PTAC

PETROLEUM TECHNOLOGY ALLIANCE CANADA

Annual Report 2020/2021

facilitating
collaborative innovation

CONTENTS

ABOUT US

Petroleum Technology Alliance Canada (PTAC) is a neutral, not-for-profit association that promotes innovative, collaborative research and technology development within the Canadian oil and gas industry.

MISSION

With 25 years of proven experience, PTAC is on a mission to significantly improve the environmental, safety, and financial performance of member companies. Working directly with producers, federal and provincial governments, regulatory bodies, technology providers, academic institutions, service and supply companies, entrepreneurs, and transporters, PTAC has completed over 670 R&D projects.

VISION

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

MESSAGE FROM THE BOARD

Throughout PTAC's 25-year history we have never seen a year like 2020/2021. A shocking COVID-19 pandemic, severe weather, volatile markets, disruptive political events, all amidst increased pressure to meet or exceed environmental, social and governance targets. As the world raced to find solutions, people embraced a new mantra that we are all in this together. Perhaps one of the most valuable lessons 2020/2021 has taught us is that innovation alone is not enough to secure the future of our industry - collaborative innovation is our only hope.

With the stakes higher than ever this year, PTAC leaned into collaborative innovation and technology development to reduce costs, improve efficiencies, and mitigate environmental impact. Despite the myriad of challenges facing the industry, these efforts brought excellent results in 2020/2021. PTAC facilitated 186 projects throughout the 15-month period, including 120 new projects and 68 ongoing projects, worked with more than 250 industry experts from our diverse stakeholders, and sustained our financial position with the highest project revenue since inception. We also adjusted our fiscal year to better serve our members and align with industry needs.

Despite the pandemic, methane emissions continued to be among the highest industry priorities in 2020/2021. PTAC has not wavered in our commitment to meet Canada's 2025 methane reduction targets nor in our long-term vision to increase technology capacity by 90% within the decade. Therefore, we continued to facilitate a variety of methane reduction initiatives including the Intelligent Methane Monitoring and Mitigation System (IM3S) project, an analytics platform that will help industry maximize methane emissions reductions, minimize costs, and optimize regulatory instruments, and the Systematic Third-party Validation of Environmental and Economic Performance of Methane Reduction Technologies (STV) project that will help operators choose the best equipment while increasing market uptake of proven methane mitigation technologies.

The AUPRF program also continued to focus on scientific studies to support methane-related regulatory development. In addition to facilitating 27 ongoing research projects related to air, ecological, remediation and reclamation, water, and well abandonment, the AUPRF program completed three world-class methane detection and quantification projects in 2020/2021. The robust data furnished by the Fugitive Emissions Management Program Effectiveness Assessment (FEMP EA) will help inform industry and regulatory decisions and the two Alberta Methane Field Challenge (AMFC) field campaigns tested promising new technologies in real-world conditions across seasonal variations.

Building on the success of these projects, the AUPRF program was awarded $2.4M in TIER funding in August 2020 to continue developing solutions for methane detection, quantification, and emissions reduction. These new AUPRF projects continue to prove that there does not need to be a trade-off between financial and environmental performance – using collaborative innovation, industry continues to meet both goals simultaneously. In fact, the AUPRF program currently realizes cost savings of an estimated $93 million per year, with future value projected at $203 million per year.

PTAC continued to promote innovation, collaborative applied research, and technology development, demonstration, deployment, and commercialization to help Canada produce sustainable, clean oil and gas resources. Key among these efforts in 2020/2021 was expansion of the Canadian Emissions Reduction Innovation Consortium (CanERIC). Provided their technologies are market-driven and commercially viable, this program ensures Canadian researchers and innovative technology providers have access to high-quality lab- and field-testing facilities at no cost. To date, 15 producers and mid-streamers have made available to CanERIC

dedicated field facilities worth over one billion dollars, while 16 universities and R&D organizations provided dedicated lab facilities. Even though Canadian SMEs and technology providers faced additional economic challenges and development hurdles in 2020/2021, CanERIC helped ensure innovative methane reduction technology continued to get to market.

PTAC also continued working closely with the Clean Resource Innovation Network (CRIN) over the past year. PTAC's President led the CRIN Methane Theme, as well as serving on the board of directors and steering committee. In collaboration with CRIN, PTAC connected people, projects, and ideas, providing both space and tools to facilitate collaborative innovation across all aspects of methane. This meant that amidst the difficult circumstances of the past year, oil and gas industry leaders, innovators, technology vendors, academia, research institutes, financiers, and government were able to work together to position Canada as a global leader in low-emission hydrocarbon energy.

Like most organizations, PTAC overcame the challenge of distance and embraced connection via technology in 2020/2021. Hosting 32 online events including forums, workshops, and Technology Information Sessions (TIS), PTAC ensured stakeholders stayed on top of project results, new research, and technology development progress. In many ways, this pivot to digital platforms fostered much more extensive collaboration. A record-breaking 587 registrants from 21 countries across 6 continents attended PTAC's Methane Emissions Reduction Forum in November 2020. Then, we further expanded our international reach with the launch of a directory of more than 60 cleantech companies working to export their methane detection and mitigation technologies to other jurisdictions around the world.

Collaborative innovation has always been the foundation of who we are and what we do. The PTAC collaborative model ensures that our members will not face the uncertain future alone. As we optimistically look towards the light at the end of the COVID-19 tunnel, PTAC remains focused on facilitating projects and events to address the most crucial industry concerns. This includes continuing the AUPRF program, expanding work with collaborative networks such as CanERIC and CRIN, increasing international activities, and launching more initiatives to help Canadian SMEs and other innovators bring their technologies to market. We will also host the Net Zero & Methane Emissions Conference in November 2021 and a robust Net-Zero conference in 2022.

The COVID-19 pandemic has created limitations and challenges that many of us never expected to face in our lifetime. However, it has also highlighted our resilience, ingenuity, and the importance of collaboration. Our successes in 2020/2021 are a credit to our membership, the dedicated volunteers who served on PTAC's Board of Directors, Technical Steering Committees, and the organizations willing to take risks together in support of innovation.

Thank you for your partnership in facilitating innovation, collaborative research and technology development, demonstration, and deployment for a responsible Canadian hydrocarbon energy industry.

Soheil Asgarpour, President

Kevin Stashin, Chairperson

PTAC PETROLEUM TECHNOLOGY ALLIANCE CANADA

SMALL & EFFECTIVE TEAM

120 new projects
68 ongoing projects

32
events

9
staff

217
PTAC members

$8,093,742
annual revenue

PTAC STAFF

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Board of Directors (as of March 31, 2021)

Kevin Stashin, Chair
Independent Director

Joy Romero, Vice-Chair
Executive Advisor Innovation; Canadian Natural Resources Ltd.

Cheryl Trudell, Chair-Elect
Joint Interest Production Manager; Imperial

Soheil Asgarpour
President; PTAC

Matt Bryan
Managing Director; Schlumberger Canada Limited

Brian Doucette
Director, Environmental Excellence; Suncor

Mike Ekelund
Independent Director

Lois Garrett
Independent Director

Rhonda Goulden
Assistant Deputy Minister, Policy; Environment and Parks

Andrew Noseworthy, Ex-Officio
Assistant Deputy Minister, Clean Technology (ISED) and Special Advisor to the President; Energy & Strategic Initiatives (ACOA)

Ken Paulson
Executive Vice President, Chief Operating Officer; BCOGC

Laurie Pushor
President and Chief Executive Officer; AER

Ken Putt
Independent Director

Justin Riemer
Assistant Deputy Minister; Western Economic Development

William Rosehart
Dean - Schulich School of Engineering; University of Calgary

Randy Rudolph
Senior Air Quality Scientist; AECOM

Laurier Schramm
Independent Director

Cécile Siewe
Director General, CanmetENERGY – Devon, Strategic Petroleum Policy and Investment Office; Natural Resources Canada

Murray Todd
Independent Director

John Zhou
Vice President - Clean Resources; Alberta Innovates

2020 / 2021 SUMMARY

ALBERTA UPSTREAM PETROLEUM RESEARCH FUND (AUPRF)

The AUPRF program conducts peer-reviewed environmental research addressing high-priority issues in Alberta's oil and gas industry. Recently, the program has focused on scientific studies to support methane-related regulatory development. In 2020/2021, AUPRF was awarded $2.4 million in research and technology funding. In addition to launching 27 new projects or project phases, AUPRF continued to facilitate 41 ongoing projects related to air, ecology, reclamation and remediation, well abandonment, and water.

