

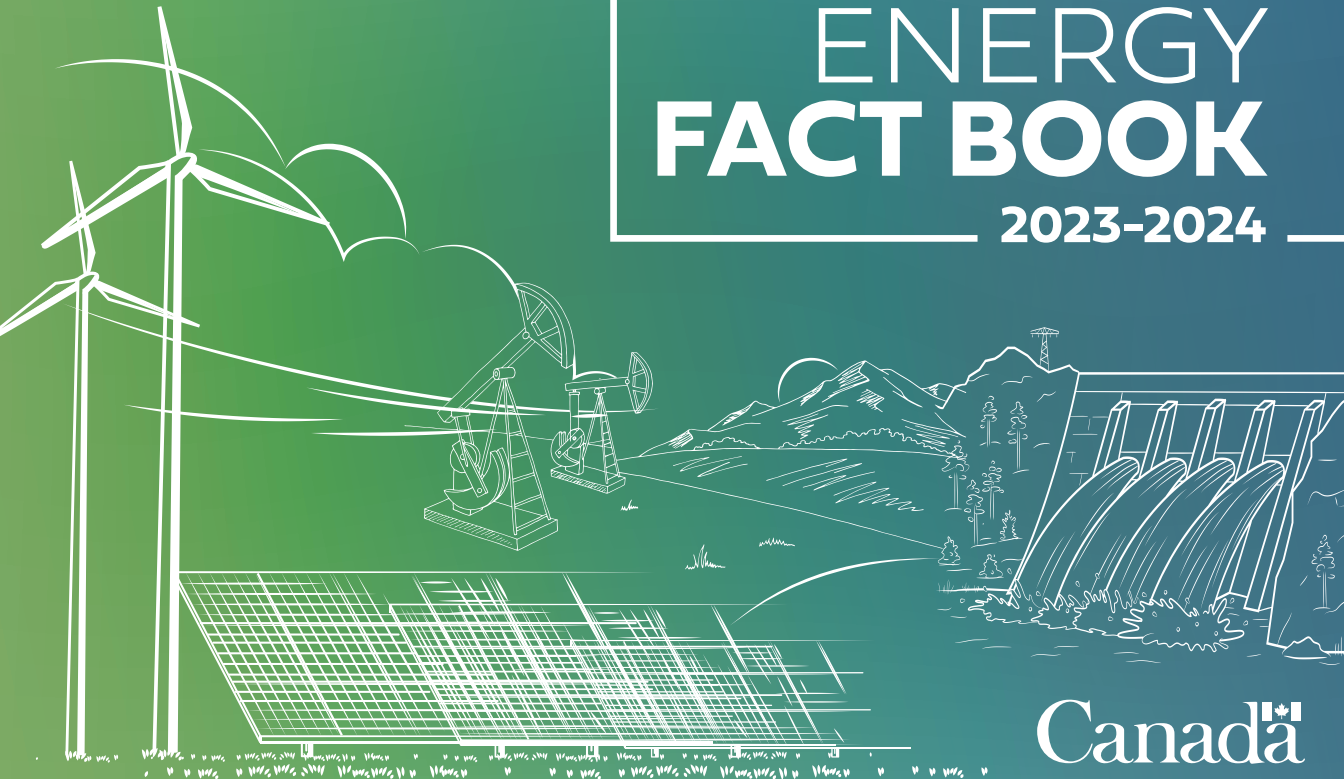


Natural Resources
Canada

Ressources naturelles
Canada

ENERGY FACT BOOK

2023-2024



Canada



Natural Resources
Canada

Ressources naturelles
Canada

ENERGY **FACT BOOK** 2023–2024

Canada

Aussi disponible en français sous le titre : Cahier d'information sur l'énergie, 2023-2024

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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.

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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.

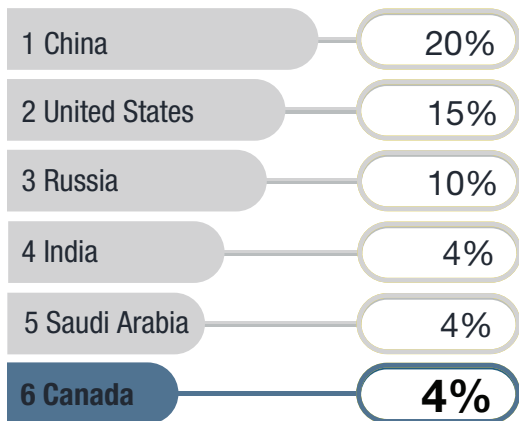
For over ten years, the *Energy Fact Book* has provided a solid foundation for Canadians to understand and discuss important developments across the energy sector. A significant milestone in Canadian energy information was achieved in 2019 with the launch of the Canadian Center for Energy Information (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*.

ENERGY PRODUCTION AND SUPPLY

CANADA: A GLOBAL ENERGY LEADER

The amount of primary energy produced by Canada in 2021 is **35% more** than in 2005. The world, on average, has increased energy production by **27%** in the same period.

WORLD TOTAL PRIMARY ENERGY PRODUCTION TOP ENERGY PRODUCERS, 2021



GLOBAL ENERGY RANKINGS FOR CANADA

	Proved reserve/ capacity	Production	Exports
Crude oil	4	4	3
Uranium	3	2	2
Hydroelectricity	4	2	-
Electricity	8	7	3
Coal	16	14	7
Natural gas	17	5	6

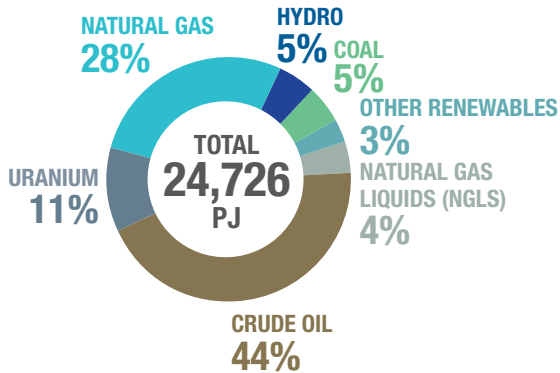
CANADIAN ENERGY PRODUCTION

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.

