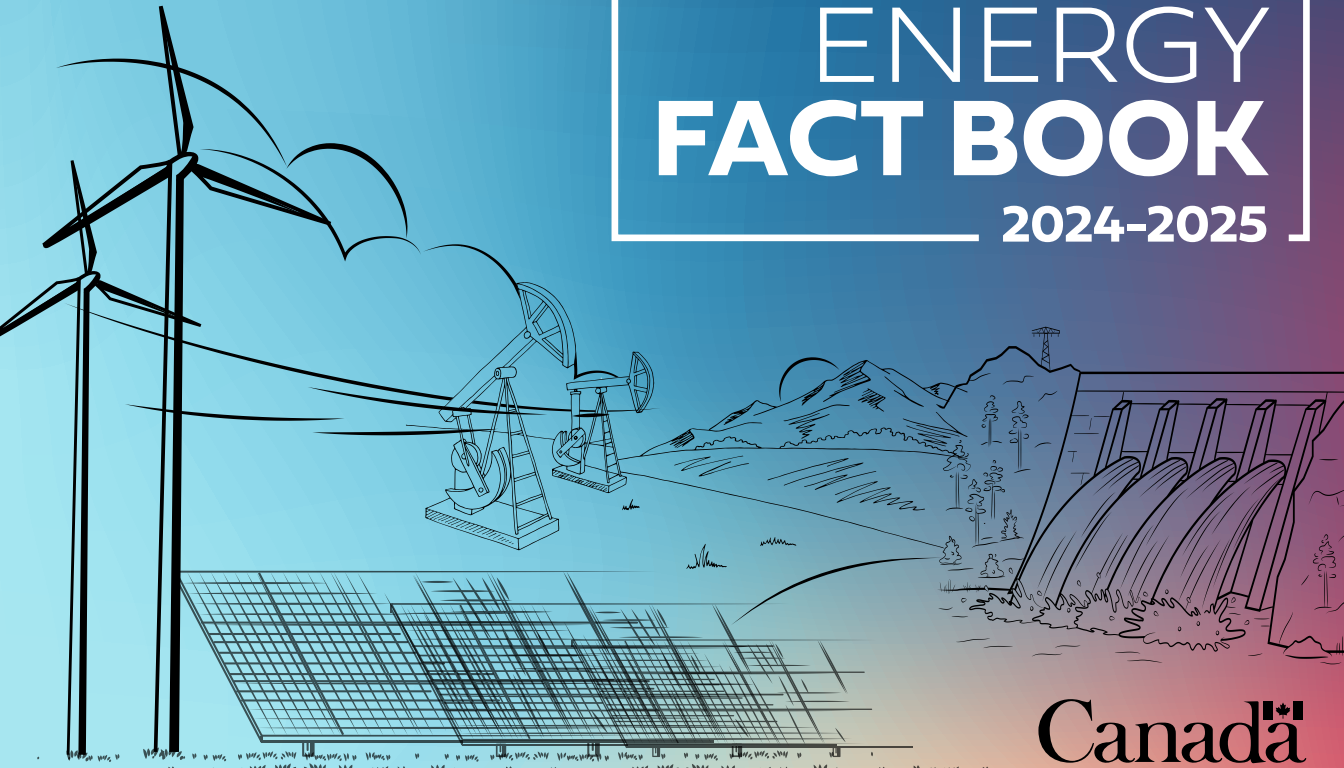
Natural Resources Canada

Ressources naturelles Canada

ENERGY FACT BOOK 2024–2025



Canada

Natural Resources Canada | Ressources naturelles Canada

ENERGY FACT BOOK

2024–2025

Canada

Aussi disponible en français sous le titre : Cahier d'information sur l'énergie, 2024-2025

Cat. No. M136-1E (Print) M136-1E-PDF (online)

ISSN 2370-3105 ISSN 2370-5027

PREFACE

The purpose of the *Energy Fact Book* is to provide key information on energy markets in Canada in a format that is easy to consult. Resources including a summary of units and conversion factors, abbreviations, and data sources used throughout this publication are available in the annexes.

All data is subject to revisions by statistical sources. In some instances, more than one source may be available and discrepancies in numbers may occur because of conceptual or methodological differences. In addition, some numbers may not add up precisely due to rounding.

This publication was assembled by the Energy and Economic Analysis Division of the Energy Policy Branch with the help of subject experts from across Natural Resources Canada (NRCan).

For questions or comments, contact NRCan at **energyfacts-faitsenergetiques@nrcan-rncan.gc.ca.**

In this publication, energy industries are generally considered to include oil and gas extraction; coal mining; uranium mining; electric power generation, transmission and distribution; pipeline transportation; natural gas distribution; biofuels production; petroleum refineries; and support activities for oil and gas extraction. The petroleum sector is a subset of these industries, and in this publication consists of oil and gas extraction and support activities, pipeline transportation and distribution of oil and gas, and petroleum refineries.

Clean energy industries such as renewable and nuclear electricity generation, biofuels production and carbon capture and storage facilities are contained within the definition of energy industries. Some energy-related industries (e.g. petroleum product wholesaler-distributors and coal product manufacturing) are excluded because of a lack of data.

CONTENTS

INTRODUCTION

From an energy perspective, Canada is very fortunate. We have a large land mass, small population and one of the largest and most diverse supplies of energy in the world. Our rivers discharge close to 7% of the world's renewable water – a tremendous source of hydroelectric power. We have the fourth-largest proven oil reserves and third-largest reserves of uranium; our energy resources are a source of strength that continues to shape our economy and society.

Canada is at the forefront of innovative technologies for how we produce and use energy. For example, low- or non-emitting forms of energy are growing in significance as part of our evolving electricity mix. In fact, wind and solar photovoltaic (PV) energy are the fastest-growing sources of electricity generation in Canada. In addition, technological advancements, such as co-generation, have resulted in an increase in energy-efficient practices and a reduction in greenhouse gas (GHG) emissions in areas such as the oil sands. Ongoing developments in areas such as grid-scale electricity storage, carbon capture and storage, hydrogen, and electric and alternative fuel vehicles have the potential to further transform the energy system.

For over ten years, the *Energy Fact Book* has provided a solid foundation for Canadians to understand and discuss important developments across the energy sector. A significant milestone in Canadian energy information was achieved in 2019 with the launch of the Canadian Center for Energy Information (CCEI). Housed at Statistics Canada, the CCEI brings together Canada's existing energy information in one place, facilitating access to products like the Energy Fact Book.

Section 1:

Key Energy, Economic and Environmental Indicators

Energy production and supply

Economic contributions

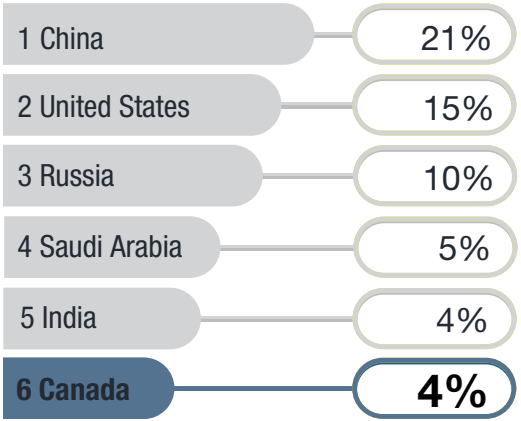
Energy and GHG emissions

ENERGY PRODUCTION AND SUPPLY

CANADA: A GLOBAL ENERGY LEADER

The amount of primary energy produced by Canada in 2022 is **40% more** than in 2005. The world, on average, has increased energy production by **32%** in the same period.

WORLD TOTAL PRIMARY ENERGY PRODUCTION
TOP ENERGY PRODUCERS, 2022



GLOBAL ENERGY RANKINGS FOR CANADA

	Proved reserve/ capacity	Production	Exports
Crude oil	4	4	3
Uranium	3	2	2
Hydroelectricity	4	3	-
Electricity	8	7	2
Coal	18	15	8
Natural gas	15	5	6

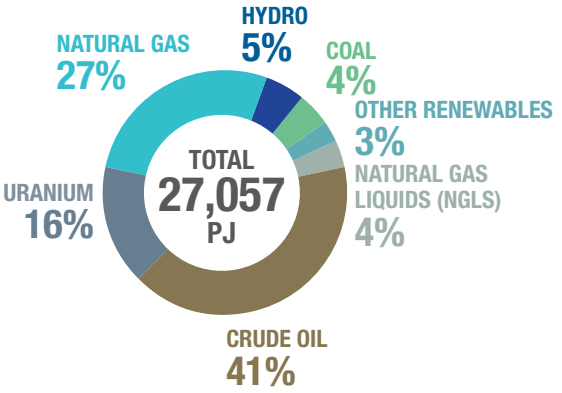
CANADIAN ENERGY PRODUCTION

Primary energy is energy that is found in nature before any processing or conversion. The *Energy Fact Book* calculates primary energy production by using two methods. The first method treats the energy embodied in uranium as primary energy, thereby capturing the uranium Canada produces and then exports. This method provides a more accurate picture of energy production in Canada.

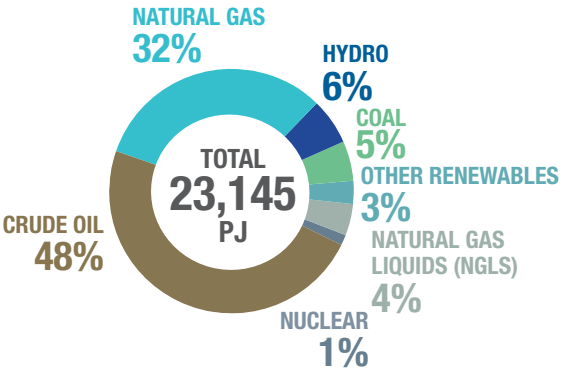
The second method–also employed by the International Energy Agency (IEA), the Energy Information Administration (EIA) and others–treats domestic electricity production from nuclear energy as primary energy, but not uranium itself. Uranium is energy-dense, and Canada exports most of its uranium production, which explains why the two methods produce such different results.

PRIMARY ENERGY PRODUCTION BY SOURCE (2022)

PRIMARY ENERGY PRODUCTION, INCLUDING URANIUM



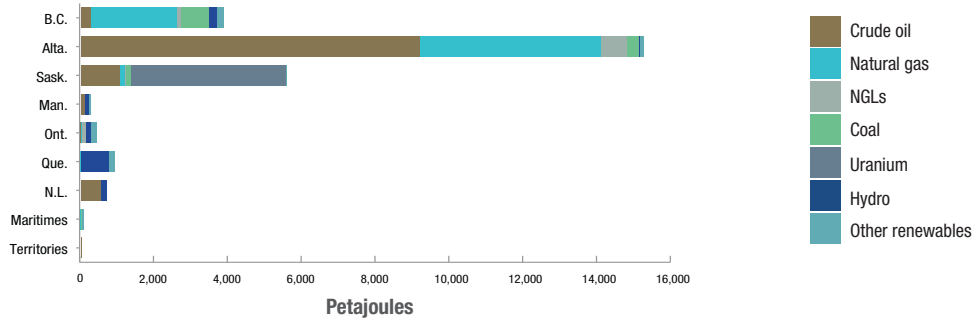
PRIMARY ENERGY PRODUCTION, EXCLUDING URANIUM



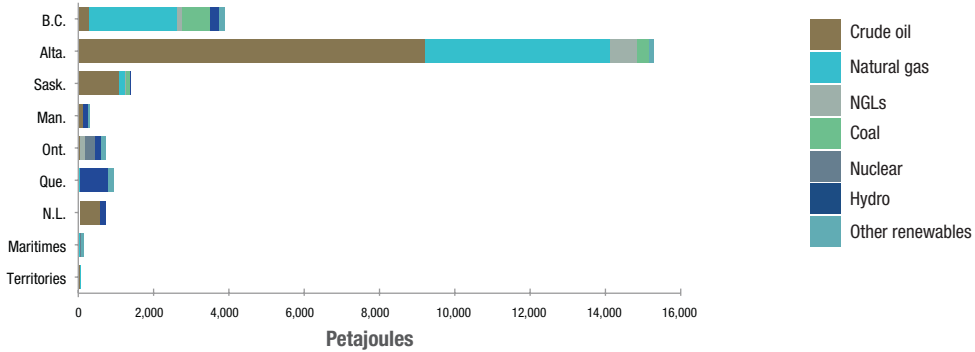
"Other renewables" includes wind, solar, wood/wood waste, biofuels and municipal waste.

PRIMARY ENERGY PRODUCTION BY REGION AND SOURCE (2022)

PRIMARY ENERGY PRODUCTION, INCLUDING URANIUM



PRIMARY ENERGY PRODUCTION, EXCLUDING URANIUM

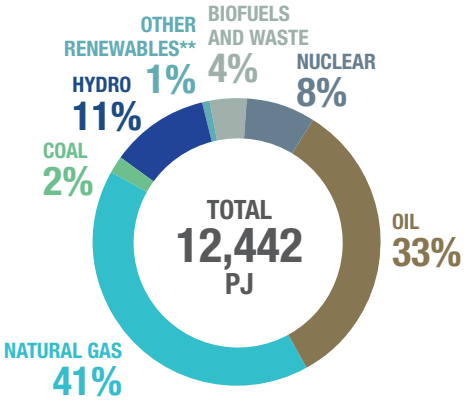


CANADA'S ENERGY SUPPLY

A look at Canada's total energy supply (TES) helps to better understand the impact of energy sources on GHG emissions. The TES[1] is calculated as:

TES = PRODUCTION + IMPORTS - EXPORTS + STOCK CHANGES

CANADA TOTAL ENERGY SUPPLY,* BY SOURCE, 2022



- Fossil fuels made up **77%** of Canada's TES in 2022.
- Renewable energy sources made up **16.8%** of Canada's TES in 2022.

Comparatively, the global TES is made up of

81% **Fossil fuel** (oil **31%**, coal **28%**, natural gas **23%**)

14% **Renewables**

5% **Nuclear**

* not including electricity trade

**"Other renewables" includes wind, solar and geothermal.

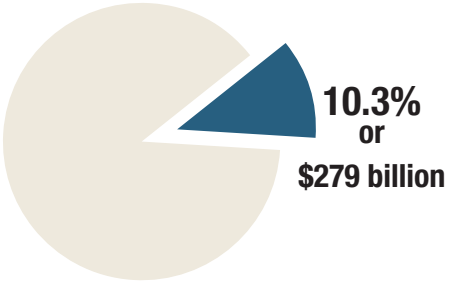
[1] For the purposes of TES, electricity production is calculated by using the energy content of the electricity (i.e. at a rate of 1 TWh = 0.086 Mtoe), with the exception of nuclear electricity, which is calculated assuming a 33% conversion efficiency factor increase (i.e. 1 TWh = 0.086 ÷ 0.33 Mtoe).

ECONOMIC CONTRIBUTIONS

NOMINAL GROSS DOMESTIC PRODUCT (2023)

ENERGY'S NOMINAL GDP CONTRIBUTION FOR CANADA

NOMINAL GDP (% OF CURRENT DOLLARS)



CANADIAN GDP

ENERGY DIRECT 8.2% ($222 billion)

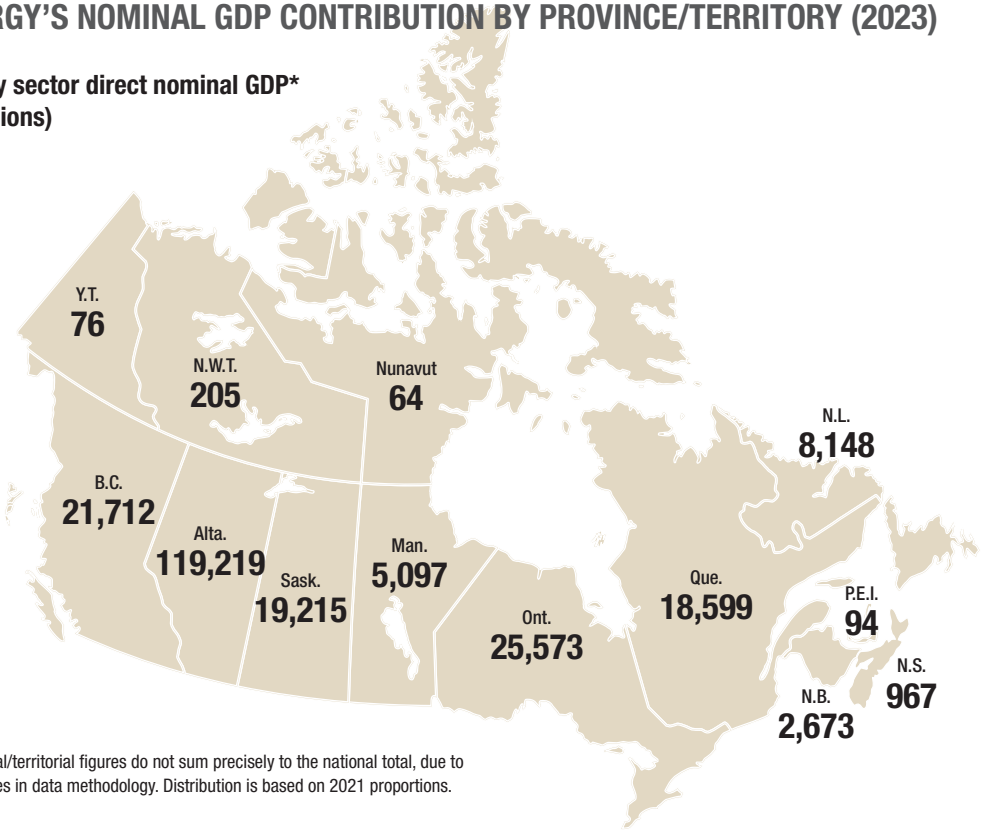
- PETROLEUM 6.1%
- ELECTRICITY 1.9%
- OTHER 0.1%

ENERGY INDIRECT 2.1% ($57 billion)

Parts may not sum to total due to rounding. For more information on the methodology used by Statistics Canada to estimate indirect contributions, please contact statcan.iadinfoddci-dciinfoiad.statcan@statcan.gc.ca.

ENERGY'S NOMINAL GDP CONTRIBUTION BY PROVINCE/TERRITORY (2023)

Energy sector direct nominal GDP*
($ millions)



*Provincial/territorial figures do not sum precisely to the national total, due to differences in data methodology. Distribution is based on 2021 proportions.

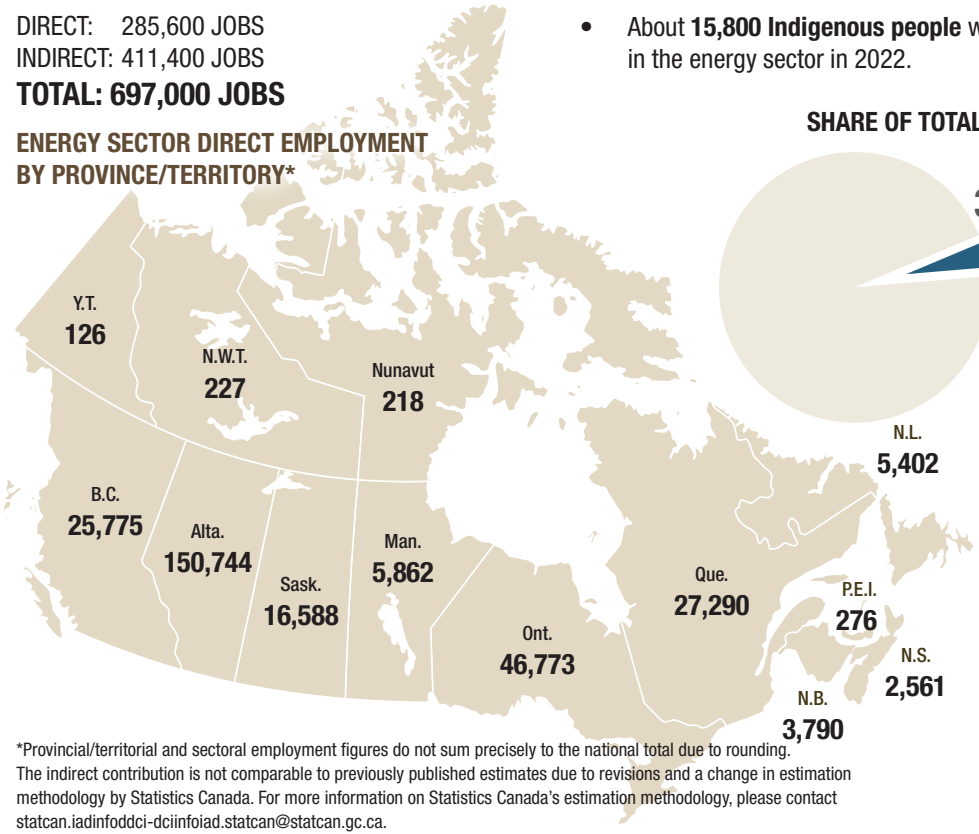
EMPLOYMENT IN CANADA'S ENERGY SECTOR (2023)

DIRECT: 285,600 JOBS
INDIRECT: 411,400 JOBS

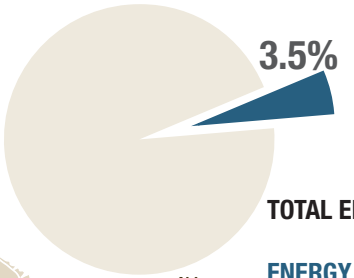
TOTAL: 697,000 JOBS

- About **15,800 Indigenous people** were directly employed in the energy sector in 2022.

ENERGY SECTOR DIRECT EMPLOYMENT BY PROVINCE/TERRITORY*



SHARE OF TOTAL EMPLOYMENT, 2023



TOTAL EMPLOYMENT

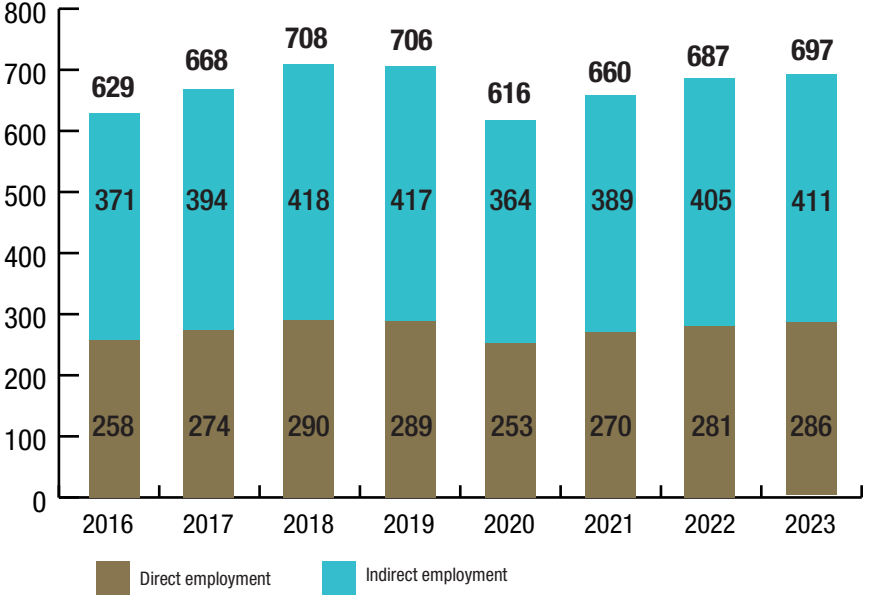
ENERGY DIRECT* 1.4%
PETROLEUM 0.9%
ELECTRICITY 0.5%
OTHER 0.1%

ENERGY INDIRECT 2.0%

*Provincial/territorial and sectoral employment figures do not sum precisely to the national total due to rounding. The indirect contribution is not comparable to previously published estimates due to revisions and a change in estimation methodology by Statistics Canada. For more information on Statistics Canada's estimation methodology, please contact statcan.iadinfoddci-dciinfoiad.statcan@statcan.gc.ca.

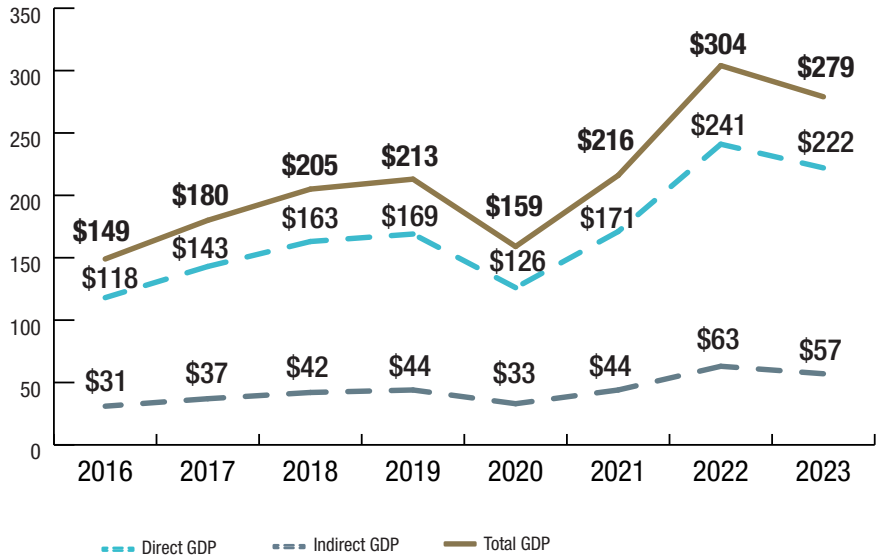
ENERGY SECTOR EMPLOYMENT

(Thousands of jobs)



Parts may not sum to total due to rounding. The indirect contribution is not comparable to previously published estimates due to revisions and a change in estimation methodology by Statistics Canada. For more information on Statistics Canada's estimation methodology, please contact statcan.iadinfoddci-dciinfoiad.statcan@statcan.gc.ca.

ENERGY SECTOR GDP
(Billions of dollars)



Parts may not sum to total due to rounding. The indirect contribution is not comparable to previously published estimates due to revisions and a change in estimation methodology by Statistics Canada. For more information on Statistics Canada's estimation methodology, please contact statcan.iadinfoddci-dciinfoiad.statcan@statcan.gc.ca.

ENERGY TRADE (2023)

Energy exports

$199.1 billion
representing

28%
of total Canadian goods exports

Oil and gas domestic exports totalled

$177 billion
of which

95% were to the U.S.

exported energy products to

123
countries

The U.S. accounts for

89%
of energy exports by value ($177.3 billion)

Exports to the U.S.

	% of Canadian exports destined for U.S.	% of Canadian production exported to U.S.	% of U.S. imports coming from Canada	% of U.S. consumption supplied by Canada
Crude oil	97	78	60	24
Natural gas	>99 *	44	>99	9
Electricity	100	10	85	1
Coal	2	2	19	0.1

*Canada exports trace amounts of Liquefied Natural Gas (LNG) to trade partners other than the United States.

Energy imports

$57.9 billion
representing

8%
of total Canadian goods imports

imported energy products from

120
countries

The U.S. accounts for

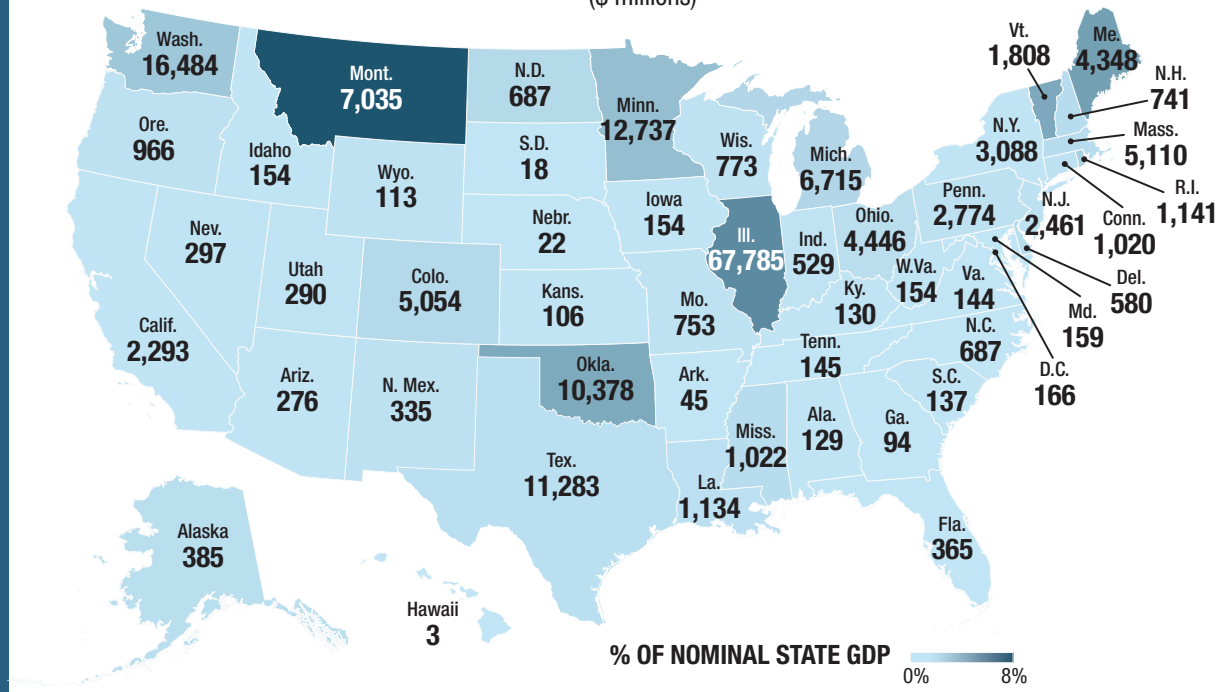
78%
of energy imports by value ($45 billion)

Imports from the U.S.

	% of Canadian imports originating from U.S.	% of U.S. exports destined for Canada	% of Canadian consumption supplied by U.S.
Crude oil	52	8	20
Natural gas	97	13	17
Electricity	100	91	4
Coal	76	5	32

CANADIAN ENERGY EXPORTS TO THE U.S. BY STATE (2023)

($ millions)

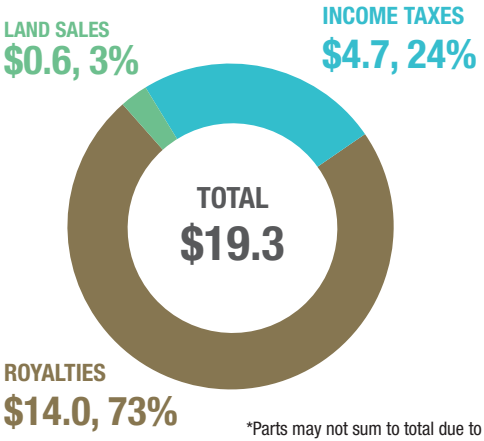


* All exports values in Canadian dollars. Values may not sum to U.S. total due to rounding and additional exports to overseas U.S. Territories.

GOVERNMENT REVENUES

Federal and provincial/territorial governments in Canada receive direct revenues from energy industries through corporate income taxes, crown royalties, which are the share of the value of oil and gas extracted that is paid to the Crown as the resource owner, and crown land sales, which are paid to the Crown in order to acquire the resource use for specific properties.

GOVERNMENT ENERGY REVENUE, 2018-2022 AVERAGE ($ BILLIONS)

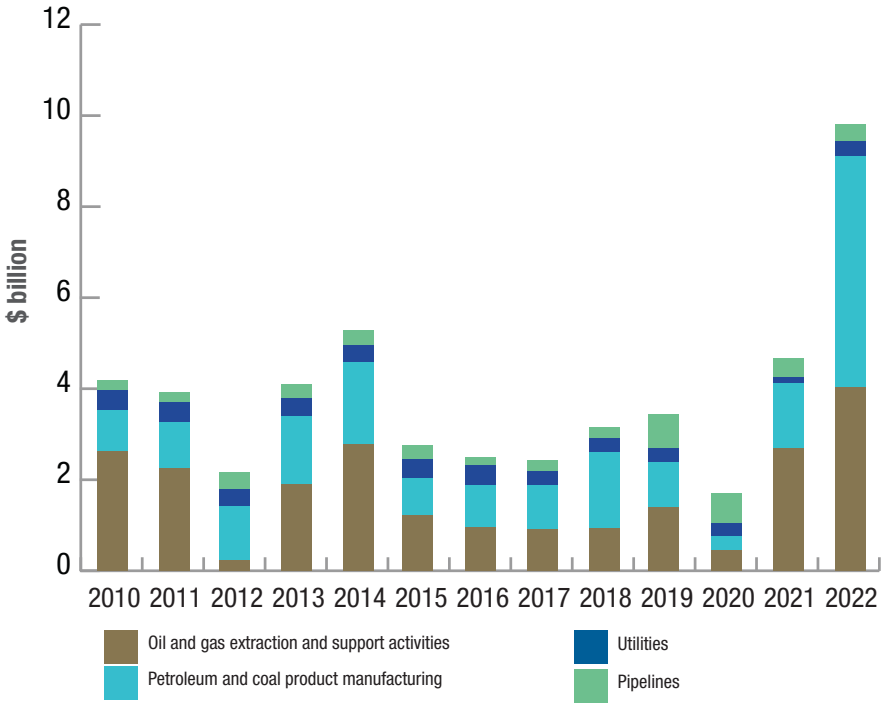


*Parts may not sum to total due to rounding.

- An important share of government revenues is collected from the petroleum sector, which averaged **$19 billion** over the last five years, including **$17 billion** from upstream oil and gas extraction and its support activities.
- Between 2018 and 2022, the energy sector's share of taxes paid by all industries was **6.0%**. Operating revenues of the energy sector represented **9.1%** of all operating revenues earned by industries in Canada.

CORPORATE INCOME TAXES PAID BY ENERGY INDUSTRIES

(Federal and Provincial)



ENERGY AND GHG EMISSIONS

In 2021,

78%

of global GHG emissions from human activity were from the production and consumption of energy.

This includes activities such as using gasoline for transportation, fossil fuel-fired electricity generation, oil and gas production, and heating and cooling buildings.

In Canada, **about 82%** of emissions come from energy. Canadians use more energy because of our extreme temperatures, vast landscape and dispersed population.

The challenges of **transitioning** to a **lower-carbon energy system** are numerous, but they also present opportunities for **Canada to be a global leader** by **supporting innovative technologies in the energy sector**, including **promoting our growing renewables and cleantech sectors**.

Since 2000, there has been a decoupling between the growth of Canada's economy and GHG emissions, largely because of technological improvements, regulations, and more efficient practices and equipment.