In a 2021 analysis, it has been determined that PTAC's AUPRF program realizes an estimated cost savings for industry of $93 million realized per year, with a projected future value of $203 million per year. During these unprecedented times, with the ongoing pandemic, current economic conditions and historically low oil prices, the oil and gas industry benefits significantly from the ongoing work the AUPRF program supports.

The success of the AUPRF applied research program continues to prove there does not need to be a trade-off between financial and environmental performance – collaborative innovation and R&D allows industry to meet both goals simultaneously. The program funds and executes projects that address the challenges affecting industry today, and the close collaboration between AUPRF researchers, oil and gas producers, Alberta Environment and Parks, and the Alberta Energy Regulator, has facilitated many policy changes based on clear scientific evidence. This collaborative approach has provided Alberta with superior regulations that reduce red tape and minimize both environmental impact and costs to industry.

TECHNOLOGY & DIGITAL INNOVATION

While industry needs shifted rapidly throughout 2020/2021, PTAC monitored member priorities expressed through committee meetings, workshops, webinars, and project support. This industry-driven focus led to several events and technology development projects in methane emissions reduction, GHG and climate change, digital transformation, support for small and medium enterprises (SME), and innovation system activation.

The detection, quantification, and reduction of methane emissions remained a critical focus for oil and gas producers and innovators in 2020/2021. PTAC facilitated several collaborative projects across the technology development scale, from prototype development to deployment of technologies at the early commercialization stage.

Some of the industry's most ground-breaking innovations flow from the SME sector, yet these small companies continue to face significant barriers in bringing their ideas to market. Chipping away at some of these barriers, PTAC once again facilitated its SME initiative in collaboration with the National Research Council Industrial Research Assistance Program (NRC-IRAP). This program provides oil and gas SMEs with innovation support, particularly for demonstrating and deploying near-commercial or deployment-ready technologies that improve environmental performance and reduce costs.

With its potential to reshape how the oil and gas industry in Canada operates, digital innovation remained a critical focus in 2020/2021, spurring technology development and events addressing opportu-

nities from novel sensors to drones, cloud computing, machine learning, and artificial intelligence. PTAC's Digital Spotlight online events sparked new ideas and encouraged industry, government, and technology providers to collaborate on overcoming challenges along the innovation journey.

At the same time, working closely with the Clean Resource Innovation Network (CRIN) enabled PTAC to expand collaboration networks and gain a deeper understanding of opportunities and challenges across the industry.

CANADIAN EMISSIONS REDUCTION INNOVATION CONSORTIUM (CanERIC)

The Canadian Emissions Reduction Innovation Consortium (CanERIC) was founded in 2019 as a pan-Canadian network of researchers and end-users created to develop and deploy technologies to reduce methane emissions. This network is providing the oil and gas industry with a platform to articulate and rank their most pressing methane emission challenges.

The program development began in earnest in early 2020, but some of the early acceleration was derailed due to the COVID-19 pandemic. Industry therefore decided to focus its attention on technologies which would capture or reduce emissions from tank vents, pneumatic devices and surface casing vents. CanERIC created a suitable on-boarding template, and input from many vendors was received. These submissions were reviewed and many technologies were selected for further review in lab and field testing facilities. The technologies in testing include: incineration, electrical power generation and compression.

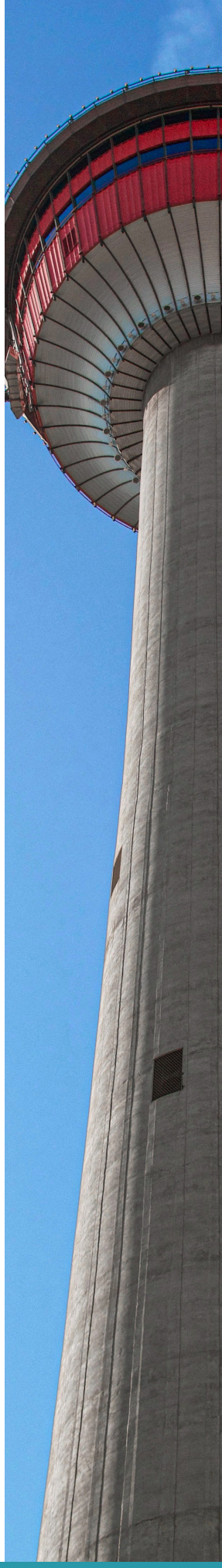
Funding from Alberta Innovates and Natural Resources Canada (NRCan) was granted to the program throughout 2020. $3 million was granted to the researchers to purchase equipment for their facilities to help test methane detection and abatement equipment. Additional funding was provided by Alberta Innovates, which when combined with the resources made available by the researchers, allowed for $1 million to be spent on developing future researchers during last year and this year.

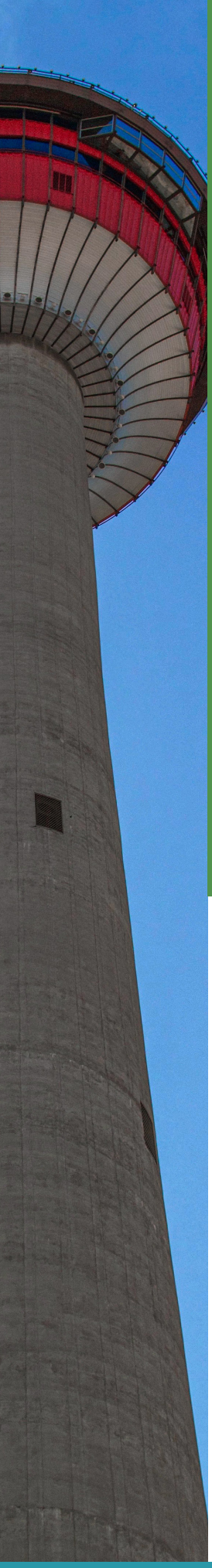
PROJECTS

In 2020/2021, PTAC facilitated, coordinated, and managed 120 new projects and 68 ongoing projects, the highest number of projects since the association's inception in 1996. These projects were guided and supported by over 250 industry experts from our diverse stakeholders. Many of the technologies developed through PTAC consortia have immensely helped industry reduce its environmental footprint while improving financial performance. This list highlights some of the projects undertaken.

Agronomic Receptor Evaluation for Direct Soil Contact

The completed project will provide a robust understanding of the effect of salinity on eco-direct contact receptors and ultimately provide recommendations for an exclusion depth, reducing unnecessary remediation. These recommendations will curtail land disturbance through remediation and lead to cost savings for industry and the province. Furthermore, the results of this study will provide a significant increase to the current body of knowledge specific to the agronomic and eco-contact receptors of Alberta.





VALUE PROPOSITION

A Right-Sized Solution for Right Now
Technology drives the modern oil and gas industry. Technological innovation touches every aspect of our business - how we extract resources; how we control costs; how we mitigate environmental impact; how we communicate. But research and technology development are expensive, and we are now facing one of the hardest seasons in the history of our industry. The PTAC Collaborative Model was created for times like this.

What is the PTAC Collaborative Model?
The PTAC collaborative model connects a variety of stakeholders to cost-effectively pursue research and development projects to solve common problems. PTAC provides neutral facilitation and project management.

Why Collaboration?
Bringing together the diverse skills and perspectives of producers, research providers, government, transporters, and service and supply companies leverages expertise, influence, and capacity.