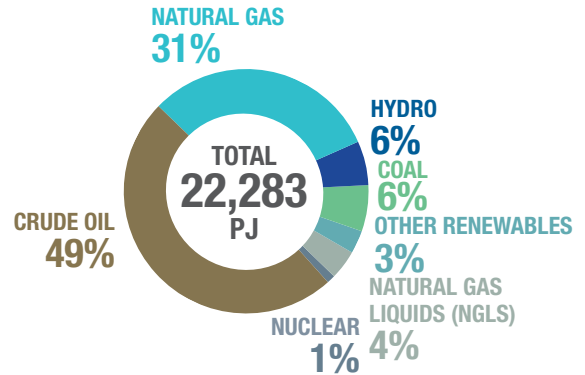
The second method—also employed by the International Energy Agency (IEA), the Energy Information Administration (EIA) and others—treats domestic electricity production from nuclear energy as primary energy, but not uranium itself. Uranium is energy-dense, and Canada exports most of its uranium production,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

PRIMARY ENERGY PRODUCTION BY SOURCE (2021)

PRIMARY ENERGY PRODUCTION,
INCLUDING URANIUM



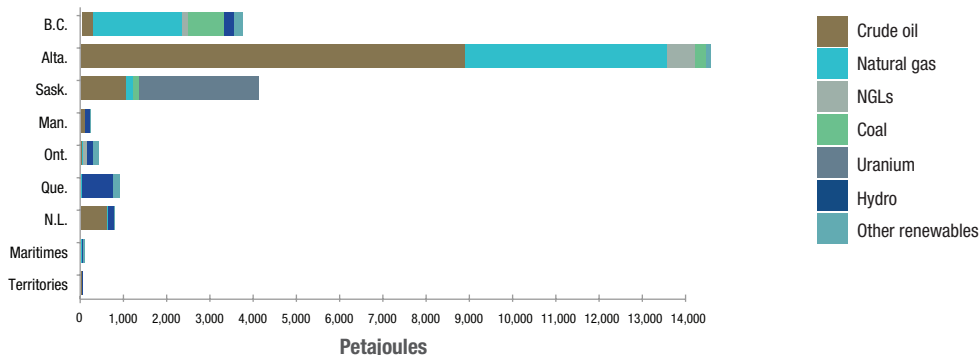
PRIMARY ENERGY PRODUCTION,
EXCLUDING URANIUM



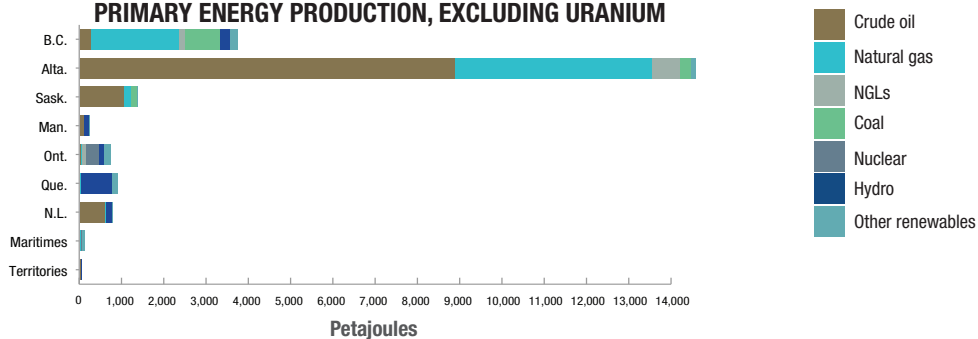
"Other renewables" includes wind, solar, wood/wood waste, biofuels and municipal waste.

PRIMARY ENERGY PRODUCTION BY REGION AND SOURCE (2021)

PRIMARY ENERGY PRODUCTION, INCLUDING URANIUM



PRIMARY ENERGY PRODUCTION, EXCLUDING URANIUM

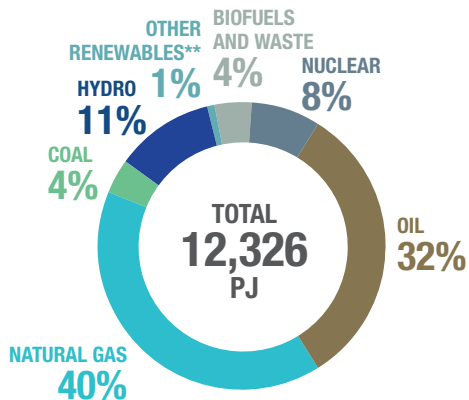


CANADA'S ENERGY SUPPLY

A look at Canada's total energy supply (TES) helps to better understand the impact of energy sources on GHG emissions. The TES¹ is calculated as:

$$\text{TES} = \text{PRODUCTION} + \text{IMPORTS} - \text{EXPORTS} + \text{STOCK CHANGES}$$

**CANADA TOTAL ENERGY SUPPLY,*
BY SOURCE, 2021**



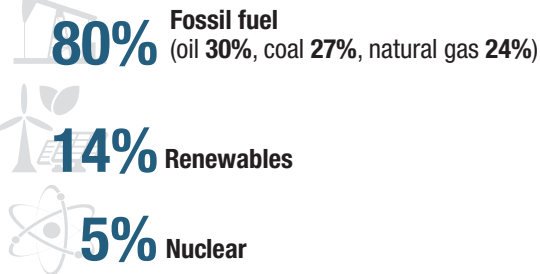
* not including electricity trade

**"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).

- Fossil fuels made up **76%** of Canada's TES in 2021.
- Renewable energy sources made up **16.6%** of Canada's TES in 2021.

