pressing challenges to deliver responsible and sustainable hydrocarbon energy production. While work continued on a full slate of ongoing initiatives, PTAC launched 41 new projects and completed 33 others in 2018.

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Improve Oil and Gas Recovery



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Reduce Capital, Operating, and G&A Costs



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Improve Value-Added Products



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Manage Environmental Impacts



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Industry Networks



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Additional Technical Focus Areas



## Manage Environmental Impacts

Canada's hydrocarbon energy industry continues to heed the call to mitigate environmental impacts and reduce GHG and methane emissions. In addition to 34 AUPRF research projects, PTAC launched three more 2018 projects in the Manage Environmental Impacts technology area.

Under the guidance of the Technology for Emissions Reduction and Eco-Efficiency (TEREE) Committee and with funding support from Alberta Innovates, PTAC launched the 'Multilateral Junction Testing and Field Trial for Permanent and Scalable Methane Emissions Reductions' project in collaboration with Modern Wellbore Solutions and Seven Generations Energy Ltd. Multilateral completion systems (in which multiple lateral boreholes are drilled within a single mainbore) dramatically reduce the number of vertical wells and associated surface facilities required for production. However, no multilateral junction yet exists that can withstand the high pressures (>16,000 psi) of fracturing in deep shale formations. This PTAC project will manufacture, bench-test and demonstrate a novel patented multilateral junction that will lead not only to permanent and scalable reductions of methane and GHG emissions, but is also expected to significantly reduce capital and operating expenses associated with the development of shale formations such as the Montney play.

The second emissions reduction project, launched under the auspices of PTAC's TEREE committee,

further builds upon foundations first laid by the Methane Emissions Reduction Network in 2017. PTAC's Methane Emissions Reduction Network (MERN) project is poised to increase Alberta's competitiveness in the current technology landscape and create new market growth as industry transitions to a sustainable hydrocarbon economy.

Leveraging the innovative spirit of Alberta producers, researchers, academia, government organizations, regulatory bodies, and entrepreneurs, MERN aims to deliver the following capabilities at a level and pace not presently available:

- Uniform, neutral and complete communications to all stakeholders;
- A unique interactive digital media platform for engagement and collaboration;
- Educational and knowledge mobilization opportunities through various virtual and hands-on mediums;
- Alignment of the current fledging community of practice into a common understanding of research needs, technology gaps, scientific opportunities and promising developments;
- Launch of eminently relevant and market-driven applied research and technology development projects, informed by respected scientific advisors, experienced end-users, and prospective customers;
- Recognition of excellence through annual student and SME innovation awards.



Because technology solutions will be developed using PTAC's collaborative model, the project is expected to deliver outcomes beyond the reach of the current fragmented methane innovation ecosystem. At the same time, the project will promote new and ongoing initiatives to ensure industry is aware of the collaborators, tools, and best practices available. As operators install MERN's energy-efficient technology hundreds of jobs may be created in Alberta's oil and gas sector.

Under MERN, PTAC assisted with the launch of the 'Calibration and Demonstration of Aerial Methane Imaging for Efficient, Wide-Area Methane Emissions Detection' project, where they participated as a project partner. PTAC aims to share the learnings from this project within its various networks.

The initial stages of the 'Methane Hub' project were completed in 2018 with guidance from CAPP and AUPRF's ARPC committee and additional financial support from MERN. The Methane Hub website experienced a successful soft launch in November, and is expected to receive significant updates in subsequent phases of the project. In addition, the Methane Hub project committee prepared and published the Methane Roadmap, to support aligning industry priorities with available funding. The finalized document has been published on the PTAC website.

The Alberta Upstream Petroleum Research Fund (AUPRF) program brought an additional 28 applied environmental research projects to conclusion in 2018.

## Improve Value-Added Products

PTAC understands that industry stakeholders are always looking to get the most out of Canada's world-class hydrocarbon resources, and the "Improve Value-Added Products" technology area explores research and technology development opportunities to enhance the value of oil and gas products and services.

With more digital technology solutions being incorporated into oil and gas workflows and operations, PTAC collaborated with Cenovus Nucleus to launch both the Consortium for Digital Innovation and Transformation (CDIT) and its related subcommittee focused on drone technology and initiatives. These two CDIT consortia will facilitate collaborative research and the development of new digital technologies to increase efficiency and productivity in the oil and gas sector. Because they were established late in the year, neither committee launched projects in 2018 but are in the process of developing initiatives.

PTAC's Pipeline Abandonment Research Steering Committee (PARSC) launched four projects in 2018. The first project, 'Review of Recent Pipeline Abandonment Research', will examine the Pipeline Abandonment Scoping Study conducted by Det Norske Veritas in 2010 and determine whether

PARSC's work thus far has satisfied the study's recommendations of potential future research projects. For any recommendations not met, PTAC's 2018 study will determine the reasons and cause of any delays.

Secondly, the 'Potential Impact of Abandoned Anode Beds' project will research available environmental and engineering industry data pertaining to impact assessments of disturbing depleted anode beds and conducting a risk assessment of potential impacts. Based upon this information, the project will establish a best practice procedure for anode groundbed installations and abandonment.

PARSC's third new project, 'Risk-Based Decision-Making Framework for Pipeline Abandonment – Update', seeks to improve and expand on the findings of 2017's 'Risk-Based Decision-Making Framework for Pipeline Abandonment' report. Following the publication of this initial report by Arcadis, PTAC commissioned former National Energy Board employee Alan Pentney to collect advice on how to best use the Arcadis risk-based framework report and provide recommendations for next steps. In August 2017, his findings were published in the 'Usability Review of a Guide for Evaluating Pipeline Abandonment Risks'. This new project will incorporate



the feedback of Pentney's usability review into the original Arcadis document, creating a comprehensive pipeline abandonment framework.

PARSC's fourth new project will also build upon the committee's previous pipeline abandonment studies. The 'Peace River Abandoned Pipeline Segment Field Study Project' will further investigate the risks of abandoning pipelines in place. Researchers will conduct subsurface assessments and laboratory analysis of segments of the TransCanada Peace River Mainline gas transmission system abandoned between 1972 and 1979.

