



Shining Lights

Energy Literacy and Language in the NWT

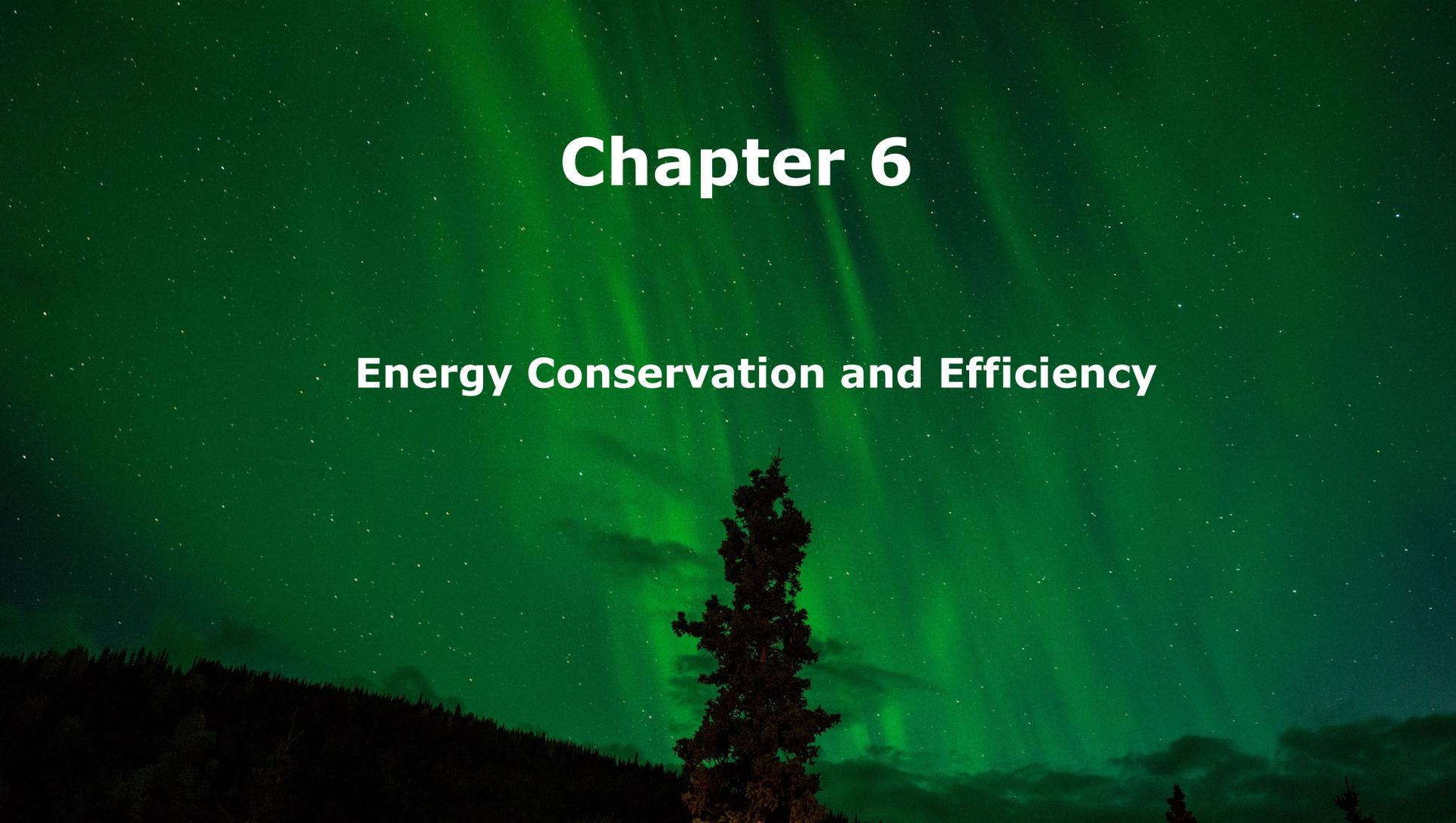
Understanding your Energy Story



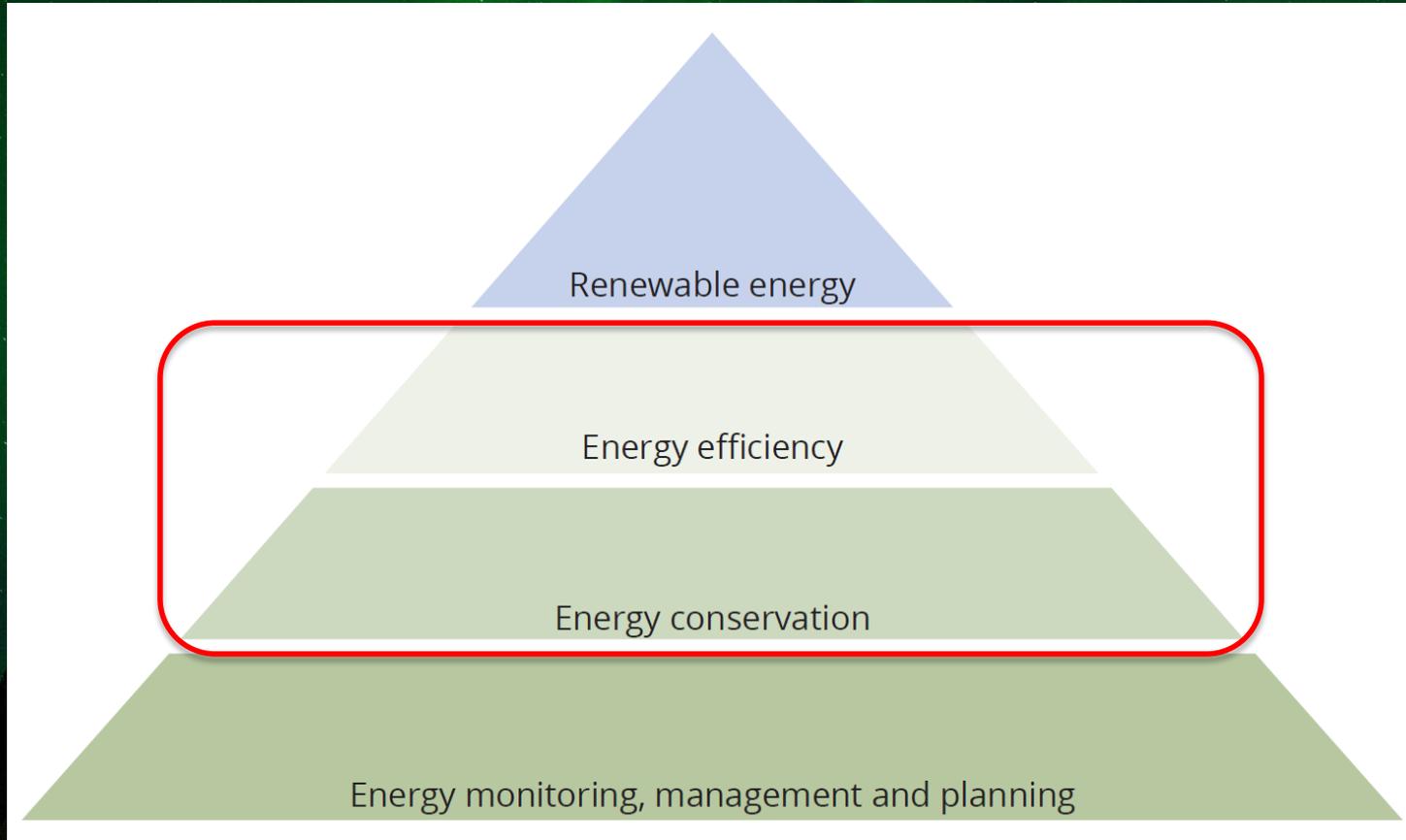
ARCTIC ENERGY
ALLIANCE

Chapter 6

Energy Conservation and Efficiency

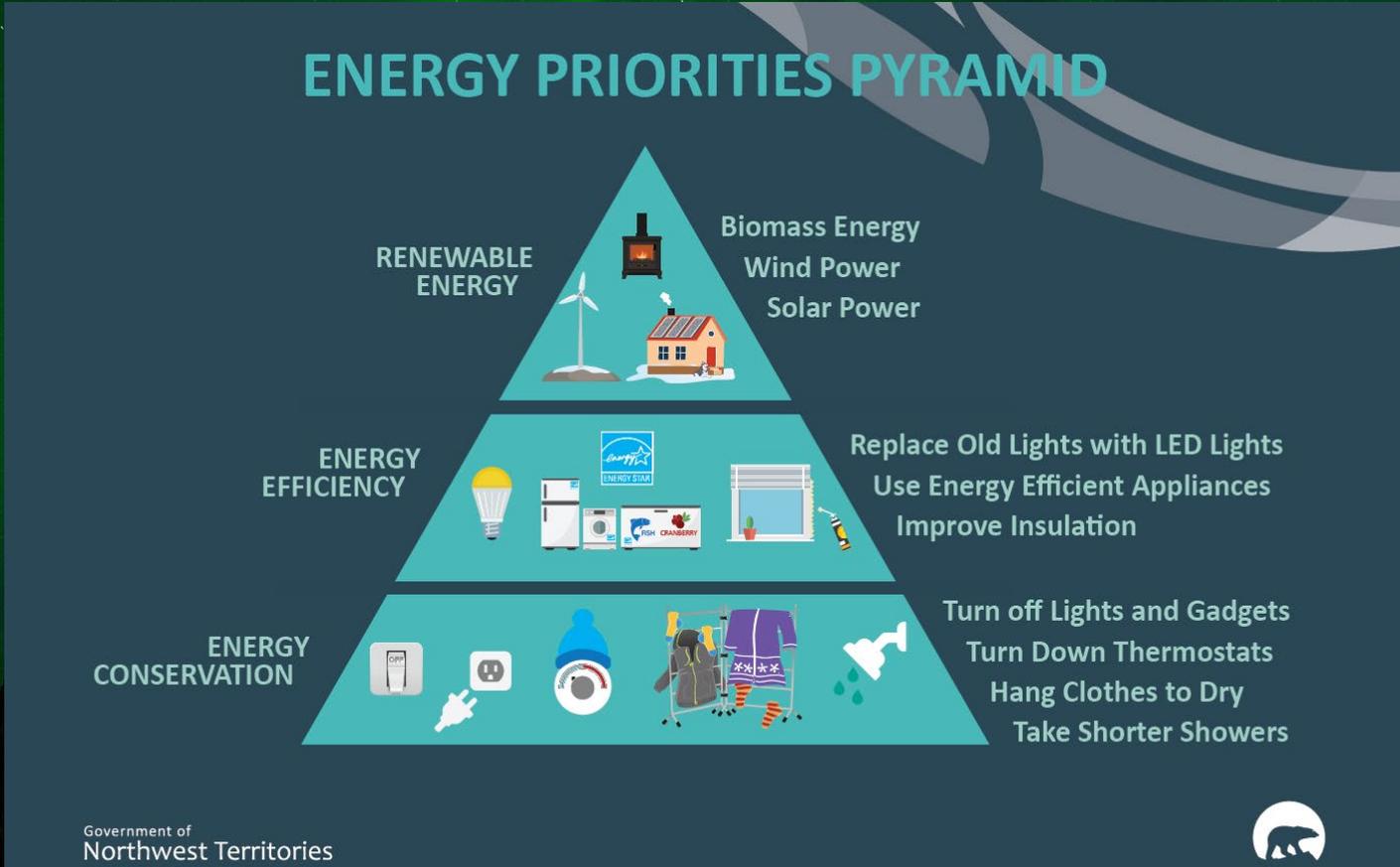


Back to the Energy Pyramid

