



ALBERTA'S ENERGY STORY



ENERGYIQ



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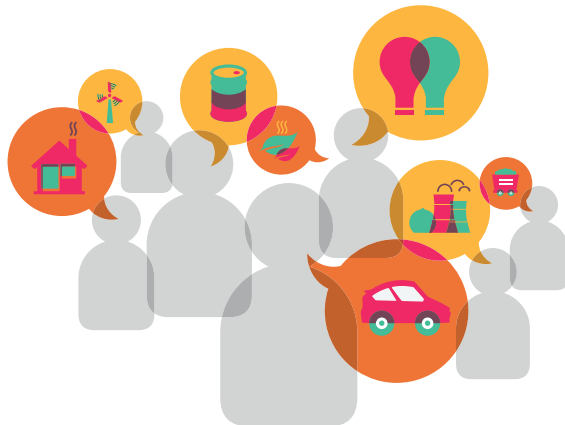
INTRODUCING ENERGY IQ

Alberta is an energy-rich province. It's Canada's largest oil and natural gas producer and ranks third in installed wind capacity in the country.

In total, the province produces seven types of energy, which travel through an intricate web of pipelines and transmission lines running across the country, as well as into the United States.

This factbook offers a snapshot of the energy sector in Alberta. It covers topics such as where natural resources are found for energy production, the process through which energy is turned into electricity, the role of energy exports and imports, how the energy industry impacts the environment, the significant contributions of Alberta's energy industry to Canada's economy, and much more.

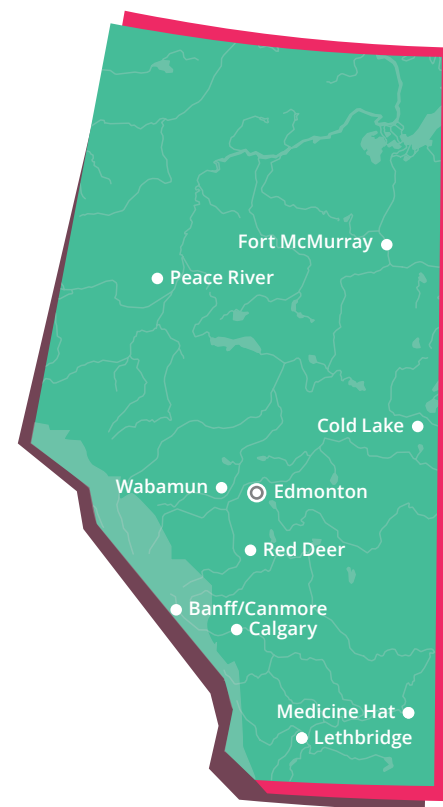
The Alberta Energy Story was produced by Energy IQ, an educational program created and delivered by Canadian Geographic Education. Energy IQ focuses on the demand, production, and transmission of various energy sources in Canada today, with the goal of helping to improve energy literacy across the country among Canadian students and educators.



For more information and resources, visit
energyiq.canadiangeographic.ca

OVERVIEW OF ALBERTA

Alberta produces six types of energy: crude oil, natural gas, coal, hydroelectricity, wind, and biomass.



FAST FACTS

4.3 MILLION
(CURRENT POPULATION)

11.6%
OF CANADIAN
POPULATION

25%
OF CANADA'S
ENERGY DEMAND

67.3%
OF CANADA'S
ENERGY PRODUCTION



Learn more about how energy is produced in Alberta and
across the country at energyiq.canadiangeographic.ca/energy_mix

OIL SANDS

For years, Alberta's crude oil came from conventional wells drilled throughout the province. Over the past few decades, the share of Alberta's oil from the oil sands has increased dramatically.

About 83 per cent of Alberta's crude oil production now comes from the oil sands, which accounts for about two-thirds of Canada's oil production. The province has three oil sands regions. The largest, and by far the most well known, is the Athabasca oil sands near Fort McMurray. About 300 kilometres west of Fort McMurray are the Peace River oil sands, while directly southeast of the city is the Cold Lake oil sands, which straddle the Saskatchewan border. All three regions are geographically unique. The oil that comes from each area is also distinct.

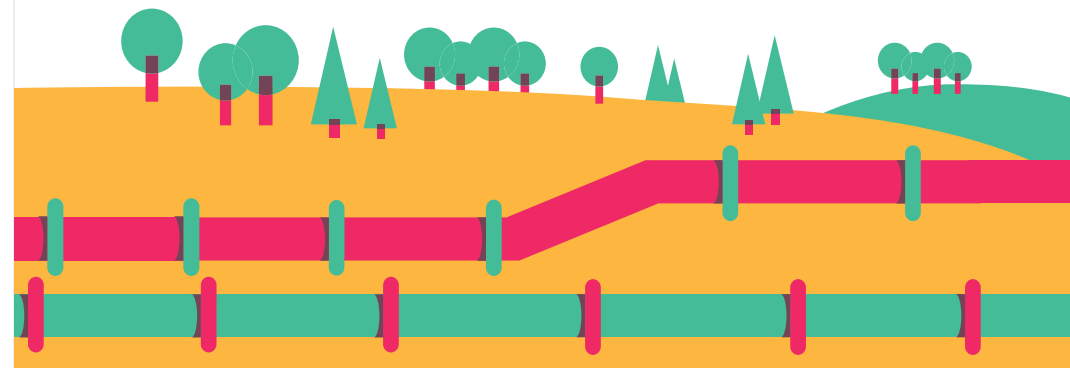


THE ATHABASCA OIL SANDS include the only oil deposit shallow enough to be excavated using trucks and shovels in open-pit mines. The vast majority of oil sands deposits are buried deeper and therefore extracted using in situ technologies such as steam-assisted gravity drainage (SAGD). In situ recovery also has less impact on land, trees and wildlife.

The Peace River oil sands are buried deep below the ground and are also removed using in situ technology. The Cold Lake oil sands are unique because, while they are also buried deep in the ground, some of the oil is fluid enough to be pumped to the surface using traditional oil wells.



THE PEACE RIVER AND ATHABASCA OIL SANDS are in the rugged and remote northern half of Alberta, while the Cold Lake oil sands are northeast of Edmonton. Pipelines are the safest and most efficient way to move oil from this remote region to refineries in Canada and the United States.



CRUDE OIL

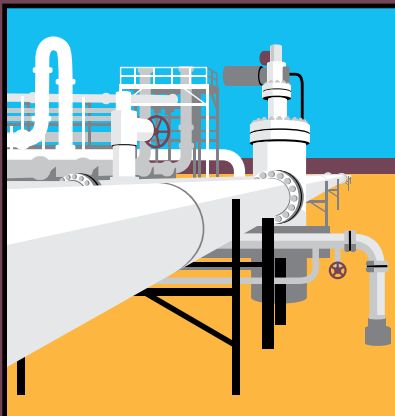
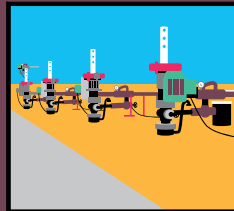
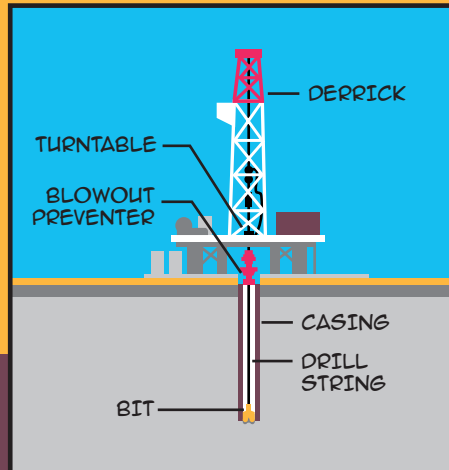
CRUDE OIL IS A YELLOW-TO-BLACK LIQUID, AND REFERS TO LIGHT, MEDIUM, AND HEAVY HYDROCARBONS. IT IS FOUND IN UNDERGROUND RESERVOIRS, OIL SANDS DEPOSITS, OR OFFSHORE RESOURCES.