In addition to launching new studies and continuing work on three existing projects, PARSC completed four projects in 2018. The results of the 'Analysis of Pipeline Exposure Data and Scoping Review of Exposure Scenarios' project, the 'Potential Impact of Power Lines on Corrosion of Abandoned Pipelines' project, the 'Review of Previous Pipeline Abandonment Program – TransCanada Peace River Mainline' project, and the 'Risk-Based Decision Making Framework for Pipeline Abandonment' project have all been published on the PTAC website and are available to the public.

## EVENTS

The success of PTAC programs and projects is rooted in multi-stakeholder collaboration. PTAC's 2018 events promoted cooperation and collaboration among our diverse membership, getting the right people in the room to hear the most relevant information. These events have been a catalyst for strengthened business relationships that have proven foundational for future project work.

## 2018 Forums and Showcases

PTAC Forums and Showcases provide an opportunity for members to connect with a broad spectrum of experts from across a particular interest area to learn about current trends, share the results of research and technology development projects, discover new technology, and network with their peers in the industry.

### Methane Emissions Reduction – Merging Policy, Science and Technology

PTAC's largest forum to date, this two-day event attracted more than 200 participants from around the world. Participants including key stakeholders from every facet of industry, from academia to regulatory bodies to producers to inventors examined the current state of emissions reduction efforts, opportunities to support technology innovation, the adoption of new practices, and current and future challenges.

### Deployment-Ready New Technologies for Cost Reduction and Environmental and Efficiency Improvements in Oil and Gas Operations

More than 25 technology and service providers exhibited innovative technologies and solutions.

### Oil and Gas in the Digital Era

Experts representing a vast array of stakeholders from across the digital spectrum presented their take on the current state of technology such as Blockchain, Artificial Intelligence, IoT, Machine Learning, and Analytics, possible implementation challenges, and their vision for a future oil and gas industry reliant on digital technologies.

### Ecological Issues Forum

AUPRF researchers presented the results of completed projects, introduced industry stakeholders to new research phases and projects, and provided updates on ongoing research.

"The PTAC AUPRF program provides the space and support for multi interest and outcome-based collaboration with the goal to enhance environmental and operational performance. Collaborating with policy makers and regulators increases competitiveness of the Canadian energy sector." – Ole Mrklas, Director, Monitoring, COSIA

## MANAGE ENVIRONMENTAL IMPACTS



PTAC hosted:  
2 forums and 3 TISs

## 2018 Workshops

PTAC workshops encourage stakeholders to roll up their sleeves and work together to address shared challenges.

### What You Need to Know about the Federal Budget and Innovation

Expert presenters introduced the 2018 Federal Innovation Ecosystem Map and explored the implications of the 2018 budget for the oil and gas industry.

### Leader Character Workshop

Industry leaders gained valuable skills to help them successfully lead their organizations through the prevailing tough season in the oil and gas sector.

### Wellbore Integrity Workshop

The workshop aimed to energize the current collaborative approach between industry and government through a workshop involving subject matter experts from industry, government and academia, to identify and prioritize knowledge gaps resulting in research projects addressing high priority environmental and social matters in alignment with regulatory requirements.

## 2018 Technology Information Sessions

PTAC Technology Information Sessions (TISs) provide members an opportunity to showcase new technologies and highlight opportunities for collaboration.

### Innovation...It's More Than You Think

presented by Kinetica Ventures

### New Technology in Machine Learning and Advanced Sensing for Reducing Risk and Costs in Remediation

presented by Maaper Analytics

### Reduce Costs and Increase Production by Optimizing and Accelerating the Dispatching of Service Equipment and Personnel

presented by IronSight

### Opportunities and Technology Needs in the UK North Sea

presented by the Department for International trade

### Finding Efficiencies in Oil & Gas Equipment Rentals and Energy Service Operations Using the Power of Information Technology

presented by Rig Equipment Rentals (RigER)

### Reducing Capital and Operating Costs - Modular Lime Sludge Handling System for SAGD Operations

presented by COOEC Canada

### Opportunities in Sustainable Low Carbon Unconventional Resources R&D

presented by University of Calgary and SAIT

### Abandonless - Using Automated Workflows to Devour Alberta's Suspended Well Backlog

presented by Cougarstone Solutions Inc.

### High Performance Slotted Liners

presented by Wellsco Slotting

### A Mobile and Web-Based Platform for Complete Emissions Inventory, Analysis and Reporting

presented by CNTRAL

### Redefining Pollution Control

presented by UV-DOX EnviroTek

#### IMPROVE VALUE-ADDED PRODUCTS



PTAC hosted:  
2 TISs

#### REDUCE CAPITAL, OPERATING, AND G&A COSTS



PTAC hosted:  
1 showcase, 1 workshop and 3 TISs

#### IMPROVE OIL AND GAS RECOVERY



PTAC hosted:  
1 TIS

#### ADDITIONAL TECHNICAL FOCUS AREAS



PTAC hosted:  
2 workshops and 2 TISs

#### INDUSTRY NETWORKS



PTAC hosted:  
1 forum

# PROJECTS OR NEW PROJECT PHASES

PTAC facilitated the launch of 41 new research projects and project phases to address industry challenges in 2018. Of these projects, 34 were launched under the direction of AUPRF technical committees, awarding \$2.5M in AUPRF Funding.

