





ENERGY EFFICIENCY: INNOVATIONS AND TECHNOLOGY CONSUMERS SHOULD KNOW ABOUT

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KEY TAKEAWAYS

Energy efficiency is one of the most effective ways to combat climate change without compromising quality of life.

Over the last decade, various technologies have been developed to improve energy efficiency in the residential, commercial, industrial, agricultural and transport sectors.

The Paris Agreement, a legally binding international treaty on climate change, adopted by 196 countries in 2015, seeks to limit global warming to 1.5°C from pre-industrial levels. According to the report of the UN's Intergovernmental Panel on Climate Change, exceeding the 1.5°C threshold exposes the planet to risks of more severe and frequent climate change impacts. These impacts include increasing temperatures; melting polar ice caps; rising sea levels; and more extreme weather conditions, which are currently being felt around the world.

Global leaders have taken notice and are taking steps to avert the impending planetary catastrophe.

One of the major outcomes of the 28th Conference of Parties (COP 28) held in Dubai in 2023, was the agreement of Parties to the science-based global stocktake that emphasises the need for greenhouse gas (GHG) emissions to be reduced by at least 43% by 2030, compared to 2019 levels. According to the stocktake, this is the world's best chance of achieving the 1.5°C target.

COP 28 identified energy efficiency as one of the strategies that can help win the fight against global warming. However, the rate of adoption of energy efficiency must be doubled and everyone must get involved.

WHAT IS ENERGY EFFICIENCY?

Energy efficiency is the practice of using less energy to provide the same amount of useful output from a service, such as heating water, lighting a room or cooling a fridge.¹ Energy efficiency is one of the most effective ways to combat climate

change without compromising quality of life. It reduces energy consumption, thereby reducing production of GHGs, and it saves money. Over the last decade, various technologies have been developed to improve energy efficiency in the residential, commercial, industrial, agricultural and transport sectors. Some of these technologies are outlined here.

INDUSTRIAL AND AGRICULTURAL

Fuel-efficient motors and pumps –

The industrial and agricultural sectors rely heavily on motors and pumps for plant and equipment operations. Adjustable or variable speed drive (A/VSD) motors control motor speed and torque in relation to the demand on the motor. The motor does not operate continuously at full capacity, thereby saving energy.

Programmable irrigation systems

More traditional agricultural water distribution systems, such as sprinklers and flood irrigation systems, can waste water through evaporation and runoff. Programmable water distribution systems, such as drip irrigation mechanisms, allow water and fertiliser to drip slowly on to the roots of plants, reducing water wastage. A system of pipes, tubes and emitters can be built into the soil surface or directly at the plant roots and programmed to release water and nutrients in small doses for heightened absorption.



¹Financial Glossary. (2024, March 06). Retrieved from Market Business News: <https://marketbusinessnews.com>

RESIDENTIAL

High-efficiency home heating, ventilation, and air conditioning (HVAC) systems

- Air conditioning has become a common feature of residences in the Caribbean as a result of increasingly hot weather. In the past, air conditioning units operated with fixed speed compressors. Inverter air conditioning units can use between 25% – 50% less energy to cool a room by adjusting the compressor speed to control the refrigerant flow rate based on the temperature of the incoming air. This is a very effective way to maintain cool indoor air while minimising energy use.



Insulation – This helps to reduce the amount of energy needed to cool or heat a building by radiating heat back to its source. Commendably in Trinidad and Tobago, it has become a standard practice to utilise roofing insulation for home construction. There are different grades of roofing insulation available, usually differentiated by the 'R-value'. The insulation material with the higher R-value possesses better insulation properties.



Energy efficient appliances

– New technological innovations are being introduced regularly to improve the efficiency of household appliances such as clothes dryers, washing machines, microwave ovens and fridges. The US Environmental Protection Agency (EPA) Energy Star label, launched in 1992, provides some assurance to consumers looking for energy efficient appliance options. There are also home tankless water heaters that work similarly to inverter air conditioning units, by only heating water when the hot water tap is turned on, eliminating standby operation.



In February 2024, the Trinidad and Tobago Bureau of Standards (TTBS) announced the completion of the Quality for Sustainable Energy in the Caribbean (QSEC) project that, among other things, launched a laboratory for testing of lighting products for

energy efficiency. Plans are also underway for enforcement of the mandatory national energy efficiency labelling standard for Light Emitting Diode bulbs (LED) and Compact Fluorescent Lightbulbs (CFLs) to protect consumers.

