



CLEANTECH CAREER AREA: PROTECTING OUR WATER

CLEANTECH AND TRANSITIONING CAREERS IN OIL & GAS

Career opportunities across Alberta's oil & gas innovation ecosystem

INTRODUCTION

To address climate change and improve environmental performance across a variety of industries requires innovation and new technologies to be developed quickly.

In this environment there is great opportunity for Alberta's workforce including experienced workers, students and new graduates, career counselors and human resource professionals, training and education institutes, innovators, entrepreneurs and employers and their hiring managers.

There is growing demand for all levels of skills and experience in innovation, technology and 'cleantech' development, as well as for the many supporting or related roles that will help apply these new solutions across many industries.

This document, and seven others in the *Cleantech and Transitioning Careers in Oil and Gas* series, is a guide to developing or adapting skills and experience for meaningful work and careers with direct impact on the environment and the economy, even as our province's resource industries transition to help meet climate challenges.

This series uses examples from Alberta's oil and gas industry. However, cleantech skills and roles are also in demand among agriculture, forestry, manufacturing, transportation and other sectors that are vital to the sustainability of our province.

NEW CAREER AREAS IN PROTECTING OUR WATER

Working to protect our water is a way new entrants, experienced professionals, researchers and entrepreneurs can bring their passion, values and skills to improve water technologies, practices and quality to minimize the environmental impact of hydrocarbon production.

Many industries require water for their operations, including conventional and unconventional oil and gas production, oil sands mining and in-situ development.

CAREER PATHWAYS FOR INNOVATIVE WATER TECHNOLOGIES IN THE OIL AND GAS INDUSTRY

Universal Attributes Required

Alongside technical skill requirements, workers in cleantech careers (in any industry) require important universal attributes. These are also known as soft skills, attitudes or behaviours.

	AGILITY Adapt to changes, feedback and iterations		SYSTEMS THINKING Ask right questions, visualize work and accommodate ongoing feedback
	BUSINESS ACUMEN Create value for the business and customers		RELATIONSHIP BUILDING Mutual respect and trust amongst team members and customers
	PERSEVERANCE & CONTINUOUS IMPROVEMENT Incorporate ongoing learning and achieve technical excellence		TRUST & COLLABORATION Work collectively on problems
	COMMITMENT & PASSION Improving the future through "out of the box" and visionary thinking		COMMUNICATIONS SKILLS Share important stories of successes and failures and inspire involvement

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WORKING TO BRING INNOVATIVE WATER TECHNOLOGIES TO THE OIL AND GAS INDUSTRY

Industrial water users use innovative technologies and information systems to source, treat, use, reuse and dispose of water. Key activities include:

- Water sourcing and management systems to reduce fresh water use and watershed impacts.
- Water and wastewater treatment to manage, develop, commercialize, and deliver water treatment technologies and solutions.
- Industrial Use, Reuse, Disposal and Remediation of Water to apply technologies to conventional and unconventional oil and gas and oil sands production processes to reduce GHG intensity and water use.

What is Involved in a Water Technologies Career in the Oil and Gas Industry?

Working in water technologies involves balancing the need for clean water and energy, improving oil and gas recovery, recycling and reuse, and decreasing emissions and land use.



Want more details on activities that bring innovative water technologies to the oil and gas sector?

Find Protecting Our Water Key Activities on the Clean Resource Innovation Network (CRIN) website:

WWW.CLEANRESOURCEINNOVATION.COM



KEY SKILLS AND OCCUPATIONS TABLES

The following tables outline the water career activity pathways and the skills, knowledge, and occupations needed to help bring innovative water technologies and practices to the oil and gas sector.

