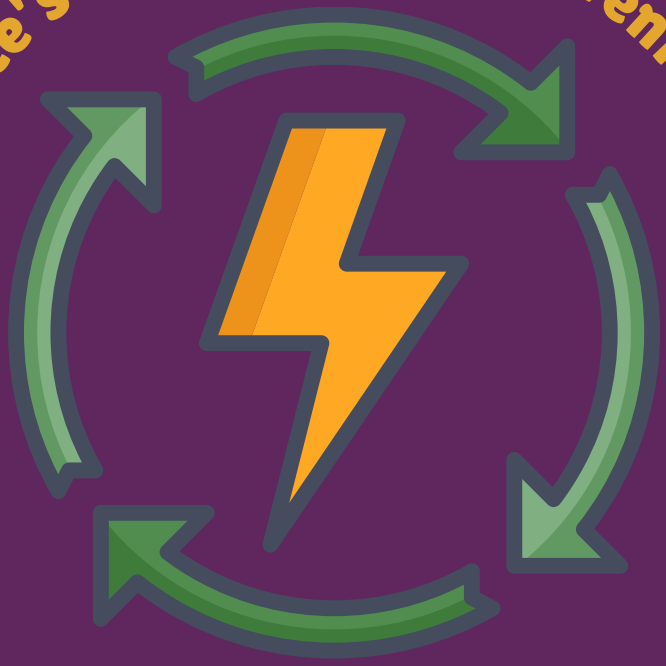
Alice's Alberta Energy Adventure



"Alice's Alberta Energy Adventure"

OVERVIEW

SYNOPSIS

In her quest to ace her test on the science and history of energy in Alberta, Alice finds herself tumbling through time in pursuit of knowledge and an errant white rabbit.

As her journey gets 'curiouser and curiouser', she encounters dinosaurs, flowers, and a chorus line of sunbeams. Alice learns that the ultimate test is to trust that you know your stuff!

Main Ideas

The guide provides further details, vocab, links and activities, however here are some of the main points:

- The presentation is a nod to Lewis Caroll's, Alice's Adventures in Wonderland, referencing some of the characters and themes from the classic tale, but with an energy-focused twist
- The simplest definition of energy is "the ability to do work". Energy is how things change and move. It's everywhere around us and takes all sorts of forms. It takes energy to cook food, to drive to school, and to jump in the air.
- The sun is the ultimate source for all of the energy and fuels that we use today. Plants need sunlight to grow. Animals, including humans, need plants for food and the oxygen they produce. (Photosynthesis) Without heat from the sun, Earth would freeze. There would be no winds, ocean currents, or clouds to transport water.
- The notion that fossil fuels (coal, oil, natural gas) came from dinosaurs is a myth
- Fossil fuels were formed over hundreds of millions of years from dead organisms that sank into mud and rock. As layers of rock accumulated, these remains transformed into different types of fossil fuels: coal originated from plants, while petroleum and natural gas primarily came from microscopic organisms like algae. Fossil Fuels are non-renewable resources (once used up, they cannot be replaced).
- Alberta has large coal, oil and gas deposits. Discoveries and exploration date back to long before we were officially a province in 1905, with the first known reference to the Athabasca oil sands made by Captain Swan in 1715, a Cree chief acting as a middleman during the fur trade
- Burning fossil fuels contributes to climate change as they release carbon dioxide (CO_2) into the atmosphere which traps heat that would otherwise escape the atmosphere, increasing Earth's temperature.
- Energy industry scientists are using the scientific method to create innovative methods and technology to reduce emissions, such as Carbon Capture
- Renewable energy is derived from natural sources that are replenished at a higher rate than they are consumed (i.e solar, wind, hydro etc)
- Everyone has a role to play in fighting climate change and contributing to Alberta's clean energy future, including kids! (Reduce, reuse, repair, unplug, walk/bike etc)

What is Energy?

Energy is the ability to do work. It makes things move. Energy makes machines go and living things grow.

Types and Forms of Energy

- Energy can take many different forms such as Heat, Light, Motion, Electrical, Chemical, Nuclear & Gravitational
- One form of energy can also be transformed into another. Through a battery stored chemical energy changes into electric energy. In a lightbulb, electric energy changes to light and heat.
- There are two types of energy: Potential (stored) & Kinetic (working)

Potential Energy

- Energy associated with an object because of its position or structure
- ie. The chemical energy of food is stored energy. When people eat, their bodies change the stored energy into moving energy such as heat energy or mechanical energy.
- Potential energy can also come from the position of an object. An object with potential energy because of its position has the ability, or potential, to move. For example, potential energy is stored in a rock perched on a cliff and in an arrow stretched back on a bowstring.

Kinetic Energy

- The energy associated with an object's motion is called kinetic energy.
- A speeding bullet, a walking person, and electromagnetic radiation like light all have kinetic energy.
- Energy associated with the constant, random bouncing of atoms or molecules. This is also called thermal energy – the greater the thermal energy, the greater the kinetic energy of atomic motion, and vice versa.
- The average thermal energy of a group of molecules is what we call temperature, and when thermal energy is being transferred between two objects, it's known as heat.

Mechanical Energy: Energy stored in objects by tension. Compressed springs and stretched rubber bands are examples of stored mechanical energy.

Heat Energy (Thermal Energy): Comes from the movement of atoms and molecules in a substance. Heat increases when these particles move faster.

Radiant Energy: Light energy is moving energy. It moves in the form of waves and can travel through empty space and air. Different wavelengths of visible light are seen as different colours.

Sound Energy:

Moving energy that is produced by the back-and-forth motion of a vibrating object. This motion produces sound waves that travel away from the object. The sound waves can travel only through a substance, such as air, water, or solid objects.

Electrical Energy:

It is the movement of tiny particles called electrons and protons. Electrical energy can be seen in nature in a bolt of lightning, which is a large number of electrons flowing through air all at once. Electrical energy is sent through wires or the air to power such things as lightbulbs, ovens, and washing machines.

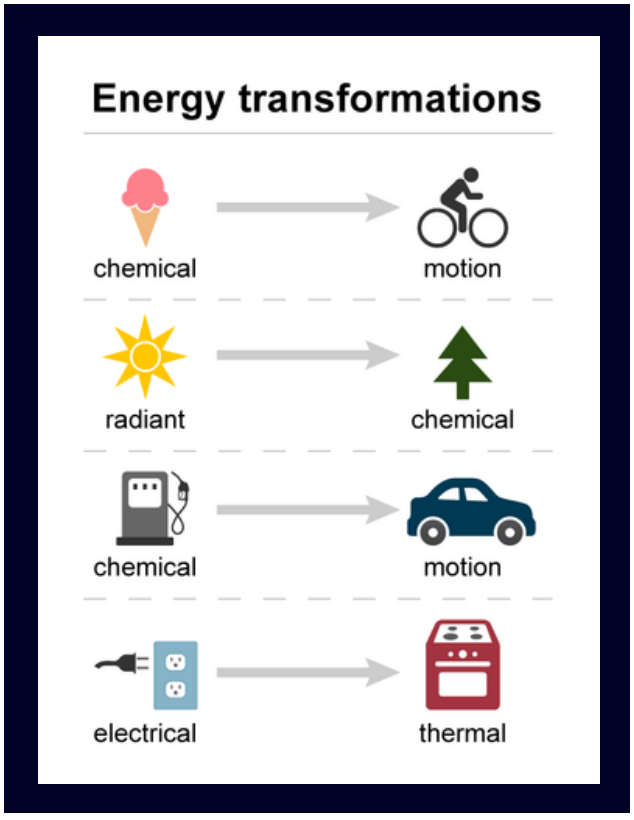
Chemical Energy: Energy stored in the bonds of atoms and molecules. Examples: Batteries, biomass, petroleum, natural gas, coal.

