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Advantages and Disadvantages of Hydroelectric Power Plant

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Abstract:- Hydroelectric power is generated by the use of gravity, using falling or flowing water as a source of energy. Hydropower is the production of electrical power through the use of gravitational force. As the most widely used form of renewable energy, it accounted for 16 percent of global electricity production in 2010 - 3,427 terawatt hours. It is expected to increase by about 3.1% annually for the next 25 years. Approximately 32 percent of the world's hydropower is generated in the Asia-Pacific region, which produces hydropower in 150 countries. The Chinese hydroelectric industry is the world's largest, producing 721 terawatt-hours of energy in 2010, which represents 17 percent of domestic energy consumption. Currently, there are four hydroelectric power plants that are larger than 10 GW: the Three Gorges Dam and Xiluodu Dam in China, the Itaipu Dam in Brazil, and the Guri Dam in Venezuela. Hydroelectricity is relatively cheap, making it a competitive source of renewable energy. An average hydroelectric station with a capacity over 10 megawatts costs between 3 and 5 cents per kilowatt-hour. Furthermore, the amount of electricity produced by the station can be adjusted up or down very quickly to meet changing energy requirements. Damming However, disrupts river flows and harms local ecosystems, and people and wildlife are often forced to move when large dams and reservoirs are built.In contrast to fossil fuel-powered energy plants, hydroelectric projects produce no direct waste and emit considerably less carbon dioxide (CO2) than those that are powered by fossil fuels.

Keywords:- *Hydroelectric, Renewable Energy, Hydropower.*

I. INTRODUCTION

A hydropower generates electricity by using the energy of moving water. Streams and rivers are created by rain or snow, usually emanating from mountains or hills. Energy from this source has been exploited for centuries. Since the ancient Greeks, farmers have ground wheat into flour using water wheels. A water wheel positioned in a river collects flowing water in buckets around the wheel. As the river moves, its kinetic energy powers the mill by turning the wheels. Hydropower became a source of electricity in the late 19th century. Hydroelectric power plants were constructed at Niagara Falls for the first time in 1879. The city of Niagara Falls began using hydropower in 1881 to power its street lamps. Appleton, Wisconsin, became the site of the first hydroelectric power plant in the United States in 1882. Water can be stored in a reservoir that is controlled by a dam that is opened or closed to control water flow. Hydroelectric plants typically consist of three parts: a power plant where electricity is produced; a dam that controls the flow of water; and a reservoir. An intake in the dam directs water into turbine blades, which turn as a result of the water pushing against them. Turbines produce electricity by spinning generators. Based on how far and how fast the water drops, you can generate the amount of electricity you desire. In addition to long-distance electric lines, electricity can also be transported over a telephone network. Nearly one-fifth of the world's electricity is generated by hydroelectric power. The five largest producers of hydropower in 2004 were China, Canada, Brazil, the United States, and Russia. Three Gorges on China's Yangtze River has one of the world's largest hydropower plants. In 2003, the reservoir for this plant began to fill, but it will not be ready for full operation until 2009. The dam is 607 feet (185 meters) high and 1.4 miles (2.3 kilometers) wide. Electricity is today generated cheapest by hydropower. Once the dam and equipment are built, the flowing water becomes the source of energy. Snow and rainfall are renewable sources of yearly energy. A hydropower can also be easily found. Its flow can be controlled by the engineers to generate electricity on demand. Recreational opportunities are also available at reservoirs, including swimming and boating. Damming rivers can destroy or compromise natural resources such as wildlife. In some cases, such as salmon, some fish cannot swim upstream to spawn. Although salmon can cross dams and reach upstream spawning grounds using fish ladders, the presence of hydroelectric dams disrupts their migration patterns and harms their populations. Low dissolved oxygen levels in the water can also be caused by hydroponically grown plants, harming river habitats.