CONVENTIONAL CRUDE OIL

ONCE OIL IS DISCOVERED IN AN UNDERGROUND RESERVOIR, THE SITE IS PREPARED FOR DRILLING. A DRILLING RIG IS USED TO HOUSE THE TOOLS AND PIPES NEEDED TO DRILL HOLES IN THE EARTH AND BRING OIL TO THE SURFACE.

AFTER THE RIG IS REMOVED, THE CREW PUTS A PUMP ON THE WELL HEAD, WHICH PULLS OIL UP THROUGH THE WELL. WHEN COMPLETED, THE WELL BRINGS A STEADY FLOW OF OIL TO THE SURFACE.

DRILLING RIGS ARE FITTED WITH BLOWOUT PREVENTERS (BOP) TO HELP PREVENT ACCIDENTAL RELEASES OF OIL.



THE CRUDE OIL IS THEN KEPT IN STORAGE TANKS OR TAKEN TO REFINERIES TO BE PROCESSED INTO VARIOUS PETROLEUM PRODUCTS.

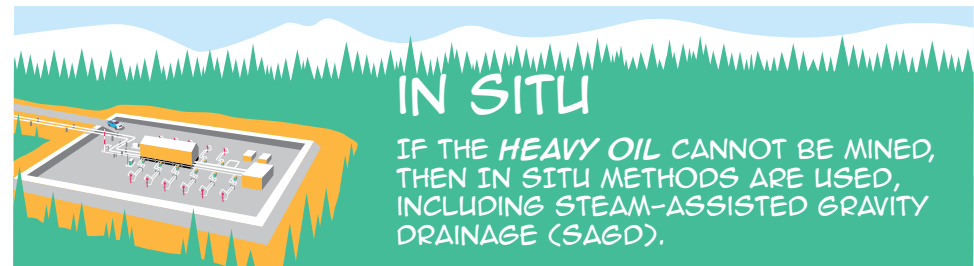
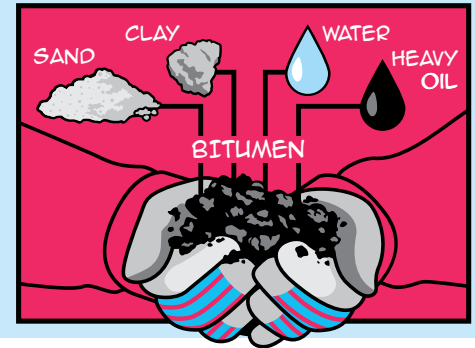
OIL IS PRIMARILY TRANSPORTED BY PIPELINES—CANADA HAS A PIPELINE NETWORK OF MORE THAN 840,000 KILOMETRES. IT IS ALSO TRANSPORTED BY RAIL, TRUCKS, OR TANKER SHIPS TO WHERE IT NEEDS TO GO.

UNCONVENTIONAL CRUDE OIL

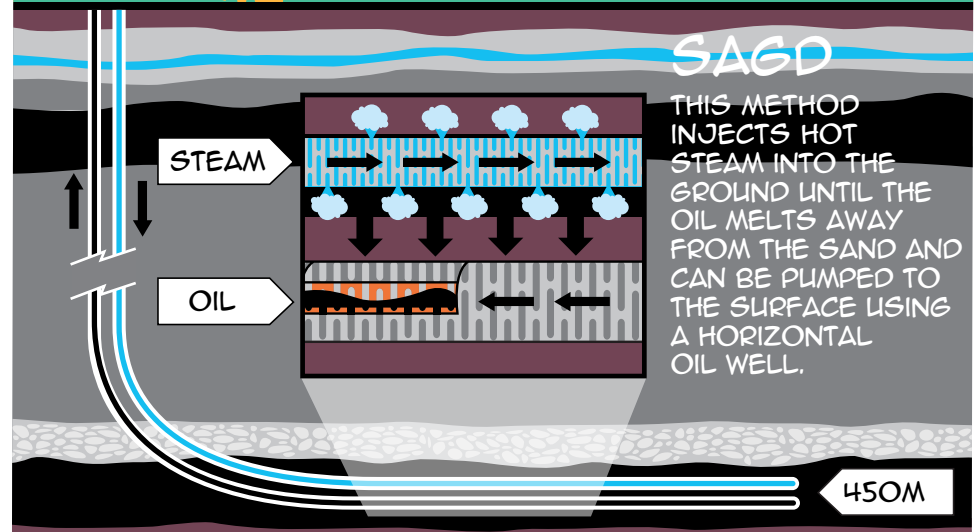
THIS HEAVY OIL MIXTURE IS **TOO THICK AND HEAVY TO FLOW** AND IS USUALLY EXTRACTED FROM THE GROUND USING EITHER **MINING** OR **IN SITU** METHODS.



MINING IS USED WHEN OIL SANDS ARE CLOSE ENOUGH TO THE SURFACE TO BE DUG UP USING EXCAVATORS, WHICH LOAD IT ONTO LARGE TRUCKS. THE **OIL SANDS** ARE TAKEN TO A PROCESSING PLANT WHERE IT IS MIXED WITH HOT WATER TO REMOVE THE SAND AND CLAY.



IF THE **HEAVY OIL** CANNOT BE MINED, THEN **IN SITU** METHODS ARE USED, INCLUDING **STEAM-ASSISTED GRAVITY DRAINAGE (SAGD)**.

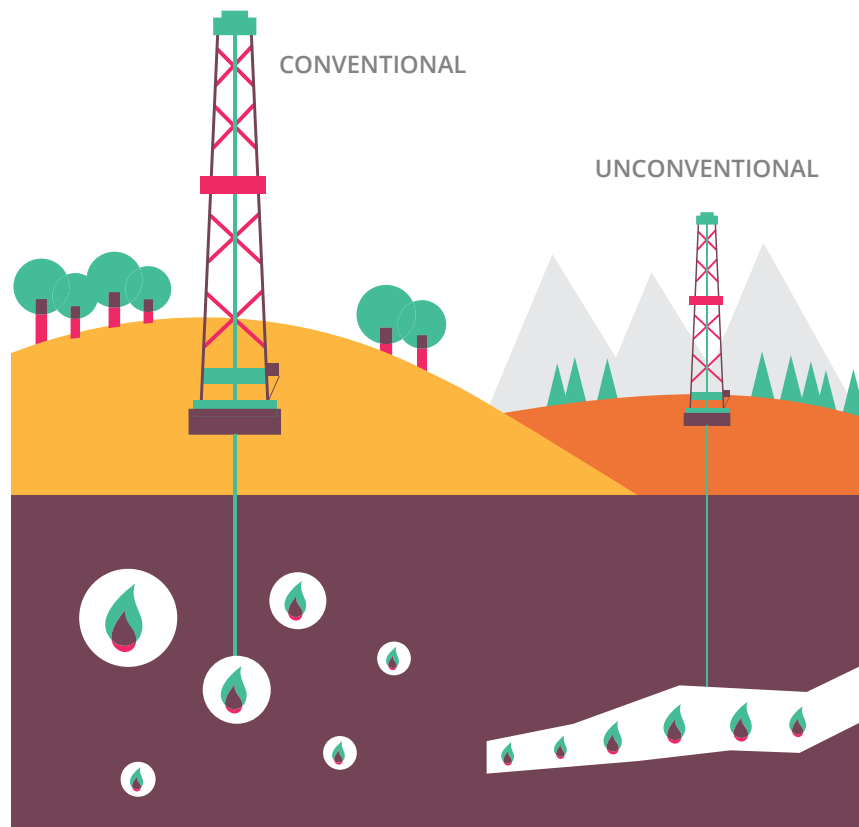


NATURAL GAS

Alberta produces about 69 per cent of Canada's natural gas, and Canada is the fourth largest producer and fifth largest exporter of natural gas in the world.