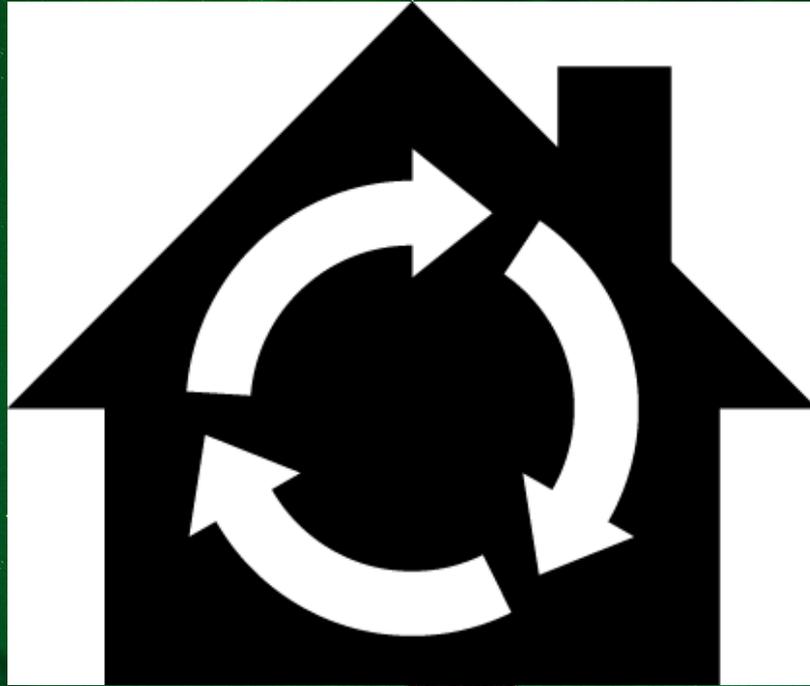


Energy Priority Pyramid – GNWT

Other examples



System as a Home



The Importance of the Home as a System – Energy Flows

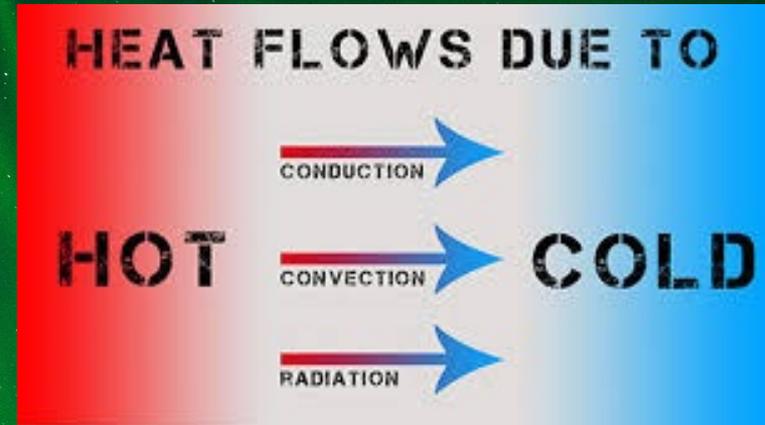
A home has **energy inputs (sources)**

- Natural passive solar
- Heating system and fuel
- Cooking and even lights give off heat
- People