## Manage Environmental Impacts

- Methane Emissions Reduction Network (MERN) Project<sup>^</sup>
- Multilateral Junction Testing and Field Trial, for Permanent and Scalable Methane Emissions Reductions\*
- Calibration and Demonstration of Aerial Methane Imaging for Efficient, Wide-Area Methane Emissions Detection Partner

## Improve Value-Added Products

- Peace River Abandoned Pipeline Segment Field Study Project (PARSC 016)
- Review of Recent Pipeline Abandonment Research (PARSC 018)
- Potential Impact of Abandoned Anode Beds Project (PARSC 019)
- Risk-Based Decision-Making Framework for Pipeline Abandonment – Update (PARSC 020)

*\*These projects were launched in concert with PTAC's SME program*

*<sup>^</sup> These projects are a joint initiative between PTAC's TEREÉ and AUPRF programs*

## AUPRF

### Air Research Planning Committee

- NSERC FlareNet Strategic Research Network
- Validation of Reduced Spacing from Residences for Enclosed Combustors
- Emissions Reduction opportunities in Dehydration Facilities
- Fugitive Emissions Management Program Effectiveness Assessment (FEMP-EA)
- Pneumatic Vent Gas Measurement
- Mobile Methane Sensing Analytics for Emissions Reduction
- Methane Emissions Data Aggregation and Analysis Project for FEMP-EA and Canadian Context: Resources, Patterns, and Measurement Methodology Performance
- Truck-Based Mobile Surveys to support the FEMP-EA project
- Field Data Collection Study to Investigate Abnormal Tank Venting
- Alternative Fugitive Emission Management Program (Alt FEMP)

### Well Abandonment Research Initiative Committee

- Plug/annular cement integrity analysis and fault diagnosis of mechanical plugs
- Identifying Regional Variation in the Source Depths of Migrating Gas from Conventional and Unconventional Wells in the Western Canadian Sedimentary Basin
- Chemical Cement Alternatives
- Plug and Abandon Strategies for Canada's Oil & Gas Wells

### Remediation Reclamation Research Committee

- Soil Salinity – Agronomic Receptor Evaluation for Direct Soil Contact
- Remediation of Hydrocarbon Contaminated Soil and Groundwater using Heat-Activated Nano Stimulators
- Standardizing Risk Assessment Approaches Based on Residual Mass vs. Numerical Endpoints
- Salt Affected Wellsites/Native Prairie Protocol Implementation Policy
- Development of a Chloride Water Quality Guideline Based on Hardness and Consideration for Cation Toxicity

- Low Probability Receptor Technical Reports
- Regulatory Approval of Risk Assessment Tools
- Re-evaluation of F2 and F3 Petroleum Hydrocarbon Management Limits
- Evaluation of Reclamation Practices on Forested Upland and Peatland Well Sites

#### Water Innovation Planning Committee

- Develop Definitions for Alternative Water Sources to High Quality Non-saline Groundwater
- Alberta Water Tool
- Scientific Evaluation and Interpretation of Baseline Groundwater Well Testing Data Available for BC

#### Ecological Research Planning Committee

- Efficient Monitoring of Wildlife Responses to Seismic Line Restoration in the Algar Habitat Restoration Program
- Canada Warbler Response to Vegetation Structure on Recovering Energy Sector Disturbances

- Woodland Caribou Calving Areas and Calf Survival in Relation to Habitat Selection, Anthropogenic Disturbance, and Exposure to Predation Risk
- Influence of forest fires on legacy seismic line revegetation and on caribou habitat restoration treatment (e.g., mounding and planting) in wetland and transitional habitats
- Grizzly Bears and Pipelines in Alberta: A Provincial Update
- Evaluation of new grizzly bear genetic scat results with DNA results from hair collection – a test and comparison of population monitoring for the future of provincial grizzly bear monitoring.
- Targeting Alternate Prey to Understand Caribou and Moose Habitat Management Choices in a Regenerating Landscape: Increasing Functional Habitat for Caribou within West-Central Ranges.
- Algar Caribou Habitat Restoration Project



## TECHNICAL STEERING COMMITTEES

In 2018, PTAC facilitated 11 technical steering committees.

#### Manage Environmental Impacts

- Air Research Planning Committee (ARPC)
- Ecological Research Planning Committee (ERPC)
- Multilateral Junction Testing and Field Trial, for Permanent and Scalable Methane Emissions Reductions Project Steering Committee (MJTMER)
- Remediation Reclamation Research Committee (RRRC)
- Technology for Emissions Reduction and Eco-Efficiency Steering Committee (TEREE)
- Well Abandonment Research Initiative Committee (WARI)
- Water Innovation Planning Committee (WIPC)

#### Improve Value-Added Products

- Pipeline Abandonment Research Steering Committee (PARSC)
- Consortium for Digital Innovation and Transformation (CDIT)
- Consortium for Digital Innovation and Transformation – Drone Focus Group (CDIT-DFG)

#### Small and Medium Enterprises

- Support for Small and Medium-sized Enterprises (SMEs) Program Committee (SSMEP)

# 2019 OUTLOOK

Public concern over climate change ramps up with each passing year, and the world casts an increasingly critical eye towards the oil and gas sector. A sustainable energy economy is on the horizon, and PTAC is committed to helping Canada's oil and gas sector develop and deploy the innovative technologies that will ensure a sustainable future for the industry and the environment. Exciting opportunities lie ahead.

In 2019, PTAC will build upon the momentum generated in 2018. We look forward to focusing on our strategic priorities as we drive membership and project growth.

As an organization predicated on a collaborative innovation model, the diversity of our membership is one of our greatest strengths. PTAC is dedicated to ensuring that our initiatives and activities bring together a wide array of producers (particularly SME producers), technology providers (i.e. academia, SME technology providers, service and supply companies, and entrepreneurs), transporters, government organizations, regulatory bodies, as well as members working in emerging sectors. By pursuing strategically targeted initiatives in 2019, PTAC will attract the best and brightest to our membership, strengthening the organization and thus, the entire industry.

PTAC is reexamining and updating its technology areas as an early step in ensuring the programs, projects, and partnerships we pursue bring the most value to our members. Outdated areas will be removed, and relevant emerging fields will be added. The revised list of technology areas will be posted on the PTAC website. Within these revised technology areas, PTAC is planning to launch several collaborative research and technology development projects in 2019.

The Intelligent Methane Monitoring & Mitigation System (IM3S) project will develop and implement an analytics platform to effectively develop a scientifically-rigorous testing and modelling framework

to assess alternative LDAR methods (Alternative Methods) and deploy sensing technologies that maximize methane emissions reductions, minimize costs, and optimize regulatory instruments. This larger program has been conceptualized with additional resources and the capability to evaluate alternative technologies and methods on a broad scale. This project is already garnering significant interest and support from a multitude of stakeholders and funders in Alberta, Western Canada and the country.