In 2022, emissions increased slightly as economic activity continued to recover from the impacts of the COVID-19 pandemic, with 2022 emissions 44 Mt lower than in 2019 (-5.9%).

Between 2000 and 2022, Canada's GHG emissions decreased by

5.3%

while GDP increased

52%

GHG emissions decreased

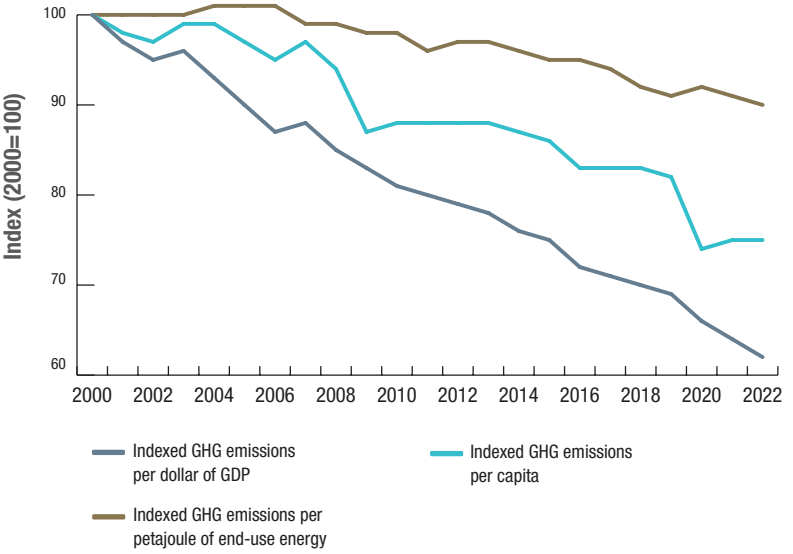
38%

per dollar of GDP and

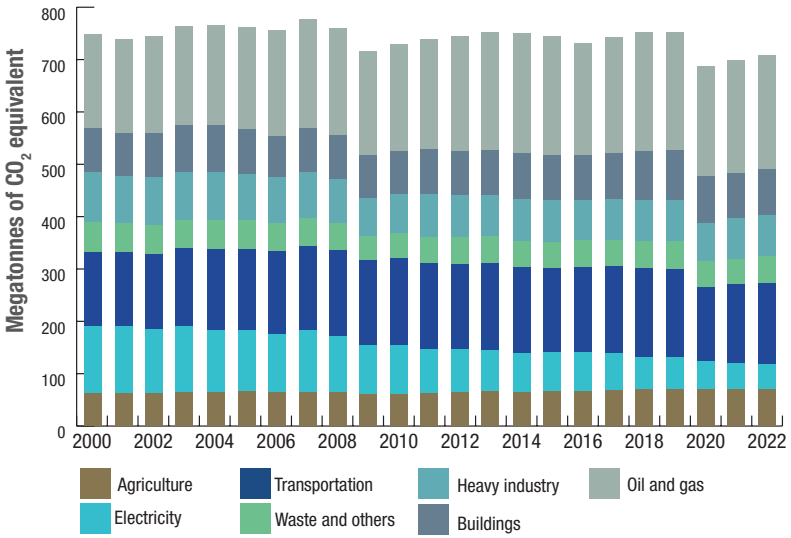
25%

per capita.

INDEXED TREND IN GHG EMISSIONS PER PERSON, PER UNIT OF GDP AND PER UNIT OF ENERGY CONSUMED, 2000–2022



GHG EMISSIONS BY CANADIAN ECONOMIC SECTOR, 2000–2022



- Between 2000 and 2022, **emissions from electricity production decreased 63%**, largely because of Ontario's successful coal phase-out action plan, which started in 2001.
- **Emissions from oil and gas production increased 21%** largely due to an increase of 67% in production.
- **Emissions from heavy industry have decreased by 19%** despite an increase in output of the industrial sector. This is due in part to improvements in energy efficiency and fuel switching.

Section 2:
Investment

Capital expenditures

Canada's Energy Infrastructure and Major Energy Projects

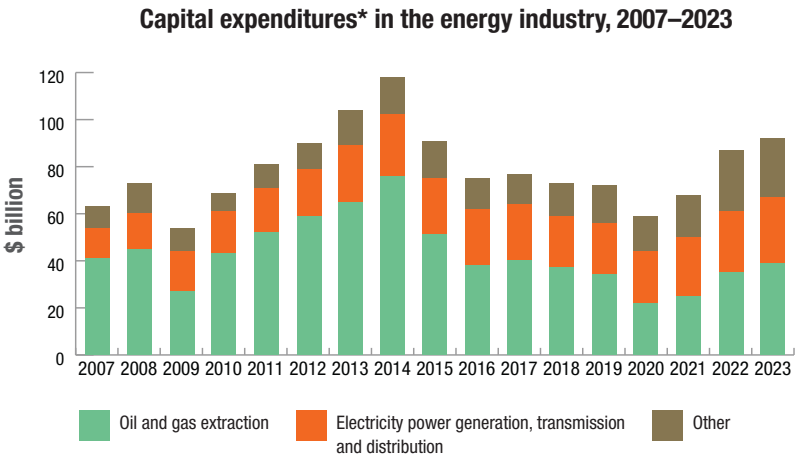
Foreign Direct Investment and Canadian Direct Investment Abroad

Canadian Energy Assets Abroad, foreign control of assets

RD&D and Mission Innovation

Environmental Protection Expenditures

CAPITAL EXPENDITURES

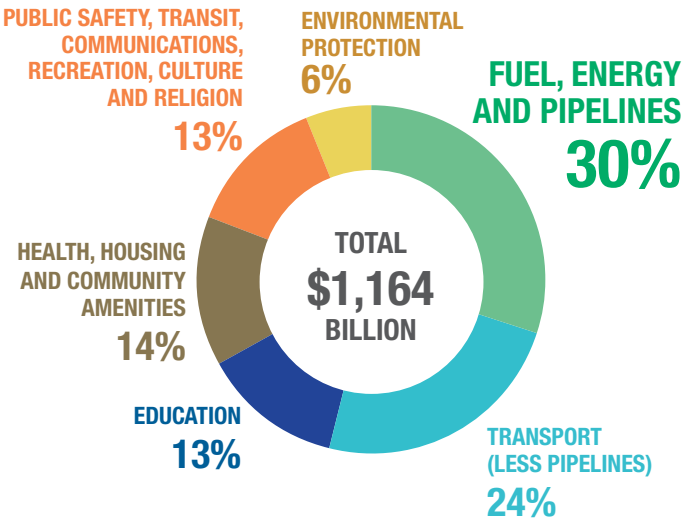


- Capital expenditures in Canada's energy sector totaled **$92 billion** in 2023, a decrease of 22% from a peak in 2014.
- After reaching an eleven year low of **$59 billion** in 2020, investment has rebounded by **47%**.
- Oil and gas extraction was the largest area of energy sector capital expenditure at **$39.2 billion** in 2023, followed by electrical power generation and distribution ($27.6 billion).

*Excludes residential expenditures and intellectual property investments such as exploration expenses. Includes investments in renewable electricity, does not capture other forms of renewable energy.

CANADA'S ENERGY INFRASTRUCTURE

Fuel, energy and pipeline infrastructure made up the largest proportion of Canada's infrastructure at **30%** of net stock in 2023.



Statistics Canada defines infrastructure as:

> "the physical structures and systems that support the production of goods and services and their delivery to and consumption by governments, businesses and citizens."

Fuel, energy and pipeline infrastructure includes electric power infrastructure like wind and solar, hydro, nuclear, and thermal generation, power transmission and distribution lines and oil and gas pipelines.

FUEL, ENERGY AND PIPELINE INFRASTRUCTURE INVESTMENT AND OPERATIONS

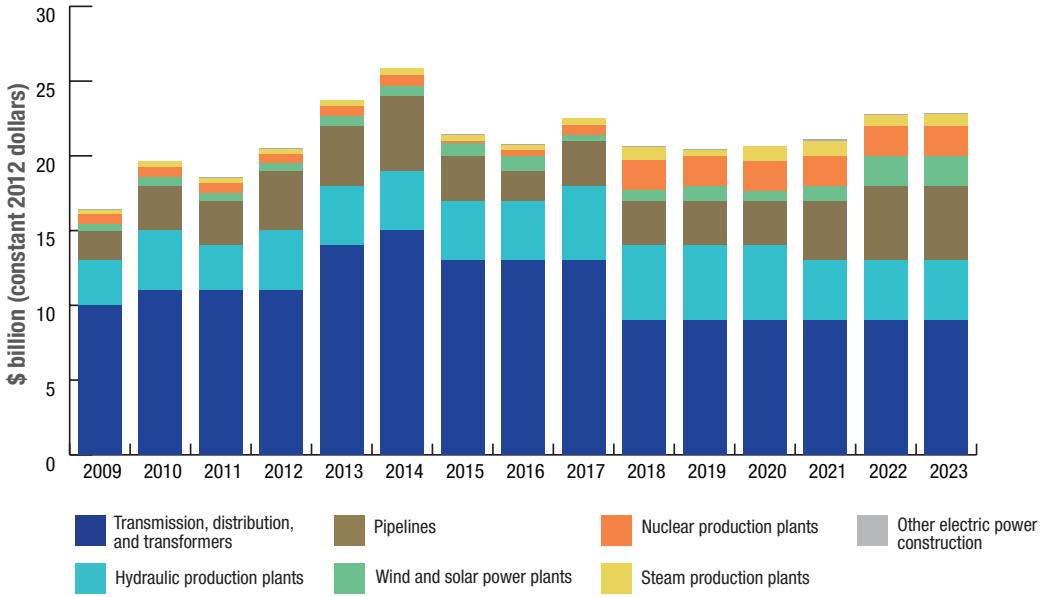
supported
140.1 k jobs

generated $12.7 billion
in employment income

and $23.5 billion
in GDP
in 2023
(direct and indirect contributions).

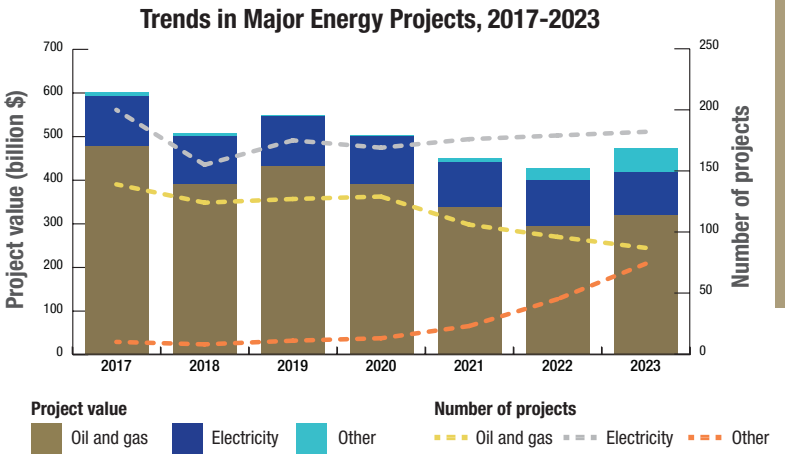
Public and private investment in fuel, energy and pipeline infrastructure in 2023 was **$30.6 billion** (nominal).

Public and private investment in fuel, energy and pipeline infrastructure, 2009–2023



CANADA'S MAJOR ENERGY PROJECTS

- In 2023, there were 223 planned (announced, under review, or approved) energy projects worth **$294B**, and 120 energy projects under construction worth **$180B**.
- Oil and gas sector projects accounted for the largest portion of project value ($319B), while there were more electricity projects overall (182).
- There were **233 clean technology projects** valued at **$159B**.



Natural Resources Canada's Major Projects Inventory captures information on major natural resource projects in Canada that are either currently under construction or planned in the next 10 years.

Minimum capital thresholds for inclusion are: **$50 million** for oil and gas, **$20 million** for electricity, and **$10 million** for other clean energy or technology projects.

Projects that are either announced, under review, approved and under construction are included.

CLEAN TECHNOLOGY PROJECT TRENDS 2018-2023

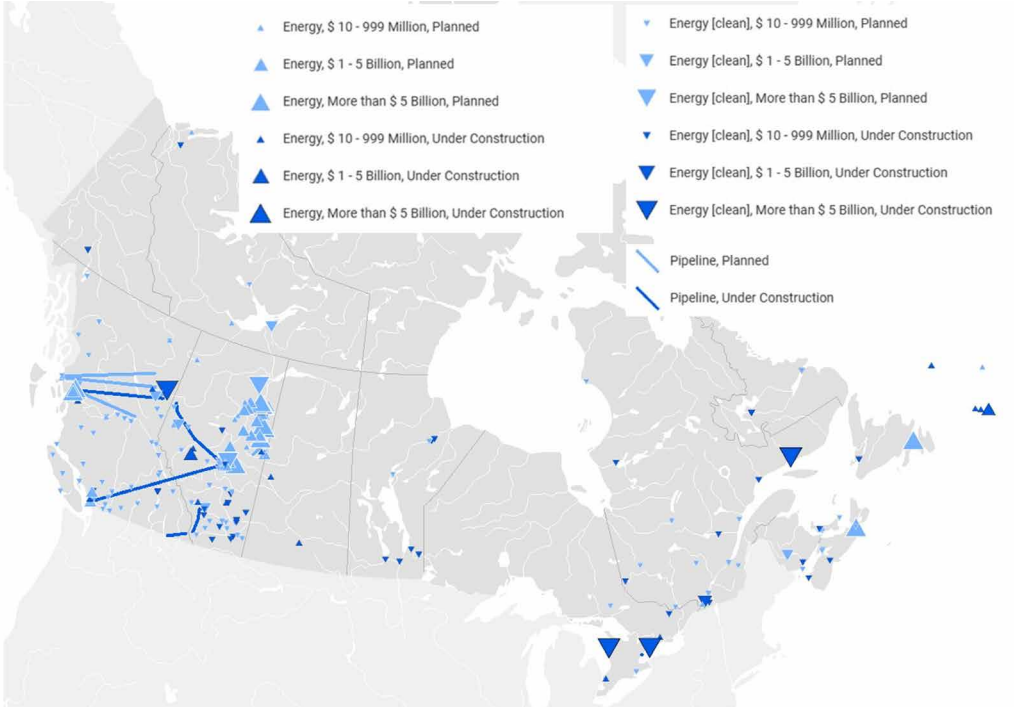
	2018	2019	2020	2021	2022	2023
Total Clean Technology Projects	**144 projects ($109.5B)**	**151 projects ($99.3B)**	**159 projects ($99.4B)**	**178 projects ($104B)**	**197 projects ($118B)**	**233 projects ($159B)**
Hydro	65 projects ($48.2B)	70 projects ($50.0B)	61 projects ($52.0B)	58 projects ($39.2B)	63 projects ($44.8B)	78 projects ($38.9B)
Wind	27 projects ($9.1B)	31 projects ($9.4B)	36 projects ($8.3B)	41 projects ($14.6B)	35 projects ($13.4B)	31 projects ($12.3B)
Biomass/Biofuels	33 projects ($6.4B)	32 projects ($3.0B)	29 projects ($4.6B)	31 projects ($8.0B)	35 proejcts ($9.4B)	42 projects ($13.8B)
Solar	7 projects ($0.9B)	6 projects ($0.7B)	13 projects ($1.4B)	22 projects ($2.2B)	30 projects ($3.0B)	31 projects ($6.2B)
Nuclear	5 projects ($28.5B)	5 projects ($28.5B)	3 projects ($26.1B)	4 projects ($27.4B)	3 projects ($26.1B)	2 projects ($25.8B)
Carbon Capture and Storage	3 projects ($16.3B)	2 projects ($7.2B)	1 project ($6.0B)	2 projects ($11.3B)	6 projects ($15.5B)	9 projects ($38.3B)
Geothermal	1 project ($0.0B)	2 projects ($0.2B)	3 projects ($0.3B)	5 projects ($0.4B)	4 projects ($0.4B)	4 projects ($0.4B)
Tidal	0 project ($0.0B)	1 project ($0.1B)	6 projects ($0.3B)	6 projects ($0.3B)	7 projects ($0.4B)	7 projects ($0.4B)
Multiple[1]	0 project ($0.0B)	0 project ($0.0B)	0 project ($0.0B)	1 project ($0.03B)	1 project ($0.03B)	1 project ($0.03B)
Other[2]	3 projects ($0.1B)	2 projects ($0.1B)	7 projects ($0.4B)	8 projects ($0.5B)	13 projects ($5.3B)	28 projects ($22.6B)

Certain values from 2020 to 2022 have been revised due to updated data.

[1] The Haida Gwaii Clean Energy Project is a multi-phased project consisting of hydro and solar sites.

[2] "Other" includes novel initiatives such as micro-grid projects, battery storage projects, bioplastics, and a helium purification plant.

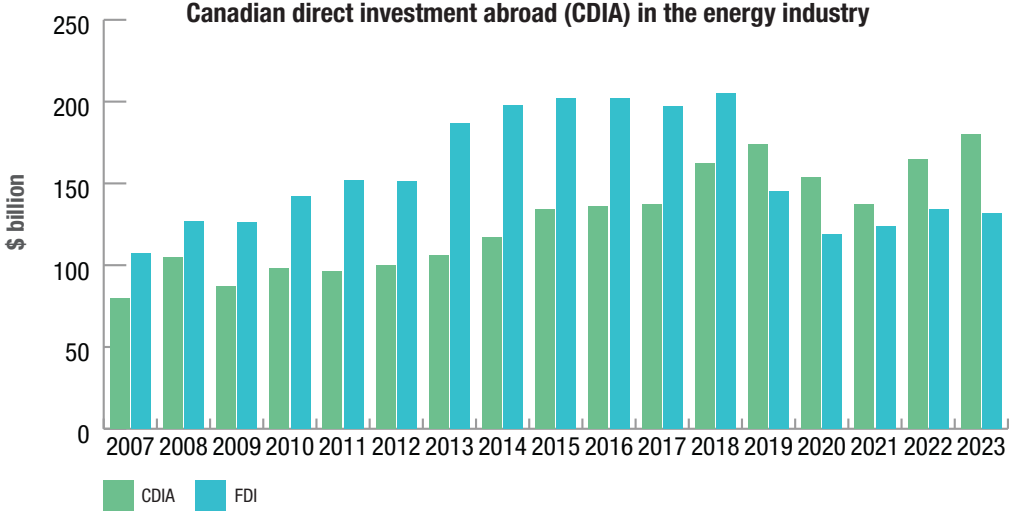
MAJOR ENERGY PROJECTS
PLANNED AND UNDER CONSTRUCTION, 2023-2033



INTERNATIONAL INVESTMENTS AND INVESTORS

Canada's energy industries operate in free markets, where investments by both Canadian and foreign companies ensure an efficient, competitive and innovative energy system.

Stock of foreign direct investment (FDI)* in Canada and Canadian direct investment abroad (CDIA) in the energy industry



* Direct investment is defined as a company owning a minimum of 10% of voting equity interest in a foreign enterprise and is measured as the total equity value at the time of acquisition. Excludes residential expenditures and intellectual property investments such as exploration expenses.

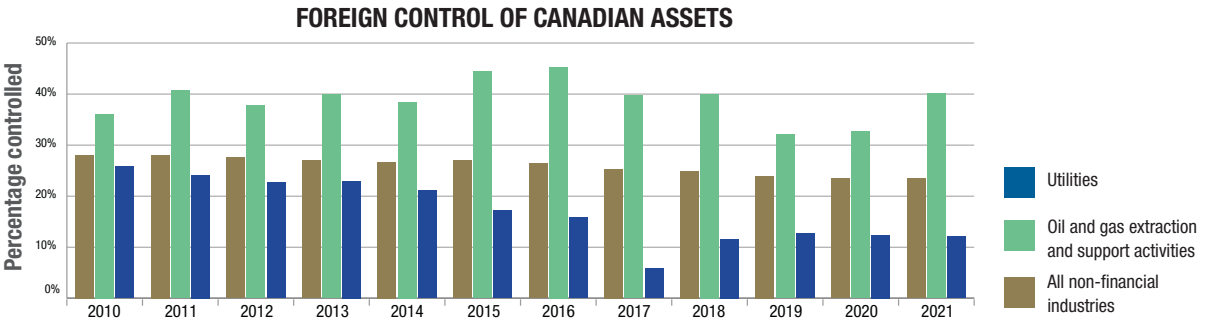
FDI and CDIA include investments in renewable electricity, do not capture other forms of renewable energy.

STOCK OF FOREIGN DIRECT INVESTMENT IN CANADA AND CANADIAN DIRECT INVESTMENT ABROAD

- The stock of **foreign direct investment** (FDI) in the energy sector fell in 2023 to **$132 billion** (-1.8% over the previous year).
- The energy industry's share of overall FDI in Canada was **10%** in 2023, same as in 2022.
- The stock of **Canadian direct investment abroad** (CDIA) was valued at **$180 billion** in 2023, up 9% from 2022.
- Investment in oil and gas extraction accounted for **$39 billion** of the CDIA stock in 2023.

FOREIGN CONTROL OF CANADIAN ASSETS

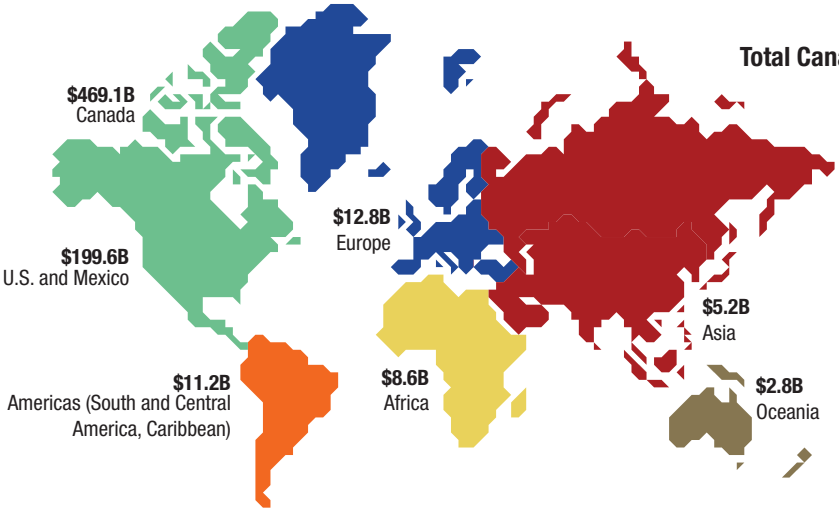
Foreign control is a measure of the extent to which foreign entities operate in Canada. Generally, a corporation is deemed to be foreign-controlled if **more than 50%** of its shares are owned by one or more foreign companies.



CANADIAN ENERGY ASSETS

The total value of Canadian* energy assets (CEA) went up in 2021 to **$710 billion**, a slight increase of **2.1%** from **$695 billion** in 2020. In 2021, domestic CEA totaled **$469 billion**, **down 2.3%** from 2020, while CEA abroad totaled **$240 billion**, up from **$215 billion**.

CANADIAN ENERGY ASSETS BY REGION, 2021



Total Canadian energy assets

$710B

Total Canadian energy assets abroad

$240B

* A Canadian company is here defined as a publicly traded company headquartered in Canada and not foreign-controlled.

RESEARCH, DEVELOPMENT AND DEMONSTRATION

CANADIAN TOTAL EXPENDITURES ON ENERGY RD&D

In 2022-23, federal energy RD&D expenditures were $1,061M and provincial and territorial (P&T) government energy RD&D expenditures were $424M, for a combined total of $1,485M.

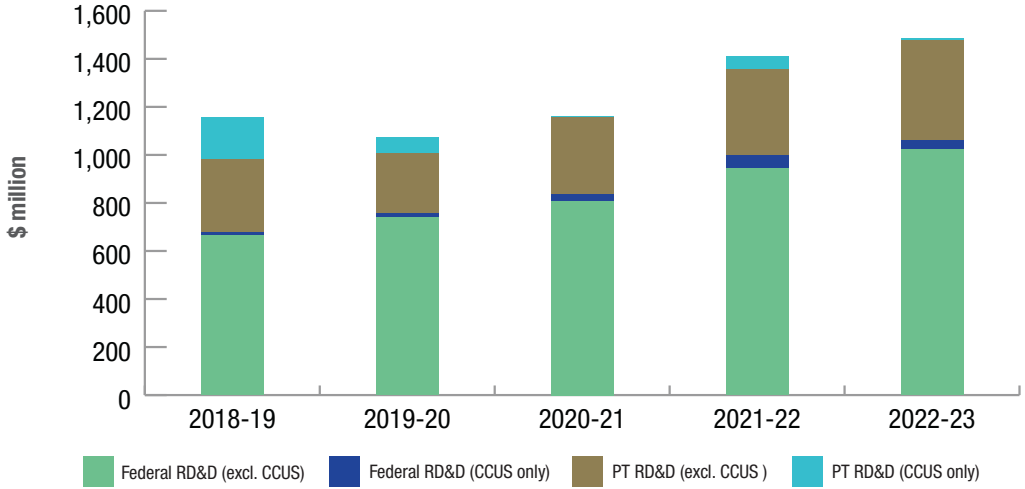
In 2022-23, federal spending increased by **6% ($60M) compared to 2021-22**. Energy efficiency accounts for one third of total federal expenditures ($385M) and investments **show a steady increase** since 2018-19 ($289M).

Canada's active participation in Mission Innovation (MI) has catalyzed increased investments in clean energy RD&D, including from 2015-2021 when Canada surpassed its MI commitment to double investments in clean energy RD&D, and through Canada's 2022 commitment of $2B in pre-allocated money to the Clean Energy Technologies Demonstration Challenge, mobilizing public investments internationally for clean energy demonstrations by 2026. Through the first two years of its commitment, federal demonstration investments have reached over $500M and remain on track to meet the 2026 commitment.

In 2022-23, P&T spending increased by **3% ($13M increase)**. CCUS had a significant decrease by $45M to $9M in 2022-23, compared to $54M in 2021-22.

Canadian industry spent about **$2.3B** on energy R&D in 2021, a significant increase from the spending reported in 2020 (**$1.7B**).

CANADIAN PUBLIC EXPENDITURES ON ENERGY RD&D



* Provincial and territorial (P/T) includes utilities and other publicly owned entities (i.e. State-Owned Entities).

Generally, federal and provincial/territorial energy RD&D spending continues to increase with significant and steady federal contributions. In 2022-23, combined federal, provincial/territorial CCUS spending decreased, similar to the spending in 2020-21.

EXPENDITURES ON ENERGY RD&D BY TECHNOLOGY AREA ($ MILLIONS)

	Federal (2022-23)	Provincial and territorial (2022-23)	Industry (2021)
Hydrocarbons (including CCUS)	96	63	830
Renewable and non-emitting energy**	530	154	756
Energy end use***	435	208	701
Total*	1,061	424	2,287

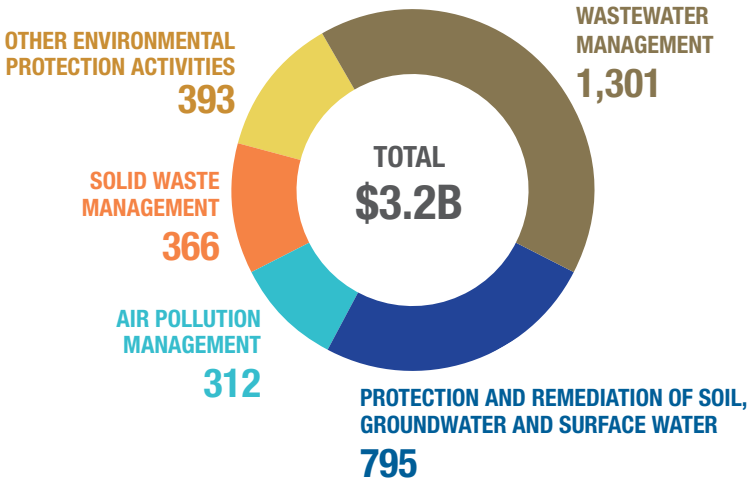
* Totals may not be exact due to rounding.
** Renewable and non-emitting energy includes renewable and nuclear energy.
*** Energy end use includes energy efficiency related to transport, industry and buildings & communities.
Note: Latest data for industry spending was not available at the time of this publication.

ENVIRONMENTAL PROTECTION EXPENDITURES

Environmental protection expenditures (operating and capital spending combined) by the energy sector totalled **$4.3 billion** in 2021, representing **41%** of expenditures made by all industries.

The oil and gas sector ($3.2 billion) accounts for the largest share of those expenditures, at 30% of total environmental protection expenditures made by all industries.

OIL AND GAS EXTRACTION EXPENDITURES PER ENVIRONMENTAL ACTIVITY (2021, $ MILLIONS)



- Electric power generation, transmission and distribution invested **$689 million** on environmental protection measures.
- Petroleum and coal product manufacturing invested **$425 million** in environmental protection activities, with the largest percentage of spending (84%) in pollution abatement and control.

Section 3:

Skills, Diversity and Community

Energy sector demographics

Energy affordability

Energy reliant communities

ENERGY SECTOR DEMOGRAPHICS (2021)

Women held **24%** of energy sector jobs.

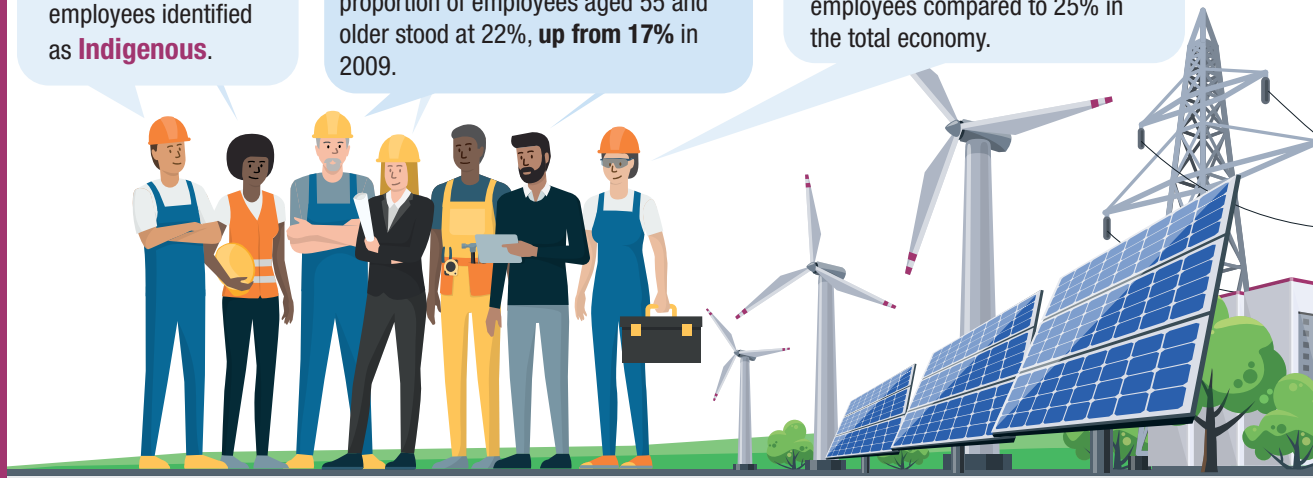
6% of energy sector employees identified as **Indigenous**.

Nearly three-quarters (74%) of employees in the energy sector had more than a high school education and **56%** of workers had a **college diploma or university degree**.

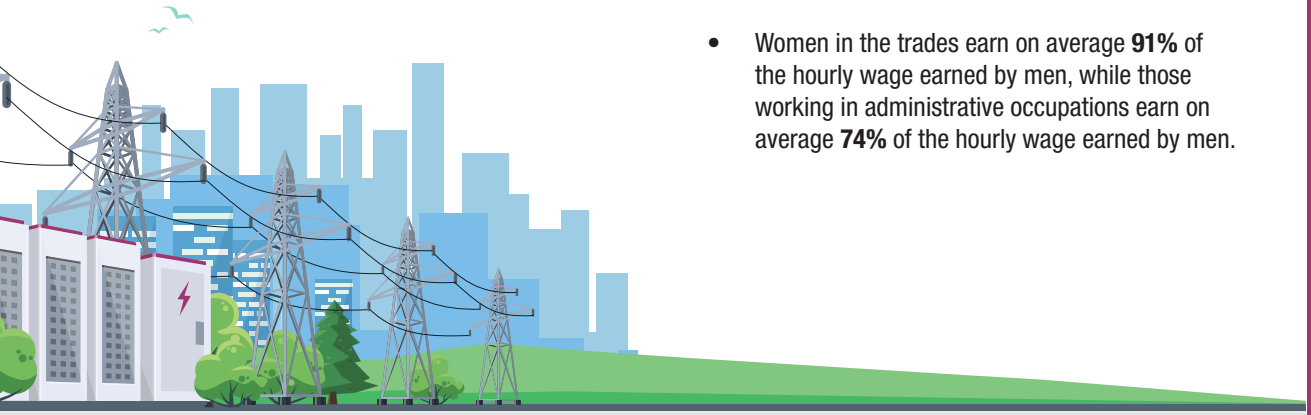
The workforce in the energy sector has been **aging over time**. In 2021 the proportion of employees aged 55 and older stood at 22%, **up from 17%** in 2009.

Since 2009, the workforce in the energy sector has become **increasingly diverse**. In 2021, **20%** of the workforce identified as members of a visible minority group, up from **17%** in 2009.