A home has **energy outputs (sinks)**

Energy flows from hot to cold

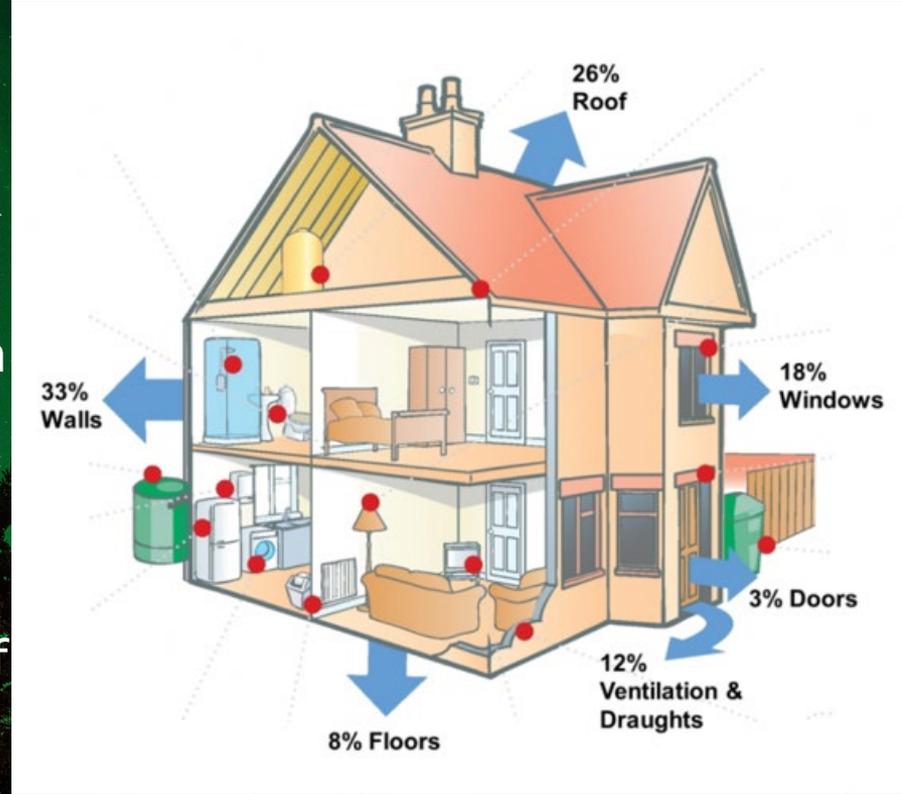
- Energy escapes through walls, floors, attics, windows, doors, ventilation system
- Energy leaks through cracks



The Importance of the Home as a System

Heat will always want to leave the home. So you need to stop it from doing that while still ensuring there is good ventilation.

- Energy heats the people and space in the home but also escapes through walls, floors, attics, windows, doors, ventilation system
- Most of the energy in a home escapes through the roof and walls of a home. That's why insulation in these spaces is so important



The importance of the home as a system - moisture

A home also has **moisture inputs (sources)**

- Humidity in the air
- People
- Showers and baths
- Cooking
- Temperature differences between surfaces

A home also has **moisture outputs (sinks)**

- Air going outside naturally
- People

Managing the humidity level (amount of moisture in the air) in a home is very important.

Energy use, humidity levels and comfort are all very closely related

The Importance of the Home as a System - Humidity

**If humidity levels
are too high you
run the risk of:**



Growing mold
and bacteria



Stuffy
conditions



Overall
discomfort

**If humidity levels
are too low you
run the risk of:**



Catching a cold
or infection



Dry and
itchy skin



Damaging your
house's wood,
siding, or paint

The importance of the home as a system

Who has experienced this?

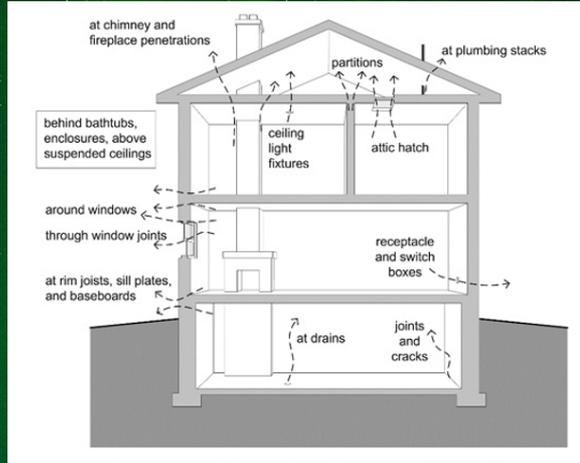
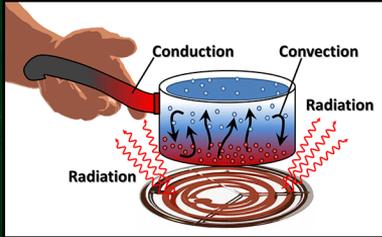


Proper ventilation and getting rid of moisture in a home is critical to home and personal health. Growth of mold results if ventilation is not managed.

