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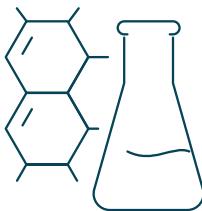
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CANADA'S CLEANTECH INDUSTRY: NOVEL HYDROCARBON EXTRACTION TECHNOLOGIES FOR OIL AND GAS OPERATORS



Canadian researchers are proving that they can effectively develop and deploy novel hydrocarbon extraction technologies.

Supporting this work is the Clean Resource Innovation Network (CRIN), a network that connects innovators, vendors and end users to water specialists, government collaborators and funders; Canada's Oil Sands Innovation Alliance (COSIA), an alliance of oil sands companies who have invested \$1.4 billion in technologies to improve environmental performance; Tight Oil Consortium (TOC), which integrates the disciplines of geoscience and engineering to address the challenges associated with developing low-permeability reservoirs; CanmetENERGY, part of Natural Resources Canada, an energy, science and technology organization working on clean energy research, development, demonstration and deployment; and Petroleum Technology Alliance Canada (PTAC), which facilitates innovation, collaborative research and technology development, demonstration and deployment for a responsible Canadian hydrocarbon energy industry.

CLEAN RESOURCE INNOVATION NETWORK (CRIN) – A NETWORK OF NETWORKS

CRIN interconnects energy producers and service providers with innovators, government entities, non-profits and academic institutions. CRIN's novel hydrocarbon extraction community discusses how to improve the ecosystem's performance in accelerating technology development. Its goal is to help the network focus on industry priorities while identifying and implementing new practices to accelerate technology development.

TIGHT OIL CONSORTIUM (TOC) SOLVES MULTIDISCIPLINARY PROBLEMS

Established at the University of Calgary in 2011, TOC integrates the disciplines of geoscience and engineering to address the challenges associated with developing low-permeability reservoirs. The group's production data-analysis tools and protocols have been implemented in commercial software and adapted by various operating companies. TOC is on the cutting edge of developing reservoir and hydraulic fracture characterization tools that can help the industry development become more efficient.

NOTEWORTHY CANADIAN CLEANTECH NOVEL HYDROCARBON EXTRACTION TECHNOLOGIES COMPANIES

➤ **Variperm**
Sand screen liners and flow-control devices

➤ **Enersoft**
Rock scanning and digital workflows using artificial intelligence

➤ **Darkvision**
High-resolution, acoustic-based imaging technology

➤ **Petrospec Engineering**
Reservoir monitoring, production optimization, engineering and field services

➤ **Acceleware**
Cleantech-enhanced oil recovery

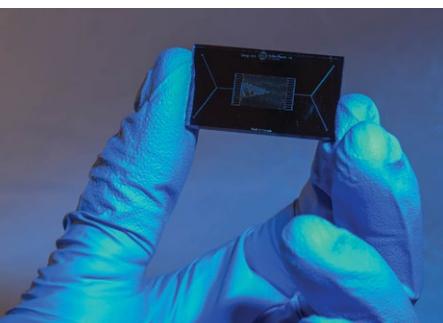
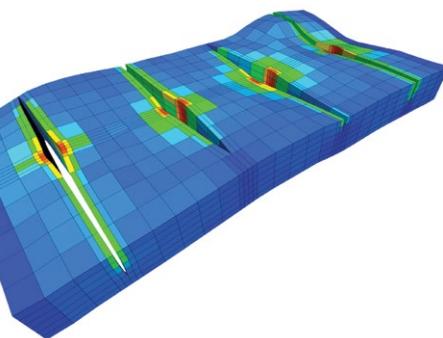
➤ **Modern Wellbore Solutions**
Multilateral, multi-stage fracturing tools

➤ **General Energy Recovery Inc.**
Portable, direct contact steam generation for enhanced oil recovery

➤ **Exergy Solutions**
Agile prototyping, virtual and augmented reality visualization and cleantech development

NOVEL
HYDROCARBON
EXTRACTION
TECHNOLOGIES
FOR OIL AND GAS
OPERATORS

CANADIAN COMPANIES WORKING GLOBALLY



RGL RESERVOIR MANAGEMENT > rglinc.com

RGL is a global oil and gas engineering, manufacturing and service company specializing in sand control and flow control technologies and completions solutions. With over 30 years of experience, the company has outfitted more than 25,000 oil wells with sand control products for projects in the Canadian oil sands, the Middle East, Mexico, South America, and elsewhere around the globe. **RGL**'s technologies have increased production and energy efficiencies for operators in a variety of applications using advanced sand control completions and proprietary flow control design coupled with data-driven reservoir simulation, testing and evaluation systems.

COMPUTER MODELLING GROUP (CMG) > cmgl.ca

With more than 171 customers worldwide, **CMG** provides industry-leading hydraulic fracture simulation workflow to model shale or tight oil/gas reservoirs. This is recognized worldwide as the standard for advanced recovery processes.

Application of their simulation allows for modelling the entire life cycle of unconventional reservoirs; a hydraulic fracturing workflow that models single and multiple wells; the design, evaluation and optimization of field development planning; simulating and analyzing geomechanical effects and accurately modelling fracture growth in complex geologies.

INTERFACE FLUIDICS > interfacefluidics.com

Interface Fluidics is a technology-enabled oil field laboratory services company with experience in North American, international and offshore plays. It offers the full integration of reservoir analogue design, fabrication, testing at reservoir conditions and expert data analysis.

The company uses reservoir information to screen through various chemistries to evaluate the performance mechanisms, helping to inform decision making. Their nanotechnology platform optimizes fluids for individual wells, and rapidly screens and quantifies relative fluid performance using reservoir analogues, permitting economically optimizing fluids on a well-by-well basis.

C-FER TECHNOLOGIES > cfertech.com

C-FER Technologies is a not-for-profit, fee-for-service subsidiary of Alberta Innovates that works in partnership with the global cleantech community to advance environmental performance, safety and efficiency. The company works with energy operators and manufacturers to identify, qualify and implement new technologies.

C-FER does this by providing specialized engineering consulting services and full-scale testing in Edmonton, Alberta, Canada. Engineering services include structural and hydraulic analysis and risk assessments. Facilities house testing systems that can combine high load, pressure, temperature and unique fluid environments to simulate virtually any operating condition encountered in industry.

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