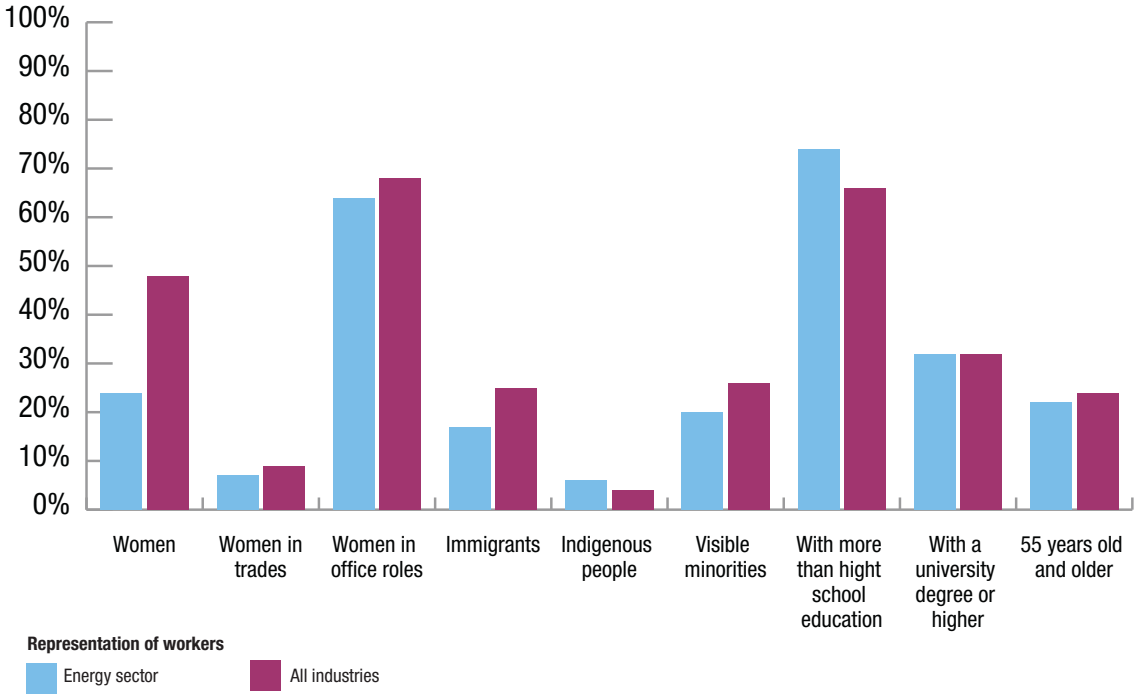
Immigrant workers represented **17%** of energy sector employees compared to 25% in the total economy.



- Energy sector jobs paid an average of **$121,435** per year, while the average Canadian job paid **$62,459**.
- The **gender wage gap** closed slightly in the energy sector in 2021, with women earning on average **85%** of the hourly wage earned by men. In contrast, in 2009, women earned on average **76%** of the hourly wages earned by men.
- Jobs requiring a **university degree** had the highest average compensation, reaching **$150,541**.
- Among **occupation types**, women in the energy sector are highly represented in office roles (administrative, general office worker, and auditor accountants and investment professionals) at **64%** of these occupations. Men are highly represented in trades (holding **93%** of these occupations).
- Women in the trades earn on average **91%** of the hourly wage earned by men, while those working in administrative occupations earn on average **74%** of the hourly wage earned by men.



Representation of demographic groups in the energy sector compared to all industries



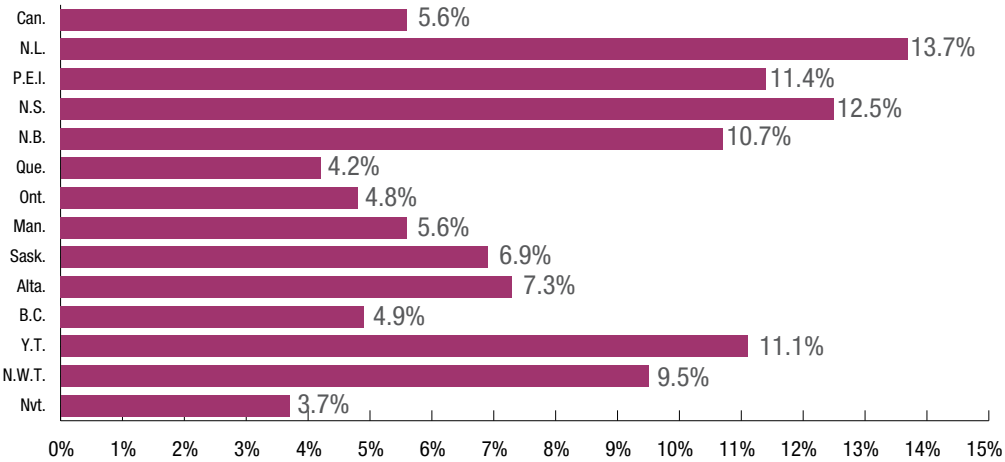
ENERGY AFFORDABILITY

In 2021, in-home energy expenditure by Canadian households averaged **$2,225**. This represented 3% of the average disposable income.

When households spend 10% or more of their income on energy needs, this is referred to as **energy poverty**.

Overall, 5.6% of Canadian households spent 10% or more of their income on energy. This share varies considerably across regions and income levels.

Energy Poverty Rates, by Geography



Energy poverty rates are based on the number of energy poor households divided by total households.

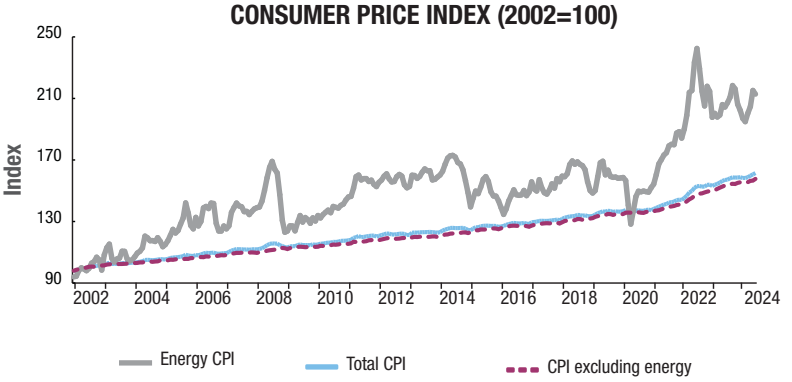
Energy, in this context, includes what is needed inside the home (i.e. space heating, appliances), and excludes transportation.

HOUSEHOLD EXPENDITURES ON ENERGY

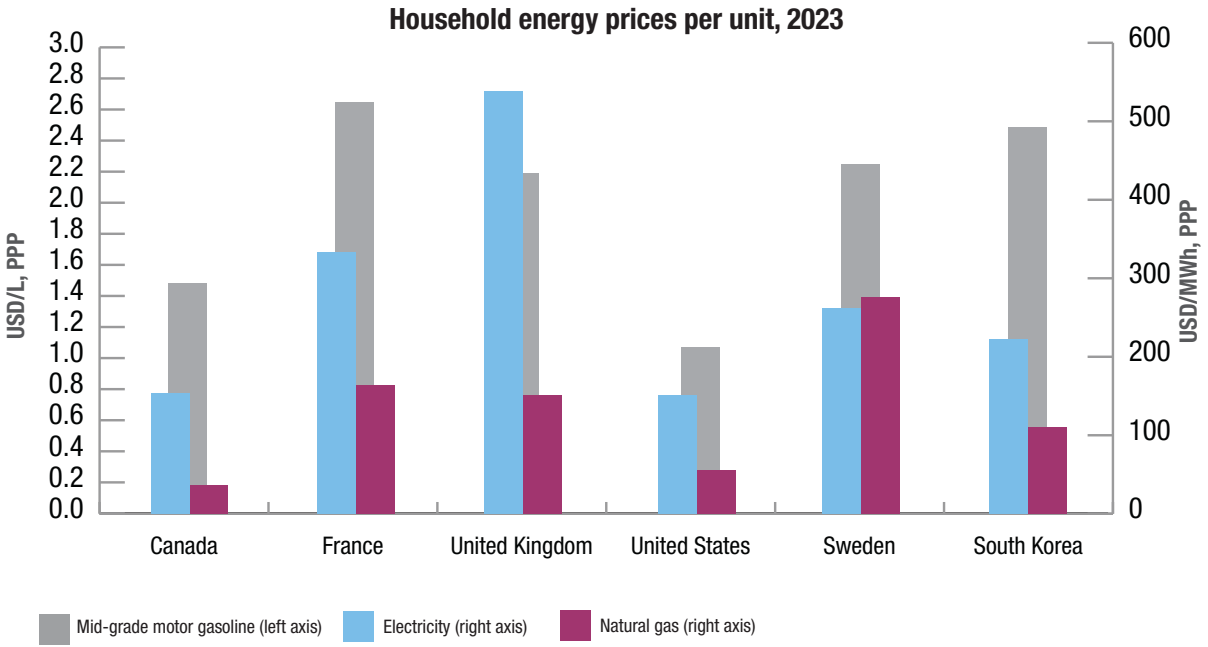
- Canadian households **spent $4,305** on average on energy in 2021.
- Residential expenditures, including for heating/cooling spaces, lighting and operating appliances, averaged **$2,225**.
- Expenditures on fuels for vehicles and tools averaged **$2,080**.
- Energy accounted for **6.4%** of current household consumption. Lower-income households spend a larger share of their disposable income on energy.

ENERGY RETAIL PRICES

- The “energy” component of the consumer price index (CPI) has been volatile in recent years and has grown much faster than the non-energy component.
- This volatility reflects mostly the variations of upstream oil and gas prices and their impact on consumer products such as gasoline.



IN COMPARISON WITH OTHER DEVELOPED ECONOMIES, CANADA'S ENERGY PRICES ARE RELATIVELY LOW.

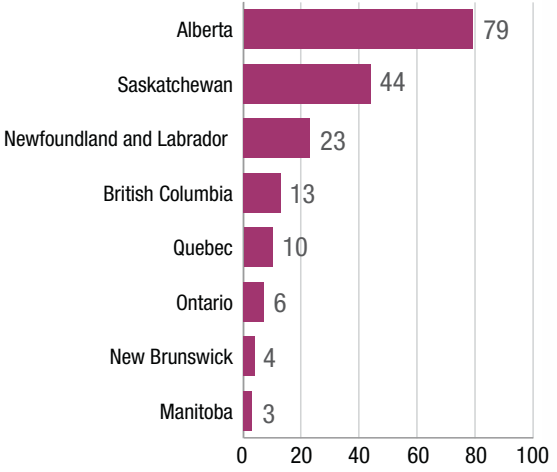


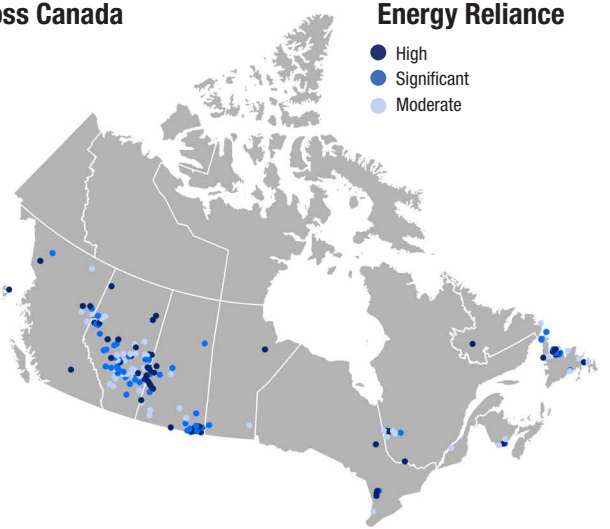
ENERGY RELIANT COMMUNITIES

A community that has a higher share of employment from a specific sector, a relatively high share of total income from that sector, and relatively low sectoral diversity in their economy compared to the average Canadian community can be described as reliant on that sector.

There are **182 communities across Canada that are at least moderately reliant** on the energy sector. Of these communities, **80% are rural or remote**.

Distribution of energy reliant communities across Canada





Section 4:
Energy Efficiency

Energy use

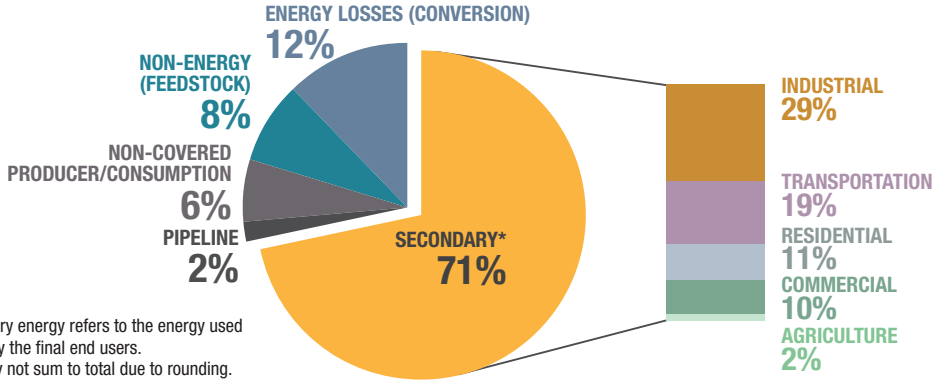
Efficiency trends

ENERGY USE

PRIMARY AND SECONDARY ENERGY USE BY SECTOR (2021)

- Primary energy use measures the total energy requirements of all energy users.
- Secondary energy use accounts for the energy used by final consumers in the economy.
- Primary energy use includes secondary energy use. Additionally, primary energy use includes the energy required to transform one form of energy into another (e.g. coal to electricity); the energy used to bring energy supplies to the consumer (e.g. pipeline); and the energy used to feed industrial production processes (e.g. the natural gas used as feedstock by the chemical industries).
- Not every fuel is consumed as energy. For example, hydrocarbon gas liquids in Canada are also used as a non-energy feedstock in the petrochemical industry.
- Canada's primary energy consumed was estimated at **12,419 PJ.**

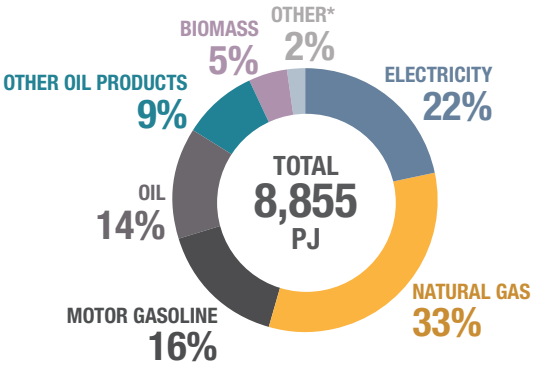
PRIMARY AND SECONDARY ENERGY USE BY SECTOR, 2021



*Secondary energy refers to the energy used directly by the final end users.
Parts may not sum to total due to rounding.

- Secondary energy use includes the energy used to run vehicles; the energy used to heat and cool buildings; and the energy required to run machinery.
- Canada's secondary energy use in 2021 was **8,855 PJ**.
- Total secondary energy use **increased 10%** from 2000 to 2021. Natural gas usage grew by **36%** while electricity usage increased 14%, during the same period.

CANADA'S SECONDARY ENERGY USE BY FUEL TYPE, 2021

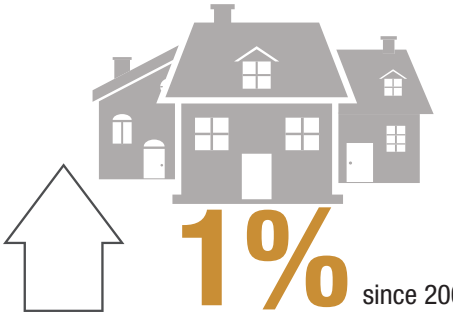


* "Other" includes coal, coke, coke oven gas, NGLs and steam and waste.
Parts may not sum to total due to rounding.

ENERGY IN OUR DAILY LIVES

- Canadian households use energy every day – to power lights and appliances, heat or cool spaces, run personal vehicles, recharge electronics and more.
- **78%** of residential energy consumption is used for space and water heating.
- Residential energy efficiency improved by **35%** between 2000 and 2021, **saving 480 PJ** of energy and **$10.9 billion in energy costs**.

Residential energy use increased



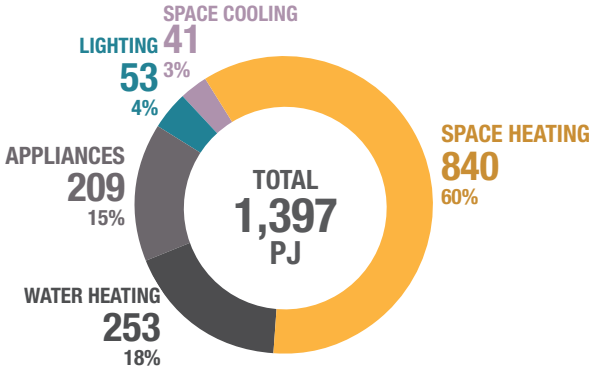
1% since 2000,

but would have increased by

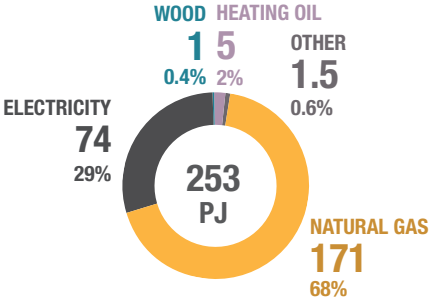
36%

without energy efficiency improvements.

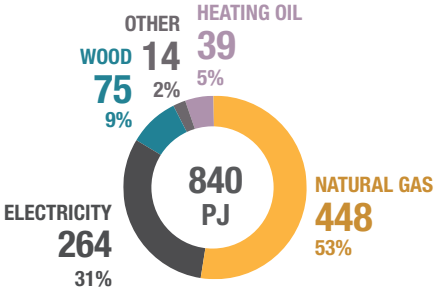
RESIDENTIAL ENERGY USE, BY TYPE (PJ), 2021



WATER-HEATING ENERGY USE (PJ), 2021

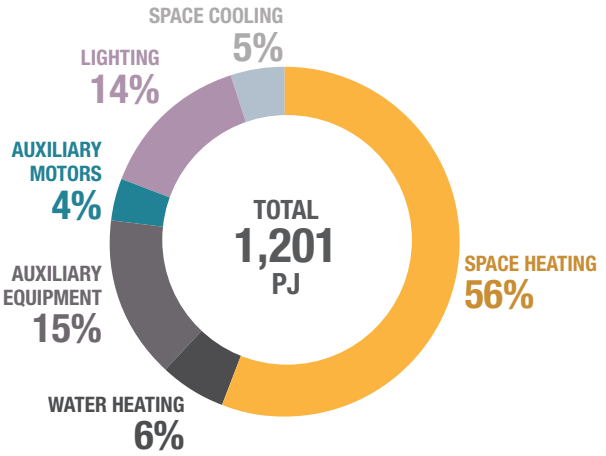


SPACE-HEATING ENERGY USE (PJ), 2021



Parts may not sum to total due to rounding.

COMMERCIAL AND INSTITUTIONAL ENERGY USE BY END USE, 2021



Commercial and institutional energy use increased between 2000 and 2021

21%

but would have increased

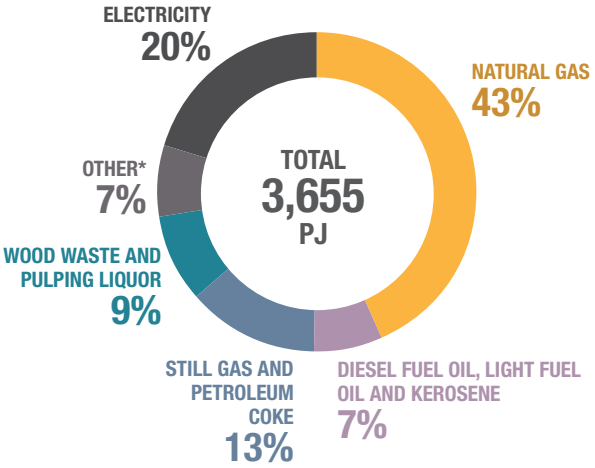
31% **without energy efficiency improvements.**

Energy intensity (GJ/m²) decreased

5%.

Since 2000, energy efficiency in the commercial and institutional sector has **improved 10%**, saving 96 PJ of energy and **$2.4 billion** in energy costs in 2021.

INDUSTRIAL SECTOR ENERGY USE BY FUEL TYPE, 2021



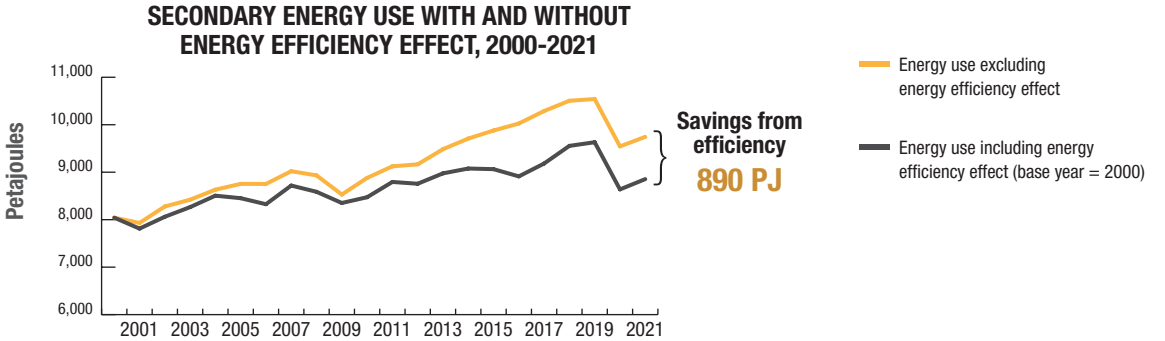
* "Other" includes HFO, coke and coke oven gas, coal, LPGs, NGLs, steam and waste.
Parts may not sum to total due to rounding.

- The **industrial sector** includes all manufacturing, mining (including oil and gas extraction), forestry and construction activities.
- From 2000 to 2021, **industrial energy use increased 15%**. Energy use in resource extraction industries increased over threefold during the same period.
- Excluding resource extraction industries, **energy efficiency improvements of 6%** in the industrial sector resulted in **savings of 140 PJ** and **$1.7 billion** in energy costs in 2021.

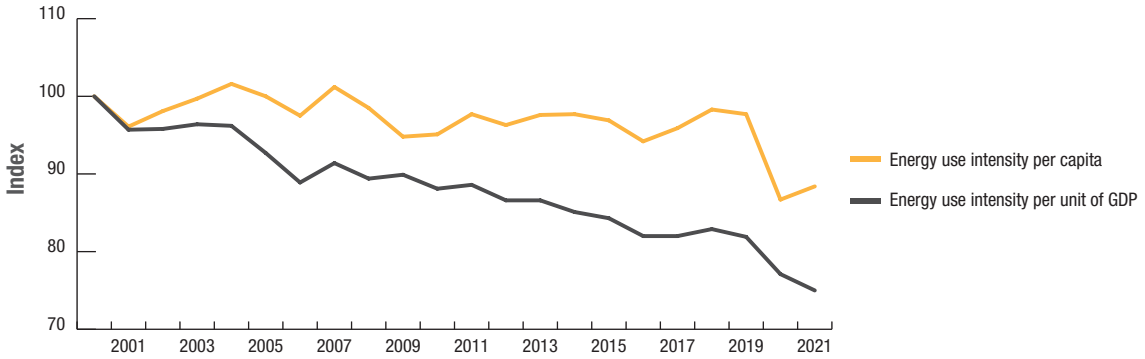
EFFICIENCY TRENDS

HISTORICAL ENERGY EFFICIENCY

- **Energy efficiency** is a measure of how effectively energy is used for a given purpose and is an important path toward decarbonization.
- **Energy intensity** is the ratio of energy use per unit of activity (such as floor space and GDP).
- **Efficiency improvements** slow the rate of growth in energy use.
- **Energy efficiency** in Canada **improved by 13%** between 2000 and 2021.
- **Energy use grew by 10%** between 2000 and 2021. Without energy efficiency improvements, energy use would have **grown by 21%**.
- **Energy efficiency savings** of **890 PJ** in 2021 were equivalent to end-user savings of **$27 billion**.



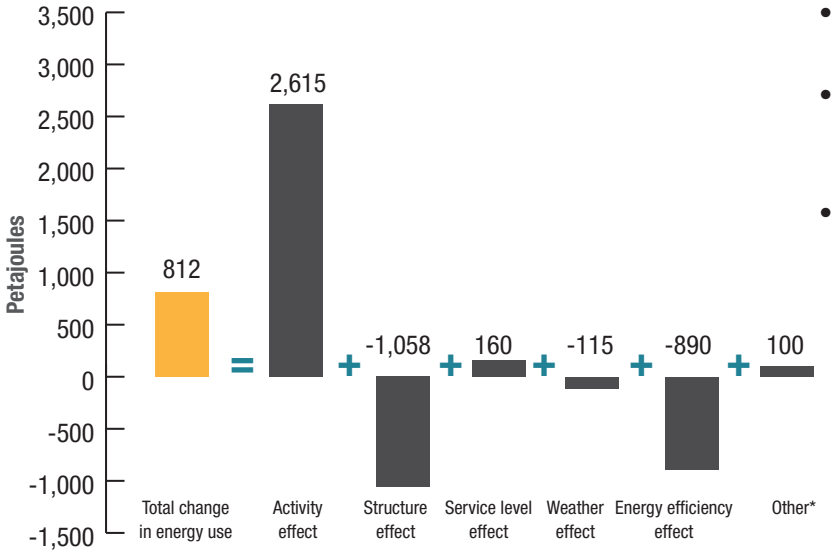
INDEXED TOTAL SECONDARY ENERGY USE INTENSITY PER CAPITA AND PER UNIT OF GDP, 2000–2021 (2000=100)



Per capita energy consumption was 12% lower in 2021 than in 2000.

Canada used 25% less energy per dollar of GDP in 2021 than in 2000.

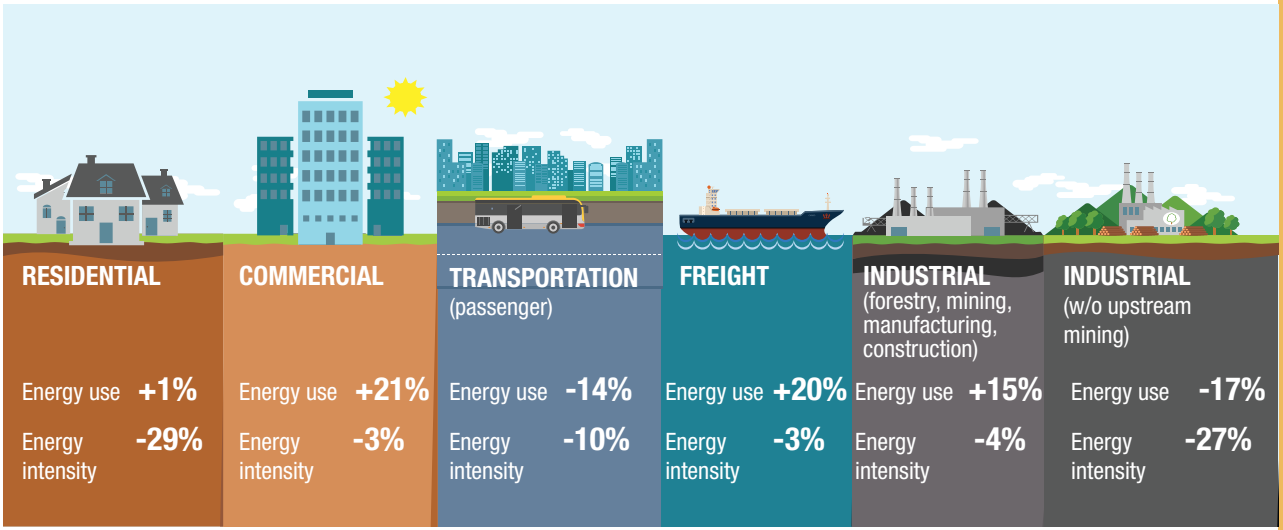
SUMMARY OF FACTORS INFLUENCING THE CHANGE IN ENERGY USE, 2000-2021



* "Other" refers to street lighting, non-commercial airline aviation, off-road transportation and agriculture, which are included in the "Total change in energy use" column but are excluded from the factorization analysis.

- **Activity:** major drivers of energy use in a sector (e.g. floor space area in the commercial/institutional sector)
- **Structure:** refers to change in the makeup of each sector
- **Service level:** increased penetration of auxiliary equipment in commercial/institutional buildings
- **Energy efficiency:** how effectively energy is being used for a given purpose. For example, providing a similar (or better) level of service with less energy consumption on a per unit basis is considered an improvement in energy efficiency.

TRENDS IN ENERGY USE AND INTENSITY BY SECTOR, 2000-2021



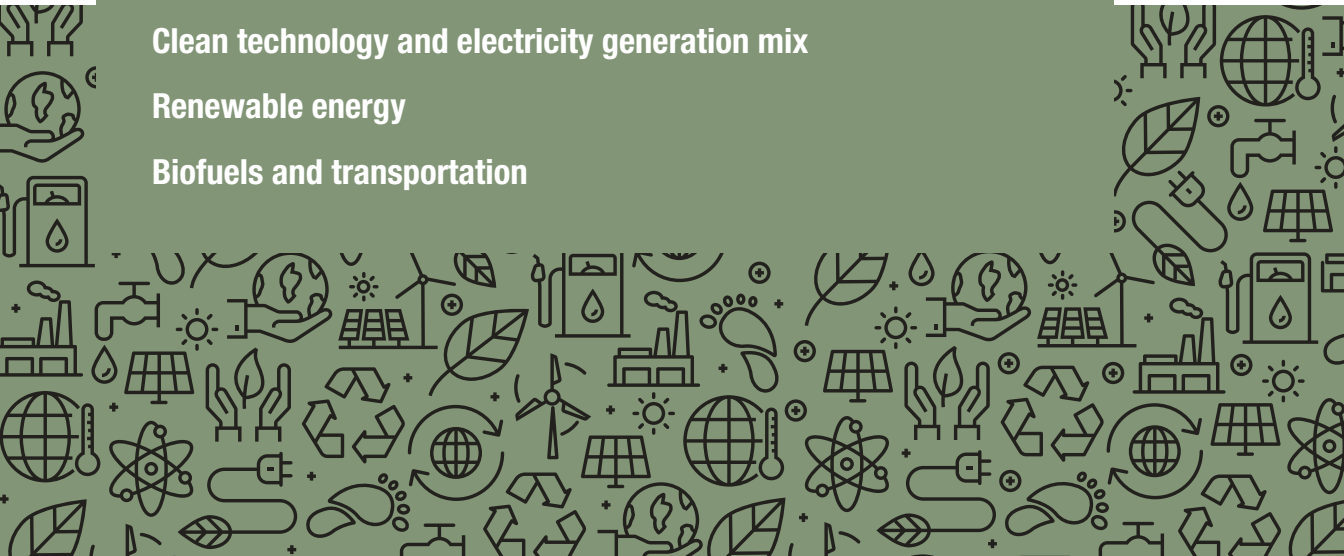
Section 5:

Clean Power and Low Carbon Fuels

Clean technology and electricity generation mix

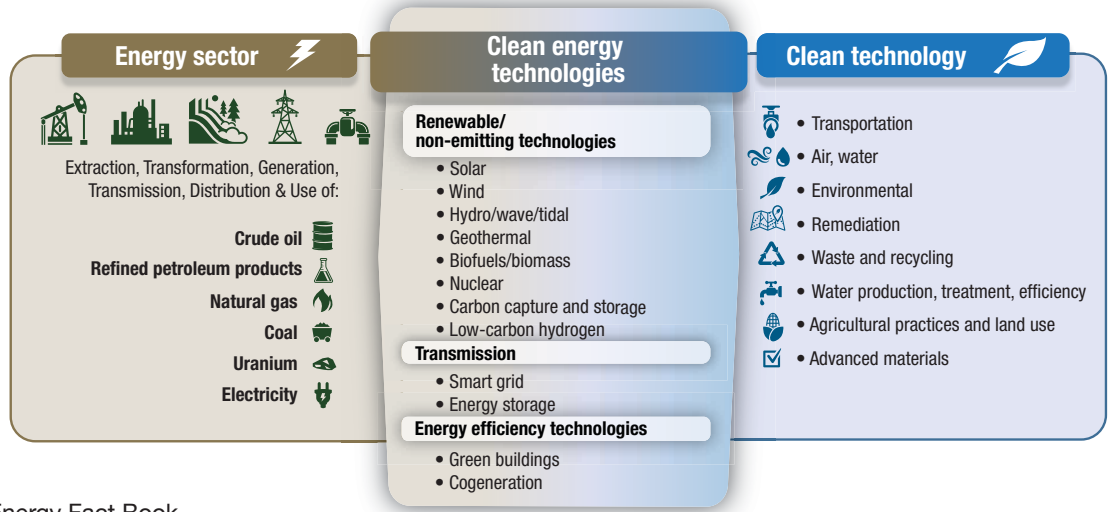
Renewable energy

Biofuels and transportation



CLEAN TECHNOLOGY AND THE ECONOMY

- In 2017, the Government of Canada invested in a Clean Technology Data Strategy to provide the foundation for measuring the economic, environmental and social impacts of clean technology in Canada.
- As part of this strategy, Statistics Canada has developed the Environmental and Clean Technology Products Economic Account (ECTPEA), which provides a comprehensive picture of the state of Canada's clean technology economy for the years from 2007 to 2022.
- The ECTPEA includes processes, products and services that reduce environmental impacts through environmental protection and resource management activities and the use of goods that have been adapted to be significantly less energy- or resource-intensive than the industry standard.



Environmental and clean technology (2022):

$80.2 billion of GDP
(**3.0%** of total GDP)

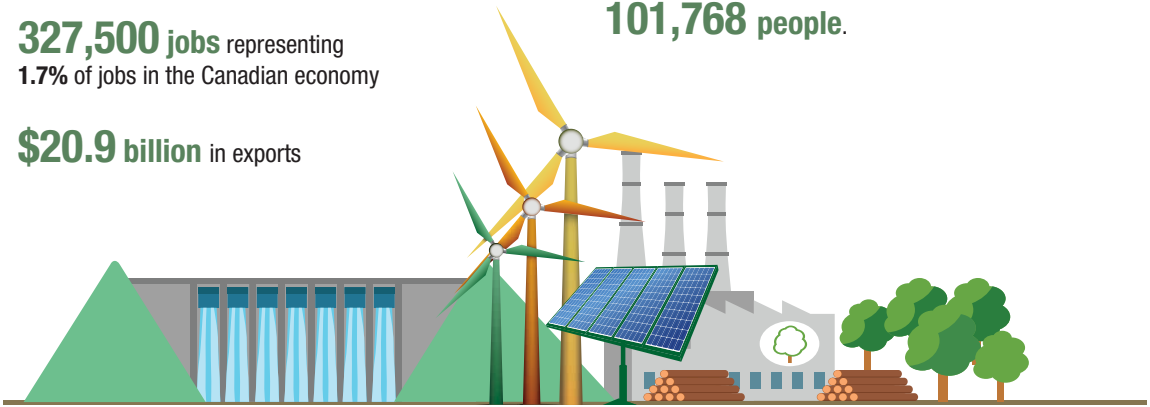
327,500 jobs representing
1.7% of jobs in the Canadian economy

$20.9 billion in exports

Of this, clean energy alone accounted for

1.5% of Canada's GDP

and employed
101,768 people.

