

# Three Gorges Dam Hydro Project

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**Abstract:** The Three Gorges Dam Hydro project is constructed in China which can be regarded as a generation in the power system. The aim of this essay is to introduce the operating principle, present situation and other important things of Three Gorges Dam Hydro project. It also enumerates the typical applications for the development of China and discusses the prospects of developments. We can get the conclusion that Three Gorges Dam Hydro project is of great value in the power system and development after studying these issues

**Keywords:** Three gorges dam; Hydroelectric generation; Electrical power system; Clean energy

## 1. Introduction

With the progress of reform and opening up and the in-depth development of China, energy is more and more important for the modern power system. People need to use electrical energy for their living and industrial production. As a peace-loving country, China should achieve energy in proper ways. Therefore, the Three Gorges Dam Hydro project was put forward. It aims to take advantage of the power in Yangtze River to deal with the energy shortage.

On the one hand, China's energy shortage has been effectively alleviated due to this generation station. On the other hand, the ecological environment, navigation capacity, and flood control capacity near the Yangtze River have been significantly improved at the same time. [1] Foreigners can learn from the experience when the Chinese enjoy the benefits of the Three Gorges Dam. It is very necessary to have an accurate understanding and positioning of Three Gorges Dam Hydro project. This is also the reason for writing this essay.

## 2. Operating Principle

Three Gorges Dam Hydro project is the generation in the power system which supplies power to the transmission. Then, people can use the energy after the distribution. Compared with other generation, Three Gorges Dam Hydro project can provide more energy which is stable and reliable because of the large numbers of generators connected to the grid. The three gorges dam generates electrical power through hydropower. A large amount of water flows into the vortex shell due to the different water level. The large force of water makes the turbine turned at a speed of 75 revolutions per minute. A generator on the same spindle of the turbine rotates at the same speed so that a lot of electrical energy was generated. [2] In simple terms, it converts the potential energy of water into mechanical energy, and then converts the mechanical energy into electricity power.

## 3. The present Situation

As the largest hydropower project in the world, The Three Gorges Dam project consisted of two parts which are known as the diversion and main building. The length of the dam is about 3000 meters, the average water level is 174 meters, the elevation of the dam is approximately 180 meters, and the storage capacity is 39 billion cubic meters in all. With a water capacity of about 23 billion cubic meters, it could withstand the serious flood in very long times. The investment is 135.66 billion RMB. [3] The station used 32 hydropower generators with a total capacity of 700MV. The completion of the station has an especial meaning that the Three Gorges Dam project with a total capacity of 22MV has become the largest hydropower station on July 4, 2012.

However, after the dam opening the gate and discharging the water on, if the power is too large, there would be lots of remaining electricity in addition to satisfying the people's electricity consumption. If using some batteries, a certain amount of electricity can be stored, but the huge power storage device is very expensive. Therefore, a very clever design was brought up---electric energy can be used to pump water back to a high level which can reduce the loss of resources. This is the origin of the pumped storage power station.

## 4. Applications

It is also of great value when it talked about the economic benefits of the magnificent project. The project has a very important position in the middle power transmission system of China. The power generated is transmitted to Jiangxi Province, Hubei Province, Hunan Province, and Henan Province of mid-china power system, Jiangsu Province and Shanghai of the east-china power system, Guangzhou Province, Anhui Province, and Hangzhou Province of south-china power system which can alleviate the shortage of electricity in China. At the end of

the first year, the total power generation of the station is 630 billion kWh. It's about 6 million tons' reduction of sulfur dioxide and 497 million tons' reduction of carbon dioxide. It has made a great contribution to China's environmental improvement.

Historically, the main areas of the Yangtze River and its many adjacent areas were often flooded. Every time a serious flood occurs, the middle area of the river below the uppers need to take flood diversion actions to make sure the land and people of Wuhan is safety. With the finish of the Three Gorges Project, the large capacity provided by the huge storage will ensure the middle area of Jingjiang could go through the terrible floods in long times. Not only it contributes to the comprehensive repair of the Jingjiang embankment, but also it does benefit to treatment of the Dongting Lake. [4]

What's more, the Three Gorges Dam can keep the level of water in the upper areas of the river at 175 meters, and the 10,000-ton fleet through the Three Gorges Ship Lock can directly reach Chongqing.

## 5. Prospects

Hydropower is one kind of clean energy which is renewable, non-polluting, low operating costs, easy to regulate power peaks, and is conducive to improving resource utilization and economic and social comprehensive benefits.

In addition to power generation, the Three Gorges Project is still using its revenue to exploit hydropower resources in the upper areas of the Yangtze River. The state has officially authorized the owner of the Three Gorges Project to invest in the development of other four hydropower stations in the Jinsha River section of the upper areas of the Yangtze River. The total capacity of generation will be further expanded. On the basis of the Three Gorges Dam, more and more hydropower station would be used.

It is undoubtedly of great significance to deal with the energy shortage in the development. It's very necessary to improve the environment, national economy, and the coordinated development. [5] In addition, vigorously developing hydropower projects will help reduce the difference between city and country and improve rural production and living conditions. It will play an irreplaceable role in promoting local agricultural production, increasing farmers' income, accelerating poverty alleviation, promoting national unity, and maintaining social stability.

## 6. Conclusion

Take into account what we have discussed above, we can safely get the conclusion that Three Gorges Dam Project has great and far-reaching significance for China. It alleviates the situation of China's energy shortage and partially improved China's ecological environment. Although the Three Gorges Dam project is not perfect, China still made it a miracle. It will meet China's development needs for a long period of time due to the increaseable generator capacity. China has set a good example for many countries to solve energy shortages. It will continue to contribute to China's future development.

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