

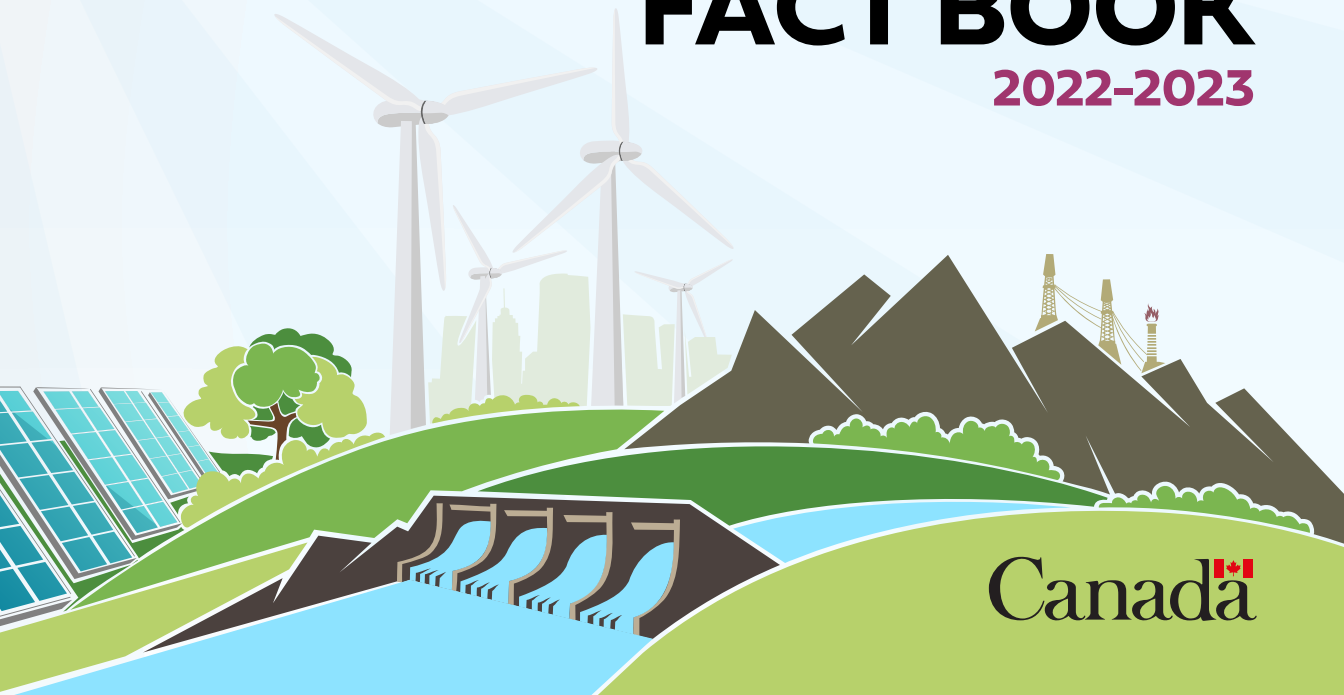


Natural Resources  
Canada

Ressources naturelles  
Canada

# ENERGY FACT BOOK

2022-2023



Canada 





Natural Resources  
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Canada

# ENERGY **FACT BOOK** **2022–2023**

Canada

*Aussi disponible en français sous le titre : Cahier d'information sur l'énergie, 2022-2023*

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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 and International Affairs Branch with the help of subject experts from across Natural Resources Canada (NRCan).

For questions or comments, contact NRCan at **[nrcan.energyfacts-faitsenergetiques.nrcan@canada.ca](mailto:nrcan.energyfacts-faitsenergetiques.nrcan@canada.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.