Nuclear Energy:

Energy stored in the nucleus of an atom—the energy that holds the nucleus together. Large amounts of energy can be released when the nuclei are combined or split apart.

Energy Conversions

- The law of conservation of energy says that energy is neither created nor destroyed. When people use energy, it doesn't disappear, but instead, it changes from one form of energy into another form
- For example, when people eat, their bodies change the chemical energy of food into heat energy and mechanical energy to keep warm and to move around.



Source Links: Brittanica Kids, Energy Kids, Khan Academy

Video Links:

What is Energy? - PBS Kids
Energy | The Dr. Binocs Show
What is Energy? - Science for Kids!
Energy and You
Energy Transfer

Kid-Friendly Energy Podcasts:

Where Does All Our Energy Come from?
Enn & Gee's Energy Explained for Kids
Marina Ventura Energy Explorer

U of A Future Energy Systems:

Visit futureenergysystems.ca for educational children's book series, energy teacher resources and videos

Sources of Energy: THE SUN

"The Past and Future of Energy: Here Comes the Sun" by Jackie Forrest

Everyone loves a sunny day! Whether it's hiking, playing or a day at the beach the sun's warmth always gives us a smile. That's also because the sun is the largest source of energy on earth. And besides making us happy, the sun's rays also power about 95 per cent of everything we do.

For starters, sunshine is energy for plants. People get energy from eating plants and burn wood for heat. Humans have also learned how to process various types of food and vegetation into fuels, called biofuels, that heat our homes and even power our cars.

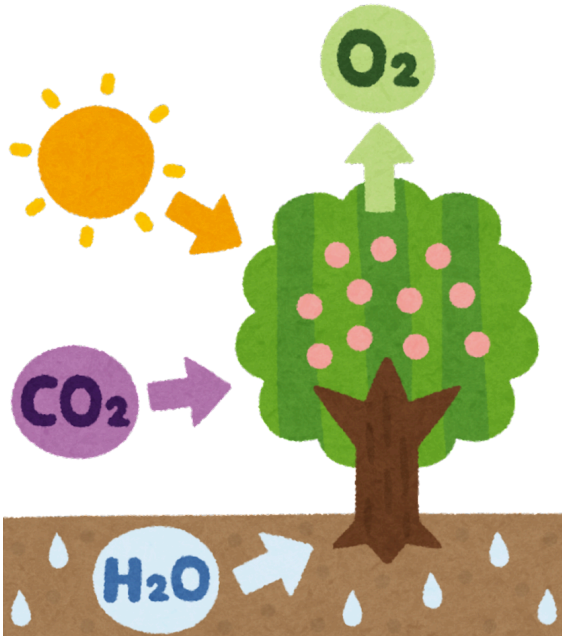
Water power also comes from the sun. When solar energy evaporates water, it creates clouds that cause rain to fall and rivers to flow. Humans convert the energy from flowing rivers into electricity using dams. Canada is a major producer of hydro power, it makes-up 60 per cent of all generation capacity in the country. Learn more about hydroelectric power generation.

The sun is also why the wind blows. The sun warms the earth unevenly. Some places are cool, others hot. That causes air to rush from one place to another. For many centuries, humans have captured the wind's energy with sail boats and windmills. Now, large turbines are converting the winds energy into electricity. The biggest ones are so tall that they reach half way up Toronto's CN Tower.

Solar panels are another way of harnessing the sun's energy. Solar panels are about the size of the top of a picnic table, flat and rectangular but with a glass top. When the sun shines on the solar panel, they produce electricity to power things like our lights, heat our ovens and even charge our electric cars. Solar panels are a bit like Lego. They can be used in small numbers, say 10 or 30 to cover the roof of your home. Alternatively, if you have a large area, over one million panels can be wired together into a massive power plant.

It may surprise you, but the gasoline you put in your car, the natural gas that heats your home, and the coal that cooks your food on the barbeque also comes from the sun. Oil, natural gas and coal come from plant matter that was buried in the dinosaur age about 100 million years ago... Article LINK

Student "sun rays" performing "The Sun" song in Evergreen Theatre's energy show with a nod to Broadway classic 'A Chorus Line'

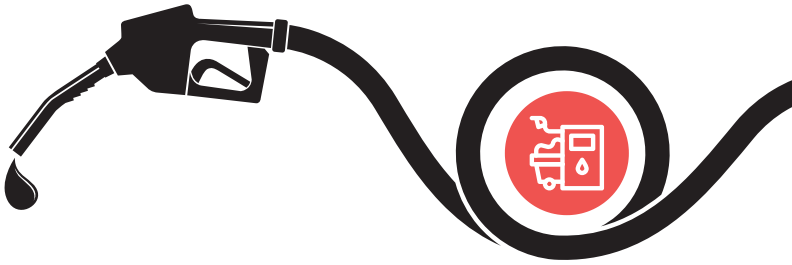


Photosynthesis

Photosynthesis is a process by which plants, algae, and certain microorganisms transform light energy from the sun into the chemical energy of food. During photosynthesis, energy from sunlight is harnessed and used to convert carbon dioxide and water into organic compounds—namely sugar molecules—and oxygen. The process enables photosynthetic organisms to change light energy into a form of energy—the chemical energy in sugars—that their cells can store and use to grow and thrive. *Britannica Kids*

Photosynthesis and Cellular Respiration Video

Photosynthesis Experiment & Activities



Sources of Energy: Fossil Fuels

How Fossil Fuels Formed:

- Myth about Dinosaurs: The common belief that fossil fuels (oil, natural gas, and coal) originated from dinosaurs is a myth.
- Origin of Fossil Fuels: Fossil fuels began forming a long time ago, during the era of dinosaurs, but they actually come from ancient plants and tiny sea creatures.
- Energy Storage: Fossil fuels store energy from the sun, which plants captured through photosynthesis millions of years ago.
- Transformation Process: When plants and small organisms die, they can become fossil fuels under specific conditions, including an oxygen-free environment and a lot of time.
- Coal originated about 300 million years ago from plants in bogs and swamps that turned into peat, which eventually transformed into coal due to heat and pressure.
- Petroleum Formation: Oil and natural gas come from small ocean organisms (plankton) that sank to the ocean floor and underwent chemical transformations over time, forming substances like kerogen and bitumen.
- Hydrocarbon Development: Kerogen can turn into crude oil or natural gas under the right conditions of heat and pressure.
- Movement of Hydrocarbons: The hydrocarbons in oil and gas are less dense than surrounding rock and water, allowing them to rise until they are trapped, forming reservoirs that can be accessed by drilling.