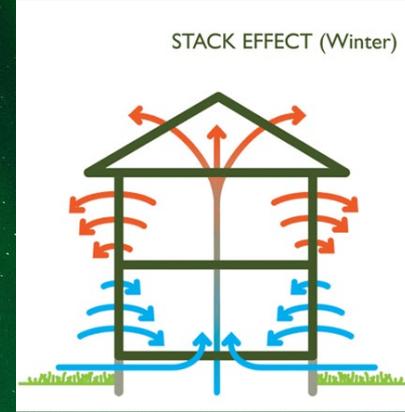
Building science is complicated stuff

Heat loss

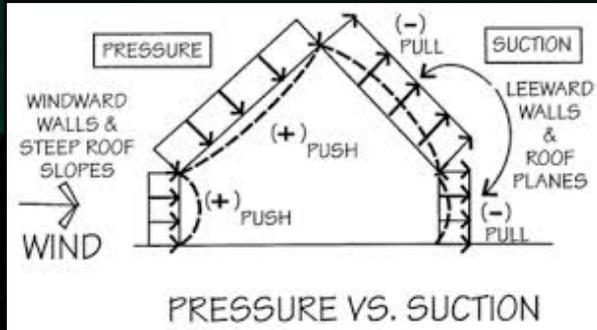
Heat transfer



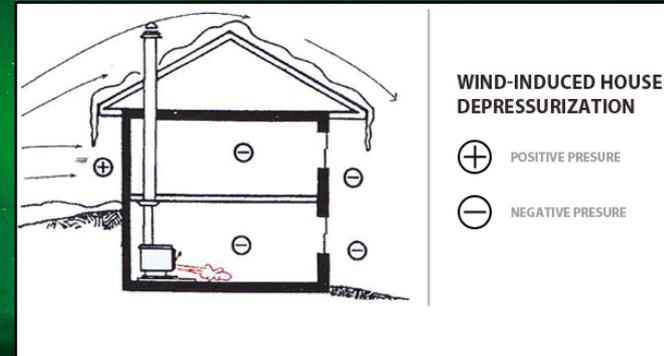
Moisture and stack effects



Wind pressures



Wind effects



The important message

Before we get into energy conservation and energy efficiency ...

There will be a lot you can do to reduce your energy consumption and energy costs through simple measures

When you start to do things that keep more heat in your home, be very aware of what you might be doing that could affect airflow, humidity and how your home works as a system.

Energy conservation versus energy efficiency

- What is the difference between the two?

Energy Conservation



Energy conservation is doing things like turning off lights or turning down the heat.

Energy Efficiency



Energy efficiency is doing things like installing better light bulbs, cleaning air filters or even installing a more efficient wood stove.

Energy Conservation



Reduce the amount of energy by changing behaviour.

“USE LESS ENERGY”

Energy Efficiency



Reduce the amount of energy but having the same products and services.

“DO THE SAME WITH LESS ENERGY”

Both actions have the same affect – they both reduce energy use in your home.

Energy Conservation

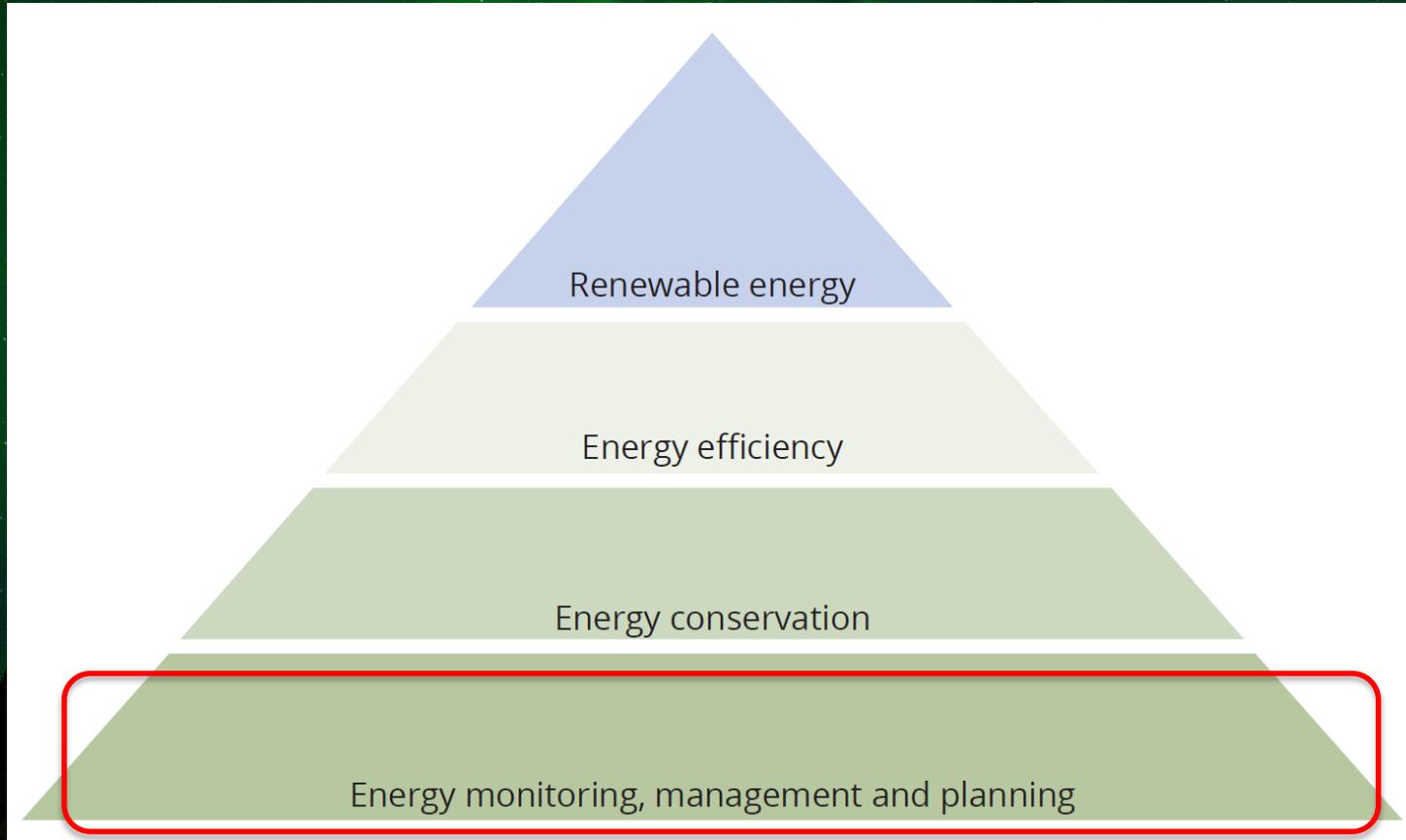
Energy conservation means **reducing** the amount of energy used by **using less** of a particular service. Energy conservation is more about **behavioural changes** and takes education, support and time, and can have a large benefit.

Energy Efficiency

Energy efficiency means **reducing** the amount of energy that is used while getting the **same services or benefits**. It is typically accomplished by **replacing an energy device** or **performing retrofits** on your home.

Energy monitoring and management involves **understanding, monitoring and managing** the energy consumption in a building in order to understand energy sources, and the tools to reduce energy use where possible. **Energy conservation** (behavioural changes) and **energy efficiency** (technology upgrades) are key parts of energy management.

Back to the energy pyramid



Energy Conservation

Reducing the amount of time we use energy



Behavioural change is really hard to do and stay at it.