KEY SKILLS AND KNOWLEDGE	<p>WATER SOURCING AND MANAGEMENT <i>Management systems to reduce fresh water use and watershed impacts</i></p> <ul style="list-style-type: none"> • Knowledge of fresh and produced water management systems • Knowledge of oil and gas industry and operational processes requiring water • Understand water transportation and logistics systems including trucking and pipelines • Knowledge and integration of industry regulations, incentive programs and reporting • Analysis of water management systems and use of data to support decision-making • Environment, fish and wildlife inspection and monitoring • Water sampling and quality testing • Stakeholder and government relations, and communications 	<p>WATER AND WASTEWATER TREATMENT <i>Manage, develop, commercialize, and deliver water treatment technologies and solutions</i></p> <ul style="list-style-type: none"> • Environmental and analytical chemistry and microbiology in water treatment and recycling • Knowledge of industrial water treatment design, and engineering • Understand chemistry in water treatment and recycling • Water/wastewater sampling and quality testing • Safe handling and mixing of chemicals used for water treatment • Process control and instrumentation systems and collection and interpretation of operational data • Installation, operation and maintenance of automatic control devices and plant equipment • Knowledge of mechanical, electrical and hydraulic principles • Policy and regulations related to chemical use, groundwater contamination and water management plans for flowback fluid handling • Effective decision-making and use of digital and analytical tools • Business development, sales and integration with business strategy and processes • Stakeholder and government relations, and communications 	<p>INDUSTRIAL USE, REUSE, DISPOSAL & REMEDIATION OF WATER <i>Apply technologies to production processes to reduce GHG intensity and water use</i></p> <ul style="list-style-type: none"> • Assessment of alternatives for water sources, transport, storage, handling and disposal. • Knowledge of subsurface and completion practices and health and safety requirements • Hydrogeology and water management knowledge • Understanding of chemistry in water treatment and recycling • Management and operation of transportation and logistics systems • Class 1 driver's license and knowledge of oil and gas infrastructure for trucking water • Drilling wastewater management and operations including sampling and compliance reporting • Environmental inspection and monitoring • Spill response, reporting and remediation knowledge • Knowledge and integration of industry regulations, incentive programs and reporting • Effective decision-making skills and use of digital and analytical tools. • Stakeholder and government relations, and communications
	<p>WATER SOURCING AND MANAGEMENT <i>Management systems to reduce fresh water use and watershed impacts</i></p>	<p>WATER AND WASTEWATER TREATMENT <i>Manage, develop, commercialize, and deliver water treatment technologies and solutions</i></p>	<p>INDUSTRIAL USE, REUSE, DISPOSAL & REMEDIATION OF WATER <i>Apply technologies to production processes to reduce GHG intensity and water use</i></p>
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KEY OCCUPATIONS	WATER SOURCING AND MANAGEMENT	WATER AND WASTEWATER TREATMENT	INDUSTRIAL USE, REUSE, DISPOSAL & REMEDIATION OF WATER
		<p><i>Management systems to reduce fresh water use and watershed impacts</i></p> <ul style="list-style-type: none"> • Engineers: civil, quality, project, chemical, process, environmental • Engineering technologists: chemical, civil, water, environmental • Biological and chemical technologists and technicians • Ecologists, biologists, environmental scientists • Transportation and logistics managers • Transport operators, pipeline operators, drivers and dispatchers • Logistical analysts • Regulatory specialists • Communications, stakeholder and government relations specialists 	<p><i>Manage, develop, commercialize, and deliver water treatment technologies and solutions</i></p> <ul style="list-style-type: none"> • Engineers: civil, quality, project, chemical, process, environmental • Engineering technologists: chemical, civil, water, environmental • Technicians/technologists: project, facility, instrumentation, electronic, mechanical • Water/wastewater treatment plant operators • Power/steam engineers • Facility and maintenance trades: electricians, mechanics • Laboratory technicians/ technologists • Biological and chemical technologists and technicians • Biochemists, biophysicists, microbiologists and chemists • Environmental scientists • Environmental, health and safety specialists • Business and financial analysts • Regulatory specialists

The **Cleantech and Transitioning Careers in Oil and Gas Series** is the result of a 2021 project funded by the Province of Alberta working in partnership with the Government of Canada, and research conducted by consultants Cheryl Knight and Pat Hufnagel-Smith.

For more information please contact: info@cleanresourceinnovation.com and to view or download documents in the series, visit www.cleanresourceinnovation.com

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