

Engineers

Engineers have a critical role in helping the energy industry to efficiently produce energy, protect the environment and reach its low-carbon goals. There are many, varied opportunities for engineers across Canada’s energy industry. Engineers create and use technological advancements that contribute to cleaner fuels, energy efficiency, and emissions reduction. There is an ongoing need for engineers in the energy industry where sustainability and environmental protection are so important.

This career might be a fit for you if you like to apply data and reasoning to solve problems. You probably also have an interest in math and science. Working in teams with others is also important. Types of engineers that are needed in the energy industry include: chemical, electrical, mechanical, petroleum, geological and civil, plus others. Once engineers have experience in a specialized area, they can work in a variety of sectors. Your skills as an engineer can help you to transfer from one energy sector to another.

Established Energy Sectors:

Oil and Gas

Offshore Oil and Gas

Oil Sands

Energy Services

Pipelines

Refining

Emerging Energy Sectors:

Biofuels

Hydrogen

Liquefied Natural Gas (LNG)

Carbon Capture and Storage (CCS)

For energy sector definitions, go to [CareersinEnergy.ca](https://careersinenergy.ca)



What Engineers Do



Research, Design, and Development

Engineers apply what they know from their engineering discipline to specific energy sectors. This includes researching, designing, and developing equipment, systems, and projects. This work is used in energy exploration, development, and production. Engineering research, design, and development have financial considerations. Both engineering and financial aspects are considered when projects are planned and decisions are made.



Oversee Engineering Projects

Engineers take charge of the installation, operations, and maintenance of processing plants, equipment, and systems. Engineers often manage both the technical and financial aspects of projects, businesses or companies.



Manage Safety Procedures

Engineers know the regulations about safety and how to design systems and procedures to reduce accidents in the workplace. They ensure that all projects are planned and implemented according to safety codes and operational safety.



Manage Project Performance

Engineers develop procedures and technologies that make performance the best it can be. They also analyze, evaluate, and troubleshoot problems.



Prepare Time and Cost Estimates

Engineers manage cost controls for facilities and projects. They provide analysis and reports to document how much time and cost a project should take and finally, how to manage it so that it stays on budget and on schedule.



Key Skills and Abilities Engineers Need

This chart shows the skills, abilities, and certifications needed as engineers enter and advance their career in the energy industry. Each occupation, job level, and responsibility will require a different mix of these skills and abilities.

Core Knowledge

Develop discipline-specific knowledge such as: mechanical and plumbing; buildings and facilities; electrical and electronics; and resource and chemical processing

Specialized digital tools for business and data analysis; computer-aided design; process engineering; industrial controls; project management; mapping; and others

Project and program management

Business planning and operations management

Strategies for environmental, social, and governance (ESG) sustainability

How to design, manage and maintain facilities

How to use quality management systems

Management of health and safety procedures

Technical Skills

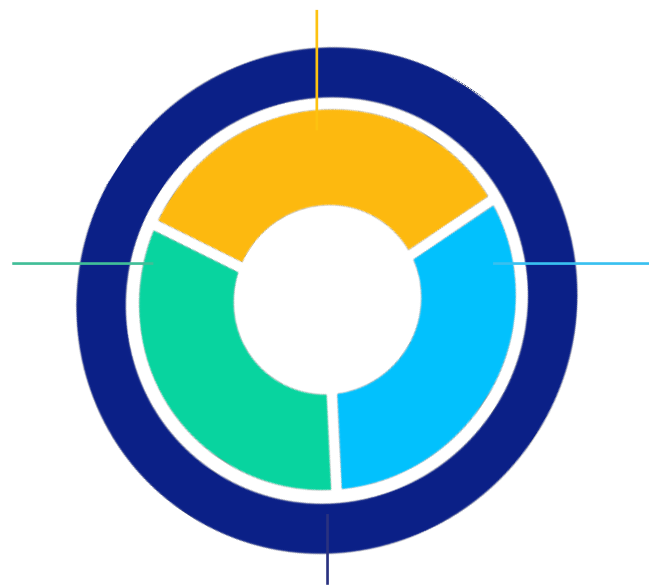
Use research and analyses to develop economical ways to create safer methods of production and improve resource conservation