# Section 2:

# Investment

**Capital expenditures**

**Canada's Energy Infrastructure and Major Energy Projects**

**Foreign Direct Investment and Canadian Direct Investment Abroad**

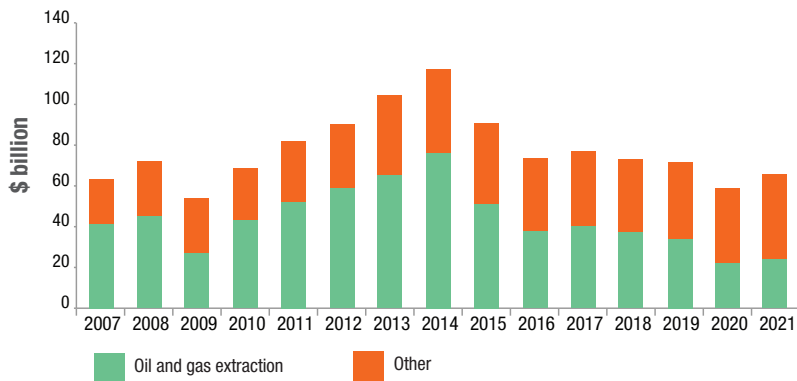
**Canadian Energy Assets Abroad, foreign control of assets**

**RD&D and Mission Innovation**

**Environmental Protection Expenditures**

# CAPITAL EXPENDITURES

Capital expenditures\* in the energy industry, 2007-2021

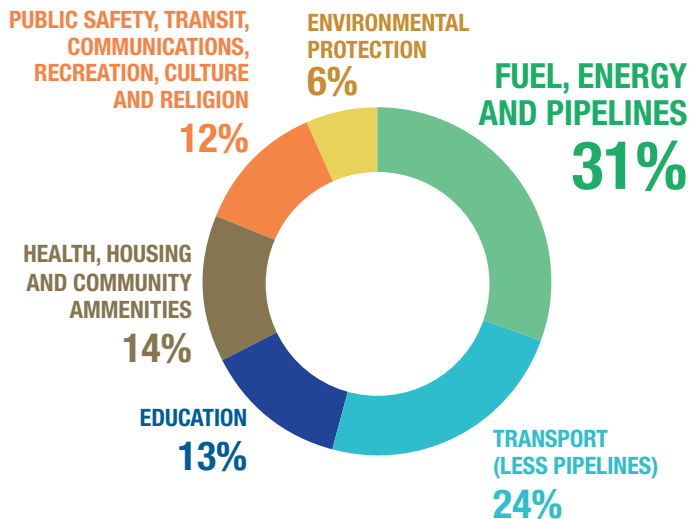


- Capital expenditures in Canada's energy sector totaled **\$66 billion** in 2021, a decrease of 44% from a peak in 2014.
- After reaching an eleven year low of **\$59 billion** in 2020, investment rebounded slightly to **\$66 billion** in 2021.
- Electric power generation and distribution was the largest area of energy sector capital expenditure at **\$25.3 billion** in 2021, surpassing oil and gas extraction (\$23.9 billion) for the first time.

\*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 **31%** of net stock in 2021.



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

created  
**115.7k jobs**

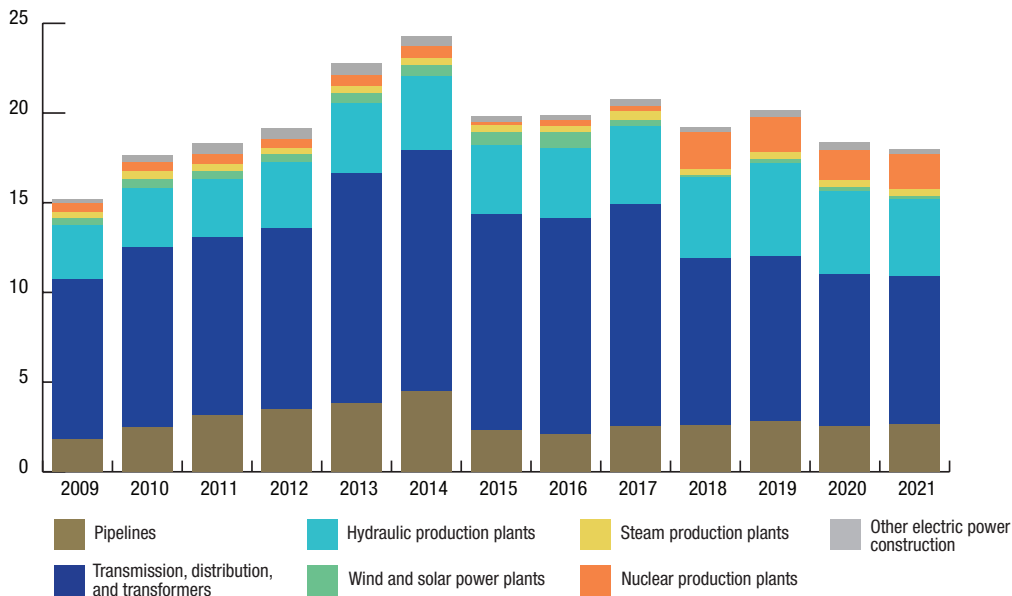
generated **\$9.5 billion**  
in employment income