Comparatively, the global TES is made up of

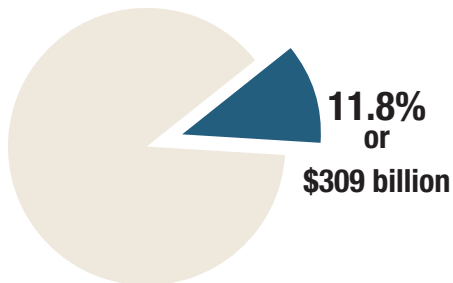


ECONOMIC CONTRIBUTIONS

NOMINAL GROSS DOMESTIC PRODUCT (2022)

ENERGY'S NOMINAL GDP CONTRIBUTION FOR CANADA

NOMINAL GDP (% OF CURRENT DOLLARS)



CANADIAN GDP

ENERGY DIRECT 9.4% (\$245 billion)

PETROLEUM 7.2%

ELECTRICITY 1.7%

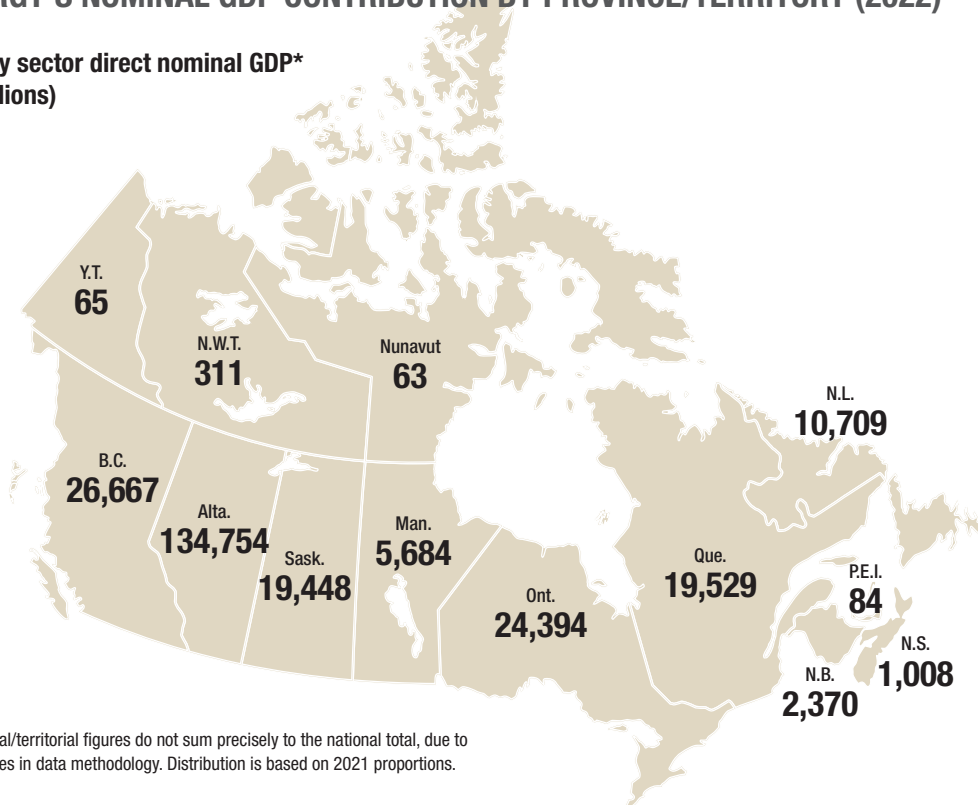
OTHER 0.5%

ENERGY INDIRECT 2.4% (\$64 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.iadinfoddc-dciinfoiad.statcan@statcan.gc.ca.

ENERGY'S NOMINAL GDP CONTRIBUTION BY PROVINCE/TERRITORY (2022)

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 (2022)