TRANSPORTATION

Fuel efficient vehicles – In response to the growing demand for energy efficient transportation, there has been a steady increase in new technology to facilitate same. The transportation industry clearly reflects various stages of the energy transition as alternatives to the internal combustion engine vehicles abound. Consumers now have the choice of purchasing compressed natural gas (CNG) vehicles, which run on natural gas – a cleaner alternative to gasoline.

There are also the options of hybrid electric vehicles, which are powered by alternating gasoline/diesel and electricity, and all-battery electric vehicles (EVs) that are powered fully by rechargeable electric batteries.



Fuel-saving tyre design – There have been significant advancements in tyre design to improve fuel economy over the past decade. Tyre manufacturers are now producing low rolling resistance tyres that use less energy to rotate the tyres at the point of contact with the road. The US Department of Energy estimates that as much as 11% of a vehicle's fuel consumption can be attributed to tyre rolling resistance. In addition to safety features such as dry and wet braking, consumers should consider rolling resistance in making their tyre purchases.

Tyre pressure gauge – Consumers who cannot afford to purchase low rolling resistance tyres can invest in a tyre pressure gauge. This simple and affordable instrument takes the guesswork out of measuring tyre pressure on a regular basis. Studies have shown that running tyres at the correct pressure can not only reduce fuel consumption of the vehicle, but also contribute to overall vehicular safety.



COMMERCIAL



Efficient consumer electronics – Electronics and gadgets such as computers, smart phones, televisions, and tablets are now an essential part of life. However, these devices require a significant amount of energy to operate and can continue burning energy when not in use. For both commercial and home offices, it is highly advisable to utilise electronics with energy efficient features such as sleep mode; low power displays; smart chargers; energy efficient processors; and solar power.

Commercial refrigeration –

Commercial refrigeration equipment runs continuously and according to a recent Oxford study for 14 restaurants, refrigeration can account for 41% of a commercial kitchen's electricity consumption. Businesses such as restaurants, supermarkets and fishing depots can save money and energy by optimising their refrigeration equipment to reduce energy consumption. One of the features included in modern commercial refrigeration equipment is an automated door management system, that reduces energy lost by open doors. There is also Energy Star-labelled equipment that feature LED lighting, efficient compressors, and better insulation. Some modern



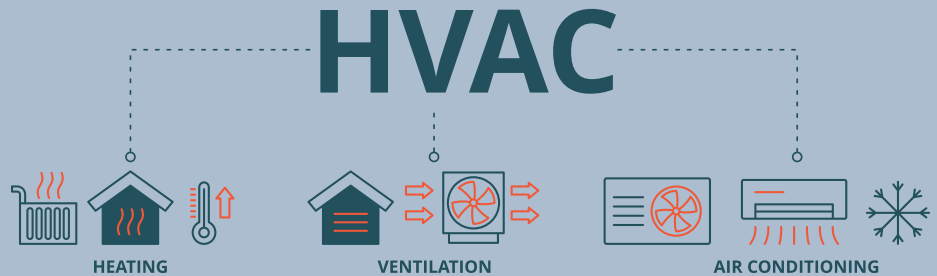
vending machines can automatically switch to low-energy lighting and refrigeration mode during periods of extended inactivity.

Enhancements to the building envelope –

The building envelope refers to the outer shell of an enclosed building. This includes the roof, walls, and foundation of the building, as well as the windows. Both residential and commercial buildings can improve energy efficiency by applying energy-smart design that allows for natural lighting and ventilation. Additionally, roofing and wall insulation with the appropriate R-value can improve efficiency, especially in large buildings. Windows that incorporate infrared-insulating and ultraviolet light-reflecting glass, as well as insulating gas fill between glass layers, can also reduce the flow of heat between the interior and exterior of a building.

LED lighting with sensors –

Motion sensor lighting is designed to come on when human movement is detected in an indoor or outdoor space and turn off when no movement is detected. This, coupled with LED lighting fixtures, can significantly impact energy usage, particularly in offices where lights are traditionally left on for 24 hours.



Automated HVAC systems –

Centralised automated HVAC systems can be used to control air conditioning, heating and ventilation. HVAC thermostats can

be pre-scheduled to increase or reduce cooling based on predictable outdoor temperatures, while ensuring that employee comfort and indoor air quality are not compromised.

As with all types of technological advancements, with increasing adoption, energy efficient technologies are becoming more affordable and accessible worldwide.

It is recommended that when considering a new purchase for the home or business, individuals and corporations should incorporate energy efficiency in their selection

criteria. An investment in energy efficiency will undoubtedly yield rewards in terms of energy and cost savings in the short, medium and long term. ■