Use statistics and analytical software for decision-making

Evaluate equipment failures and major equipment changes

Develop and/or implement risk review processes to evaluate safety, hazards, and reliable performance

Understand regulatory requirements for industrial equipment and facilities



Beneficial Certifications

Driver's Licence plus a clean abstract

First Aid

H2S Alive

Fall Protection

Confined Space Entry

Transportation of Dangerous Goods

Aerial Lift

Equipment Isolation

Workplace Hazardous Materials Information System (WHMIS)

Personal Attributes

Active Learning

Collaboration

Adaptability

Innovativeness

Analytical Thinking

Leadership

Attention to Detail

Stress Tolerance

Engineering Careers in the Energy Industry

There are different types of education requirements for the engineering career. Entry to an engineering career in energy can start with relevant education, or education combined with related job experience.

The chart shows how roles and educational requirements change for each career level. As you advance your career, your education and experience can help you to move across the various sectors in the

Career Level	Entry	Mid	Senior
Types of Jobs, After Completion of a 4-year University Degree in an Engineering Discipline	<p>Engineer-in-Training (EIT)</p> <p>EITs are required to work under a professional engineer for a minimum of 1 to 2 years before they can become a professional engineer.</p>	<p>Intermediate Engineer</p> <p>Work experience to develop the technical and personal skills needed to adapt to a variety of situations and work settings.</p> <p>Professional Engineer (P.Eng.) licence</p>	<p>Senior Engineer</p> <p>Professional Engineer (P.Eng.) licence</p>
	<p>Entry-Level Engineer</p> <p>Skills required include: internship or entry-level position to get on-the-job training, learning to work autonomously, take direction, and develop technical skills.</p>		<p>Senior Engineer with Specialization</p> <p>Specialization based on interests, technical and personal skills and experience include:</p> <p>Product, projects, and processes Business and sales Management Individual contributor</p>
	<p>Junior Engineer</p> <p>Licensing by a provincial or territorial association requires 3 to 4 years of supervised work experience in engineering and passing an exam.</p>		