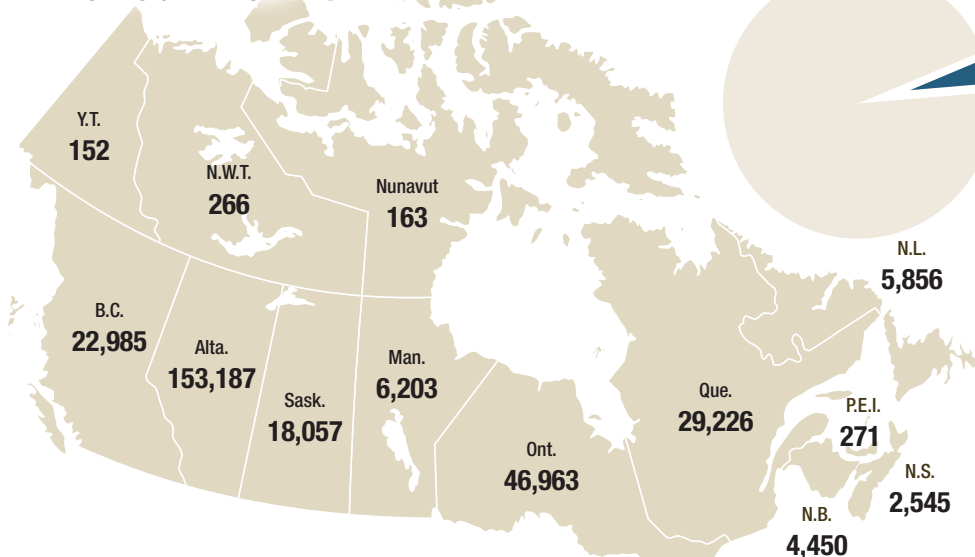
DIRECT: 290,300 JOBS

INDIRECT: 405,800 JOBS

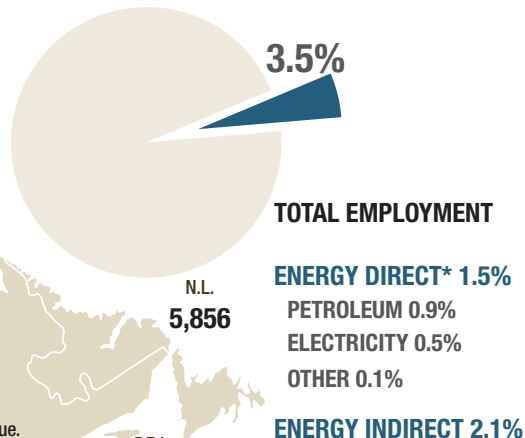
TOTAL: 696,100 JOBS

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

ENERGY SECTOR DIRECT EMPLOYMENT BY PROVINCE/TERRITORY*



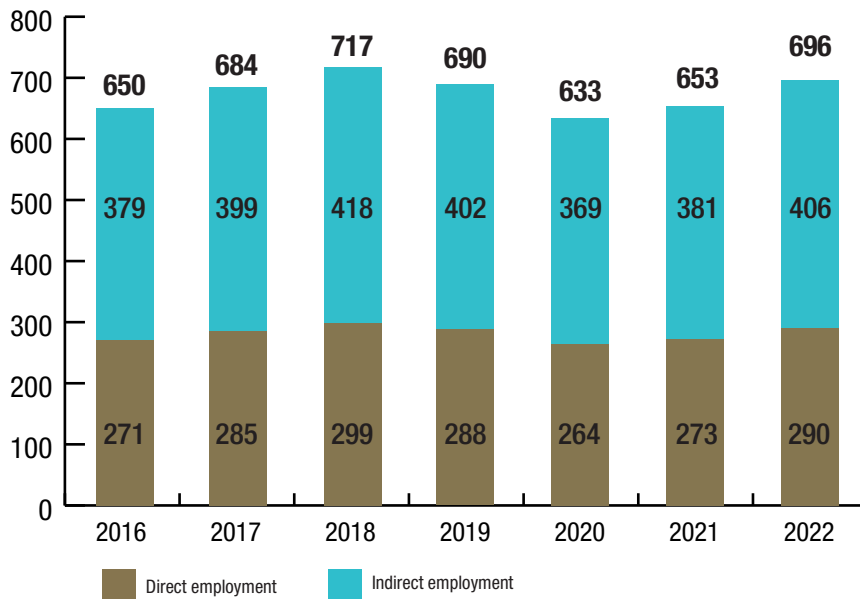
SHARE OF TOTAL EMPLOYMENT, 2022



*Provincial/territorial and sectoral employment figures do not sum precisely to the national total due to rounding.

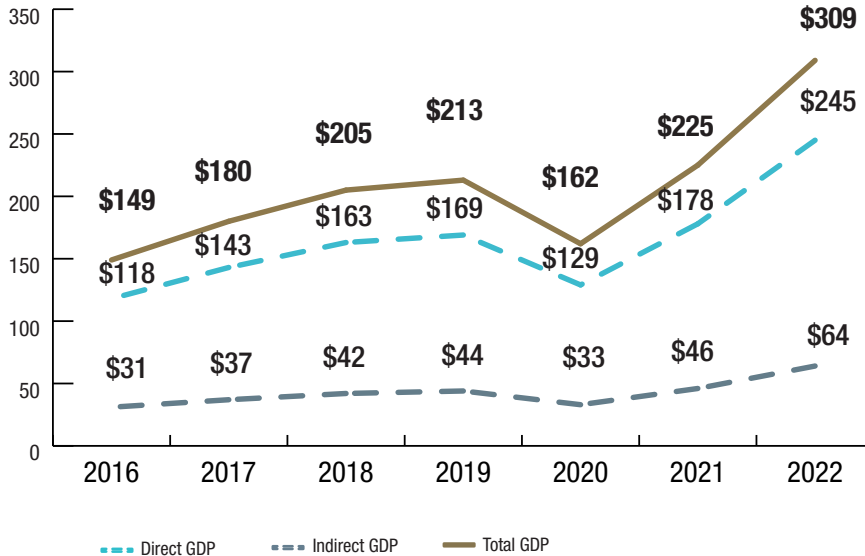
The indirect contribution is not comparable to previously published estimates due to revisions and a change in estimation methodology by Statistics Canada. For more information on Statistics Canada's estimation methodology, please contact statcan.iadinfoddc-dciinfoiad.statcan@statcan.gc.ca.

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.iadinfoddc1-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.iadinfoddc-dciinfoiad.statcan@statcan.gc.ca.

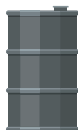
ENERGY TRADE (2022)

Energy exports

\$240.5 billion
representing

33%

of total Canadian
goods exports

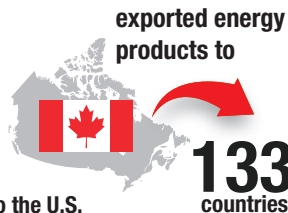


Oil and gas domestic
exports totalled

\$217 billion

of which

96% were to the U.S.



The U.S. accounts for



90%

of energy exports
by value
(\$216.5 billion)

Exports to the U.S.



Crude oil

Natural gas

Electricity

Coal

% 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
97	77	60	24
100*	46	99	9
100	8	92	1
3	1	28	0.3

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

Energy imports

\$65.3 billion
representing



of total Canadian
goods imports

imported energy
products from



117
countries

The U.S. accounts for



76%

of energy imports
by value
(\$50 billion)

Imports from the U.S.