The province's natural gas reservoirs are actually collections of tiny gas molecules trapped inside cracks and holes in underground rocks.

Alberta's first natural gas well was drilled in 1883 near Medicine Hat, and the surrounding southeast plains region is still one of the largest conventional natural gas-producing areas in the country. The province's rugged foothills region along the east side of the Rocky Mountains contains significant quantities of shale gas — natural gas trapped between layers of shale rock — and is a major focus of natural gas production.



ALBERTA HAS A MASSIVE NETWORK of natural gas pipelines that move natural gas to market for distribution to homes and businesses, with the very largest pipelines reaching into eastern Canada and the United States.

NATURAL GAS PIPELINES



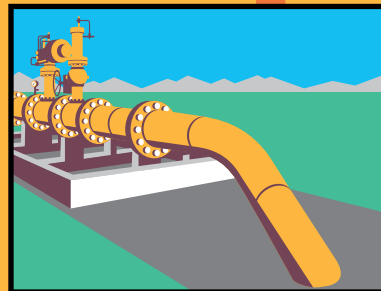
NATURAL GAS ACCOUNTS FOR about 45 per cent of Alberta's electricity generation, helping to heat homes and businesses, while the remainder of the natural gas is shipped across Canada and into the United States.



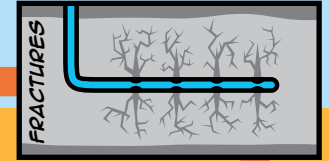
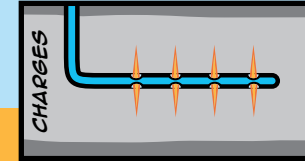
NATURAL GAS

NATURAL GAS IS FOUND IN RESERVOIRS DEEP UNDERGROUND, USUALLY TRAPPED BENEATH, AND SOMETIMES WITHIN, LAYERS OF ROCK.

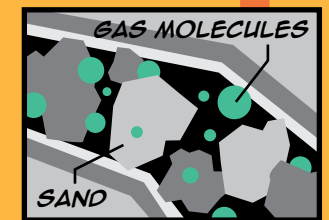
TO EXTRACT **CONVENTIONAL NATURAL GAS**—GAS TRAPPED IN POROUS SANDSTONE AND LIMESTONE FORMATIONS—WELLS ARE DRILLED INTO THE EARTH, AND THE GAS FLOWS TO THE SURFACE THROUGH THE WELL.



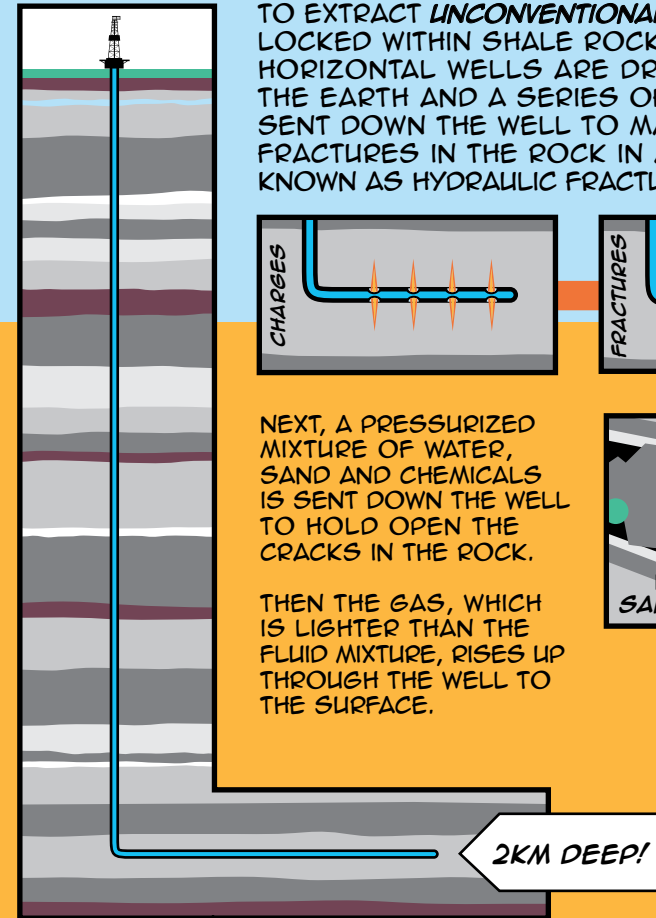
TO EXTRACT **UNCONVENTIONAL NATURAL GAS**—LOCKED WITHIN SHALE ROCK FORMATIONS—HORIZONTAL WELLS ARE DRILLED DEEP INTO THE EARTH AND A SERIES OF CHARGES ARE SENT DOWN THE WELL TO MAKE SMALL FRACTURES IN THE ROCK IN A PROCESS KNOWN AS HYDRAULIC FRACTURING.



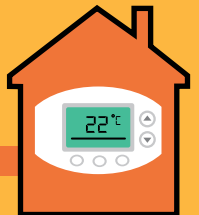
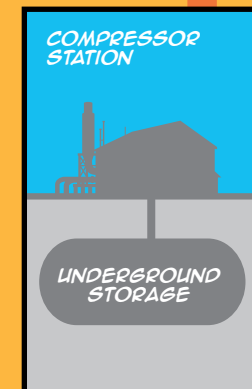
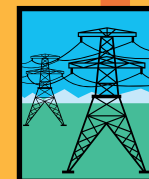
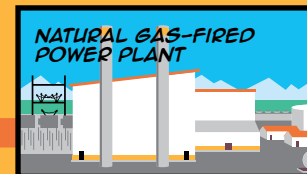
NEXT, A PRESSURIZED MIXTURE OF WATER, SAND AND CHEMICALS IS SENT DOWN THE WELL TO HOLD OPEN THE CRACKS IN THE ROCK.



THEN THE GAS, WHICH IS LIGHTER THAN THE FLUID MIXTURE, RISES UP THROUGH THE WELL TO THE SURFACE.



EITHER WAY, NATURAL GAS CAN BE USED TO GENERATE ELECTRICITY, AND HEAT HOMES.



COAL

First mined in the late 1800s, coal was the beginning of Alberta's energy industry, and the black rock remains the most plentiful fossil fuel in the world today.

Alberta, along with British Columbia and Saskatchewan, accounts for most of Canada's coal production. Coal provides about 45 per cent of Alberta's electricity and is also exported by rail through British Columbia and then shipped to Japan, China and South Korea.