Source: Explainer: Where fossil fuels come from

Videos:

- Do Fossil Fuels Really Come from Fossils?
- Fossil Fuels 101
- Fossil Fuels | Types and Formation
- Alberta's Oil Sands Explained (Teacher/Div 2+ level)

Web Articles:

- The biggest myth about fossil fuels and dinosaurs, debunked by science
- Do Fossil Fuels Really Come from Fossils?
- Where fossil fuels come from

Alberta's Energy History

Dino Dee & Dino Dum, in their Laurel & Hardy inspired "Dino Ditty", busted the fossil fuel dinosaur myth and presented key points from Alberta's energy history regarding coal, gas & oil

Energy History Highlights:

1715: The first known reference to the Athabasca oil sands is made by Cree Chief Captain Swan. He brings a sample of "that Gum or pitch that flows out of the Banks of that River" during fur trade.

1793: The first published record of coal in Alberta is attributed to Peter Fidler. He is a surveyor, explorer, mapmaker and fur trader for the Hudson's Bay Company.

1874: The first coal-powered electricity generators are developed near present-day Lethbridge.

1882 to 1883: The first coal mine in Alberta opens in Lethbridge (originally called Coalbanks) in 1882. The first mine in Edmonton opens in 1883.

1883: A Canadian Pacific Railway (CPR) crew drilling for water near Medicine Hat, Alberta accidentally discovers natural gas 55 kilometres northwest of Medicine Hat.

1894: Drilling begins at the Athabasca oil sands. Crews strike a reservoir of natural gas which blows wild for 21 years.

1905: Alberta is proclaimed a province on September 1, 1905.

1912: A 270 km pipeline begins carrying natural gas from Bow Island, Alberta to Calgary. This will allow natural gas to replace coal gas as a heating, lighting and cooking fuel.

1914: May 14 is a victorious day for Arthur W. Dingman. He and his associates savour the fruits of their risk-taking with a natural gas discovery at Turner Valley on the edge of Kananaskis Country.

1915: Sydney Ells demonstrates the first commercial use of oil sands. In 1915, he ships several tonnes of Athabasca oil sands by water, sleigh and rail to Edmonton for a road-paving experiment.

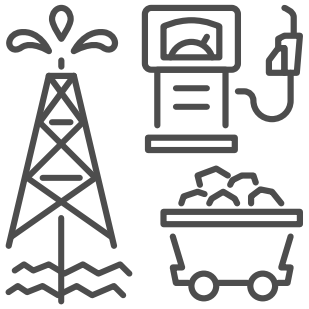
1947: After drilling 133 dry holes across Western Canada, Imperial Oil strikes oil at Leduc, Alberta, on February 13. This transforms Canada into an oil-rich nation.

Visit here for the full Energy in Alberta Timeline & .Our_Energy_History.

Alberta Energy History Video Links:

Coal: Energy Resources Heritage
Oilsands - Alberta Energy Resources Heritage
Natural Gas - Alberta Energy Resources Heritage

Non-Renewable Resources



- There are two main types of energy resources: renewable and nonrenewable. Renewable resources can naturally replenish themselves, while nonrenewable resources are limited and finite.
- The four major nonrenewable resources are oil, natural gas, coal, and nuclear energy. Oil, natural gas, and coal are known as fossil fuels, formed from the remains of dead plants and animals over millions of years
- Formation of Fossil Fuels: Fossil fuels originated during the Carboniferous Period (300 to 360 million years ago) when plants and animals absorbed solar energy through photosynthesis. This energy is released when fossil fuels are burned.
- Crude Oil: Crude oil is a liquid fossil fuel primarily used to produce gasoline, diesel, and plastics. It is extracted from underground rocks through wells.
- Natural Gas: Natural gas, mainly composed of methane, is commonly used for cooking and heating. It is found near oil deposits and can be extracted using the same wells as crude oil.
- Coal: Coal is a solid fossil fuel used for heating and electricity generation. It is found in fossilized swamps and must be mined from the ground.
- Nuclear Energy: Nuclear energy is derived from radioactive elements like uranium, which is mined and refined into fuel. (Currently there are no nuclear power plants in Alberta)
- Dependence on Nonrenewable Resources: Currently, about 80% of global energy comes from fossil fuels, which are energy-rich and inexpensive. However, burning fossil fuels contributes to carbon dioxide emissions, a major cause of global warming. Source Link: National Geographic

Climate Change Impacts

Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in the sun's activity or large volcanic eruptions. But since the 1800s, human activities have been the main driver of climate change. Burning fossil fuels generates greenhouse gas emissions that act like a blanket wrapped around the Earth, trapping the sun's heat and raising temperatures.

The main greenhouse gases that are causing climate change include carbon dioxide and methane. Energy, industry, transport, buildings, agriculture and land use are among the main sectors causing greenhouse gases. Climate change has a wide range of effects on the environment, ecosystems, and human societies including heatwaves, melting ice, rising seas, extreme weather, ocean changes, ecosystem disruptions, agriculture impact, water shortages, health problems, economic losses and social issues. *Source*

NASA Climate Kids | What is Climate Change? | Best Kid Books on Climate Change

Climate Change Experiments | Climate Change Art Projects | Climate Writing Prompts

Alberta Energy: Science, Technology & Innovation

The fossil fuel energy industry is developing new technologies and efficiencies in order to reduce greenhouse gas emissions and minimize environmental impact.

- Carbon Capture and Storage (CCS): Alberta is a leader in CCS technology, capturing carbon dioxide emissions from oil and gas operations and storing it underground to prevent it from entering the atmosphere.
- Methane Emission Reduction: The industry is implementing technologies and practices to detect and reduce methane leaks, including using advanced monitoring systems and improving equipment maintenance.
- Enhanced Oil/Hyrdrocarbon Recovery (EOR): Some companies are using CO2 injection methods to extract more oil while simultaneously storing carbon dioxide, which helps reduce overall emissions.
- Renewable Energy Integration: Oil and gas companies are investing in renewable energy sources, such as wind and solar, to power their operations, reducing reliance on fossil fuels.
- Energy Efficiency Improvements: The industry is adopting energy-efficient technologies and practices to reduce energy consumption in extraction and processing activities.
- Research and Development: Companies are investing in research to develop new technologies that can further reduce emissions and improve environmental performance.
- Regulatory Compliance: The Alberta government has set regulations and targets for emissions reductions, and the oil and gas industry is working to meet these standards.
- Collaboration with Indigenous Communities: Many companies are partnering with Indigenous groups to ensure that environmental stewardship practices are integrated into their operations.
- Sustainable Practices and Reporting: Companies are increasingly adopting sustainability reporting and practices that focus on transparency and accountability in their emissions management.
- Public Engagement and Education: The industry is working to engage the public and educate stakeholders about their efforts to reduce emissions and contribute to a more sustainable future.