Crude oil



Natural gas



Electricity



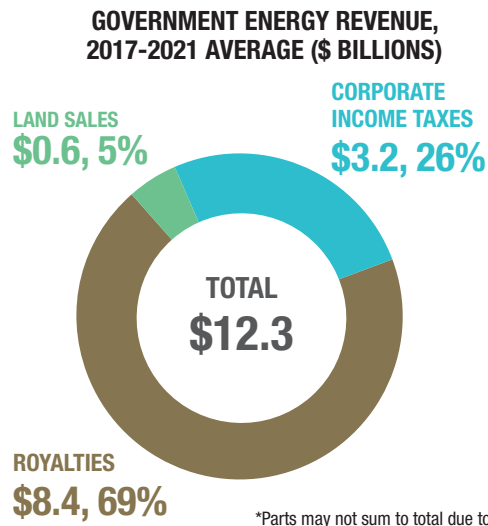
Coal



% of Canadian imports originating from U.S.	% of U.S. exports destined for Canada	% of Canadian consumption supplied by U.S.
50	9	20
99	14	20
100	67	2
75	5	28

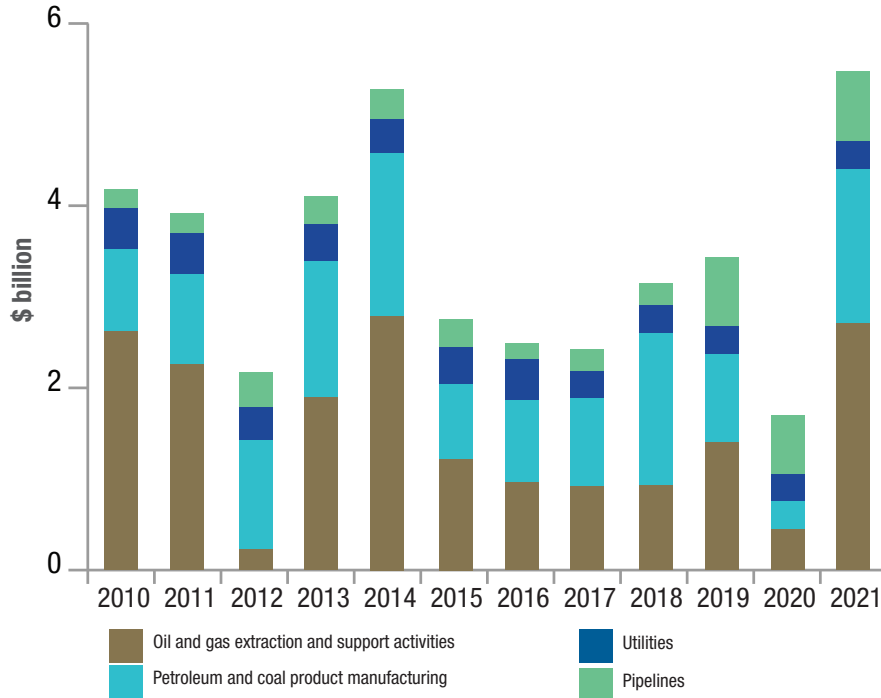
GOVERNMENT REVENUES

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.



- An important share of government revenues is collected from the petroleum sector, which averaged **\$12 billion** over the last five years, including **\$10 billion** from upstream oil and gas extraction and its support activities.
- Between 2017 and 2021, the energy sector's share of taxes paid by all industries was **4.6%**. Operating revenues of the energy sector represented **8.6%** of all operating revenues earned by industries in Canada.

CORPORATE INCOME TAXES PAID BY ENERGY INDUSTRIES (Federal and Provincial)



ENERGY AND GHG EMISSIONS



In 2020,

77%

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 81%** 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 2021, emissions increased slightly as economic activity began to recover from the impacts of the COVID-19 pandemic, with 2021 emissions 53 Mt lower than in 2019 (-7.4%).


Between 2000 and 2021,
Canada's GHG emissions
decreased by

 **6.8%**

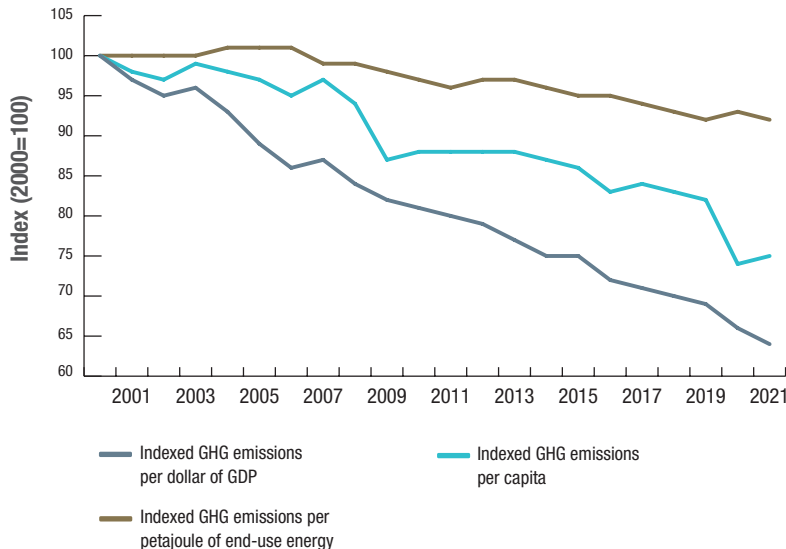
while GDP increased

 **46%**

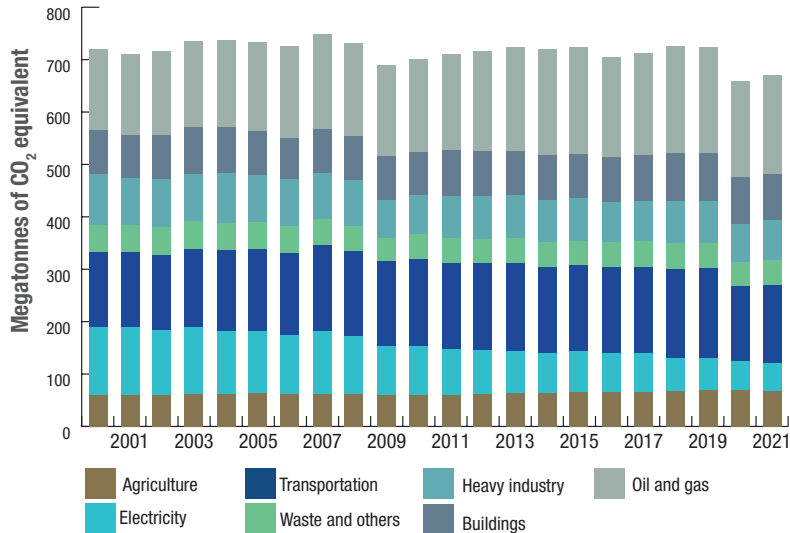
GHG emissions decreased

 **36%**
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, 2000–2021



GHG EMISSIONS BY CANADIAN ECONOMIC SECTOR, 2000–2021



- Between 2000 and 2021, **emissions from electricity production decreased 60%**, largely because of Ontario's successful coal phase-out action plan, which started in 2001.
- **Emissions from oil and gas production increased 23%** largely due to an increase of 59% in production.
- **Emissions from heavy industry have decreased by 21%** despite an increase in output of the industrial sector. This is due in part to improvements in energy efficiency and fuel switching.