and **\$18.0 billion**  
in GDP  
in 2021  
(direct and indirect contributions).



Public and private investment in fuel, energy and pipeline infrastructure in 2021 was **\$23.6 billion** (nominal).

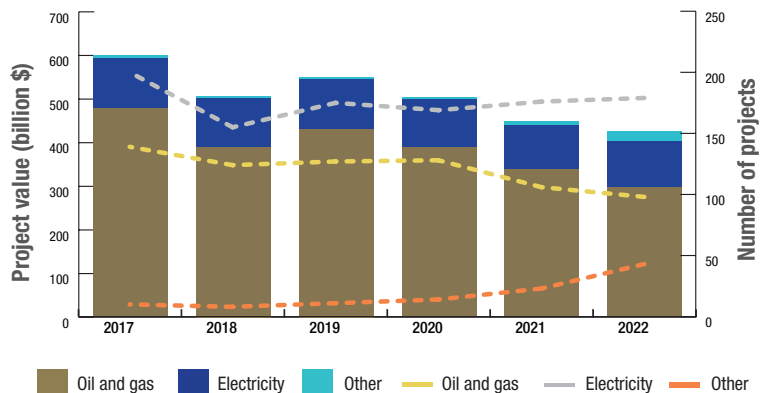
## Public and private investment in fuel, energy and pipeline infrastructure, billion \$ (constant 2012)



# CANADA'S MAJOR ENERGY PROJECTS

- In 2022, there were 320 planned (announced, under review, or approved) energy projects worth **\$427 B**, and 61 energy projects under construction worth **\$46.5 B**.
- Oil and gas sector projects accounted for the largest portion of project value (\$298 billion), while there were more electricity projects overall (179).
- There were **183 clean technology projects** valued at **\$116 B**.

Trends in Major Energy Projects, 2017-2022



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.

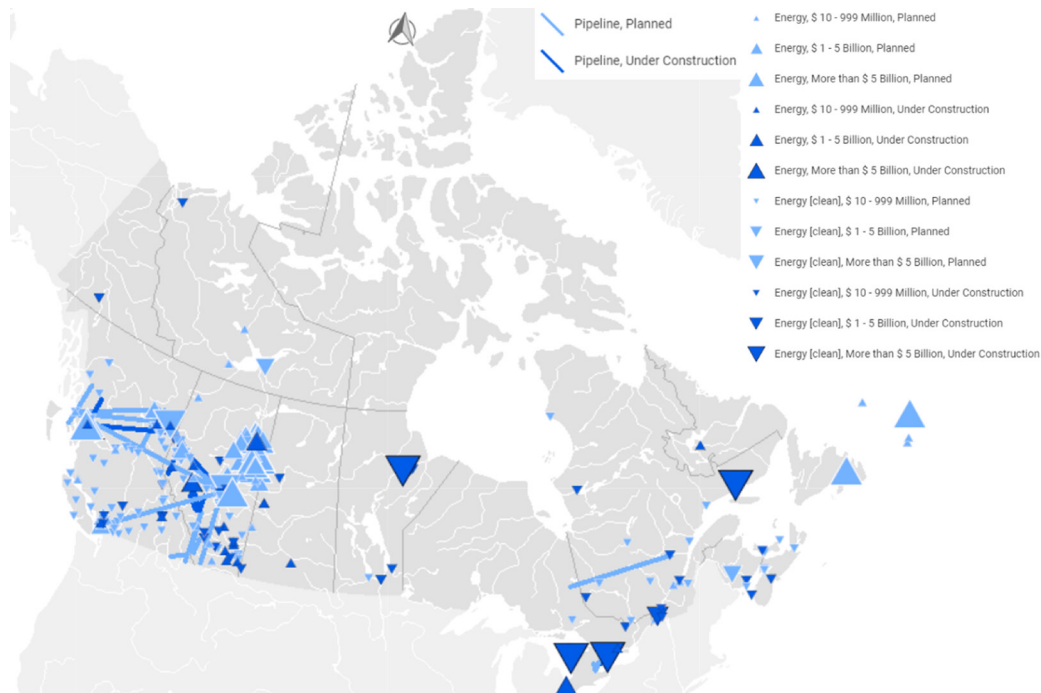
Projects that are either announced, under review, approved and under construction are included.