Carbon Capture Utilization and Storage (CCUS)

The Alberta Wild Rose character initially mistakes Alice for Carbon Dioxide and has her "Carbon Cops" seize her to introduce the concept of Carbon Capture. Here's a kid-friendly explanation to help class discussions:

Imagine that our planet is like a big, cozy house, and we need to keep it clean and safe. But sometimes, we make a mess by burning things like coal and oil for energy, which releases a gas called carbon dioxide (CO2). Too much CO2 can make our house too warm, like leaving the oven on too long!

Now, carbon capture utilization and storage (CCUS) is like having a super vacuum cleaner that can suck up the messy CO2 from the air and from factories.

- Capture: First, the vacuum cleaner (which is a special machine) catches the CO2 before it gets into the air.
- Utilization: Then, instead of just throwing the CO2 away, we can use it for helpful things, like making fizzy drinks or even helping plants grow in greenhouses!
- Storage: Finally, if we can't use all the CO2, we store it safely underground, almost like putting it in a secret room where it can't escape and make a mess.

Could this technology save us from climate change? | CBC Kids News

Renewable Energy Resources

Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed. Generating renewable energy creates far lower emissions than burning fossil fuels.

SOLAR: Solar energy is the most abundant of all energy resources and can even be harnessed in cloudy weather. Solar technologies can deliver heat, cooling, natural lighting, electricity, and fuels for a host of applications. Solar technologies convert sunlight into electrical energy either through photovoltaic panels or through mirrors that concentrate solar radiation.

WIND: Wind energy harnesses the kinetic energy of moving air by using large wind turbines located on land (onshore) or in sea- or freshwater (offshore). Wind energy has been used for millennia, technologies have evolved over the last few years to maximize the electricity produced.

GEOTHERMAL: Geothermal energy utilizes the accessible thermal energy from the Earth's interior. Heat is extracted from geothermal reservoirs using wells or other means.

HYDROPOWER: Hydropower harnesses the energy of water moving from higher to lower elevations. It can be generated from reservoirs and rivers. Reservoir hydropower plants rely on stored water in a reservoir, while run-of-river hydropower plants harness energy from the available flow of the river.

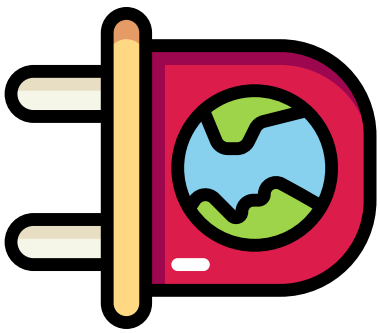
OCEAN ENERGY: Ocean energy derives from technologies that use the kinetic and thermal energy of seawater - waves or currents for instance - to produce electricity or heat.

BIOENERGY: Bioenergy is produced from a variety of organic materials, called biomass, such as wood, charcoal, dung and other manures for heat and power production, and agricultural crops for liquid biofuels. Most biomass is used in rural areas for cooking, lighting and space heating, generally by poorer populations in developing countries. Source: What is renewable energy?

Student volunteer actors demonstrating nature-inspired renewable energy such as solar and wind

Educational Resources:

- Energy Education Tool Kit
- Become a Renewable Energy Engineer
- Canadian Renewable Energy Project Map



Videos:

- Renewable Energy 101
- Solar, Wind & Wave power Explained| LEGO learning
- Electricity and Alternative Energies History in Alberta

Energy Sources Advantages & Disadvantages

Coal +

- Abundant Resource
- Cost-Effective
- Reliable Energy Supply
- Established Infrastructure
- Energy Density

Coal –

- Environmental Impact/Emissions
- Health Risks
- Land Degradation
- Water Use and Pollution
- Non-Renewable Resource

Natural Gas +

- Cleaner Burning compared to coal and oil
- Abundant and Accessible
- Flexible Energy Source
- Efficient Power Generation vs coal
- Quick Startup and Shutdown

Natural Gas –

- Greenhouse Gas Emissions
- Environmental Impact of Extraction
- Infrastructure Challenges
- Non-Renewable Resource
- Volatility in Prices

Oil +

- High Energy Density
- Established Infrastructure
- Versatile Applications
- Economic Importance
- Reliable Energy Source

Oil –

- Greenhouse Gas Emissions
- Environmental Impact
- Finite Resource - non-renewable
- Health Risks: Air pollution
- Price Volatility

Solar +

- Renewable Resource
- Environmentally Friendly
- Low Operating Costs: After the initial investment in solar panels
- Energy Independence
- Job Creation
- Scalability

Solar –

- Intermittent Energy Source
- High Initial Costs
- Space Requirements:
- Resource and Manufacturing Impact
- Energy Storage Costs

Wind +

- Renewable Resource
- Environmentally Friendly
- Low Operating Costs: Once wind turbines are installed
- Job Creation
- Versatility
- Energy Independence:

Wind –

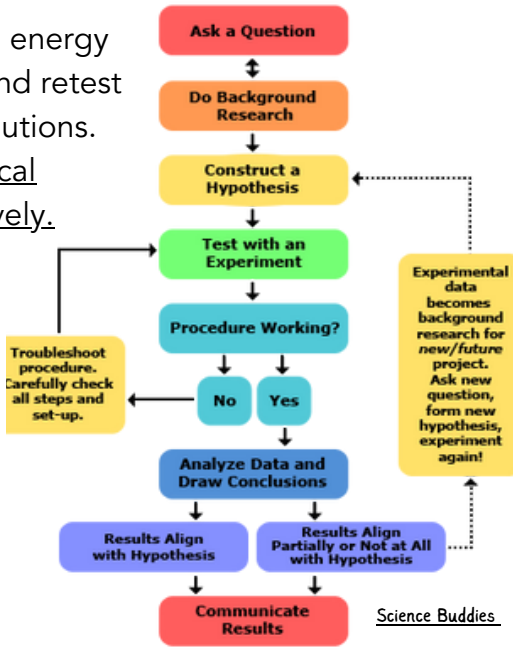
- Intermittent Energy Source
- Initial Costs
- Space Requirements
- Impact on Wildlife
- Noise and Aesthetic Concerns

Scientific Method

Science will help us here in Alberta and around the world, to develop the energy of the future. We will continue to explore innovative ideas, test, modify and retest in order to address disadvantages and inefficiencies of various energy solutions. Scientific knowledge allows us to advance new technologies, solve practical problems, and make informed decisions — both individually and collectively.

