

## Project details

### Development of a hydropower plant in Cameroon awarded

16.02.2015 By: Prof. Georg Scharfenberg

The green electricity provider Enspire honors the development of a micro hydroelectric power plant by students of the Faculty of Electrical Engineering and Information Technology at the Ostbayerische Technische Hochschule Regensburg (OTH Regensburg).

Justus Hofmeister and African project students of the NPB setting up the water intake.

For more than three years, a team of bachelor students has been working on the development of a hydropower plant for rural areas without electricity supply in Africa (Cameroon), either in their practical semester or with a thesis.

The project was brought to the university by the organization "Engineers Without Borders" and has a place in the BiSP lab (Biometric Smart Pen) and machine laboratory under the supervision of Stefan Krebs (Engineers without Borders) and Gerald Schickhuber (Laboratory Engineer OTH Regensburg) found.

### Open Source Thought

The jury appointed by Enspire particularly valued the open-source concept, which aims to teach the construction and installation of the turbine in Cameroon at a vocational school so that the local young people are able to create and maintain the hydropower plant as a complete system with watercourse, mechanical construction and electrical connection.

Important here was the good preparation, which focused on the use of locally losable materials and the production of the turbine on site. To this end, students from OTH Regensburg have already been to Cameroon in recent years and studied the conditions on site.

Currently, Justus Hofmeister, a student in his internship semester, and Stefan Krebs are in Uganda to assemble a first turbine from individual parts on site at a school near Bamenda together with the teachers and students and to install the small hydropower plant in a stream. The team at the OTH Regensburg has prepared extensive documentation for the technology transfer. The first micro hydropower plant for the generation of electrical energy with an output of 250 to 300 watts is to go into operation in the spring, so that the electricity requirements of small residential units can be covered.

The Enspire Award 2014 was presented to Engineers Without Borders at the end of 2014 for the so-called WIL 250 project. As a project partner of the project, OTH Regensburg is supported by the National Polytechnic Bamenda (NPB) in Cameroon.

## Water is Light

### The Water is Light Project

Water is Light is a project in cooperation between the University of Applied Sciences Regensburg (Faculty of Electrical Engineering and Information Technology) and Ingenieure ohne Grenzen e.V. (Regionalgruppe Regensburg). Originally, the project was initialized by GREEN STEP e.V. in the year 2010. The purpose of the project is to develop pico hydro turbine systems for developing countries. The design is adopted to a not-industrial manufacturing with avoidance of complex machining and maximum use of local material. Thus we see the product as a vehicle to teach, train and to motivate people to start their own business. Target is to support organisations like Vocational Training Centers or Technical Schools in order to multiply the knowledge.

### Background of the project

The origin of the project is based on the fact that in many rural areas in many countries of Africa and other developing countries worldwide sufficient electricity supply is not present. In addition the costs of fuel for power units are very expensive. However, in many countries water power often in form of small rivers is available, which would enable a constant electricity supply for few houses or a village near these rivers. For this reason the aim is to develop an open source and “do-it-your self” low power water turbine, requiring a flow rate of approximate 30 liter/sec and a water head of 2m. Also one goal is that the components of the turbine are available in the developing countries or can be imported easily. With these precondition we hope that we are able to contribute zu the concept “help for self-help”.

### Cameroon Water is Light

A micro hydropower plant is to supply people in rural Cameroon with electricity. In addition, training courses on renewable energies are held on site. Partner Organization: African Center for Renewable Energies and Sustainable Technologies (A.C.R.E.S.T.), OTH Regensburg

Project Phase: - Planning phase - Implementation phase - Completed

Total budget: ca. 45.000,00 Euro Location: Cameroon Project period: 06/2011 until 12/2023 Topics: Renewable energy Sustainability goals: (UN SDGs)

Project Management: Engineers without borders

Leaflet | OpenStreetMap contributors



### Project goal

According to the World Bank, only 56.8% of the Cameroonian population had access to electricity in 2014. In rural areas, the figure was as low as 22.1 %. A locally producible, inexpensive system that can be built, operated by trained specialists and A maintenance-free micro hydro turbine for electricity generation can help. With the help of local partners, we train turbine builders and maintenance workers who install the turbines as micro-entrepreneurs in those areas where they are most needed. We support village communities in Electrification through technical training and advice and arrange for craftsmen\* trained by us to plan, install and maintain the systems. In accordance with the principle of helping people to help themselves, our project is advancing electrification in the country's rural regions and ensuring a sustainable improvement in local living conditions.



### Project description

Hydropower offers a constant, efficient and environmentally friendly possibility of energy generation and causes only low costs. In order to use this possibility of energy generation in the partner countries, the micro hydropower plant WIL (Water is Light) was developed and tested by Engineers without Borders as a research project together with the Ostbayerisch Technische Hochschule (OTH) Regensburg and Green Step e. V. in Germany.



The WIL consists of a propeller turbine directly connected to a generator. It is designed in such a way that it can be produced by local specialists from locally available materials and with existing technology at a low price.

The WIL 250 is to be used primarily by private households without access to electricity. The plant can be used along streams and small rivers to generate enough electricity for smaller village communities. Only with the creation of local expertise and knowledge about (environmentally friendly) technology on site can sustainable development become possible. This includes above all training and knowledge transfer in renewable energies and other environmentally friendly technologies on site. This is not about duplicating European knowledge, but about developing technology and know-how adapted to local conditions

#### **Milestones so far**

A first fact-finding mission took place at the beginning of 2014. The implementation phase for WIL technology transfer followed at the beginning of 2015 and was successfully implemented. Training on turbine construction and installation was carried out as planned.

In September 2017, a successful turbine construction training was held with our partner A.C.R.E.S.T., a research, production and training company near Mbouda in rural northwest Cameroon. In spring 2018, the installation of the first demo turbine, could take place. In the fall of 2018, the pilot phase began. For this, a team of Engineers Without Borders together with the village community and our project partner laid the foundation for the supply of a village. During the pilot phase, the turbines could be optimized in terms of technology, materials, tools and construction instructions, and the durability of the turbines could be tested. The work on the pilot

sites and the electrification of the village was driven by two local workers who had been trained for this purpose beforehand.

For this purpose, they receive support and advice from the Regensburg regional group. The maintenance of the demo turbine and the collection of data are also part of their remit. This phase was completed at the end of 2018.





After the completion of the handbook, a manual for the construction and operation of the WIL system, the next steps will follow. The aim is to find further partners for the training of craftsmen in Cameroon and the dissemination of the turbine system. After technology transfer in the form of training, these partners should be able to independently explore suitable locations for the system and advise local village communities on electrification. If interested, the partners then organize the tradesmen and oversee the installation. The regional group provides support for the training courses and, if necessary, for start-up financing.

The training for the partners covers not only the technical aspects of the turbine, but also business aspects to ensure sustainable financing of the maintenance and, if necessary, repair of the system after commissioning. Important are also the social aspects like the distribution of the available energy and the electricity costs. With the revenues the maintenance of the system should be secured in the long run and in the best case also the financing of other things in the interest of the village community should be made possible.

For the search of the partners and craftsmen the regional group engages itself voluntarily. For the training of the partners and the training of the craftsmen on site we need your support and thank you for your donation

!Do you have any questions? Then contact us!

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