Broadly aligned with IM3S, the Alberta Methane Field Challenge (AMFC) seeks to trial Alternative Methods in operational field settings to provide inputs to data modelling. The AMFC will accelerate field testing of Alternative Methods by using already collected high-quality-blind-controlled-release testing data. Alternative Methods that do not have sufficient controlled-release testing data available will be supported through a separate, future program that may fall under IM3S.

The Systematic Third-Party Validation of Environmental and Economic Performance of Methane Reduction Technologies (STV) project will provide neutral third-party information to expedite the purchase of equipment. This project will remove critical barriers to the timely deployment of methane reduction technologies, spurring economic growth for SMEs and directly reducing GHG emissions.

Balancing the significant emphasis on mitigating environmental impacts and reducing methane emissions, PTAC will build on the work done by CDIT



in 2018 and explore projects in other technology areas, such as the Digital Innovation Network (DIN).

DIN will leverage the innovative spirit of Alberta producers, researchers, academia, government organizations, regulatory bodies, and entrepreneurs and will contribute to job creation in Alberta by the end of the program due to an increase in demand for digital technologies. Ultimately, Alberta can be a leader in exporting those technologies to other national and global jurisdictions, and industries.

Additionally, DIN will strengthen existing PTAC infrastructure and workflows in a matter that will support the above initiatives. Major enhancements will include:

- Increased website interactivity that will allow users to effectively obtain the detailed information they require and safely and efficiently collaborate with like-minded peers;
- Annual innovation survey, which will provide feedback from the Alberta oil and gas innovation system in a manner that will inform actionable improvements;
- Improved and higher velocity series of events that will provide hands-on opportunities for practitioners to share and collaborate on emerging and innovative solutions.

PTAC will also continue to facilitate the SME program delivered in partnership with NRC-IRAP. PTAC has already begun planning an additional showcase to highlight emerging, innovative SME technologies and services to be held in fall 2019. Doubling-up this showcase is part of PTAC's expanded event roster for 2019.

To promote awareness, fraternization, and innovation, PTAC will increase the number of industry events we host in 2019. Already on the calendar are two completely new PTAC events. Among these include a dedicated event recognizing and encouraging women in the oil and gas sector as well as a Stampede cook-off. Building on the extremely successful inaugural

event in 2018, PTAC has already scheduled the 2019 Methane Emissions Reduction Forum for November. This event will look at current and future challenges facing the Canadian oil and gas industry related to 2025 methane emissions reductions targets including current state of emissions reduction opportunities as well as the challenges and opportunities available to support technology innovation and new practices.

To further bolster our influence as a strong voice for a sustainable and profitable oil and gas industry, PTAC will take steps to increase awareness of our organization and actively engage with a broader complement of stakeholders in 2019. With the recent addition of a dedicated communications expert to our staff, PTAC will ramp up our output of quality content while maintaining clear, consistent messaging to industry, government, and the public. We will also improve our media and online presence, and actively employ social media platforms to authentically engage with people from both within and outside the oil and gas industry.

The Canadian hydrocarbon energy industry is rapidly changing. Technological advances and digitization are transforming the current energy industry landscape. PTAC's 2019 suite of existing and emerging technologies and projects are firmly focused on helping industry embrace these disruptive changes while preparing for a low-carbon future.

As we navigate this transformative era in 2019, PTAC will reach out farther than ever before to promote collaborative research and technology development, demonstration and deployment. At the same time, our refined projects and programs will continue to focus on making a responsible Canadian hydrocarbon energy industry a reality for everyone.







## COLLABORATING

### Technical Steering Committees

PTAC Technical Steering Committees consist of PTAC members representing various industry sectors, governments, and non-governmental organizations. These technical steering committees work 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

### Streamlined Communications

PTAC's streamlined communications strategy has reduced the number of broad email blasts being sent to our members by replacing individual event notifications with an opt-in bi-monthly newsletter. This electronic publication highlights current PTAC project opportunities, new technologies, member news, upcoming events, and other initiatives addressing current industry current trends and needs.



# VOLUNTEER RECOGNITION AWARDS

Each year, PTAC recognizes volunteers who have gone above and beyond serving the organization with their time and talent. Individuals are nominated by their fellow members and recipients are selected by a panel of their peers. The 2017 Volunteer Recognition Awards were presented at the PTAC Annual General Meeting on May 2, 2018.

## PTAC Leadership and Service Awards

The following recipients have advanced research and technology development in the Canadian oil and gas industry through leadership, devoted service, and a demonstrated commitment to innovation and technology development.

### **PTAC Legacy Award**

Eric Lloyd, Independent  
Ken Putt, Independent  
Murray Todd, Todd Resources  
Mike Ekelund, Government of Alberta

### **President's Award for Leadership in Collaborative Research and Development**

Sherry Sian, Canadian Association of Petroleum Producers CAPP  
Wayne Hillier, Canadian Association of Petroleum Producers CAPP

### **Chairperson's Award**

Dean Jenkins, Encana Corporation

### **Corporate Leadership Award**

Suncor Energy

### **Lifetime Achievement Award**

Randy Rudolph, Millennium EMS Solutions

### **Outstanding Service Award**

Paul Jeakins, BC Oil and Gas Commission

### **Distinguished Service Award**

Sean Hiebert, Cenovus Energy Inc.

### **Commercialization of SME Technology Award**

Atlantis Research Labs

## AUPRF Committee Awards

The following recipients provided outstanding technical direction and project leadership while serving on AUPRF committees.