Alice used the scientific method to investigate her observations and answer the question as to why the Caterpillar was having difficulty driving.

1. Ask a Question
2. Do Background Research
3. Construct a Hypothesis
4. Test Your Hypothesis by Doing an Experiment
5. Analyze Your Data and Draw a Conclusion
6. Communicate Your Results



What are the steps of the scientific method? The Scientific Method: Steps and Examples

Alberta's Clean Energy Future

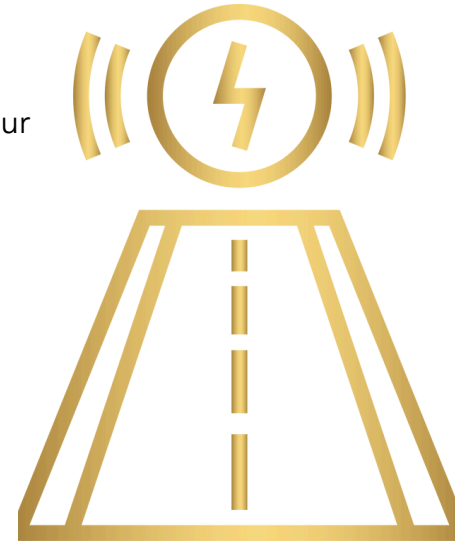
- Alberta is making great progress on energy emissions reduction - coal was phased out years ahead of schedule
- Alberta has already reduced methane emissions from the oil and gas sector by 45 per cent since 2014, but new technologies and innovations are needed
- Alberta is the largest hydrogen producer in Canada. Its clean combustion does not produce carbon emissions.
- Alberta is positioned to attract investment in the geothermal industry with a natural geographical advantage, leadership in drilling technology, and extensive oil and gas expertise.
- Emerging technologies have the potential to convert Alberta's waste materials to bioenergy products, including renewable fuels.
- The Bitumen Beyond Combustion (BBC) program is developing technologies using Alberta's bitumen outside of the combustion cycle to create useful products. It reduces greenhouse gas emissions and simultaneously increases the value of Alberta's bitumen by up to 133%

CHECK OUT EMISSIONS REDUCTION ALBERTA & ALBERTA INNOVATES TO DISCOVER HOW WE ARE USING SCIENCE AND TECHNOLOGY TO CREATE AND IMPROVE CLEAN ENERGY

Fun Future Facts

Check out these cool ideas being explored to provide cleaner energy in the future

- Gigantic solar power stations in space beaming power to Earth
- Hygroelectricy - harvesting electricity from humid air to power our devices
- Energy Harvesting Fabrics - Wearable energy technology
- Combining human body heat and underground heat storage at da club!
- Wireless electric roads - transfers energy to a receiver attached to a vehicle battery through "inductive charging"



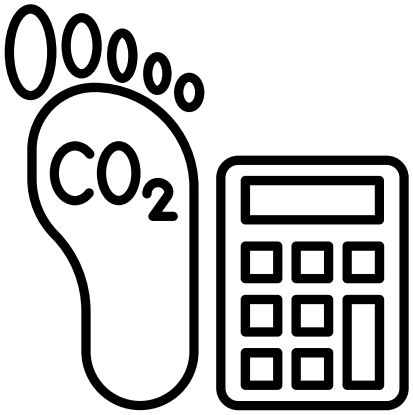
Shared Responsibility

Reducing emissions, combatting climate change and creating the energy future we want to see is a shared responsibility between government, industry, scientists, corporations, non-profit organizations, everyday citizens and YOU!

What Can Kids Do?

- Reduce and reuse as much as possible. Factories emit carbon dioxide when making new products. So instead of buying new stuff, fix your appliances and clothes
- Send a letter, postcard, or drawing to your mayor, local, provincial and/or federal government representative, or even the Prime Minister sharing your concerns, compliments, thoughts or suggestions regarding energy and the environment.
- "Vampire" appliances suck energy even when turned off. Kill these monsters by unplugging phone and laptop chargers when not in use, and use power strips for lamps and TVs. (Bonus: It'll save your parents money on energy bills!)
- Try to eat mostly in season and locally grown fruits and vegetables. This helps cut down on the energy used to grow and transport food, which reduces the release of heat-trapping gases.

What Can Kids Do Continued...



- Use an online carbon footprint calculator to see how much carbon dioxide your actions release. If you know how you're impacting the planet, you can take steps for change.
- Livestock such as cows account for some of Earth's heat-trapping gas emissions. (Yep, it's the cow BURPS!) Eating more plants cuts down on the need for so much livestock.
- Hang up and reuse your hotel towels instead of washing them after each use. That saves water and energy.
- Walk or bike as much as you can. Biking or walking just one kilometre a day for a year could save 330 pounds of carbon dioxide—that's the same as planting four trees and letting them grow for 10 years!
- Write a letter to the editor about energy & climate change in your local or school newspaper. The more people talk about the issue, the better!
- Wear a warm sweater instead of turning up the heat, and open your windows and turn on a fan instead of blasting the air conditioner.
- Not everyone understands climate change. Learn the facts and talk to your friends and family. If everyone gets the science, we can work together to find solutions.

Source: Ways to save the Earth from climate change

Exploring Indigenous Connections

INDIGENOUS CLIMATE HUB

- As mentioned in the "Dino Ditty", the first known reference to the Athabasca oil sands is made by Captain Swan. He was a Cree chief acting as a middleman between the native hunters of the west and the fur factories of Hudson Bay. Swan tells Governor James Knight in council at York Fort in 1715 about a river feeding the Churchill River where he found "Gum or pitch." In 1719 Swan returns to York Fort, where Henry Kelsey has replaced Knight as governor. He gives Kelsey a sample of "that Gum or pitch that flows out of the Banks of that River." Learn more about historical and modern Indigenous contributions and partnerships involving clean energy and how Indigenous communities are leading the way in Canada's transition to a low-carbon future.
- Develop an understanding of First Nations, Métis and Inuit perspectives on respectful use of the land and resources.
- Visit Two-Eyed Seeing: Resource for respectfully incorporating Indigenous cultural and language opportunities and connections for students in a variety of educational environments.
- Discover more about traditional land acknowledgements and/or create one together for your class

Alberta's Official Symbols

Evergreen Theatre's production, "Alice's Alberta Energy Adventure" features the wise, but prickly, Alberta Wild Rose, personified. The Wild Rose is our designated provincial floral emblem. Alberta also has an official:

- flag - adopted on June 1, 1968
- grass (Rough Fescue)
- tartan
- bird (Great Horned Owl)
- gemstone (Ammolite)
- stone (Petrified wood)
- tree (Lodgepole Pine)
- mammal (Rocky Mountain Bighorn Sheep)
- fish (Bull Trout),
- song
- colours (blue and gold)

Fractured Fairytales & Parody

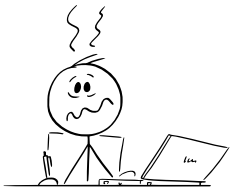
"Alice's Alberta Energy Adventure"is the latest in Evergreen Theatre's Eco-Tales series in which beloved traditional tales are retold featuring popular music parodies.