## CLEAN TECHNOLOGY PROJECT TRENDS 2018-2022

	2018	2019	2020	2021	2022
<b>Total Clean Technology Projects</b>	<b>144 projects (\$109.5B)</b>	<b>151 projects (\$99.3B)</b>	<b>148 projects (\$94.5B)</b>	<b>170 projects (\$103.0B)</b>	<b>183 projects (\$116.0B)</b>
<b>Hydro</b>	65 projects (\$48.2B)	70 projects (\$50.0B)	60 projects (\$48.3B)	59 projects (\$39.2B)	63 projects (\$44.8B)
<b>Wind</b>	27 projects (\$9.1B)	31 projects (\$9.4B)	34 projects (\$7.8B)	39 projects (\$14.1B)	30 projects (\$12.1B)
<b>Biomass/Biofuels</b>	33 projects (\$6.4B)	32 projects (\$3.0B)	28 projects (\$4.5B)	30 projects (\$7.9B)	34 projects (\$9.3B)
<b>Solar</b>	7 projects (\$0.9B)	6 projects (\$0.7B)	8 projects (\$0.9B)	20 projects (\$3.2B)	28 projects (\$2.8B)
<b>Nuclear</b>	5 projects (\$28.5B)	5 projects (\$28.5B)	3 projects (\$26.1B)	4 projects (\$27.4B)	3 projects (\$26.1B)
<b>Carbon Capture and Storage</b>	3 projects (\$16.3B)	2 projects (\$7.2B)	1 project (\$6.0B)	1 project (\$10.0B)	7 projects (\$15.5B)
<b>Geothermal</b>	1 project (\$0.0B)	2 projects (\$0.2B)	3 projects (\$0.3B)	5 projects (\$0.4B)	4 projects (\$0.4B)
<b>Tidal</b>	0 project (\$0.0B)	1 project (\$0.1B)	5 projects (\$0.3B)	5 projects (\$0.3B)	6 projects (\$0.4B)
<b>Other<sup>1</sup></b>	3 projects (\$0.1B)	2 projects (\$0.1B)	6 projects (\$0.3B)	7 projects (\$0.5B)	8 projects (\$4.6B)

<sup>1</sup> Other includes novel initiatives such as micro-grid projects, battery storage projects, bioplastics, and a helium purification plant.