Examples of Energy Conservation

Reducing the amount of time we use energy

Examples:

- Turning off lights when no one is in the room
- Turning down the heat when not home or at night
- Using less wood, heat management, open-closing windows
- If necessary, use space heaters to heat only the rooms you're in (rather than a central system that heats the whole house)
- Turning off devices when not in use and plug all devices into power bars so they can easily be turned off together
- Taking less showers or shorter showers
- Hanging clothes outside instead of using the dryer
- Use cold water for laundry
- Walking or biking instead of driving
- ... and many, many more



Examples of energy efficiency

Using as little of energy as possible to meet our needs

Examples:

- Caulking and weather stripping to seal air leaks
- Using low-flow shower heads
- Using LEDs to light a room
- Increasing insulation in a house (many, many different types)
- Using Energy Star appliances
- Installing a high-efficiency wood stove
- Installing a high-efficiency diesel furnace
- Installing efficient windows and doors



Costing Difference Between Energy Conservation and Energy Efficiency

Energy Conservation

- Mostly is driven by behavioral change
- Sometimes simple technologies can be used to facilitate energy conservation

*No or very low
money required*

Energy Efficiency

- Usually requires technologies that use less energy but give you the same result

1. *Energy savings devices - \$*
2. *Energy savings appliances / electronics - \$\$*
3. *Energy retrofits - \$\$ to \$\$\$*

Plastic Wrap on Windows

- If your windows are single pane or not very well sealed, plastic shrink wrap on your windows every winter can be a big help to stop drafts



Cleaning Filters

- Cleaning and regularly changing air filters can have a dramatic affect on how hard your furnace fan works.
- And your furnace fan uses electricity!!
- Change regularly!



Energy conservation devices that help



- Programmable thermostats
- Timers
- Power bars
- Power bars with timers
- Motion sensors



Energy conservation devices that help



Programmable thermostats can be a huge source of savings – they can potentially save between 5% and 20% of your heating costs.

Programmable thermostats only really work with furnaces (and electric heat, but remember you don't want to use electric heat)

It is so easy to forget to turn down the heat at night or when you leave the home

Energy efficiency devices that help

- LED lights
- low-flow shower heads
- Aerators (reduces the amount of water you use)
- Hot water tank and drain pipe wrap



Energy Efficiency Products

- weather stripping, caulking and insulation
- hot water pipe and tank wrapping
- ENERGUIDE or ENERGY Star appliances and products
- heating system upgrades – high-efficiency furnaces, wood stoves, heat pumps

Caulking

- Caulking and gap filling – inside and outside the home
- Filling gaps around windows, doors and ventilation or mechanical conduits



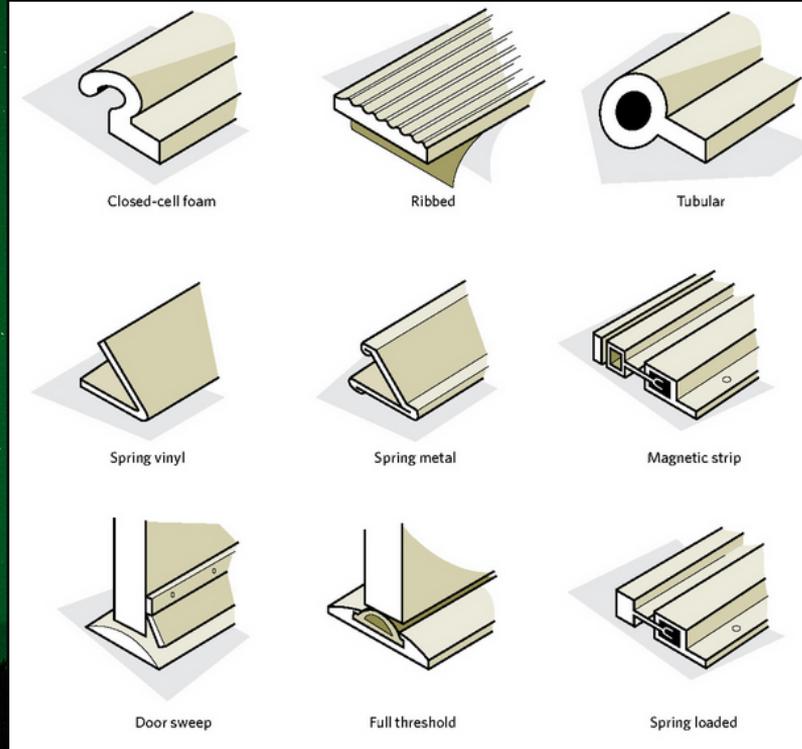
Weather Stripping

- Creating tight closures of doors and around windows



Weather stripping

- There are all different types and materials of weather stripping



Hot Water Wrapping

- Reduces the heat loss from pipes and standing tanks
- Very important and useful if you have electric heat



Wall, Attic, Crawlspace Insulation

- There are many different types of insulation that can be applied to your home
- Some are easy upgrades – for example, blown-in cellulose in your attic
- Some are harder – for example, wall insulation. It requires access to inside your walls



Blown-in attic insulation



Wall insulation

Remember, roofs account for 26% and walls account of 33% of heat loss

The Evolution of Lighting – The LED

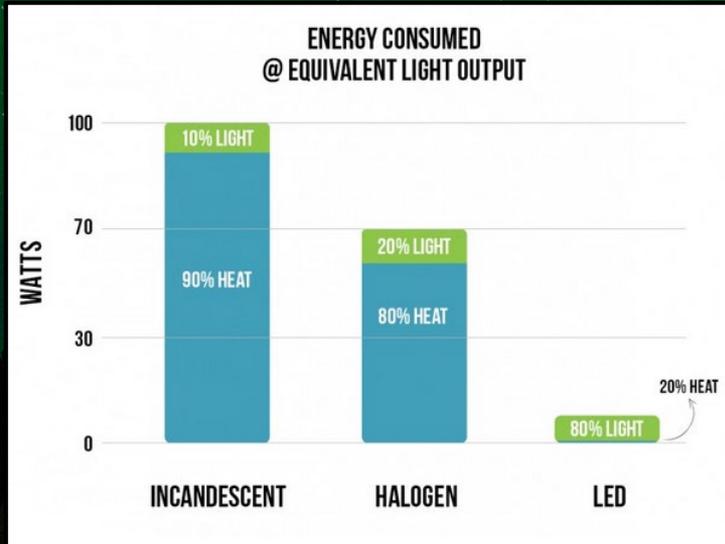
- For a long time, lighting was provided by incandescent lights – this goes back to Thomas Edison – the inventor of the lightbulb
- The compact florescent light bulb (CFL) was invented a few decades ago. It was more efficient than the incandescent light bulb
- In recent years, the light emitting diode (LED) light was brought to lighting technology.
- LED lights were quite expensive for some time, but prices have come down, and many rebates are available.
- LED lights are now the preferred lighting choice for all lighting needs (inside, outside) and there is likely an LED light to meet most lighting needs in your home

An LED light is 75% - 80% more efficient than a standard incandescent bulb and last 25-30 times longer

The Evolution of Lighting – The LED

- LED's are so efficient compared to incandescent lights that even the higher cost is justified considering the cost savings.

Considering light electricity costs \$0.30 / kWh, switching to LEDs is one of the most important energy efficiency things you can do.



