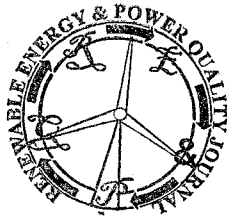


Optimization of the electric power generated by a brake of water

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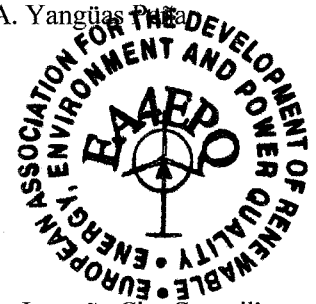


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Abstract. This article shows a new method designed to predict and optimize electric power generation by means of water control.

It is about optimizing the sustainable use of the hydroelectric resources within a basin. Although, the primary purpose of the extracted water is not exactly for energy generation, but for the purpose of obtaining drinkable water to for human consumption.

This use implies that only the water to be used needs to be processed, therefore treatment costs are minimized and the ecological conservation of the fluvial basin is of maximum importance.

To predict amount of electric power to be generated, the demands of the consumers consumption and the cost of the maintenance of the water-treatment plant, are taken into account.

In order to guarantee water supply to the population, there is an intermediate deposit, the level of which should always be regulated above minimum capacity to guarantee water supply at all times in the event of mishap or accident.

Key words

Hydraulic energy, prediction of the generation, optimization, sustainable development.

1. Introduction

On some occasions the use of the hydrological resources is not produced at the same level as the extraction of those resources.

This difference in level implies an energy potential energy that can be substantial at times, that should be added when the difference is negative or extracted when this energy is positive; in the latter case, if it is not extracted from the water it can damage the processing facilities. This "stopping" of the water can be achieved by using a valve, or alternatively, by a process of energy transformation. This latter process can be implemented by means of a Small hydroelectric power station, provided the heights and flows allow it.

This latter process is the cape at Logroño City Council's Treatment of Drinking water plant (ETAP). Here, prior to the treatment of drinking water, the water is "stopped" by means of a Small hydroelectric power station to the network.

After this, the water is Purified and it is stored to guarantee water supply for human consumption, even in the cape of mishap in ETAP. But it must also be remembered that water storage over an excessively long time can be detrimental to its properties and the management of resources should be considered.

The current philosophy of water usage is based on the extracting only what is needed from the river bed. This way when the volume of the stored water descends below a minimum, which guarantees a reserve time, the flow of water into the water plant is increased manually and when the volume increases, the flow is decreased. This means that an estimation of water consumption is not based exactly on a prediction, but rather it is based on the evolution of the intermediate deposit and on the experience of the technicians.

If water consumption is estimated an forecasts it would be possible to spin this volume of water based on the optimization of the energy production or of any other factor. This project is centred on looking for the production of maximum energy, for a given volume, studying the factors that intervene in electric consumptions as well as the productive process as in the generation of electric power itself.

2. Work methodology

In order to achieve an optimization method it is necessary to have assessment models for resources and consumptions.

Resources depend obviously on the water in demand[1] and the management capacity of storage.

As regards the volume demanded, it doesn't only depend on the time of the year, but also on human consumption as a social factor[2]. This latter factor habits and even