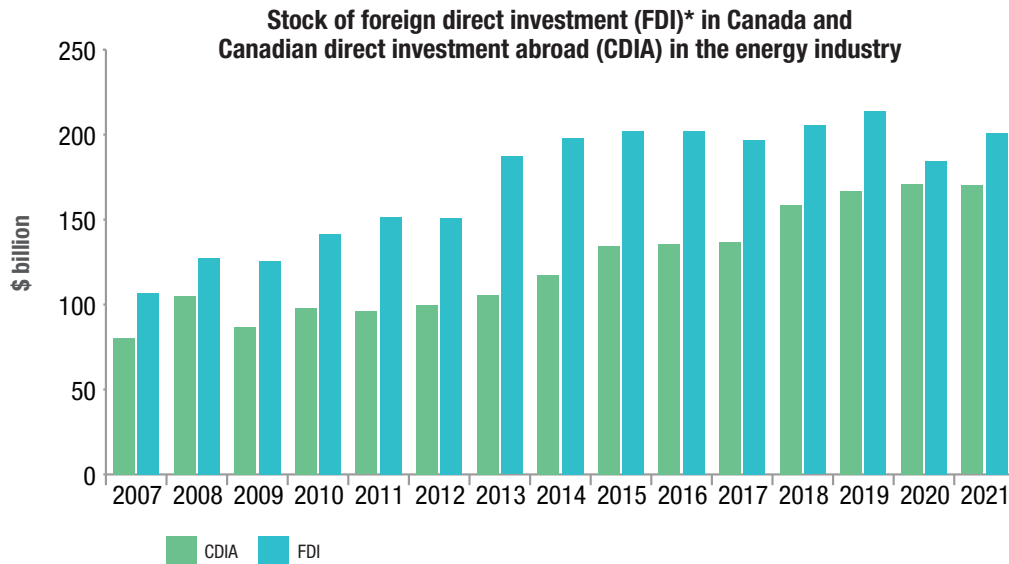
## MAJOR ENERGY PROJECTS PLANNED AND UNDER CONSTRUCTION, 2022-2032





## 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.



\* 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.

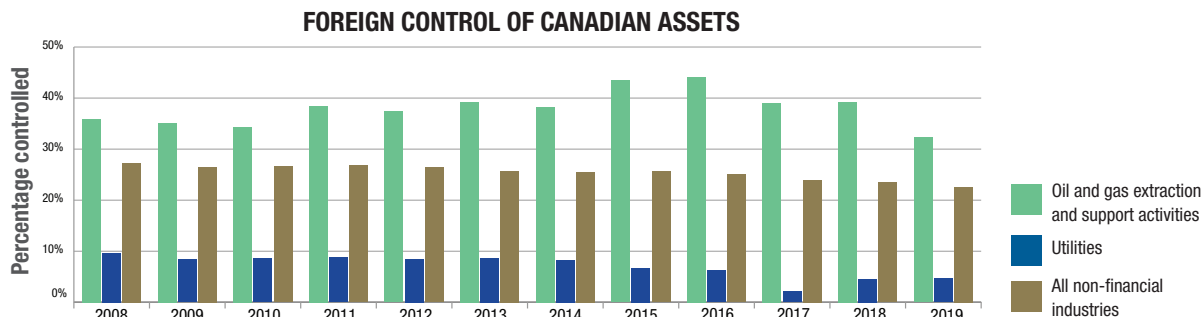
FDI and CDIA include investments in renewable electricity, do not capture other forms of renewable energy.

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

- The stock of **foreign direct investment** (FDI) in the energy sector rose significantly in 2021 to **\$201 billion** (+8.8% over the previous year).
- The energy industry's share of overall FDI in Canada was **19%** in 2021, relatively unchanged from 2020.
- The stock of **Canadian direct investment abroad** (CDIA) was valued at **\$170 billion** in 2021, down **0.6%** from 2020.
- Investment in oil and gas extraction accounted for **\$62 billion** of the CDIA stock in 2021.

## 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 down in 2020 to **\$695 billion**, a slight decrease of **2.5%** from **\$712 billion** in 2019. In 2020, domestic CEA totaled **\$480 billion**, down **4.0%** from 2019, while CEA abroad totaled **\$215 billion**, up from **\$213 billion**.

