ptrc
Sustainable Energy

ENERGY RESILIENCE

ANNUAL REPORT 2023-2024

TABLE OF CONTENTS

LETTER FROM THE CEO

2023-2024 marked a year of profound transition and advancement for the PTRC, and I am proud to have been stewarding this exciting period of change with our dedicated staff and committed Board of Directors.

PTRC remains committed in its ongoing support of oil and gas research, development and deployment (RD&D) to help this important industry attain the Government of Saskatchewan's stated goal of increasing daily production to 600.000 barrels per day, while reducing overall emissions from production. Our Heavy Oil Research Network (HORNET) completed its request for proposals in 2023-24, approving 9 projects and providing $1.21 million in funding to researchers. This included the University of Regina, and additional collaborative projects with the Universities of Saskatchewan, Alberta, and Calgary.

Our partnership with Mitacs reached new heights in 2023-24, with the signing of an agreement for 4 years of matched research funding in clean energy research. PTRC has committed $2.72 million over four years beginning in 2024-25 and running to 2027-28 for the training of researchers at Canadian universities, and Mitacs in turn has agreed to match PTRC funding with $3.33 million in the same time frame. This means Saskatchewan and Canada's future clean energy expertise will help the country meet its emissions reduction targets.

This fiscal year saw major announcements at the PTRC's offices. The Mitacs agreement was one, followed by a press event with the City of Regina and Government of Saskatchewan announcing provincial and federal funding to proceed with Regina's new Lawson Aquatic Centre in the city's downtown core. The project includes geothermal heating of the building and pool itself. The latter was made possible by the PTRC providing a detailed feasibility study for the facility earlier in 2023.

PTRC also assisted the First Nations Power Authority in securing federal funding for a three-year clean energy awareness program for Indigenous communities. PTRC secured two Mitacs interns to work on the new program at FNPA, and we continue to assist in the public dissemination of clean fuel information to First Nations communities.

2023-2024 also saw the PTRC receive two awards for Aquistore. The Carbon Capture Canada Conference in Edmonton presented PTRC with the "CO_2 Storage Project of the Year" at a banquet in September, and the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) also acknowledged Aquistore with its Environmental Excellence Award as the project surpassed 580,000 tonnes of stored CO_2. As part of the recognition accorded to PTRC's work, in December of 2023 I was asked to accompany Premier Scott Moe and the Saskatchewan delegation to the COP 28 conference in Abu Dhabi, where I participated in a number of clean energy panels and discussions.

Towards the end of fiscal year 2023-24, I was further encouraged by the decision of our board and Innovation Saskatchewan to move forward with a new initiative – the Energy Innovation Hub – which will create the capacity for PTRC to conduct its own research and provide world-class research facilities to its partners. Stay tuned for exciting news about the EIH in 2024-25. An energy mix that is realistic and environmentally impactful is what PTRC strives to provide.

Ranjith Narayanasamy
CEO, President
PTRC Sustainable Energy

LETTER FROM THE CHAIR

Sometimes the measure of a company's impact can be seen in the sheer amount of work its board chair experiences in one year. If this is true, PTRC had an exemplary fiscal year in 2023-24.

I attended more press announcements and awards ceremonies – along with three Board of Directors' meetings where exciting possibilities were discussed and enacted – than I have in any previous years in my tenure as a PTRC board member.

From major funding announcements like matched money available to universities through Mitacs because of PTRC's growing array of clean energy research projects, to the expanding geothermal feasibility and pre-feasibility work conducted for different municipalities, new and innovative work has been brought forward throughout the year.

Yet, the core focus for ongoing and new projects remains helping Saskatchewan develop an energy mix that reduces emissions and keeps the economy strong as outlined in the Province of Saskatchewan's Prairie Resilience Plan. PTRC remains committed to the importance of hydrocarbons in the province's economy, but also committed to the energy transition and RD&D that looks at options like blue hydrogen, geothermal heating, compressed air energy storage (CAES) and, of course, CO_2 storage. The company's Aquistore program saw significant interest from Saskatchewan and Alberta projects currently in development, to learn from the measurement, monitoring and verification (MMV) work at the site.

