# The Use Of Renewable Energy In Guyana: The Application And Utilization Of Photovoltaic (PV) Solar Energy In Guyana

## -Introduction

One characteristic, which the entire Caribbean is globally recognized for is the heat of the Sun throughout most of the year. This characteristic heat of the Caribbean sun holds the potential to create enough Renewable energy to remove the dependency of these countries on fossils fuels and to satisfy their dependent needs for the use of energy in their citizens daily lives. A transfer of the thermal energy from the sun causes this Heat, where the energy is transferred from one object to another, in these instances from the sun to the islands and countries of the Caribbean. The Sun is recognized as a renewable source of energy because the energy retrieved from this source are not finite to fear depletion as with Non-Renewable sources of Energy like Fossil Fuels. It is based on a reasonable assumption that the sun will rise again tomorrow and the following days to come, thus it potential energy-producing ability can be always exist.

Why then would a country not utilizing this abundant source of energy, which could be cost-effective when compared to the traditionally used fossil fuels and if granted subsidies by the government, efficient and most importantly the input/ most of the materials needed for the energy production are free. It also does not create harmful and dangers emissions like that of Non-renewable sources of energy?

Guyana has now come into the discovery of one of the largest deposits of oil in the world, but as mentioned these Non-renewable energy sources are finite and limited, they would only last for a number years. The real long-term goal, initiative, vision and the question to be answered by the country should be where would they be getting their energy when such a time comes that there is no longer fossil fuels (black gold (oil)) to depend upon for their inherently dependent energy needs?

The answer to such a question for Guyana is present right above the country`s hypothetical head. That powerful sun`s energy is one of the best ways for a country that will soon possess the funds to invest in infrastructure for the betterment of the country and a country which also possess large land spaces, an ideal solution for the inevitable energy need after the depletion of the fossils fuels occurs. The source closest and ever present none other than Solar Energy.

## -What is Non-Renewable Energy?

Non-Renewable sources of energy are those energies created by drawing on or are dependent on finite sources, that would eventually be depleted or take very long to be replaced by the natural processes, which created them. They could also become expensive to extract or cause severe environmental damage in the extraction and utilization of these sources. Fossil fuels are an example of such a source of energy, examples include crude oil and natural gas collectively referred to as petroleum, coal and the Nuclear energy also extracted from Uranium is also another example of a Non-Renewable source of energy reason being the amount of uranium

present in the Earth is very limited. Fossil Fuels referred to as Carbon fuels require to burning to extract the energy held within these sources.

However, in the extraction of these sources of energy, they create environmentally damaging conditions such as carbon emissions which results in climate change, which also has its devastating effects like flooding, drought, rise in the sea levels and stronger hurricanes, etc. Once these sources of energy have been extracted and utilized, they cannot be reused, recycled or repurposed after being used once, since there may take millions of years for their supplies to be replenished.

## -What is Renewable Energy?

Renewable Energy are those energies that are created or generated from sources that do not have a finite or limited end or depletion, these sources could be reused, recycled or can be used to create energy again, without fear of depletion occurring. These resources could be replenished in a shorter period compared to Non-renewable sources, which could take millions of years to replenish their supply. Natural sources of Renewable sources of energy include solar power, wind power, and water power, which consists of Hydropower and Tidal power.

The solar energy received by Earth`s continents is more than two hundred (200) times the total amount of commercial energy consumed by humans. Solar Energy is generated from the sun. Wind energy from air movements that result from low and high atmospheric pressure of hot and cold temperatures produced by the sun. Hydropower is created from water movements, Wave power comes from wind and temperature shifts over water; tidal power is created from the gravitational pull and the wind. While biomass from organic matter grows because of interacting factors of the sun, wind and water. The ability to replenish means that the use is largely sustainable over the short and medium-term; the goal is for long-term sustainability.

The increasing use of renewable energy is based upon their sustainability. Sustainability has two interrelated aspects:

“To use the resources with a minimal negative impact on the environment and to develop resources in an appropriate and cost-effective manner that is able to carry on for the long term”.

## -What is solar energy?

Solar energy is energy from the sun used to generate electricity and to heat water. Broadly, speaking, solar energy is converted into three types of energy: solar thermal, solar photovoltaic and concentrated solar energy. Solar thermal energy refers to solar energy converted to heat. Concentrated solar power is a type of solar thermal energy used to generate electricity. Most often aimed at large-scale energy production, concentrated solar power technologies use lenses or mirrors to reflect and concentrate sunlight onto receivers (a small beam); the concentrated heat is then converted to thermal energy, which in turn produces electricity via a steam turbine or heat engine driving a generator. Photovoltaic (PV) solar power is electricity generated from the use of photovoltaic cells. PV modules can offer electricity in areas where it is not cost-effective to use the conventional grid, or where electricity grids are limited to produce, example in the hinterland areas present in Guyana.

## -Components of the Photovoltaic (PV) Solar Electric Energy System?

Solar Energy can be used in the production of Electricity, with the use of sunlight and photovoltaic cells (photo = light; voltaic = electricity). These photovoltaic cells convert sunlight directly into electricity.

These photovoltaic modules commonly called “panels” are made of many cells, which contain the element of silicon, a semiconductor material. The process occurs as follows: when sunlight hits the photovoltaic cells that contain the element of silicon within the panels, some of the sun`s energy is absorbed and transferred to the some of the electrons of the semiconductor, which causes some of the electrons to become free from their atoms. The panels are constructed in such a manner to allow the flow of the electrons (the current produced) in a particular path. The Current produced is stored in batteries and with the use of additional devices such as inverters, the Direct Current (DC) produced from the panels is turned into Alternating Current (AC) which is what electronic devices and household appliances utilize.

