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ENERGY AND WATER EFFICIENT BUILDINGS

Energy and Water Efficient Buildings

THE GREENHOUSE EFFECT

The exchange of incoming and outgoing radiation that warms the Earth is often referred to as the greenhouse effect, because a greenhouse works in much the same way. The greenhouse effect, combined with increasing levels of greenhouse gases and the resulting global warming, is expected to have profound implications, according to most climate scientists.

NATURALLY OCCURRING GREENHOUSE EFFECT

Solar energy passes through the atmosphere and warms the Earth.

About 30 percent of the energy is reflected back into space.

Greenhouse gases in the atmosphere trap the remaining energy. The solar radiation is absorbed by the oceans, land and atmosphere. As they heat up, the oceans, land and atmosphere release heat, which passes out of the atmosphere and into space.

HUMAN-ENHANCED GREENHOUSE EFFECT

Solar energy passes through the atmosphere and warms the Earth.

Increased levels of greenhouse gases, caused by human activities, trap the sun's energy and warm the planet's surface above the normal temperature, causing significant climate change.

increased levels of greenhouse gases

greenhouse gases

atmosphere

The equilibrium of incoming and outgoing radiation makes the Earth habitable, with an average temperature of about 59 degrees Fahrenheit (15 degrees Celsius), according to NASA.



HUMAN ACTIVITY & GREENHOUSE GASES

Human activities have added greenhouse gases to the atmosphere, mainly through the burning of fossil fuels and deforestation.

- Carbon dioxide (CO₂)

burning fossil fuel, cement production, deforestation

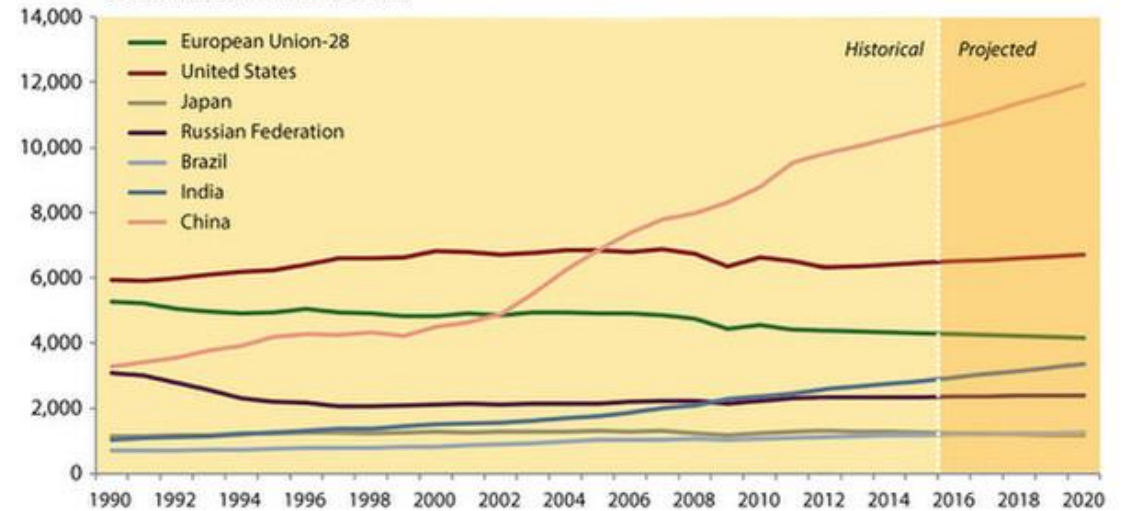
- Methane (CH₄)

fossil fuels, rice paddies, waste dumps, livestock



GREENHOUSE GAS EMISSIONS FOR MAJOR ECONOMIES

CO₂ emissions, in millions of tons



SOURCES: U.S. Environmental Protection Agency, Center for Climate and Energy Solutions, LiveScience.com

R. TORO / © LiveScience.com

Energy and Water Efficient Buildings

Resilient
Buildings



Climate
Change
Designs

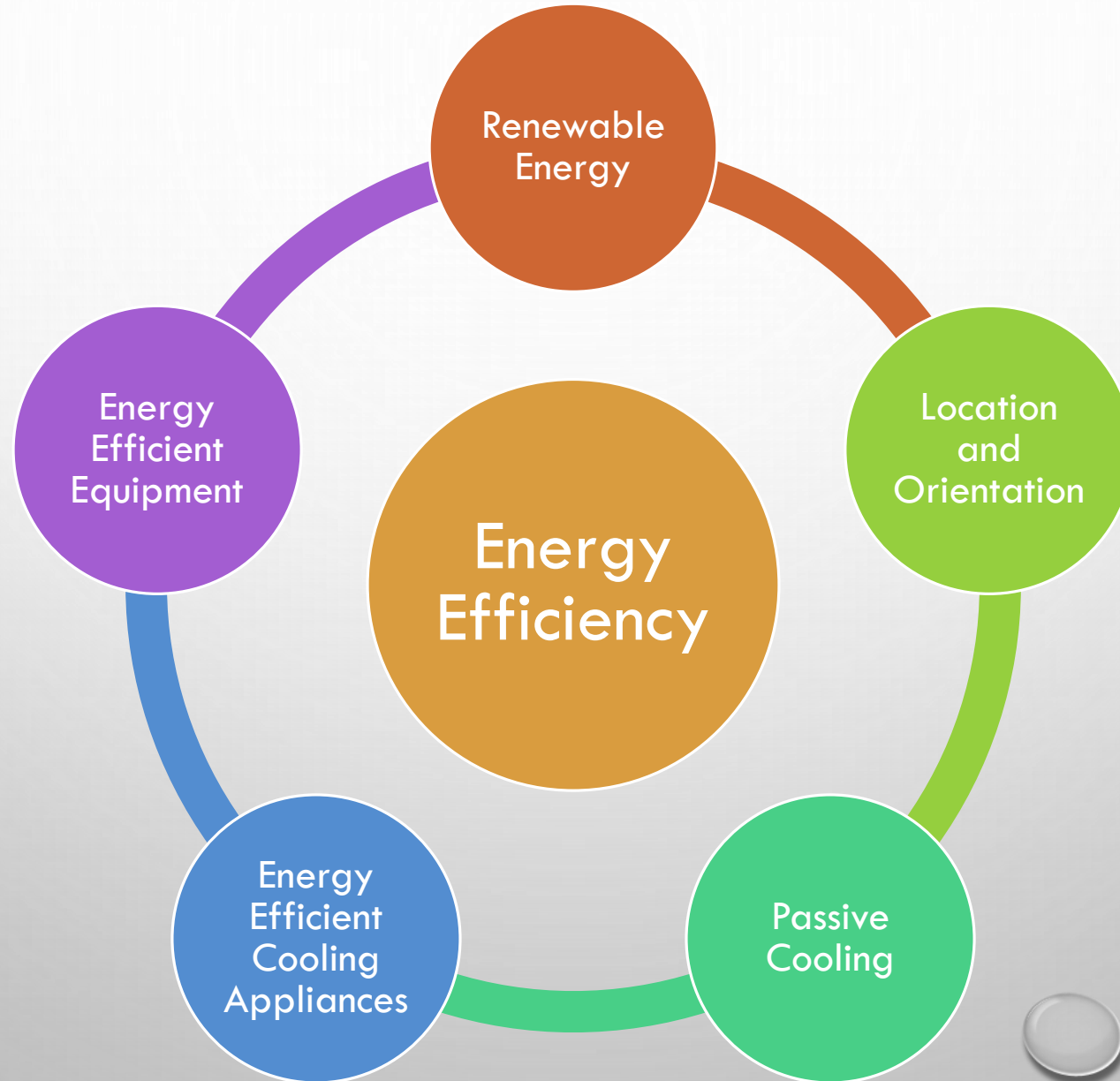


Reducing
greenhouse
effect

Energy and Water Efficient Buildings



Energy Efficient Buildings



Renewable Energy

Install Solar Panels



Solar Energy is a clean and renewable source of energy. Grenada being a tropical country has an abundance of solar energy. Solar technology has drastically improved within the last twenty years.



While solar panels require a substantial upfront investment, the long term savings repay the initial investment. The use of solar energy for heating elements (water heaters) and cooling (Air conditioning) would reduce the fossil fuels



By taking advantage of solar power you can bring down the use of fossil fuel by producing solar energy that is sold to Grenada Electricity Services Ltd. (GRENLEC).

Renewable Energy

Wind Energy



1. Wind blows...
2. across tall windmills...
3. to turn the blades of huge turbines...
4. which spin generators to create electricity.
5. A transformer increases the voltage to send electricity over...
6. distribution lines. Then local transformers reduce the voltage...
7. for you to use.



Wind energy in addition to being a source of clean renewable energy, it is also sustainable.



It has the added advantage of producing electricity at night, when the sun is down and has both domestic and commercial applications

Energy Efficient Equipment

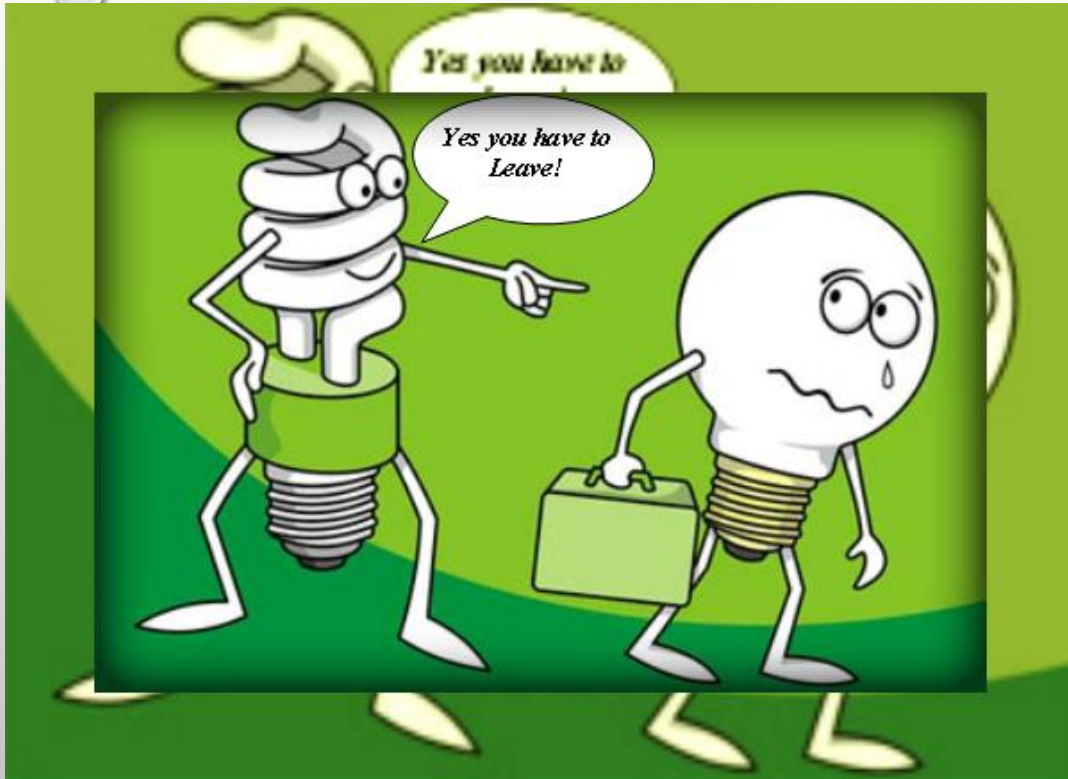
Energy Label and Eco-design



The use of Energy efficient equipment is highly recommended, especially the equipment that is fitted during the construction phase of the project such as lighting, AC, and some in-built kitchen equipment.

Energy Efficient Equipment

Energy Label and Eco-design



Some of the most popular energy efficient items include solar water heater, LED and motion controlled lighting system, and inverter air conditioning units. To identify products that are energy efficient, buyers can rely on different energy labels in Grenada, depending on the origin of the goods.

Energy Efficient Equipment

Energy Label and Eco-design

Based on standard U.S. Government tests

ENERGYGUIDE

Central Air Conditioner
Cooling Only
Split System

XYZ Corporation
Model 12345

Compare the Energy Efficiency of this
Air Conditioner with Others Before You Buy.

This Model's Efficiency
11.5SEER

Energy efficiency range of all similar models

| | |
|-------------------------|------------------------|
| Least Efficient 10.0 | Most Efficient 16.9 |
|-------------------------|------------------------|

SEER, the Seasonal Energy Efficiency Ratio, is a measure of energy efficiency for central air conditioners.

Central air conditioners with higher SEERs are more energy efficient.

- This energy rating is based on U.S. Government standard tests of this condenser model combined with the most common coil. The rating may vary slightly with different coils.
- Federal law requires the seller or installer of this appliance to make available a fact sheet or directory giving further information about the efficiency and operating cost of this equipment. Ask for this information.

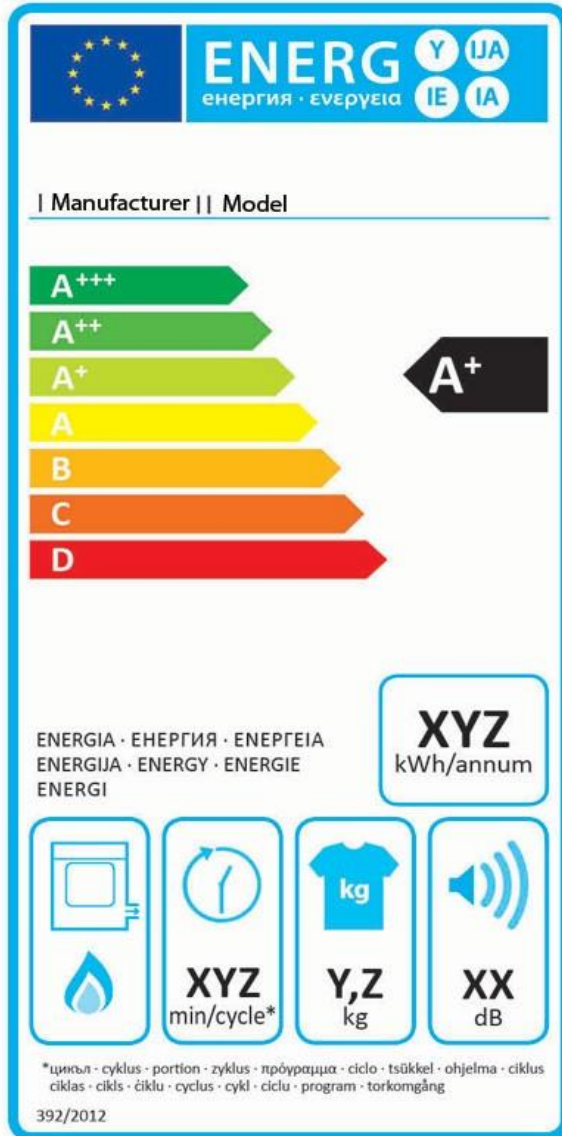
Important! Removal of this label before consumer purchase violates the Federal Trade Commission's Appliance Labeling Rule (16 CFR Part 305)



- There are various Energy Guides that may be found on equipment
- “The Energy Star for example” is used on goods originating from the United States of America

Energy Efficient Equipment

Energy Label and Eco-design



1. Energy Efficiency Rating
A+++ is the most efficient, and D is the least efficient, based on the product's energy consumption.

2. Annual Energy Consumption
The annual energy consumption (in kWh per year) for each product is calculated using specific EU-defined criteria. Here, for tumble dryers, the figure is calculated based on the standard cotton program at full and half load.

3. Product-specific information
You'll also find images showing extra data related to the product, such as capacity, water consumption and noise levels.



“The “ENERG” logo is used by the European Union (EU). The EU label grades the efficiency of the product.

Energy Efficient Equipment

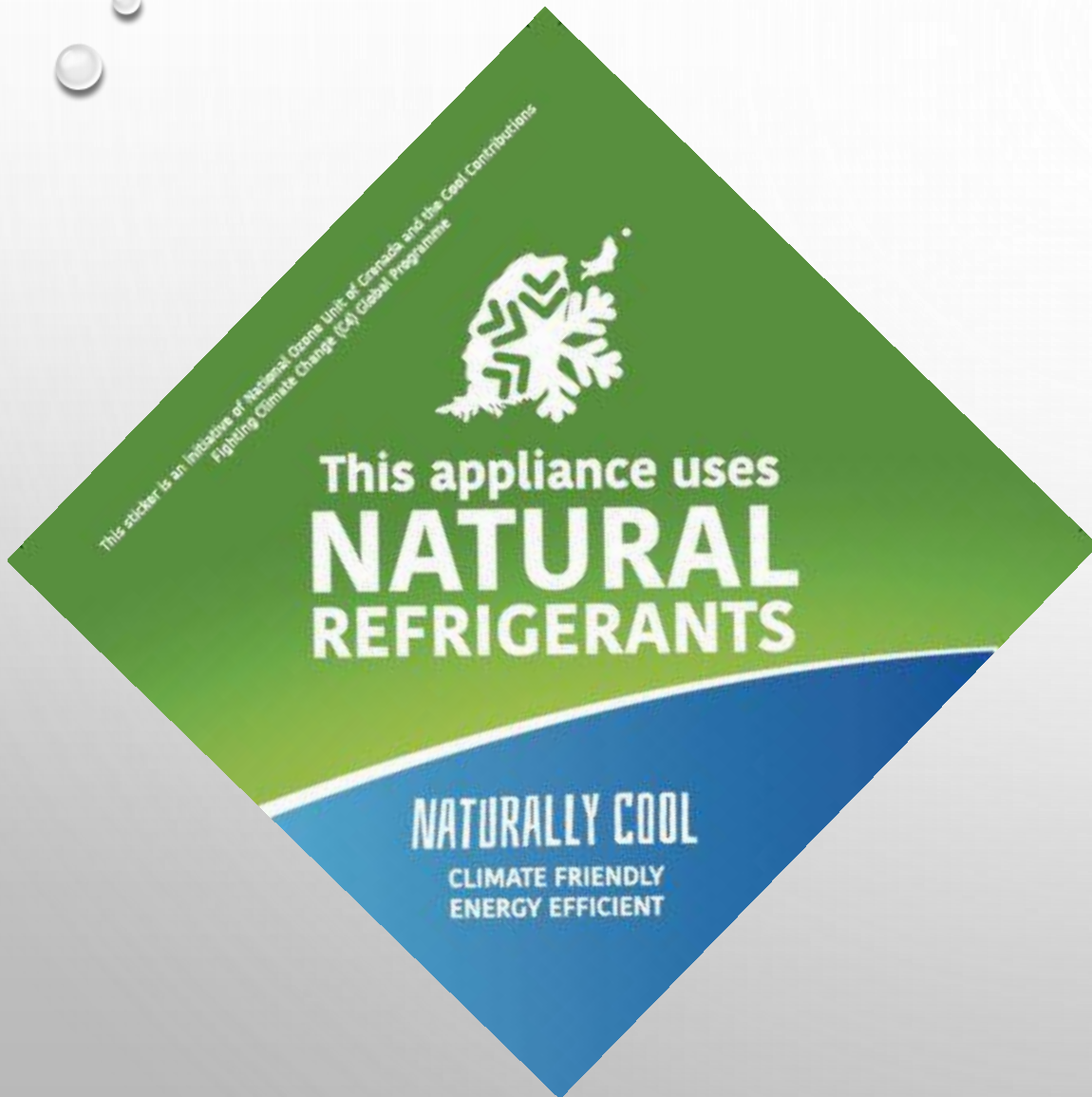
Promote the use of energy efficient cooling appliances



The sticker developed by the National Ozone Unit makes it easy to identify Natural Refrigerant units



Natural Refrigerant units are more energy efficient than HFC based cooling units. They are also more environmentally friendly and are the new standard for the cooling sector, HFC gases being eventually phased out.



**Greenz
Concept**

Energy Efficiency

Location

Buildings should be oriented to take advantage of the prevailing Northeastern trade winds of Grenada.

LOCATION AND ORIENTATION

This is the most effective measure to avoid unnecessary heating from sunlight

Orient the building with longer facades facing South and North, and shorter facades to West and East.

Energy Efficiency

• Eco-design •

Window technology has also improved and is capable of reducing heat gains

WINDOWS

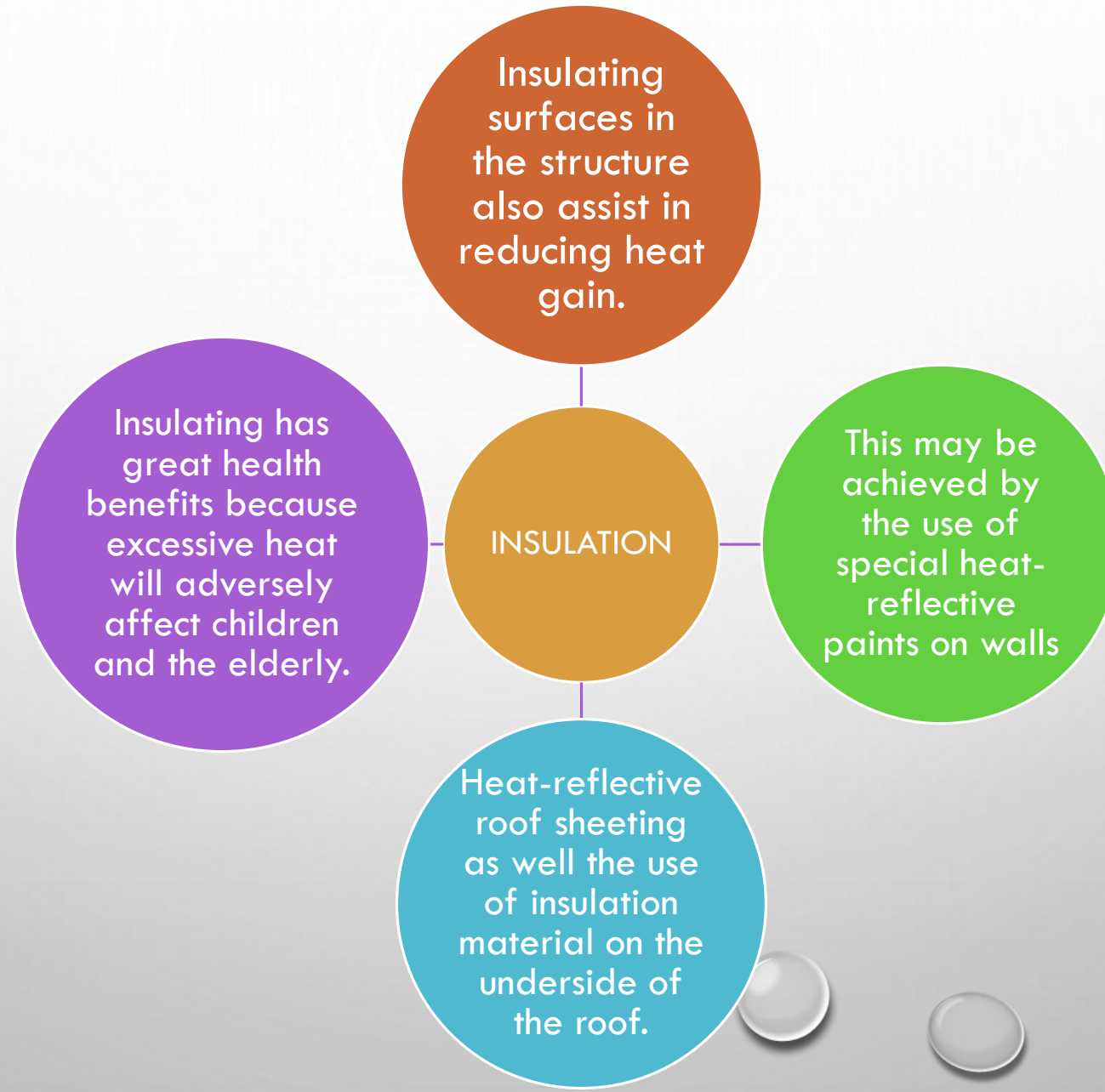
These films reflect the sun's heat and ultraviolet rays, and reduce glare without obscuring the view

The application of heat control window film should be considered

Banfield's Grenada

Energy Efficiency

• Eco-design •



Energy Efficiency

• Eco-design •

**Sherwin
Williams**

Energy Efficiency

• Eco-design •

In tropical climates like Grenada excess solar gains can result in high cooling energy consumption.

These methods do not rely on mechanical means to maintain a comfortable indoor temperature. Natural cooling can be achieved by proper layout and orientation of buildings.

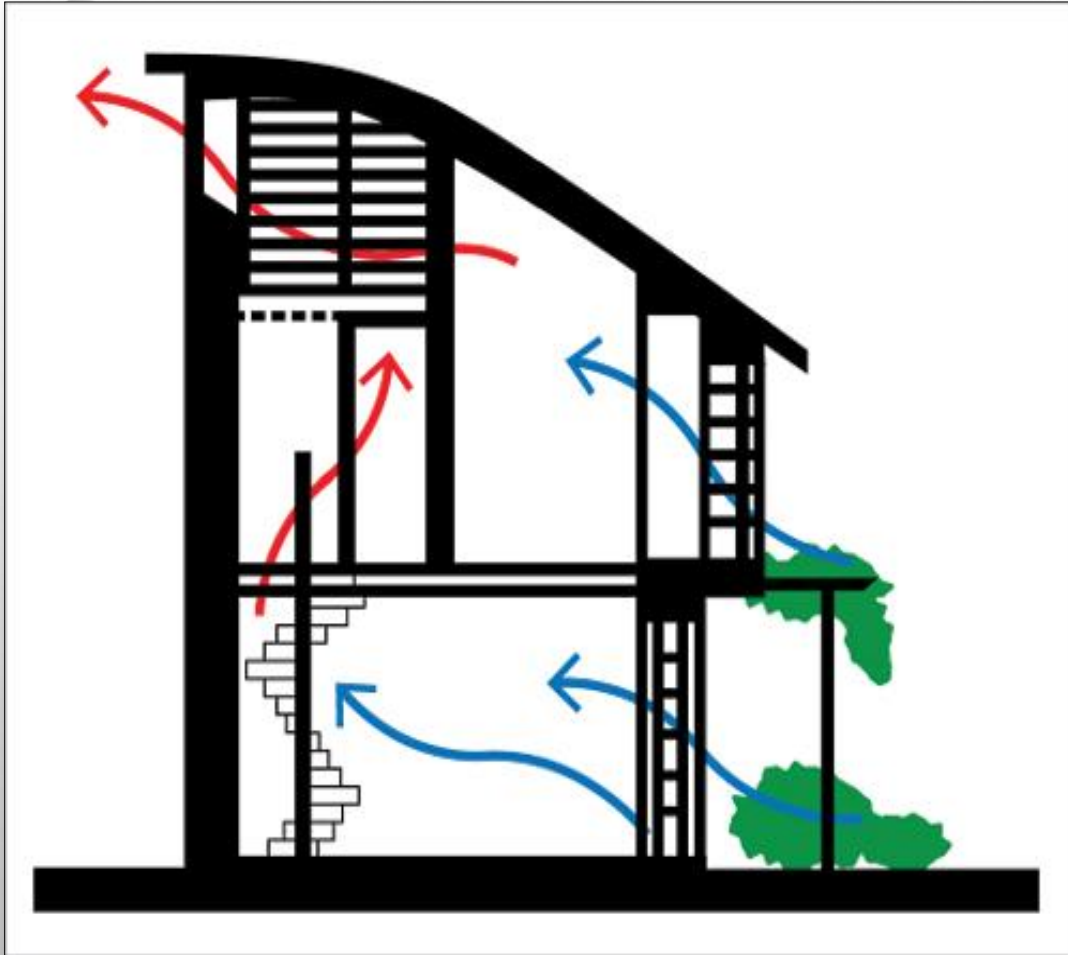
Cooling

This consumption could result in the use of conventional energy sources and hence further depletion of fossil fuels and emission of greenhouse gasses.

Natural and passive systems may be employed

Energy Efficiency

Passive Cooling



Passive cooling regulates the indoor climate by a controlled air flow through windows and other vents that are purposely provided.

To provide natural ventilation locate and orient the building to take advantage of the prevailing Northeastern trade winds.

By installing vents higher in structure at ceiling level, as hot air rises they escape through the higher vents and the void is filled with cooler air entering.

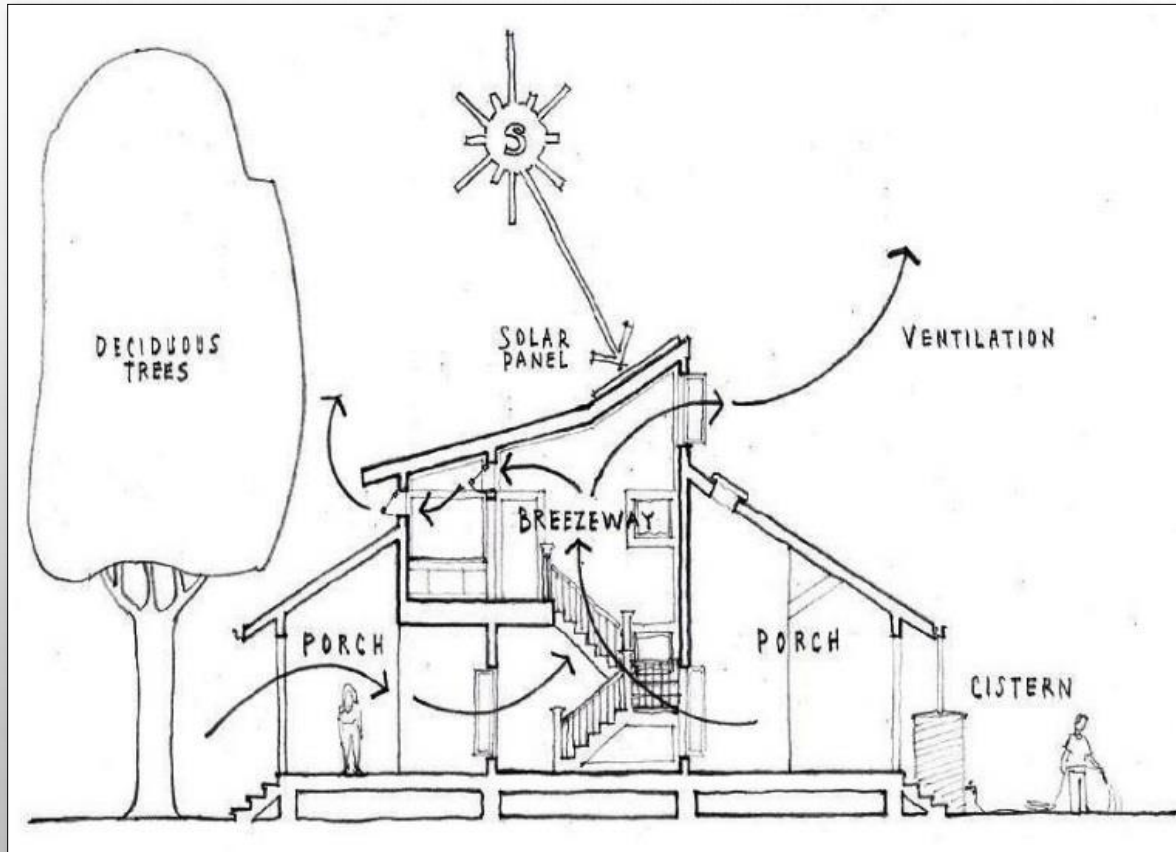
Energy Efficiency

Passive Cooling

In addition to ventilation, shading techniques also assist in reducing heat gains.

Well-designed sun control and shading devices can dramatically reduce building peak heat gain.

Grenada being mountainous and tropical allows for the provision of naturally growing vegetation as a means of shading buildings

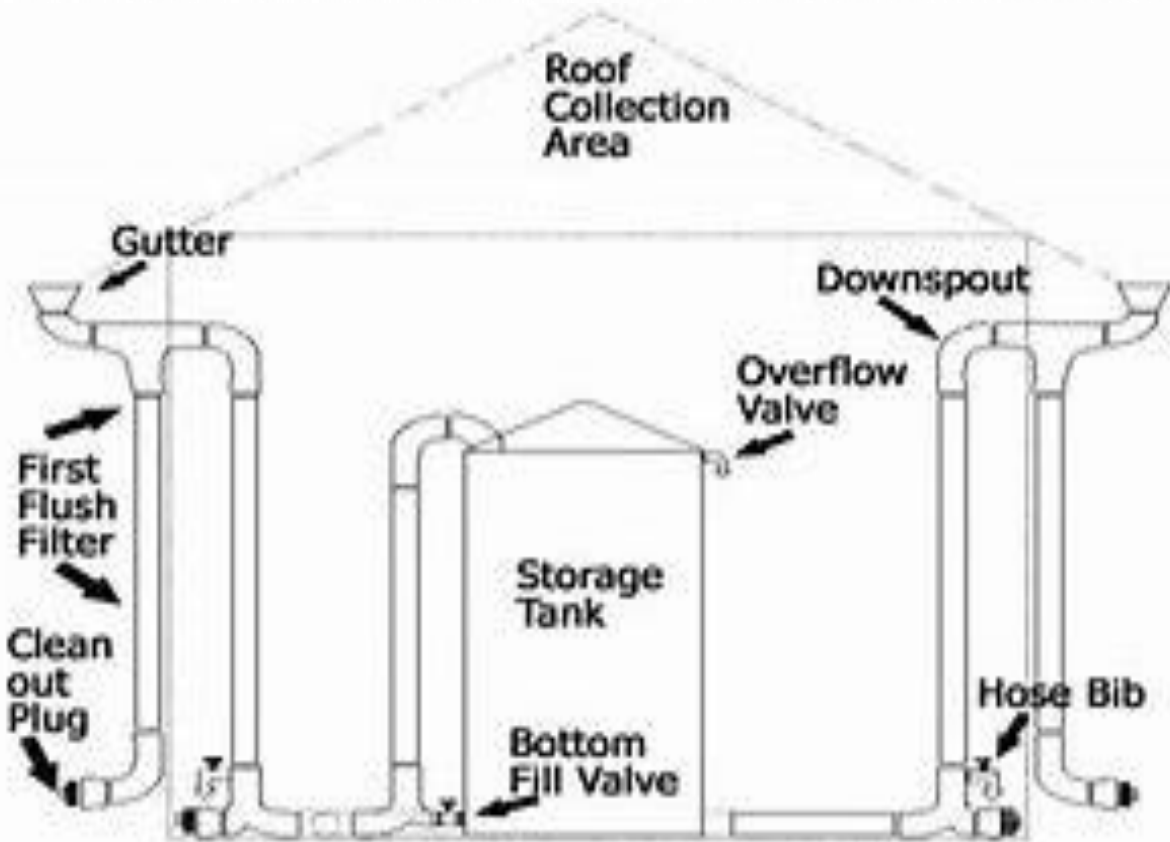


Water Efficiency



Water Efficiency

Rainwater Harvesting



Rainfall is projected to decrease overall for the Southern Caribbean, with an anticipated 26-53% decrease in precipitation by 2050.

With fewer rainfall events expected, more intense dry spells are also predicted. Because of this, it is expected that water will become more expensive and less available

Rain water collected can be used for outdoor use (gardens, pools, etc.) and indoor use such as toilets and washing machines. **It is generally not recommended to use untreated rainwater for drinking or bathing/showering**

Water Efficiency

Water Conserving Fixtures



Technology has allowed for the development of low water consumption equipment that create more environmentally friendly building.

Toilets can account for up to 30% percent of water consumed in homes. Toilets carrying the 'Watersense' label, for example, require as little as 1.28 gallons per flush. Dual flush system toilets should also be recommended.

Water efficient showerheads and faucets use less water than standard models without sacrificing water pressure – These fixtures are available in most local hardware distributors.

The image features a solid green background with several realistic water droplets of various sizes scattered across it. In the center, there is a diamond shape formed by two overlapping outlines: an outer one in a light orange color and an inner one in a light green color. The text "THANK YOU" is centered within this diamond shape.

THANK YOU