Our twist on "Alice's Adventures in Wonderland" incorporates some familiar elements and characters, but with a twist such as: Alice's rabbit (named Lewis after Lewis Carroll), a Caterpillar who speaks in short riddling quips like the original, but this one is a spin on an oil sands Caterpillar brand truck, references to "March Hares" and "Drink Me", the concept of the pocket watch/time and of course the background of a wacky dream-like Wonderland.

You may have recognized some of the songs that were parodied off of hits like: "Houdini" by Dua Lipa, "A Chorus Line", "Flowers" by Miley Cyrus and Taylor Swift's "Wonderland".

We are happy to pass along the lyrics if your students would like to give the songs a try!

Overcoming Test Anxiety



Alice is worried about her upcoming Energy test even though "she knows her stuff". She says she has a tendency to "freeze" when she's tested. The sun helps her think about ways to "thaw". Discuss academic/test (or general) anxiety with your students and brainstorm ways to reduce the associated stress such as:

- Start studying the day the teacher first says there will be an exam. That way you won't be cramming at the last minute.
- Schedule study time. Put it in your calendar or set an alarm on your phone to remind you.
- Focus on smaller chunks of material during study sessions so they're easier to handle.
- Ask someone in the class if you can study together to keep you on track.
- Try breathing exercises to relax.
- Remind yourself that you don't have to get a perfect score on every test. Everyone slips up, so keep mistakes in perspective. Think of them as chances to learn for the next time. Source: Test Anxiety

Brain Basics: Anxiety for Kids

SHOW VOCAB GLOSSARY

BIOFUELS: Fuels made from organic materials, such as plant or animal waste, that can be used as alternatives to fossil fuels.

BITUMEN: A viscous, tar-like form of petroleum often found in oil sands and used for road construction and roofing.

CARBON CAPTURE: A technology aimed at capturing carbon dioxide emissions produced from the use of fossil fuels in electricity generation and storing it underground.

CARBON DIOXIDE: A colourless gas produced by burning fossil fuels and biomass, as well as through respiration; it is a significant greenhouse gas.

COAL: A combustible black or dark brown rock consisting mainly of carbonized plant matter, found mainly in underground deposits and widely used as fuel.

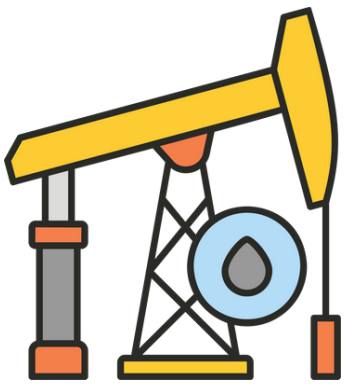
CLIMATE CHANGE: Long-term changes in temperature, precipitation, wind patterns, and other elements of the Earth's climate system, primarily driven by human activities.

ELECTRICITY: A form of energy resulting from the flow of electric charge, used for lighting, heating, and powering devices.

EMISSIONS: Pollutants released into the atmosphere, often as a result of human activities such as transportation and industrial processes.

ENERGY: The capacity to do work or produce heat, existing in various forms such as kinetic, potential, thermal, and chemical.

EXPERIMENT: A scientific procedure undertaken to test a hypothesis or demonstrate a known fact.



FINITE: Having limits or bounds; often used in reference to resources that are limited in supply.

FOSSIL FUEL: An energy source formed in the Earth's crust from decayed organic material., including coal, oil, and natural gas, used for energy production.

GREENHOUSE GASES: Gases like carbon dioxide, methane, and nitrous oxide that trap heat in the atmosphere and contribute to global warming.

SHOW VOCAB GLOSSARY Pg 2

HELIOTROPIC EFFECT: The orientation of plants or organisms toward sunlight, which influences their growth and photosynthesis.

HYDROGEN: The simplest and most abundant element in the universe, often used as a clean fuel source in various technologies.

HYPOTHESIS: A proposed explanation for a phenomenon, which can be tested through experimentation.

INDIGENOUS ELDERS: Respected members of Indigenous communities who possess wisdom and knowledge about culture, traditions, and history.

INNOVATION: The process of developing new ideas, products, or methods to improve efficiency or effectiveness.

NATURAL GAS: A fossil fuel primarily composed of methane, used for heating, electricity generation, and as an industrial feedstock.

NEWTON'S LAWS OF MOTION: Three physical laws formulated by Sir Isaac Newton that describe the relationship between a body and the forces acting upon it.

NON RENEWABLE RESOURCES: Resources that cannot be replenished in a short time frame, such as fossil fuels and minerals.

OBSERVATION: The act of carefully watching and recording phenomena to gather information for scientific study.

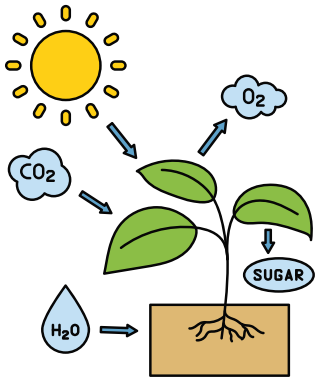
OIL: A viscous liquid derived from petroleum, especially for use as a fuel or lubricant.

OIL SANDS: Deposits of sand and clay saturated with a thick, viscous form of crude oil called bitumen.

ORGANIC MATERIAL: Substances that are derived from living organisms, often used in agriculture and energy production.

PEAT: A type of organic material that forms in waterlogged conditions, often used as a fuel and in horticulture.

SHOW VOCAB GLOSSARY Pg 3



PHOTOSYNTHESIS: The process by which green plants and some other organisms use sunlight to synthesize foods with the help of chlorophyll.

POTENTIAL ENERGY: The stored energy in an object due to its position or arrangement, which can be converted into kinetic energy.

RENEWABLE Resources that can be replenished naturally over time, such as solar, wind, and hydro energy.

RESOURCES: Materials or assets available for use in producing goods and services, including natural resources like minerals and water.

THE R's - Reduce, Reuse, Recycle, Repair, Rethink: Principles aimed at promoting sustainability and minimizing waste through responsible consumption.

SCIENTIFIC METHOD: A systematic process used for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge.

SOLAR PANEL: A device that converts sunlight directly into electricity using photovoltaic cells.

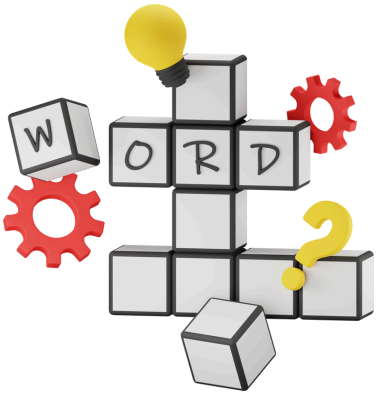
TECHNOLOGY: The application of scientific knowledge for practical purposes, especially in industry.

