



ENERGY EDUCATION TOOL KIT

BY INSIDE EDUCATION

TEACHER'S
GUIDE

WELCOME TO YOUR ENERGY EDUCATION TOOL KIT!

Learning about energy is a valuable way for students to understand Alberta's natural resource landscape and how it impacts our economy, society and environment.

The **Energy Education Tool Kit** includes tools, activities and lessons adapted from Inside Education's programs that will help you create an immersive energy education experience for your students. This kit is divided into 8 topics, each exploring a different aspect of energy in Alberta. Each topic has an introductory sheet, tools, guiding questions, activities, and opportunities to "consider, connect and learn more". These activities connect directly to the Alberta Program of Studies, with Curriculum Connections listed below. The tools required for each activity are in your Energy Education Tool Kit, and instructions on how to use them are included on the introductory worksheet.

These activities are generally designed for a grade 4-9 audience and the materials are intended to last for a long time, so the kit can be used in multiple classrooms for years to come. We hope you enjoy exploring energy in Alberta through this unique educational resource!

CURRICULUM CONNECTIONS

Grade 4 Social Studies Unit A: Alberta, A Sense of the Land
Grade 4 Science Unit C: Building Devices and Vehicles that Move
Grade 5 Science Unit A: Electricity and Magnetism
Grade 5 Science Unit B: Mechanisms Using Electricity
Grade 6 Science Unit D: Evidence and Investigation
Grade 8 Science Unit D: Mechanical Systems
Grade 9 Science Unit C: Environmental Chemistry
Grade 9 Science Unit D: Electrical Principles and Technologies

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1

TOPIC #1 NATURAL RESOURCES FOR ENERGY

Explore the natural resources used for energy in Alberta. Students will learn where natural resources are found in the province, as well as the opportunities and challenges of using each natural resource for energy.

Materials included: Natural resource samples (*coal, oil, natural gas, nuclear, biomass, wind, solar, hydro, geothermal*), “Natural Resource Riddle” cards, “Alberta’s Natural Resources” Puzzle, “Considerations for Using Natural Resources for Energy in Alberta” Chart

2

TOPIC #2 CANADA'S ENERGY LANDSCAPE

Through playing the Energy Moves board game, students will learn about the steps involved in producing, transporting and using Alberta’s oil and gas resources. Along the way students will be challenged to think critically about their role in the energy landscape.

Materials included: Energy Moves

3

TOPIC #3 ELECTRICITY GENERATION

Discover how electricity is generated from natural resources as well as which natural resources are used the most for electricity generation in Alberta. Students will also use tools to understand electromagnetism and explore how kinetic energy is transformed into electrical energy.

Materials included: “Fill in the Blank - Turn on a light using natural gas”, “Fill in the Blank - Turn on a toaster using wind power”, “Alberta’s Electricity Mix - Discussion Questions”, “Build an Electromagnet” activity, hand generator, multimeter, Electricity Poster

4

TOPIC #4 RENEWABLE & ALTERNATIVE ENERGY

Learn about different types of renewable and alternative energy and the opportunities and challenges associated with each. Students will build a wind turbine model, conduct a solar generation experiment, and generate electricity from mud through microbial fuel cell technology.

Materials included: Wind turbine model, 1.5V solar panel, MudWatt Microbial Fuel Cell, mini light bulb (*light output indicator*)

5 TOPIC #5 EXPERIENCE FOSSIL FUELS

Discover how fossil fuels connect to our economy and daily lives. Students will learn about Alberta's abundant coal, oil and natural gas reserves, and explore how energy is produced with an eye to resources that are mined. Students will take a deep dive into oil and natural gas by completing a video scavenger hunt, and a deep dive into mineral extraction by completing a Mining Poster scavenger hunt.

Materials included: Mining Posters (4), instructions to access PetroLMI's Experience the Energy 360° videos

6 TOPIC #6 ENERGY EFFICIENCY & CONSERVATION

Students will learn how they can reduce their energy consumption through energy efficiency and conservation. Students will use tools to measure and track the electrical output of different types of light bulbs and classroom devices.

Materials included: LED light bulb, incandescent light bulb, energy meter, infrared thermometer, lux meter

7 TOPIC #7 ENERGY STORAGE

As renewable sources for electricity generation increase, the need for energy storage becomes more important due to the variable nature of these resources. Students will compare how energy can be stored using battery and flywheel technology by experimenting with two different car models.