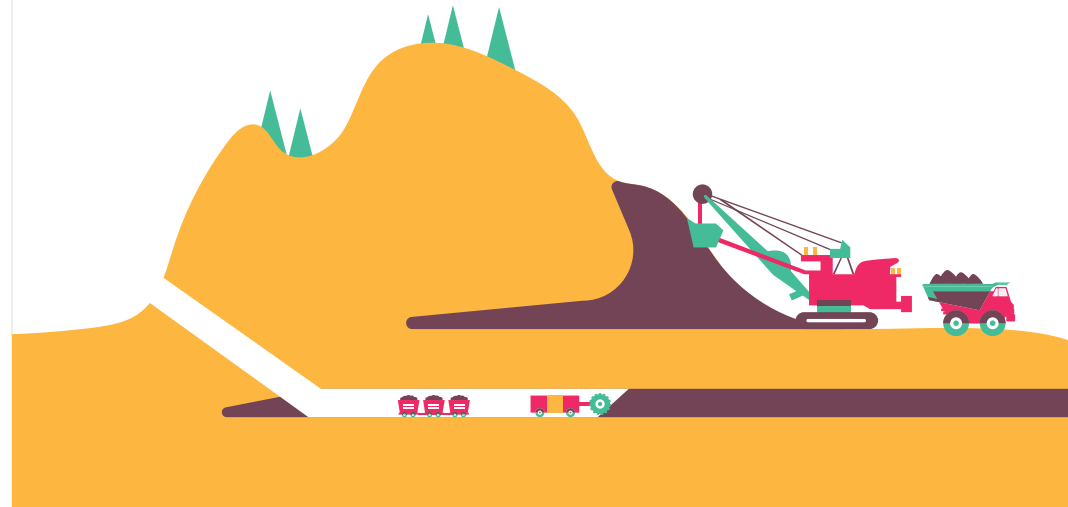
Alberta's coal resources are found on the plains, where strip-mining is used to remove coal near the surface, as well as in the foothills and Rocky Mountains.

Although coal was once mined in Edmonton, Lethbridge, Drumheller, Canmore and the area that is now Banff National Park, today most of Alberta's coal mines are in the central and west-central parts of the province. The largest strip coal mine in Canada is the Highvale Mine, covering more than 125 square kilometres west of Edmonton near Wabamun.

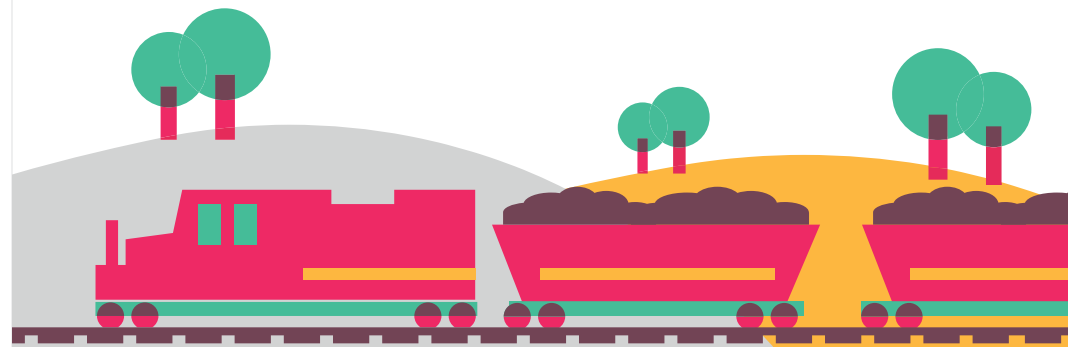
**ALBERTA
REPRESENTS
TWO-THIRDS
OF CANADA'S
COAL-FIRED
GENERATION CAPACITY
FOR ELECTRICITY**



THERE ARE TWO TYPES OF COAL. Metallurgical coal is used for things like manufacturing steel and cement, while thermal coal is used for electricity generation. More than 95 per cent of the coal exported from Canada is metallurgical coal.

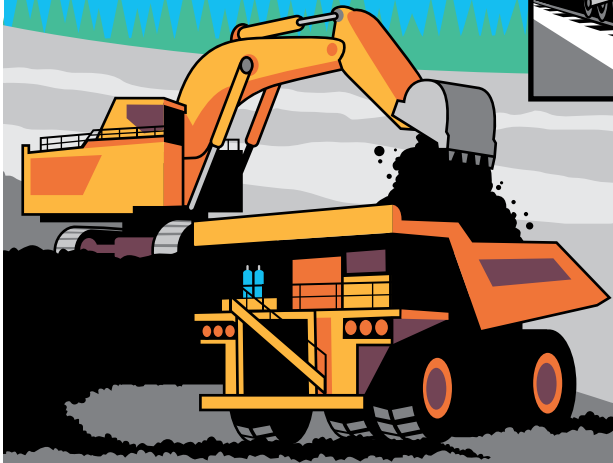


ALBERTA IS IN THE PROCESS OF PHASING OUT COAL as an energy source for electricity generation and plans to eliminate coal-fired power generation by 2030. The former coal power plants will transition to natural gas or biomass energy.

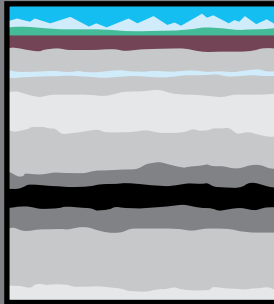


COAL

COMMERCIAL MINING IN CANADA DATES BACK TO THE EARLY 1800S.



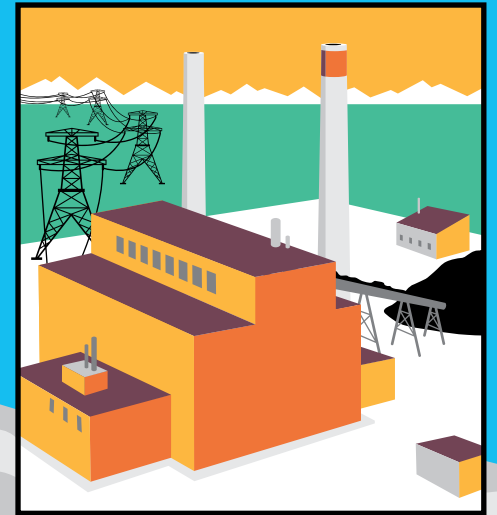
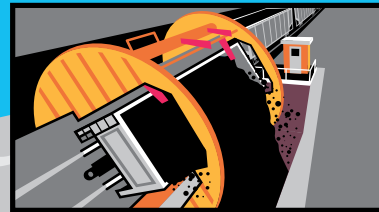
LIKE OIL SANDS MINING, COAL CAN BE STRIPPED FROM THE SURFACE OF THE EARTH BY MACHINE, CALLED STRIP-MINING...



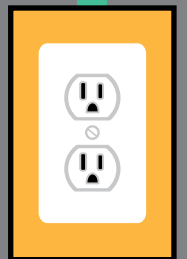
...OR DUG UP BY MINERS WHO BLAST AND BURROW DEEP UNDERGROUND INTO BURIED COAL DEPOSITS OR "SEAMS."



ONCE OUT OF THE GROUND, COAL IS TAKEN TO A POWER PLANT WHERE IT IS BURNED TO HEAT WATER TO MAKE STEAM. THE PRESSURE CREATED BY THAT STEAM SPINS A TURBINE, WHICH IN TURN SPINS MAGNETS INSIDE A GENERATOR.