Transferring Engineering Skills from One Energy Sector to Another

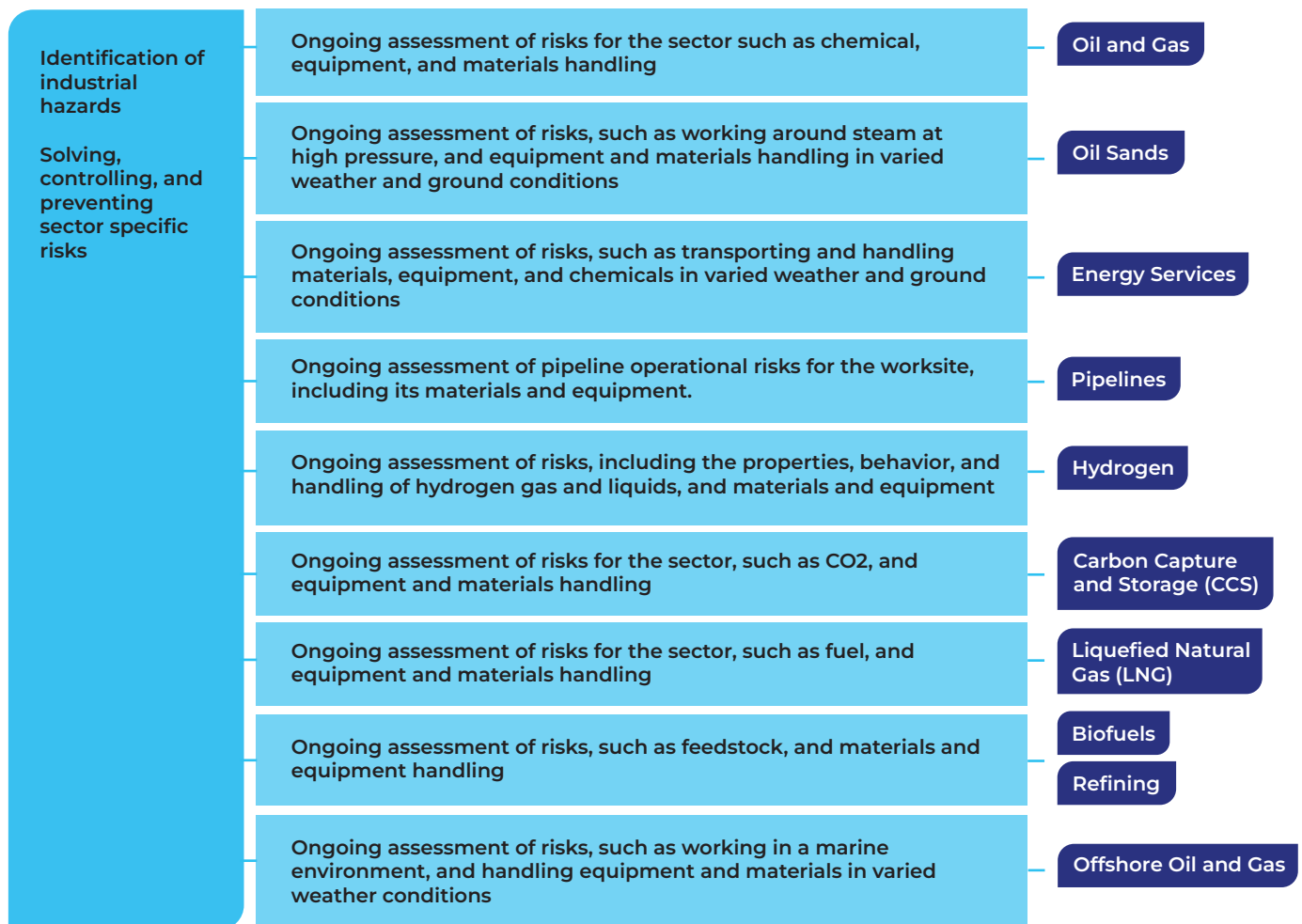
There are core skills and knowledge that all engineers need for their careers. These building blocks apply across all energy sectors and for all specializations.

The following flow chart presents the core skills and knowledge engineers need as building blocks. It will also identify evolving skills needed to address the needs in each energy sector. Each energy sector uses the building blocks in different ways.

New entrants to an engineering career can use the diagram to understand the building block skills needed to work in sectors across the energy industry. Experienced engineers can use the diagram to explore how each building block is applied across the energy sectors.