Mobilizing funding from all stakeholders enables the pursuit of large research and development projects that would be too costly for an individual organization to tackle on their own. Collaboration promotes a wholistic approach to projects, sparking fresh ideas and facilitating candid conversations that lead to efficiencies and innovation.

Leveraging both funding and expertise mitigates a variety of individual risks and ensures collective commitment to success.

Our Programs:
- Cost reduction
- Research and development
- Technology development
- Implementing smart policies
- Implementing best management practices
- Collaboration

Alberta Water Tool - Open Access

The Alberta Water Tool provides streamlined access to water supply, demand, and environmental flow needs across more than 200,000km2 of Alberta. The tool provides scientifically defensible, high-quality, location-specific reports that can be used at the planning stage for water supply assessment. These reports are regularly provided as supporting material for water use applications from industry or consultants working on their behalf.

Beyond Visual Line of Sight Demonstration

The Beyond Visual Line of Sight (BVLOS) project builds upon the work of the PTAC-led Digital Innovation Network (DIN). The BVLOS project facilitates the development of drone flights for the monitoring and inspection of remote oil and gas installation sites in Central and or Northern Alberta.

Canadian Capabilities in Methane Emissions Reduction Guide & Directory

Canada is a world leader in responsible development of natural resources and it has taken steps to reduce methane emissions at home and abroad. The objective of this guide and company directory is to share Canada's experience and expertise in methane emissions reduction in the oil and gas sector. This guide highlights Canadian capabilities with the purpose to assist other oil and gas producing countries to reduce methane emissions, particularly in upstream operations.

Cold Heavy Oil Production with Sand (CHOPS GOR)

Current methods for estimating gas production and venting volumes associated with CHOPS production in Alberta and Saskatchewan have been scrutinized for their level of effectiveness and accuracy. This project seeks to determine an appropriate method that is cost effective and sufficiently accurate.

Data Collection & Analysis of Phase II Environmental Site Assessments (ESA) Associated with Drilling Waste Disposal Locations

The intended outcome of this work program is to determine if the Compliance Options are appropriate as currently written or if they need to be adjusted to reduce false positive or negative triggers for Phase II ESAs, and to identify any other required changes.

Development of a Chloride Water Quality Guideline Based on Hardness and Consideration for Cation Toxicity

The project aims to finalize and incorporate recently-released research into the hardness-chloride toxicity relationship, informing the development of an aquatic life guideline for chloride. The current guideline is driven by testing on the freshwater mussel species Epioblasma torulosa rangiana. However, the species' sensitivity to sodium chloride toxicity, it is endangered in Canada and it cannot be re-tested. The project will examine whether toxicity testing can be completed in another country by a competent laboratory.

Digital Innovation Network

The Digital Innovation Network (DIN) leverages the innovative spirit of Alberta producers, researchers, academia, government organizations, regulatory bodies, and entrepreneurs to commercially deploy digital technologies. The project contributes to the direct creation of thousands of jobs in Alberta by elevating operator demand for installations of digital technologies.

Electric Dump Valve Actuator

Phase 1 of the project is currently pursuing the design, development, and field test of an affordable, zero-emission, fail-safe EDVA for 1" valve applications. Phase 2 of the project, with support from ERA, will develop and test a larger EDVA with the addition of modulating precision control capability using LMT's SmartRam™ Shape Memory Alloy technology. The technology addresses natural gas venting.

Energy UTM

Energy UTM piloted a technology to allow safe and regulated drone flights beyond visual line of sight (BVLOS). However, regulations are not yet in place for full deployment in Canada. Robust and reliable technologies are required to permit, approve, monitor and regulate drone flights to ensure public safety and the safety of piloted aircraft. This project brings together AirMarket and PTAC-member oil and gas companies to pilot the UTM technology in the context of national trials supervised by Transport Canada and NAV Canada.

Evaluation of Reclamation Practices on Forested Upland and Peatland Well Sites

The goal of this project is to provide recommendations for an acceptable policy framework/decision support tool to help industry and regulators make decisions regarding appropriate management and certification of forested upland and peat well sites that ensure functioning ecosystems are developed and that a process is in place outlining eligibility for reclamation certification.

Field Study of Pipeline Segments Abandoned on Farmland (PARSC 017)

The project conducted field observations and excavations of abandoned pipe segments. Results are being analyzed and will become available in 2021.

Finalization of Research and Preliminary Selenium Soil Quality Guideline Derivation

An in-depth literature assessment has indicated that no regulatory agency has developed defensible soil quality guidelines for selenium that incorporate the influence of sulphate, a common salinity ion encountered naturally in the Western Sedimentary Basin. This project seeks to develop such environmental regulatory guidelines using a sound science-based approach. Focusing remediation efforts away from guideline exceedances that are not associated with an unacceptable potential for adverse effect will expedite and improve processes when evaluating selenium impacts at hydrocarbon energy industry sites. There is a net environmental and cost benefit for this work.

Identify GHG Level for Well Repair and Monitoring of Sweet Natural Gas Wells to Identify Acceptable Leak Rate

This project will provide a 'proof of concept' that may be updated as future technologies are developed and research conducted with respect to well remediation, emissions mitigation and plant tolerance to methane in the soil.

Intelligent Methane Monitoring and Mitigation System (IM3S)

Currently, this project is focused on the development of numerical modelling to inform the design of alternative fugitive emissions management programs. IM3S was first launched in 2019 and supported the second cohort of the Alberta Methane Field Challenge. The analysis and reporting of the 2019 field campaigns is underway and will be reported in 2021. The LDAR SIM component is developing knowledge and tools for the design, monitoring, and management of FEMPs in order to efficiently achieve (or exceed) compliance at the lowest possible cost.

Jurisdictional Review: Alternative Water Transfers Using Temporary Layflat Hose

To decrease industry use of high quality non-saline water, fracking operations are considering alternative water sources such as flowback and produced water. Alberta energy operators are exploring the use of layflat, temporary hoses rather than trucks to transport produced and flowback water. Building on previous work and incorporating additional research, this project seeks to summarize and compare experiences using this process in Alberta, BC, Colorado and Texas.

Methane Consortia Program (MCP)

This methane reduction project was launched in 2019 to increase market uptake of commercial technologies and deliver a demonstrated permanent Greenhouse Gas reduction in the 6-24 months term by leveraging the deployment of methane projects accessible to all Alberta producers. Project participants consist of Alberta oil and gas producers and technology providers. In 2020, they reviewed eight proposals and awarded funding to begin installations and operation of measurement equipment.

Methane Emissions – Risk Tool – Site Prioritization and Emission Closure Guidelines

By providing knowledge and information on key variables associated with leaking wells (including various regulatory policy components), this project will develop a consistent, risk-driven tool for assessing the relative risk between wells and prioritizing mitigation sites so that resources can be deployed more effectively.

Methane Emissions Reduction Network (MERN)

Methane Emissions Reduction Network (MERN) identifies and addresses technology gaps and champions projects and initiatives to reduce methane emissions. Through on-going and planned technology initiatives, MERN will increase the collective technology capacity and help the oil and gas industry meet its methane emissions target by 2025. The Network organizes and participates in forums, workshops, and Technology Information Sessions to share the latest developments in methane reduction technology, as well as raise awareness and increase uptake of innovative, cost-effective oil and gas practices. Information on MERN events is disseminated via the Methane Hub.

Methods to Identify Product Placement Behind Pipe & Identify Drilling Practices to Optimize Well Integrity with Primary Cementing

Using alternate products in well remediation could save industry billions of dollars and substantially reduce environmental risks. Although industry is developing advanced products (alternate products) to replace remedial cementing in specific applications, research is needed to optimize the process. This project will help identify where these new products should be placed behind casing during well remediation attempts.

Multi-Year Compositional, Isotopic and Microbial Investigation of Methane Migration Issues to Develop “Best-Practices” for Industry

The proposed research will address the scientific and regulatory gaps in knowledge and technology by integrating investigative frameworks and technologies capable of quantitatively evaluating soil gas migration rates and volumes.

