

**HYPOWER IS AN UNDER-UTILIZED RESOURCE IN JAMAICA.
DISCUSS THIS STATEMENT INDICATING THE PROS AND CONS OF
USING THIS FORM OF ENERGY -
A Caribbean View**

Hydroelectric energy is an alternative way of satisfying the world's energy demands. As water falls it gains kinetic energy, hence hydroelectric plants generate electricity from falling or running water. Kinetic energy is energy gained by a moving body and is referred to as the energy of motion. This is the energy that is converted to electrical energy in a hydroelectric plant. This source of energy is an alternative to using imported oil to produce energy for consumption. Hydropower uses only water to produce energy. This form of energy, while it is being explored, taken advantage of and used in many parts of the world, is underutilized in Jamaica.

Hydroelectric energy can be generated at a hydroelectric station. A hydroelectric station consists of a dam which is built primarily to trap and control water flow. Gravitational potential energy is stored in water above the dam. The water is channeled through tunnels in the dam turning turbines, which are an integral part of producing hydroelectricity or hydropower. The fallen water pushes against the turbine blades causing them to spin. As the turbines spin they turn a generator that produces electrical energy. The water arrives at the turbines at very high pressures which results in high quantities of generated energy.

In Jamaica, hydroelectric stations are actually built next to fast flowing rivers such as the Rio Cobre or large inland bodies of water. In this arrangement water is allowed to flow

through similar tunnels and turn turbines. However, water flow can neither be controlled nor stored for later use.

This type of energy is underutilized in Jamaica. The term energy refers to the capacity to do mechanical work. An important concept is the one that states that energy cannot be created or destroyed, but converted from one form to another. This is the basic principle of hydroelectric energy. Energy is converted from kinetic to kinetic again in the turbines then to electrical. The concept of underutilization refers to the underuse of a product or service or failure to use up to maximum capacity.

Jamaica currently lacks the resource and potential for large scale hydroelectricity generation. No match for mountainous countries such as Switzerland and New Zealand whose hydroelectric power provide more than half of the countries' energy needs. Jamaica produces only 23.8 megawatts (23.8MW) of hydroelectric power annually. Surely the island can do better as it regards hydropower. The current supply as a ratio of potential supply stands at 23.8 percent (23.8%).

There are currently twenty-four hydropower stations in the island. The Jamaica Public Service Company owns nine of these plants of which eight are functional. In the year 200, the island's total energy production in thousand metric tones of oil equivalent was four hundred and eighty six (486) units. Energy imports were three thousand three hundred and fifty two (3,352) units in comparison to only sixty-seven (67) units in exports. Of the energy produced only ten (10) units were produced by hydroelectricity.

In the late 1980's to early 90's more than eighty percent (80%) of Jamaica's primary energy demand was satisfied by imported oil with only a mere one percent (1%) being supplied by hydropower. In 1998 there was a 23.5 percent (23.5%) increase in energy supplied by hydroelectric plants and a 6.5 percent (6.5%) input of hydropower in the country's energy source. With population increase and the rising energy demands in the island, the same quantity of hydroelectric energy now supplies less than one percent (1%) of the nation's energy as imported oil accounts for ninety-nine percent (99%) of energy consumed in Jamaica.

The Back Rio Grande has been identified as the potential site of a fifty megawatt (50MW) capacity generating plant since the late 1990's but that is yet to materialize. The plant alone would supply almost twice the energy being supplied by all the hydropower plants in Jamaica. This would be an excellent development for the country which though it cannot generate majority energy needs by hydroelectricity has the potential to generate significant amounts and certainly more than is being generated now.

The largest plant presently, the Magotty Falls, has a capacity of 6.3 MW. This is a far cry from what the Back Rio Grande could do if developed. Jamaica is seriously underutilizing our hydroelectricity resources and capabilities. If necessary investments are made, the benefits will surely be enormous and invaluable to the country.

Implementation of the Back Rio Grande project to boost Jamaica's hydroelectric production would also have many other benefits. Jamaica's hydroelectric potential is limited by small catchment areas and rugged topography hence most potential hydropower projects are small run-of-river-schemes. Not so with the Back Rio Grande if developed. Such an addition would make an invaluable contribution to the energy sector once the project is complete. Jamaica's dependence on imported fuels and susceptibility to fuel cost fluctuations would be significantly reduced. Hydropower plants do not burn fuel to produce electricity hence their costs are not subject to inflation resulting from rising oils prices. The energy needs of the country would be met in the most effective manner if only Jamaica took the opportunity and utilitied the available hydroelectric resources.

