University of Applied Sciences and Arts Northwestern Switzerland

Project report

Implementation and knowledge transfer for a new water supply system in Ethiopia

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Project 4 Energy and Environmental Technology (FS 2016)

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Management summary

Water shortages have been an important subject to many charity associations, among them Elfinesh, the client of this project. Elfinesh's activity is to improve the lives of people in Gurage, a region in Ethiopia, which is located 250 km south of the capital Addis Ababa. Over the years Elfinesh built kindergartens and a water supply system, which pumps groundwater from a depth of about 100 meters. The technical performance of the current system is neither economical nor sustainable, because it is run by diesel generators. However, diesel is very expensive in Ethiopia.

This is a continuation of a previous project. The task of the first project was to develop various possible technical solutions with renewable energies to replace the current system. This semester's project's tasks are about the implementation of the new system and to dimension it for conditions of Gurage. Additional to that, the knowledge should be transferred to an Ethiopian student, who will be working on the project and install the new water supply system. The project is divided in three following parts.

Technical Concept
The previous project generated ideas of several possible technical solutions. Now was the task to dimension the facilities. The new calculations dimension a photovoltaic plant of 41 m^2 at the school with 5.5 kWp and one of 60 m^2 at the Elfi-House with 8kWp for power feeding, larger water tanks of 13 m^3 at the school and 31 m^3 at the Elfi-House to overlap days with not enough sun radiation and a backup battery of 3 kWh at both locations to bypass cloudy days. For the dimension a calculation tool was programmed.

Implementation and Knowledge Transfer
The first goal was to create a detailed stakeholder analysis of all concerned stakeholder in Ethiopia as well as Switzerland. In addition to that, the project of installing the new water supply system has been divided into four different phases. For obtaining more detailed information, interview questions have been brainstormed for each project phase. To compile all information about situation in Ethiopia and to scrutinize possible technical solutions, one team member traveled to Ethiopia. The insight of the culture, Interviews with villagers and inspections of the current system helped to finalize an implementation process diagram.

Financing Methods
For the financing concept a purchase order monitoring concept was prepared for the materials which are needed for the new water supply system. Additionally, different financing methods were evaluated and a manual for the best method was created. In the future, Elfinesh can use it for raising funds. Elfinesh should revise their webpage as soon as possible to reach more interested investors. A proper presence in different social media platforms helps to acquire new supporters for the association. The analysis of the financing methods showed that the best option to raise money for the implementation of this and future projects is to use a crowdfunding on one of the platforms called 100-days, Indiegogo, or Leetchi.

A photovoltaic plant in addition to a battery and an underground storage tank are the best technical as well as financial solutions. To replace the old water supply system Elfinesh depends on donations, which will best be generated by the method crowdfunding for collecting easy and fast donations for the substitute procedure. The implementation process diagram serves as support for the Ethiopian student when he will begin to establish the new water supply system