NRC-IRAP Client SME Innovation

In collaboration with NRC IRAP, we continue to onboard PTAC members and IRAP clients to help sharpen the market focus of new technologies through engaging conversations with potential end-users and stakeholders. At the end of March 2021, a total of 32 Product Market Fit engagements were completed with 12 progressing to project development and consortium formation. Seven of these engagements advanced to the launch of a funded project. The total value of the seven projects launched in 2020-21 by PTAC involving IRAP clients was $37.7 million.

NSRC FlareNet Strategic Network

The overarching objective of FlareNet is to provide a quantitative understanding of flare-generated pollutant emissions, which will inform science-based regulations, accurate pollutant inventories, understanding of climate forcing and health implications, and engineering design and assessment of mitigation strategies to minimize environmental impacts in the energy sector.

Peace River Abandoned Pipeline Segment Field Study Project (PARSC 016)

This project incorporates field observations and excavations of the abandoned Peace River pipeline.

Plant Uptake of Petroleum Hydrocarbons and Salt (NaCl) and Derivation of Soil-to-Plant Uptake Factors

Environmental Risk Assessment (ERA) is a specialized tool that can be used to manage contaminated sites, including oil and gas facilities and spill sites. The process involves identification of site-specific receptors (human and ecological), contaminants of concern, and exposure pathways through which receptors may come in contact with contaminants. This information is then used to qualitatively and/or quantitatively evaluate health risk. Ultimately, the goal for most sites where ERA is used is to obtain regulatory closure and mitigate environmental liability.

Plug and Abandon Strategies for Canada's Oil & Gas Wells to stop Surface Casing Vent Flow (SCVF) and Gas Migration (GM)

This 4-year project will clarify knowledge gaps and expose technological issues by assessing the status of typical Canadian P&A operations, well architectures, and regulatory practices in a global context, and then conducting a detailed review of the scientific and engineering literature as it pertains to questions of plug integrity. The project will then target research in a series of complementary sub-projects to provide physical and engineering rationale for those regulatory and operational decisions that concern fluid mechanical issues, e.g. plug placement, cleaning of residual well fluids, mixing during placement, bonding/contact, squeeze cementing.

Potential Impact of Abandoned Anode Beds Project (PARSC 019)

This project provided companies with a defensible best practice procedure for anode groundbed installations and abandonment. By collecting relevant information on anode abandonment and groundbed installation and abandonment, this study provided a foundation for future best practices and a resource for companies to inform regulators and property owners upon request.

Surface Water Diversion Learning Portal

This learning portal helps personnel within Alberta's oil and gas industry to better understand the environmental risks associated with water use and also sheds light on the industry's legal obligations under the Water Act.

Systematic Third-Party Validation (STV)

This project will overcome a major gap that hampers the validation, adoption, and deployment of innovative emissions reduction technologies in Alberta's oil and gas sector. While new devices are currently available, the general performance and cost profiles in field use have yet to be established to the extent required for a wide-scale transition from legacy operations. STV will remove a critical barrier to the widespread deployment for a cohort of technologies, allowing them to cross over the chasm that separates them from full commercialization.

Targeted PureJet Incinerators for Methane Challenges (ERA)

The project will develop and conduct multiple field demonstrations of the PureJet Incinerator. By working with multiple pilots (Atlantis Research Labs, Husky Energy (now Cenovus), and City of Medicine Hat) who each have a different application across the supply chain will assist in refining the ideal market roll-out strategy. The first PureJet unit was tested and analyzed in 2020. A second unit was delivered in 2021 and testing continues.

Testing Alternative Products for Well Remediation and Decommissioning / Abandonment – Phase I

Industry is developing advanced products (alternate products) to replace remedial cementing in specific applications. This project investigates the efficacy of multiple technologies.

Viking Duvernay Methane Capture Study

The project has completed a desktop study to identify potential technologies to capture and utilize associated gas at upstream oil and gas sites from the Viking and Duvernay systems.

Water Use Data Sources and Water Metrics for Canada

The project will identify the water data available from Canada's oil and gas industry as well as performance metrics commonly reported in other oil and gas producing jurisdictions. This knowledge will help to evaluate the water use performance in Canada's oil and gas compared to other oil and gas producing countries.

COMMITTEES

"Unity is strength… where there is teamwork and collaboration, wonderful things can be achieved"
- Mattie J.T. Stepanek

Air Research Planning Committee (ARPC)

ARPC supports industry's desire for shared research development to develop credible and relevant information to address knowledge gaps in the understanding and management of high priority environmental and social matters. Our goal is to initiate credible research projects, both fundamental and applied, on existing and emerging environmental issues to support both development of new regulatory requirements and industry best practices.

- Brian Spiegelmann, NAL Resources Management Ltd
- Bruce Fraser, Environment and Climate Change Canada
- Cassandra Schostek, Alberta Energy Regulator
- Colin Hennel, Bonavista Energy
- Don D'Souza, BC Oil and Gas Commission
- Don McCrimmon, Canadian Association of Petroleum Producers (CAPP)

- Filiz Onder, Encana
- Gerald Palanca, Alberta Energy Regulator
- Greg Unrau, Repsol
- Jacob Bayda, Saskatchewan Ministry of Energy and Resources
- James Beck, Suncor Energy
- Johnny Matta, Environment and Climate Change Canada
- Koray Onder, TC Energy
- Marie Johnson, BC Oil and Gas Commission
- Mark Anderson, Husky Energy
- Moruf Aminu, Encana
- Neuczki Mathurin, TC Energy
- Paolo Bomben, Alberta Innovates
- Randy Dobko, Alberta Environment and Parks
- Rekha Nambiar, Suncor Energy
- Richelle Foster, Canadian Natural Resources Ltd.
- Roopa Ganapathy, Environment and Climate Change Canada
- Sean Hiebert, Cenovus Energy
- Sean Mercer, Imperial

Canadian Emissions Reduction Innovation Consortium (CanERIC)

The Canadian Emissions Reduction Innovation Consortium is a network of emissions reduction test facilities with a vision to encourage national integration and collaboration, avoid duplication, host open information sharing and maintain Canadian global innovation leadership. CanERIC will be anchored by its founding members but will accept new members to provide facilities responding to innovation needs of TRL 5-9 technologies.

Infrastructure Steering Committee:

- Aravinder Kumar, Harrisburg University
- Bob Davies, Southern Alberta Institute of Technology
- Chris Hugenholtz, University of Calgary
- Clay Bell, Colorado State University
- Dave Risk, St. Francis Xavier
- Erica Emery, Saskatchewan Research Council
- Erin Powell, Saskatchewan Research Council
- Fred Wassmuth, Innotech Alberta
- James Brydie, CanmetENERGY
- Jason Olfert, University of Alberta
- Ken Omotani, Southern Alberta Institute of Technology
- Kirk Osadetz, CMC Research Institutes
- Kyle Daun, University of Waterloo
- Larry Kostiuk, University of Alberta
- Lesley McGilp, Saskatchewan Research Council
- Matt Johnson, Carleton University
- Mohammad Latifi, Polytechnique Montreal
- Nader Mahinpe University of Calgary
- Neil Yaremchuk, Innotech Alberta
- Scott Mundle, University of Windsor
- Vita Martez, Southern Alberta Institute of Technology

Industry Solutions Steering Committee:

- Abbas Ali Beg, ATCO
- Dan Morrison, InterPipeline
- Gary Shum, Ovintiv
- Jason Brannick, Canadian Natural Resources Ltd.
- Kendell Esau, Bonavista
- Lisa Song, Chevron
- Mark Bohm, Suncor
- Morgan Wrishko, Cenovus Enery
- Neuczki Mathurin, TC Energy
- Patrick Kitchin, Whitecap
- Richelle Foster, CNRL
- Scott James, Velvet Energy
- Sean Mercer, Imperial
- Stephanie Neilson, ARC Resources
- Vincent Saubestre, Total E&P Canada Ltd.
- Yori Jamin, PETRONAS

Consortium for Digital Innovation and Transformation (CDIT)

Digital is a key enabler to reduce costs, increase efficiency and productivity, reduce environmental impact, and make better business decisions. Industry, along with other technology leaders, identifies and collaborates to solve a number of common digital innovation challenges.