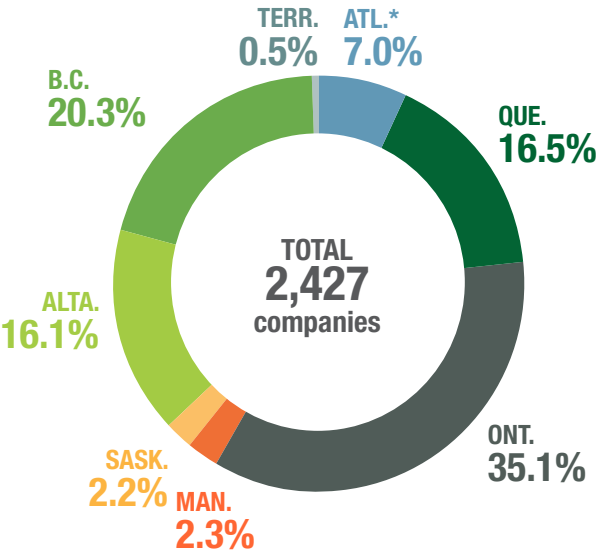


The TSX and TSX-Venture exchanges list **94 companies in the cleantech sector**, with a total market capitalization of **$48.9 billion**. Of these companies, 83 are headquartered in Canada, with a total market capitalization of **$40.5 billion** (as of May 31, 2024).

CLEANTECH COMPANIES

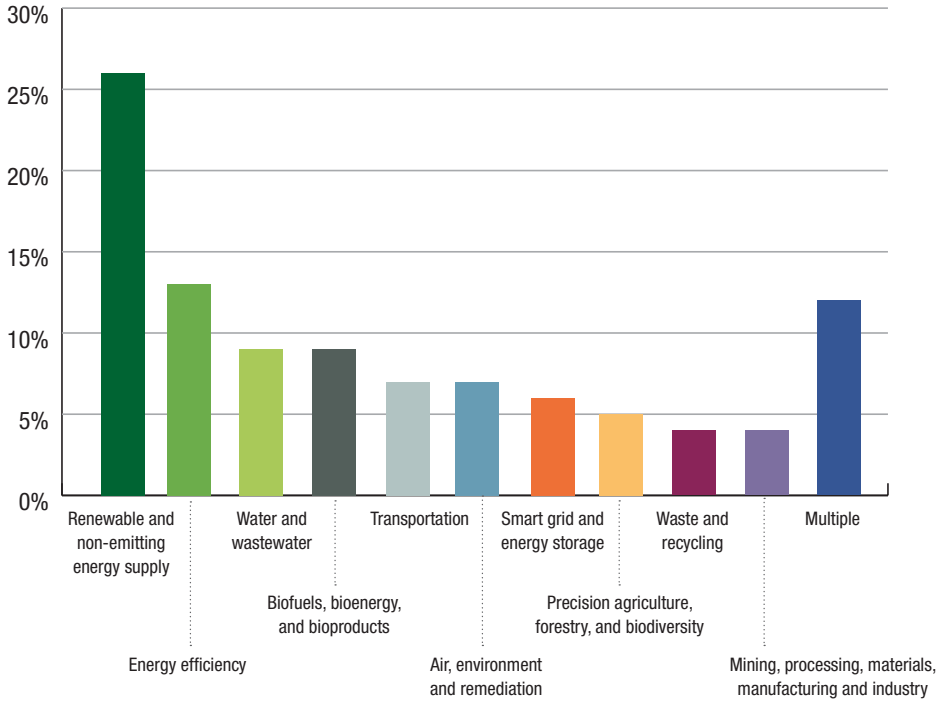
More than half of Canada's 2,427 cleantech companies relate to the energy industry, operating in renewables, energy efficiency, and smart grid technology. They are concentrated in Ontario, British Columbia, Quebec, and Alberta.

CANADIAN CLEANTECH COMPANIES BY PROVINCE, 2022



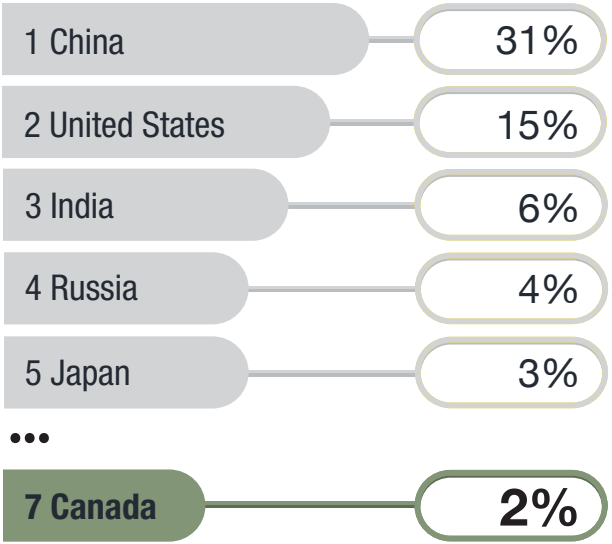
* Atlantic provinces

CANADIAN CLEANTECH COMPANIES BY INDUSTRY, 2022

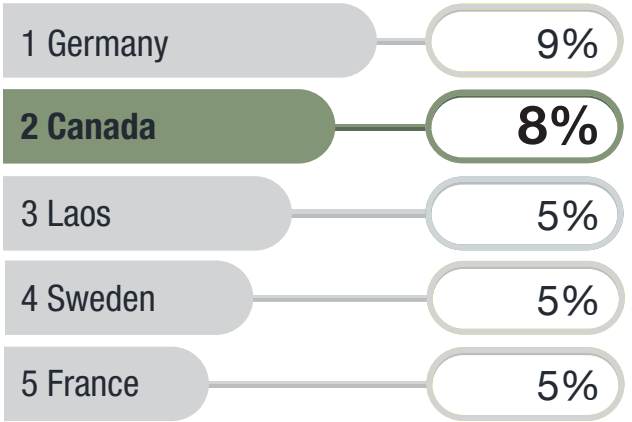


ELECTRICITY
INTERNATIONAL CONTEXT

World production – 29,270 TWh (2022)



World exports – 833 TWh (2022)



TRADE (2023)

All Canadian electricity trade is with the U.S.

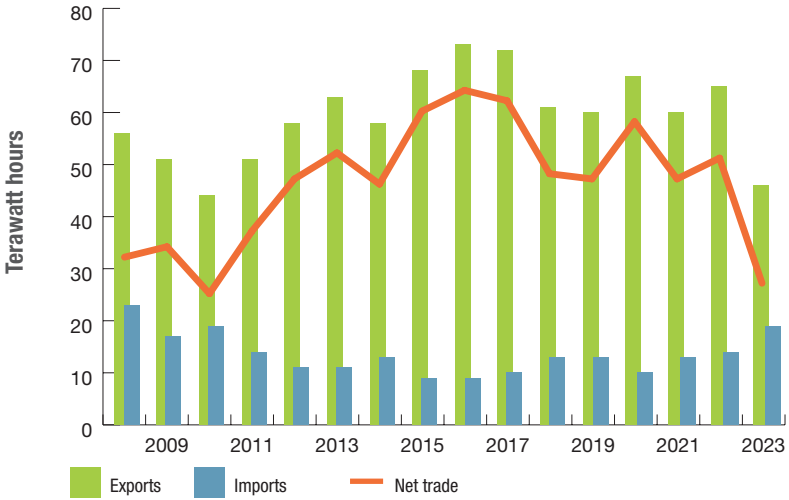
EXPORTS

45.9 TWh

IMPORTS

19.2 TWh

CANADA'S ELECTRICITY TRADE WITH THE U.S.*

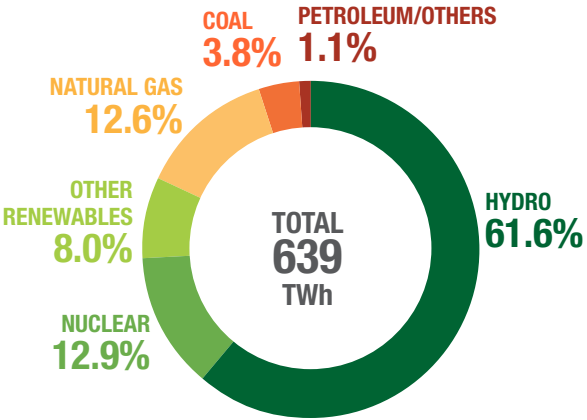


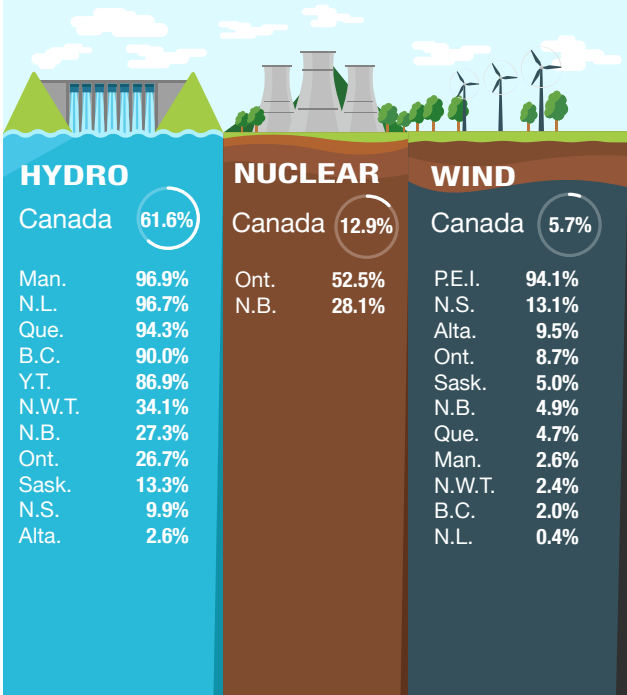
* includes only electricity traded under purchased contracts; excludes electricity transferred under non-financial agreements (e.g. under treaty obligations)

CANADIAN SUPPLY

GENERATION IN CANADA – 639 TWh

GENERATION BY SOURCE, 2022





PROVINCIAL ELECTRICITY GENERATION BY SOURCE, 2022

BIOMASS

Canada 1.4%

B.C.	5.3%
N.B.	4.8%
Alta.	2.3%
N.S.	1.9%
Ont.	0.9%
P.E.I.	0.7%
Que.	0.7%
Man.	0.2%
N.L.	0.2%
Sask.	<0.1%

NATURAL GAS

Canada 12.6%

Alta.	67.4%
Sask.	46.4%
N.S.	18.5%
N.W.T.	14.6%
Ont.	8.8%
N.B.	6.6%
Y.T.	4.4%
B.C.	2.5%
N.L.	0.6%
Man.	<0.1%
Que.	<0.1%

PETROLEUM

Canada 1.0%

Nvt.	99.5%
N.W.T.	48.6%
N.B.	12.3%
N.S.	12.3%
Y.T.	7.0%
Alta.	2.3%
N.L.	2.2%
P.E.I.	0.4%
Que.	0.2%
B.C.	0.1%
Man.	<0.1%
Ont.	<0.1%
Sask.	<0.1%

SOLAR

Canada 0.9%

P.E.I.	4.8%
Ont.	2.4%
Alta.	2.3%
Y.T.	1.7%
N.S.	0.8%
Nvt.	0.5%
Sask.	0.4%
N.W.T.	0.2%
Man.	0.1%
B.C.	<0.1%
N.B.	<0.1%
Que.	<0.1%
N.L.	<0.1%

COAL

Canada 3.8%

N.S.	43.5%
Sask.	34.4%
N.B.	15.8%
Alta.	13.2%
Ont.	<0.1%

OTHER

Canada 0.1%

Sask.	0.5%
Alta.	0.4%
Ont.	<0.1%
Que.	<0.1%

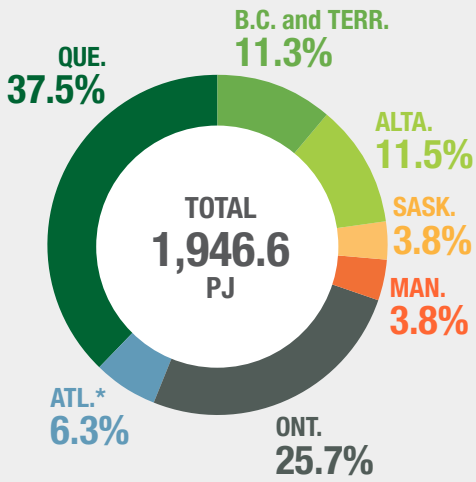
ELECTRICAL ENERGY USE

TOTAL ELECTRICAL ENERGY USE* ROSE TO 1,946.6 PJ IN 2021

Sector	Energy use (PJ)	% of the total
Residential	633.3	32.5%
Commercial	522.8	26.9%
Industrial	747.6	38.4%
Transportation	4.6	0.2%
Agriculture	38.1	2.0%
Total	**1,946.6**	**100%**

*secondary energy use

ELECTRICAL ENERGY USE BY PROVINCE, 2021

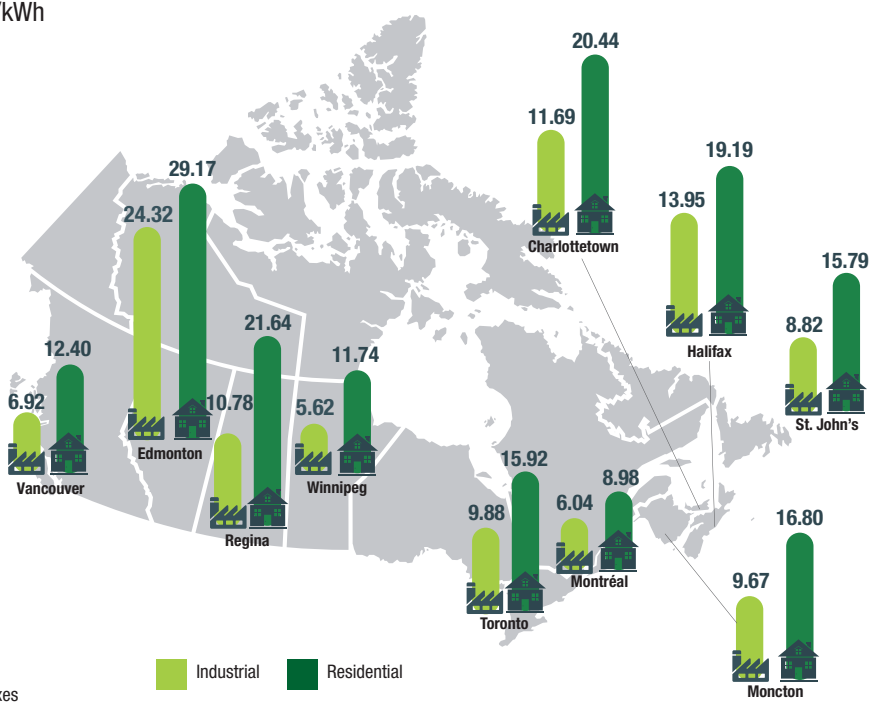


* Atlantic provinces

ELECTRICITY PRICES

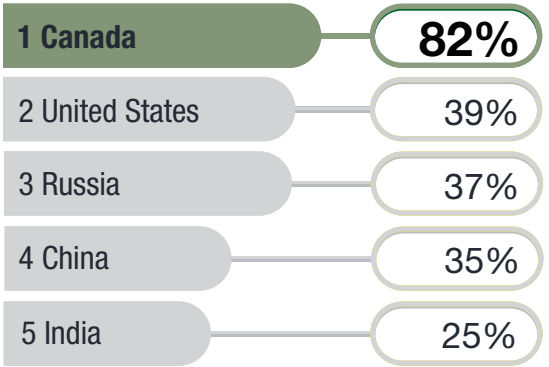
AVERAGE LARGE INDUSTRIAL AND RESIDENTIAL ELECTRICITY PRICES* (AS OF APRIL 2023)

in cents/kWh



*including taxes

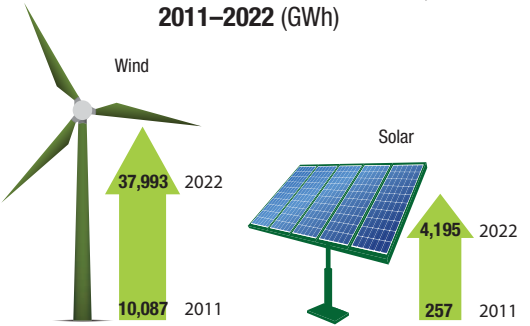
PERCENTAGE OF TOTAL ELECTRICITY FROM NON-EMITTING SOURCES FOR THE TOP FOUR ELECTRICITY-GENERATING COUNTRIES AND CANADA, 2022



- **Renewable electricity generation** has **increased 14%** between 2011 and 2022, with solar and wind having the largest growth.
- In 2022, **82% of electricity in Canada** came from non-GHG emitting sources. **Hydro** made up **62%**, **nuclear was 13%**, and other renewables were the remaining **8%***.

*Parts may not sum to total due to rounding.

WIND AND SOLAR NET ELECTRICITY GENERATION GROWTH IN CANADA, 2011–2022 (GWh)

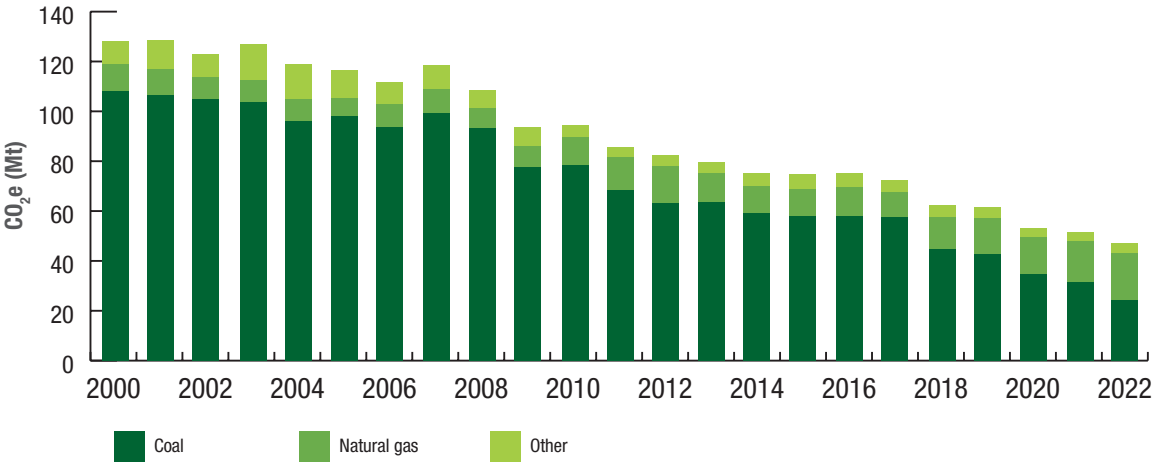


GHG SPOTLIGHT: ELECTRICITY

Total electricity emissions **decreased by 63%** from 2000 to 2022 because of increased generation from non-emitting sources.

Coal-fired electricity generation accounted for **4% of generation** and **52% of electricity-related** GHG emissions in 2022.

ELECTRICITY SECTOR GHG EMISSIONS FOR CANADA, 2000–2022

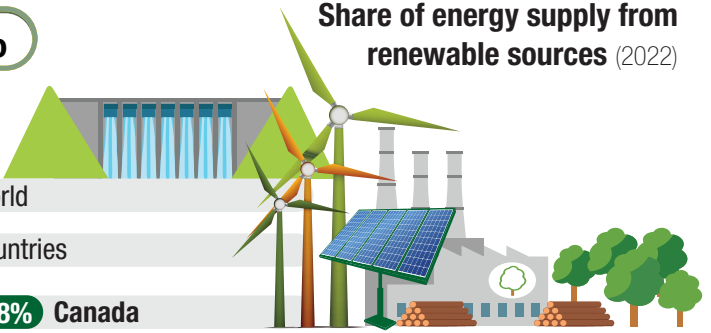


RENEWABLE ENERGY
INTERNATIONAL CONTEXT

World production – 86,666 PJ or 2,070 MTOE (2022)

1 China	19%
2 India	12%
3 United States	9%
4 Brazil	7%
5 Indonesia	3%
6 Canada	**2%**

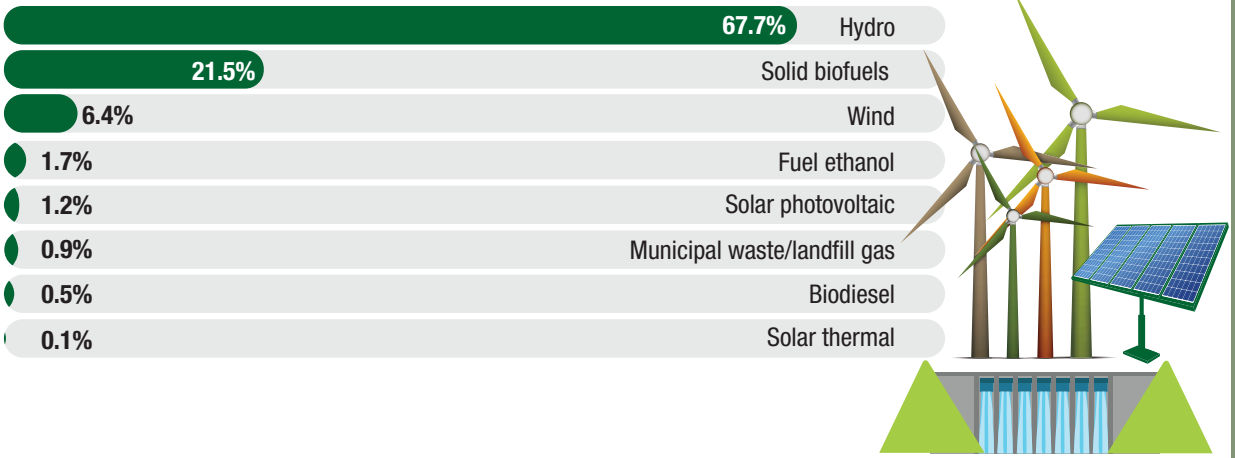
Share of energy supply from renewable sources (2022)



14.0%	World
12.2%	OECD countries
16.8%	**Canada**

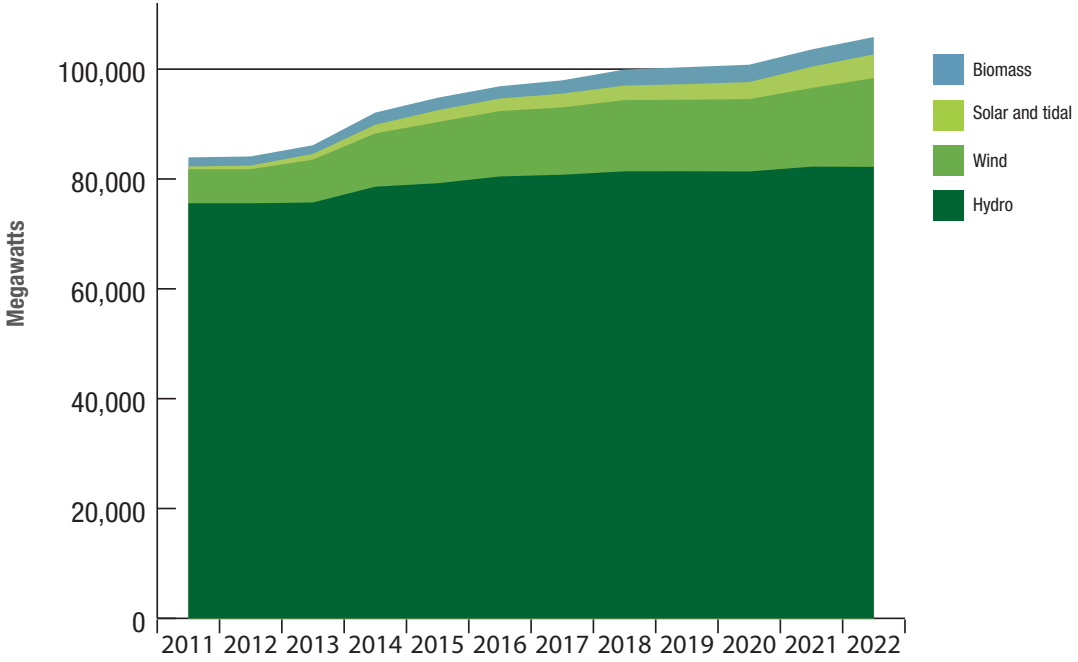
CANADIAN PRODUCTION (2022)

Total renewable energy* – 2,121 PJ or 50.7 MTOE

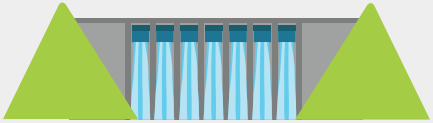


*includes energy consumed for electricity and heat production and for biofuels in the transportation sector

CANADIAN RENEWABLE ELECTRICITY GENERATING CAPACITY



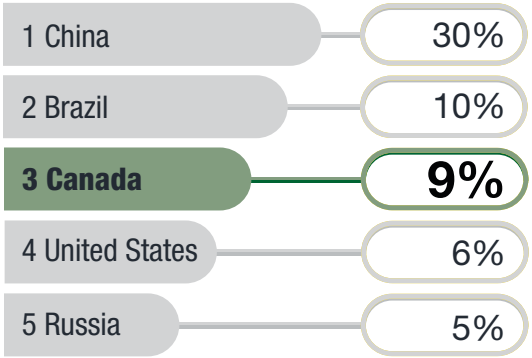
HYDROELECTRICITY



Moving water is the most important renewable energy source in Canada, providing **62%** of Canada's electricity generation. In fact, in 2022, Canada was the third-largest producer of hydroelectricity in the world.

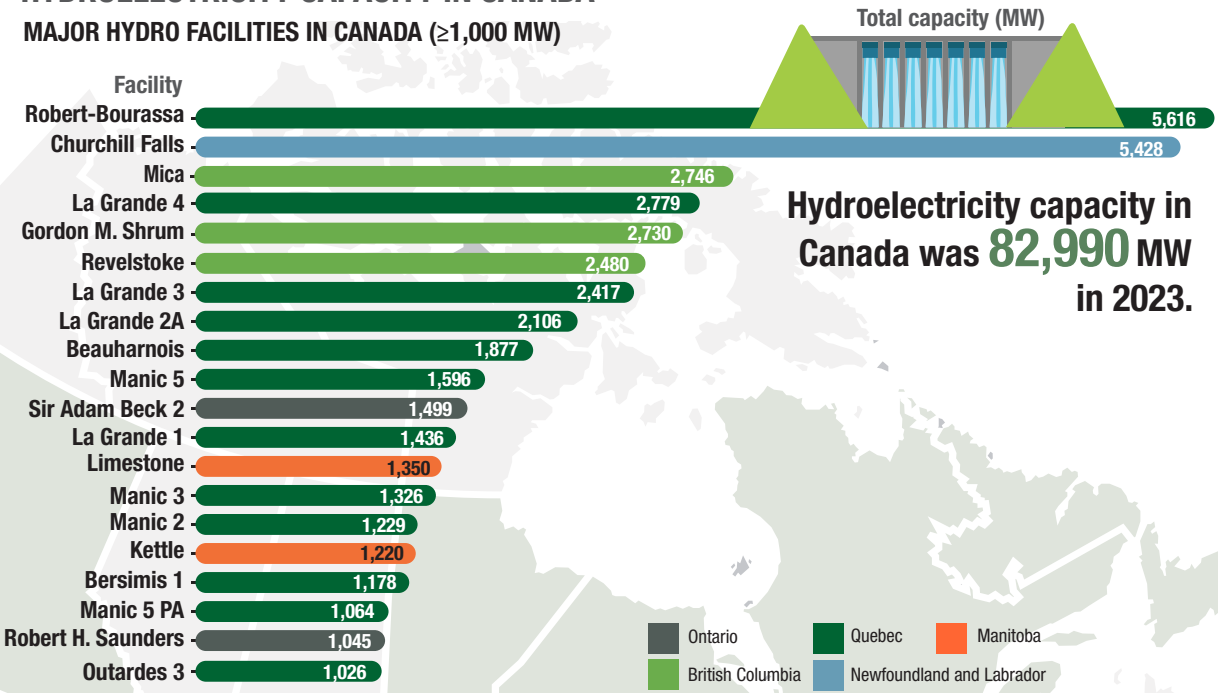
INTERNATIONAL CONTEXT

World generation of hydroelectricity – 4,350 TWh
(2022)



HYDROELECTRICITY CAPACITY IN CANADA

MAJOR HYDRO FACILITIES IN CANADA (≥1,000 MW)



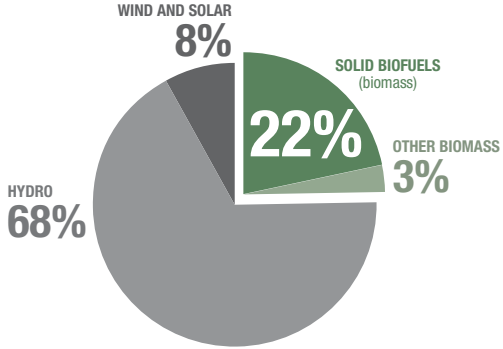
Hydroelectricity capacity in Canada was 82,990 MW in 2023.

BIOMASS

- Biomass is a renewable energy resource derived from living organisms and/or their by-products.
- In 2023 there were **41 operational** co-generation units at pulp and paper mills and **35 Independent Power Providers (IPP)** using biomass.
- Electrical capacity of pulp and paper co-generation was **1,551 MW**, while heat capacity was **10,154 MW**. IPP capacity for electricity and heat was **831 MW** and **701 MW**, respectively.
- In 2023, there were about **640 operational** bioheat systems with installed capacity of **480 MWth**. **83%** of the biomass heating systems are less than **1 MW** in size.

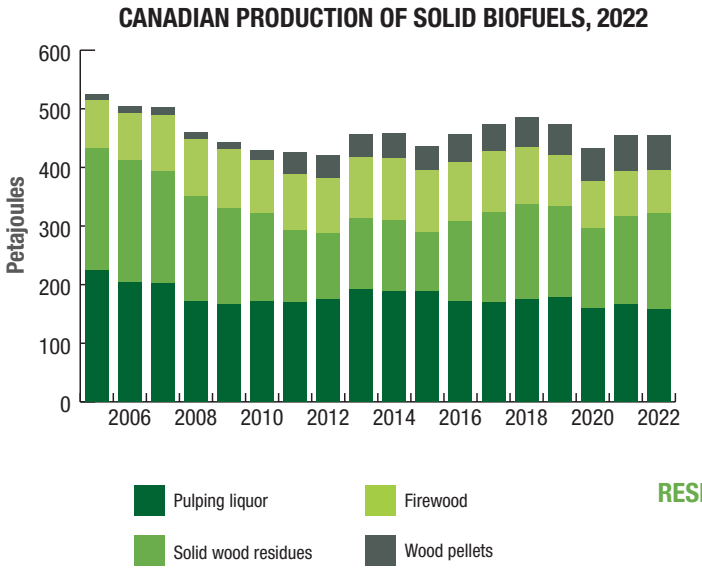
Biomass* accounts for the **largest share of renewable energy production** in the OECD**, at

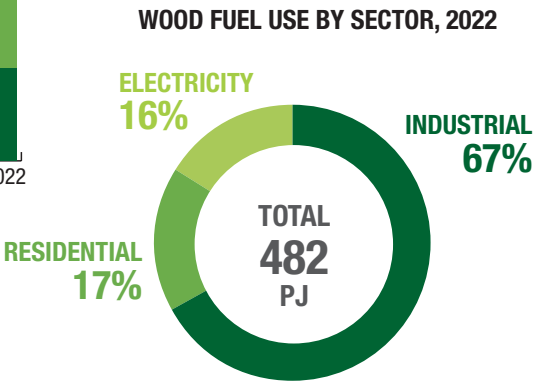
In Canada, that share is 25%.



*Includes solid biofuels, liquid biofuels, biogases and renewable municipal waste
**Organization for Economic Cooperation and Development

CANADIAN PRODUCTION OF SOLID BIOFUELS



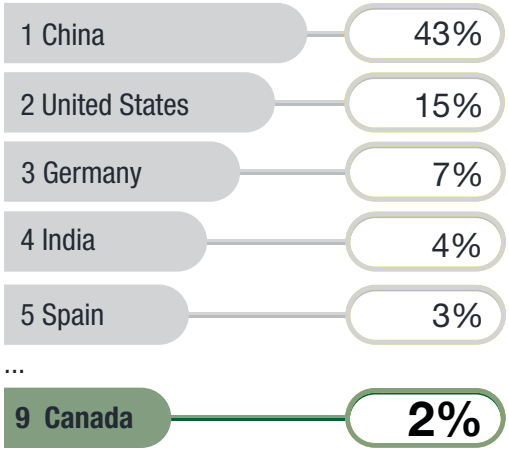


WIND POWER

- Electricity from wind energy is one of the **fastest growing sources** of electricity in the world and in Canada.
- Wind accounted for **5.7%** of electricity generation in Canada in 2022.

