

Power transforming in isolated Hydro Electric system

Jan Lorenz Svensen¹, Lasse Bang Dalegaard¹

¹DTU Electroengineering, Technical University of Denmark

INTRODUCTION

Hydropower is an interesting technology, which can be used to store water, for later transforming it to energy, which can be used for example in ones homes. All over the world, there exist large installations where water is stored in a reservoir, and are used when needed; such installations can be dammed water or pumped-storage.

The amount of energy that potentially can be stored in these pumped-storages is large, and the effect can be up to 87%, and some places have seen peak power up to 4 GW². The water is supplied potential energy through for example wind power and a pump, when the water drops down again, over a turbine, it creates electric energy.

PROJECT

The theory/idea behind this project, is that by pumping water up to a given height, by using green technologies, for example wind or sun, we can save electric energy on to the time, where the other technologies doesn't produce enough electricity to supply the users.

In this project we focus on the part of this process, where the water have been transformed to electric energy again, but this electricity doesn't necessarily have a voltage of 230V, and frequency on 50Hz, without those properties, it could be dangerous to supply to a normal house

Besides this, the project also is about controlling the amount of used water.

METHOD

The method that will be used, is first transforming the electric three phased AC output of the turbine generator, to single phase DC, using rectifiers.

By using a capacitor as a bank, the DC is kept more stabled, where after the voltage is bucked down, to the final voltage, and here it should also have been made into 50Hz AC, but because of problems with time, and with economy, this part has been replaced with an inverter, so the final voltage is the required input of the inverter, which in return give us 230V at 50Hz AC electricity.

The water which is sent to the turbine, is controlled by the amount energy in the capacitor bank, through a regulator system.

REFERENCES

1. Hawaiian Electric Company, hentet 2012-02-24 T 18:44 GMT+1, <http://www.heco.com/portal/site/heco/menuitem.508576f78baa14340b4c0610c510b1ca/?vgnnextoid=94600420af0db110VgnVCM1000005c011bacRCRD&vgnnextchannel=ab020420af0db110VgnVCM1000005c011bacRCRD&vgnnextfmt=default&vgnnextrefresh=1&level=0&ct=article>

RESULTS

Because this project is part of course 31015, Introductory project – Electrotechnology, the project isn't finished at the given time, put will be finished before the end of the competition in June.

So far we have designed, and gotten hold on the parts we need, so we only have to build and test the project

CONCLUSION

This project doesn't directly produce green energy, but makes it possible for small energy sources to save the unneeded energy, and use it, when needed, plus the project relies only on well-known technologies, which makes it realizable.