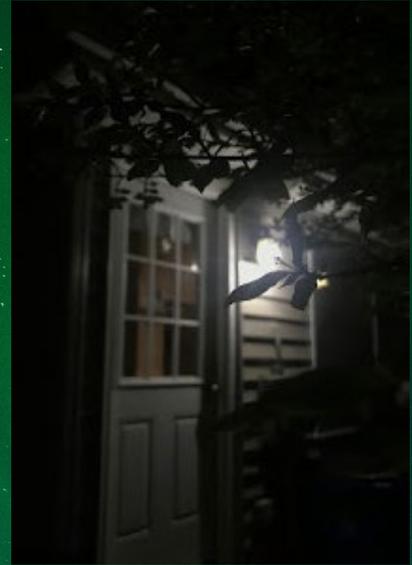
“The porch light that is always on”

- Consider a porch light that is always on 24/7, every day of the year. (yes, just an example)

What do you think the cost difference is between:

- 1) Using a 100-watt incandescent bulb**
- 2) A 12-watt LED bulb**

For both electricity rates of \$0.30 per kWh (subsidized rate) and \$0.69 per kWh (unsubsidized rate)

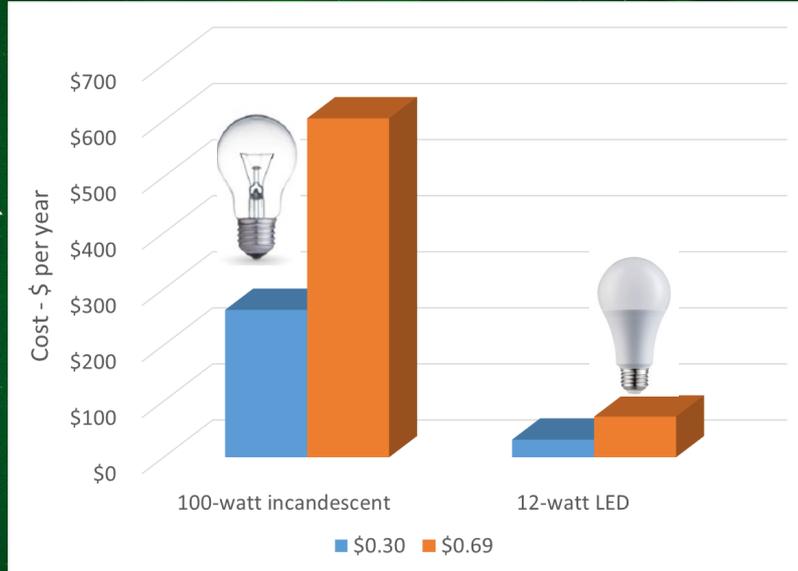


versus



The porch light that is always on

- Consider a porch light that is always on 24/7, every day of the year. (yes, just an example)



A 100-watt bulb @ \$0.30 per kWh will cost almost **\$262** per year, compared to a 12-watt LED that will cost **\$32** per year!

A 100-watt bulb @ \$0.69 per kWh will cost almost **\$600** per year, compared to a 12-watt LED that will cost **\$72** per year!

Savings from Energy Conservation and Efficiency Actions

How much can be saved from the various actions? **Well ... it depends**

- How the home is heated (space, water) and what fuel source is the main heating source
- What the conversion efficiency of the technology is
- What the cost of fuel is
- What incentives or rebates can be applied to reduce the capital cost

We will look at cost savings from a few different scenarios in the final chapter to give you some guidance

Savings from energy conservation and efficiency actions

But generally ...

	Energy Conservation or Energy Efficiency	Cost Investment	Complexity of upgrade	Payback
Install programmable thermostat	Energy Conservation	Low	Medium	Very quick
Heating system upgrade	Energy Efficiency	High	High	Typically long
Reduce air leakage	Energy Conservation	Medium	Medium	Quick to very quick
Insulation - attic	Energy Efficiency	Medium	Medium	Moderate to quick
Install a low-flow shower head	Energy Efficiency	Low	Low	Very quick
Install hot water tank wrap	Energy conservation	Low	Medium	Quick
Upgrade to LED lights	Energy efficiency	Medium	Low	Quick to very quick
Energy Star appliances	Energy Efficiency	High	Medium	Typically long
Timers and power bars	Energy Conservation	Low	Low	Very quick

Bioenergy is a very valuable resource

Why biomass

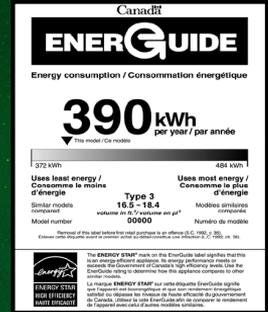
- sustainable and renewable energy source if harvested properly
- local resource and local employment in the supply-chain
- provides self-sufficiency and energy security for a community



The Arctic Energy Alliance has great resources, support and rebates for heating with wood.

ENERGUIDE and ENERGY STAR

- **ENERGUIDE** is the official Government of Canada mark associated with the labelling and rating of the energy consumption or energy efficiency of specific products
- **ENERGUIDE** labelling exists for appliances, heating and cooling equipment, houses and vehicles
- **Energy Star** – is a certification system out of the U.S. that gives certification to high energy performing products
- Both **ENERGUIDE** and **Energy Star** apply to products and homes



ENERGY STAR Products

- Dishwashers, refrigerator, freezers
- Clothes washers and dryers
- Ceiling fans and ventilating fans
- Central air conditioners and air source heat pumps
- Geothermal heat pumps
- Dehumidifiers
- Ductless split air conditioners and heat pumps – New in 2019
- Boilers, Gas furnaces
- Computer monitors and equipment
- Televisions – new in 2019
- Windows and doors



Support, Incentives and Rebate Programs Available through AEA

- Energy advice, education and workshops
- Project co-ordination
- Energy evaluation for buildings and energy projects
- Building energy audits (non-residential)
- Rebates for energy efficiency and renewable energy
- Energy efficiency products
- Building upgrades
- Renewable energy

Who are they available for?

- Homeowners
- Businesses
- Indigenous communities and community governments

Energy Advice, Education, Workshops and Support

Energy advice, education, workshops and support



Knowing the best ways to save energy is the first step toward taking action. That's why we offer the following services:

- Providing free energy-related advice and guidance to residents, businesses, non-profits and community governments
- Taking part in community events, and hosting workshops, training sessions and other educational opportunities



Project Coordination

Project coordination services



Sometimes the most effective way to take action on energy management is to partner with a team of experts to get a project off the ground. We offer the following services to help make that happen:

- Providing project coordination services to help implement energy-saving projects
- Coordinating a range of special projects to help northerners save energy and money—such as partnering with communities to get new, efficient wood stoves installed in residents' homes



Energy Evaluations for Buildings and Energy Projects

Energy evaluations for buildings and energy projects



For buildings or energy projects, big and small, we can help you find ways to save energy and money.

Home energy evaluations

An EnerGuide home evaluation can help you understand how your home uses energy now—and identify upgrades to help improve energy efficiency. Whether you have an existing home or are building a new one, we can find ways to maximize your energy savings.