### **Air Quality Research and Development Leadership Award**

Al Duben, Alberta Energy Regulator  
John Grant, Alberta Energy Regulator

### **Methane Reduction Leadership Award**

Alison Miller, Imperial

### **Ecological Leadership Award**

Caroline Bampfyld, Alberta Environment and Parks

### **Reclamation and Remediation Research Leadership Award**

Sonia Glubish, Canadian Natural Resources Limited

### **Well Abandonment Leadership Award**

Shawn Forster, Husky Energy

### **Water Innovation Leadership Award**

Brent Moore, Canadian Natural Resources Limited

### **Eco-Efficiency Leadership Award**

Owen Henshaw, Husky Energy

### **Pipeline Leadership Award**

Rob Power, Alliance Pipeline

## COMMITTEE VOLUNTEERS

- Emile Abou-Khalil, Seven Generations Energy Ltd. (MJTMER)
- James Agate, Canadian Natural Resources Limited (ARPC)
- Paul Aguas, Alberta Energy Regulator (WARI)
- Tamer Al-Ramahi, NRC-IRAP (SITC)
- Dean Anderson, Baseline Regulatory Compliance Services Ltd. (TEREE)
- Mark Anderson, Husky Energy Inc. (ARPC)
- Joshua Anhalt, GreenPath Energy Ltd. (TEREE)
- Jarred Anstett, Murphy Oil (WIPC)
- Frank Annua, Canadian Federation of Agriculture (MERN)
- James Armstrong, Encana Corporation (WIPC)
- Jessie Arthur, Canadian Association of Petroleum Producers (WARI)
- Dion Balson, Canadian Natural Resources Ltd. (CDIT, CDIT-DFG)
- Brenna Barlow, DXD Consulting Inc. (TEREE)
- Carol Barsky, Canadian Association of Petroleum Producers (ERPC)
- Jacob Bayda, Saskatchewan Ministry of Energy and Resources (ARPC)
- James Beck, Suncor Energy (TEREE, ARPC)
- Michael Bevan, Alberta Energy Regulator (WIPC)
- Katherine Bibby, Devon Canada Corporation (ARPC)
- Greg Bolzon, Canadian Natural Resources Limited (CDIT)
- Mark Boulton, Suncor Energy (ERPC)
- Daniel Burt, Suncor Energy (TEREE)
- Jamie Callendar, Callendar Energy Services (TEREE)
- Lindsay Campbell, Alberta Energy Regulator (ARPC, TEREE)
- Keven Cann, Husky Energy Inc. (TEREE)
- Andrea Cherkas, SAIT (TEREE)
- Ken Choi, Orphan Well Association (WARI)
- Deanna Cottrell, Shell Canada (WARI, WIPC)
- Mike Crabtree, Saskatchewan Research Council (MERN)
- Ed Cullinan, ATCO (CDIT)
- Yonathan Dattner, Luxmux Technology Corporation (TEREE)
- Mike D'Antoni, GreenPath Energy Ltd. (TEREE)
- Don D'Souza, British Columbia Ministry of Environment (TEREE)
- Leah Davies, Imperial (WARI)
- Gordon Dinwoodie, Alberta Environment and Parks (RRRC)
- Randy Dobko, Alberta Environment and Parks (ARPC)
- Luke Donnelly, Repsol Oil & Gas Canada Inc. (WIPC)
- Cam Dowler, Spartan Controls (TEREE)
- Bruce Duong, Alberta Innovates (TEREE, MJTMER)
- Linda Eastcott, Imperial (RRRC)
- Tijjani Elabor, National Energy Board (PARSC)
- Carol Engstrom, Independent (ERPC)
- Daniel Feldman, Luxmux Technology Corporation (TEREE)
- Allison Fisher, Shell Canada (ARPC)
- Shawn Forster, Husky Energy Inc. (WARI)
- Colin Forsyth, Cenovus Energy Inc. (CDIT, CDIT-DFG)
- Richelle Foster, Canadian Natural Resources Limited (ARPC, TEREE)
- Neil Fricke, Suncor Energy (WIPC)
- Wes Funk, DXD Consulting Inc. (TEREE)
- Roopa Ganapathy, Environment and Climate Change Canada (ARPC)
- Celine Gerson, Schlumberger Canada Ltd. (MERN)
- Kerri Gilders, Keyera Energy Ltd. (RRRC)
- Sonia Glubish, Canadian Natural Resources Limited (AUPRF, RRRC)
- Chris Godwaldt, COSIA (CDIT)
- Bruce Greenfield, Alberta Energy Regulator (ERPC)
- Scott Grindal, ConocoPhillips Canada (AUPRF, ERPC)
- Anil Gupta, Alberta Environment and Parks (WIPC)
- Ben Hale, Husky Energy Inc. (ERPC)
- Wade Hartzell, Canadian Natural Resources Limited (WARI)
- Paul Hartzheim, Canadian Association of Petroleum Producers (RRRC, WARI)
- Alistair Hazewinkel, Alberta Innovates (TEREE)
- Kevin Heal, Cap-Op Energy Inc. (TEREE)
- Jackson Hegland, Methane Emission Leadership Alliance (MERN)
- Sean Hiebert, Alberta Energy Regulator (TEREE, ARPC)
- Darryl Hill, Energy Efficiency Alberta (MERN)
- Scott Hillier, Cenovus Energy Inc. (AUPRF, WIPC)
- Wayne Hillier, Canadian Association of Petroleum Producers (ARPC, TEREE, MERN)
- Jason Hinchcliff, Husky Energy Inc. (CDIT, CDIT-DFG)
- James Holoboff, Process Ecology Inc. (TEREE)
- Roy Hunt, Advisian (TEREE)
- Mark Jamieson, Alberta Department of Energy (TEREE)
- Dean Jenkins, Encana Corporation (ARPC, TEREE)
- Paul Jiapizian, Environment Canada (TEREE)
- Laura Johnson, Alberta Energy Regulator (ARPC, TEREE)
- Marie Johnson, BC Oil and Gas Commission (ARPC)
- Gordon Jolly, NRC-IRAP (SITC)
- Adam Judd, Keyera Energy Ltd. (RRRC)
- Kasem Kaci, Alberta Energy Regulator (WARI)
- Arvinder Kainth, NRC-IRAP (TEREE, SITC)
- Steven Keays, NRC-IRAP (SITC)
- Derek Kelly, Natural Resources Canada (TEREE)
- Sherry Kenneway, Canadian Natural Resources Limited (WARI)
- Tony Khoo, Enbridge Inc. (CDIT)
- Kyle Klam, Modern Wellbore Solutions (MJTMER)
- Tom Knapik, Plains Midstream Canada ULC (RRRC)
- Paul Krawchuk, Hatch Ltd. (MERN)
- Milos Krnjaja, Alberta Energy Regulator (TEREE)
- Steve Kullman, Husky Energy Inc. (RRRC)
- Jeff LaFrenz, Clean Resource Innovation network (CDIT)
- Rajan Lalli, Kinder Morgan (PARSC)
- Ray Lambert, Cenovus Energy Inc. (TEREE, OEGH)