I am pleased to say that the board also approved moving forward with a new Energy Innovation Hub in fiscal year 2024-25, with Innovation Saskatchewan approving additional funds for the PTRC to upgrade laboratory facilities in the PTRC building and develop new business and research plans to foster collaborations between universities and industry.

The centre will develop new technologies from the demonstration to field levels. Look for more announcements on the EIH in late 2024.

And finally, as part of ongoing Indigenous reconciliation efforts, PTRC continues to work with the First Nations Power Authority in a "Clean Fuels Awareness Program" to disseminate knowledge across Indigenous communities about cleaner fuel options. The company has also increased its Indigenous procurement program, using a First Nations-owned field company to trench in fibre-optics at the Aquistore site, and employing two Indigenous interns for a full year with the assistance of Mitacs to work on the FNPA program.

Economic growth and environmental stewardship are both outgrowths of transitional RD&D. PTRC has proven this through the hard work of its CEO, Ran Narayanasamy, the dedicated work of its staff. I am pleased to provide this annual financial and project report demonstrating the successes of 2023-24.

Randy Brunet
Chair, PTRC
MLT Aikins

As part of ongoing Indigenous reconciliation efforts, PTRC continues to work with the First Nations Power Authority in a “Clean Fuels Awareness Program” to disseminate knowledge across Indigenous communities about cleaner fuel options.

Randy Brunet
Chair, PTRC
MLT Aikins

PTRC Staff Photo
(back, left to right): Erik Nickel, Ran Narayanasamy, Brittney Musleh, Matt Nasehi
(front, left to right): Haley Solie, Norm Sacuta, Marziyeh Kamali, Zeinab Movahedzadeh, Wanda Russell

WHO WE ARE

PTRC Sustainable Energy is a not-for-profit research, development and demonstration (RD&D) company, founded in 1998 to facilitate projects that reduce the carbon footprint and increase the production of subsurface energy.

PTRC brings together private and public sector funding to develop projects that help companies and research groups meet their environmental, social and governance (ESG) needs, while assuring that Saskatchewan and Canada maintain their leadership in energy innovation. The company seeks to train and retain the next generation of highly qualified personnel in energy RD&D.

VISION

Be the leader in research and innovation to develop sustainable and environmentally responsible energy

MISSION

Be the incubator, accelerator and developer of research and innovation to reduce the carbon footprint and increase the production of subsurface energy

INDIGENOUS ENGAGEMENT

PTRC is a member of the Partnership Accreditation in Indigenous Relations (PAIR) program through the Canadian Council for Indigenous Business, working to address Canada's Truth and Reconciliation Commission's 92 calls to action.

PAIR COMMITTED
PARTNERSHIP ACCREDITATION IN INDIGENOUS RELATIONS

CANADIAN COUNCIL FOR INDIGENOUS BUSINESS

In 2023-24 the company applied for two Indigenous internship positions through Mitacs for the First Nations Power Authority's Clean Fuels Awareness Project. PTRC also assisted the FNPA in its successful application to Natural Resources Canada for funding of that project.

PTRC supports a diverse workforce, and continue to build on its relationships with energy partners across industry, academe, government and Indigenous groups.

In 2023-24 PTRC applied to CCIB for certification of its second phase of PAIR, and hopes to have achieved "bronze" status as a supporter of Indigenous businesses by the spring of 2026. In the past year the company also secured an Indigenous-owned company – KDM Constructors – to install and trench-in fibre-optic lines at the Aquistore site near Estevan ahead of an important seismic shoot to image the CO_2 plume.

PTRC supporting the Every Child Matters Initiative

AQUISTORE UPDATE

The ongoing, routine monitoring of the Aquistore CO_2 storage site continued in 2023-24, with public assurance monitoring of groundwater and soil gas confirming that CO_2 containment and security continues in the injection location 3.4 km underground.

The Aquistore project itself received two awards – one in September 2023 from the Carbon Capture Canada Conference for "Storage Project of the Year" and a second in January 2024 from the Association of Professional Engineers and Geophysicists of Saskatchewan (APEGS) for "Environmental Excellence".