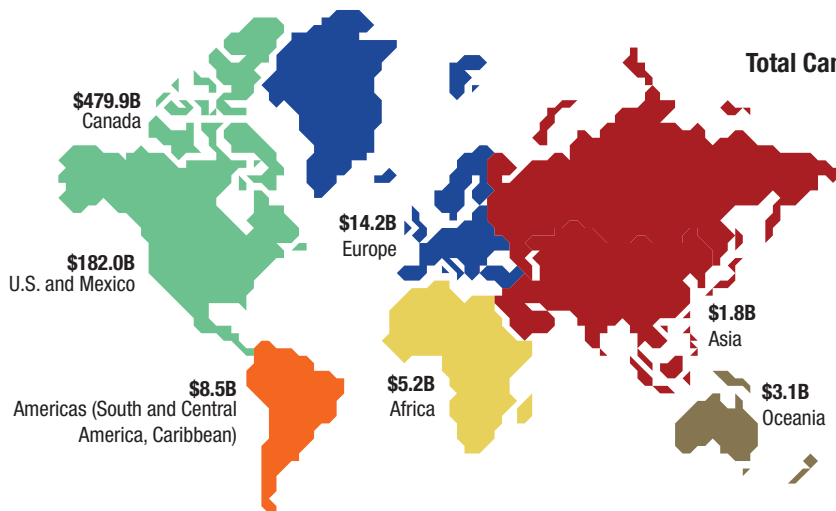
CANADIAN ENERGY ASSETS BY REGION, 2020

Total Canadian energy assets

**\$695B**

Total Canadian energy assets abroad

**\$215B**



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

# RESEARCH, DEVELOPMENT AND DEMONSTRATION

## CANADIAN EXPENDITURES ON TOTAL ENERGY RD&D

In 2020-21, federal energy RD&D expenditures were **\$837 M** and provincial and territorial (P&T) government energy RD&D expenditures were **\$325 M**, for a combined total of **\$1,162 M**.



In 2020-21, federal spending increased by **10% (\$79 M increase)**, primarily driven by energy efficiency related activities. Energy efficiency increased to **\$367 M** in 2020-21, compared to **\$322 M** in 2019-20.



At COP21 in 2015, Canada joined Mission Innovation and committed to double its public investment in clean energy RD&D over five years. At the Sixth Mission Innovation Ministerial in June 2021, Canada announced that it had met its doubling pledge in clean energy RD&D by 2020, with actual spending of **\$786.8 million** in 2019-20 – exceeding its **\$775 M** target. While MI's doubling commitment period has ended, MI members, including Canada, have committed to continue to sustain, and wherever possible increase investment in clean energy RD&D during MI's second phase.

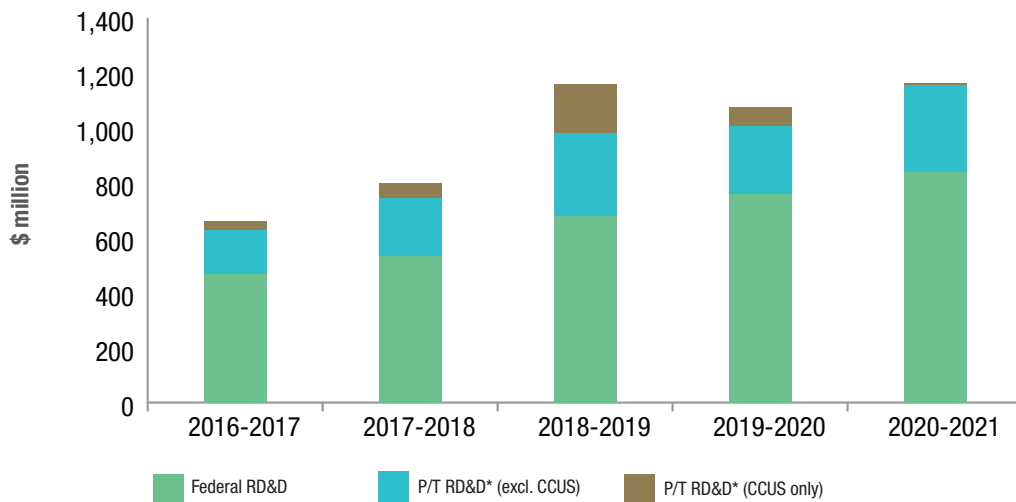


In 2020-21, P&T spending slightly increased by **3% (\$9M increase)**. CCUS continued to decline with spending decreased by **88% to \$8M** in 2020-21, compared to **\$69M** in 2019-20



The Canadian industry spent about **\$1.7 B** on energy R&D in 2020, a slight increase from the spending reported in 2019.







## CANADIAN PUBLIC EXPENDITURES ON ENERGY RD&D



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

Overall, federal, provincial and territorial spending recovered from the decline in 2019-20 to re-attain 2018-19 levels.

