



CLEANTECH CAREER AREA:
CLEANER FUELS

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 CLEANER FUELS

There are many career opportunities in reducing carbon intensity through the development of cleaner fuels. New entrants, experienced professionals, researchers and entrepreneurs can bring their passion, values and skills to help the energy industry address climate targets and improve the lives of Albertans and people around the globe.

Innovation in this sector is expanding supply chains and reducing environmental impacts in the manufacturing and processing of fuel products (improved input materials and feedstocks) through to the storage, distribution and use of these cleaner fuels. Employment opportunities include:

- Application or adoption of skills or solutions in related sectors such as bioenergy, agriculture, forestry, pulp and paper, industrial processing and manufacturing, industrial construction and transportation, and others.
- New research and technologies will continue to be required to develop the equipment and processes currently in use by large, traditional industries such as chemical manufacturing and food processing, in addition to refining.

What are Cleaner Fuels in the Oil and Gas Industry?

New ways to reduce emissions, carbon intensity and other environmental impacts from liquid fuels generated during their production, refinement, transportation and consumption.

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CAREER PATHWAYS FOR CLEANER FUELS

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.



WORKING IN CLEANER FUELS

There are four key phases in lowering carbon intensity, reducing emissions and improving energy efficiency in the production of cleaner fuel products:

- **Facility construction and modifications** to engineer, design and install new or adapted facilities/equipment for biomass processing facilities and refineries.
- **Applying conversion technologies to upstream** inputs such as biomass and CO₂ feedstock.
- **Midstream operations** to process, co-process and manufacture fuel from feedstock, quantify carbon inputs and outputs, and manage commercial supply chains.
- **Downstream handling** of fuel products including storage, transportation, distribution and marketing.



Want more details on activities within the Cleaner Fuels sector?

Find Cleaner Fuels Key Activities on the Clean Resource Innovation Network (CRIN) website:

WWW.CLEANRESOURCEINNOVATION.COM



KEY SKILLS AND OCCUPATIONS TABLES

Using the four phases identified above, the following table outlines the full lifecycle of producing and refining low-carbon or cleaner fuels, including the downstream distribution and handling of cleaner fuel products to end-users, facilitating the transition to a circular economy. You'll also find the applicable skills, knowledge, and occupations in each stage.

KEY SKILLS AND KNOWLEDGE	FACILITY CONSTRUCTION AND MODIFICATIONS	UPSTREAM INPUTS <i>Equipment, Material and Feedstock</i>	MIDSTREAM OPERATIONS <i>Processing, Co-processing and Manufacturing Fuel</i>	DOWNSTREAM HANDLING AND USE <i>Storage, Distribution and Use of Products</i>
	<ul style="list-style-type: none"> • Metallurgy and viscosity testing • Industry regulations • Energy management systems including renewables and co-generation • Plant construction, retrofits, start-up and commissioning • Prepare engineering drawings/plans • Offsite fabrication • Design, construction and testing of electrical components and/or electrical, electronic, controls (SCADA) or power systems • Experience with mechanical and/or electrical designs, software and installations 	<ul style="list-style-type: none"> • Development of written protocols for training and monitoring • Knowledge of electrical codes and standards • Carbon capture technologies such as direct air and air to fuel. Also, separate, purify and compress CO₂ • Knowledge of biofuel feedstock production, handling and processing • Knowledge of land use and biodiversity • Storage and transportation of feedstock to refinery (pipeline, tanker, rail, etc.) • Use of digital and analytical tools for decision-making • Business development and supply chain analysis and integration • Stakeholder and government relations, and communications • Knowledge of regulations and their impact on reporting and operations 	<ul style="list-style-type: none"> • Knowledge of industry regulations, incentive programs, standards, reporting and operations • Instrumentation, mechanical and electrical control technologies and work processes • Experience with SCADA, DCS and PLC systems and system integration • Process optimization and quality control of processes, systems and procedures • Company health, safety and environmental standards, policies and procedures • Mechanical equipment problems and issues • Turnaround maintenance, tuning and troubleshooting • Calculate, measure, load, mix and process refined feedstock with additives or reaction process vessels and monitor production process • Decision-making and use of digital and analytical tools • Business development, and supply chain analysis and integration • Stakeholder and government relations, and communications • knowledge of regulations and impact on reporting and operations 	<ul style="list-style-type: none"> • Management and operations of transportation and logistics systems • Knowledge of purchasing, procurement, logistics and supply management • Contract management • Knowledge of fuel storage systems use and regulations • Effective decision-making and use of analytical tools • Sales, marketing and business development and integration • Stakeholder and government relations, and communications



KEY OCCUPATIONS	FACILITY CONSTRUCTION AND MODIFICATIONS	UPSTREAM INPUTS <i>Equipment, Material and Feedstock</i>	MIDSTREAM OPERATIONS <i>Processing, Co-processing and Manufacturing Fuel</i>	DOWNSTREAM HANDLING AND USE <i>Storage, Distribution and Use of Products</i>
		<ul style="list-style-type: none"> Engineers: process/chemical/metallurgical, project, automation, software, civil Electrical/Instrumentation designers Mechanical designers Trades: welders, electricians, insulators Permitting coordinators Environmental specialists Energy managers 	<ul style="list-style-type: none"> Engineers: process/chemical/metallurgical, project, automation, civil Technicians/technologists: CAD/engineering, biological, chemical, laboratory Trades: welders, electricians Health and Safety Specialists Project managers Agriculture and forestry managers and labourers Supply chain and logistics specialists Biochemists, biophysicists, microbiologists and chemists Soil and plant scientists Regulatory specialists Business and financial analysts Communications, stakeholder and government relations specialists 	<ul style="list-style-type: none"> Engineers – mechanical, facility/operations, chemical, electrical, automation Technicians/technologists: facility, instrumentation, electronic, mechanical, automation, laboratory, biofuel Health, safety and environmental specialists Predictive and preventative maintenance specialists Maintenance trades Regulatory specialists Communications, stakeholder and government relations specialists Plant/operations managers Control room/Panel operators Business and financial analysts Regulatory specialists Supply chain professionals Sales and distribution professionals Communications, stakeholder and government relations 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