In late October and early November of 2023 PTRC and its research partners at Japan Organization for Metals and Energy Security (JOGMEC) and the Geological Survey of Canada began installing new fibre optic cables ahead of the 8th seismic shoot at Aquistore, which took place November 16th and 17th.

The early days of CO_2 monitoring at the site (starting in 2012) relied on using the 650 geophone array around the injection and observation wells. And while this array is still important, and regularly maintained, in the last number of years fibre optic cables both at the surface and down-well have become an increasingly valuable tool to create images of the CO_2 deep underground in the Deadwood Formation.

APEGS "Environmental Excellence" Award Acceptance

Helically Wound Cables

Zeinab and Marziyeh at Seismic Data Collection Site

KDM CONSTRUCTORS

JOGMEC installed the most advanced fibre optics ever used for CO_2 plume imaging – a combination of linear and Helically Wound Cables (HWC) – in order to further test its important set point seismic source that is operating at Aquistore. Such cables have never been used to image a CO_2 plume anywhere in the world, and are currently only deployed at a mining operation in France.

Seismic data was collected November 16-17th from some 340 dynamite shots, and will be processed by Don White and his team at the Geological Survey of Canada in the coming few months, helping to create a more precise image of the CO_2 plume at Aquistore.

HORNET

PTRC's Heavy Oil Research Network

The PTRC held its annual request for proposals (RFP) for new research and development projects in heavy oil in February 2023 for projects starting in fiscal year 2023-24, with nine projects chosen for funding totaling $1.21 million. The list below shows the organizations with approved projects. PTRC continues to encourage collaboration between universities.

The $1.21 million is not the only funding PTRC's approval provides for projects. PTRC, as an industry member of the Mitacs program, sees an additional $400,000 in matched funding provided to graduate, post-graduate and post-doctoral researchers at the universities.

FUNDED PROJECTS: 2023-24

Institutions	Projects
University of Regina	• Pressure Gradient-Driven Dynamic Wormhole Growth and Determination of Effective Multi-Well Drainage Areas for Cold Heavy Oil Production with Sand (CHOPS) under Reservoir Heterogeneity • Bubble Evolution from Nucleation to Coalescence during Foamy Oil Flow in CO_2-Based CSI: Experimental Observations, Numerical Modeling (Microscopic) • Development of an Integrated Mobile System for Methane Utilization and Produced Water Treatment • Geomechanical Modelling and Predication of Caprock Integrity during Long-Term CO_2 Sequestration in Shallow Heavy Oil Reservoirs in the Lloydminster Area • Experimental and Numerical Investigation of the Oil and Sand Production Mechanisms of Horizontal CHOPS • Wormhole Effects on CO_2-Based Cyclic Solvent Injection (CO_2-CSI) in Canadian Post CHOPS Reservoirs
University of Saskatchewan and University of Alberta	• Numerical Simulations and Field Application – Scaled Physical Modeling of the Geomechanical Implications of Wormholes during CO_2-based CSI Processes from Water-flooded CHOPS Reservoirs
University of Regina and University of Calgary	• The Phase Behavior, Displacement Efficiency and Associated Solid Precipitation of Emulsified Heavy Oil during the Immiscible Cyclic CO_2 Injection Process
University of Regina and University of Saskatchewan	• A Systematic Study of Polymer Alternating Carbon Dioxide Flooding for Enhancing Heavy Oil Recovery in Different Well Configurations – Phase 1
	Total Funding: $1,221,000

IMPACTS

Mitacs Funding Announcement

In February of 2024 PTRC and Mitacs, a federally funded not-for-profit that matches graduate and post-graduate funding to universities, reached an agreement to provide over $6 million in total funding for clean energy research to universities between 2024 and 2028.

The collaborative program will include projects in geothermal energy, blue hydrogen, methane reduction, CO_2 capture and storage, integrated power systems incorporating artificial intelligence (AI), and technologies that reduce the environmental impact of hydrocarbon production.