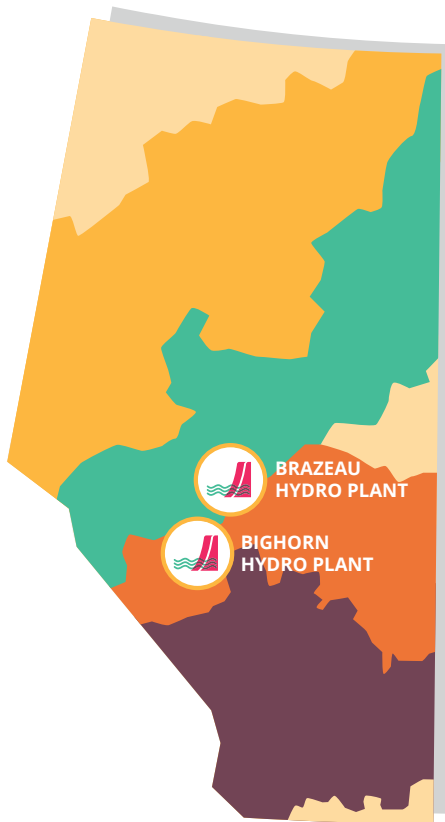
THIS GENERATOR CONVERTS THAT MECHANICAL ENERGY INTO THE KIND OF ELECTRICAL ENERGY WE USE EVERY DAY.



RENEWABLE ENERGY

RENEWABLE ENERGY SOURCES, such as wind, hydroelectricity, solar and biomass (organic material, such as trees, agricultural byproducts and municipal waste, that can be burned or converted into biofuel to produce energy) can be found wherever the wind blows, rivers flow, sun shines or crops grow. Fortunately for Alberta, the province has not only abundant fossil fuel resources but also plenty of wind, water, sun and biomass.

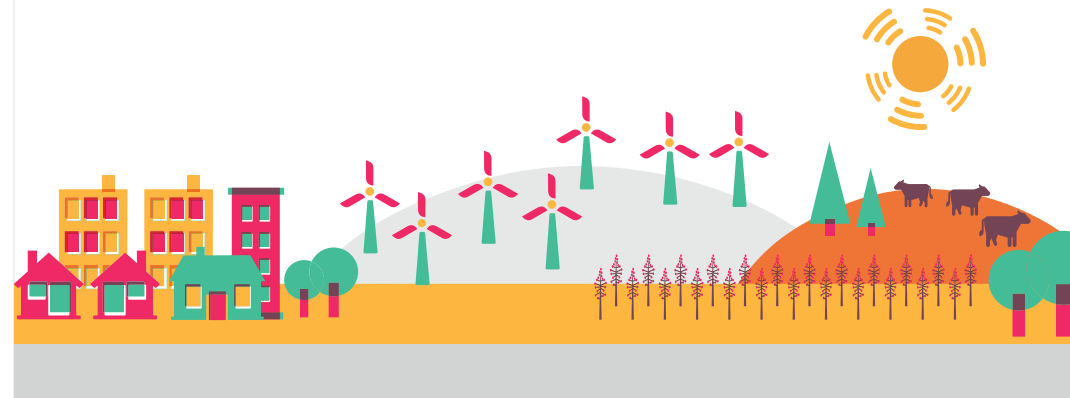
Alberta has more than 20 hydroelectric dams and generating plants on the province's four main river basins: the Peace/Slave basin, the Athabasca basin, the North Saskatchewan basin and South Saskatchewan basin. However, only a very small amount of Alberta's electricity comes from hydro power.



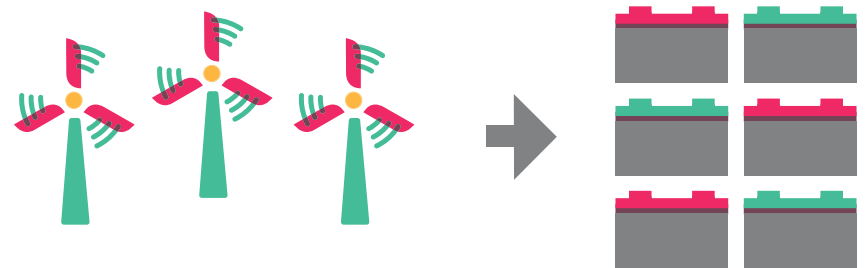
ALBERTA'S MAIN RIVER BASINS

1. PEACE/SLAVE
2. ATHABASCA
3. NORTH SASKATCHEWAN
4. SOUTH SASKATCHEWAN

ALBERTA IS THE BIRTHPLACE OF COMMERCIAL WIND ENERGY IN CANADA. There are enough wind turbines scattered along ridges and plains in the southern half of the province to potentially power almost 400,000 homes when the wind is blowing. The province also produces biomass energy, with a total installed capacity of about 428 megawatts. Feedstocks, such as agricultural products, (like corn and canola crops), forestry waste and livestock waste are burned to produce heat or converted into biofuels such as ethanol, biodiesel and biogas.

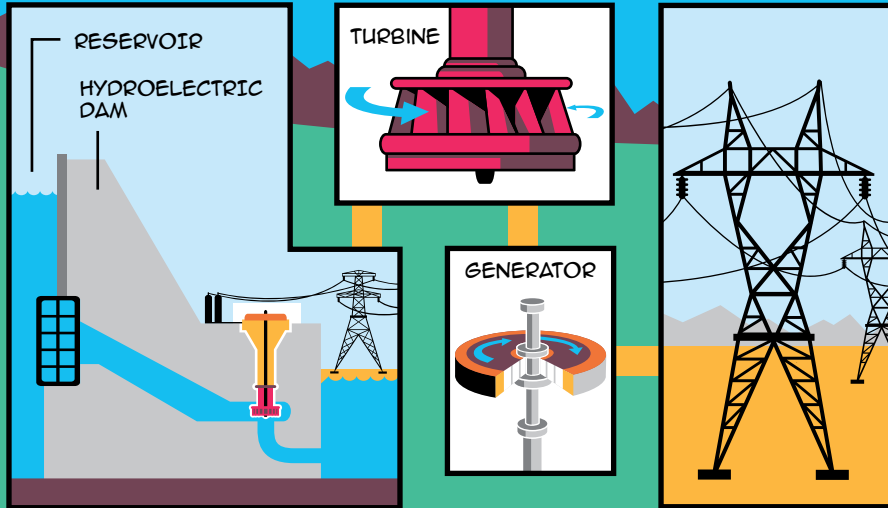


THE MAIN CHALLENGE FOR WIND ENERGY, however, is storage. Unlike hydro power, which is stored behind dams in the form of massive water reservoirs, and biomass, which can be converted into liquid or gas fuel, wind cannot be stored and doesn't always blow when electricity is needed. Therefore, wind energy must be converted into chemical energy in the form of batteries, a process that is expensive and loses significant quantities of energy when converted for storage, and then recovered later.



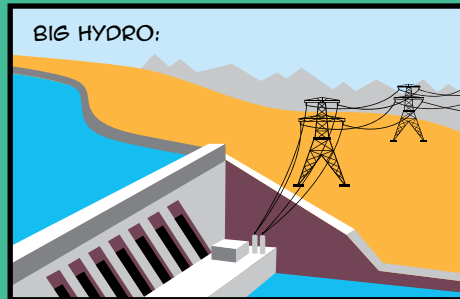
HYDROELECTRICITY

FOR BIG HYDRO PROJECTS, A DAM IS BUILT ON A RIVER TO STORE WATER IN A RESERVOIR. WHEN THE WATER IS RELEASED, ITS KINETIC ENERGY PASSES THROUGH A PENSTOCK (A SET OF CHANNELS OR PIPES). THE WATER TURNS THE BLADES OF A TURBINE, CREATING MECHANICAL ENERGY, WHICH IS THEN CONVERTED INTO ELECTRICITY BY A GENERATOR.

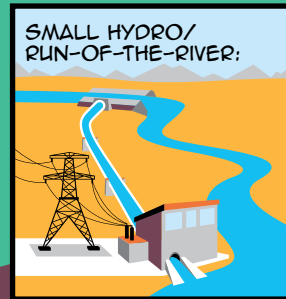


IN A PUMPED STORAGE SYSTEM, WATER IS RELEASED WHEN THERE IS PEAK DEMAND. WHEN DEMAND IS LOW, THE WATER IS PUMPED BACK UP TO THE RESERVOIR USING ELECTRICITY FROM OTHER ENERGY SOURCES. IN RUN-OF-THE-RIVER INSTALLATIONS, THE NATURAL FLOW OF THE RIVER PROVIDES THE NECESSARY KINETIC ENERGY.