WATER CYCLE: The continuous movement of water on, above, and below the surface of the Earth, involving processes such as evaporation, condensation, and precipitation.

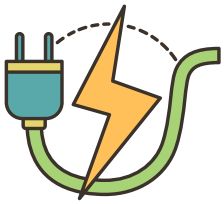
WILD ROSE: A type of flowering plant in the family Rosaceae, often found in many regions and valued for its beauty and ecological importance. Alberta's provincial flower.

WIND TURBINE: A device that converts kinetic energy from the wind into mechanical energy, which can be used to generate electricity.

Check out the show vocab word search and crossword worksheets at the end of the guide



"Alice's Alberta Energy Adventure"
Vocabulary Word Search Level 1



Words can go in any direction. Words do not share letters.

Alberta	fuel	light	peat	science
Alice	gas	oil	plug	sun

W L M K I C T Y G X F T G E J
E C I L A N Z B G O A T M O Q
P C M T Z N N M S T E Y S I E
S R Z H L M S J R Q R T T L S
Y M T Z G A E E N A E W E A V
F F P A Z G B N V P O W G C Y
H U S F P L S L E R I I E C T
S V E P A R D W K R P S N T B
D Y L L H O L L H Y G P H H C
C U I J T D G V A J H Y Q W O
G T T S U N T W Z O L A S T L
M A O N M A E D D R C M D E I
K E T H W K V R G A V W K M G
K P P J K F M C M B M F V V H
S C I E N C E W L F W V R R T

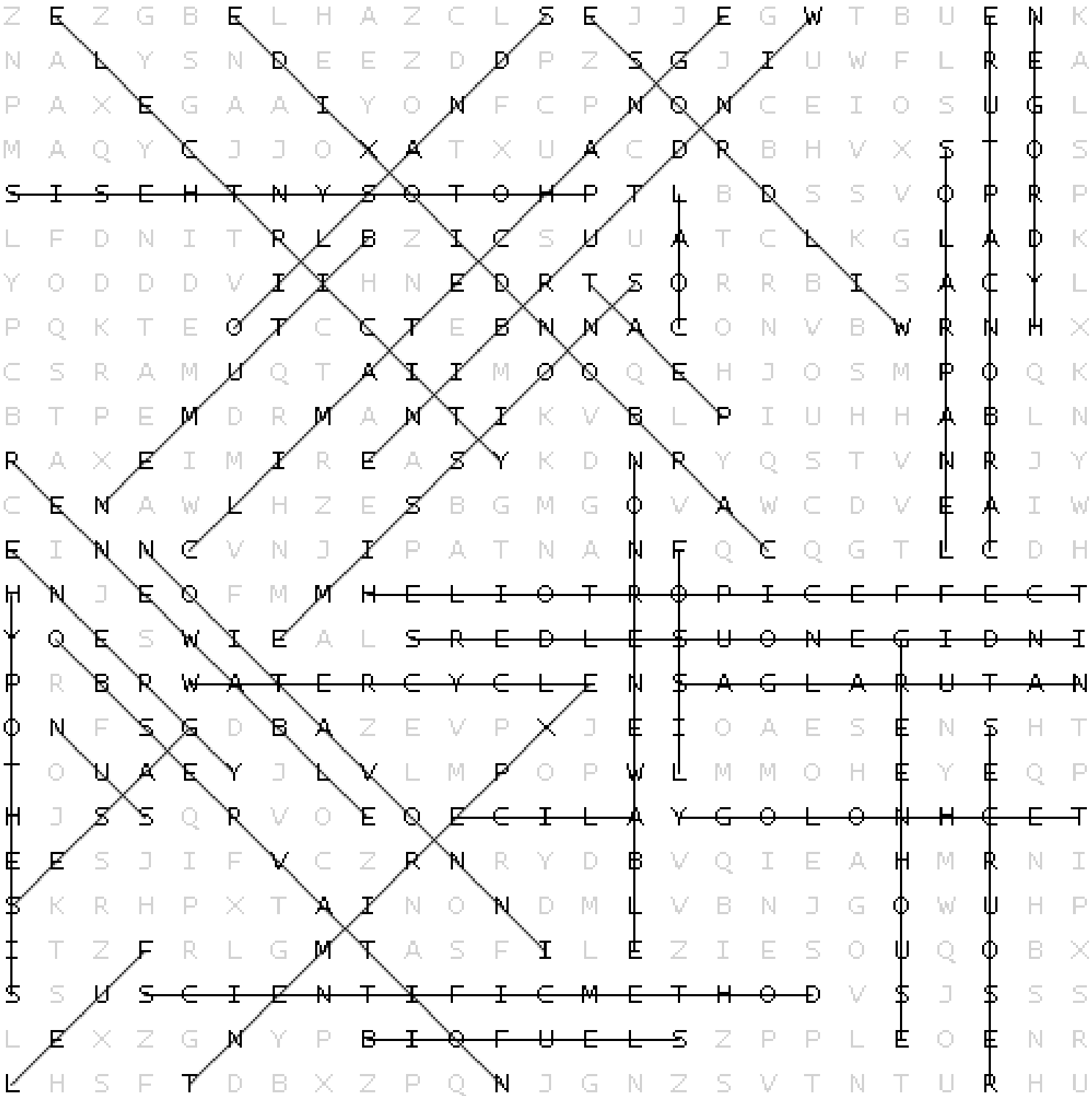
"Alice's Alberta Energy Adventure"
Vocabulary Word Search Level 2

Alice	Electricity	Greenhouse	Non Renewable	Scientific Method
Biofuels	Emissions	Heliotropic Effect	Observation	Solar Panel
Bitumen	Energy	Hydrogen	Oilsands	Sun
Carbon Capture	Experiment	Hypothesis	Peat	Technology
Carbon Dioxide	Fossil	Indigenous Elders	Photosynthesis	Water Cycle
Climate Change	Fuel	Innovation	Renewable	Wild Rose
Coal	Gases	Natural Gas	Resources	Wind Turbine

Words can go in any direction and can share letters as they cross over each other.