- Matthew Larsen, Seven Generations Energy Ltd. (MJTMER)
- Michael Lawson, Alberta Energy Regulator (TEREE)
- Logan Leduc, Environment Canada (TEREE)
- Brian Lemoine, Imperial (WARI)
- Kelsey Locke, Blue Source Energy ULC (TEREE)
- Michael Loughlean, Suncor Energy (CDIT)
- Derek L'Hirondelle, Simark Controls (TEREE)
- Angela MacPherson, TransCanada Pipelines Ltd. (CDIT)
- Kyle Maguire, Modern Wellbore Solutions (MJTMER)
- David Marshall, Chevron Canada Resources (CDIT)
- Ken Masich, Alberta Energy Regulator (WARI)
- Andrew McClausland, Cap-Op Energy Inc. (TEREE)
- Don McCrimmon, Canadian Association of Petroleum Producers (TEREE)
- Glenn McCrimmon, Husky Energy Inc. (CDIT, CDIT-DFG)
- Matt McLean, Husky Energy Inc. (WIPC)
- Janet McNally, NuVista Energy Ltd. (WIPC)
- Paul Martin, ConocoPhillips Canada (WIPC)
- Clinton Meads, Seven Generations Energy Ltd. (MJTMER)
- Sean Mercer, Imperial (ARPC)
- Brent Moore, Canadian Natural Resources Limited (WIPC)
- Michelle Morris, Alberta Environment and Parks (WIPC)
- Ryan Munro, Canadian Natural Resources Limited (WARI)
- Andrew Myles, National Research Council (TEREE)
- Rekha Nambiar, Suncor Energy (TEREE, ARPC, AUPRF)
- Kelly Newnham, Advisian (TEREE)
- Lori Neufeld, Imperial Oil (ERPC)
- Shanna Nolan, Shell Canada (WARI)
- Agata Nowak, MEG Energy (WIPC)
- Chris O'Neill, Enbridge Inc. (CDIT)
- Kirk Osadetz, CMC Research Institutes (TEREE)
- Chelsea O'Connor, Simark Controls (TEREE)
- Gerald Palanca, Alberta Energy Regulator (TEREE, ARPC)
- Kelly Parker, Husky Energy Inc. (TEREE)
- Kori Patrick, Enbridge Inc. (PARSC)
- Shane Patterson, Alberta Environment and Parks (ERPC)
- Tara Payment, Canadian Association of Petroleum Producers (WIPC)
- Rick Phaneuf, Alberta Environment and Parks (TEREE)
- Daniel Pollard, Alberta Energy Regulator (RRRC)
- John Paul Portelli, Canadian Natural Resources Limited (CDIT, CDIT-DFG)
- Ken Paulson, BC Oil and Gas Commission (MERN)
- Jessica Poupore, Environment Canada (TEREE)
- Rob Power, Alliance Pipeline (PARSC)
- Ron Quick, NRC-IRAP (TEREE, SITC)
- Rao Ravi, Spartan Controls Ltd. (TEREE)
- Scott Rayner, MEG Energy (WIPC)
- Daniel Regier, Westview Engineering (TEREE)
- Jason Reid, Imperial (WARI)
- Tania Rizwan, TransCanada Pipelines Ltd. (CDIT)
- Cooper Robinson, Cap-Op Energy Inc. (TEREE)
- Joy Romero, Canadian Natural Resources Limited (MERN)
- Dave Rosgen, Canadian Natural Resources Limited (ARPC)
- Victoria Ross, Encana Corporation (CDIT)
- Peter Rutherford, Athabasca Oil Corporation (TEREE)
- Jennifer Saldana, Husky Energy Inc. (WIPC)
- Dave Samuelson, Cenovus Energy Inc. (WARI)
- Jerry Scoular, Independent (TEREE)
- Jessica Schumlich, Energy Efficiency Alberta (TEREE)
- Jennifer Shalagan, Husky Energy Inc. (ERPC)
- Sherry Sian, Canadian Association of Petroleum Producers (AUPRF)
- Cecile Siewe, Natural Resources Canada (MERN)
- Jonathan Smith, Blue Source Canada ULC (TEREE)
- Jordan Smith, Canadian Natural Resources Limited (ERPC)
- Scott Smith, Cenovus Energy Inc. (TEREE)
- Mark Sombach, Cenovus Energy Inc. (CDIT, CDIT-DFG)
- Jim Spangelo, Alberta Energy Regulator (TEREE)
- Brian Spiegelmann, NAL Resources Management Ltd. (ARPC, TEREE)
- Ryan Streams, Kairos Aerospace (TEREE)
- Lisa Studzinski, Enerplus Corporation (TEREE)
- Mark Summers, Emissions Reduction Alberta (TEREE)
- Debbie Tainton, Canadian Natural Resources Limited (RRRC)
- Cara Tardiff, Modern Wellbore Solutions (MJTMER)
- Tyler Tarnoczi, Cenovus Energy Inc. (TEREE)
- Michael Teshima, Suncor Energy (CDIT, CDIT-DFG)
- Catherine Thistlethwaite, Alberta Energy Regulator (TEREE)
- Al Towers, Area 51 Machine Design Inc. (TEREE)
- Mike Truzak, Enerplus Corporation (RRRC)
- Bill Tubbs, ICF Canada (TEREE)
- Greg Unrau, Repsol Oil & Gas Canada Inc. (TEREE, ARPC)
- Sadiq Unwala, Alberta Environment and Parks (TEREE)
- Albert Ussher, Murphy Oil (ARPC)
- Carolyn Ussher, Nexen Energy ULC (ARPC)
- Brian Van Vliet, Spartan Controls Ltd. (TEREE)
- Rajan Varughese, Alberta Energy Regulator (WARI)
- Armin Vatandoust, Suncor Energy (CDIT, CDIT-DFG)
- Nick Veriotes, Canadian Natural Resources Limited (TEREE)
- JoAnne Volk, Repsol Oil & Gas Canada Inc. (WIPC)
- Steve Walker, Suncor Energy (CDIT, CDIT-DFG)
- Steve Wallace, Alberta Environment and Parks (WIPC)
- Charles Ward, Alberta Department of Energy (TEREE)
- Niki Weinrauch, Cenovus Energy Inc. (WARI)
- Heather Wilcott, Imperial (CDIT)
- Jeff Willick, Canadian Natural Resources Limited (WIPC)
- Jim Yaremko, Canadian Energy Pipeline Association (PARSC)
- Kourosh Zanganeh, Natural Resources Canada (TEREE)
- Adele Zenide, Canadian Natural Resources Limited (WARI, TEREE)
- John Zhou, Alberta Innovates (MERN)