HYDROELECTRICITY IS A RENEWABLE SOURCE OF ENERGY BECAUSE WATER IS NOT USED UP IN THE ENERGY PRODUCTION PROCESS.



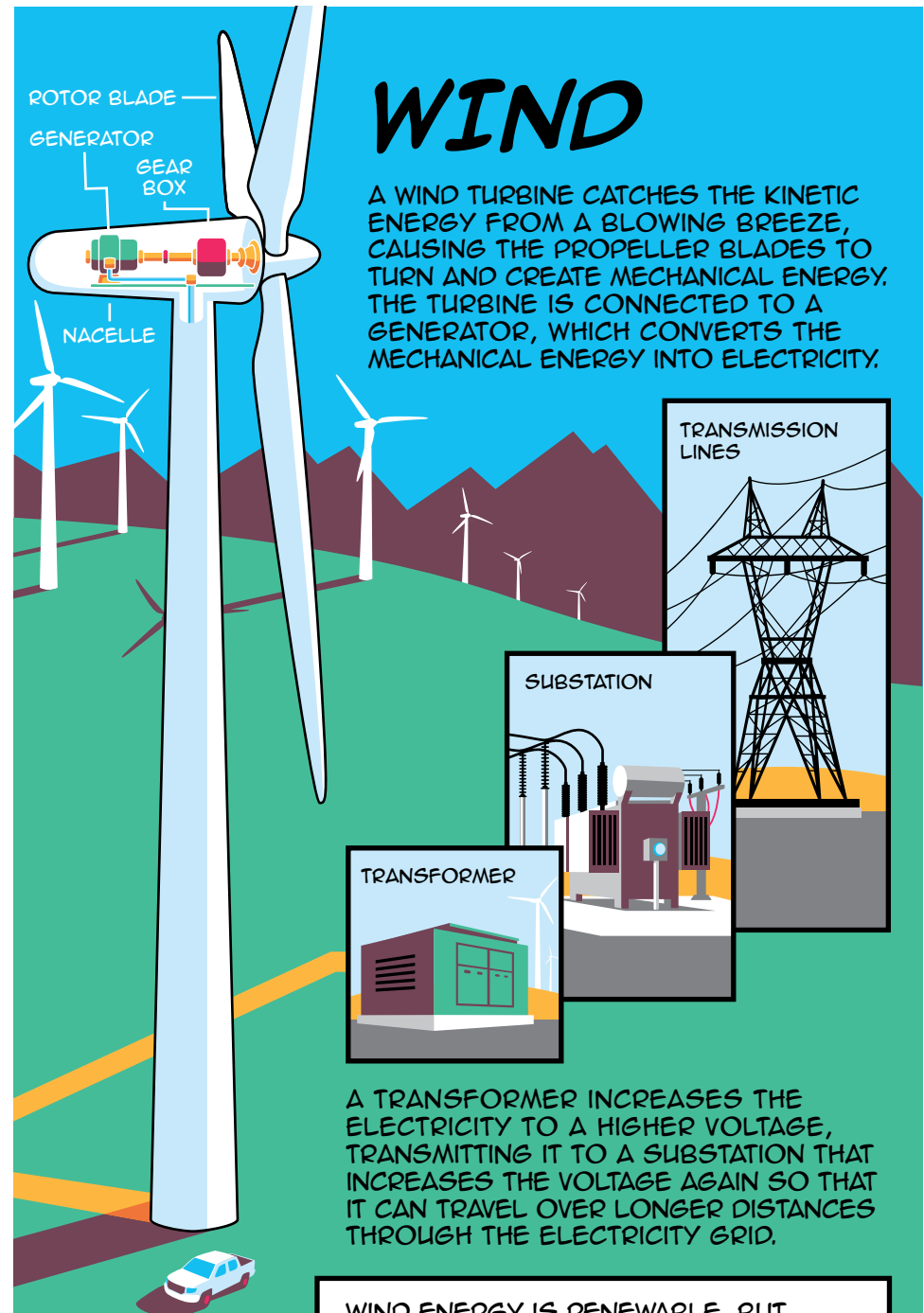
BIG HYDRO:



SMALL HYDRO/
RUN-OF-THE-RIVER:

WIND

A WIND TURBINE CATCHES THE KINETIC ENERGY FROM A BLOWING BREEZE, CAUSING THE PROPELLER BLADES TO TURN AND CREATE MECHANICAL ENERGY. THE TURBINE IS CONNECTED TO A GENERATOR, WHICH CONVERTS THE MECHANICAL ENERGY INTO ELECTRICITY.



A TRANSFORMER INCREASES THE ELECTRICITY TO A HIGHER VOLTAGE, TRANSMITTING IT TO A SUBSTATION THAT INCREASES THE VOLTAGE AGAIN SO THAT IT CAN TRAVEL OVER LONGER DISTANCES THROUGH THE ELECTRICITY GRID.

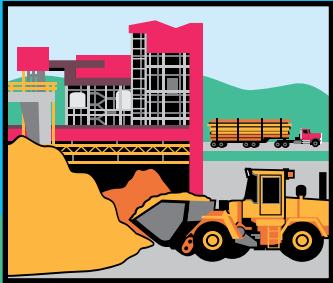
WIND ENERGY IS RENEWABLE, BUT IT IS ALSO INTERMITTENT, MEANING THAT IT IS NOT ALWAYS AVAILABLE.



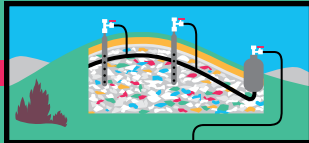
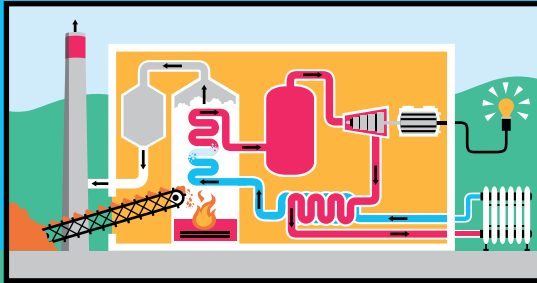
BIOMASS



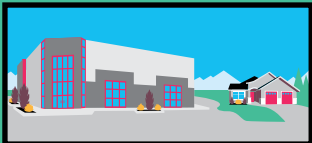
BIOENERGY BEGINS WITH BIOMASS, WHICH IS ANY ORGANIC MATERIAL THAT HAS STORED ENERGY FROM THE SUN IN A CHEMICAL FORM, SUCH AS TREES, HAY, AND EVEN HOUSEHOLD GARBAGE.



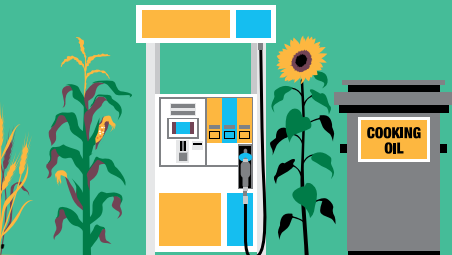
ELECTRICITY: WOODCHIPS, SAWDUST, OR OTHER ORGANIC MATERIALS, ARE COLLECTED AND COMPRESSED INTO PELLETS. THE PELLETS FUEL A BOILER USED TO PRODUCE STEAM. IT TURNS TURBINES, WHICH SPIN MAGNETS IN A GENERATOR, CONVERTING MECHANICAL ENERGY INTO ELECTRICITY.