- Michael Teshima, Suncor Energy
- Angela MacPherson, TC Energy
- John Paul Portelli, Canadian Natural Resources Ltd.
- Glen McCrimmon, Clean Resource Innovation Network
- Tony Khoo, Enbridge Inc.
- Jeff LaFrenz, Clean Resource Innovation Network
- Chris Godwaldt, COSIA
- Heather Wilcott, Imperial
- Jeffrey Dueck, Chevron
- Armin Vatandoust, Suncor Energy
- Steve Walker, Suncor Energy
- Victoria Ross, Ovintiv
- Michael Loughlean, Suncor Energy
- Greg Bolzon, Canadian Natural
- David Marshall, Chevron
- Tamara Rego, TC Energy

- Tania Rizwan, TC Energy
- Alistair Kirk, Imperial
- Mark Sombach, Syncrude
- Colin Forsyth, Syncrude
- Dion Balson, Canadian Natural Resources Ltd.
- Khaled Rafih, Husky Energy
- Stan Tumoth, TC Energy

Ecological Research Planning Committee (ERPC)

The committee will support industry's desire for shared research to develop credible and relevant information to address knowledge gaps in the understanding and management of high priority environmental and social matters related to resource access issues such as caribou, habitat relationship for listed species, wetlands, reclamation, and mitigations.

- Amit Saxenda, Canadian Natural Resources Ltd.
- Ben Hale, Husky Energy
- Carol Engstrom, dependent
- Jennifer Shalagan, Husky Energy
- Lori Neufeld, Imperial
- Mark Boulton, Suncor Energy
- Mark Phinney, Ovintiv
- Richard Chabaylo, Alberta Energy Regulator
- Samuel Rawluk, Canadian Association of Petroleum Producers (CAPP)
- Shane Patterson, Alberta Environment and Parks

Electric Dump Valve Actuator (EDVA) Steering Committee

Used to provide process control over flow rate, pressure, and temperature, pneumatic devices account for approximately 20 per-cent of methane emissions in the Canadian oil and gas sector. This steering committee oversees design, fabrication, shop tests, and field tests of a zero-emission, affordable, and fail-safe electric dump valve actuator to replace existing pneumatic valves.

- Patrick Kitchin, Whitecap Resources
- Sean Hiebert, Cenovus Energy
- Ray Lambert, Cenovus Energy
- Owen Henshaw, Cenovus Energy
- Brad Morello, Shell
- Brian Van Vliet, Spartan Controls
- Charles Whitehead, Linear Motion Technologies
- Ronda Foster, Linear Motion Technologies
- Jim Wilson, Linear Motion Technologies
- Wes Barrett, Linear Motion Technologies

Energy UTM Steering Committee

This steering committee oversees the Energy UTM project, bringing together AirMarket and PTAC-member oil and gas companies to pilot the UTM technology to allow safe and regulated drone flights beyond visual line of sight (BVLOS), in the context of national trials supervised by Transport Canada and NAV Canada. Energy UTM piloted a technology to allow safe and regulated drone flights beyond visual line of sight (BVLOS).

- Bruce Duong, Alberta Innovates
- Lindsay Mohr, AirMarket
- Jeremy Byatt, AirMarket
- Denis Niles, Telus
- Stan Tumoth, TC Energy
- Tania Rizwan, TC Energy

IM3S Steering Committee

This collaborative steering committee oversees the development of numerical modelling to inform the design of alternative fugitive emissions management programs.

- Richelle Foster, Canadian Natural
- Chris Hugenholtz, University of Calgary
- Thomas Fox, Highwood Environmental Management
- Jessica Shumlich, Highwood Environmental Management

Methane Consortia Program (MCP) Steering Committee

In our constant endeavor to lower methane emissions through innovation, PTAC – along with Alberta Environment and Parks– formed the Methane Consortia Program. This collaborative committee promotes the deployment of innovation within the Alberta oil and gas sector.

- Heather Carmichael, Alberta Environment and Parks
- Monica Micak, Alberta Environment and Parks
- Chris Hugenholtz, University of Calgary
- Gerald Palanca, Alberta Energy Regulator

PureJet Steering Committee

When flaring is unviable or uneconomic, venting may occur. Targeted at eliminating this risk, PTAC is facilitating the PureJet project with collaborators Cenovus Energy, Husky Energy, and Alberta-based Atlantis Research Labs to develop the PureJet Incinerator. This device, coupled with its ability to handle a wide range of pressures and flow rates, enables methane to be destroyed at sites.

- Aaron Baugh, Emissions Reduction Alberta
- Owen Henshaw, Cenovus Energy
- Vladimir Mravcak, Atlantis Research Labs
- Janelle Mravcak, Atlantis Research Labs

Remediation Reclamation Research Committee (RRRC)

The committee will support industry's desire for shared research development to develop credible and relevant information to address knowledge gaps in the understanding and management of high priority environmental and social matters related to the assessment and management of exploration and production sites as related to geo-environmental protection, soil and groundwater remediation and reclamation, excluding water use, conservation and resource issues.

- Christopher Boyd, Shell Canada Limited
- Daniel Pollard, Alberta Energy Regulator
- Debbie Tainton, Canadian Natural Resources Ltd.
- Gordon Dinwoodie, Alberta Environment and Parks
- Jack O'Neil, COSIA
- Jason Desilets, Cenovus Energy
- Linda Eastcott, Imperial
- Lisa Warren, Husky Energy
- Mike Truzak, Enerplus
- Natalie Shelby-James, COSIC
- Paul Hartzheim, Canadian Association of Petroleum Producers (CAPP)
- Shawn Glessing, Husky Energy
- Sonia Glubish, Canadian Natural Resources Ltd.
- Steve Kullman, Husky Energy
- Tom Knapik, Plains Midstream Canada ULC
- Wanda Sakura, Orphan Well Association

STV Steering Committee

There is a major gap that hampers the validation, adoption, and deployment of innovative emissions reduction technologies in Alberta's oil and gas sector. The STV steering committee works to remove a critical barrier to the widespread deployment for a cohort of technologies, allowing them to cross over the chasm that separates them from full commercialization.

- Richelle Foster, Canadian Natural
- Patrick Kitchin, Whitecap Resources
- Morgan Wrishko, Cenovus Energy
- Vanessa White, Alberta Innovates

Support for Small and Medium Sized Enterprises (SMEs) Program

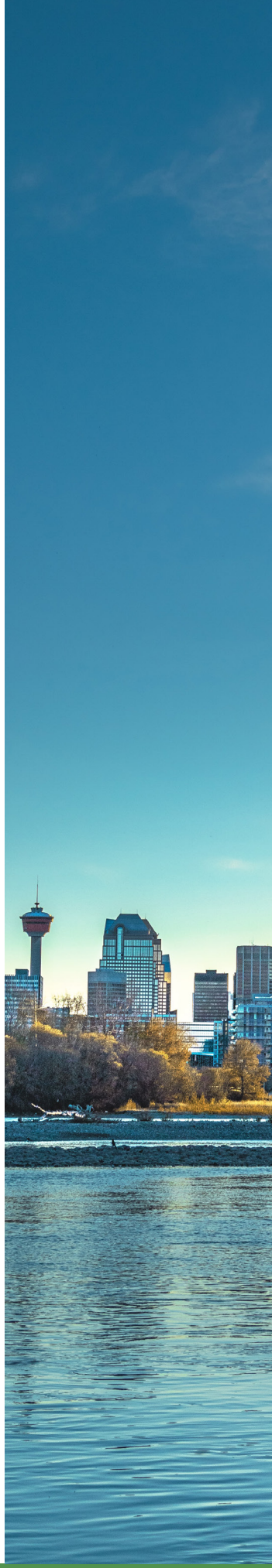
Some of the industry's most ground-breaking innovations flow from the Small and Medium-Sized Enterprise (SME) sector, yet these small companies often face significant barriers in bringing their ideas to market. PTAC facilitates the SME pro-gram in collaboration with the National Research Council Industrial Research Assistance Program (NRC-IRAP), providing oil and gas SMEs with innovation support, particularly for the demonstration and deployment of near-commercial or deployment-ready technologies that improve environmental performance and reduce costs.

