



Energy Audit (simple) Home Heating

Most of our homes are heated with natural gas. Natural gas burns cleaner than oil or coal, but still creates CO₂ emissions that contribute to climate change. Making our homes more energy efficient lowers those emissions and saves us money.

Some changes we make are more expensive, like replacing an old furnace with a high efficiency furnace, or adding insulation to the attic or walls of our home. There are also many easy and inexpensive things we can do to make our homes more energy efficient, like turning down the heat, and using low flow showerheads. Some of them are described in this audit.

The purpose of this audit is to determine if you are using heat efficiently in your home, and to help you see the connection between energy efficient homes, and greenhouse gas emission reductions.

Heating Your House:

1. What temperature is the thermostat set to:
 - During winter months when you are at home?
 - During winter months when you are sleeping?
 - During winter months when you are away? (at school, work or on vacations)

Note: In **winter**, indoor temperatures of 20 to 22°C are reasonable. Turning down the heat 2 to 5°C when you are sleeping or away is comfortable. Save 2% on your heating bill for every 1°C you turn down your thermostat overnight. In **summer**, indoor temperatures around 24°C are reasonable.

2. Does your family have a programmable thermostat in your home? Because they can be programmed ahead to turn heat up or down, they help us to save energy by remembering for us!
3. Can you feel drafts around doors, windows and electrical outlets? Make a note of which ones so retrofits or changes can be made. Use a tissue taped to a pencil, or anything else that will react to a subtle breeze to find where the drafts are. This works best on a very cold or windy day.



Note:

Weather stripping: Weather stripping seals openings like doors and windows from drafts and heat loss. It is often made of foam or vinyl and creates a seal by squishing against both the door and frame (or window and frame) when the door (or window) is closed. Damaged or missing weather stripping allows drafts to enter the building, and heat to be lost.

Caulking: Caulking is used to seal around windows and door frames. It is a pliable material that goes on as a thick liquid, and sets in place to seal cracks or joins. If it becomes brittle or breaks off, the gap it leaves allows drafts to enter the building, and heat to be lost.

Outlet Gaskets: Foam outlet gaskets fit behind electrical outlets and switches. Placed on perimeter wall outlets, they block air leaks.

4. Is the furnace high efficiency? If your furnace has vents that go out the wall, it is high efficiency. If it has a chimney that goes out through the roof it is not.

Heating Your Water:

5. What sort of water heater do you have?
 - Naturally Aspirated (large tank with a chimney 55-65% efficient)?
 - Power Vented or condensing (large tank with vent out the wall 80-96% efficient)?
 - Tankless (box on the wall, about 1 meter square, and ½ meter deep 80-98% efficient)?
6. Is insulation used to reduce heat loss around hot water pipes? If a pipe is warm to touch, insulating it will help reduce heat loss.
7. Do you have low flow showerheads and faucet aerators?
8. What else could your family do to reduce heat loss, hot water consumption, and greenhouse gas emissions at your house?



9. Summarize the information you have collected in the chart below. Changes that make your home more energy efficient save both money, and reduce CO₂ emissions that contribute to climate change.

Action	Potential Savings*	% Savings at my house*
Turn down the heat overnight	2% savings for each degree it's turned down	2%/°C x ____ °C = _____%
Turn down the heat during the day	2% savings for each degree it's turned down	2%/°C x ____ °C = _____%
Caulk and weather strip	If your house felt windy before and isn't now: 20% If you found and fixed a few things: 5%	
Install a high efficiency furnace	If you do some of these things, and upgrade to a high efficiency furnace, add 30% . If you do none of these and upgrade to a high efficiency furnace, add 35% .	
Upgrade water heater to high efficiency	6% savings	
Install low flow showerhead	2.5% savings	
Install faucet aerator	4% savings	
Total		%

*These are very rough estimates. Savings from heating are tricky, because each saving affects the others. That is why doing more than one action reduces the savings per action



CURRICULUM CONNECTIONS

Mathematics Connections: There are many connections with this audit and mathematics in the grades 5-8 curriculum in numbers, patterns and relations, and statistics and probability. Charting of results and CO₂ reduction impacts can be done in a variety of formats.

Grade 7 Science: Outcome: HT7.1 Assess the impact of past and current heating and cooling technologies related to food, clothing, and shelter on self, society, and the environment. **HT7.3** Investigate principles and applications of heat transfer via the processes of conduction, convection, and radiation.

Social Studies: Outcome: RW7.3 Assess the ecological stewardship of economies of Canada and the circumpolar and Pacific Rim countries.

Grade 8 Social Studies: Outcome: RW8.3 Critique the approaches of Canada and Canadians to environmental stewardship and sustainability.

Health Education: Outcome: 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.

English Language Arts: Outcomes CC8.5, CC8.6, CC8.7

Physical Science 20: PS20-HT2 Explain scientific principles of heating and cooling in industry and in our lives.