Materials included: Zecar (*flywheel storage model*), electric car (*battery storage model*)

8 TOPIC #8 STEWARDSHIP

Discover ways to lessen your impact on the environment by conducting a school energy audit. Students will use tools to measure heat loss, electricity usage, and water usage at your school, and discuss ways to reduce overall energy usage at school and at home.

Materials included: Infrared thermometer, energy meter, 1000mL beaker

Photo	Tool Name	Brief Description
1 Natural Resources for Energy		
	Coal sample	Sample of coal as an energy resource.
	Oil sands sample	Sample of oil sands as an energy resource.
	Natural gas pipe	Model of a natural gas pipe demonstrating natural gas as an energy resource.
	Nuclear sample (plastic replica)	Sample of uranium (<i>nuclear energy</i>) as an energy resource.
	Solar sample	Example of a solar panel demonstrating the sun as an energy resource.
	Wind sample	Photo of a wind turbine demonstrating wind as an energy resource.
	Geothermal sample	Model of the earth demonstrating geothermal as an energy resource.
	Hydro sample	Photo of a hydroelectric dam demonstrating water as an energy resource.
	Biomass sample	Sample of biomass (<i>wood pellets</i>) as an energy resource.
	Magnetic Puzzle (Alberta Natural Resources Map)	Map of Alberta's natural regions and the natural resources found within each.
	Natural Resource Riddles (cards)	A series of 9 clues that correspond to each of the natural resource samples.
2 Canada's Energy Landscape		
	Energy Moves Board Game & Cards	Board game with 6 sets of cards - consultation, environmental assessment, resource extraction, transportation, reclamation & monitoring, and processing.
3 Electricity Generation		
	Hand Generator	Converts mechanical energy to electrical energy to light a light bulb. Leads can also be attached to a multimeter, LED bulb, etc.
	Multimeter	An instrument that measures electric current, voltage and resistance.
	D-Cell battery	A large battery used in the electromagnet building experiment.
	Bolt (zinc, 3in)	A zinc bolt used in the electromagnet building experiment.

All of the items on this list are available for purchase from various vendors. If you need a hand sourcing tools for your classroom, do not hesitate to reach out — we are happy to help! info@insideeducation.ca

Photo	Tool Name	Brief Description
	Paperclips	Small and large paper clips used to test the strength of an electromagnet.
	Electrical tape	Electrical tape used to connect copper wire to the battery in the electromagnet building experiment.
	Insulated copper wire (20AWG)	Insulated copper wire used in the electromagnet building experiment.
	Electricity poster	The Electricity poster includes a number of activities on topics including electricity safety, natural resources for electricity, and generating electricity across Canada.

4 | Renewable & Alternative Energy

	Wind turbine model	This easy-to-build wind turbine model demonstrates how wind energy is captured. Includes a light and sound board and multimeter to measure output, and materials to experiment with the blade design.
	MudWatt Microbial Fuel Cell	This microbial fuel cell only requires an input of soil (<i>or compost</i>) to demonstrate how chemical energy can be turned into electrical energy using the power of microbes.
	Solar panel (1.5V)	This 1.5V solar panel contains photovoltaic cells that capture solar energy and convert it to electrical energy.
	Mini light bulb (light output indicator)	A light output indicator can be used in various electricity demonstrations and experiments.

5 | Experience Fossil Fuels

	Mining posters (4)	The 4 mining posters give an overview of the mining industry in Alberta, including its products, environmental considerations, technology development, and careers.
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6 | Energy Efficiency & Conservation

	Energy Meter	Measures the amount of electrical energy consumed by an electrical device.
	LED light bulb	A source of electrical light that uses one or more Light Emitting Diodes (<i>LEDs</i>) to produce light.
	Incandescent light bulb	A source of electric light that works by incandescence, which is the emission of light caused by heating a filament.
	Lux Meter	A device that measures the brightness of illumination (<i>light</i>) of a surface.

7 | Energy Storage

	Zecar	This model car uses the stored kinetic energy of its flywheel to scoot across the floor.
	Electric car model	This model car uses the stored energy of its battery to scoot across the floor.

8 | Stewardship

	Infrared thermometer	An instrument that detects the infrared radiation emitted by an object to determine its temperature.
	1,000 mL beaker	A 1,000 mL beaker can be used to measure the flow rate of a tap.