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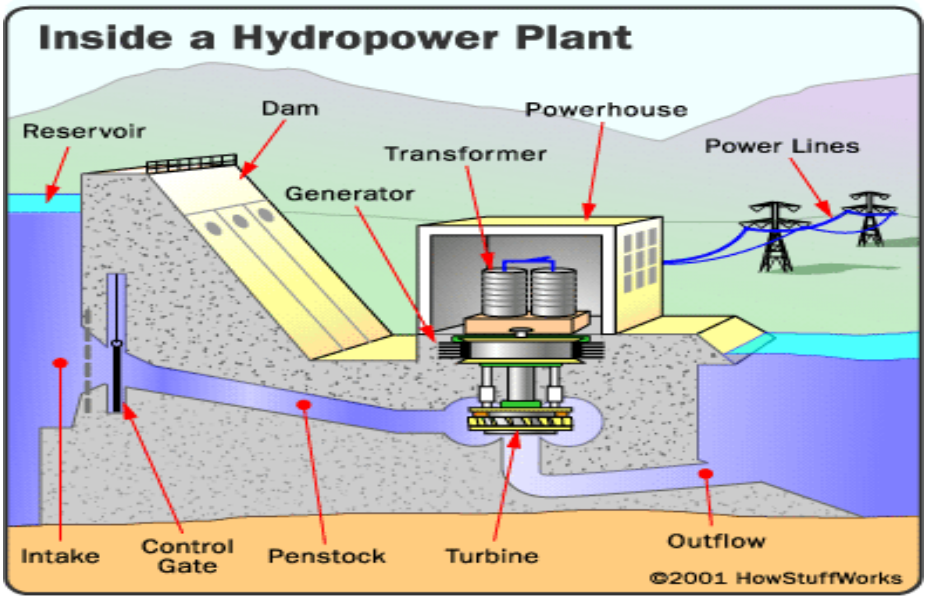

Advantages of Hydroelectricity :-

1. Water flow and electricity output are easily adjustable. When the power consumption is low, the water flow is reduced and the magazine levels are conserved so that when the power consumption is high, the levels are raised.
2. Generating electricity with hydro energy does not pollute the environment. Construction of these massive power plants is the only source of pollution.
3. When dam systems are in use, electricity produced doesn't emit green house gases. The atmosphere is not polluted by them.
4. Water can be used from the lake for irrigation.
5. In addition to generating electricity for many years or decades, dams are designed to last for many decades.
6. A dam can produce electricity at a constant rate once it is constructed.
7. By closing the sluice gate, electricity cannot be generated if the station is not in need of it. In times of high electricity demand, water can be saved and used later.
8. Water sports and leisure activities can be performed in the lake behind the dam. A large dam often becomes a tourist attraction in its own right.
9. When water builds up in the lake, it can store energy until it is needed, when it can be released to create electricity.
10. A renewable energy source is hydroelectric power. There is no limit to what we can accomplish. However, hydroelectric power plants can only be built in a limited number of reservoirs. They can also only be built in a few places where they are profitable.
11. Hydraulic power is extremely reliable. It is not common for the electric power produced by the plants to fluctuate unless it is needed to do so. Hydroelectricity is used as a base load energy source in countries with large hydropower resources. The magazine can generate electricity as long as water is present.
12. Hydroelectricity is much safer than fossil fuels and nuclear energy. The only fuel (aside from water) involved is electricity.

- Hydropower is environmentally friendly. A 22 billion-gallon oil tanker or 120 million-ton coal furnace is not needed as it prevents the burning of both.
- There is no air pollution or greenhouse gas release with a hydropower.
- Hydropower don't leave any waste behind.
- Water resources in Wisconsin have expanded due to hydropower projects, and they support a diverse, healthy, and productive fishery. Hydropower reservoirs catch substantially more game fish than natural lakes. In terms of renewable energy, hydropower leads the way. Renewable energy generates over 97% of all electricity in the country. There are fewer than 3% other renewable energy sources including solar, geothermal, wind, and biomass.
- Several water-based recreational activities can be enjoyed in reservoirs formed by hydroelectric dams, such as fishing, water sports, boating, and hunting water fowl.
- The operators of hydropower projects often provide recreation facilities to their customers, such as boat landings, swimming beaches, restrooms, picnic areas, fishing piers, nature trails, and canoe portages.
- Local economies benefit from hydropower reservoirs. The recreational value of one large hydropower project in Wisconsin totaled more than $6.5 million annually. Water is not 'used' in hydroelectricity, as it is entirely returned to its point of origin after use. As long as a body of water is not depleted, hydroelectric power can be generated 24/7 indefinitely. Moreover, it is another source of energy that is completely clean. In the process of converting fuels into electricity, the plants do not produce any waste byproducts. During times of high demand for power, dams can also close their gates and conserve water.

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Disadvantages of Hydroelectricity :-

1. Power plants are generally expensive to build. This applies to hydroelectric power plants as well. The plant, however, requires fewer workers and maintenance costs are normally low.
2. The construction of dams blocking a river in one country usually leaves the following country with no control over the flow of the same river. Disputes between nearby countries can result from this.
3. Dams built at a large scale can damage the Earth's geology. During the construction of the Hoover Dam in the USA, a number of earth quakes occurred and the earth's surface was depressed.
4. Flooding destroys the natural environment by flooding large areas of land.
5. Dams are extremely expensive to build and must be built to a very high standard.
6. In order to become profitable, dams must be operated for decades given their high construction cost.
7. There must be an evacuation of residents living in the valley to be flooded. The loss of farmland and businesses is severe. People in some countries are forced to leave to make way for hydro-power schemes.
8. Dams today can be designed and planned as well as they can be built; however an older dam has been known to breach (give in under the weight of the water). Flooding and deaths have resulted from this.
9. The natural level of the water table is altered by building large dams. Aswan Dam construction in Egypt, for instance, caused significant changes in the water table. In turn, this is gradually causing damage to many of its ancient monuments, as salts and damaging minerals are deposited in the stone work by the 'rising damp' caused by the changing water table levels. Hydropower has environmental consequences as a result of the damming of rivers, the alteration of water flow, and the construction of roads and power lines. A complex interaction of physical and biological factors may cause hydroelectric power plants to affect fish. There are more users interested in exploitation of fish species, which indicates that this is a field about which many people have strong opinions. Water levels, water velocity, shelter opportunities, and food access all play a role in shaping the habitat of fish. Fish would suffer irreversible damage if they were drained. Further, depending on the type and stage of the fish's lifecycle, the amount of water in a river may have different effects on them. The large fluctuations in flow in unregulated river systems may not be ideal for fish production.
10. Water availability is directly related to how much electricity and energy is produced during droughts. This could be affected by a drought.
11. Limited reservoirs: Hydroelectric power plants have already been built in areas that had suitable reservoirs available. More than 20 major power plants are currently under construction which will produce more than 2000 MW. There have been only two such projects in the past two years. The construction of hydroelectric plants is costly, and they must meet very high standards. Plants must operate for a very long time before they become profitable because of the high cost. As a result of dam construction, land can flood, destroying the natural environment, the habitat of animals, and even people. It is also possible for the construction of hydroelectric dams to cause problems with water access. Those downriver may no longer have control of water flow if a dam is constructed in one location. As the water flows out of the reservoir, it spins a turbine, which in turn activates a generator to produce electricity. A huge dam isn't necessary to produce hydroelectricity. Some hydropower plants only channel the river water through a turbine using a small canal. Power can also be stored in another type of hydroelectric power plant. Powered by a power grid, the generators generate electricity. The generators then reverse the rotation of the turbines, which causes the turbines to pump water from a river or upper reservoir to a lower reservoir, where it is stored. It is necessary to release water from the upper reservoir into the lower reservoir or the river to generate power. Activating the generators with this force spins the turbines forward, generating electricity.

II. RESULT AND DISCUSSION

In many countries, supplying electricity to the growing population creates difficult choices. As a result of climate change imperatives and a shift away from greenhouse gas emitting energy sources, the context for decision-making is also changing. Hydropower is a mature technology that uses the energy flowing from higher to lower elevations. The projects range in size from large reservoirs to small run-of-river projects. Hydropower produces low greenhouse gas emissions, and it is renewable. A range of services are provided by this premium energy source. In addition to base load and peak load generation, other forms of electricity generation, such as renewable energy sources, are supported. Hydropower development has often faced great controversy despite its obvious benefits because of social and environmental concerns. Development of tools that promote good practices in hydropower development, as well as promoting sustainable hydropower projects, has been a challenge for hydropower developers and operators. Financers and development partners have also developed their own approaches. The assessment and guidance of hydropower sustainability have been guided by some convergence. Currently, the hydropower sector is well aware of the sustainability issues that must be addressed, along with how to continue good practices in addressing these issues. Home, office, factory, hospital, and school are all powered by it. Hydroelectricity is relied on by billions every day. Developing countries normally use hydroelectricity as their first option for providing affordable electricity in rural areas. Community members can improve hygiene and education by using hydroelectricity. As China and India's development has grown rapidly, they have built dozens of dams over the past decade. Hydroelectricity, however, is often associated with human suffering. Large hydroelectric dams flood entire valleys because of the massive reservoirs they create. Dam construction could cause many homes, towns, and communities to move.

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