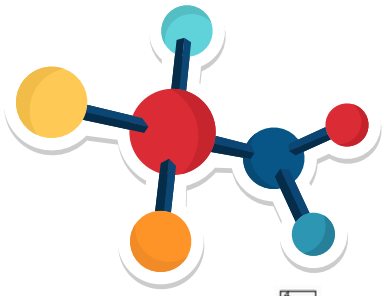
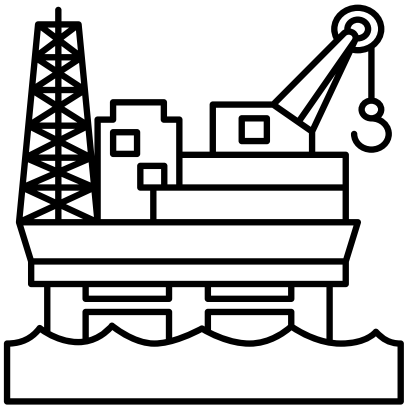
Z E Z G B E L H A Z C L S E J J E G W T B U E N K
N A L Y S N D E E Z D D P Z S G J I U W F L R E A
P A X E G A A I Y O N F C P N O N C E I O S U G L
M A Q Y C J J O X A T X U A C D R B H V X S T O S
S I S E H T N Y S O T O H P T L B D S S V O P R P
L F D N I T R L B Z I C S U U A T C L K G L A D K
Y O D D D V I I H N E D R T S O R R B I S A C Y L
P Q K T E O T C C T E B N N A C O N V B W R N H X
C S R A M U Q T A I I M O O Q E H J O S M P O Q K
B T P E M D R M A N T I K V B L P I U H H A B L N
R A X E I M I R E A S Y K D N R Y Q S T V N R J Y
C E N A W L H Z E S B G M G O V A W C D V E A I W
E I N N C V N J I P A T N A N F Q C Q G T L C D H
H N J E O F M M H E L I O T R O P I C E F F E C T
Y O E S W I E A L S R E D L E S U O N E G I D N I
P R B R W A T E R C Y C L E N S A G L A R U T A N
O N F S G D B A Z E V P X J E I O A E S E N S H T
T O U A E Y J L V L M P O P W L M M O H E Y E Q P
H J S S Q R V O E O E C I L A Y G O L O N H C E T
E E S J I F V C Z R N R Y D B V Q I E A H M R N I
S K R H P X T A I N O N D M L V B N J G O W U H P
I T Z F R L G M T A S F I L E Z I E S O U Q O B X
S S U S C I E N T I F I C M E T H O D V S J S S S
L E X Z G N Y P B I O F U E L S Z P P L E O E N R
L H S F T D B X Z P Q N J G N Z S V T N T U R H U

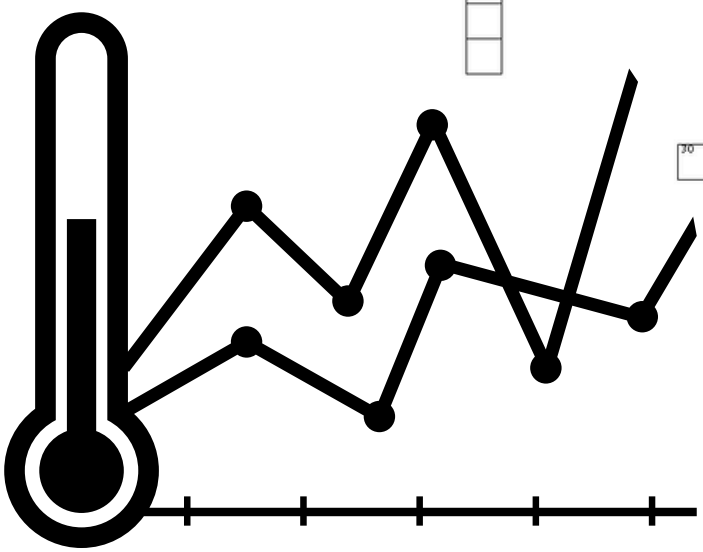
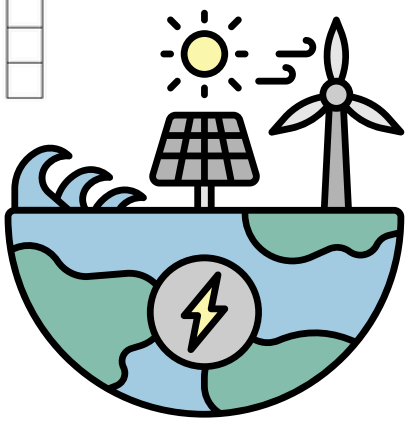
“Alice’s Alberta Energy Adventure”
Vocabulary Word Search
SOLUTION



Evergreen Theatre's "Alice's Alberta Energy Adventure" Vocabulary Crossword

Refer to Page 2 for clues. Words can go across or down. Letters are shared when the words intersect.
Hint: Take a peek at the Word Search Vocab List.

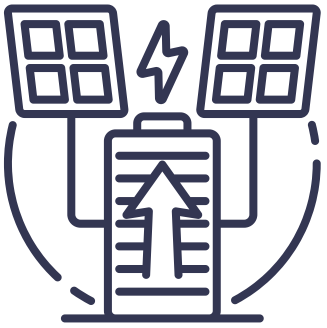



Evergreen Theatre's
"Alice's Alberta Energy Adventure"
Vocabulary Crossword Clues

ACROSS

2. A flowering plant known for its beauty, and Alberta's provincial flower.
6. A colourless gas from burning fossil fuels and breathing, that contributes to climate change.
9. A black or brown rock made from ancient plant material, used as fuel.
10. The ability to do work or produce heat, found in different forms like kinetic and thermal.
13. A thick liquid from petroleum, used as fuel or lubricant.
14. The movement of water around the Earth, including evaporation and precipitation.
17. Resources that can be naturally replenished, like solar and wind energy.
18. A step-by-step process for investigating and learning about phenomena.
21. Sand and clay mixed with thick crude oil called bitumen.
22. Gases like carbon dioxide and methane that trap heat in the atmosphere.
25. Plants growing toward sunlight to help them grow and make food.
26. Energy sources like coal, oil, and natural gas formed from decayed plants and animals.
27. Resources that take a long time to replace, like fossil fuels.
30. An idea that can be tested to explain something.



DOWN

1. Organic material that forms in wet areas, used as fuel and in gardening.
3. Creating new ideas or products to improve things.
4. The way plants make food using sunlight and chlorophyll.
5. Fuels made from plants or animal waste that can replace fossil fuels.
6. A technology that traps carbon dioxide from burning fossil fuels and stores it underground.
7. Materials used to produce goods and services, like minerals and water.
8. The simplest and most common element, used as a clean fuel source.
11. Respected leaders in Indigenous communities with knowledge of culture and traditions.
12. A thick, tar-like oil found in oil sands, used for roads and roofs.
15. Using scientific knowledge for practical purposes, especially in industry.
16. Pollutants released into the air from activities like driving and industry.
19. A form of energy created by moving electric charge, used for lighting and powering devices.
20. A test done to check a hypothesis or show a fact.
23. A fossil fuel made mostly of methane, used for heating and electricity.
24. Long-term shifts in weather patterns, mainly caused by human activities.
28. Watching and recording things to gather information for science.
29. _____ Turbine - A device that uses air currents to generate electricity.
31. A device that turns sunlight into electricity.

Evergreen Theatre's: "Alice's Alberta Energy Adventure"

Vocabulary Crossword

SOLUTION