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

	 <b>Federal</b> (2020/2021)	 <b>Provincial and territorial</b> (2020/2021)	 <b>Industry</b> (2020)
 <b>Hydrocarbons</b> (including CCUS)	<b>135</b>	<b>73</b>	<b>621</b>
 <b>Renewable and non-emitting energy**</b>	<b>296</b>	<b>150</b>	<b>596</b>
 <b>Energy end use***</b>	<b>406</b>	<b>102</b>	<b>457</b>
<b>Total*</b>	<b>837</b>	<b>325</b>	<b>1,675</b>

\* Totals may not be exact due to rounding.

\*\* Renewable and non-emitting energy includes renewable and nuclear energy.

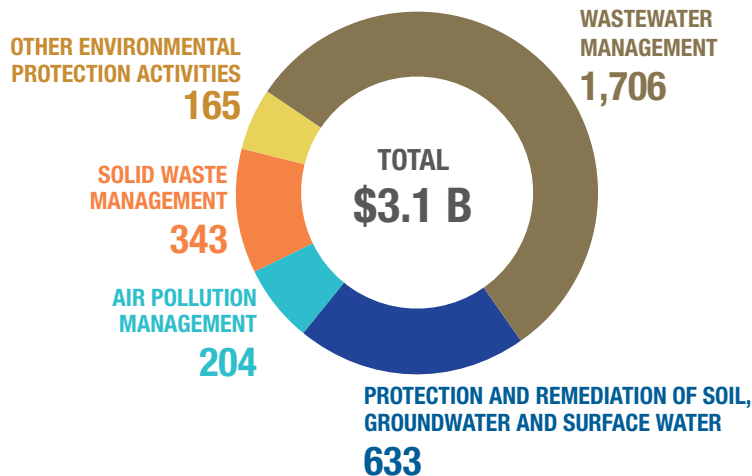
\*\*\* Energy end use includes energy efficiency related to transport, industry, and buildings & communities.

# ENVIRONMENTAL PROTECTION EXPENDITURES

Environmental protection expenditures (operating and capital spending combined) by the energy sector totalled **\$4.2 billion** in 2019, representing **48%** of expenditures made by all industries.

The oil and gas sector (\$3.1 billion) accounts for the largest share of those expenditures, slightly more than one-third (34%) of total environmental protection expenditures made by all industries.

## OIL AND GAS EXTRACTION EXPENDITURES PER ENVIRONMENTAL ACTIVITY (2019, \$ MILLIONS)



- Electric power generation, transmission and distribution invested **\$660 million** on environmental protection measures.
- Petroleum and coal product manufacturing invested **\$501 million** in environmental protection activities, the largest percentage of spending (94%) in pollution abatement and control.





# 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<sup>3</sup>) (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<sub>3</sub>O<sub>8</sub>)
- 1 lb. U<sub>3</sub>O<sub>8</sub> = 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<sup>3</sup> of crude oil = 39.0 GJ
- 1,000 m<sup>3</sup> 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	HGL	hydrocarbon gas liquids
B	billion	HST	Harmonized sales tax
b/d	barrels per day	IEA	International Energy Agency
Bcf/d	billion cubic feet per day	kg	kilogram
Bcm/d	billion cubic metres per day	km	kilometre
CANDU	Canada deuterium uranium	km <sup>2</sup>	square kilometre
CCS	carbon capture and storage	kt	kilotonne
CCUS	carbon capture, utilization and storage	kWh	kilowatt hour
CDIA	Canadian direct investment abroad	lb.	pound
CEA	Canadian energy assets	L	litre
CER	Canada Energy Regulator	LCOE	levelized cost of electricity
CO <sub>2</sub> equivalent	carbon dioxide equivalent	LNG	liquefied natural gas
CPI	consumer price index	LPG	liquefied petroleum gases
CPL	cents per litre	LWR	light water reactor
ECTPEA	Environmental and Clean Technology Products Economic Account	m	metre
EIA	Energy Information Administration (U.S.)	m <sup>2</sup>	square metre
EU	European Union	m <sup>3</sup>	cubic metre
FDI	foreign direct investment	Mb/d	thousand barrels per day
G7	seven wealthiest major developed nations: Canada, France, Germany, Italy, Japan, U.K. and U.S.	MJ	megajoule
GDP	gross domestic product	MMb/d	million barrels per day
GHG	greenhouse gas	MMcf/d	million cubic feet per day
GJ	gigajoule	MMbtu	million British thermal units
GST	Goods and Services tax	Mt	million tonnes; megatonne
GWh	gigawatt hours	Mtoe	million tons of oil equivalent
		MW	megawatt
		NGL	natural gas liquids