The development and retention of talent, with unique skills required to maintain and develop Canada's sustainable energy future, is a key reason for the program. Dr. Marziyeh Kamali, who completed a Mitacs internship at the PTRC in 2023-24, was recently hired to a full time project engineer position at PTRC with a particular focus on geothermal energy – evidence that retaining such expertise is crucial to Saskatchewan and Canada.

From left: PTRC CEO Ranjith Narayanasamy, Saskatchewan's Minister of Advanced Education the Honourable Gordon Wyant, Mitacs post-doc and now PTRC's employee Marziyeh Kamali, and CEO of Mitacs John Hepburn

IMPACTS

Advancements in Compressed Air Energy Storage and Geothermal RD&Ds

In November, PTRC released a white paper on Compressed Air Energy Storage (CAES) and its possible advancement in Saskatchewan. Given the provinces unique geology – with the ability to hollow out salt caverns at significant depth for the injection and storage of air for CAES to take place – increased interest is being shown my Saskatchewan's utilities and private sector partners for the installation of CAES for offering solar and wind power baseload energy to offset slow periods of itinerant energy.

In early 2024 – after the PTRC completed a pre-feasibility study for geothermal heating for the new Lawson Aquatic Centre in Regina's downtown – the City of Regina, and the Governments of Saskatchewan and Canada hosted a press conference in the PTRC building to announce the securing of funding for building the new facility. The PTRC's study on the economic and technical aspects of using geothermal helped Regina secure ICIP funding from the Canadian government for the geothermal part of the project. This marked a major success for PTRC in its expansion of clean energy RD&D, helping the City and Saskatchewan reach goals highlighted in the province's Prairie Resilience Plan.

Advancing Blue Hydrogen Research

In October, PTRC announced $123,000 in funding for a joint exploratory research project involving seven professors from both the universities of Saskatchewan and Regina examining the role of blue hydrogen in the Saskatchewan economy, and the important role that CO_2 storage will have to play in the development of that economy.

This first-phase of a multi-year program will include such studies as the safe subsurface storage of hydrogen, an economic feasibility study of converting H2S to H2, and a look at safe transportation of H2. Results from these preliminary studies will lead to more advanced work on the location, production and deployment of the hydrogen industry in Saskatchewan.

Premier Scott Moe, Her Worship Mayor Sandra Masters, Minister Don McMorris, and PTRC's CEO Ran Narayanasamy at the announcement of the Lawson Aquatic Centre geothermal project. ▶

EVENTS AND MEETINGS

2023-24 marked the busiest year, ever, in PTRC's networking activities. The company hosted two major conferences – the Plenary Meeting of the International Organization for Standardization's Technical Committee on Carbon dioxide, capture, transportation and geological storage (ISO TC-265) in Regina in June, and the Executive of the Energy Optimization and Recovery Technical Collaboration Program (EOR TCP) in Calgary in September.

The ISO Plenary included representatives on the international committee setting standards for CCS from at least 15 countries. Working group break out sessions included areas such as CO_2 capture, pipeline and other forms of transportation, geological storage, CO_2-EOR, and quantification/verification standards. The five day event concluded with a tour of SaskPower's Boundary Dam capture plant, PTRC's Aquistore site, and Whitecap's Weyburn CO_2-EOR field.

The EOR TCP Annual Meeting included executive representatives from at least 9 countries, and featured three days of presentations about enhanced oil recovery using new and established technologies, and how those technologies are being used around the world to reduce environmental impacts and emissions. At a reception in Fort Calgary, the visiting executive members were given the traditional white hats from the City of Calgary.

Letter of Intent signing at COP 28 Conference in Abu Dhabi

In December, CEO Ran Narayanasamy joined Premier Scott Moe, Jeff Keshen (the President of the University of Regina) and Professor John O'Reilly (President of Khalifa University of Science and Technology) to sign a letter of intent to collaborate on clean energy R&D at the COP 28 conference in Abu Dhabi. Ran also presented a paper on Aquistore research at ADIPEC conference in UAE in October.

Additional networking, media and events are available at the PTRC's LinkedIn profile.

ISO Tour of Weyburn

The ISO meeting's banquet featured traditional Indigenous dancing.