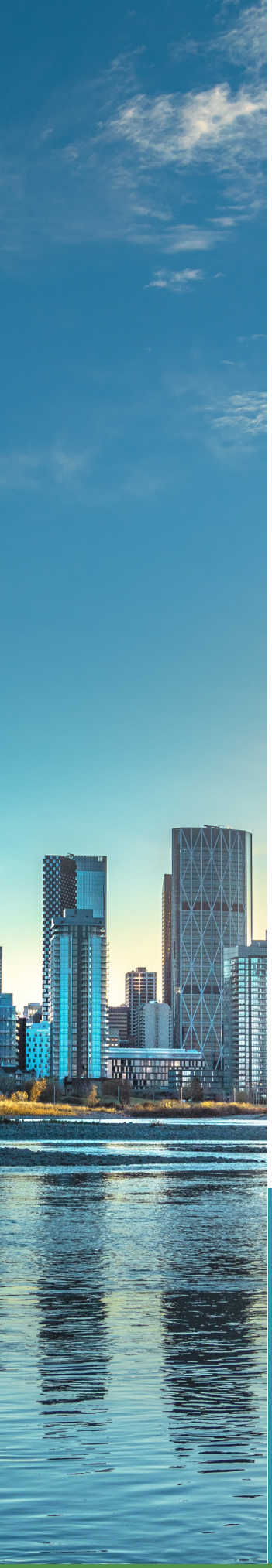
- Arvinder Kainth, National Research Council Industrial Research Assistance Program (NRC – IRAP)
- Ron Quick, National Research Council Industrial Research Assistance Program (NRC – IRAP)
- Tamer Al-Ramahi, National Research Council Industrial Research Assistance Program (NRC – IRAP)

Technology for Emissions Reduction and Eco-Efficiency (TEREE) Program

TEREE is a network of industry, services, products technology providers, and provincial and federal government representatives convened to oversee finding and implementing new technologies and methods required to achieve air emissions reductions in the Oil and Gas industry. TEREE projects have made a significant contribution to industry through the transfer of technologies used globally in the sector.

- Adele Zenide, Canadian Natural Resources Ltd.
- Andrew McClausland, Radicle
- Arvinder Kainth, NRC – IRAP
- Brenna Barlow, Radicle
- Brian Spiegelmann, Whitecap Resources
- Patrick Kitchin, Whitecap Resources
- Bruce Duong, Alberta Innovates
- Catherine Thistlethwaite, Alberta Energy Regulator
- Charles Ward, Alberta Department of Energy
- Chelsea O'Connor, SFC Energy Canada
- Cooper Robinson, Radicle
- Dean Anderson, Baseline Regulatory Compliance Services
- Derek Kelly, Natural Resources Canada
- Derek L'Hirondelle, SFC Energy Canada
- Don McCrimmon, Canadian Association of Petroleum Producers (CAPP)
- Don D'Souza, Government of British Columbia
- Cam Dowler, Spartan Controls
- Gerald Palanca, Alberta Energy Regulator
- Greg Unrau, Repsol
- James Holoboff, Process Ecology
- Joshua Anhalt, GreenPath Energy
- James Beck, Suncor Energy
- Jamie Callendar, Callendar Energy Services
- Jessica Schumlich, Highwood Environmental Management
- Thomas Fox, Highwood Environmental Management
- Jonathan Smith, Blue Source Canada
- Kelly Newnham, Advisian
- Kelly Parker, COSIA
- Kelsey Locke, Blue Source Canada
- Kirk Osadetz, CMC Research Institutes
- Kevin Heal, Radicle
- Kourosh Zanganeh, Natural Resources Canada
- Lisa Studzinski, Enerplus
- Logan Leduc, Environment Canada
- Mark Jamieson, Alberta Energy
- Mark Summers, Emissions Reduction Alberta
- Mike D'Antoni, GreenPath Energy
- Michael Lawson, Alberta Energy Regulator
- Milos Krnjaja, Alberta Energy Regulator
- Paul Jiapizian, Environment Canada
- Rao Ravi, Spartan Controls
- Ray Lambert, Cenovus Energy
- Rick Phaneuf, Alberta Environment and Parks
- Richelle Foster, Canadian Natural Resources Ltd.
- Rekha Nambiar, Suncor Energy
- Ron Quick, NRC – IRAP
- Roy Hunt, Advisian
- Ryan Streams, Kairos Aerospace
- Scott Smith, Cenovus Energy
- Sean Hiebert, Cenovus Energy
- Tyler Tarnoczi, Cenovus Energy
- Brian Van Vliet, Spartan Controls
- Wes Funk, DXD Consulting
- Yonathan Dattner, Luxmux Corporation
- Cassandra Schostek, Alberta Energy Regulator
- Owen Henshaw, Cenovus Energy
- Moruf Aminu, Ovintiv
- Sean Mercer, Imperial
- Monica Sippola, Kuva Systems





- Neuczki Mathurin, TC Energy
- Koray Onder, TC Energy
- Morgan Wrishko, Cenovus Energy
- Connor O'Shea, Westgen Technologies
- Kevin Schatz, Birchill

Water Innovation Planning Committee (WIPC)

The committee will support industry's desire for shared research to develop credible and relevant information to address knowledge gaps related to water. A collaborative approach engages 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.

- Anil Gupta, Alberta Environment and Parks
- Brent Moore, Canadian Natural Resources Ltd.
- Courtney Blackmore, MEG Energy
- Deanna Cottrell, Shell Canada Limited
- Janet McNally, NuVista Energy Ltd.
- Jarred Anstett, Murphy Oil
- Jeff Willick, Canadian Natural Resources Ltd.
- JoAnne Volk, Repsol
- Matt Mclean, Husky Energy
- Michael Bevan, Alberta Energy Regulator
- Michelle Morris, Alberta Environment and Parks
- Neil Fricke, Suncor Energy
- Niki Weinrauch, Cenovus Energy
- Paul Martin, ConocoPhillips Canada
- Rodney Guest, Suncor Energy
- Scott Hillier, Cenovus Energy
- Scott Rayner, Meg Energy
- Sharla Howard, Husky Energy
- Steve Wallace, Alberta Environment and Parks
- Tara Payment, Canadian Association of Petroleum Producers (CAPP)

Well Abandonment Research Initiative Committee (WARI)

The committee will support industry's desire for shared research to develop credible and relevant information to address knowledge gaps related to suspended, abandoned, remediated, and reclaimed wells. A collaborative approach engages 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.

- Ben Fraser, Imperial
- Benjamin Ringrose, Orphan Well Association
- Calvin Bacque, Shell Canada Limited
- Claudette Fedoruk, Canadian Association of Petroleum Producers (CAPP)
- Dave Samuelson, Cenovus Energy
- Deanna Cottrell, Shell Canada Limited
- Kasem Kaci, Alberta Energy Regulator
- Ken Choi, Orphan Well Association
- Ken Masich, Alberta Energy Regulator
- Leah Davies, Imperial
- Nadia Haider, Alberta Energy Regulator
- Niki Weinrauch, Cenovus Energy
- Paul Hartzheim, Canadian Association of Petroleum Producers (CAPP)
- Rajan Varughese, Alberta Energy Regulator
- Ryan Munro, Canadian Natural Resources Ltd.
- Shanna Nolan, Shell Canada Limited
- Shawn Forster, Husky Energy
- Wade Hartzell, Canadian Natural Resources Ltd.