INTERNATIONAL CONTEXT

World capacity of wind power – 1,021 GW (2023)



WIND POWER IN CANADA

Capacity (2022):

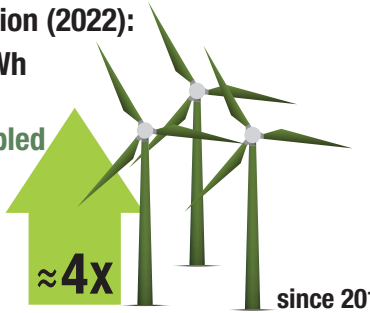
16.2 GW

more than tripled

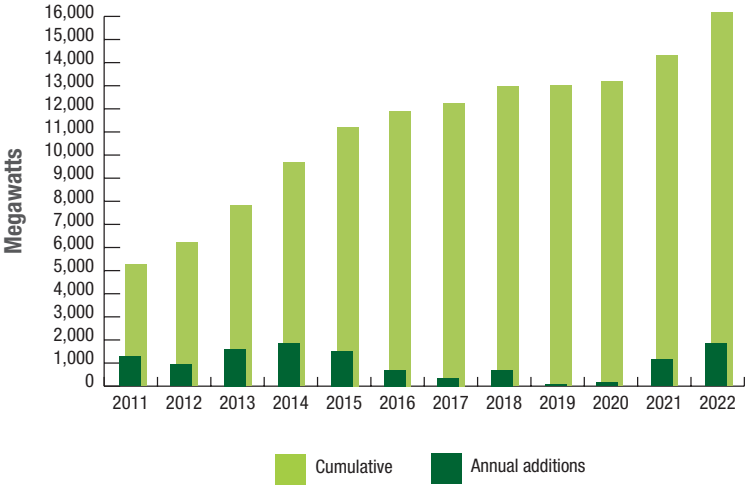
Generation (2022):

38.0 TWh

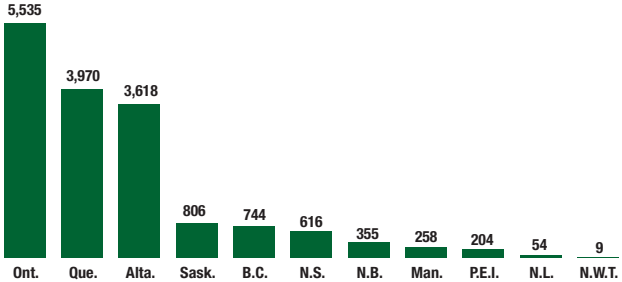
nearly quadrupled



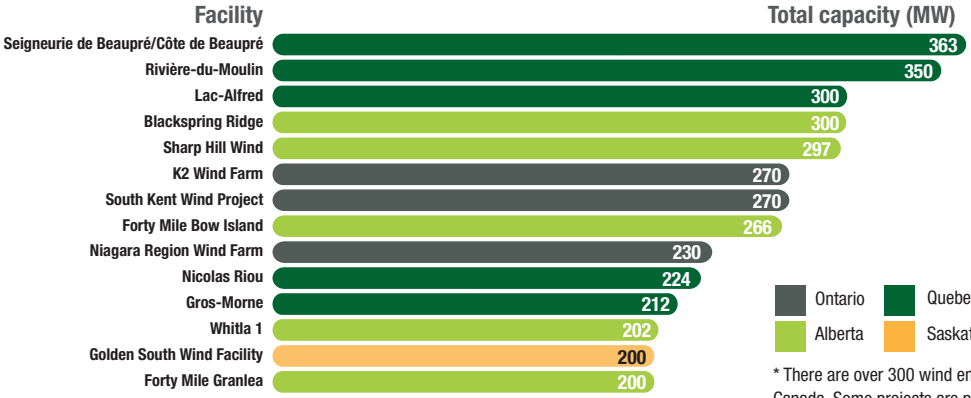
INSTALLED CAPACITY



CAPACITY BY PROVINCE (MW)



LARGEST WIND PROJECTS* (≥200 MW)



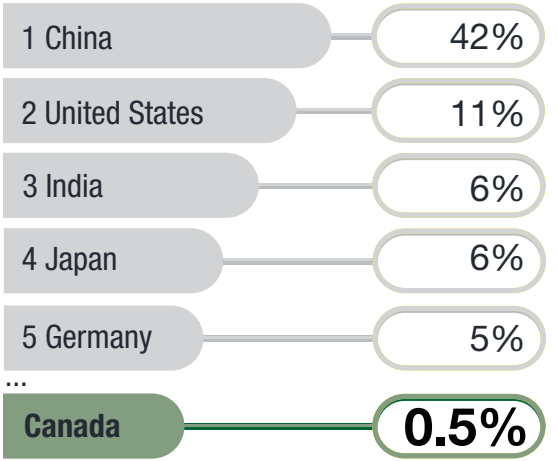
* There are over 300 wind energy projects across Canada. Some projects are part of a larger wind farm.

SOLAR PHOTOVOLTAIC

- Solar power is the conversion of energy from sunlight into electricity. Solar PV is rapidly becoming an economical, renewable technology to harness renewable energy from the sun.

INTERNATIONAL CONTEXT

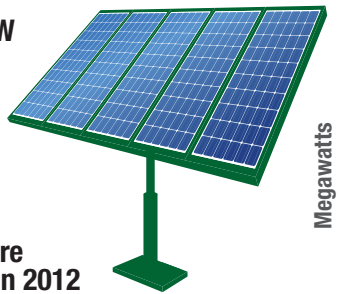
World capacity of solar PV – 1,581 GW (2023)



SOLAR PV IN CANADA

Capacity (2022):

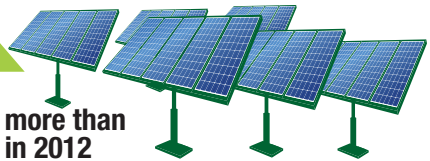
4,323 MW



6.6x more than 2012

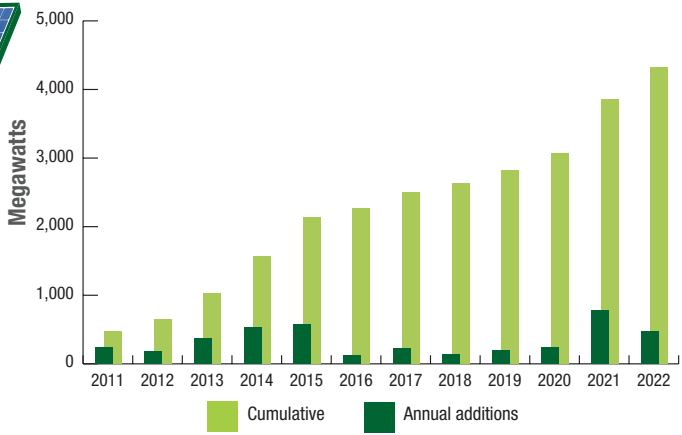
Generation (2022):

4.2 TWh

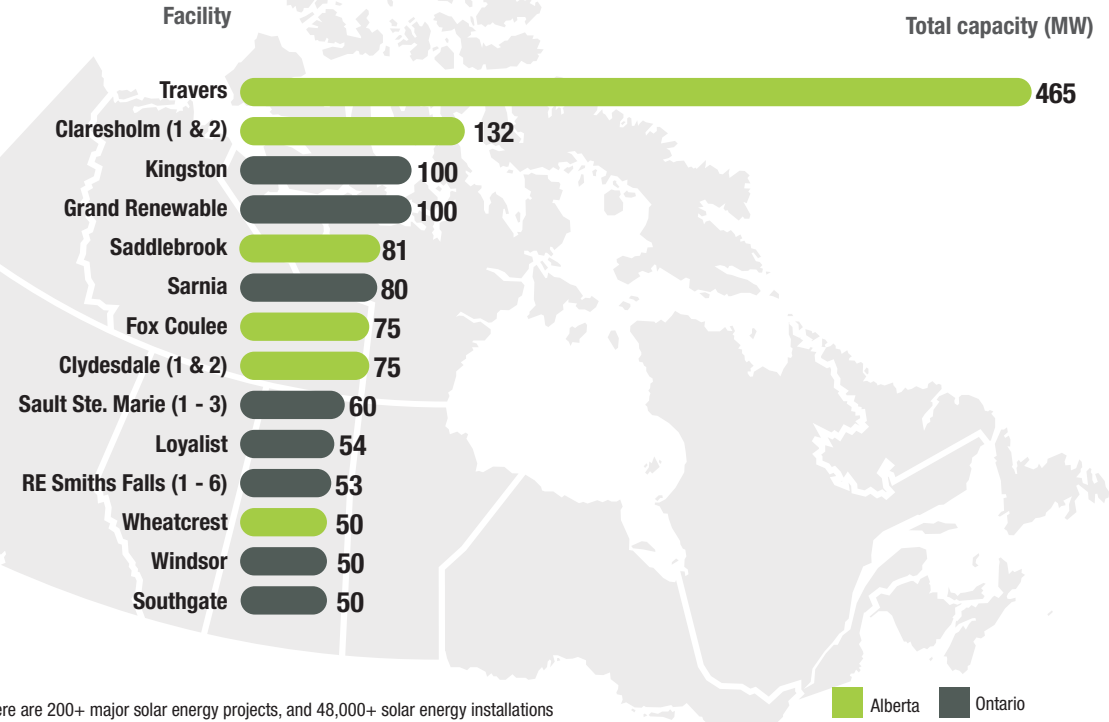


16x more than in 2012

INSTALLED CAPACITY



LARGEST SOLAR PROJECTS* (≥50 MW)



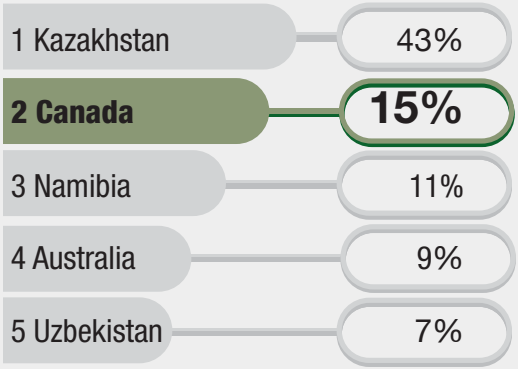
*There are 200+ major solar energy projects, and 48,000+ solar energy installations across Canada.

URANIUM

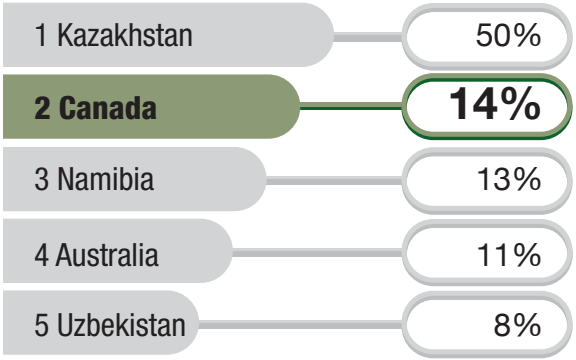
- Uranium is a silvery-white metal and a primary energy source. After raw uranium is mined and milled, it is **processed to make fuel for nuclear reactors** to generate electricity.

INTERNATIONAL CONTEXT

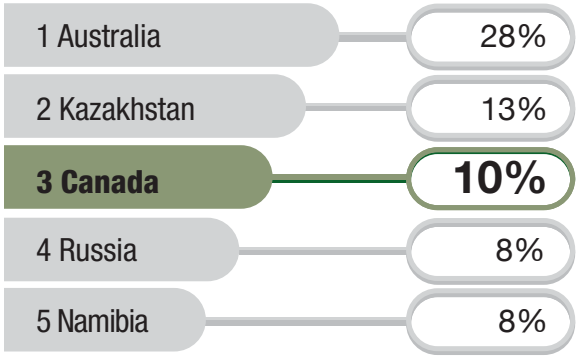
World production – 49.4 kt (2022)



World exports – 42.6 kt (2022)



World known recoverable resources – 6.1 Mt (2021)

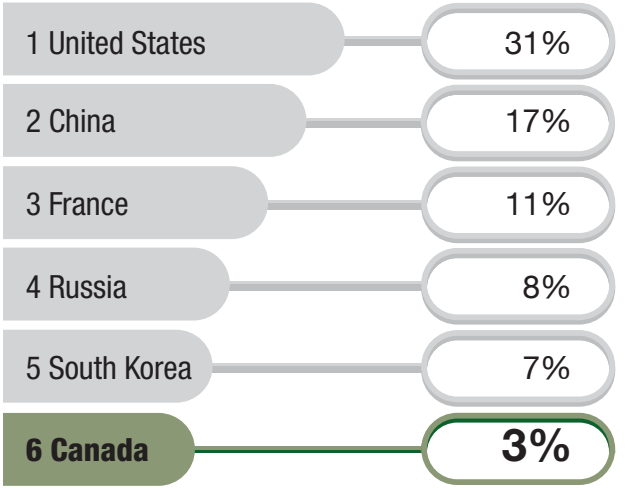


NUCLEAR POWER

- Nuclear energy is the second largest contributor of non-emitting electricity in Canada. In 2022, nuclear energy provided approximately **13% of Canada's total electricity needs** (52% in Ontario).

INTERNATIONAL CONTEXT

World generation – 2,487 TWh (2022)



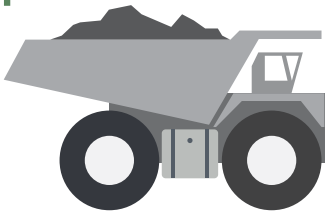
CANADIAN SUPPLY AND DEMAND (2022)
URANIUM

Canadian production **7.4 kt**

All uranium comes from mines in Saskatchewan.

VALUED AT
about

$1.1 billion



80% of production was available for export.

Based on long-term contracts*, uranium sold by Canada is destined for:

1) North America/Latin America	**58%**
2) Europe	**26%**
3) Asia	**16%**

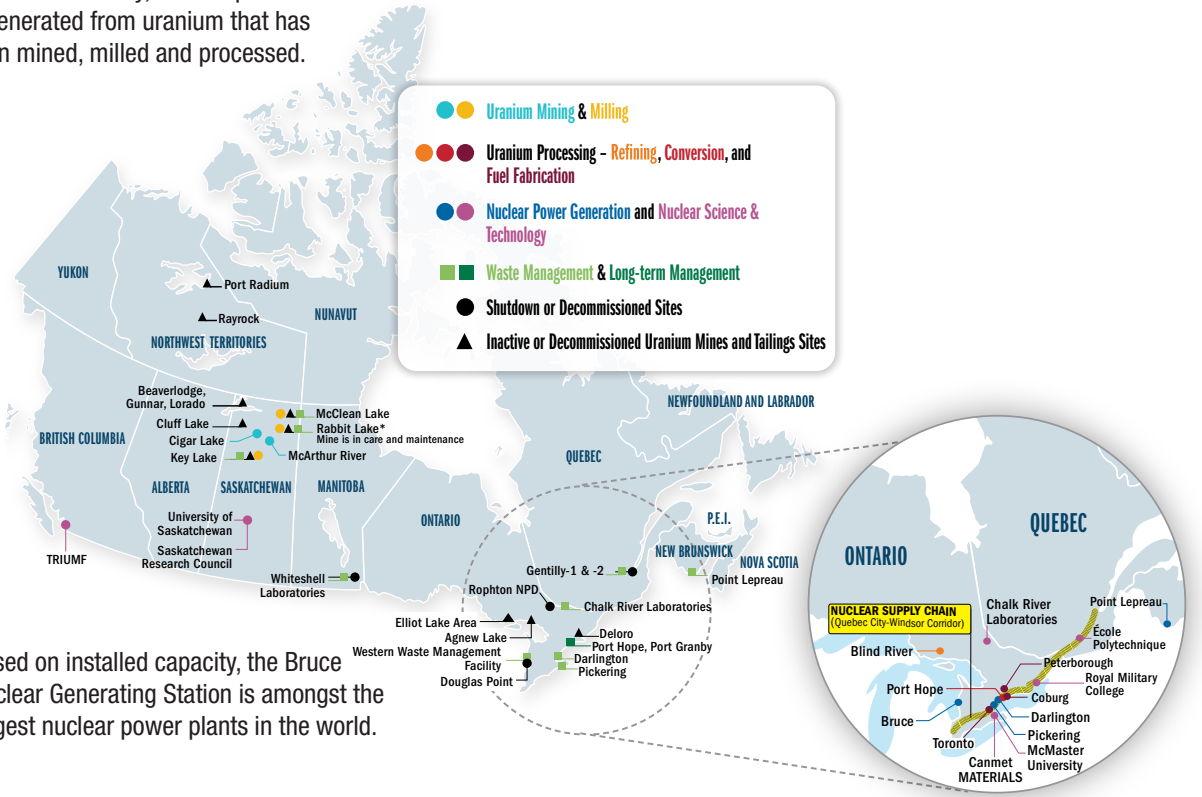
* These values can vary based on changes in regional demand.

25% of uranium purchased by U.S. nuclear reactors in 2023 came from Canada, making Canada the largest foreign supplier of uranium to the U.S.

DOMESTIC USE: 20% of production

Used in Canada's CANDU reactors (Ontario and New Brunswick), including the Bruce Generating Station, amongst the world's largest operating nuclear facilities.

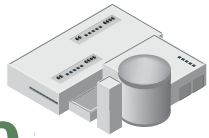
Across the country, nuclear power is generated from uranium that has been mined, milled and processed.



Based on installed capacity, the Bruce Nuclear Generating Station is amongst the largest nuclear power plants in the world.

CANDU NUCLEAR REACTORS

- **Canada has developed a unique nuclear reactor technology called CANDU**, for CANada Deuterium Uranium. Canada is one of roughly half a dozen countries that offer domestically designed reactors to the open commercial market.
- The CANDU reactor is a pressurized heavy water reactor (PHWR) that uses heavy water (deuterium oxide) as a moderator and coolant and natural uranium for fuel. The majority of power reactors in use in the world are light water reactors (LWR), which use normal water as the moderator and coolant and enriched uranium for fuel.
- There are 19 CANDU reactors operating in Canada, and nine operating in five other countries. These 28 reactors represent nearly 7% of global reactors and 5% of global nuclear electricity capacity (18.7 GWe).
- CANDU reactor refurbishment in Ontario is one of the largest infrastructure projects in Canada and will extend the life of Ontario's nuclear fleet past mid-century.

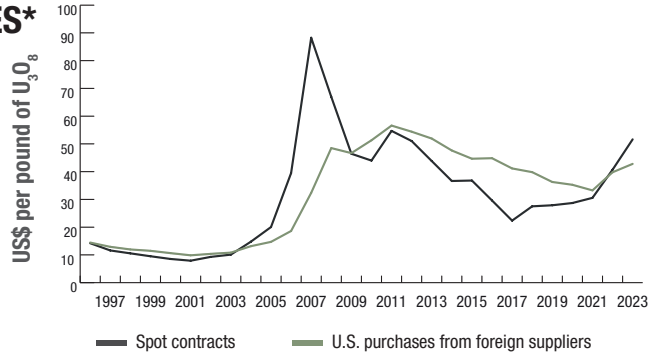


9 CANDU reactors
are in operation outside of Canada.

GROSS ELECTRICAL OUTPUT OF NUCLEAR POWER PLANTS IN CANADA

Facility	Province	Gross Electrical Output (MW)	Units
Darlington	Ontario	3,736	4
Bruce B	Ontario	3,507	4
Bruce A	Ontario	3,437	4
Pickering B	Ontario	2,160	4
Pickering A	Ontario	1,084	2
Point Lepreau	New Brunswick	705	1

URANIUM - PRICES*



* The majority of Canadian uranium production is sold by long-term contract, as opposed to the spot market.

BIOFUELS AND TRANSPORTATION

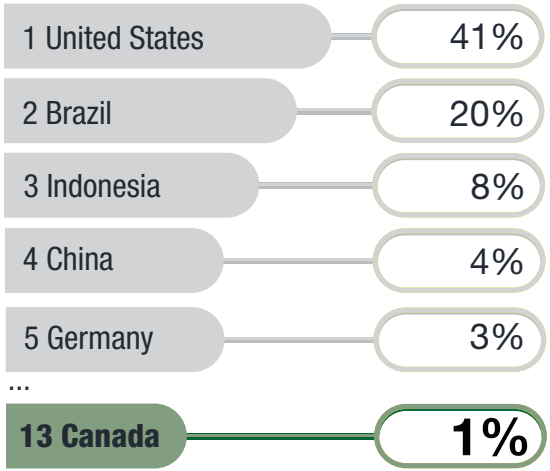
LIQUID BIOFUELS

- Liquid biofuels are enhanced biomass-derived fuels that can take the form of a liquid such as ethanol or renewable diesel fuels. The liquid biofuels are mixed with traditional gasoline and diesel to reduce the overall GHG emissions associated with the blended fuel.
- The federal *Renewable Fuels Regulations* require fuel producers and importers to have an average renewable content of **at least 5%** based on the **volume of gasoline** that they produce or import and **at least 2%** of the **volume of diesel fuel** that they produce and import.*

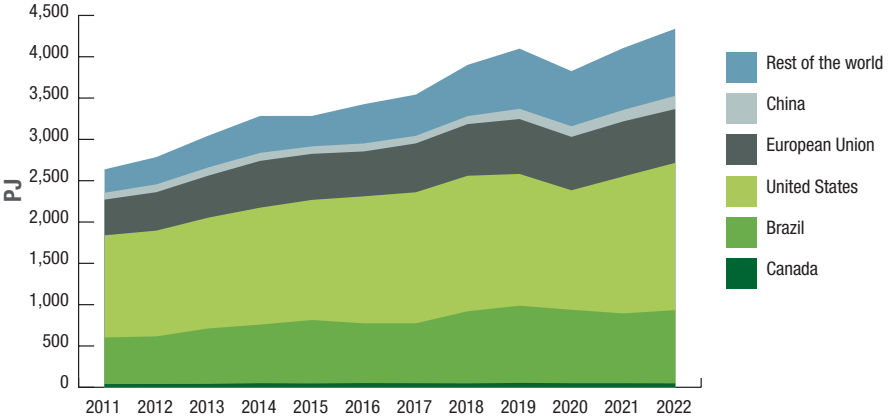
* Heating distillate oil volumes for space-heating purposes are excluded from the diesel regulations.

INTERNATIONAL CONTEXT

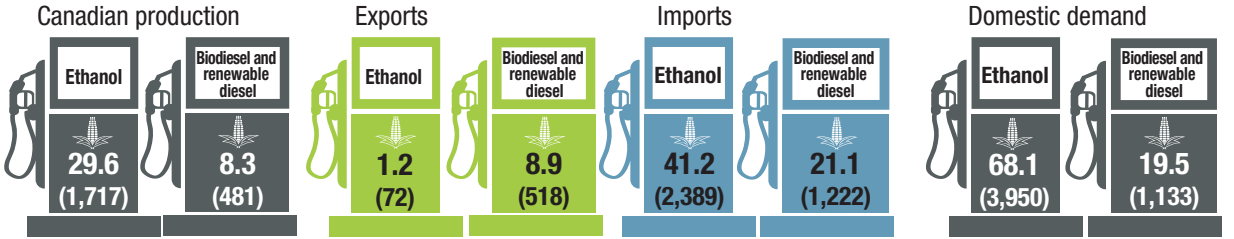
World production of biofuels – 4,340 PJ (2022)



WORLD BIOFUELS PRODUCTION



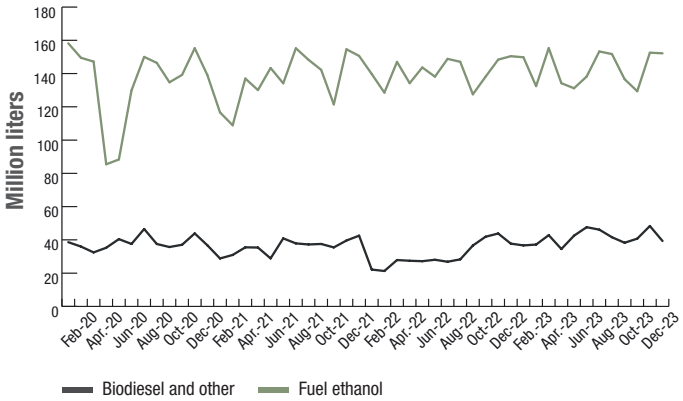
CANADIAN SUPPLY AND DEMAND (2023) - MB/D (MILLION LITRES)



CANADIAN BIOFUEL PRODUCTION

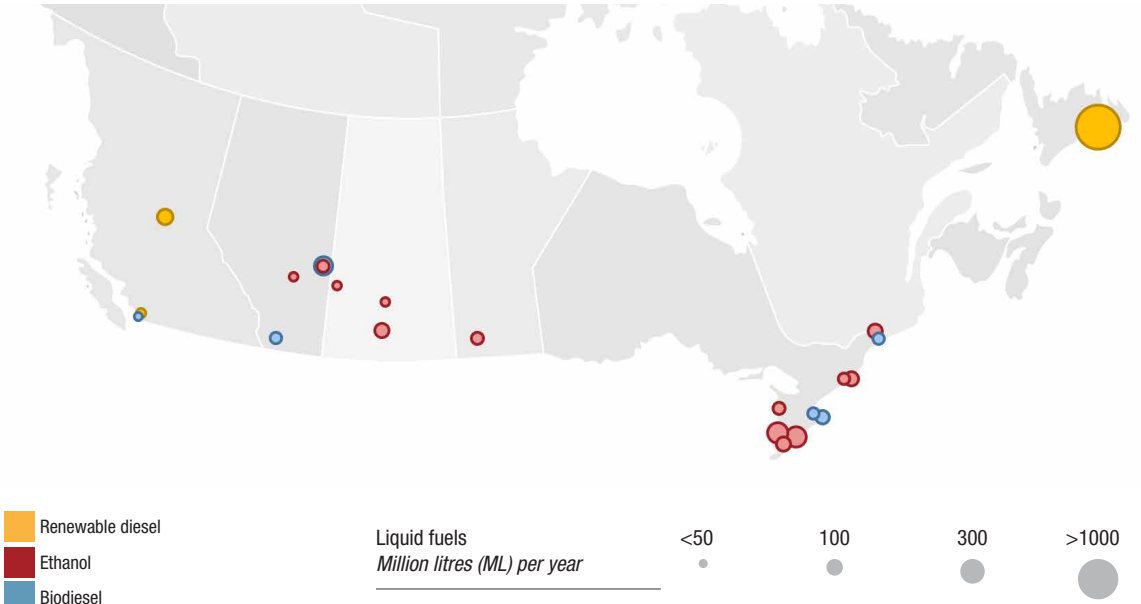
- Liquid biofuels are made of **feedstocks such as cereal grains and vegetable oils**.
- In 2023, **4.1 million tonnes** of cereal grain, and **420 thousand tonnes** of vegetable oil were used in domestic production of biofuels.
- Canada produced **1.7 billion liters of fuel ethanol** and **500 million liters of biodiesel and other products** in 2023.
- Co-products are secondary goods that are generated during the biofuel manufacturing process and can be sold or reused. Biofuel production generated **1.5 million tonnes of co-products in 2023**, primary distillers grains which can be used as animal feed.

MONTHLY PRODUCTION OF LIQUID BIOFUELS, 2020-2023

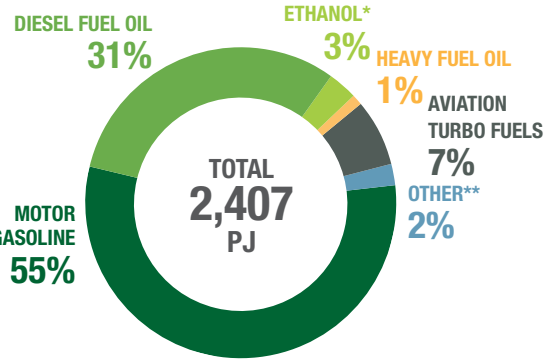


Currently the **majority of liquid biofuel facilities** in Canada are **located in southern Ontario and Saskatchewan**. The largest facility is located in Newfoundland and Labrador.

BIOFUEL PRODUCTION CAPACITY (2024)

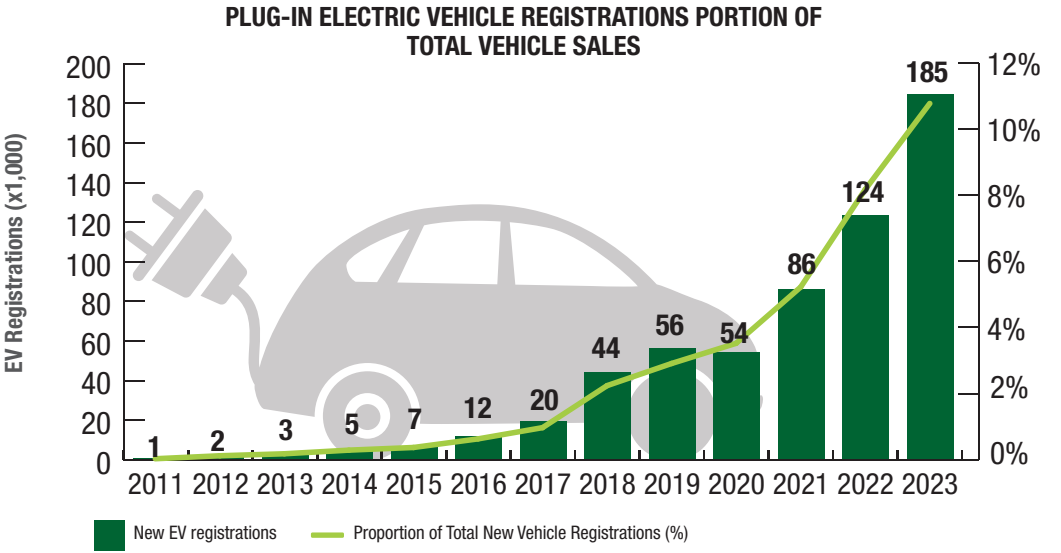


FUEL MIX OF THE TRANSPORTATION SECTOR, 2021



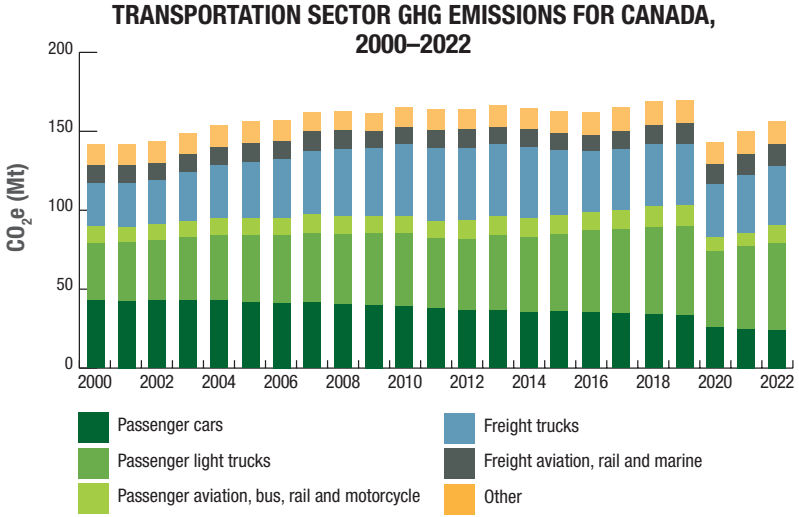
- Total transportation energy use **increased 6%** from 2000 to 2021.
- Energy efficiency improvements in the transportation sector saved Canadians **456 PJ** of energy and over **$16 billion** in energy costs in 2021.
- Passenger transportation contributes **47%** to the total emissions, freight emissions are **47%**, and off-road emissions are **6%**.

* The ethanol proportion is estimated based on production data.
** The category "Other" includes electricity, natural gas, biodiesel fuel oil, light fuel oil, aviation gasoline and propane
Parts may not sum to total due to rounding.



- In 2023, electric vehicle (EV) registrations made up **10.8% of total vehicle registrations**.
- Over **184,000 plug-in EVs** were **registered** in 2023, over nine times the number of registrations as in 2017. Sales are highest in the provinces of Quebec, British Columbia and Ontario.

GHG SPOTLIGHT: TRANSPORTATION



- **Transportation GHG emissions** (from passenger, freight, and other forms of transport) **increased** 4% from 2020 to 2022, reflecting a gradual rebound from the pandemic. Despite the increase, transportation emissions were 8% below their pre-pandemic level in 2019.

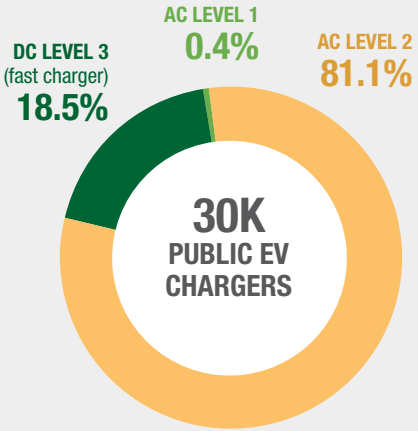
ELECTRIC VEHICLE CHARGING

EV chargers deliver electricity to the on-board batteries of both **battery electric vehicles (BEV)** and **plug-in hybrid electric vehicles (PHEVs)**. There are two main types of EV chargers: **alternating current (AC) chargers** provide electricity to the vehicle via Level 1 and Level 2 chargers. **Direct current (DC) chargers**, also known as **Level 3 fast chargers**, provide electricity much more rapidly.

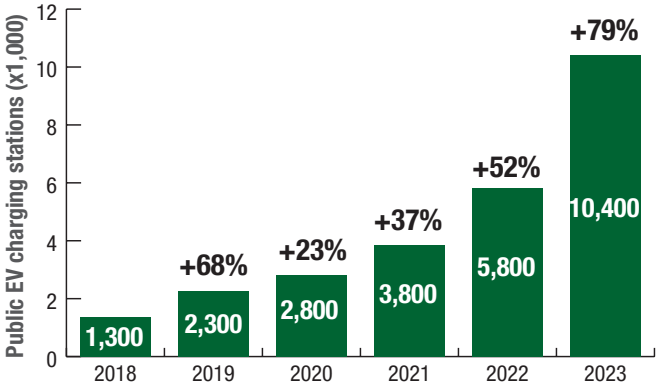
Charger	Input	Outlet type	Estimated charging time*	Estimated range per hour of charging*	Typical uses
AC Level 1	120 V	Standard electrical outlet (for example, phone charger)	8–50+ hours	3-8 km	Home charging and back-up situations
AC Level 2	208/240 V	Special electrical outlet (for example, stove or dryer plug)	4–10 hours	16-50 km	Home charging, charging at businesses and public spaces
DC Level 3 (fast charger)	480 V	DC outlet (not found in homes)	25–30 minutes	Up to maximum driving range of vehicle	Charging at dedicated stations, public spaces, and highway corridors

*Estimates assume 80% charging level limit. Time to full charge and range per hour of charging will vary depending on the vehicle, battery, and charger, as well as fluctuating temperatures, battery state, and tire pressure.

TYPES OF EV CHARGERS AT PUBLIC CHARGING STATIONS IN CANADA (2024)*



PUBLIC EV CHARGING STATIONS IN CANADA*



Canada's network of public charging facilities for EVs has expanded rapidly in recent years. In 2024, roughly **17%** of publicly accessible EV charging facilities nationwide supported at least one DC fast charger.

*Total includes publicly accessible stations reserved for patrons of businesses

HYDROGEN

Hydrogen is a versatile energy carrier that can be produced from a variety of feedstocks.