LANDFILL GAS CAPTURE: METHANE FROM CAPPED LANDFILLS IS COLLECTED, PROCESSED AND UPGRADED, THEN TRANSMITTED BY PIPELINE TO HOMES AND BUSINESSES.



LIQUID BIOFUELS: BIOETHANOL IS CREATED BY FERMENTING AND DISTILLING BIOMASS SUCH AS STRAW, CORN, OR GRAINS. BIODIESEL IS DERIVED FROM VEGETABLE AND ANIMAL FATS, INCLUDING USED OIL FROM RESTAURANTS.



ENERGY TRANSMISSION

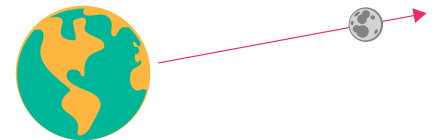
Whether it's coal, oil, natural gas or biofuels, the sources of energy that heat our homes, fuel our vehicles and power our devices often travel huge distances. This means how we transport energy is almost as important as finding the sources of energy in the first place.

There are more than 422,000 kilometres of pipelines running through Alberta—which is more than the distance to the moon! These pipelines are the safest way to transport energy resources such as oil and natural gas. While the majority of crude oil in Alberta is moved by pipeline, approximately 1 million barrels per day are transported by rail.

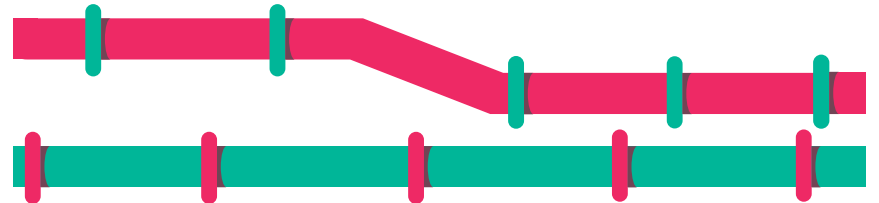
The most visible form of transportation is probably right outside your window—power lines. Did you know there are different types of power lines?

High-voltage transmission lines bring electricity from power plants to sub-stations in cities. There, the high-voltage electricity is converted into the low-voltage electricity we use and is sent along distribution lines to our homes, offices and schools. There are about 26,000 kilometres of transmission lines in Alberta and more than 215,000 kilometres of distribution lines.

THERE ARE MORE THAN 422,000 KM OF PIPELINE RUNNING THROUGH ALBERTA



(MORE THAN THE DISTANCE TO THE MOON!)



ENVIRONMENTAL IMPACTS

All energy sources impact the environment. Fossil fuels — namely coal, oil and natural gas — emit greenhouse gases (GHGs) when burned (the kind of gases they emit and in what quantity differs for each).

Although renewable energy sources such as wind and hydroelectricity emit less GHGs when operating than fossil fuels, infrastructure for these renewable energy sources does use fossil fuels in their construction and maintenance.

Locating and developing energy resources also has an impact on the environment. Exploring for resources such as coal, oil and natural gas, then getting them out of the ground and refining them into usable fuel requires energy and therefore also emits GHGs into the atmosphere. In addition, both fossil fuels and renewable resources can have an impact on wildlife. For example, wind turbines can harm birds, which is why careful site selection is important in order to avoid areas with high bird movement or migration routes.

The following chart compares Canada's major energy sources and their effects on the environment (this also applies for Alberta, which relies on all of the energy sources mentioned in the chart). It looks at four main criteria: average weight in kilograms of carbon dioxide (CO₂, the most commonly measured GHG) per million British thermal units (BTUs, a measure of energy) emitted when using the energy source for fuel, the infrastructure needed to produce the energy resource, the impact on the landscape of developing these resources, and how long it takes the land to return to its previous, or similar, productivity.



To learn more about how energy sources contribute to climate change, visit energyiq.canadiangeographic.ca/learning_centre

CANADA'S MAJOR ENERGY SOURCES AND THEIR IMPACTS ON THE ENVIRONMENT



COAL



OIL



NATURAL GAS



RENEWABLES

TYPE FOUND IN CANADA

Bituminous & sub-bituminous coal

Oil sands, conventional oil, offshore oil and tight oil (trapped within reservoir rocks)

Conventional and unconventional

Hydroelectric, wind, solar and biomass

AVERAGE KGS OF CO₂/MILLION BTU

95.35

ABOUT 71

53.07

VERY LOW GHGS

INFRASTRUCTURE NEEDED

Excavators, trucks, processors, coal-fired power plants, transmission lines

Excavators, trucks, drilling rigs, upgraders, refineries and pipelines

Drilling rigs, processors, natural gas-fired power plants, transmission lines

Wind turbines, biomass feedstocks and generating plants, hydroelectric dams, transformers, transmission lines

IMPACT ON LANDSCAPE

Vast areas of land are disturbed

For mining, areas of land are stripped and tailings ponds remain for several years. For conventional drilling, and in situ oil sands, very little land is used

Minimal clearing of trees around a well site, if necessary. Hydraulic fracturing requires significant quantities of water

Wind farms can harm bird populations. Hydroelectric dams can harm fish, plants and ecosystems. Biomass can include crops, and generating facilities can produce some GHGs. Solar uses farm land, and the panels can be hazardous to birds

TIME FOR LAND TO RETURN TO PREVIOUS PRODUCTIVITY

Many years, though often the landscape can be drastically changed

For oil sands mining, many years of reclamation are necessary. In the case of conventional oil, there is often no disruption to previous productivity

Reclamation of a natural gas well site takes about five years, includes: capping the well, removing the equipment, clean up, replacing soil and replanting vegetation

Immediately, though hydroelectric dams cause long-term changes to river ecosystems

ENERGY ECONOMY

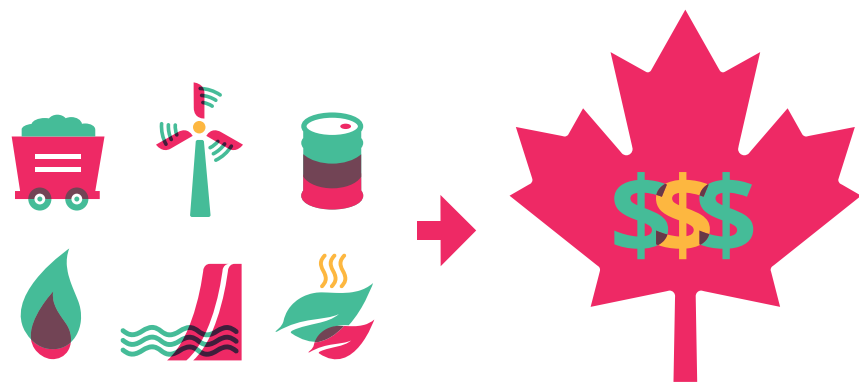
Alberta's energy resources play an important part in both the province's and Canada's economies. Alberta's energy sector contributes more than \$71 billion to the country's nominal GDP. Energy accounts for about one-third of all the goods produced and services provided within Alberta, and more than half of the province's total exports.

Alberta's oil and natural gas industry employs more than 415,000 Albertans, including those employed in related fields or supporting roles, such as investment advisers or environmental monitors.

Direct employment, which accounts for about 143,000 jobs, includes a variety of positions in trades such as rig operators, welders, pipe-fitters, gas plant operators, and heavy-duty mechanics and professionals such as engineers, geologists, reclamation specialists, economists, accountants and many others.

