

## SCHOOL ENERGY REVIEW

# HEATING AND COOLING

This assignment gives you the opportunity to learn more about the things that consume energy in your school. Your team will be reviewing your school's heating and cooling system by following these steps:

1. Read all the information and instructions for this assignment before beginning your review, filling out the table on page 4, and answering the presentation questions.
2. Determine the rooms your team will review.
3. Complete the review and record your findings in the provided table.
  - **Your group will use a thermometer to complete your section.**
  - You'll need the help of your teacher or a custodian to answer questions related to your school's heating sources and cooling system.
  - If you have permission from your teacher, take photos during your review. They can be added to your presentation to help your classmates better understand your points and make your presentation more visual.
4. Complete any necessary additional research.
5. Revisit and answer the questions in the "For your presentation" section on page 3 to prepare a presentation for your class. In this presentation, you'll include recommendations to reduce the energy required for heating and cooling in your school.

## HELPFUL INFORMATION

Most schools in Manitoba have boilers that generate heat. The heat is distributed across the school through pipes to individual heating units in other rooms. The systems are typically either hot water boilers or steam boilers.

### HOT WATER BOILERS

- A hot water boiler heats water (to about 70 to 82°C). This hot water is pumped through pipes to heaters in classrooms. As the water gives off heat to warm the rooms, it cools down and goes back to the boiler to be heated again.
- There are both medium efficiency and high efficiency hot water boilers.
  - Medium efficiency boilers range from 80 to 90% efficient — that means 80 to 90% of the energy used to power the boiler is converted into useable heat.
  - High efficiency hot water boilers range from 90 to 99% efficient!





## STEAM BOILERS

- A steam boiler (pictured below) heats water to boiling (100°C) to create pressurized steam. The steam is transported to individual heating units in classrooms and other rooms. The steam changes back to water and travels back through pipes by gravity to the boiler to be used again.
- Steam boilers are considered low efficiency, meaning they use quite a bit of energy. They range from 60 to 80% efficient.
- Steam boilers are most often found in older schools.



Most newer schools have centralized digital control systems that can be scheduled. When people leave for the day, the temperature can be lowered in the winter or raised in the summer. This is a great way to save energy because when it's done manually, it can easily be forgotten or not prioritized. But remember that comfort matters, too! We don't want to save a lot of energy on a cold day, only to be shivering and wearing gloves in class.

It's possible that your classroom may have a manual thermostat or no thermostat within the room. This could mean the temperature is controlled elsewhere or not at all.



## COOLING SYSTEMS

Older schools don't usually have cooling systems. Instead, they rely on opening windows as needed on warmer days. Some schools install individual window-mounted cooling units in each classroom.

Newer schools typically have a central cooling plant. A large air conditioning unit (or chiller) is usually located on the school's roof. It contributes to cooling air distributed throughout the school to maintain a comfortable indoor temperature.

## HEATING AND COOLING CONTROLS

A thermostat (pictured top right) is used to tell the heating system what temperature you'd like your space to be, and tells the heating and cooling device how much heat or cooling to provide. Heating or cooling a space more than necessary wastes energy.

## HOW TO USE A THERMOMETER

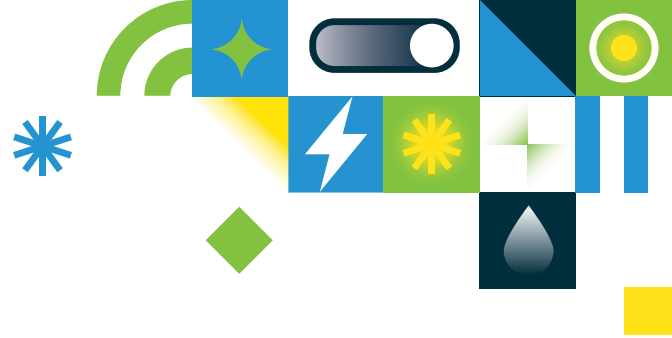
(pictured below)



**Step 1** Turn the device on and choose Celsius.

**Step 2** Wait three minutes for it to calibrate.

**Step 3** When the flashing stops, the calibration is complete, and the reading should be accurate and ready for recording.



## FOR YOUR PRESENTATION

After your review, use these questions to help summarize your data and prepare your presentation:

1. If there was a thermostat in the room, did the temperature generally match the average from the thermometer tests?
2. How can a digital thermostat help save energy?
3. Does your school use a boiler? If so, is it energy efficient?
4. What is your school's heating source (electricity, natural gas, propane, fuel oil, or wood)? What might be the most environmentally friendly heating source?
5. Did you find portable space heaters, fans, or other devices being used? If so, were they being used to supplement or counteract the heating or cooling in the school? For example, if it's winter, was there a portable space heater to help make the room warmer (supplement), or were the windows open because it was too hot (counteract)?
6. Were any air vents or registers blocked? If so, how might that impact the ability of a system to heat or cool a room?
7. What type of cooling system was found in most or all rooms?
8. Based on the data you collected, what specific changes could be made in your school to reduce the energy required for heating and cooling?

SCHOOL ENERGY REVIEW

# HEATING AND COOLING

Building heating energy source	Electricity		Natural gas		Propane		Fuel oil		Wood	
Room/area										
Thermostat type	Digital None	Manual	Digital None	Manual	Digital None	Manual	Digital None	Manual	Digital None	Manual
Temperature setting (if no thermostat in the room, write N/A)										
Actual temperature (check three places using the provided thermometer)	One:		One:		One:		One:		One:	
	Two:		Two:		Two:		Two:		Two:	
	Three:		Three:		Three:		Three:		Three:	
	Average:		Average:		Average:		Average:		Average:	
Are there any blocked registers or vents?	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Are any windows open while the room is being heated or cooled?	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Are there any portable space heaters or portable fans? What is the wattage if listed? (on the back label)	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
	Wattage		Wattage		Wattage		Wattage		Wattage	
Type of cooling system (individual window-mounted cooling unit, school-wide central air conditioning, windows, or none)										

If you don't have enough room in your table, add additional notes and observations below!

Date:

Team members:

