

ENERGY EFFICIENCY INFORMATION

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TERMS AND DEFINITIONS

ENERGY STAR

ENERGY STAR serves as a leading indicator of energy efficiency on an international scale. By selecting products that carry this certification, you contribute to a more sustainable future by using less energy and helping to minimize emissions that impact climate change.

Energy measurement: What is a GJ?

GJ (gigajoule) – A joule (J) is a unit of energy. It is the energy needed to emit one watt of power for one second. The giga (G) prefix represents a billion. Natural gas is most often measured in GJs by utility providers.

Electricity can also be measured using GJ, as 1 joule equals to 1 watt x 1 second. However, utilities measure electricity by the hour and provide services by the kilowatt-hour (kWh).

Source: <https://www.directenergy.ca/en/learn/understanding-your-bill/joules-gigajoules-and-your-energy-bill>

Annual gigajoule rating (GJ/year) is used to determine your home's place on the GJ-per-year scale and is what your home rating is based on. It shows your score as a unit of energy consumption for the year.

Source: <https://natural-resources.canada.ca/energy-efficiency/product-energy-ratings/energuide/after-your-energuide-home-evaluation>

What is a building envelope?

The building envelope consists of the components that make up a structure, designed to physically separate the exterior environment from the interior. The main building envelope system consists of a foundation, walls, windows, doors, and roof. There are also mechanical systems that control interior building functions, such as temperature or ventilation.

What is a benchmark home?

A benchmark home compares your existing home's energy use to what it would be if it had been built under the most recent building codes for energy performance.

Source: <https://natural-resources.canada.ca/energy-efficiency/product-energy-ratings/energuide/after-your-energuide-home-evaluation>



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Insulation: What are RSI and resistance-value?

RSI (metric), or R-Value (imperial), is the rate of thermal resistance of a material. The higher the resistance value, the higher the resistance of heat transfer through the material. Heat flows from hot to cooler places, thus, a material that resists the heat transfer more has a higher RSI.

- Imperial units: R-Value ($\text{ft}^2 \cdot ^\circ\text{F} \cdot \text{h}/\text{BTU}$)
- Metric units: RSI ($\text{m}^2 \cdot \text{K}/\text{W}$)
- Divide the R-Value by 5.6 to obtain the RSI

Source: <https://www.energyeducation.ca/encyclopedia/R-value>

A *nominal* RSI is the thermal resistance of the insulation material, for example, batt insulation between studs.

An *effective* RSI is the cumulative value of the thermal resistance of all insulation materials in the assembly.

Source: <https://www.constructioncanada.net/the-language-of-r-values-understanding-differences-between-nominal-and-effective/>

Windows: What is U-Value?

U-Value is a standard used to evaluate how effectively building materials prevent heat from escaping. It is the inverse of the R-Value. The lower the U-Value, the greater the resistance to heat loss. For windows, it specifically indicates their efficiency and insulation effectiveness. U-Value is measured in watts per square meter per Kelvin ($\text{W}/\text{m}^2\text{K}$).

Source: <https://energyeducation.ca/encyclopedia/U-value>

What is thermal bridging?

A thermal bridge is the pathway of heat flowing away from areas in the building envelope that are less insulated, causing heat loss. This can typically be found in areas such as the framing, ceiling junctions, outer corners, verges, and eaves. These areas have lower temperatures and can lead to energy loss, condensation, and moisture accumulation over time.

Source: <https://blog.passivehouse-international.org/what-is-a-thermal-bridge/>

Heating and cooling systems: What is the coefficient of performance?

Coefficient of Performance (COP) is a metric used to evaluate the performance of heat transfer in HVAC appliances such as heat pumps, furnaces, fridges, and air conditioners. COP is a ratio that measures the output of heating or cooling compared to the amount of electricity the unit uses to run.

Source: https://energyeducation.ca/encyclopedia/Coefficient_of_performance



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What is tCO₂e?

The carbon dioxide equivalent (CO₂e) is a unit of measurement used to standardize various greenhouse gas (GHG) effects on the climate.

There are other GHGs such as methane (CH₄), nitrous oxide (N₂O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), nitrogen trifluoride (NF₃), and sulphur hexafluoride (SF₆). They are converted into CO₂ equivalents so that they can be compared. Carbon is used as a measurement since it is the most common GHG emission related to human activity.

The metric ton, also called tonnes, is denoted by the symbol “t.” It is a standard unit of mass for measuring GHG emissions and is equivalent to 1,000 kilograms (kg).