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 (¢/m³) (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 (U₃O₈)
- 1 lb. U₃O₈ = 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 m³ of crude oil = 39.0 GJ
- 1,000 m³ 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

AECO	Alberta Energy Company	GST	Goods and Services tax
B	billion	GWh	gigawatt hours
b/d	barrels per day	HGL	hydrocarbon gas liquids
Bcf/d	billion cubic feet per day	HST	Harmonized sales tax
Bcm/d	billion cubic metres per day	IEA	International Energy Agency
CANDU	Canada deuterium uranium	IHA	International Hydropower Association
CanREA	Canadian Renewable Energy Association	kg	kilogram
CCS	carbon capture and storage	km	kilometre
CCUS	carbon capture, utilization and storage	km ²	square kilometre
CDIA	Canadian direct investment abroad	kt	kilotonne
CEA	Canadian energy assets	kWh	kilowatt hour
CER	Canada Energy Regulator	lb.	pound
CO ₂ equivalent	carbon dioxide equivalent	L	litre
CPI	consumer price index	LCOE	levelized cost of electricity
CPL	cents per litre	LNG	liquefied natural gas
ECTPEA	Environmental and Clean Technology Products Economic Account	LPG	liquefied petroleum gases
EGS	enhanced geothermal system	LWR	light water reactor
EIA	Energy Information Administration (U.S.)	m	metre
EU	European Union	m ²	square metre
FDI	foreign direct investment	m ³	cubic metre
G7	seven wealthiest major developed nations: Canada, France, Germany, Italy, Japan, U.K. and U.S.	Mb/d	thousand barrels per day
GDP	gross domestic product	MJ	megajoule
GHG	greenhouse gas	MMb/d	million barrels per day
GJ	gigajoule	MMcf/d	million cubic feet per day
		MMbtu	million British thermal units
		Mt	million tonnes; megatonne

Mtoe	million tons of oil equivalent	P/T	provincial/territorial
MW	megawatt	PV	photovoltaic
NGCC	natural gas combined cycle	RD&D	research, development and demonstration
NGL	natural gas liquids	R&D	research and development
NRCan	Natural Resources Canada	RPP	refined petroleum products
NRSA	Natural Resources Satellite Account	SDTC	Sustainable Development Technology Canada
NSERC	National Science and Engineering Research Council of Canada	Tcf	trillion cubic feet
OECD	Organisation for Economic Co-operation and Development	Tcm	trillion cubic metres
PHWR	pressurized heavy water reactor	Tkm	tonne-kilometre
PJ	petajoule	t	tonnes
Pkm	passenger-kilometre	TPES	total primary energy supply
Provinces	Alta. – Alberta	TWh	terawatt-hour
	B.C. – British Columbia	U.K.	United Kingdom
	Man. – Manitoba	U.S.	United States
	N.B. – New Brunswick	US\$	United States dollars
	N.L. – Newfoundland and Labrador	WTI	West Texas Intermediate
	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		

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:** Statistics Canada tables 25-10-0020-01, 25-10-0029-01, 25-10-0030-01, 25-10-0031-01, and 25-10-0082-01 and NRCan estimates
 - **Canada's energy supply:** IEA Annual Database, World Energy Balances and IEA Standing Group on Long-Term Co-operation questionnaire
 - **Primary and secondary energy use:** Natural Resources Canada's National Energy Use Database
- **ECONOMIC CONTRIBUTION**
 - **GDP:** Statistics Canada tables 38-10-0285-01, 36-10-0221-01, 36-10-0103-01 and 36-10-0400-01 and NRCan estimates
 - **Employment:** Statistics Canada tables 38-10-0285-01, 36-10-0214-01, 36-10-0489-01, 36-10-0480-01, 36-10-0221-01, 36-10-0400-01, 14-10-0023-01, Provincial NRSA and Statistics Canada special tabulations
 - **Energy Trade:** Statistics Canada International Merchandise Trade Database, IEA Annual Database and United States EIA (U.S. Imports by Country of Origin)
 - **Canada-U.S. Energy Trade:** Statistics Canada International Merchandise Trade Database and United States EIA (U.S. Imports by Country of Origin)

- **Government Revenues:** Statistics Canada Table 33-10-0500-01 and Canadian Association of Petroleum Producers, Statistical Handbook, Table 01-01 (Crown land sales Western Canada and Canada lands)

• ENERGY AND GHG EMISSIONS

- **GHG Emissions by Sector:** Environment and Climate Change Canada (National Inventory Report), Climate Watch Data Explorer and Statistics Canada Table 17-10-0134-01

SECTION 2: INVESTMENT

- **Capital expenditures:** Statistics Canada tables 34-10-0035-01, 34-10-0036-01, and 34-10-0040-01
- **Canada's Energy Infrastructure:** StatCan Table: 36-10-0608-01: Infrastructure Economic Accounts, investment and net stock by asset, industry, and asset function
- **Canada's Major Energy Projects:** NRCan Major Project Inventory
- **Foreign Direct Investment and Canadian Direct Investment Abroad:** Statistics Canada Table 36-10-0009-01
- **Foreign Control of Canadian Assets:** Statistics Canada 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, 38-10-0132-01