## -Benefits or Advantages to the use and implementation of Photovoltaic (PV) solar energy in Guyana

Solar power utilization has a vast amount of benefits, while there are other forms of renewable sources of energy, these sources usually require larger-scale developments to make use of such sources, like windmills for a the production of wind energy. Most of these applications cannot fit into the residential housing sectors of countries, especially in Guyana where the move is now to a more Suburb layout for the housing established across the country. Where there are limited spaces like these, the ideal and the most effective of these systems would be Solar Energy electricity generating systems. These systems would help to reduce carbon emissions by lessening or removing the dependency of homes for electricity from power plants that burn fossil fuels to create that energy, could create cost savings in terms of removal or lessening of electricity bills, and these systems also provide for very low maintenance and are usually very reliable.

Where arguments for the disadvantages of these systems may arise, they can easily be overturned. Solar Energy disadvantages usually include lack of suitable places to put panels, in apply this argument to Guyana there is an abundance of empty roofs of houses and land spaces that could be utilized.

Another disadvantage being the initial costs to set up one of these solar energy systems and the return on investment is usually long. This disadvantage is a short term view of costs incurred, if calculated correctly the return on investment might take a while indeed but the focus must remain of the long term goal that would be achieved, which includes the use of cleaner energy and once that initial investment is returned the energy generated is basically free.

The hot Caribbean sun provides a conducive environment for the utilization of Solar Power initiatives to create electrical energy. These systems are dependent upon the sun but the energy created can be stored and utilized later, like during the night or during storms.

## -Solar Power Implementation, Advancement and Initiatives in Guyana

According to the Guyana Energy Agency (GEA), Guyana is currently dependent on imported petroleum-based fuels as its main source of energy. However, the country has committed its self to pursuing the utilization of renewable sources of energy in electricity generation through its Green State Development Strategy. This prioritization of renewable energy transition is based on Guyana`s international recognition and it track record for the move to a more green and sustainable economy with it initial steps being the conservation of it forests, as part of its ongoing agreement with the Government of Norway for the Guyana-REDD+ Investment Fund (GRIF).

As stated in the Green State Development Strategy:

“In 2016, 85% of Guyana’s total installed power generation capacity consisted of fossil fuels, whilst renewable sources, including biomass (bagasse and rice husk) and small installations of solar PV (photovoltaic) and wind turbine systems, reportedly accounted for 15% of installed capacity. It is estimated that the transportation and power (electricity) sectors consume three-quarters of total imported petroleum products; with the power sector being the country's largest energy user (36%); followed by the transport sector (35%); agriculture, fishing and mining (21%); the residential sector (4%); and industry/manufacturing (3%).”

Some of these figures are disturbing, but the country`s steps toward a greener and clear economy can be found. With its innovative biomass systems, which utilizes the countries own local agricultural waste of bagasse and rice husk and it developed in its photovoltaic and wind turbine systems could be recognized as advancement to a better, greener and cleaner environment for the country.

## -Initiatives are taken by the Government of Guyana to Support Solar Power Electricity Production Development.

According to the Energy Sector Management Assistance Program (ESMAP), Guyana receives an average of 1,800 kWh/m2 annually. As a result, most locations across Guyana have excellent solar insolation levels (Insolation is a measure of solar radiation energy received on a given surface area in a given time.) and are ideal for solar PV generation. According to the Guyana Energy Agency (GEA) under the Hinterland Electrification Programme, in excess of 19,000 solar PV systems have been installed in nearly 200 communities in 2018.

Citizens of Guyana are now able through incentives created by the government to implement Solar Energy electricity generation in their homes and workplaces, etc.

“Fiscal incentives include Value Added Tax (VAT) and import duty exemptions for renewable electricity equipment, solar appliances, solar water heaters and solar cookstoves. In addition, one-off tax holiday of two years for corporation tax to importers of items for solar energy investments, and a change of the Wear and Tear Schedule of the Income Tax Act to allow for the write-off of capital expense within 2 years.”

Guyana Power and Light Inc. the electricity generating company present in Guyana is also assisting to help the country achieve its Green State Development Strategy: Vision 2040. The company is preparing plans to establish three (3) large scale or utility-scale Solar Photovoltaic farms to account for the production of around thirty megawatts (30MW) of electricity from these solar farms in the near future. Plans also exist for the development for Solar Photovoltaic farms at Wakenaam to produce around 0.75 Megawatts of solar electricity and at Onverwagt to produce around 4 Megawatts of electricity.

In addition, plans also exist to install 1.184 MW of solar Photovoltaic systems at 80 public buildings in all 10 Administrative Regions of Guyana in 2019. These installations are estimated to result in costs savings of G$114 million and avoiding 1,415 tons of CO2 emissions per year.

Guyana`s Solar power initiatives can be recognized as long term goals and visions of a country, not blinded by its recent discovery of vast amounts of oil, towards systems that can produce electricity for its dependent citizenry even when depletion of their fossil fuels occur. If continuation for their goals of transitioning to renewable energy utilization as set out in their Green State Development Strategy, Vision 2040, the country would create a cleaner, decarbonised and greener economy.

## References


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