# INDEPENDENT AUDITOR'S REPORT

## TO THE MEMBERS OF PETROLEUM TECHNOLOGY ALLIANCE CANADA:

We have audited the financial statements of Petroleum Technology Alliance Canada (the "Organization"), which comprise the statement of financial position as at December 31, 2018, and the statements of operations, changes in net assets and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

### OPINION

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Organization as at December 31, 2018, and its results of operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Organization in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our ethical responsibilities in accordance with those requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

BDO Canada LLP

#### STATEMENTS OF FINANCIAL POSITION (As at December 31, 2018)

ASSETS	2018	2017
<b>Current</b>		
Cash & cash equivalents	\$ 1,504,106	\$ 941,883
Cash - restricted	3,228,251	4,573,282
Restricted short term investment	2,205,640	1,003,178
Short term investment	2,688,436	3,040,407
Goods & services tax recoverable	7,422	11,715
Accounts receivable & accrued receivables	3,839,908	2,737,201
Prepaid expenses	21,294	21,221
Due from related corporation	-	5,559
	<u>13,495,057</u>	<u>12,334,446</u>
<b>Property and equipment</b>	<u>6,066</u>	<u>10,328</u>
	<b>\$ 13,501,123</b>	<b>\$ 12,344,774</b>
<b>LIABILITIES</b>		
<b>Current</b>		
Accounts payable & accrued liabilities	\$ 1,683,986	\$ 1,741,500
Deferred membership revenue	418,082	425,725
Due to related corporation	4,141	-
Deferred contributions	7,306,932	6,375,204
	<u>9,413,141</u>	<u>8,542,429</u>
<b>NET ASSETS</b>		
Invested in property & equipment	7,283	11,545
Internally restricted Reserve	2,680,699	2,390,800
	<u>1,400,000</u>	<u>1,400,000</u>
	<u>4,087,982</u>	<u>3,802,345</u>
	<b>\$ 13,501,123</b>	<b>\$ 12,344,774</b>

#### STATEMENTS OF OPERATIONS (As at December 31, 2018)

REVENUE	2018	2017
Project & service revenue	\$ 5,884,466	\$ 6,085,821
Membership revenue	415,838	417,053
Event revenue	168,612	90,215
Interest income	111,269	62,087
Realized/unrealized exchange gain	8,474	-
Miscellaneous income	1835	487
Rental income	-	441
Project participation fee	-	27,951
	<u>6,590,494</u>	<u>6,684,056</u>
<b>EXPENSES</b>		
Project & service cost - third party	5,023,566	5,409,610
Salaries & benefits	1,018,255	1,309,032
Rent	75,658	103,582
Direct event costs	50,180	15,310
Consulting & professional fees	22,065	27,403
Bad debt	21,383	-
Office & equipment leases	14,984	21,127
Insurance	14,297	14,123
Marketing	13,725	18,587
Bank charges & credit card discounts	11,946	8,019
Volunteer recognition	11,037	8,923
Computer & website	8,839	9,393
Printing & publications	8,178	8,878
Amortization	6,482	5,783
Training	4,262	6,158
Realized/unrealized exchange loss	-	86
	<u>6,304,857</u>	<u>6,966,014</u>
<b>Excess of revenue over expenses</b>	<b>\$ 285,637</b>	<b>\$ (281,959)</b>

For a complete copy of the 2018 Independent Auditor's Report, please email [sjangula@ptac.org](mailto:sjangula@ptac.org).

# MEMBERS

PTAC's membership was comprised of 221 active members at year-end 2018.

## Associations (11)

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- Alacrity Foundation
- Alberta Canada Fusion Technology Alliance
- BC Innovation Council
- Canadian Association of Petroleum Producers (CAPP)
- Canadian Energy Pipeline Association
- Canadian Geothermal Energy Association
- CSA Group
- Environmental Services Association of Alberta (ESAA)
- Innovate Calgary
- Petroleum Services Association of Calgary: PSAC
- TECTERRA

## Producers (18)

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- Athabasca Oil Corporation
- Canadian Natural Resources Limited
- Cenovus Energy Inc.
- Chevron Canada Resources
- ConocoPhillips Canada
- Devon Canada Corporation
- Encana Corporation
- Enerplus Corporation
- Husky Energy Inc.
- Imperial
- Japan Canada Oil Sands Limited
- NAL Resources Management Ltd.
- Nexen Energy ULC
- NuVista Energy
- PetroChina Canada
- Repsol Oil and Gas Canada Inc.
- Shell Canada
- Suncor Energy

## Government (10)

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- Alberta Department of Energy
- Alberta Economic Development and Trade

- Alberta Energy Regulator
- Alberta Environment and Parks
- British Columbia Oil and Gas Commission
- Canada Revenue Agency – Calgary CTSO SR & ED
- Environment Canada
- National Research Council – Industrial Research Assistance Program
- Saskatchewan Ministry of Energy and Resources
- City of Medicine Hat