SECTION 3: SKILLS, DIVERSITY AND COMMUNITY

- **Energy Sector Demographics:** Statistics Canada Natural Resources Account, special release tables.
- **Energy Affordability:** NRCan estimates based on Statistics Canada special tabulations
- **Household Expenditures on Energy:** Statistics Canada Table 11-10-0222-01
- **Energy Retail Prices:** Statistics Canada tables 18-10-0004-01 and 18-10-0001-01 and IEA Annual Database
- **Energy Reliant Communities:** NRCan analysis based on Statistics Canada 2021 Census Data

SECTION 4: ENERGY EFFICIENCY

- **ENERGY USE**
 - **Primary and secondary energy use:** Natural Resources Canada's National Energy Use Database
 - **Energy efficiency:** Natural Resources Canada's National Energy Use Database and Natural Resources Canada Energy Efficiency Trends in Canada 2000-2020
 - **Energy intensity:** Natural Resources Canada's National Energy Use Database
 - **Energy in our daily lives:** Natural Resources Canada's Energy Efficiency Trends in Canada 2000-2020
 - **Residential Energy Use, water heating and space heating** Natural Resources Canada's National Energy Use Database and NRCan estimates
 - **Residential, commercial, institutional and industrial sectors:** Natural Resources Canada's National Energy Use Database

• ENERGY TRENDS

- **Trends in Energy use and intensity:** Natural Resources Canada's National Energy Use Database

SECTION 5. CLEAN POWER AND LOW CARBON FUELS

• CLEAN TECHNOLOGY AND THE ECONOMY

- **Environmental and clean technology:** compiled by NRCan from Statistics Canada data and other public sources (Toronto Stock Exchange), NRCan 2022 Cleantech Industry Survey

• ELECTRICITY

- **World production and exports:** IEA database (Electricity Information [note: IEA production/generation data is expressed on a "gross" basis, i.e. before generating station use])
- **Trade:** CER Table (Electricity Exports and Imports Statistics), and Statistics Canada.
- **Canadian and provincial supply:** compiled by Statistics Canada and NRCan's Electricity Division from various sources
- **Prices:** Hydro-Québec (Comparison of Electricity Prices in Major North American Cities)
- **Electricity energy use:** Office of Energy Efficiency Comprehensive Energy Use Database.
- **Levelized cost of electricity:** CER (Canada's Adoption of Renewable Power Sources – Energy Market Analysis)

• RENEWABLES

- **Electricity GHG emissions:** Environment and Climate Change Canada (National Inventory Report)
- **International context – Production:** IEA (Renewables Information)

- **International context – share of energy supply:** IEA (Electricity Information, Energy Balances of OECD Countries, and Energy Balances of Non-OECD Countries) and United States EIA
 - **Domestic production:** IEA (Renewables Information) and NRCan data based on Statistics Canada
 - **Hydro – international generation:** IEA (Electricity Information, Energy Balances of OECD Countries, and Energy Balances of Non-OECD Countries)
 - **Hydro – capacity in Canada:** International Hydropower Association (Hydropower Status Report)
 - **Hydro – facilities and projects:** compiled by NRCan from Statistics Canada and other public sources
 - **Biomass – Renewable balance:** IEA database (Renewables balances)
 - **Biomass – production:** Statistics Canada Table 25-10-0031-01, Statistics Canada International Merchandise Trade Database and NRCan
 - **Biomass – wood fuel use by sector:** IEA (Renewables Information)
 - **Wind – international context:** Global Wind Energy Council (Global Wind Report)
 - **Wind – capacity in Canada:** compiled by NRCan from CanREA data
 - **Wind generation in Canada:** compiled by Statistics Canada and NRCan from various sources
 - **Wind – wind farms:** CanREA data
 - **Solar PV – international context:** Renewable Energy Policy Network for the 21st Century (Renewables 2023 Global Status Report)
 - **Solar PV – capacity in Canada:** compiled by NRCan from CanREA data
 - **Solar PV – generation in Canada:** compiled by Statistics Canada and NRCan from various sources
 - **Solar PV – solar PV farms:** compiled by NRCan from CanREA data
- **URANIUM AND NUCLEAR**
- **Biofuels – regulations:** compiled by Office of Energy Efficiency from various public sources
 - **World uranium production and exports:** World Nuclear Association (World Uranium Mining) and NRCan estimates based on World Nuclear Association production data
 - **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, 2020 Ed.)
 - **Canadian supply and demand:** World Nuclear Association (Uranium in Canada), Cameco Annual report and estimates compiled by NRCan from company information
 - **Nuclear in Canada infographic:** NRCan website (Nuclear Energy and Uranium)
 - **Purchases by U.S. nuclear reactors:** United States EIA (Uranium Marketing Annual Report) Table 3 (Uranium purchased by owners and operators of U.S. civilian nuclear power reactors by origin country and delivery year)
 - **CANDU nuclear reactors:** Based on figures compiled by NRCan
 - **Nuclear power plants in Canada:** compiled by NRCan from Statistics Canada Table 57-206, International Atomic Energy Agency Power Reactor Information System and other public sources

- **Spot prices:** United States EIA Annual Uranium Market Report
- **BIOFUELS AND TRANSPORTATION**
 - **Biofuels – regulations:** compiled by Office of Energy Efficiency from various public sources
 - **Biofuels – international context:** IEA (Renewables Information)
 - **Biofuels – production, supply and demand :** Compiled by NRCan from a variety of sources
 - **Transportation – Electric vehicle sales:** Statistics Canada Table: 20-10-0021-01
 - **Transportation – GHG emissions:** Environment and Climate Change Canada (National Inventory Report)
 - **Hydrogen – NRCan Hydrogen Strategy for Canada,** EIA Global Hydrogen Review