Building energy audits (non-residential)

Businesses, non-profit organizations and community governments can benefit from energy audits to improve their buildings' energy efficiency. There are two types of audits:

- **Yardstick audits** use utility bills or other data to summarize the energy and water use in a building and compare it to benchmarks.
- **Targeted audits** involve an AEA energy advisor going through your building to determine the most beneficial upgrades to save energy.



Rebates for Energy Efficiency and Renewable Energy

Rebates for energy efficiency and renewable energy



We make it easier to choose energy-efficient products and renewable-energy technologies by providing rebates and other incentives to lower the initial cost. And the great news is, by choosing energy-efficient or renewable options, you'll continue to save for years to come. Our regular rebate options are listed below. Other incentives are available for special projects.

Energy-efficient products

We provide fixed rebates on products such as LED lighting, ENERGY STAR® certified appliances, wood stoves, efficient furnaces and boilers, and much more, to save you money both now and in the future.



Building upgrades

Improving the energy efficiency of your home or larger building can be expensive, but we have rebates to help.

- **Homes:** up to \$20,000
- **Non-residential buildings:** up to \$50,000



Renewable energy

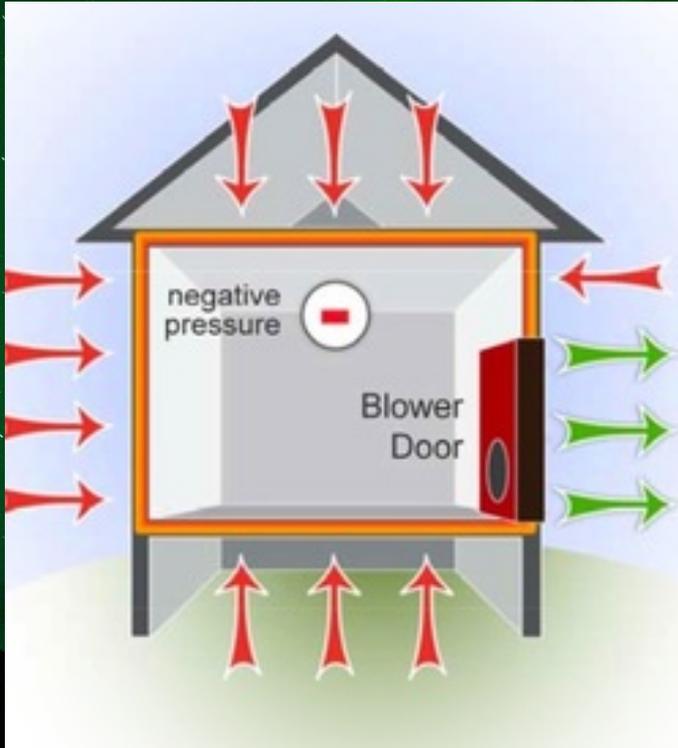
Renewable energy is an environmentally conscious choice—and can even help you save on your power or heating bills. Our rebates lower the barrier to installing a solar electric system, a wood pellet boiler or other technologies.

- **Residents:** up to \$20,000
- **Businesses, non-profits and community governments:** up to \$50,000