## Individuals (13)

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- Dr. Havez Balavi
- Jamie Callendar
- José Delgado
- Sonia Glubish
- Peter Holmes
- Eric Lloyd
- Bob Mick
- Ken Putt
- George Rhodey
- Earle Shirley
- Monica Sippola
- Murray Todd
- Henry van der Sloot

## Learning Institutions (4)

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- Carleton University
- Southern Alberta Institute of Technology (SAIT)
- University of Alberta
- University of Calgary

## Research Providers (18)

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- Alberta Innovates
- Alberta Sulphur Research Ltd.
- Baker Hughes, a GE Company
- Canada Institute for Photonic Innovations
- CMC Research Institutes
- fRI Research

- Gas Technology Institute
- Genome Alberta
- Innocorps Research Corporation
- InnoTech Alberta
- Natural Resources Canada
- Patro Research
- Petroleum Technology Research Centre
- Priddis Environmental Solutions Ltd.
- Saskatchewan Research Council
- Strategic Timelines
- Terrestrial Energy Inc.
- zEroCor Tubulars Inc.

## Transport/Midstream (2)

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- Keyera Energy Ltd.
- TransCanada Pipelines Ltd.

## Venture Capital (1)

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- First Merchants Capital Partners Inc.

## Service and Supply (144)

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- 3M Canada – Oil and Gas Division
- Acceleware Ltd.
- Advisian
- Agar Canada Corporation Ltd.
- AgriPower Inc.
- Allardyce Bower Consulting Inc. (ABC Engineering)
- Altus Group Limited
- AMGAS Services Inc.
- AOMS Technologies Inc.
- ARCADIS Canada Inc.
- ASSIST Energy Solutions Corporation
- Atlantis Research Labs Inc.
- Baseline Energy Group Ltd.
- Belca Soft Corporation
- Beta-Tech Inc.
- BgtL LLC
- Black Gold Rush Industries

- Blue Source Canada ULC
- Blue Spark Energy
- BrightSpot Consulting
- Calscan Energy Ltd.
- Cap-Op Energy Inc.
- Carbon Upcycling Technologies
- Catch 44 Inc.
- CH2M Hill
- CLEAResult
- Clearstone Engineering Ltd.
- CNTRAL Inc.
- Computer Modelling Group Ltd.
- COOEC Canada Company Ltd.
- Core Laboratories Canada Ltd.
- Cougarstone Solutions Inc.
- Crimson Regulatory and Environmental Consulting
- Dell Technologies
- Deloitte – Research and Development, Tax
- Delta Remediation Inc.
- DXD Consulting Inc.
- Eagle Sky Energy Services Ltd.
- Emission Rx Ltd.
- EnerNEXT Advisors
- Enersoft Inc.
- Ensol Systems Inc.
- Envirosoft Products Inc.
- Envirotech Engineering
- Equilibrium Environmental Inc.
- Expansion Power
- Expeto Wireless Ltd.
- Extreme Telematics Corp.
- Ferus Inc.
- FieldCap Inc.
- FLIR System Inc.
- G Seven Generations Ltd.
- Gas Pro Compression
- GCHEM Ltd.
- Gentherm Global Power Technologies
- geoLOGIC Systems Ltd.
- GHG Solutions Corp.
- GHGSat Inc.
- Global Analyzer Systems Ltd.
- Go-By Design Inc.
- Golder Associates
- Goliath Snubbing Ltd.
- GreenPath Energy Ltd.
- Halliburton Group Canada
- Hatch Ltd.
- Hawkiiii
- Hicks & Associates Intellectual Property
- Higher Ground Consulting
- IBM Canada – Energy Branch
- II-VI Marlow
- Ingu Solutions Inc.
- INO
- Integrated Sustainability Consultants Ltd.
- I-Open Technologies
- IronSight
- JET Solutions Inc.
- Kairos Aerospace
- Katch Kan Limited
- Kenilworth Combustion Ltd.
- Kinetica Ventures
- KPMG High Technology Practice Group
- LCO Technologies
- LiDAR Services International
- LOOKNorth
- LuxMux Technology Corporation
- Maaper Analytics
- mAIRsure LLC
- Matrix Solutions Inc.
- Maxwellian Inc.
- MBM Intellectual Property Law
- McCarthy Tetrault LLP – Technology Group
- Millennium EMS Solutions Ltd.
- MNP LLP
- Multisensor Scientific
- Nakeyan Environmental Consulting Inc.
- New Oil Generation
- New Paradigm Engineering Ltd.
- Newalta
- N-Solv Corporation
- NuWave Industries
- OilPro Oilfield Production Equipment Ltd.
- Oplii
- Osprey Informatics
- Portfire Associates Inc.
- Process Ecology Inc.
- ROSEN Canada Ltd.
- RWDI Consulting Engineers and Scientists
- SAFCell Inc.
- Schlumberger Canada Ltd.
- SeekOps Inc.
- Simark Controls
- Sirius Instrumentation and Controls Inc.
- Sky Hunter Corporation
- SLR Consulting
- SNC Lavalin – Environment and Geoscience
- SNC Lavalin – Studies and Developmental Projects
- Solstice Canada Corp.
- Spartan Controls Ltd. – Efficiency Group
- Strategic Capability Network
- Surface Solutions Inc.
- Tecvalco Ltd.
- Terra Water Systems LP
- TerraHub Technologies Inc.
- Terrapro Group
- Tetra Tech Inc.
- The Delphi Group
- Titan Logix Corporation
- Total Combustion Inc.
- Trace Associates Inc.
- Transworld Technologies Inc.
- TriCore Carbon Solutions Inc.
- Trido Industries Inc.
- TSGI Corporation
- Tundra Process Solutions Ltd.
- UV-DOX EnviroTek Ltd.
- Veolia Water Solutions & Technologies
- Vertex Resource Group Ltd.
- VizworX Inc.
- Wave Control Systems Ltd.
- WaVv Strategic Consulting
- Wellsco Slotting Inc.
- Westview Engineering
- Winterhawk Technologies Ltd.
- WSP



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## **We Want to Hear From You!**

For further information about PTAC projects, programs, or volunteer opportunities please contact us at:

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