Hydrogen can be converted to electricity through a fuel-cell in electric vehicles and power generation equipment, combusted to produce heat, or used as a feedstock in a range of chemical and industrial processes.

Hydrogen produced via low-carbon production pathways such as electrolysis or natural gas using carbon abatement can be ideal for decarbonizing hard-to-abate sectors such as heavy industry, truck freight or bus transit.

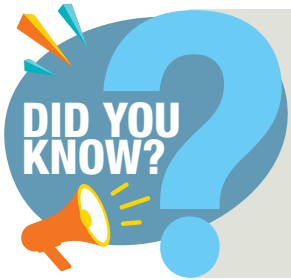
Versatile energy carrier

Carbon free at point of use

Can be produced from variety of feedstocks

Can be transported long distances

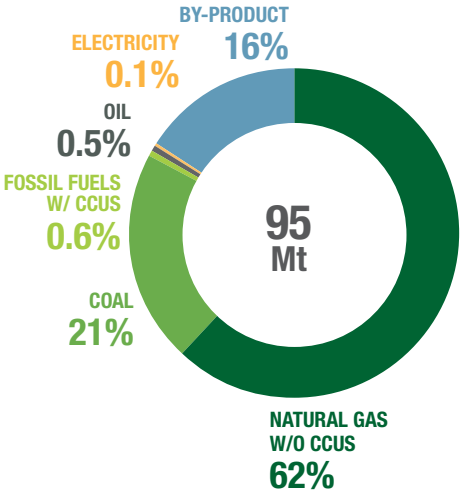
Highest energy per mass of any fuel



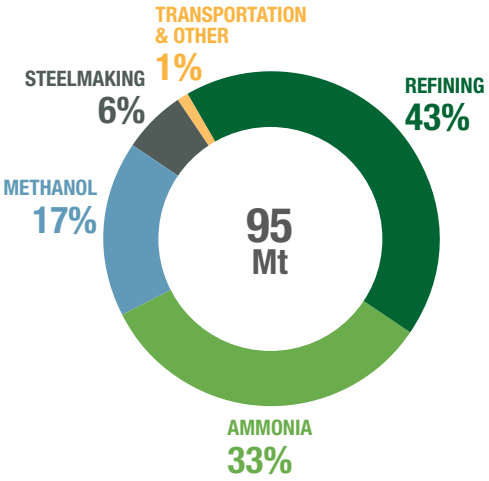
The energy in **1 kg** of **hydrogen** is the same as approximately **2.8 kg** **of gasoline**.

- The total global production of hydrogen in 2022 was **95 million tonnes (Mt)**, in which **84%** of production was deliberate, and **16%** was produced as a by-product to industrial processes.
- Global demand for hydrogen in 2022 was **95 Mt**. Hydrogen for oil refining and ammonia production were the most common end-uses, accounting for approximately **43%** and **33%** of total demand, respectively.

GLOBAL HYDROGEN PRODUCTION BY ENERGY SOURCE, 2022



GLOBAL HYDROGEN DEMAND BY END-USE, 2022



- Canada is **one of the top 10 hydrogen producers in the world today**, with an estimated **4 Mt** of hydrogen produced per year (low-carbon and carbon-intensive).
- Most hydrogen in Canada is produced from natural gas and used by the chemical industry and the oil and gas sector. Some of this hydrogen is now being produced using carbon abatement technologies and interest is growing rapidly in low-carbon production facilities.
- Air Liquide deployed a **20 MW** electrolyser in Canada in 2021, which is **Canada's largest** facility, producing low-carbon hydrogen using electricity to split water. Canada's total deployed low-carbon hydrogen production capacity is currently **over 3,450 tonnes** per year.
- Currently in Canada, there are over **80 electrolysis or natural gas with CCUS production projects** in various forms of initial planning or development, with a **combined potential value over $100 billion** and **combined potential production capacity over 5 Mt**.
- There are more than **100 established hydrogen and fuel cell companies** spanning the full value chain, **employing almost 4,300 people** in direct jobs within Canada, and generating **revenues in excess of $525 million** and **investing $125 million in research, development and demonstration**.

Section 6:
Oil, natural gas and coal

Crude oil

Natural gas

Hydrocarbon gas liquids (HGLs)

Refined petroleum products (RPPs)

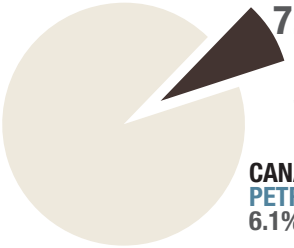
Coal

GHG Emissions from petroleum

PETROLEUM AND THE ECONOMY

NOMINAL GDP CONTRIBUTION FOR CANADA, 2023

NOMINAL GDP (% OF CURRENT DOLLARS)



CANADIAN GDP
PETROLEUM DIRECT
6.1% ($166.0 BILLION)

PETROLEUM INDIRECT
1.6% ($42.8 BILLION)

EMPLOYMENT, 2023

DIRECT: 181,100 JOBS

OIL AND GAS EXTRACTION:	73,400
SUPPORT ACTIVITIES:	55,700
EXPLORATION:	2,900
NATURAL GAS TRANSMISSION AND DISTRIBUTION:	17,300
CRUDE OIL AND OTHER PIPELINE TRANSPORTATION:	4,700
OTHER:	27,000

INDIRECT: 265,500 JOBS

TOTAL: 446,600 JOBS

Approximately **10,800 Indigenous people** are employed in the oil and gas sector.

- Capital Expenditures (2023): **$64 billion**
- Canada's oil and gas sector represents about **31%** of the country's GHG emissions.
- Exports (2023): **$177 billion** (25% of total exports)

4TH Largest oil producer globally

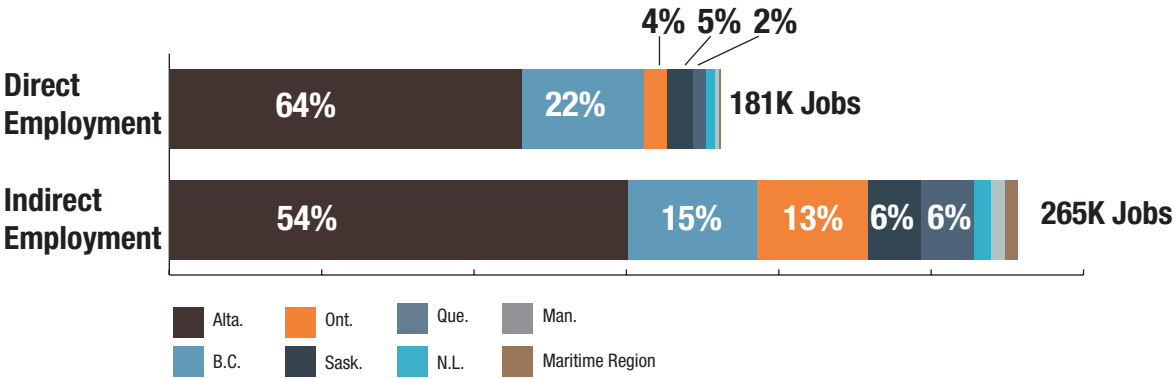
5TH Largest gas producer globally

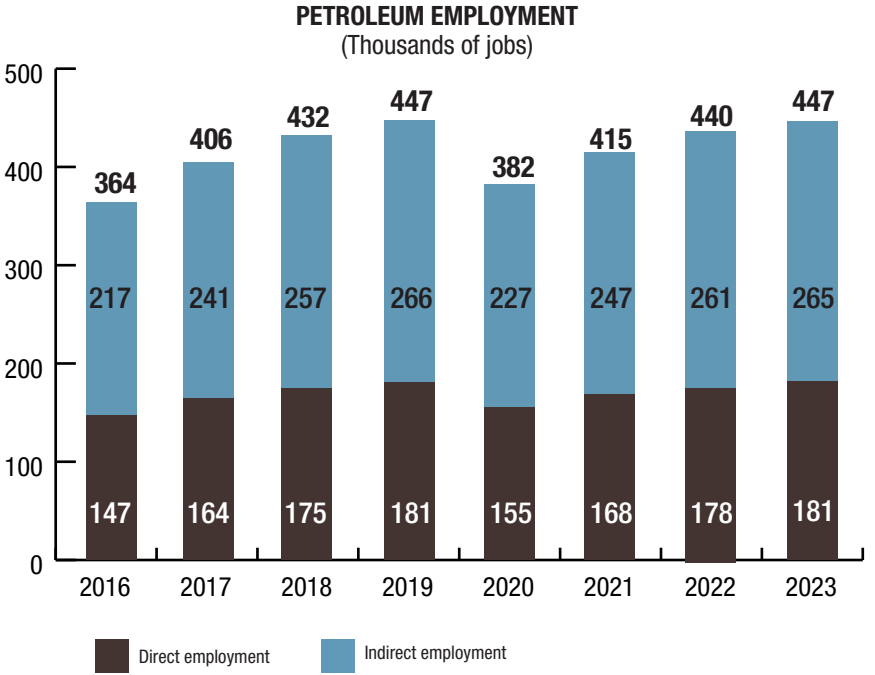
Parts may not sum to total due to rounding. The indirect contribution is not comparable to previously published estimates due to revisions and a change in estimation methodology by Statistics Canada. For more information on Statistics Canada's estimation methodology, please contact statcan.iadinfoddci-dciinfoiad.statcan@statcan.gc.ca.

- While Canada's petroleum sector **directly employed 181K people** in 2023, the sector's use of inputs from other industries created an additional

265K indirect jobs in the supply chain.

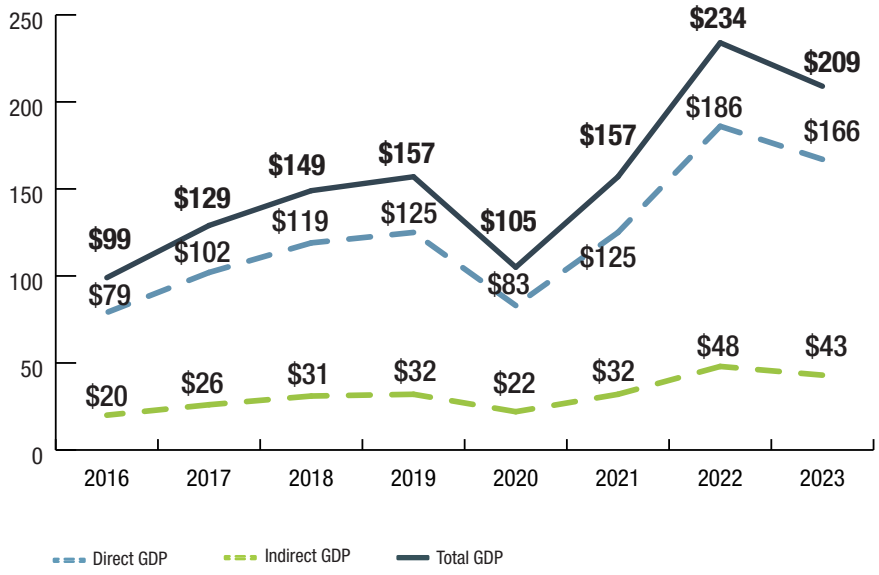
Alberta employed the majority (54%) of the supply chain workers followed by BC (15%). Ontario (13%) and Quebec (6%) also accounted for sizeable shares of supply chain jobs.





Parts may not sum to total due to rounding. The indirect contribution is not comparable to previously published estimates due to revisions and a change in estimation methodology by Statistics Canada. For more information on Statistics Canada's estimation methodology, please contact statcan.iadinfoddci-dciinfoiad.statcan@statcan.gc.ca.

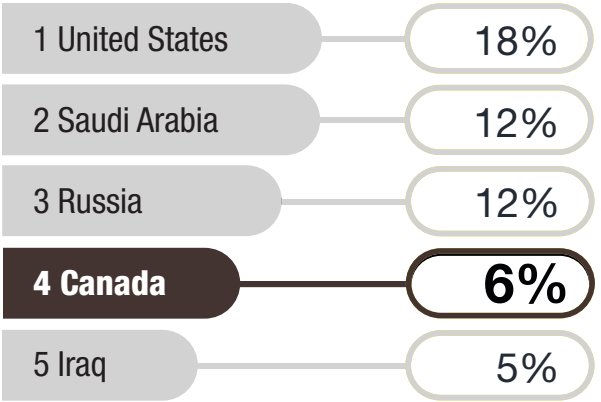
PETROLEUM GDP
(Billions of Canadian Dollars)



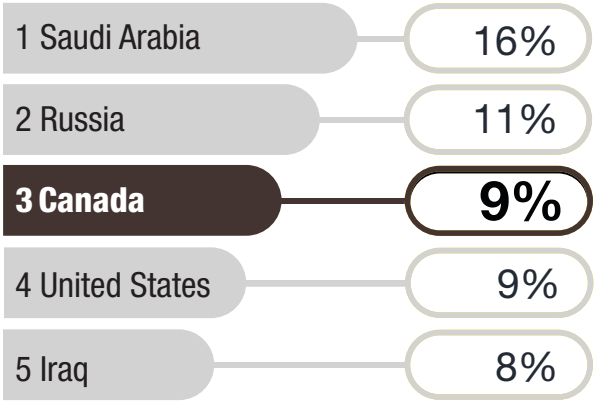
Parts may not sum to total due to rounding. The indirect contribution is not comparable to previously published estimates due to revisions and a change in estimation methodology by Statistics Canada. For more information on Statistics Canada's estimation methodology, please contact statcan.iadinfoddci-dciinfoiad.statcan@statcan.gc.ca.

CRUDE OIL
INTERNATIONAL CONTEXT

World production* – 89.6 MMb/d (2023)



World exports* – 45.2 MMb/d (2022)

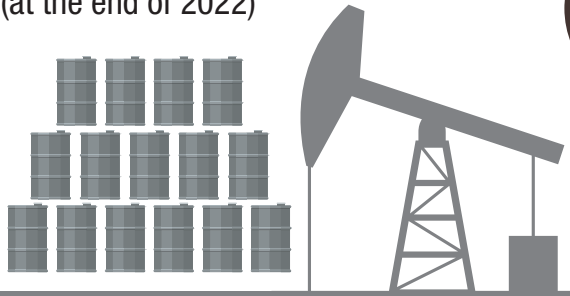


* includes crude oil, NGLs, additives and other hydrocarbons (including the receipts of additives).

World proved reserves

1,747 billion barrels

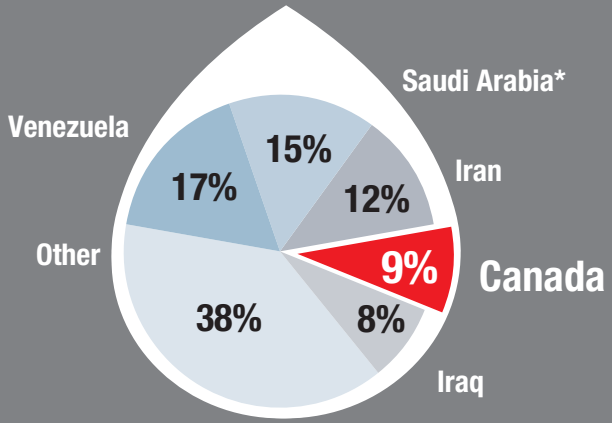
(at the end of 2022)



Proved reserves are those reserves expected to be recoverable with a high degree of certainty.

97%

of Canada's proven oil reserves are located in the oil sands.

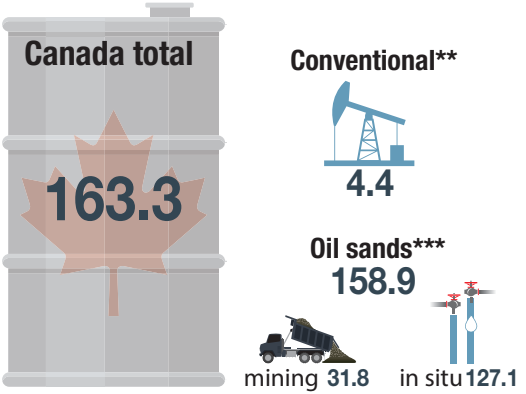


*Saudi Arabia and Kuwait reserves include the Saudi-Kuwaiti "neutral zone," with total proved reserves of 5 billion barrels.

CANADIAN RESOURCES

REMAINING ESTABLISHED RESERVES*

(billion barrels, as of December 2022)

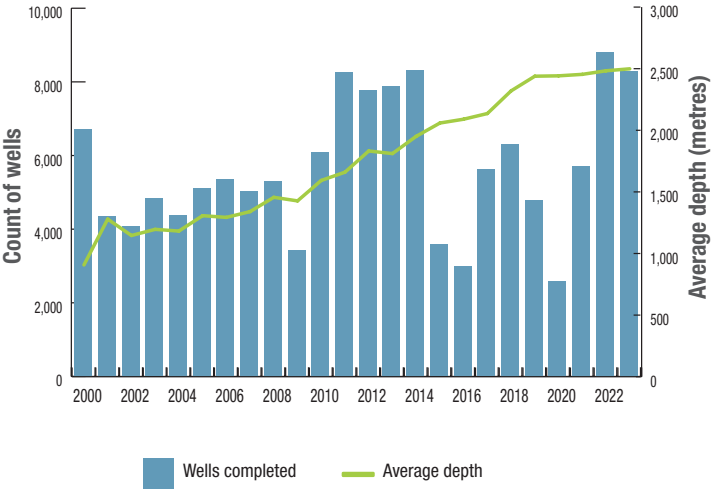


* Reserves known to exist and recoverable under current technological and economic conditions. Totals may not sum due to rounding.

** Reserves also include proved reserves of pentanes plus (a crude-oil equivalent that is associated with oil production).

***With improved technology, it is estimated that 315 billion barrels are ultimately recoverable from the oil sands. Totals may not sum due to rounding.

COUNT AND AVERAGE DEPTH OF OIL WELLS COMPLETED IN WESTERN CANADA

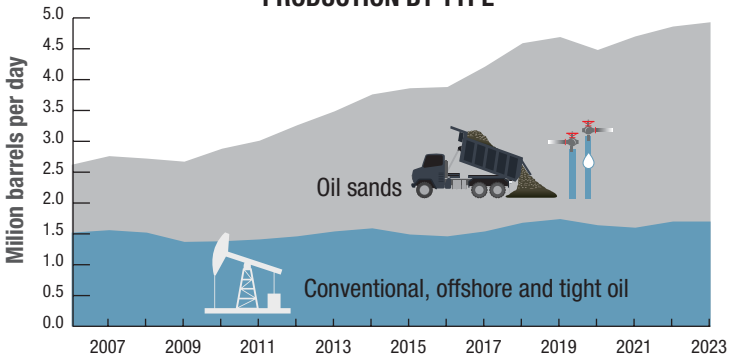


CANADIAN PRODUCTION

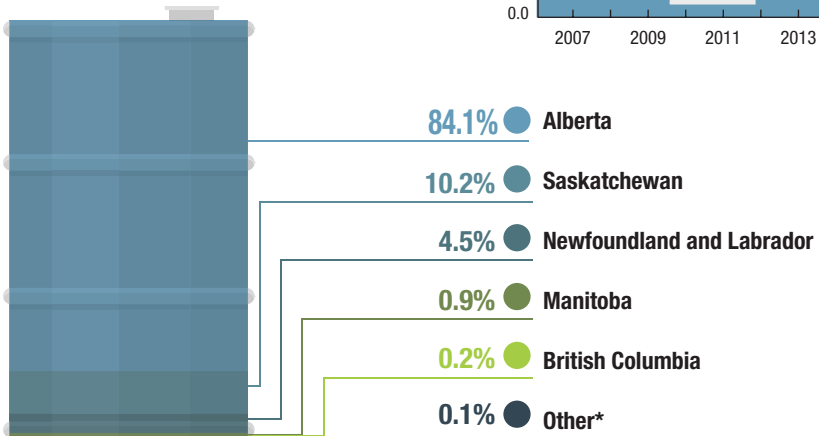
Oil sands production has exceeded conventional production since 2010.

In 2023, oil sands production was **3.2 MMb/d** compared with **1.7 MMb/d** of other oil production.

PRODUCTION BY TYPE

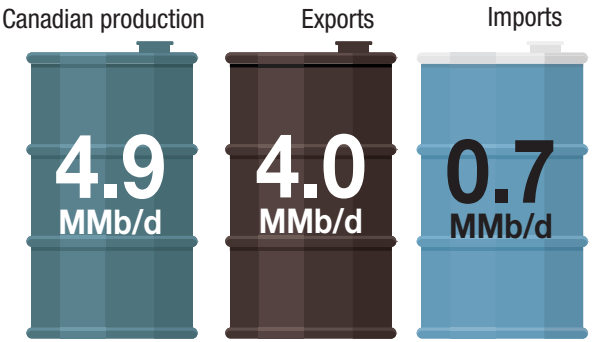


PRODUCTION BY PROVINCE, 2023

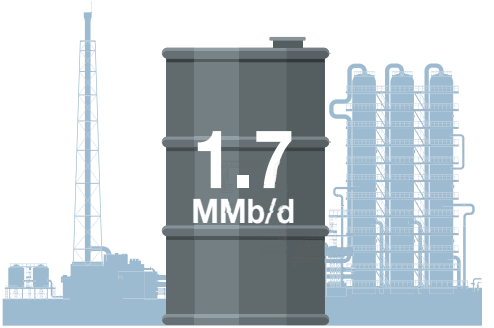


*Other: Nova Scotia, Ontario and the Northwest Territories.

CANADIAN SUPPLY AND DEMAND* (2023)

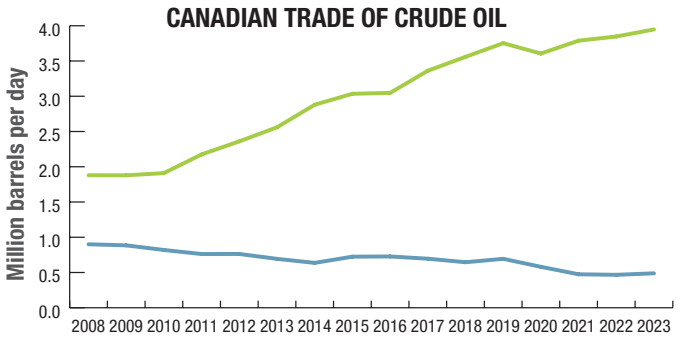


* includes condensates and pentanes plus.



CRUDE OIL INPUT TO DOMESTIC REFINERIES

TRADE



OIL SANDS

An estimated **$366 billion** of capital investment to date, including

$12.4 billion in 2023

97%

OF CANADA'S PROVED RESERVES

OF CANADA'S OIL PRODUCTION IN 2023 OR 3.2 MMb/d

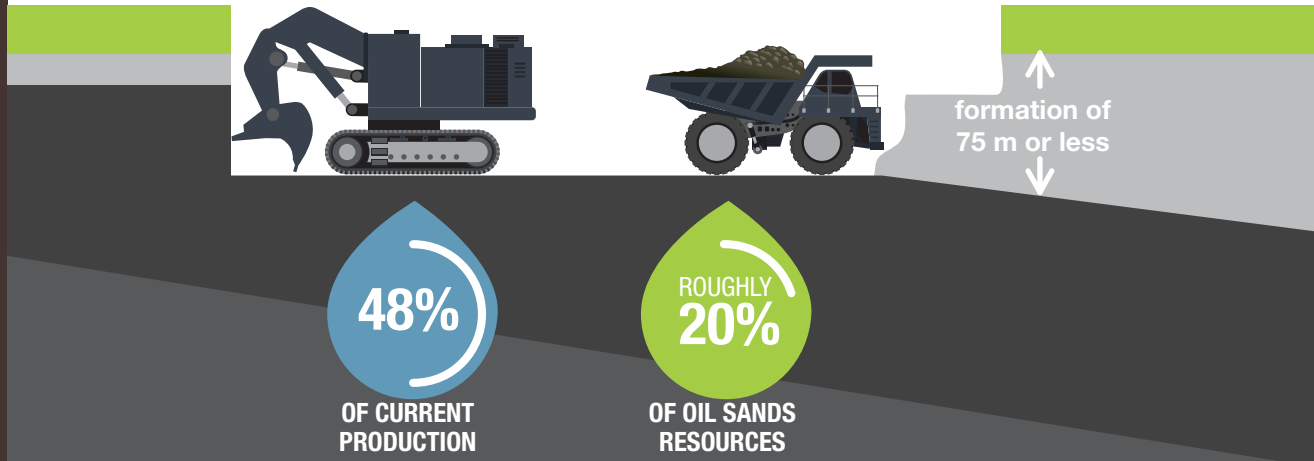
BITUMEN UPGRADING

- Crude bitumen from oil sands may be transported to upgraders for processing to make it lighter – "synthetic crude oil."
- In 2023, **41%** of the raw bitumen produced was sent for upgrading in Alberta.
- Major companies with upgrading capacity include Syncrude, Suncor, Shell, Canadian Natural Resources, Husky and Nexen-CNOOC.
- The total upgrading capacity in Canada is **1.5 MMb/d**
- Bitumen may also be blended with diluent (e.g. condensates) and sold directly to refineries capable of processing heavier oils.

MINING METHOD

Process: Companies use trucks and shovels to scoop oil sands from the ground. The oil sands are then transported to extraction plants where bitumen is separated from the sand by using steam. Tailings are then pumped into settling basins.

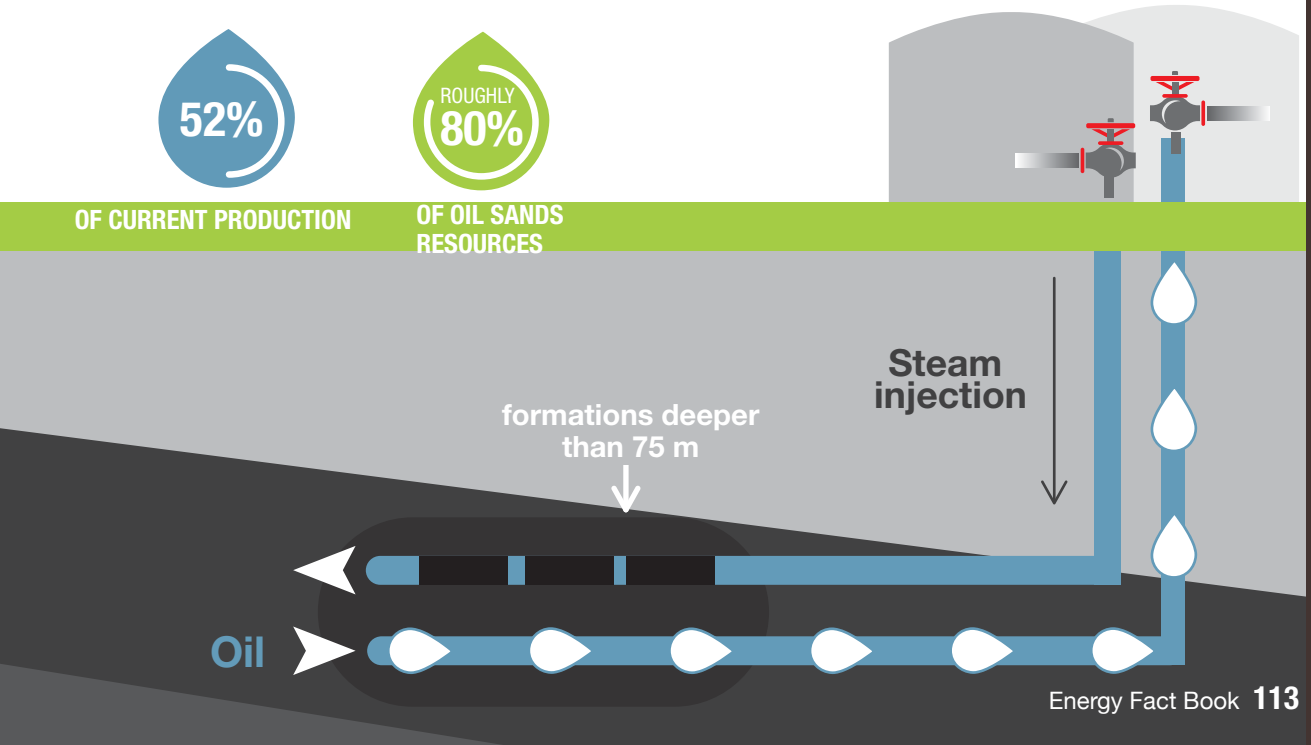
In 2023, **seven projects in Alberta** produced **1,647 Mb/d**: Syncrude Mining Project **(366 Mb/d)**, Suncor Base Mine **(249 Mb/d)**, CNRL Horizon Mine **(266 Mb/d)**, Athabasca Oil Sands Project – Muskeg River (**195 Mb/d**), Jackpine Mine (**129 Mb/d**), Imperial's Kearl Mine **(288 Mb/d)** and Fort Hills **(154 Mb/d)**.



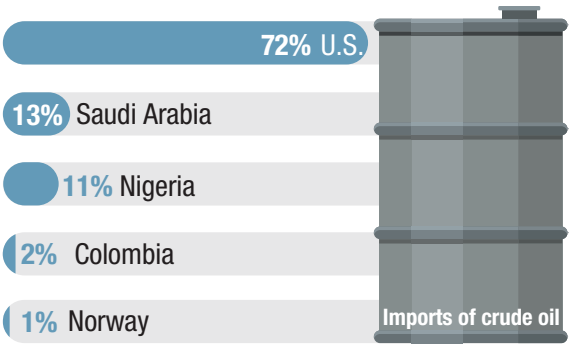
IN SITU METHOD

Process: Companies drill vertical and/or horizontal wells to inject steam to facilitate the flow of oil.

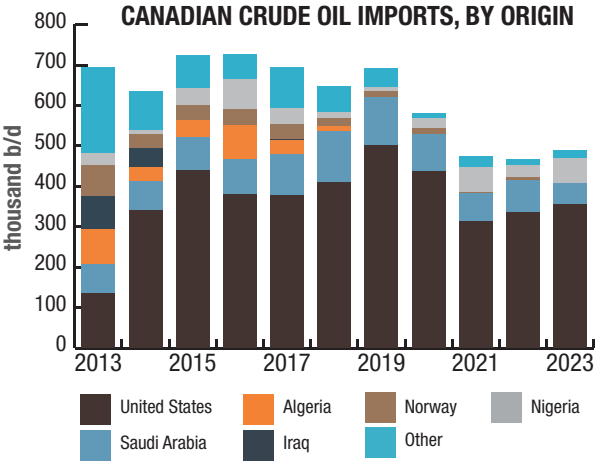
More than 20 projects in Alberta – The largest projects in 2023 were Firebag and MacKay River (Suncor) at **251 Mb/d**, Christina Lake (Cenovus) at **237 Mb/d**, Foster Creek (Cenovus) at **183 Mb/d** and Cold Lake (Imperial Oil) at **137 Mb/d**.



In 2023, imports of crude oil into Canada came from a range of countries including:



Over recent years, the U.S. has become Canada's primary supplier of imported crude oil.



In 2023, Canada was the **largest foreign supplier of crude oil** to the U.S., accounting for

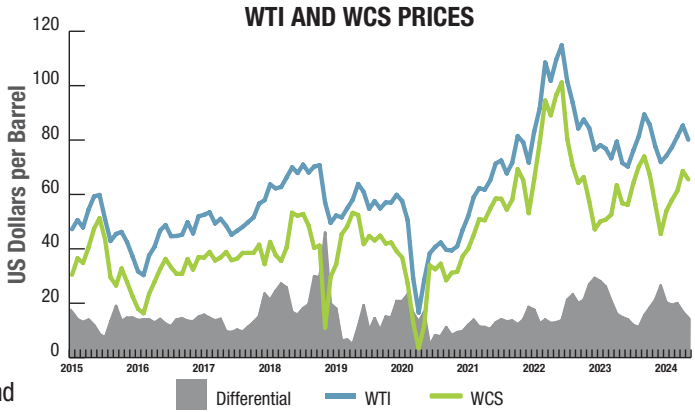
PRICES

WEST TEXAS INTERMIEDATE (WTI) AND WESTERN CANADIAN SELECT (WCS)

- WTI is a reference price for light crude oil delivered at Cushing, Oklahoma (a major pipeline hub) and is used as the benchmark price for North American crudes. WTI underlies oil futures contracts on the NYMEX.
- WCS is the main benchmark price for Canadian heavy crude, specifies delivery at Hardisty, Alberta and is representative of the price of oil from the oil sands.

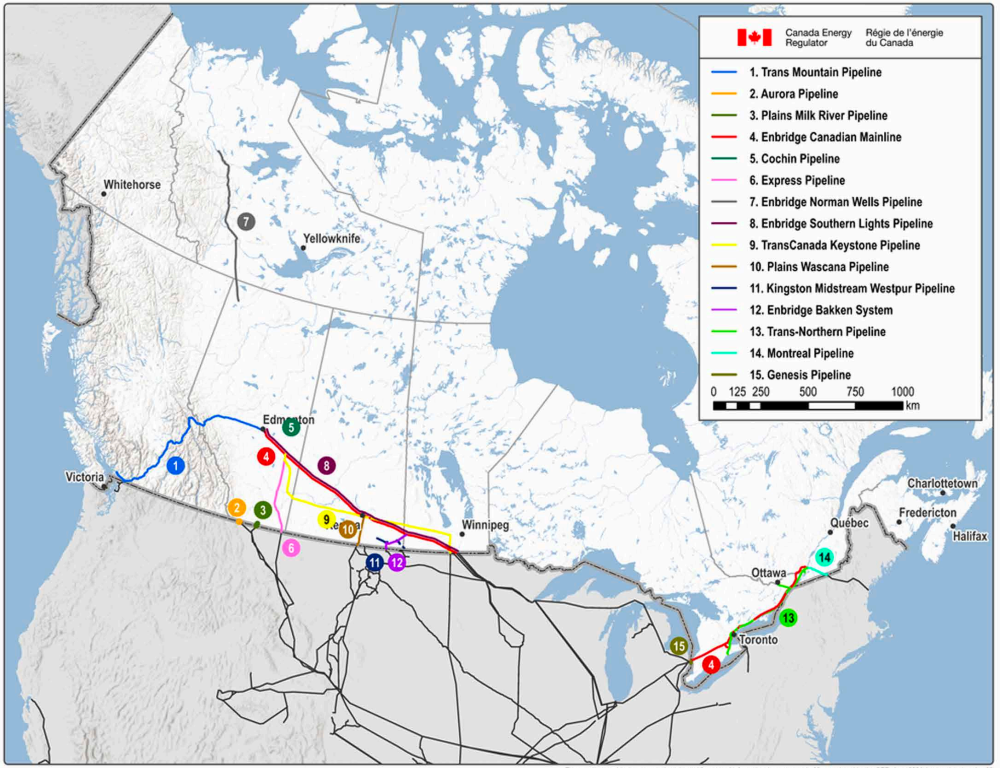
WTI-WCS DIFFERENTIAL

- WCS is typically sold at a discount to WTI due to differences in quality and transportation costs. Heavy crude is more difficult to process and requires specialized equipment at refineries.
- The WCS-WTI differential has historically averaged between US$10-$15 per barrel. However, during the fall of 2018, the differential reached a record high of over US$50 per barrel due to insufficient pipeline capacity.
- In Q2 2020, oil prices collapsed due to the drop in demand resulting from the global pandemic. US refineries drastically reduced their refinery runs and purchases of Canadian heavy crude.



