Smarter Science Better Buildings
Prince Albert Science Centre

Workstation Guiding Questions

Heating and Cooling

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. What factors make ***cellulose insulation*** an environmentally beneficial insulation choice?

2. ***Heat Pumps*** use electrical energy to move heat energy from one location to another. Compare the size of the blue “electrical energy coming in” arrow, to the size of the red “heat energy coming out” arrow. What does that tell you about the efficiency of the heating system?

3. Name three things ***Beardy’s and Okemasis’ Cree Nation*** wanted to accomplish with their new homes.

4. In ***How Heat Moves***, which home would be warmer and less drafty in winter? Which home uses the least amount of energy?

5. Set the ***thermostats*** in the display to 15ºC. If you set the thermostat in your home back to 15ºC at night, how would it help you to save energy?

Net Zero Home

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. List the things that make up the ***building envelope***. Why is it important for the envelope to be airtight and have good insulation?

2. ***Canada's National Energy Code:*** How much more energy efficient is tier 4 than the current Saskatchewan code? List three actions that would increase a home's energy efficiency.

1. _____

2. _____

3. _____

3. What is **thermal bridging** and how does the double wall construction reduce it?

4.

$$Q = \frac{A \times \triangle T}{R}$$

When you "turned down" the thermostat ($\triangle T$), what happened to the power (Q), consumption of the house? Why?

5. What is the connection between the energy our homes use and ***climate change***?

Lighting and Appliances

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. The ***Innovative Design:*** How does the reflective material bring natural light into the interior of the buildings?

2. The ***average Saskatchewan home*** uses a lot more electricity than the NET ZERO home. Name three ways the NET ZERO home uses less.

3. Look at the circle graph of **household electricity use**. Check (✓) ways you think you and your family could make changes to save electricity.

Use LED lights	Turn out lights that aren't needed	Dry clothes on a clothesline
Use timers for lights and vehicle block heaters	Use a power bar to turn off phantom load	Unplug electronics not in use
Buy ENERGY STAR® appliances	Reduce Air Conditioner use by setting the thermostat to 24ºC or higher	Other:

4. Look at the **light display**. Excluding the exit lamp, which light uses the least amount of power?

5. ***Energy = Power x Time.*** If your lamp has two, 15watt bulbs, and you have them on for five hours, how much energy do they use?
   Energy (watt hours) _____ *= 2(15w) x 5hrs*
   Explain how reducing power (w) and time (hrs) can reduce overall energy use?

Water

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. How does the **drain water heat recovery Powerpipe** use **conduction** to save energy? Look at the large copper pipe on the left side of the display.

2. Explain how a **rainwater system** described here makes use of rainwater.

3. What role do wetlands play in the ***Logan Green Water Management System***?

4. Check (✓) ways you could **save water** in your home and at school.

Turn off the tap while brushing your teeth	Replace your old dishwasher with an ENERGY STAR® dishwasher	Take a shorter shower
Fix a leaking toilet	Turn off the tap after washing your hands	Install a low-flow showerhead
Collect rainwater to water your lawn/garden	Grow drought tolerant plants	Other:

5. ***Shorter showers:*** If a showerhead has a flow of 6 litres/minute, calculate the amount of water used for a five minute shower compared to a 20 minute shower.

6L/min x 5min = _____ L 6L/min x 20min = _____ L

How much water do you save by shortening your shower this much?

Solar

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. What parts of Canada have the highest ***annual photovoltaic potential***? What part of Saskatchewan has the highest potential?

2. Try the ***solar panel*** display. What difference do the clouds make to how bright the lights are? Why?

3. ***Innovative designs:***
   - LightLeaf panels – where would you use these panels?
   - Mitrex building integrated panels – what makes these solar panels innovative?

4. The ***Pesâkâstêw Solar Project*** powers 2,500 homes and eliminates more than 15,000tCO2e/year. List the benefits of this project for the two First Nations involved.

5. If your home uses 7,500 kWh/yr and the average solar panel produces 400 kWh/yr, how many panels will you need to produce enough electricity for your home? If you live in Saskatoon, check MyHEAT Solar to see the solar potential of your address.

Retrofits

Spend some time looking over the materials at the display. Use these questions to help focus your investigations.

1. Compare the ***EnerGuide® ratings*** of the historical and modern houses. What factors helped the older homes use less energy? What factors help the modern homes use less energy?

2. Put your hands on the ***window display***. Which type of glass allows more heat to escape? Which window keeps more heat in? Explain how the window's design and construction contribute to heat loss or retention.

3. Try out the home retrofit samples like ***weather stripping, pipe and wall plate insulation***. Which would be useful in your home and where would you use them?

4. What are some of the benefits the Prairie South School Division achieved by putting new windows and lighting in these Moose Jaw ***heritage schools***?

5. ***Real Retrofit:*** The 2018 Energy Retrofits of the **1970s Split-Level** home will reduce the home's energy use by about 40% or 70GJ/year. Calculate the reduction in greenhouse gas emissions from making this retrofit to the home. Use this calculation:

   70GJ/year x 50kgCO2/GJ = _____kgCO2/year reduction.