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		
P/T	provincial/territorial		
PV	photovoltaic		
RD&D	research, development and demonstration		
R&D	research and development		

## 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
- **Primary Energy Production by Region & Source:**  
Statistics Canada tables 25-10-0020-01, 25-10-0029-01 and 25-10-0007-01 and NRCan estimates
- **Total primary 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 33-10-0006-01, Statistics Canada special tabulation

(royalties) and Canadian Association of Petroleum Producers, Statistical Handbook, Table 01-01C (Crown land sales Western Canada and Canada lands)

#### • ENERGY AND GHG EMISSIONS

- **GHG Emissions by Sector:** Environment and Climate Change Canada (National Inventory Report)

### 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**
- **Environmental Protection Expenditures:** StatCan Environmental protection expenditures by businesses, 2018 (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.
- **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
- **Energy Reliant Communities:** NRCan analysis based on Statistics Canada 2016 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 2000-2018
- **Energy intensity:** Natural Resources Canada's National Energy Use Database
- **Energy in our daily lives:** Natural Resources Canada's Energy Efficiency Trends in Canada 2000-2018
- **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)

### • 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

- **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:** Statistics Canada Table 25-10-0022-01 and compiled by NRCan
- **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 multiple sources (Canadian Wind Energy Association, Statistics Canada and NRCan)
- **Wind generation in Canada:** Statistics Canada Table 25-10-0020-01
- **Wind – wind farms:** compiled by NRCan from Statistics Canada data and other public sources (including Canadian Wind Energy Association)
- **Solar PV – international context:** Renewable Energy Policy Network for the 21st Century (Renewables 2020 Global Status Report)
- **Solar PV – capacity in Canada:** IEA and compiled by NRCan
- **Solar PV – generation in Canada:** Statistics Canada Table 25-10-0020-01
- **Solar PV – solar PV farms:** compiled by NRCan from Statistics Canada data and various public sources
- **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
- **Hydrogen – Hydrogen Strategy For Canada,** <https://www.nrcan.gc.ca/climate-change/canadas-green-future/the-hydrogen-strategy/23080>

## 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:** Canadian Association of Petroleum Producers Statistical Handbook tables 2.6 (Crude Oil Remaining Established Reserves) and 2.1a (Crude Reserves) Alberta Energy Regulator ST98 (Alberta's Energy Reserves and Supply/Demand Outlook), tables R4.5 (Conventional crude oil reserves as of each year-end), R4.1 (Reserve and production change highlights) and 1 (Resources, reserves and production summary)
- **Wells completed and metres drilled in western Canada:** Canadian Association of Petroleum Producers, Statistical Handbook, Wells and Metres Drilled in Western Canada (2020 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), Canada's Oil Sands Innovation Alliance, CanOils Database and NRCan analysis
- **Prices:** United States EIA tables (Spot Prices for Crude Oil) and Sproule
- **Pipelines:** compiled by NRCan
- **Transportation by Rail:** CER (Canadian Crude Oil Exports by Rail – Quarterly 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 2020: 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 reserved:** World Energy Council (BP Statistical Review of World Energy)
  - **World production and exports:** IEA (Coal Information)
  - **Canadian supply and demand:** Public provincial data sources, Statistics Canada table 25-10-0017-01, Statistics Canada International Merchandise Trade Database, public sources and NRCan estimations
- **GHG EMISSIONS FROM PETROLEUM**
  - **GHG Emissions by Sector:** Environment and Climate Change Canada (National Inventory Report)



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