- Starting in Q3 2020, easing lockdown measures led to a demand recovery and a price rebound that lasted through 2021, accelerating in the first half of 2022 following the Russian invasion of Ukraine. After peaking in June 2022, prices trended downward due to increasing global inventories and concerns over slowing demand amid rising interest rates.

MAJOR CER REGULATED OIL PIPELINES

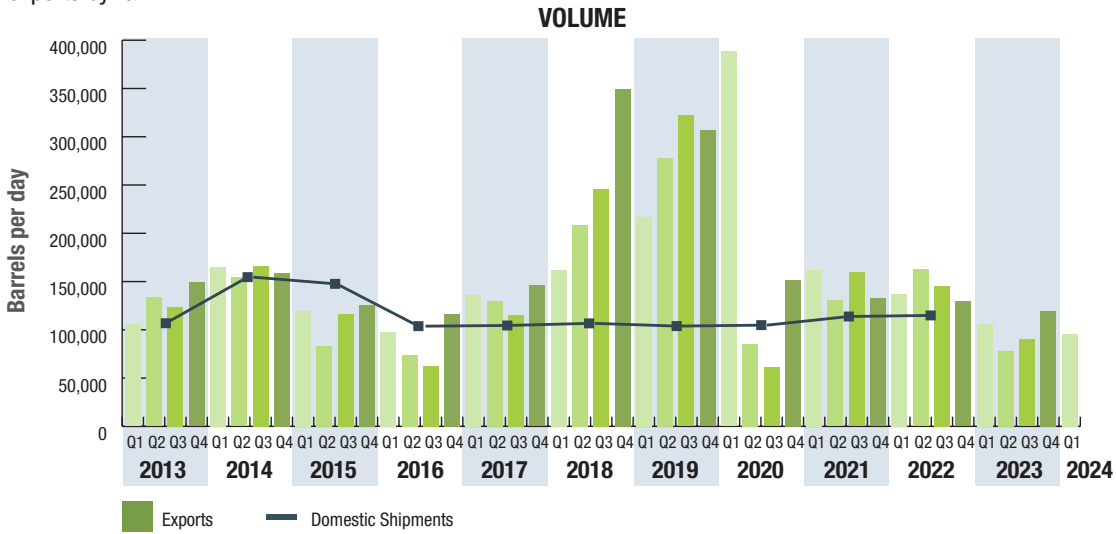


CRUDE BY RAIL

In 2018, as production increases in Western Canada began to outpace pipeline capacity, shipments of crude oil by rail increased to fill the gap, more than doubling from their 2017 levels.

Amidst the economic disruption beginning in Q1 2020, crude shipments surged beyond their 2019 peak, reaching a high of **412 Mb/d** in February 2020. This upswing was promptly reversed in Q2, when shipments fell sharply. After bottoming-out at a four year low in July 2020, volumes started to recover.

Domestic rail shipments of fuel oils and crude petroleum are relatively stable compared to volumes of crude oil exports by rail.

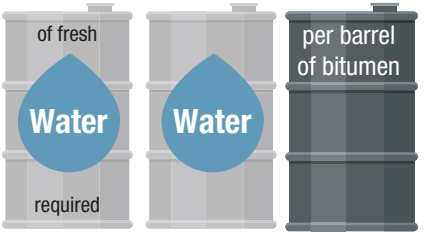


OIL SANDS: ENVIRONMENTAL CONSIDERATIONS

WATER

Mining method:

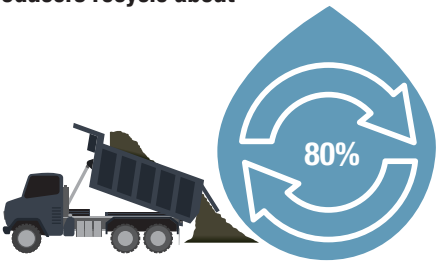
2.0 barrels



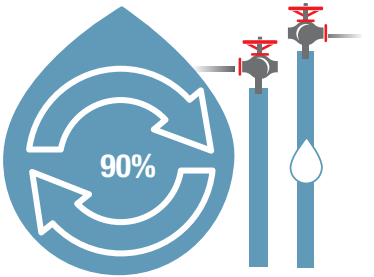
In situ method: an average of

0.16 barrels

Oil sands producers recycle about



OF THE WATER USED FOR ESTABLISHED MINES



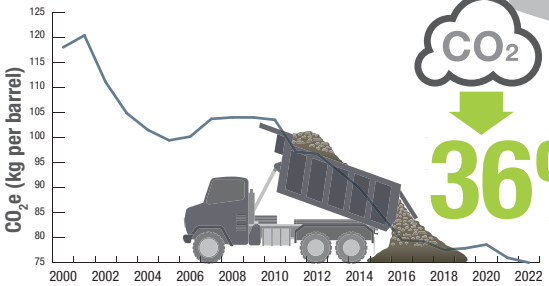
OF THE WATER USED FOR IN SITU PRODUCTION

GREENHOUSE GASES

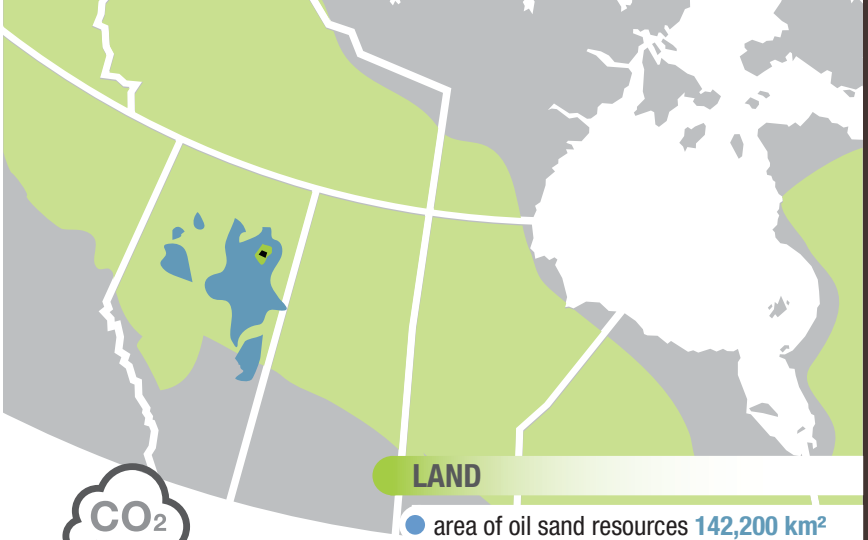
12% of Canada's total **GHG emissions in 2022**

and **0.18%** of **global emissions in 2021**

From 2000 to 2022, emissions intensity per barrel decreased by



as a result of **technological and efficiency improvements**, fewer venting emissions and reductions in the percentage of crude bitumen being upgraded to synthetic crude oil.



LAND

- area of oil sand resources **142,200 km²**
- total mineable area **4,800 km²**
- total area being mined **953 km²**

  tailings ponds **257 km²**

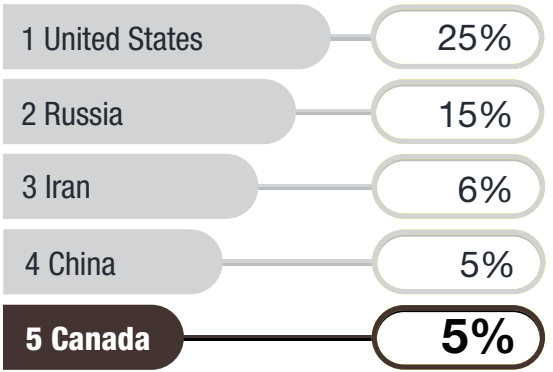
For comparison:

- Canada's area **10,000,000 km²**
- Canada's boreal forest **2,700,000 km²**

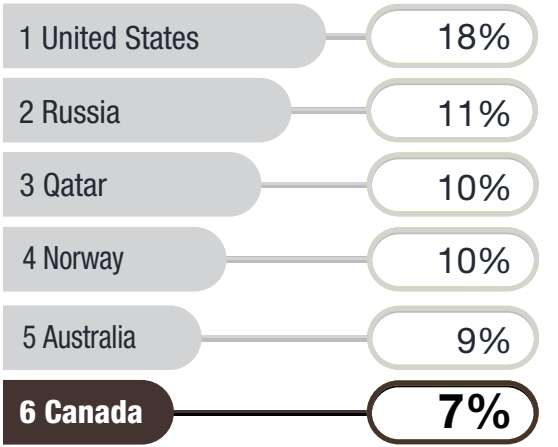
NATURAL GAS

INTERNATIONAL CONTEXT

World production – 409 Bcf/d (11.6 Bcm/d)
(2023, PRELIMINARY)



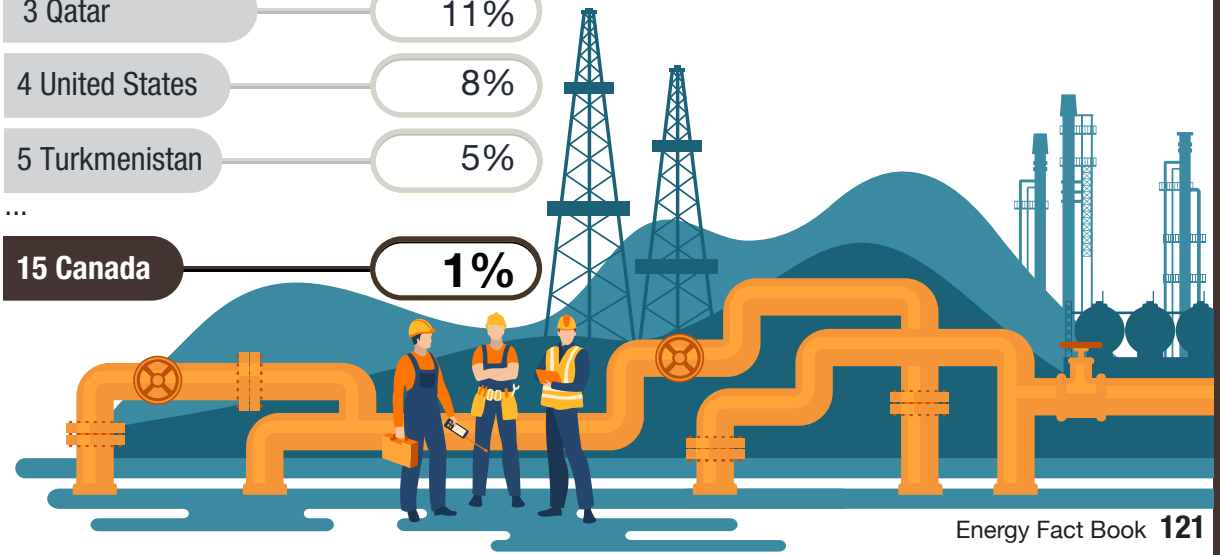
World exports – 118 Bcf/d (3.4 Bcm/d)
(2023, PRELIMINARY)



World proved reserves – 7,507 Tcf (213 Tcm)

(BEGINNING OF 2024)

1 Russia	22%
2 Iran	16%
3 Qatar	11%
4 United States	8%
5 Turkmenistan	5%
...	
15 Canada	**1%**



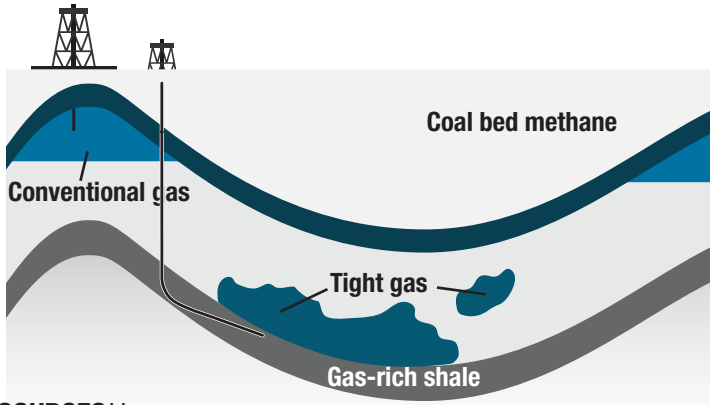
CANADA-U.S. RESOURCES

PROVED RESERVES* BEGINNING OF 2024

87 Tcf

615 Tcf

TOTAL 702 Tcf



MARKETABLE/TECHNICALLY RECOVERABLE RESOURCES**

Canada total, year-end 2022 **1,368** Tcf

conventional **380** Tcf

unconventional **988** Tcf

(coal-bed methane, shale and tight gas)

U.S. total, year-end 2020 **2,973** Tcf

portion that is shale and tight gas **2,172** Tcf

portion that is other **801** Tcf

World total (year-end 2022) **28,358** Tcf

conventional **14,867** Tcf

unconventional **13,490** Tcf

* Proved reserves are known to exist and are recoverable under current technological and economic conditions.

** Canadian marketable resources: natural gas that is in a marketable condition, after the removal of impurities and after accounting for any volumes used to fuel surface facilities. Marketable resources are recoverable using existing technologies, based on geological information, but much of the drilling necessary to produce the natural gas has not yet been performed.
U.S. technically recoverable resources: gas estimated to be recoverable as drilling and infrastructure expands (similar to Canadian marketable resources)

CANADA-U.S. MARKET (2023)

Canada's natural gas market is heavily integrated with that of the U.S. largely because of the location of supply basins, demand centres, and the availability of transportation infrastructure, as well as existing Canada-U.S. trade agreements. These factors allow for consumers and distributors on either side of the border to freely access natural gas from the lowest cost supplier.

Canadian average marketable production

18.5 Bcf/d (0.52 Bcm/d)

10% conventional

90% unconventional*

U.S. average marketable production

103.8 Bcf/d (2.94 Bcm/d)

10% conventional

90% unconventional*

* Unconventional gas includes tight gas, coal bed methane and shale gas.

Canada-U.S. production

122.3 Bcf/d (3.46 Bcm/d)

LNG imports

9 MMcf/d

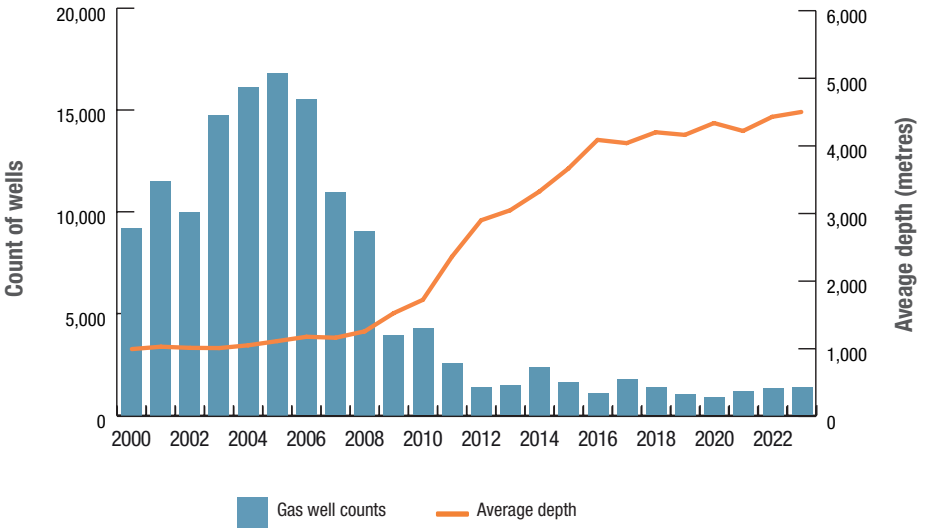
42 MMcf/d

LNG exports

7 MMcf/d

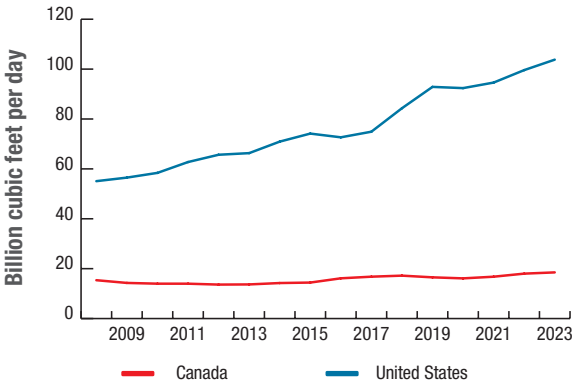
11,899 MMcf/d

COUNT AND AVERAGE DEPTH OF NATURAL GAS WELLS COMPLETED IN WESTERN CANADA

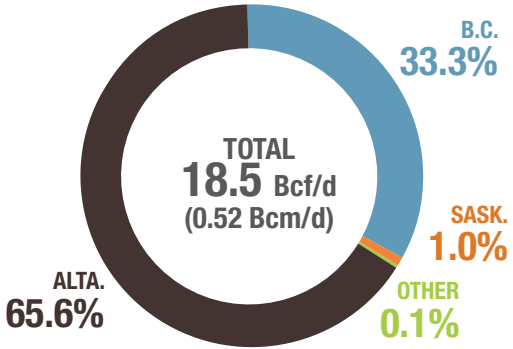


While Canadian natural gas production remained relatively flat and the number of wells drilled declined, the well productivity has increased over time. This reflects the increased use of horizontal drilling and increased well length.

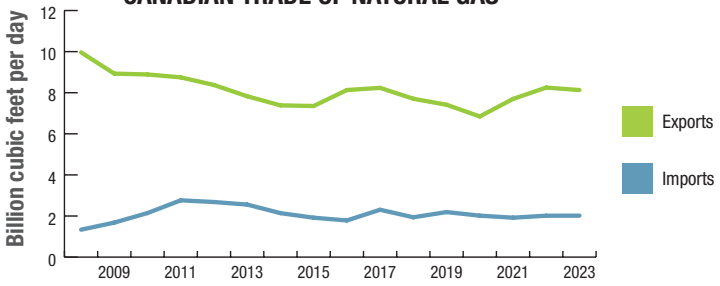
CANADIAN AND U.S. MARKETABLE PRODUCTION OF NATURAL GAS



MARKETABLE PRODUCTION BY PROVINCE, 2023



CANADIAN TRADE OF NATURAL GAS



Canadian exports to the U.S.

8.1 Bcf/d (0.23 Bcm/d)

Canadian imports from the U.S.

2.0 Bcf/d (0.06 Bcm/d)

- Natural gas imports from the U.S. into Eastern Canada are on the rise because of higher supplies in the U.S. Northeast and shorter transportation distances from these U.S. natural gas basins.
- Canadian natural gas exports to the western U.S. and U.S. Midwest remain significant.
- Since 2009, Canada has imported liquefied natural gas (LNG) from other countries via the Canaport LNG terminal in Saint John, N.B.
- Since 2017, Canada has also exported small quantities of LNG to other countries via the Port of Vancouver, B.C.

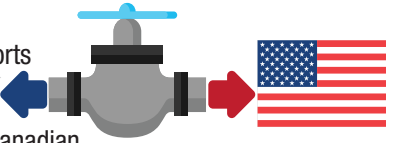
44% of Canadian production is exported.

Canadian exports are largely destined for the U.S.

99% of U.S. imports and 9% of U.S. consumption comes from Canada.

The value of Canadian net exports (exports minus imports) was **$10.1 billion** in 2023.

99% of Canada's imports and **17%** of Canadian consumption comes from the U.S.



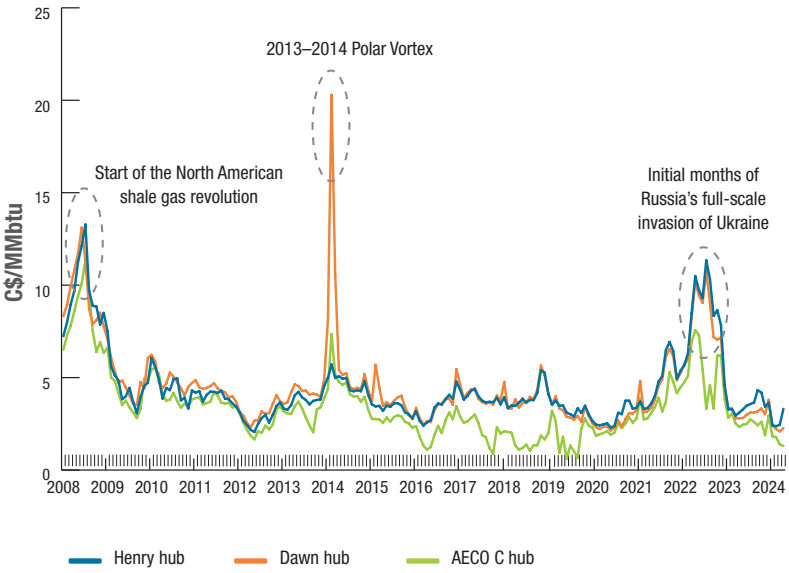
UPSTREAM PRICES

The AECO hub is Canada's largest natural gas trading hub, and the AECO price serves as a benchmark for Alberta wholesale natural gas transactions.

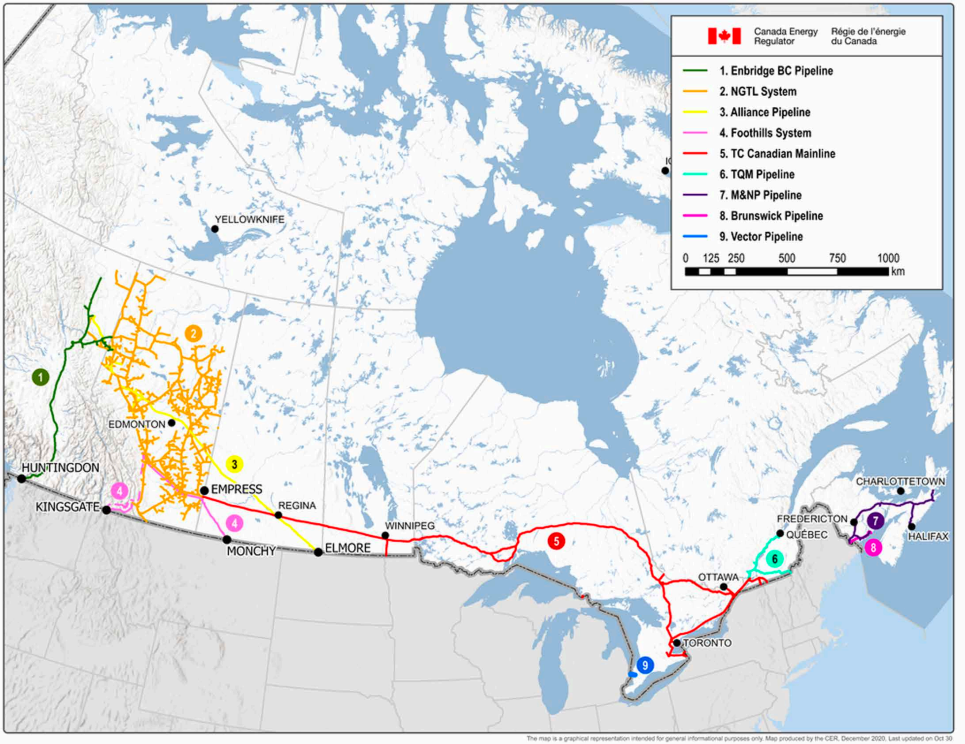
AECO PRICE

Average: 2009–2016	**$3.38**/MMbtu
Average: 2017	**$2.20**/MMbtu
Average: 2018	**$1.53**/MMbtu
Average: 2019	**$1.80**/MMbtu
Average: 2020	**$2.24**/MMbtu
Average: 2021	**$3.64**/MMbtu
Average: 2022	**$5.43**/MMbtu
Average: 2023	**$2.64**/MMbtu

MONTHLY AVERAGE NATURAL GAS SPOT PRICES



TRANSPORTATION
CER REGULATED GAS PIPELINES

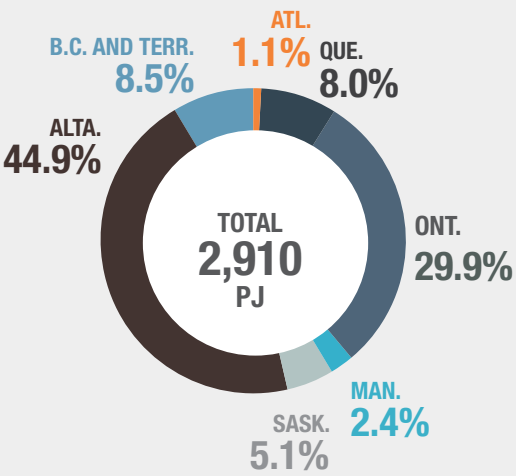


NATURAL GAS ENERGY USE

NATURAL GAS END USE BY SECTOR, 2021

Sector	Energy use (PJ)	Energy use (Bcf/d)	% of the total
Residential	628.4	1.63	21.6%
Commercial	623.4	1.62	21.4%
Industrial	1,608.8	4.18	55.3%
Transportation	4.6	0.01	0.2%
Agriculture	45.0	0.12	1.5%
Total	**2,910.1**	**7.56**	**100%**

NATURAL GAS ENERGY USE BY PROVINCE, 2021

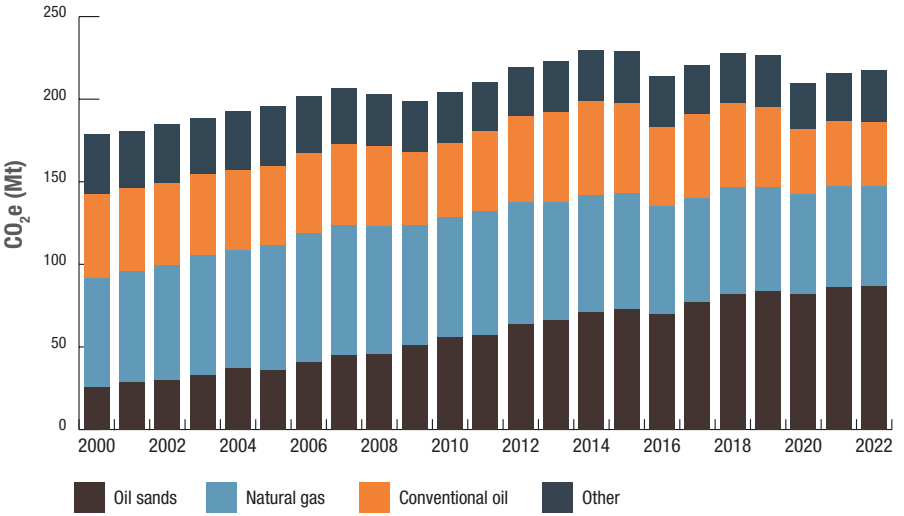


GHG SPOTLIGHT: OIL AND GAS

GHG emissions from oil and gas production **have gone up 21% between 2000 and 2022,** largely from increased oil sands production, particularly in situ extraction.

During this period, oil sands production emissions **more than tripled** while conventional oil and natural gas emissions **decreased by 15%**.

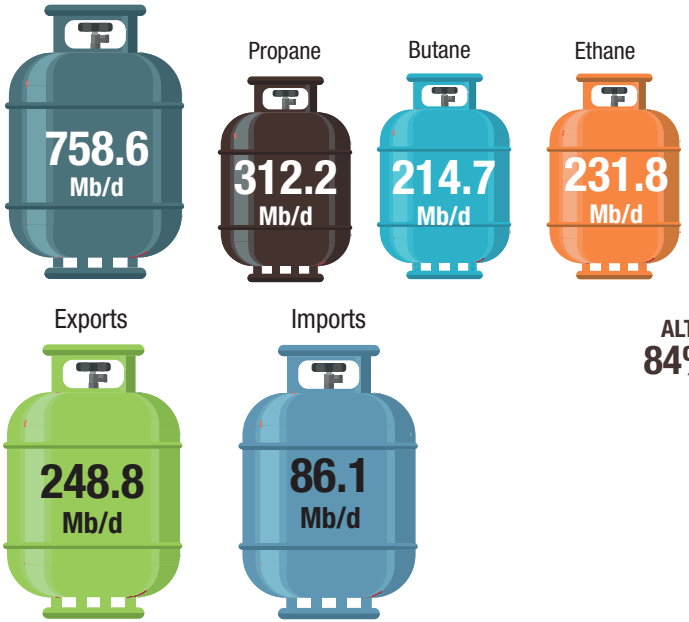
OIL AND GAS SECTOR GHG EMISSIONS FOR CANADA, 2000–2022



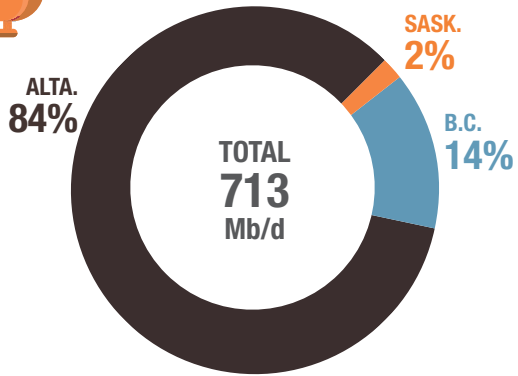
HYDROCARBON GAS LIQUIDS (HGLs)

SUPPLY AND DEMAND* (2023)

Canadian production



GAS PROCESSING PLANT PRODUCTION OF NGLS BY PROVINCE (2023)



* excludes condensates and pentanes plus, which are induded as part of crude oil, and includes refinery-produced LPGs.

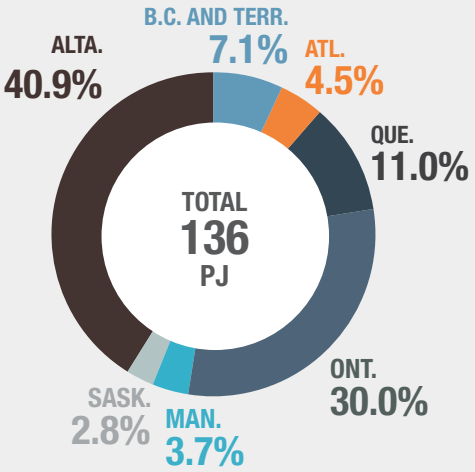
NATURAL GAS LIQUIDS ENERGY USE

TOTAL NATURAL GAS LIQUIDS ENERGY USE WAS 135.5 PJ IN 2020.

Sector	Energy use* (PJ)	% of the total
Residential	15.8	11.7%
Commercial	34.1	25.1%
Industrial	64.9	47.9%
Transportation	11.4	8.4%
Agriculture	9.4	6.9%
Total	**135.7**	**100%**

*secondary energy use

NATURAL GAS LIQUIDS ENERGY USE BY PROVINCE, 2021



REFINED PETROLEUM PRODUCTS (RPPs)

PETROLEUM REFINERIES

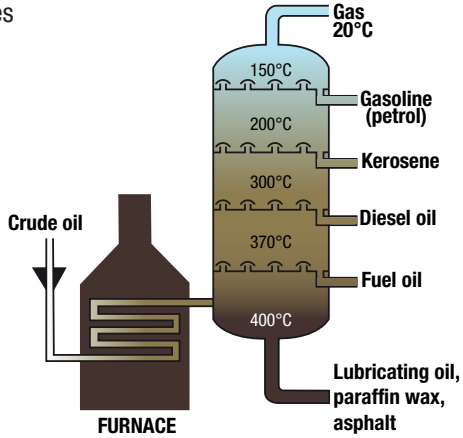
Petroleum refineries transform crude oil into a wide range of refined petroleum products (RPPs, e.g. gasoline, diesel). Other facilities such as asphalt plants, lubricant plants, upgraders and some petrochemical plants also process crude oil to produce a limited range of products.