INDEPENDENT AUDITORS' REPORT

VIRTUS GROUP
Chartered Professional Accountants & Business Advisors LLP

To the Members,
Petroleum Technology Research Centre Inc.

Opinion // The summary financial statements, which comprise the summary statement of financial position as at March 31, 2024, the summary statements of operations, net assets and cash flows for the year then ended, and related notes, are derived from the audited financial statements of **Petroleum Technology Research Centre Inc.** for the year ended March 31, 2024.

In our opinion, the accompanying summary financial statements are a fair summary of the audited financial statements, which were prepared in accordance with Canadian accounting standards for not-for-profit organizations.

Summary Financial Statements // The summary financial statements do not contain all the disclosures required by Canadian accounting standards for not-for-profit organizations. Reading the summary financial statements and the auditor's report thereon, therefore, is not a substitute for reading the audited financial statements and the auditor's report thereon.

The Audited Financial Statements and Our Report Thereon // We expressed an unmodified audit opinion on the audited financial statements in our report dated August 13, 2024.

Management's Responsibility for the Summary Financial Statements // Management is responsible for the preparation of the summary financial statements based on the audited financial statements prepared in accordance with Canadian accounting standards for not-for-profit organizations.

Auditor's Responsibility // Our responsibility is to express an opinion on whether the summary financial statements are a fair summary of the audited financial statements based on our procedures, which were conducted in accordance with Canadian Auditing Standard (CAS) 810, *Engagements to Report on Summary Financial Statements*.

August 13, 2024
Regina, Saskatchewan

FINANCIAL REPORT

SUMMARY STATEMENT OF FINANCIAL POSITION, CONSOLIDATED

For the year ended March 31, 2024

(C$000s)	2024	2023
Assets		
Cash	947	1,070
Investments	2,812	1,897
Other assets	190	1,034
Total assets	3,949	4,001
Liabilities		
Deferred revenue	1,536	1,657
Other liabilities	696	704
Total liabilities	2,232	2,361
Net assets	1,717	1,640
Total liabilities and net assets	3,949	4,001

SUMMARY STATEMENT OF OPERATIONS, CONSOLIDATED

For the year ended March 31, 2024

(C$000s)	2024	2023
Revenue recognized		
Funding revenue	4,105	3,335
Grant revenue	–	4
Unrealized gain (loss) on investments	115	(139)
Other	432	359
Total revenue recognized	4,652	3,559
Expenses		
Projects	2,756	3,018
Operations	1,819	1,239
Total expenses	4,575	4,257
Excess of revenue over expenses	77	(698)

SUMMARY STATEMENT OF NET ASSETS, CONSOLIDATED

For the year ended March 31, 2024

(C$000s)	Internally restricted net assets	Unrestricted net assets	2024	2023
Opening balance	900	740	1,640	2,338
Excess of revenue over expenses	–	77	77	(698)
Ending balance	900	817	1,717	1,640

SUMMARY STATEMENT OF CASH FLOWS, CONSOLIDATED

For the year ended March 31, 2024

(C$000s)	2024	2023
Net cash from operating activities	793	(188)
Net cash used in investing activities	(915)	(129)
Increase (decrease) in cash resources	(123)	(59)
Cash, beginning of year	1,070	1,129
Cash, end of year	947	1,070

SUMMARY FINANCIAL STATEMENTS

The summary financial statements are derived from the audited financial statements, prepared in accordance with Canadian accounting standards for not-for-profit organizations, as at March 31, 2024 and for the year then ended.

The preparation of these summary financial statements requires management to determine the information that needs to be reflected in them so that they are consistent in all material respects with, or represent a fair summary of, the audited financial statements.

Management prepared these summary financial statements using the following criteria:

(a) The summary financial statements include a statement for each statement included in the audited financial statements;

(b) Information in the summary financial statements agrees with the related information in the audited financial statements;

(c) Major subtotals, totals and comparative information from the audited financial statements are included; and

(d) The summary financial statements contain the information from the audited financial statements dealing with matters having a pervasive or otherwise significant effect on the summary financial statements.

The audited financial statements of Petroleum Technology Research Centre Inc. are available upon request by contacting the organization.

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