Thank you to our incredible volunteers and members who are integral to helping PTAC achieve its vision to help Canada become a global hydrocarbon energy technology leader.

ANNUAL EVENTS

2019 PTAC Annual General Meeting

The PTAC Annual General Meeting was held virtually on May 7, 2020 through the GoToWebinar software. The event highlighted PTAC's achievements for 2019. Due to the physical distancing requirements of the ongoing COVID-19 pandemic, this event solely focused on the needs of the Annual General Meeting and did not include an awards luncheon or keynote speakers.

Meeting the Methane Emissions Reduction Target Post COVID

On July 7-9, 2020 PTAC held a virtual conference focusing on reducing methane emissions and costs while creating clean tech jobs. As the work-from-home reality won't be permanent, the impact of today's crisis on the industry will be. This event opened a discussion on a plan for a future beyond the pandemic and price wars, and the need to make business decisions carefully, responsibly, and cost-effectively.

Virtual Innovation Showcase

Our industry faces the unique challenge of reducing operational costs while implementing more efficient processes to improve overall company performance and safety. This is why each year PTAC brings together SME technology service providers and industry end-users at our Innovation Showcase. On October 27, 2020, PTAC launched the first Virtual Innovation Showcase, an online collection of pre-recorded videos showcasing innovative technologies. These videos can be access for a full year on the PTAC website.

Methane Emissions Reduction Forum

Largely regarded as PTAC's most informative event, the annual Methane Emissions Reduction Forum focuses on various aspects of reducing methane emissions from oil and gas operations including regulation development, resources and opportunities available to industry, as well as, detection, quantification, and mitigation technologies. The third-annual forum was held virtually and broke PTAC event attendance records with over 580 registrants from 21 countries. It continued the discussion on challenges facing the Canadian oil and gas industry and looked closer at opportunities available to support technology innovation and new practices.

Vision for the Future of Wellsite Asset Retirement: Decommissioning through Closure

This event, held on December 9, 2020, shared successes, learnings and a collective vision for advancing efficient and sustainable practices to most effectively address the full scope of wellsite asset retirement. Presenters discussed a shared vision for holistic asset retirement, and energized the decommissioning and liability closure community with shared outcomes from model practices.

ADDITIONAL EVENTS

In addition to large annual events, PTAC encourages stakeholders to engage in a wide array of monthly functions and smaller initiatives as an enriching element of the PTAC membership. These events provide participants opportunities to further develop the broad themes central to PTAC's mission, as well as provide a platform for collaboration and dissemination of project results and information that benefits the industry. Further, they are a platform for leading think tanks, government bodies, and organizations to present their research and findings.

The following events of this variety took place this year:

- Innovation Mixer and Pitch Session
- Wellbore Abandonment Innovation Mixer
- PTAC Reducing Methane Emissions from Tanks
- PTAC Learnings: Hydropti Water management for Hydraulic Fracturing Operations
- Logging in: TEREE Focused Conversations
- Digital Spotlight: Showcase of Upcoming Technologies
- Digital Spotlight: Applications during COVID-19
- Logging In: TEREE Focused Conversations
- CRIN | PTAC DIGITAL SPOTLIGHT
- Intellectual Property (IP) Barriers to Innovation in Oil & Gas: Perspectives, Challenges and Alternative Models to "Big payout or bust" Approach
- TEREE Townhall
- Virtual Innovation Showcase - Spring Ramp-up

Technology Information Sessions

Technology Information Sessions (TIS) allow PTAC member companies to present in front of a group of industry experts in the hopes of gaining brand, product, and service awareness.

- Luxmux's Accurate Remote Monitoring System for Emissions Measurements
- PermianChain Technologies Inc. – Blockchain Platform-as-a-Service (BPaaS)
- EZOPS - Digital Solutions to Empower Frontline Industry Workers
- Titanium Energy Services – Turn Oily Wastewater into Value
- National Silicates –Sodium silicate & geopolymers as cost effective cement alternatives for remediation and plug abandonment
- Target Emissions Services – LDAR Technologies
- LCO Technologies – Vent gas capture from tanks in remote locations with no power
- Exothermic Chemical Treatment (ECT) – Environmentally Friendly EOR Technology
- Genomics Applications and Technology Development for the Oil & Gas Sector – 2 events
- Process Ecology Emissions Advisor: Beyond Compliance
- SRC: Using Custom Physical Models to Accelerate Technology Development and Reduce Risks
- Kathairos Introduces Novel Solution Using Liquid Nitrogen to Produce Zero Methane Emission Result
- Clairifi - Technology Innovation and Emissions Reduction (TIER) Regulations
- Matidor Managing Remote Work More Effectively-Lessons Learned from Working with Consultants and Operators during this time
- Earthmaster Environmental Strategies Inc.

2020/2021 MEMBERS

Academia

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

Associations

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

Government

- Alberta Department of Energy
- Alberta Economic Development and Trade
- Alberta Energy Regulator
- Alberta Environment and Parks
- British Columbia Oil and Gas Commission
- Environment Canada
- National Research Council - Industrial Research Assistance Program

Individuals

- ABBOTT Energy & Environmental Consulting/ART
- Bob Mick
- Canadian Eagle
- Carol Engstrom
- Dave Rushford
- Dr. Hafez Balavi
- DXP/HSE Integrated
- Earle Shirley
- ECO Consulting Inc.
- Eric Lloyd
- Henry van der Sloot
- Jim Kelsall/HydrocarbonX
- Ken Putt
- LMK Environmnetal Consulting/Mark Beasse
- Murray Todd
- Nick Battocletti
- Schooner Consulting

Producers

- Advantage Oil and Gas
- Birchill Canada LP
- Bonavista Energy Corporation
- Canadian Natural Resources Limited
- Cenovus Energy Inc.
- Chevron Canada Resources
- CNOOC International
- ConocoPhillips Canada
- Ember Resources Inc.
- Enerplus Corporation
- Husky Energy Inc.
- Imperial
- Japan Canada Oil Sands Limited
- NAL Resources
- NuVista Energy
- Ovintiv
- PetroChina Canada
- Suncor Energy
- Syncrude
- Teck Resources
- Velvet Energy

Research Providers

- Alberta Innovates
- Alberta Sulphur Research Ltd.
- Bureau Veritas
- Canadian Institute for Photonic Innovations (CIPI)
- CMC Research Institutes
- FRI Research
- Gas Technology Institute
- Genome Alberta
- InnoTech Alberta
- Natural Resources Canada
- Patro Research
- Petroleum Technology Research Centre (PTRC)
- Saskatchewan Research Council (SRC)
- Strategic Timelines
- Waterline Resources Inc. - Environmental Team

Service and Supply

- Allardyce Bower Consulting Inc.
- Acceleware Ltd.
- AgriPower In.c
- Akine Inc.
- AMGAS Services Inc.
- Anax Power
- Arolytics
- ASSIST Energy Services
- Atlantis Research Labs
- AUTOSOL
- Black Gold Rush Industries
- Blue Source Canada ULC
- Boreal Laser Inc.
- Breama Inc.
- Bridger Photonics
- Calscan Energy Ltd.
- Cap-Op Energy/TriCore Carbon Solutions
- Carbon Connect International
- Caron Measurement & Controls
- CEL Quality Services
- Challenger Technical Services'
- Clairifi Inc.
- CLEAResult
- Clearstone Engineering Ltd.
- CNTRAL Inc.
- Computer Modelling Group Ltd.
- COOEC Canada Company Ltd.
- Crimson Regulatory
- Crossroad Energy Solutions Inc.
- DXD Consulting Inc.
- Emission Rx Ltd.
- enSift Corp.
- Ensol Systems
- Envirosoft Products Inc.
- Envirotech Engineering
- EnviroVault LP
- Equilibrium Environmental
- Expansion Power Inc.
- Expeto Wireless Ltd.
- Extreme Telematics Corp.
- EZOPS Inc.