REFINERY ACTIVITIES

- **crude oil distillation:** separating products from crude oil by heating
- **additional processing:** e.g. catalytic cracking, reforming, coking
- **product blending:** end-use RPPs are usually blended with additives or renewable fuels

REFINERY OUTPUTS

- transportation fuels: gasoline, diesel, aviation fuels, heavy fuel oil
- heating oil
- liquid petroleum gases: propane and butane from refineries
- petrochemical feedstock
- other products: e.g. kerosene, lubricating oils, greases, waxes, asphalt



SUPPLY AND DEMAND* (2023)

Canadian net production

2.1
MMb/d
(121 billion L)

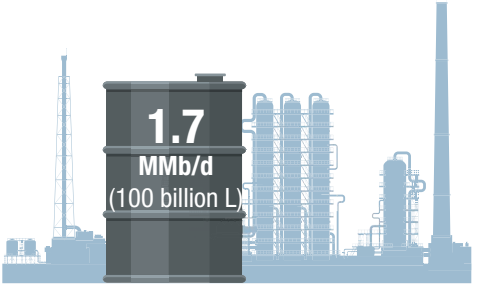
Exports

0.3
MMb/d
(18 billion L)

Imports

0.2
MMb/d
(9 billion L)

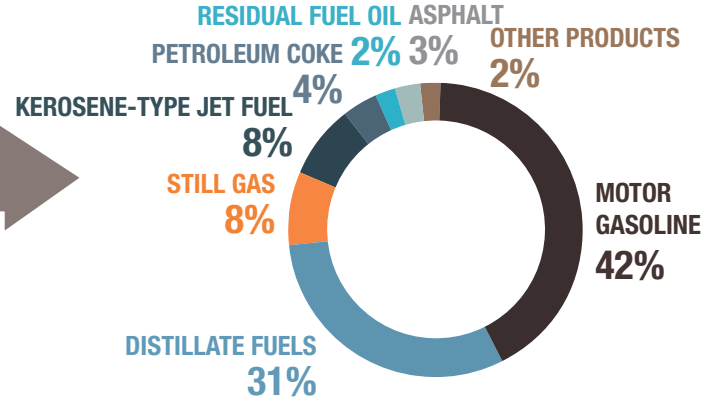
CRUDE OIL SHIPPED TO DOMESTIC REFINERIES



Domestic Consumption

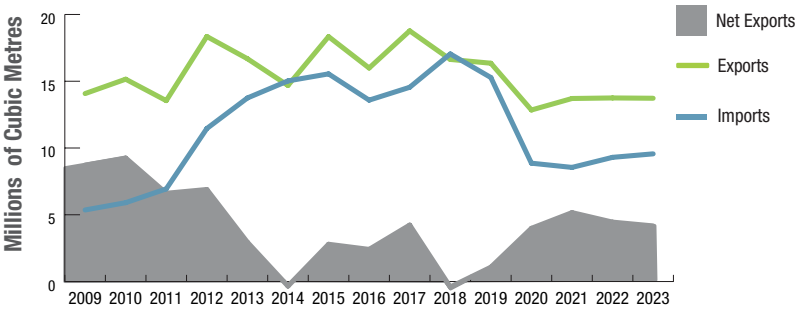
1.8
MMb/d
(103 billion L)

DOMESTIC CONSUMPTION BY PRODUCT, 2023

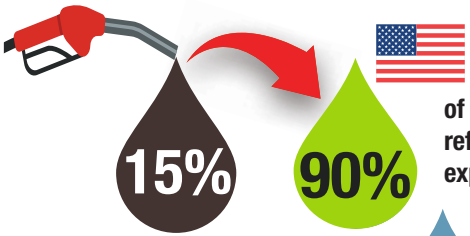


TRADE

CANADIAN TRADE OF MAJOR REFINED PETROLEUM PRODUCTS



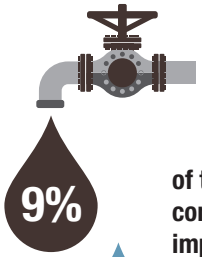
Primarily motor gasoline, diesel, jet fuel, fuel oil, and kerosene



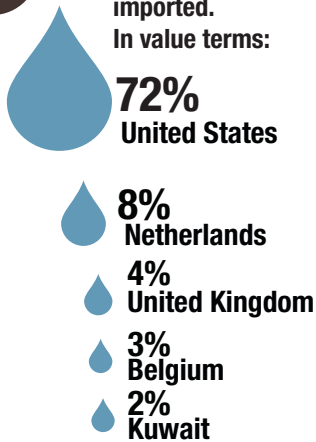
of Canadian production of refined petroleum products is exported

of the dollar value of Canadian refined petroleum products exports are to the United States.

of United States imports come from Canada.

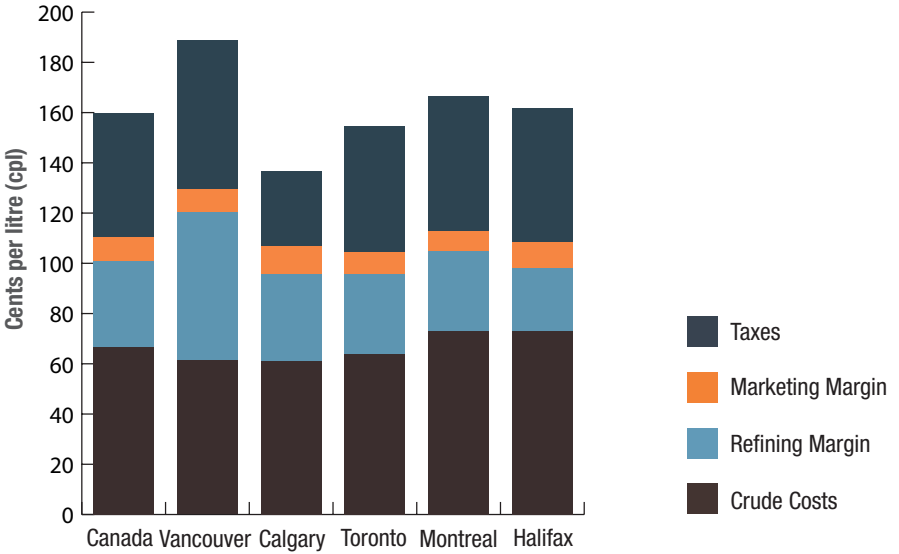


of total Canadian consumption is imported.
In value terms:



RETAIL PRICES

AVERAGE CANADIAN REGULAR GASOLINE PRICES, 2023



REFINERY CAPACITY

CANADIAN PETROLEUM REFINERIES BY COUNT AND CAPACITY*, 2023

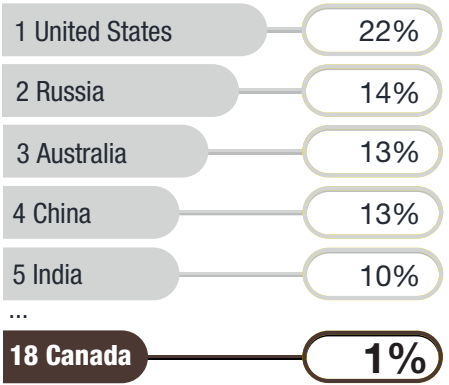
Province	Petroleum refinery		Asphalt plants		Lubricant plants (using crude oil as feedstock)		Total	
	Count	Capacity	Count	Capacity	Count	Capacity	Count	Capacity
Alberta	4	530	-	-	-	-	4	530
British Columbia	2	67	-	-	-	-	2	67
New Brunswick	1	300	-	-	-	-	1	300
Ontario	4	393	-	-	1	16	5	409
Quebec	2	372	-	-	-	-	2	372
Saskatchewan	1	135	2	52	-	-	3	187
Total	**14**	**1,797**	**2**	**52**	**1**	**16**	**17**	**1,865**

*Capacities are in Mb/d. The Come by Chance Refinery in Newfoundland and Labrador is being converted into a biofuel refinery.

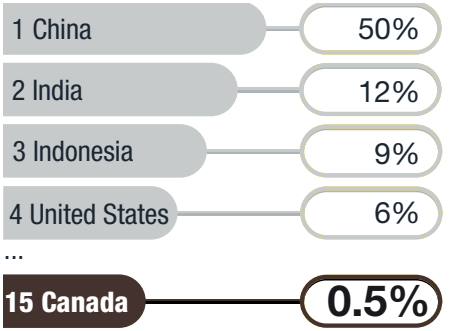
COAL

INTERNATIONAL CONTEXT

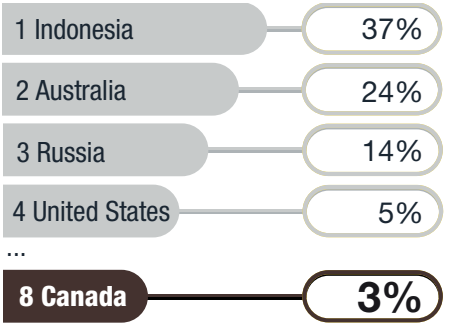
World proved reserves – 1,141 BILLION TONNES (2022)



World production – 8.7 BILLION TONNES (2023)

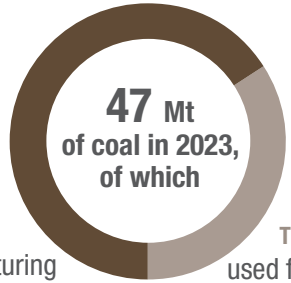


World exports – 1.4 BILLION TONNES (2023)



PRODUCTION AND USE

Canada produced

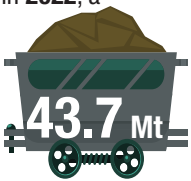


66% is **METALLURGICAL COAL** used for steel manufacturing

34% is **THERMAL COAL** used for electricity

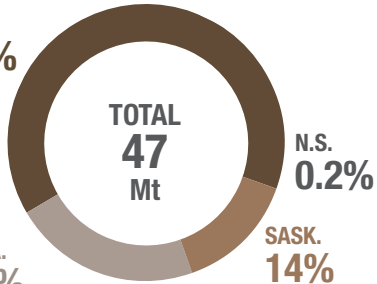
Electricity generation consumed

of coal in **2022**, a **67%** decrease from

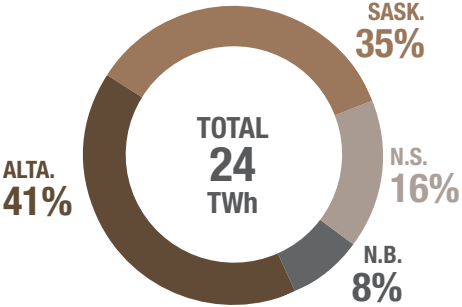


in **2010**.

COAL PRODUCTION BY PROVINCE, 2023



COAL-FIRED ELECTRICITY GENERATION BY PROVINCE, 2022



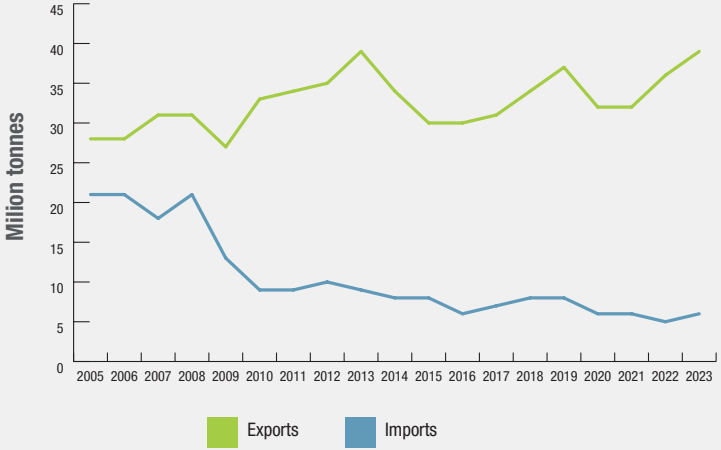
DOMESTIC DEMAND (2023)

Mostly for electricity generation in Alberta and Saskatchewan

Also for metallurgical applications

TRADE

CANADIAN TRADE OF COAL



Canada's exports are primarily metallurgical coal (**79%** in 2023).

TRADE (2023)

EXPORTS

$12 billion in coal exports

major export destinations

(by volume)

30% Japan
26% China
17% South Korea

2% of Canadian exports are to the U.S.,

representing **19%** of **U.S. coal imports**.

IMPORTS

$1.5 billion in coal imports

76% of Canadian imports are from the U.S.

ANNEXES

ANNEX 1: UNITS AND CONVERSION FACTORS

PREFIXES AND EQUIVALENTS

Prefix SI/Metric		Imperial	Equivalent	
k	kilo	M	thousand	10^3
M	mega	MM	million	10^6
G	giga	B	billion	10^9
T	tera	T	trillion	10^{12}
P	peta	-	quadrillion	10^{15}

Notes

- Tonne may be abbreviated to “t” and is not to be confused with “T” for tera or trillion.
- Roman numerals are sometimes used with imperial units (this can create confusion with the metric “M”).

CRUDE OIL

Upstream

- reserves usually in barrels or multiples (million barrels)
- production/capacity often in barrels per day or multiples (thousand barrels/day or Mb/d, million barrels/day or MMb/d)
- metric: 1 cubic metre = 6.2898 barrels
- International Energy Agency: uses weight (tonnes) rather than volume

Downstream (petroleum products)

- volumes of refined products usually in litres
- 1,000 litres = 1 cubic metre
- U.S.: 1 U.S. gallon = 3.785 litres

NATURAL GAS

Volume

- reserves/production usually in cubic feet or multiples (billion cubic feet or Bcf, trillion cubic feet or Tcf)
- production/capacity often in cubic feet per day or multiples (Bcf/d, Tcf/d)
- metric: 1 cubic metre = 35.3147 cubic feet

Density

- 1 million t LNG = 48.0279 billion cubic feet

Pricing

Volume-based:

- cents per cubic metre (¢/m^3) (customer level in Canada)
- $ per hundred cubic feet ($/CCF) (customer level in the U.S.)

Energy content-based:

- $ per gigajoule ($/GJ) (company level in Canada)
- $ per million British thermal units ($/MMbtu) (company level in the U.S., LNG)

URANIUM

- 1 metric tonne = 1,000 kilograms of uranium metal (U)
- U.S.: in pounds of uranium oxide (U_3O_8)
- 1 lb. U_3O_8 = 0.84802 lb. U = 0.38465 kg U

COAL

- 1 metric tonne = 1,000 kilograms
- U.S.: 1 short ton = 2,000 pounds
- 1 metric tonne = 1.10231 short tons

ELECTRICITY

Capacity

- maximum rated output that can be supplied at an instant, commonly expressed in megawatts (MW)

Total capacity

- installed generator nameplate capacity

Generation/sales

- flow of electricity over time, expressed in watt-hours or multiples:
  - kilowatt-hours or kWh (e.g. customer level)
  - megawatt-hours or MWh (e.g. plant level)
  - gigawatt-hours or GWh (e.g. utility level)
  - terawatt-hours or TWh (e.g. country level)

From capacity to generation

- A 1-MW unit operating at full capacity over one hour generates 1 MWh of electricity
- Over one year, this unit could generate up to 8,760 MWh (1 MW × 24 hr × 365 days)

- Units are rarely used at full capacity over time because of factors such as maintenance requirements, resource limitations and low demand
- "Capacity factor" is the ratio of actual generation to full capacity potential

ENERGY CONTENT

Rather than using "natural" units (e.g. volume, weight), energy sources can be measured according to their energy content – this allows comparison between energy sources

- metric: joules or multiples (gigajoules or GJ, terajoules or TJ, petajoules or PJ)
- U.S.: 1 British thermal unit (BTU) = 1,055.06 joules
- IEA: energy balances expressed in oil equivalent: :
  - thousand tonnes of oil equivalent (ktoe)
  - million tonnes of oil equivalent (Mtoe)

Typical values

- 1 m^3 of crude oil = 39.0 GJ
- 1,000 m^3 of natural gas = 38.3 GJ
- 1 MWh of electricity = 3.6 GJ
- 1 metric tonne of coal = 29.3 GJ
- 1 metric tonne of wood waste = 18.0 GJ
- 1 metric tonne of uranium = 420,000 GJ to 672,000 GJ

ANNEX 2: ABBREVIATIONS

AC	alternating current
AECO	Alberta Energy Company
AESO	Alberta Electric System Operator
AER	Alberta Energy Regulator
B	billion
b/d	barrels per day
Bcf/d	billion cubic feet per day
Bcm/d	billion cubic metres per day
BEV	battery electric vehicle
CANDU	Canada deuterium uranium
CAPP	Canadian Association of Petroleum Producers
CanREA	Canadian Renewable Energy Association
CCS	carbon capture and storage
CCUS	carbon capture, utilization and storage
CDIA	Canadian direct investment abroad
CEA	Canadian energy assets
CER	Canada Energy Regulator
CFS	Canadian Forest Service
CO_2 equivalent	carbon dioxide equivalent
CPI	consumer price index
CPL	cents per litre
DC	direct current
ECCC	Environment and Climate Change Canada
ECTPEA	Environmental and Clean Technology Products Economic Account
EGS	enhanced geothermal system
EIA	Energy Information Administration (U.S.)
EU	European Union
EV	electric vehicle
FDI	foreign direct investment
G7	seven wealthiest major developed nations: Canada, France, Germany, Italy, Japan, U.K. and U.S.
GDP	gross domestic product
GHG	greenhouse gas
GJ	gigajoule
GST	Goods and Services tax
GWh	gigawatt hours
HGL	hydrocarbon gas liquids
HST	Harmonized sales tax
IEA	International Energy Agency
IHA	International Hydropower Association
kg	kilogram
km	kilometre
km^2	square kilometre
kt	kilotonne
kWh	kilowatt hour
lb.	pound
L	litre
LCOE	levelized cost of electricity
LNG	liquefied natural gas
LPG	liquefied petroleum gases
LWR	light water reactor

m	metre
m^2	square metre
m^3	cubic metre
Mb/d	thousand barrels per day
MJ	megajoule
MMb/d	million barrels per day
MMcf/d	million cubic feet per day
MMbtu	million British thermal units
Mt	million tonnes; megatonne
Mtoe	million tons of oil equivalent
MW	megawatt
NGCC	natural gas combined cycle
NGL	natural gas liquids
NRCan	Natural Resources Canada
OEE	NRCan Office of Energy Efficiency
NRSA	Natural Resources Satellite Account
NSERC	National Science and Engineering Research Council of Canada
NYMEX	New York Mercantile Exchange
OECD	Organisation for Economic Co-operation and Development
PHEV	plug-in hybrid electric vehicle
PHWR	pressurized heavy water reactor
PJ	petajoule
Pkm	passenger-kilometre

Provinces

Alta.	Alberta
B.C.	British Columbia
Man.	Manitoba
N.B.	New Brunswick
N.L.	Newfoundland and Labrador
N.S.	Nova Scotia
N.W.T.	Northwest Territories
Ont.	Ontario
P.E.I.	Prince Edward Island
Que.	Quebec
Sask.	Saskatchewan
Y.T.	Yukon
Atl.	Atlantic provinces
Terr.	Territories
P/T	provincial/territorial
PV	photovoltaic
RD&D	research, development and demonstration
R&D	research and development
RPP	refined petroleum products
SDTC	Sustainable Development Technology Canada
StatCan	Statistics Canada

States

Ala.	Alabama
Ariz.	Arizona
Ark.	Arkansas
Calif.	California

Colo. – Colorad
Conn. – Connecticut
Del. – Delaware
D.C. – District of Columbia
Fla. – Florida
Ga. – Georgia
Ill. – Illinois
Ind. – Indiana
Kans. – Kansas
Ky. – Kentucky
La. – Louisiana
Me. – Maine
Md. – Maryland
Mass. – Massachusetts
Mich. – Michigan
Minn. – Minnesota
Miss. – Mississippi
Mo. – Missouri
Mont. – Montana
Nebr.– Nebraska
Nev. – Nevada
N.H. – New Hampshire
N.J. – New Jersey
N.Mex. – New Mexico
N.Y.– New York
N.C.– North Carolina
N.D. – North Dakota
Okla.– Oklahoma
Ore. – Oregon
Penn. – Pennsylvania
R.I. – Rhode Island
S.C. – South Carolina
S.D. – South Dakota
Tenn. – Tennessee
Tex. – Texas
Vt.– Vermont
Va. – Virginia
Wash. – Washington
W.Va. – West Virginia
Wis. – Wisconsin
Wyo. – Wyoming

Tcf	trillion cubic feet
Tcm	trillion cubic metres
Tkm	tonne-kilometre
t	tonnes
TPES	total primary energy supply
TWh	terawatt-hour
TSX	Toronto Stock Exchange
U.K.	United Kingdom
U.S.	United States
US$	United States dollars
V	volt
WCS	Western Canadian Select
WTI	West Texas Intermediate

ANNEX 3: SOURCES

SECTION 1: KEY ENERGY, ECONOMIC AND ENVIRONMENTAL INDICATORS

- **ENERGY PRODUCTION AND SUPPLY**
  - **Global Primary Energy Production:** IEA. *Annual Database*
  - **Global Energy Rankings:** IEA. *Annual Database*; IHA. *World Hydropower Outlook*
  - **Primary Energy Production by Region & Source:** StatCan. Tables *25-10-0020-01, 25-10-0029-01, 25-10-0030-01, 25-10-0031-01,* and *25-10-0082-01*; NRCan OEE. *National Energy Use Database*; ECCC. *Special tabulations*
  - **Canada's energy supply:** IEA. *Annual Database*
  - **Primary and secondary energy use:** NRCan OEE. *National Energy Use Database*
- **ECONOMIC CONTRIBUTION**
  - **GDP:** StatCan. Tables *38-10-0285-01, 36-10-0221-01, 36-10-0103-01* and *36-10-0400-01*; StatCan. *Custom tabulations*; NRCan estimates
  - **Employment:** StatCan. Tables *38-10-0285-01, 36-10-0480-01* and *14-10-0023-01*; StatCan. *Custom tabulations*; NRCan estimates
  - **Energy Trade:** StatCan. *International Merchandise Trade Database*; IEA. *Annual Database*; U.S. EIA. *U.S. Imports by Country of Origin*
  - **Canada-U.S. Energy Trade:** StatCan. *International Merchandise Trade Database*; U.S. EIA. *U.S. Imports by Country of Origin*; U.S. Bureau of Economic Analysis. *Gross Domestic Product by State*
  - **Government Revenues:** StatCan. Tables *33-10-0500-01* and *25-10-0065-01*; CAPP. *Statistical Handbook*, *Table 01-01*; geoLOGIC Systems Ltd. Daily Oil Bulletin. *Land sales data*; Canada-Newfoundland and Labrador Offshore Petroleum Board; *Annual Report*; Canada-Nova Scotia Offshore Petroleum Board. *Annual Report*
- **ENERGY AND GHG EMISSIONS**
  - **Emissions by Sector:** ECCC. *National Inventory Report*; Climate Watch. *Data Explorer*
  - **Indexed Trend in GHG Emissions:** ECCC. *National Inventory Report*; StatCan. Tables *17-10-0005-01* and *36-10-0434-03*

SECTION 2: INVESTMENT

- **Capital expenditures:** StatC*an. Tables 34-10-0035-01, 34-10-0036-01* and *34-10-0040-01*
- **Canada's Energy Infrastructure:** StatCan. Table *36-10-0608-01*
- **Canada's Major Energy Projects:** NRCan. *Major Projects Inventory*
- **Foreign Direct Investment and Canadian Direct Investment Abroad:** StatCan. Table *36-10-0009-01*
- **Foreign Control of Canadian Assets:** StatCan. Tables *33-10-0033-01, 33-10-0005-01* and *33-10-0006-01*
- **Canadian Energy Assets:** Compiled by NRCan from S&P Global Market Intelligence and annual financial statements from publicly traded Canadian energy companies
- **Research, Development and Demonstration:** Compiled by NRCan from internal sources
- **Environmental Protection Expenditures:** StatCan. Tables *38-10-0130-01* and *38-10-0132-01*

SECTION 3: SKILLS, DIVERSITY AND COMMUNITY

- **Energy Sector Demographics:** StatCan. *NRSA Human Resources*

Module custom tables

- **Energy Affordability:** StatCan. Estimation of Energy Poverty Rates Using the 2021 Census of Population ; StatCan. Table *11-10-0222-01*
- **Household Expenditures on Energy:** StatCan. Table *11-10-0222-01*
- **Energy Retail Prices:** StatCan. Table *18-10-0004-01* and *18-10-0001-01*; IEA. *Annual Database*
- **Energy Reliant Communities:** NRCan analysis based on StatCan 2021 Census Data

SECTION 4: ENERGY EFFICIENCY

- **Energy use, efficiency and trends:** NRCan OEE. *National Energy Use Database*; NRCan estimates

SECTION 5. CLEAN POWER AND LOW CARBON FUELS

- **CLEAN TECHNOLOGY AND THE ECONOMY**
  - **Environmental and clean technology:** NRCan. *2022 Cleantech Industry Survey*; StatCan. Tables *14-10-0023-01, 36-10-0103-01, 36-10-0629-01* and *36-10-0632-01*; Toronto Stock Exchange. *TSX & TSXV Listed Companies*
- **ELECTRICITY**
  - **World production and exports:** IEA. *Electricity Information* [note: IEA production/generation data is expressed on a "gross" basis, i.e. before generating station use])
  - **Trade:** CER. *Commodity Tracking System*
  - **Canadian and provincial supply:** Compiled by NRCan's Energy Systems Sector from various sources
  - **Prices:** Hydro-Québec. *Comparison of Electricity Prices in Major North American Cities*
  - **Electricity energy use:** NRCan OEE. *National Energy Use Database*
- **RENEWABLES**
  - **Electricity GHG emissions:** ECCC. *National Inventory Report*
  - **International context – Production:** IEA. *Renewables Information*
  - **International context – share of energy supply:** IEA. *World renewables and waste energy supply*
  - **Domestic production:** IEA. *Renewables Information*
  - **Hydro – international generation:** IEA. *Electricity Information*; IEA. *Energy Balances of OECD Countries*; IEA. *Energy Balances of Non-OECD Countries*
  - **Hydro – capacity in Canada:** WaterPower Canada. *Hydropower Refurbishments and Redevelopments in Canada*
  - **Hydro – facilities and projects:** WaterPower Canada. *Hydropower Refurbishments and Redevelopments in Canada*
  - **Biomass – Renewable balance:** IEA. *Renewables balances*
  - **Biomass – production and facilities:** StatCan. Table *25-10-0031-01*; NRCan CFS data compiled from various sources
  - **Biomass – wood fuel use by sector:** StatCan. Tables *25-10-0025-01* and *25-10-0084-01*; NRCan estimates
  - **Wind – international context:** Global Wind Energy Council. Global Wind Report
  - **Wind – generation and capacity in Canada:** CanREA. *By the Numbers*; NRCan analysis based on various sources
  - **Wind – wind farms:** AESO. *Current Supply Demand Report*; CanREA. *By the Numbers*; Government of Ontario. *Renewable*

Energy Projects Listing; Hydro Québec. *Electricity supply contracts in force in Québec*; SaskPower. *System Map*

- **Solar PV – international context:** IEA Photovoltaic Power Systems Programme. *2024 Snapshot of Global PV Markets*
- **Solar PV – capacity in Canada:** NRCan and CanREA. *National Survey Report of PV Power Applications in Canada - 2022*
- **Solar PV – generation in Canada:** Compiled by NRCan from various sources
- **Solar PV – solar PV farms:** CanREA. *By the Numbers*; AESO. *Current Supply Demand Report*; Government of Ontario. *Renewable Energy Projects Listing*; NRCan analysis based on various sources

- **URANIUM AND NUCLEAR**
  - **World uranium production and exports:** World Nuclear Association. *World Uranium Mining*; NRCan estimates
  - **World known recoverable resources of uranium:** OECD Nuclear Energy Agency and International Atomic Energy Agency. Uranium: *Resource, Production and Demand*; World Nuclear Association. *Supply of Uranium*
  - **World generation of nuclear power:** International Atomic Energy Agency. *Nuclear Power Reactors in the World*
  - **Canadian supply and demand:** World Nuclear Association. *Uranium in Canada*; Cameco. *Annual report*; NRCan estimates
  - **Nuclear in Canada infographic:** NRCan. *Nuclear Energy and Uranium*
  - **Purchases by U.S. nuclear reactors:** U.S. EIA. *Uranium Marketing Annual Report*
  - **CANDU nuclear reactors and nuclear power plants in Canada:** International Atomic Energy Agency. *Power Reactor Information System*; NRCan analysis based on various sources
  - **Spot prices:** U.S. EIA. *Annual Uranium Market Report*

- **BIOFUELS AND TRANSPORTATION**
  - **Biofuels – international context:** IEA. *Renewables Information*
  - **Biofuels – production, supply and demand:** StatCan. Tables *25-10-0081-01* and *25-10-0082-01*
  - **Transportation – Electric vehicle sales:** StatCan. Tables *20-10-0021-01* and *20-10-0024-02*
  - **Transportation – Electric vehicle chargers:** NRCan. *Electric vehicle charging – EV charging basics*; NRCan. *Electric Charging and Alternative Fuelling Stations Locator*
  - **Transportation – GHG emissions:** ECCC. *National Inventory Report*
  - **Hydrogen:** IEA. *Global Hydrogen Review*; NRCan. *Hydrogen Strategy for Canada*

SECTION 6: PETROLEUM, GAS AND COAL

- **PETROLEUM AND THE ECONOMY**
  - **GDP and employment:** StatCan. Tables *38-10-0285-01* and *36-10-0480-01*; *StatCan. Special tabulations of the NRSA Human Resources Module*
  - **Capital expenditures:** StatCan. Table *34-10-0036-01* and *special tabulations*
  - **Exports:** StatCan. *International Merchandise Trade Database*

- **CRUDE OIL**
  - **World production and exports:** IEA. *Annual Database*
  - **World proved reserves:** Oil and Gas Journal. *Worldwide Look at Reserves and Production*
  - **Canadian resources – remaining established reserves:** AER. *Alberta Energy Outlook (ST98)*; CAPP. *Conventional reserves special tabulation*
  - **Oil wells in Western Canada:** AER. *ST59: Alberta Drilling*

Activity Monthly Statistics; BCER. *Drilling Data for All Wells in BC [BCOGC-41984]*; Petrinex. *Saskatchewan Public Data*; Province of Manitoba. *Oil & Gas Statistics*

- **Canadian and provincial production:** StatCan. Tables *25-10-0063-01* and *25-10-0014-01*; NRCan analysis
- **Canadian Supply and Demand:** StatCan. Tables *25-10-0063-01* and *25-10-0014-01*; *StatCan. International Merchandise Trade Database*
- **Trade:** StatCan. Table *25-10-0063-01*; StatCan. *International Merchandise Trade Database*; U.S. EIA. *Imports by Country of Origin and Refining and Processing*
- **Oil Sands:** CAPP. *Statistical Handbook*, *Table 04-14*; StatCan. Tables *34-10-0036-01* and *25-10-0063-01*; AER. *Alberta Energy Outlook (ST98)*
- **Prices:** U.S. EIA. Table *Cushing*, *OK WTI Spot Price FOB*; Sproule. *Price Forecast*
- **Pipelines:** CER. *Crude Oil Pipeline Transportation System*
- **Transportation by Rail:** CER. *Canadian Crude Oil Exports by Rail – Monthly Data*; StatCan. Table *23-10-0062-01*
- **Oil Sands Environmental Considerations:** ECCC. *National Inventory Report*; World Resources Institute. *Country Greenhouse Gas Emissions Data*; Alberta Government. *Oil Sands Information Portal*; Alberta Government. *Oil Sands 101*; Alberta Government. *Lower Athabasca Regional Plan*; AER. *Oil Sands Mining Water Use*; AER. *Oil Sands In Situ Recovery Water Use*; AER. *Alberta Mineable Oil Sands Plant Statistics Monthly Supplement (ST39)*; AER. *Alberta In Situ Oil Sands Production Summary (ST53)*; StatCan. Table *25-10-0063-01*; NRCan. *Boreal forest data*

- **NATURAL GAS**
  - **World production and exports:** IEA. *World natural gas statistics*
  - **World proved reserves:** Oil and Gas Journal. *Worldwide look at reserves and production*
  - **Canada and U.S. – Proved reserves:** U.S. EIA. *International Data Browser*; Oil and Gas Journal. *Worldwide look at reserves and production*
  - **Canada and U.S. – Marketable and technically recoverable resources:** CER. *Canada's Energy Future 2023, Macro Indicators*; U.S. EIA. *Annual Energy Outlook 2023*; U.S. EIA. *Shale Gas, Proved Reserves as of Dec. 31* ; NRCan analysis
  - **Canadian average marketable production:** CER. *Canada's Energy Future 2023*, *Figure Data (Excel)*; StatCan. Table *25-10-0055-01*
  - **U.S. average marketable production:** U.S. EIA. *Annual Energy Outlook 2023*; U.S. EIA. *Dry Natural Gas Production, Annual*
  - **LNG imports, Canada:** StatCan. *Canadian International Merchandise Trade Database*
  - **LNG imports, U.S.:** U.S. EIA. U.S. *Liquefied Natural Gas Imports (MMcf)*
  - **LNG exports, Canada:** CER. *Commodity Tracking System*
  - **LNG exports, U.S.:** U.S. EIA. *Liquefied U.S. Natural Gas Exports (MMcf)*
  - **Natural gas wells in Western Canada:** AER. *ST59*: *Alberta Drilling Activity Monthly Statistics*; BCER. *Drilling Data for All Wells in BC [BCOGC-41984]*; Petrinex. *Saskatchewan Public Data*; Province of Manitoba. Oil & Gas Statistics
  - **Canadian and U.S. marketable production of natural gas:** StatCan. Table *25-10-0055-01*; U.S. EIA. *Dry Natural Gas Production, Annual*

- **Canadian trade of natural gas:** CER. *Commodity Tracking System*; StatCan. *Canadian International Merchandise Trade Database*
- **Marketable production by province:** StatCan. Table *25-10-0055-01*
- **Upstream prices:** Sproule. *Sproule Price Forecast*; StatCan. Table *33-10-0163-01*
- **Pipelines:** CER. *Facilities we regulate*
- **Natural gas energy use:** NRCan OEE. *National Energy Use Database*

- **HGLs**
  - **Processing plant production:** StatCan. Table *25-10-0036-01*
  - **Refinery production:** StatCan. *Monthly Refined Petroleum Product Survey*
  - **Shares of NGL Production by province:** CAPP. *Custom report for NRCan*
  - **NGLs end use:** NRCan OEE. *National Energy Use Database*
  - **Exports:** CER. *Commodity Tracking System*
  - **Imports:** StatCan. *International Merchandise Trade Database*

- **RPPs**
  - **Canadian refineries:** Compiled by NRCan from various sources
  - **Supply and Demand:** StatCan. Table *25-10-0081-01*
  - **Crude oil shipped to domestic refineries:** StatCan. Table *25-10-0063-01*
  - **Domestic consumption by product:** StatCan. Table *25-10-0081-01*; NRCan analysis
  - **Trade:** StatCan. Table *25-10-0081-01*; StatCan. *International Merchandise Trade Database*. U.S. EIA. *U.S. Imports by Country of Origin for Petroleum and Other Liquids*
  - **Gasoline prices:** Kalibrate Technologies Ltd. *Petroleum price data, Pricing analytics: Margin*
  - **Refinery capacity:** Oil Sands Magazine. *List of Canadian Refineries; NRCan analysis*

- **COAL**
  - **World proved reserves:** U.S. EIA. *Coal Reserves*
  - **World production and exports:** IEA. *Coal Information*
  - **Canadian supply and demand:** IEA. *Coal Information*; StatCan. *International Merchandise Trade Database*; *NRCan analysis*
  - **Canadian Production:** StatCan. Table *25-10-0046-01*; *NRCan analysis*
  - **Electricity Generation:** StatCan. Tables *25-10-0017-01* and *25-10-0084-01*; *Data* compiled by NRCan from StatCan and other public sources

- **GHG EMISSIONS FROM PETROLEUM**
  - **GHG Emissions by Sector:** ECCC. *National Inventory Report*

CANADIAN CENTRE FOR ENERGY INFORMATION

CCEI

Canadian Centre for Energy Information

https://energy-information.canada.ca/index-eng.htm