What is global warming potential?

The global warming potential (GWP) is the relative measure of seven main greenhouse gases' (GHGs) ability to trap heat in the atmosphere compared to the GWP of CO₂, which is set as 1. For instance, the GWP of methane is 28, meaning its global warming impact is 28 times greater than that of carbon dioxide.

For more information, check out these resources:

Source: <https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/quantification-guidance/global-warming-potentials.html>

Source: <https://www.ipcc.ch/sr15/>

TECHNOLOGY DESCRIPTIONS

Energy efficient windows

Energy efficient windows are windows designed to reduce heat transfer, minimize drafts, and improve insulation. They typically feature double or triple panes, low-E coatings, and insulated frames, contributing to lower energy costs and increased indoor comfort. Usually, the lower the U-value for the window, the higher the efficiency. Windows with U-values of 1.22 or lower are considered to be high efficiency.

Energy efficient doors

Energy efficient doors are made with materials and have a design that minimize heat loss or gain, improving insulation and energy efficiency. These doors help reduce energy consumption by preventing drafts and air leaks. The higher the R-value, the more efficient the door.



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Smart thermostat

A smart thermostat is a device that can connect to a Wi-Fi network and be controlled using a smart device, such as a cell phone or tablet. It allows users to adjust the temperature settings to their preferred levels. These thermostats can also be programmed to automatically adjust settings for optimal energy usage, helping to maximize energy savings.

Air sealing

Air sealing is the process of locating and sealing any open seams or areas in a building structure that contribute to excess air flow. This will help to improve the air flow and overall air quality in your home.

Heat recovery ventilator

A heat recovery ventilator (HRV) unit is a system that improves indoor air quality by exchanging stale indoor air with fresh outdoor air while recovering heat from the exhaust air. It increases energy efficiency by reducing the load on heating and cooling systems.

Drain water heat recovery

A drain water heat recovery (DWHR) unit is a device that captures heat from wastewater like from showers, sinks, and dishwashers, and uses it to preheat incoming cold water. This process helps reduce the energy needed to heat water, making your home more energy efficient.

Heat pump water heater

A heat pump water heater is a highly efficient water heater that uses electricity to move heat from the air or ground to heat water, rather than generating heat directly. It consumes significantly less energy compared to conventional electric water heaters.

Ductless mini-split heat pump

A ductless mini-split heat pump (DMHP) is a type of heating, ventilation, and air conditioning (HVAC) system that does not require the use of ducts to heat or cool your home. Rather than heating your entire house, DMHPs can be used to strategically heat or cool zones of your home.

Air source heat pump

An air source heat pump is a heat pump that extracts heat from the outdoor air to heat or cool a building. It's an energy-efficient alternative to conventional heating and cooling systems, particularly in moderate climates. In colder climates, an air source heat pump may need a back-up heat source for cold days.



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Ground source heat pump

A ground source heat pump (GSHP) is a highly efficient heating and cooling system that utilizes the temperature of the ground to exchange heat. It reduces energy consumption by transferring heat between a building and the earth. Ground source heat pumps require digging into the earth for installation. They are more expensive than mini-split ductless heat pumps or air source heat pumps, but they are also more efficient and do not require back-up heating for colder climates.

Attic insulation

Insulation materials are used to reduce the transfer of heat between exterior and interior environments. When reducing the loss of heat within an attic, the energy efficiency and overall comfort of the house are proportionally benefited. The higher the R-value, the more efficient the insulation is.

Foundation insulation

Insulation materials are applied to the foundation of a building, reducing heat transfer through the foundation walls or slab and helping prevent moisture issues and energy loss. The higher the R-value, the more efficient the insulation is.

Exterior wall insulation

Insulation materials are placed within or on the outside of exterior walls to minimize heat transfer, increasing a building's energy efficiency and comfort. The higher the R-value, the more efficient the insulation is.

Rim joist insulation

Insulation materials are installed in the rim joist area, where the floor meets the exterior wall, to reduce air leaks and improve the overall thermal performance of the building. The higher the R-value, the more efficient the insulation is..

Solar photovoltaics (PV)

Solar photovoltaic, or solar PV, is a technology that converts sunlight into electricity. Home solar PV systems provide electricity to the home when the sun is shining and feed excess electricity into the electrical grid. Because the energy source is the sun, it is categorized as a renewable energy source.



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