- FieldCap Inc.
- FLIR System Inc.
- Galatea Technologies Inc.
- Gas Activated Systems
- Gas Pro Compression
- GCHEM Ltd.
- GCL Environmental Ltd.
- Gentherm Global Power Technologies
- geoLOGIC systems Ltd.
- Geonomic Technologies Inc.
- Geoverra
- GHGSat Inc.
- Golder Associates
- Goliath Snubbing Ltd.
- GreenPath Energy Ltd.
- Grid Environmental Ltd.
- H2Sweet Inc.
- Halliburton Group Canada
- Hatch Ltd.
- Hatfield Consultants
- Heath Consultants
- Higher Ground Consulting
- Ingu Solutions Inc.
- INO
- Integrated Sustainability Consultants Ltd.
- Intelliview Technologies Inc.
- Intricate Group Inc.
- Ironline Compression Limited Partnership
- Kairos Aerospace
- Kathairos Solutions Inc.
- Katch Kan Limited
- Kinetica Ventures
- KPMG High Technology Practice Group
- Kuva Systems
- LCO Technologies
- LiDAR Services International
- Linear Motion Technologies Canada
- LOOKNorth
- Lux Modus Ltd.
- Luxmux Technology
- Matrix Solutions Inc.
- Micro Engineering
- Microgen Energy Canada
- Millenium EMS Solutions Ltd.
- Modern Wellbore
- Montrose Environmental Group Inc.
- Muddy Boots Online
- National Silicates
- New Oil Generation
- New Paradigm Engineering Ltd.
- Nexus Space Canada
- North Shore Environmental Consultants
- OilPro Oilfield Production Equipment Ltd.
- Osprey Informatics
- PermianChain Technologies Inc.
- Portfire Associates
- Proactive Environmental Rentals Inc.
- Process Ecology Inc.
- Qnergy
- Qube Technologies Inc.
- ROSEN Canada
- Roska DBO Inc.
- RWDI
- Schlumberger Canada Ltd.
- Schooner Consultings
- Seal Well Inc.
- SeekOps
- SFC Energy Canada
- Sibex International Inc.
- Silvacom Ltd.
- Sirius Instrumentation & Controls Inc.
- SkySkopes Inc.
- SLR Consulting (division-based)
- Solstice Canada Corp.
- Spartan Controls - Efficiency Group
- Strategic Capability Network
- Surface Solutions Inc.
- Telops
- Tetra Tech
- Thin Air Labs
- Titanium Tubing
- Tomahawk Energy Services Limited Partnership
- Total Combustion Inc.
- Trace Associates
- TriAcc
- TSGI Corporation
- Tundra Process Solutions
- VEERUM
- Vertex
- Vizworx Inc.
- Westgen Technologies Inc.
- Winterhawk Technologies Ltd.
- World Class Contractor and Construction
- Worley Canada Services Ltd.
- WSP

Transportation / Midstream

- ATCO
- Keyera Energy Ltd.
- TransCanada PipeLines Ltd.

Venture Capital

- First Merchants Capital Partners Inc.

AUDITOR'S REPORT

To the Members of Petroleum Technology Alliance Canada

Opinion

We have audited the financial statements of Petroleum Technology Alliance Canada (the "Organization"), which comprise the statement of financial position as at March 31, 2021, and the statements of operations, changes in net assets and cash flows for the period then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Organization as at March 31, 2021, and its results of operations and its cash flows for the period then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Basis for Opinion

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilties 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 other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

BDO Canada, LLP
Chartered Professional Accountants

Calgary, Alberta
August 31, 2021

Statement of Financial Position
as at March 31, 2021

	March 31, 2021	December 31, 2019
ASSETS		
Current		
Cash and cash equivalents (note 3)	$ 2,311,891	$ 2,478,185
Cash and cash equivalents- restricted (note 4)	5,247,876	4,143,783
Restricted short-term investment (note 4)	7,422,307	1,403,571
Short-term investments (note 6)	-	2,337,012
Goods and services tax receivable	13,586	41,671
Accounts receivable and accrued receivables	1,011,272	995,249
Prepaid expenses	21,077	22,635
	16,028,009	11,422,106
Restricted long term investment (note 4)	1,420,411	-
Property and equipment (note 5)	1,838	2,806
	$ 17,450,258	$ 11,424,912
LIABILITIES		
Current		
Accounts payable and accrued liabilities	$ 2,081,977	$ 1,874,698
Deferred membership revenue	35,889	50,452
	2,117,866	1,925,150
Deferred contributions (note 7)	10,464,953	4,895,077
	10,464,953	4,895,077
NET ASSETS		
Invested in property and equipment	3,057	4,025
Internally restricted (note 13)	2,864,382	3,200,660
Reserve	2,000,000	1,400,000
	4,867,439	4,604,685
	$ 17,450,258	$ 11,424,912

Statement of Operations
as at March 31, 2021

	March 31, 2021 (15 months)	December 31, 2019 (12 months)
Revenue		
Project and service revenue (notes 12 & 15)	$ 7,495,553	$ 6,641,155
Membership revenue	463,204	388,756
Interest income	76,480	132,877
Event revenue (notes 12 & 15)	58,092	234,572
Miscellaneous income	413	-
	8,093,742	7,397,360
Expenses		
Direct project and service costs	6,197,451	5,403,533
Salaries and benefits	1,436,241	1,111,894
Rent and parking	106,650	115,470
Consulting and professional fees	20,030	24,215
Office and equipment leases	18,973	16,135
Insurance	18,860	13,728
Computer and website	9,531	14,192
Bank charges and credit card discounts	9,062	13,864
Marketing	7,173	12,328
Training	2,782	6,150
Volunteer recognition	1,980	13,552
Bad debt	1,281	32,281
Amortization	968	3,259
Realized / unrealized exchange loss	6	1
Direct event costs	-	91,647
Printing and publications	-	8,408
	7,830,988	6,880,657
Excess of revenue over expenses	$ 262,754	$ 516,703

GLOSSARY OF TERMS

AI	Alberta Innovates
Alt FEMP	Alternative Fugitive Emission Monitoring Program
AMFC	Alberta Methane Field Challenge
ARPC	Air Research Planning Committee
AUPRF	Alberta Upstream Petroleum Research Fund
BVLOS	Beyond Visual Line of Sight
CanERIC	Canadian Emissions Reduction Innovation Consortium
CDIT	Consortium of Digital Innovation and Transformation
CRIN	Clean Resources Innovation Network
DIN	Digital Innovation Network
EDVA	Electronic Dump Valve Actuator
EEA	Energy Efficiency Alberta
ERA	Emissions Reduction Alberta
ERPC	Ecological Research Planning Committee
ESA	Environmental Site Assessments
FEMP	Fugitive Emission Monitoring Program
GHG	Greenhouse Gas
GM	Gas Migration
IM3S	Intelligent Methane Monitoring and Mitigation System
LDAR	Leak Detection and Repair
LDAR-SIM	Leak Detection and Repair Simulator
LMT	Linear Motion Technologies
MCP	Methane Consortium Program
MERN	Methane Emissions Reduction Network
MJTA	Multilateral Junction Tool Assembly
PARSC	Pipeline Abandonment Research Steering Committee
QOGI	Quantitative Optical Gas Imaging
RRRC	Reclamation and Remediation Research Committee
SCVF	Surface Casing Vent Flow
SSMEP	Support for Small and Medium-sized Enterprises Program
STV	Systematic Third-Party Validation
TEREE	Technology for Emissions Reduction and Eco-Efficiency Program
TIER	Technology Innovation and Emission Reduction Regulation
TIS	Technology Information Session
UTM	Unmanned Traffic Management
WARI	Well Abandonment Research Initiative
WD	Western Economic Diversification Canada
WIPC	Water Innovation Planning Committee

PTAC
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