SECTION 6: PETROLEUM, GAS AND COAL

- **CRUDE OIL**
 - **World production and exports:** IEA Online Data Services (Crude Oil Information)
 - **World proved reserves:** Oil and Gas Journal (Worldwide Look at Reserves and Production)
 - **Canadian Resources:** CER (Canada’s Energy Future Data Appendices) and Oil & Gas Journal (World proved reserves)
 - **Wells completed and metres drilled in western Canada:** Canadian Association of Petroleum Producers, Statistical Handbook, Wells and Metres Drilled in Western Canada (2021 Drilling Activity)
 - **Canadian and provincial production:** Statistics Canada Table 25-10-0063-01 and NRCan analysis
- **Canadian Supply and Demand:** Statistics Canada Table 25-10-0063-01 and Statistics Canada International Merchandise Trade Database, United States EIA (Imports by Country of Origin, Refining and Processing, total crude oil and products, consumption/sales)
- **Trade:** Statistics Canada table 25-10-0063-01 and Statistics Canada International Merchandise Trade Database, U.S. EIA (Imports by Country of Origin, Refining and Processing, total crude oil and products, consumption/sales)
- **Oil Sands:** Canadian Association of Petroleum Producers, Statistical Handbook, Table 04-14 (Canada Oil Sands Expenditures), Statistics Canada tables 34-10-0036-01 and 25-10-0063-01, Alberta Energy Regulator ST98 (Alberta’s Energy Reserves and Supply/Demand Outlook) table S3.1 (Crude bitumen production) and NRCan analysis
- **Prices:** United States EIA tables (Spot Prices for Crude Oil) and Sproule
- **Pipelines:** CER (Crude Oil Pipeline Transportation System)
- **Transportation by Rail:** CER (Canadian Crude Oil Exports by Rail – Monthly Data) , Statistics Canada table 23-10-0062-01 and various sources
- **Oil Sands Environmental Considerations:** NRCan compiled using Environment and Climate Change Canada (National Inventory Report 1990 to 2021: Greenhouse Gas Sources and Sinks in Canada), World Resources Institute (CAIT - Country Greenhouse Gas Emissions Data), Alberta Government (Oil Sands Information Portal), Alberta Energy Regulator, Statistics Canada, NRCan Boreal forest website, Alberta Government Lower Athabasca Regional Plan and Canadian Association of Petroleum Producers (Frequently used statistics)

• NATURAL GAS

- **World production and exports:** IEA (Natural Gas Information)
 - **World proved reserves:** U.S. EIA, International Data Browser
 - **World unproved technically recoverable shale resources:** U.S. EIA, World Shale Resource Assessments
 - **World resources and technically recoverable resources:** IEA (World Energy Outlook 2017, 2014 and 2013) tables 5.3 (Remaining technically recoverable natural gas resources by type and region), 8.2 (Remaining technically recoverable natural gas resources by type) and 3.3 (Remaining technically recoverable natural gas resources by type and region) and Oil and Gas Journal (Worldwide Look at Reserves and Production)
 - **Canada and US proved reserves:** U.S. EIA and O&G Journal, extracted from EIA International Data Browser
 - **Marketable and technically recoverable resources:** CER Energy Future Report, EIA Annual Energy Outlook, Assumptions to AEO - Oil and Gas Supply Module, EIA Shale gas proved reserves, IEA World Energy Outlook
 - **Canadian production and share of conventional versus unconventional production:** StatCan Table: 25-10-0055-01 Natural gas supply and disposition and CER Energy Futures, Natural Gas Production by Type
 - **US production and share of conventional versus unconventional production:** U.S. EIA, Dry Natural Gas Production, Annual and US EIA Annual Energy Outlook
 - **LNG Imports of North American countries:** CER LNG Imports and Exports, U.S. EIA Liquefied Natural Gas Imports and Exports, Annual, and IGU World LNG Report
 - **Natural gas wells completed and average metres drilled:** CAPP, Statistical Handbook
 - **Canadian trade of natural gas:** CER Exports and Imports of Natural Gas
 - **Marketable Production by Province:** StatCan Table: 25-10-0055-01 Natural gas supply and disposition
 - **Prices:** Sproule Price Forecast
 - **Pipelines:** Canada Energy Regulator
 - **Natural gas energy use:** NRCAN Office of Energy Efficiency, National Energy Use Database
 - **Consumption:** Statistics Canada Table 25-10-0030-01 and IEA Annual Mini-Questionnaire
- ## • HGLs
- **Processing plant production:** StatCan Table 25-10-0036-01 - Supply of natural gas liquids and sulphur products from processing plants
 - **Refinery production:** Gross production of HGLs from StatCan Monthly Refined Petroleum Product Survey
 - **Shares of NGL Production by province:** CAPP Statistical Handbook
 - **NGLs end use:** NRCAN Office of Energy Efficiency, National Energy Use Database
- ## • RPPs
- **Canadian refineries:** compiled by NRCAN (from company information, Conference Board of Canada, Canada's Petroleum Refining Sector Canadian Fuels Association, Canadian Association of Petroleum Producers, Oil Sands magazine and CanOils Database)
 - **Supply and Demand:** Statistics Canada Tables, 25-10-0063-01 and 25-10-0081-01 and NRCAN Analysis

- **Crude oil shipped to domestic refineries:** Statistics Canada table 25-10-0063-01
- **Domestic consumption by product:** Statistics Canada table 25-10-0081-01 and analysis by NRCan
- **Trade:** Statistics Canada Table 25-10-0081-01, United States EIA (U.S. Imports by Country of Origin for Petroleum and Other Liquids) and Statistics Canada International Merchandise Trade Database
- **Gasoline prices:** Kalibrate Technologies Ltd (average retail prices for regular gasoline and diesel fuel) and data compiled by NRCan
- **Refinery capacity:** Oil sands magazine and estimates compiled by NRCan
- **COAL**
 - **World proved reserves:** Energy Institute (Statistical Review of World Energy)
 - **World production and exports:** IEA (Coal Information)
 - **Canadian supply and demand:** IEA (Coal Information), Statistics Canada International Merchandise Trade Database, and NRCan estimations
- **GHG EMISSIONS FROM PETROLEUM**
 - **GHG Emissions by Sector:** Environment and Climate Change Canada (National Inventory Report)

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