In Alberta, oil and natural gas development supports about 20,000 businesses that directly or indirectly depend on oil and gas activity, including about 400 Indigenous-owned businesses. All of these businesses generate about \$3.33 billion in economic activity.

As a result of oil and natural gas activity, the provincial government receives about \$4.8 billion in resource revenues, \$185 million in provincial corporate income taxes, and billions of dollars in personal and property taxes.



ENERGY FUTURES

The energy landscape in Canada, and around the world, is rapidly changing as industries work to develop more efficient ways to meet a growing energy demand while also working to lower GHG emissions.

As the world's population continues to grow, and emerging economies urbanize and industrialize, the demand for all forms of energy will increase. Although there will be shifts in the overall global energy mix, growing demand is expected to be met by all available forms of energy. And Canada, specifically Alberta, will remain a critical supplier of oil and natural gas for the global marketplace.

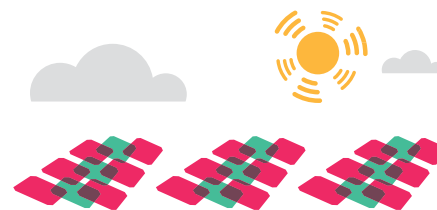
In Alberta, as the province phases out coal-fired electricity generation by 2030, there will be an opportunity for other, cleaner energy resources to fill the gap, such as already developed resources like natural gas, biomass, and wind, or underdeveloped ones like solar energy.

Although the share of renewable energy in Alberta's energy mix is growing, there are some challenges. The intermittent nature of wind or solar energy makes it less reliable for industrial use and the geography of Alberta is such that major rivers suitable for hydroelectricity generation are far from the cities or centres where that electricity is needed.

Despite this, there are opportunities for renewable energy development in Alberta that will encourage resource development. Alberta has some of the highest wind and solar energy potential in Canada when it comes to wind speeds and sunny days.

Oil and natural gas will continue to be important energy resources for Alberta and Canada. Alberta has about 165 billion barrels of recoverable oil located in the oil sands and approximately 26.6 trillion cubic feet of conventional marketable natural gas reserves. Alberta's oil and natural gas industry can play a significant role in meeting the world's future energy demand. Through innovation and technology, Alberta can leverage its leadership in environmental stewardship and responsible energy production to help address growing global carbon emissions.

ALBERTA HAS SOME OF THE HIGHEST WIND AND SOLAR ENERGY POTENTIAL IN CANADA



ENERGY QUIZ

Test your knowledge of Alberta's energy resources.

1) Choose the answer that best describes these energy sources in order from highest carbon emissions to lowest:

- A) Oil, natural gas, coal, renewables B) Natural gas, renewables, coal, oil
C) Coal, oil, renewables, natural gas D) Coal, oil, natural gas, renewables

2) TRUE or FALSE: Most of the electricity used in Alberta comes from burning coal.

- A) True B) False

3) How much of Canada's natural gas is produced in Alberta?

- A) 69% B) 35%
C) 94% D) 17%

4) Choose the answer that best describes Alberta's oil sands regions in order from largest to smallest:

- A) Athabasca, Peace River, Cold Lake B) Peace River, Athabasca, Cold Lake
C) Athabasca, Cold Lake, Peace River D) Cold Lake, Athabasca, Peace River

5) TRUE or FALSE: Unlike natural gas, the energy generated from wind is easy to store.

- A) True B) False

6) How many homes can Alberta power with the wind energy it produces?

- A) 100,000 B) 400,000
C) 600,000 D) 200,00

7) TRUE or FALSE: Wind and hydroelectricity have less GHG emissions than oil or natural gas.

- A) True B) False

8) How much of all the goods and services provided within Alberta are in the energy sector?

- A) 1/10 B) 1/2
C) 1/3 D) 1/8

9) What are the names of Alberta's four main river basins?

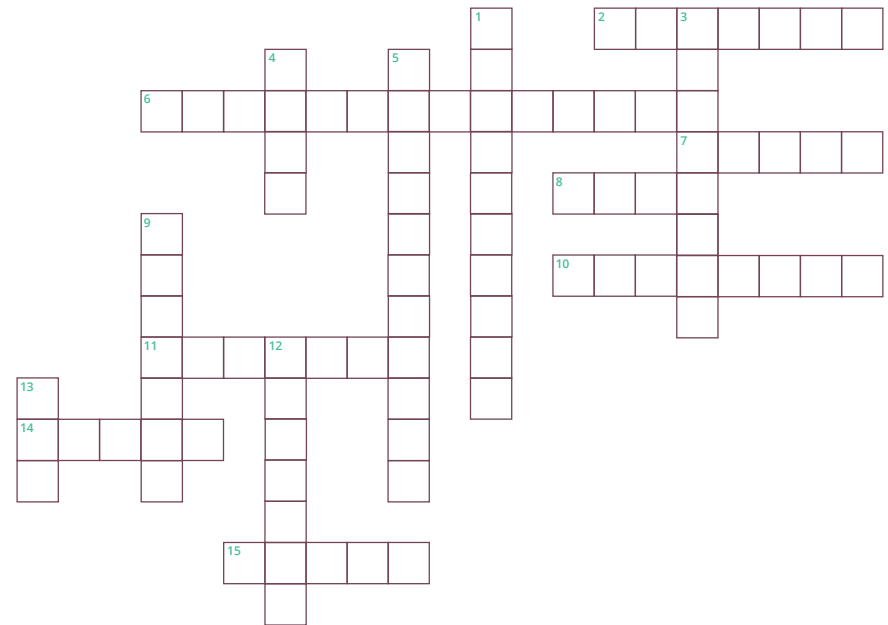
10) TRUE or FALSE: Biomass energy can be produced from agricultural crops, forestry waste and livestock waste.

- A) True B) False



For more fun and interactive energy quizzes, visit
energyiq.canadiangeographic.ca/main/quizzes

CROSSWORD



ACROSS

2) Type of energy derived from crops

6) Industry term used for hydraulic fracturing method to extract natural gas

7) Energy derived from the sun

8) Alberta coal is exported by rail to British Columbia, then shipped to countries in _____

10) Oil sands deposits include Peace River, Athabasca and _____ (2 words)

11) At a wind farm, a wind _____

14) Electricity produced from moving water

15) One of the five river basins with a hydroelectric dam

DOWN

1) Alberta produces 69 per cent of this resource in Canada

3) A mix of sand, clay, water and bitumen (2 words)

4) Resource that is mined and used to generate electricity

5) First natural gas well was in 1883 near _____ (2 words)

9) Wind power stored as chemical energy

12) An example of this is ethanol

13) Acronym for greenhouse gases

ANSWER KEY

Answers to energy quiz (Pg 26):

- 1) D – Coal, oil, natural gas, renewables
- 2) A – True
- 3) A – 69%
- 4) C – Athabasca, Cold Lake, Peace River
- 5) B – False
- 6) B – 400,000
- 7) A – True
- 8) C – 1/3
- 9) Peace/Slave basin, the Athabasca basin, the North Saskatchewan basin and South Saskatchewan basin
- 10) A – True

Answers to crossword (Pg 27):

ACROSS

- 2) Biomass
- 6) Unconventional
- 7) Solar
- 8) Asia
- 10) Cold Lake
- 11) Turbine
- 14) Hydro
- 15) Peace

DOWN

- 1) Natural gas
- 3) Oil sands
- 4) Coal
- 5) Medicine Hat
- 9) Battery
- 12) Biofuel
- 13) GHG

NOTES

This image shows a single sheet of white paper with horizontal green ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

NOTES

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