Skill: Knowledge of Industrial Hazards, and Risk Management and Response

Skill attributes



Skill: Knowledge of Science, Technologies and Operational Processes

Skill attributes

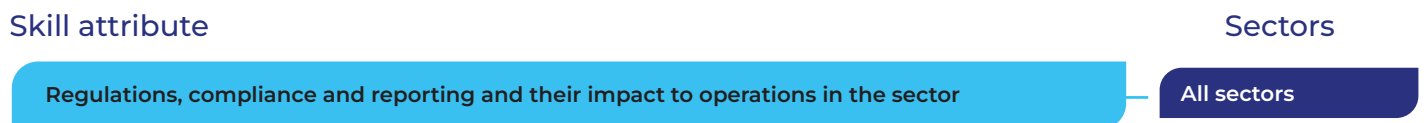
Sector

<p>Understanding and interpreting fluid flow and pressures</p> <p>Addressing mechanical equipment problems and issues</p> <p>Completing predictive maintenance and troubleshooting</p>	<p>Well design and planning</p>	<p>Experience with bitumen mining and in-situ extraction, steam-assisted gravity drainage (SAGD) oil recovery technology for use in the oil sands, upgrading processes and facilities, remediation, and reclamation</p>	<p>Oil Sands</p>
	<p>Reservoir modelling and engineering</p>	<p>Familiarity with production facilities, vessels, and offshore operations; experience with offshore exploration</p>	<p>Offshore Oil and Gas</p>
		<p>Experience with exploration, production, and field operations, and familiarity with processing facilities</p>	<p>Oil and Gas</p>
<p>Physics, thermodynamics and statistics</p> <p>Emissions detection, reduction, and monitoring</p>	<ul style="list-style-type: none"> Production processes using electrolysis technologies, electrochemical and thermochemical reactions and carbon capture and storage (CCS) Underground storage Compressing, liquifying, and blending of hydrogen for truck and pipeline transportation Working with fuel cells Knowledge of the properties, behaviour, and handling of hydrogen 		<p>Hydrogen</p>
<p>Efficiency technologies and management of assets to reduce energy consumption</p>	<ul style="list-style-type: none"> Drilling and completion for CO2 injection wells Capture, separation, purification, liquefaction, steam generation and transmission of carbon Storage of CO2, evaluation and monitoring of CO2 storage sites Properties and behaviour of carbon/CO2 		<p>Carbon Capture and Storage (CCS)</p>
	<ul style="list-style-type: none"> Refining, petrochemical processing, and carbon capture technologies Feedstock production, handling, and processing Storage and transportation of feedstock to refinery (by pipeline, tanker, rail, etc.) 		<p>Biofuels</p>
	<ul style="list-style-type: none"> Natural gas liquefaction and LNG storage, transportation, and re-gasification processes 		<p>Liquefied Natural Gas (LNG)</p>
	<ul style="list-style-type: none"> Oil refining processes for creating end uses and products 		<p>Refining</p>
	<ul style="list-style-type: none"> Experience with pipelines (of all types) and storage facilities. Pipeline design, operations, and integrity. 		<p>Pipelines</p>
<p>Experience with seismic data collection and interpretation (geomatics), drilling, testing, completing, maintaining, and reclaiming service lines</p> <p>Applying expertise and skills to emerging technologies and energy sources, such as geothermal, carbon capture and storage, and methane emissions reduction</p>			<p>Energy Services</p>

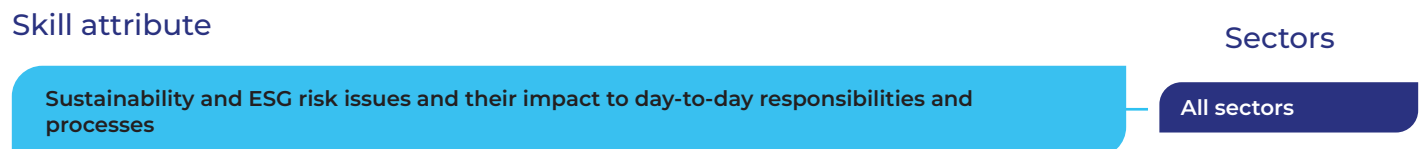
Skill: Safety Programs and Certifications for Industrial Operations



Skill: Compliance Issues and Regulations for the Sector



Skill: Company Sustainability Goals and ESG Risk Management



Career Outlook for Engineers



Projected to have a large number of job openings

Projected to have 1,500 or more job openings over the period 2022-2035 nationwide.

Source: Careers in Energy, National Labour Market Outlook to 2035



Top 10 in-demand

Top 10 in-demand occupation: Projected to have the greatest number of job openings over the period 2022 - 2035 nationwide.

Source: Careers in Energy, National Labour Market Outlook to 2035



Projected labour shortages

The demand for workers is projected to be greater than the supply of available workers.

Source: Careers in Energy, National Labour Market Outlook to 2035



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