



Energy: One Pager

Background and concepts

$$\text{Energy: Power} \times \text{Time} = \text{Energy}$$

How can I reduce my electricity use, reduce greenhouse gas emissions, and save money?

Take photos of the actions you are taking to save energy or keep a list or journal of what you are doing to save electricity. Do the math. Share your actions with your teacher, family, and friends.

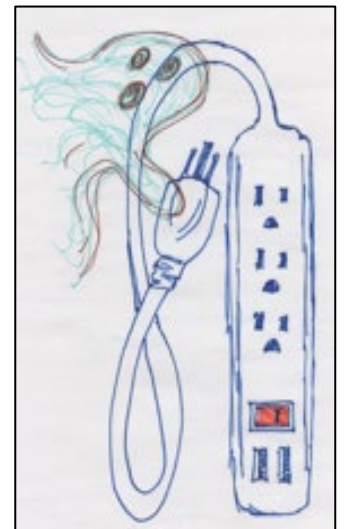
I turn out lights when not needed:

- Make use of natural light from windows.
- If it is a sunny day only turn on the lights that you need.
- Turn out lights when you leave the room.
- Place a poster by each switch to remind your family to turn out the lights.
- Use your journal to track how you reduced lighting use over 3 days.



I unplug stuff that's not in use:

- **Phantom or standby power** is the power a device uses even when it is turned off. It is using some power if it has ... a clock, a remote control, a visible light when not in use, it is programmable, it is instant on, or it is a SMART device.
- Use a power bar, to make it easier to turn devices on and off.
- Make a list of all the things in your home that use phantom power. Identify the ones you can unplug.



By reducing phantom load by 50% the average home saves:

- power (350 kWh/y),
- greenhouse gas emissions (210 kgCO₂e/y), and
- money on utility bills (\$60/y)



I change an old light bulb for a new LED light bulb:

Compare the 3 light bulbs:

Power

60 Watt Incandescent light bulb

$300 \text{ Wh/d} \times 365 \text{ d/y} = 109,500 \text{ Wh/y} / 1000 \text{ kWh} = 109.5 \text{ kWh/y}$

$109.5 \text{ kWh} \times 0.5 \text{ kgCO}_2\text{e} = \mathbf{54.75 \text{ kgCO}_2\text{e/y}}$

x Time

x 5h/d

= Energy

= **300 Wh/d**

13 Watt Compact fluorescent (CFL) light bulb

$65 \text{ Wh/d} \times 365 \text{ d/y} = 23,725 \text{ Wh/y} / 1000 \text{ kWh} = 23.73 \text{ kWh/y}$

$23.73 \text{ kWh} \times 0.5 \text{ kgCO}_2\text{e} = \mathbf{11.87 \text{ kgCO}_2\text{e/y}}$

x 5h/d

= **65 Wh/d**

9 Watt Light emitting diode (LED) light bulb

$45 \text{ Wh/d} \times 365 \text{ d/y} = 16,425 \text{ Wh/y} / 1000 \text{ kWh} = 16.43 \text{ kWh/y}$

$16.43 \text{ kWh} \times 0.5 \text{ kgCO}_2\text{e} = \mathbf{8.2 \text{ kgCO}_2\text{e/y}}$

x 5h/d

= **45 Wh/d**

W = watt	h = hours	d = day	y = year
kg = kilogram	CO ₂ e = carbon dioxide equivalent		



List other ideas to reduce electricity and create your action plan below:



Curriculum connections

Grade 4: Mathematics: N4.1 Demonstrate an understanding of whole numbers to 10 000 (pictorially, physically, orally, in writing, and symbolically) by: representing, describing, comparing two numbers, ordering three or more numbers. **N4.2** Demonstrate an understanding of addition of whole numbers with answers to 10 000 and their corresponding subtractions (limited to 3 and 4-digit numerals) by: using personal strategies for adding and subtracting, estimating sums and differences, solving problems involving addition and subtraction. **N4.3** Demonstrate an understanding of multiplication of whole numbers (limited to numbers less than or equal to 10) by: applying mental mathematics strategies, explaining the results of multiplying by 0 and 1 **N4.7** Demonstrate an understanding of decimal numbers in tenths and hundredths (pictorially, orally, in writing, and symbolically) by: describing, representing, relating to fractions. **N4.8**