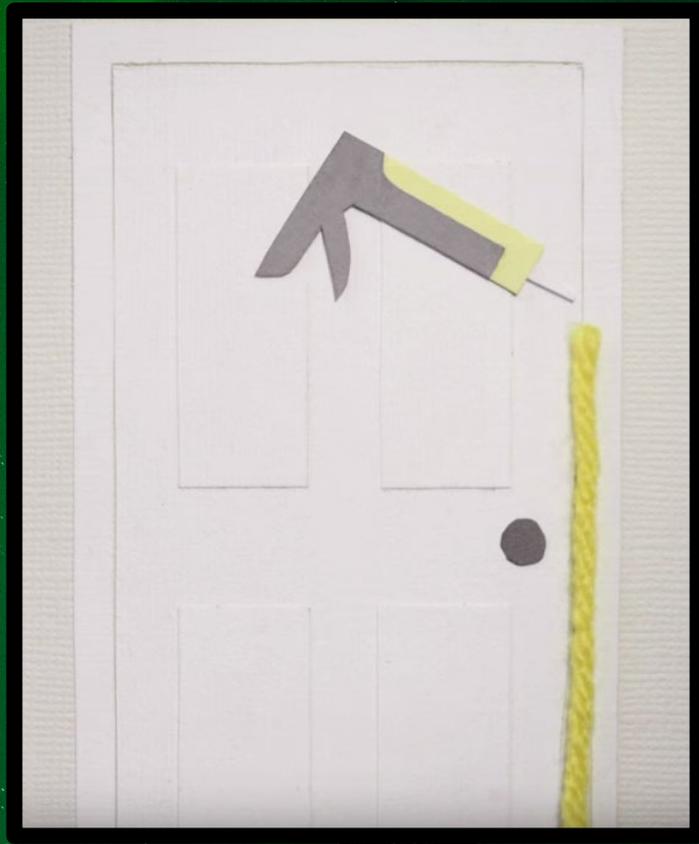
Home Energy Audit

- AEA offers Home Energy Evaluations at \$150 plus GST





door test – Kanaka Bar First

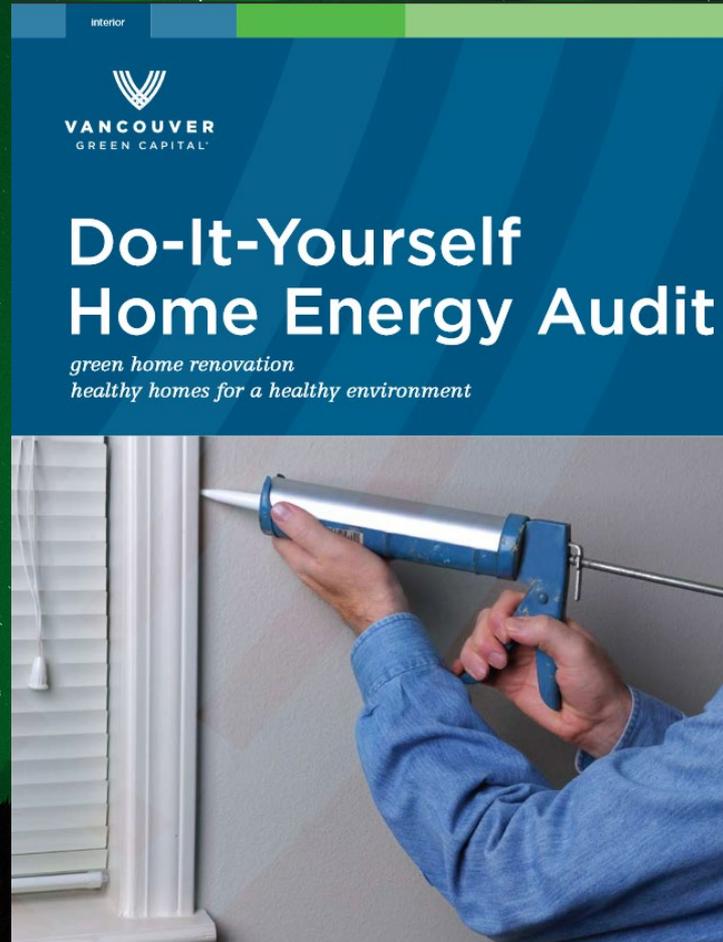


Story – Kwadacha Energy Efficiency and Savings



Story – Five Nations Energy Conservation Program

Further Resources



Further Resources



Support for Conservation & Energy Management in Indigenous Communities

AUGUST 2018

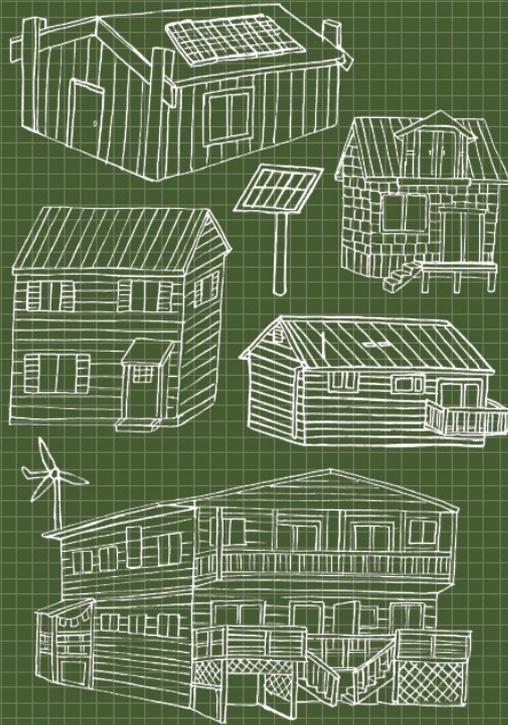
Prepared by: Halina Rachelson,
UBC Sustainability Scholar, 2018
Prepared for: Amy Seabrooke, Program Manager,
Conservation & Energy Management, BC Hydro



Further Resources

Energy Saving Toolkit

A Guide for Haida Gwaii Homes



Further Resources

NTPC energy calculator

Energy Calculator

Select your community for your rate calculation:

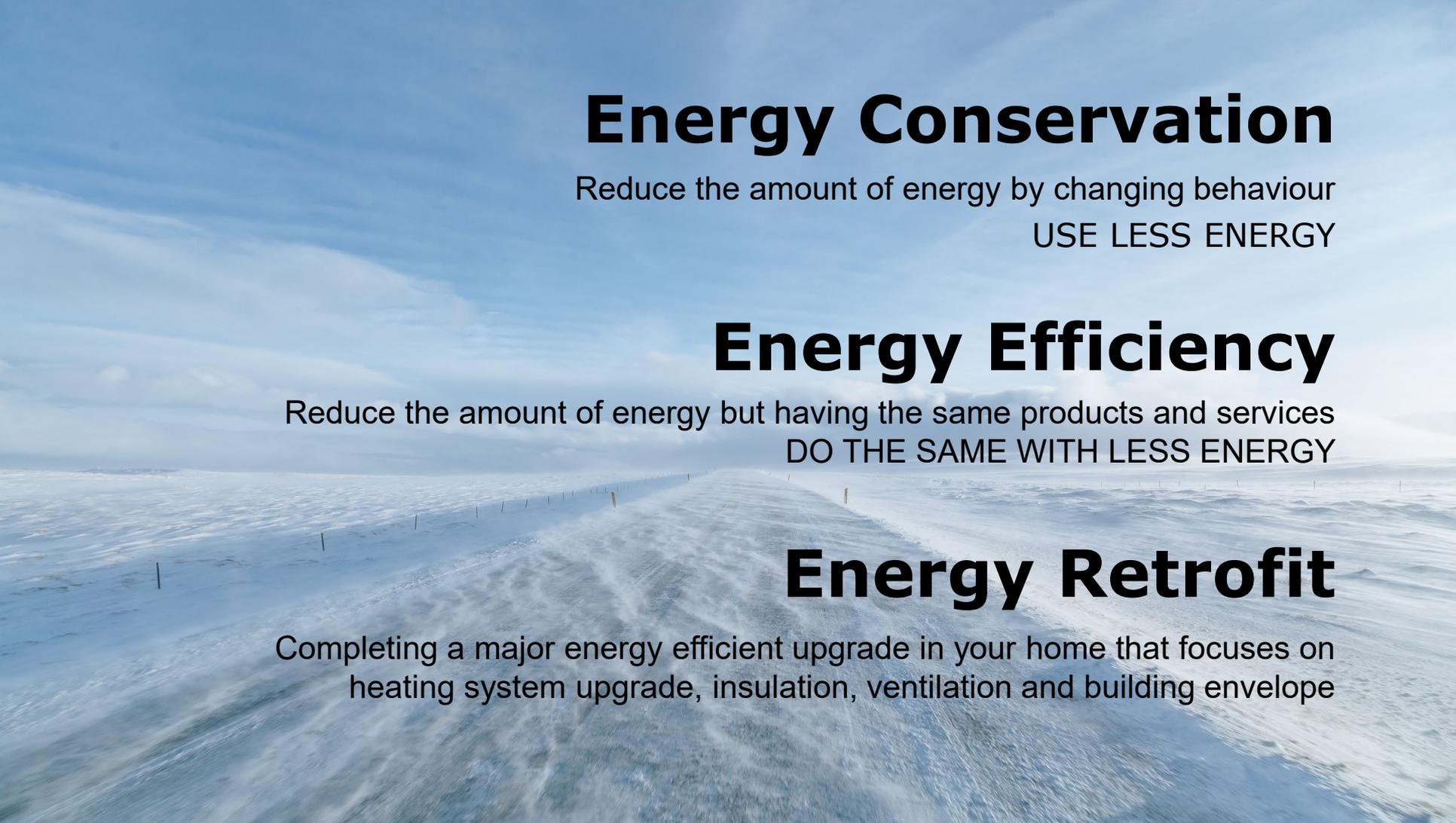
Select Community

- Kitchen
- Living Room
- Bathroom & Laundry
- Bedroom
- Lighting
- Garage & Utility
- Heating & Cooling
- Office
- Outdoor

Total kWh: 0
Total Cost: \$0.00



KEY TERMS TO REMEMBER



Energy Conservation

Reduce the amount of energy by changing behaviour

USE LESS ENERGY

Energy Efficiency

Reduce the amount of energy but having the same products and services

DO THE SAME WITH LESS ENERGY

Energy Retrofit

Completing a major energy efficient upgrade in your home that focuses on heating system upgrade, insulation, ventilation and building envelope

ENERGY STAR

A certification system out of the U.S. that gives certification to high energy performing products

ENERGUIDE rating

is the official Government of Canada mark associated with the labelling and rating of the energy consumption or energy efficiency of specific products

Other terms?

Are there other important terms we missed?