There are countless advantages and disadvantages to be had from hydroelectric power stations such as economic benefits, concerns with the cost of development and the environmental impacts that the plant will have. Despite the fact that a hydroelectric plant is virtual self-sufficient, the construction of the hydro plant is very expensive when compared to that of a fossil furl plant. There is no need to buy fuel from outside sources to maintain it and maintenance costs only rise at a rate of half to one third inflation but the initial cost associated with building the plant are very significant. Dams are also very expensive to build bu costs may be shared between the public and private sectors since many dams are also used for flood control or irrigation.

Apart from the economic benefits there are many other benefits of using hydro energy. The existing plants along with other potential plants have the potential to significantly reduce the amount of carbon dioxide released into the atmosphere from the burning of coal each year. Reduction of up to ninety thousand tones of carbon dioxide is projected if Jamaica maximizes its hydropower supply potential.

Hydroelectric power is clean. Hydropower sources do not produce carbon dioxide, silicon dioxide or nitrous oxides which contribute to acid rain and other harmful effects in the atmosphere. There are absolutely no air emissions. There is also no liquid or solid waste. There are no pollution effects therefore this type of energy is very safe for the environment. Water, however, has many uses hence there may be conflicting demands on the availability of water in the country.

Water is very reliable as an energy source. Unlike wind or solar energy, which are not constant and assured, water never stops flowing. Unlike the sun, which does not shine at nights and wind which ceases from time to time, water does not stop flowing. Except for seasonal rivers which dry up or have fluctuation levels, water rarely stops flowing and continues for extended periods. There are therefore no restrictions on hours or times when power is generated hence there are no major inconsistencies.

Water may be stored above the dam ready for periods of high demand. In this regard it is easy to increase or decrease the electricity output. This is one major advantage that hydropower has over other forms of energy. This is one major advantage that

hydropower has over other forms of energy. This storage of water, however, may be a disadvantage since building a large dam will flood a very large area upstream. When the water is not able to follow a free path as in the case of building of the dam, the water must gather at some point when the dam is full. Since the water has nowhere to go, rivers overflow their banks and damage is caused in areas where there are habitants surrounding the river. This causes problems for animals that used to live near the river before the dam was built. These animals die of starvation, drown or migrate.

If a hydropower plant is destroyed, the results could be disastrous and damage could occur over an extensive radius. The destruction or failure of a hydropower plant brings about widespread flooding which result in loss of life and property. These events are heard of ever so often with the occurrence of dams overflowing and rivers overflowing their banks causing catastrophic damage.

Hydropower stations can increase to maximum production very quickly and there are no waiting periods associated with waiting for the production levels to gradually rise, as is the case with other energy sources. Electricity is generated constantly but even then finding suitable sites for such plants may prove to be very challenging. The environmental impact of the plant must be assessed and the impact on residents and the environment may be harmful.

One harmful environment impact is that water quality and quantity downstream may be affected when hydropower plants are put in place, thus having an impact o life forms

downstream. Dams disrupt the normal flow of rivers causing significant change in the ecosystem of the surrounding areas. An area which was once a habitat for some animals becomes inhabitable and this animal has to seek refuge elsewhere.

A great environmental impact of hydroelectricity plants is their ability to improve wetlands and provide habitats for local wildlife by considerably lessening the quantity of water in the area while ensuring a consistent supply. However, a major concern surrounding this development is that while hydroelectric plants aid some wildlife they actually inconvenience and destroy others. When the quantity and quality of water is significantly lowered, the natural course of the fish would be migration. They however are not able to do so since the quantity of water is reduced and mass migration upstream is hampered by the presence of the plant. This indeed poses a crisis as it concerns the building of hydroelectric plants.

These concerns are definitely significant and are contributors to the underutilization of hydropower in Jamaica as a source of renewable energy. There are however, many convincing benefits to be had. Water never runs out since it is a renewable resource. It is constant and will always be replenished-for-free! Another reason that the maximization of water resources is very beneficial is that while oil has a low efficiency rate and produces many bi-products, hydro energy is very efficient. A hydropower plant is ninety percent (90%) efficient! It converts ninety percent (90%) of kinetic energy received into electrical energy. That is a major benefit!

Hydropower has many pros and cons, many disadvantages and equally abundant advantages. Both sides are to be carefully considered when looking to build such a plant and Jamaica has, no doubt taken into consideration these factors.

It may therefore be concluded that Jamaica does underlize hydropower with potential for major gains if such a project is undertaken. At first glance, this idea seems insane when there are so many benefits to be had such as efficiency, cost effectiveness and environmental benefits but it is an inevitable fact that there are also disadvantages to constructing these plants. By constructing these plants, Jamaica would be paving the way for major environmental repercussions which at this point are undesirable. The odds are therefore equal; there will always be a negative and a positive side to the use of hydroelectricity and the construction of facilities to undertake such a venture. Which would you choose?

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