Demonstrate an understanding of addition and subtraction of decimals limited to hundredths (concretely, pictorially, and symbolically) by: using compatible numbers, estimating sums and differences, using mental math strategies, solving problems. **P4.1** Demonstrate an understanding of patterns and relations by: identifying and describing patterns and relations in a chart, table or diagram, reproducing patterns and relations in a chart, table, or diagram using manipulatives, creating charts, tables, or diagrams to represent patterns and relations, solving problems involving patterns and relations

Science: LI4.1 Investigate the characteristics and physical properties of natural and artificial sources of light in the environment. **LI4.3** Assess personal, societal, and environmental impacts of light-related technological innovations including optical devices. **Social Studies: RW4.3** Assess the impact of Saskatchewan resources and technological innovations on the provincial, national, and global communities.

Grade 5: Mathematics: N5.1 Represent, compare, and describe whole numbers to 1 000 000 within the contexts of place value and the base ten system, and quantity. **N5.2** Analyze models of, develop strategies for, and carry out multiplication of whole numbers. **N5.6** Demonstrate understanding of decimals to thousandths by: describing and representing, relating to fractions, comparing and ordering. **N5.7** Demonstrate an understanding of addition and subtraction of decimals (limited to thousandths). **P5.1** Represent, analyse, and apply patterns using mathematical language and notation. **P5.2** Write, solve, and verify solutions of single-variable, one-step equations with whole number coefficients and whole number solutions. **SP5.1** Differentiate between first-hand and second-hand data. **Social Studies: RW5.1** Explain the importance of sustainable management of the environment to Canada's future.

RW5.2 Hypothesize about economic changes that Canada may experience in the future.

Grade 6: Mathematics: N6.3 Demonstrate understanding of the order of operations on whole numbers (excluding exponents) with and without technology. **N6.4** Extend understanding of multiplication and division to decimals (1-digit whole number multipliers and 1-digit natural number divisors).

Science: EL6.1 Assess personal, societal, economic, and environmental impacts of electricity use in Saskatchewan and propose actions to reduce those impacts.



Social Studies: RW6.2 Contribute to initiating and guiding change in local and global communities regarding environmental, social, and economic sustainability.

Grade 7: Mathematics: N7.2 Expand and demonstrate understanding of the addition, subtraction, multiplication, and division of decimals to greater numbers of decimal places, and the order of operations. **P7.3** Demonstrate an understanding of one- and two-step linear equations of the form $ax/b + c = d$ (where a , b , c , and d are whole numbers, $c \leq d$ and $b \neq 0$) by modeling the solution of the equations concretely, pictorially, physically, and symbolically and explaining the solution in terms of the preservation of equality. **P7.4** Demonstrate an understanding of linear equations of the form $x + a = b$ (where a and b are integers) by modeling problems as a linear equation and solving the problems concretely, pictorially, and symbolically.

Social Studies: RW7.2 Investigate the influence of resources upon economic conditions of peoples in circumpolar and Pacific Rim countries. **RW7.3** Assess the ecological stewardship of economies of Canada and the circumpolar and Pacific Rim countries.

Grade 8: Health Education: USC8.6 Examine and assess the concept of sustainability from many perspectives, and develop an understanding of its implications for the well-being of self, others, and the environment. **AP8.10** Design, implement, and evaluate three seven-day action plans that establish multiple supports for responsible health action related to family roles and responsibilities, non-curable infections/diseases, violence and abuse, body image, sustainability, and sexual health.

Mathematics: N8.3 Demonstrate understanding of rates, ratios, and proportional reasoning concretely, pictorially, and symbolically.

Social Studies: RW8.3 Critique the approaches of Canada and Canadians to environmental stewardship and sustainability.