

## Tests and experiences

### Project small business development



Location: e.g. Buea/Cameroon Target group: local artisans Period: since 2017  
Partners: — Status: ongoing

Under the term small business promotion, we summarize several projects that have resulted from the activities of the “School for Renewable Energies and Environmental Technology” (HOTPEC). Starting a business is always a step with many hurdles and uncertainties. We support young entrepreneurs, among other things: – In imparting commercial knowledge (business plan, operational management) – Support when starting your first own projects – Planning and procurement of materials – Financial support in the start-up phase We are currently promoting Loius Che Bame. He completed his engineering studies with a bachelor’s degree at the University of Buea and now wants to start his own company in the field of renewable energies. GREEN STEP would like to support Loius on his way. Already in 2010 GREEN STEP had the development of a very easy designed micro hydroelectric power plant to generate electricity, which is now available as ‘WIL-Water is light’. Loius already has experience

with hydropower. Our support is therefore initially focused on the construction of the WIL in craft businesses and their installation with the aim of supplying remote villages with basic energy. The project is divided into three phases: Phase 1: Training: Construction of a WIL turbine and proof of quality through testing Phase 2: (optional) Implementation of a self-cleaning rake Phase 3: Search of 10 sites for WIL implementation

First, a brief overview of WIL: The micro hydroelectric turbine was developed in a cooperation between 'Engineers Without Borders' and the OTH Regensburg developed. The goal is to get one with the water turbine to enable independent power supply in remote areas that are not connected to the public power grid and thus improve the living conditions of people in the Global South. With electricity, it is possible for families to have light and charge devices even after sunset. The focus in the development of the water turbine is to make the construction as simple as possible, but still effective, so that production can take place on site without any problems. The instructions are freely accessible.

Loius is now working on his first water turbine. He can work in a workshop in the Yaounde area. He buys most of the components locally. However, some components are difficult to obtain, such as the necessary magnets. We sent this to him. So Loius is in the first phase of the collaboration.

Status April 2020 Of course, a lot has happened since the beginning of the project. Here is a brief overview: The project was planned to be divided into three phases: Phase 1: Training: Construction of a WIL turbine and proof of quality through testing Phase 2: (optional) Implementation of a self-cleaning rake Phase 3: Search of 10 sites for WIL implementation

Loius has already built his first water turbine. Unfortunately, Loius was not able to determine the quality of the turbine on a test stand. However, the individual steps in the workshop were supervised by our member Stefan Krebs. Stefan has a lot of experience in building the WIL and was therefore always able to support Loius. Phase two is considered optional and we initially skipped it because there is currently no possibility of a test stand. If the WIL is successfully implemented, it should be considered whether the second phase should then be tackled again. So Loius is now in the third phase of the collaboration. Unfortunately, Loius initially had bad luck when looking for a location. In two trips in October last year and in January this year, he found two suitable locations in Nsana and Ze. Loius wanted to start with the first installation. However, as time goes by, more and more problems arise with the villagers as well. There is disagreement in the village and Loius is even threatened. These developments have prompted us to recommend Loius to look for another location. In mid-March, Loius finds a new location in the southern region of Cameroon. The villagers are very cooperative here. The topography with small waterfalls and short distances from the installation sites to the village offers the best conditions as a location for WIL. Here, after a long search, Loius can finally begin to install the first WIL. As of March 2022 The place that Loius found as the new turbine location is called 'Mbikiliki. It is located in southern Cameroon along a river. About 30 houses form the center of the village. The village community would like to finally have electricity in the village and, in contrast to the last location, is united behind the Loius project. Influential personalities also want to invest in their home village. For Loius, this now

means he can install his first pilot plant and show the villagers that his concept works: The river carries water all year round. In this way, the system can be supplied with sufficient water even in the dry season. In the rainy season, however, the river becomes a torrent and large areas are flooded. The hydraulic structure must therefore be robust and stable and function for the dry and rainy seasons.

Before the water reaches the water turbine, the river diverts it into a floodplain area. This also serves as a sand settling tank. In order to make the hydraulic engineering as robust as possible, Loius built stable retaining walls at the fork in the river. A 40m long pipe leads from the flooding area to the turbine. The turbine is located 2.5 m above the river course via this protected inlet. Space for another turbine has also been planned here. The two turbines should then run in parallel and together the turbines should deliver an output of around 500 to 600 W.



Another challenge is grass, leaves and other debris that can clog the turbine inlet. A self-cleaning Coanda rake was developed in two bachelor theses at the OTH Regensburg. With this rake, the leaves and grass are washed away by the overflowing water and 'cleaned' water can flow into the inlet channel of the turbine. Loius was able to build the rake and initial tests showed that the rake reliably protects the turbine. Much of the grass is washed away. The few grasses left in the rake can be easily removed.







We sent Loius some material and building instructions from Germany. So he was already able to set up a load controller. A load controller is necessary to generate a constant mains voltage (220V/ 50Hz). After the latest software updates, it is ready for use. At the end of November it will be done. The system is running! In the next step, Loius will now demonstrate the system in operation to the villagers and decision-makers. The dream of electricity in the village is getting closer and closer: For the first time, it may be possible to hold a meeting in a square after sunset with electric lighting. Flashlight and mobile phone batteries can be charged. Greetings, music and perhaps a video from the national soccer team's last game can be experienced together. Everything like us. Just as the needs are so similar to ours - only real for the first time in Mbikiliki.