



Context

Mélanie Grondin, Fred Elisma and I (Ismaël Aduayom) are travelers. We all travelled in several developing countries and each of us witnessed this dramatic reality: the lack of safe drinking water and the unreliable electric power network in these locations. It was imperative to act and create a simple and reliable solution to mitigate the water shortage issue and the electric power grid. We connected 20 years ago in a Science lab at the University of Quebec at Montreal.

The COP21 agreement was not yet enforced but global warming as becoming obvious. Carbon footprint of human activity (electric power generation and water treatment was already an issue) is becoming a major issue when considering human demography. Water re-cycling is necessary in the face of climate change: to combat water scarcity and global warming.

Expertise

Mélanie Grondin was working on persistent, bioaccumulative and toxic substances, a problematic issue to deal with. I was working on heavy metal toxicity related to the intestinal absorption and Fred Elisma was reorienting his expertise in Bioinformatics. He designed a website to enable technology transfer to small and medium business interested to build up the technology locally. Since I had studied global warming mechanisms during my graduate study, I was the match that produced the spark that became a shared passion.

The project: from science to technology

Step 1: the proof of concept - 3 years

The project drew inspiration from various sources. From nature, we observed how solar refraction in water droplets initiates severe burnings on plants under the sun and learned how we could use this effect to harvest solar power and efficiently use it to produce electric power and drinking water at the same time. From science, we reviewed technologies of the past that are well mastered and imagined how we could use them to design a breakthrough technology that does not necessitate very expensive tools and high skills to be implemented at a local level. The innovative technology provided by the LFree project allows to get free from costly sewage treatment plants. It fights against the rural exodus, and water scarcity by recycling wastewater on site. The proof of concept has been established using a weak solar flux in Paris. It enabled steam production under a solar flux of 800 W.m^{-2} . This is how we decided to create the company [Bio-S-TEAM](#).

Step 2: The construction of an operating prototype (current stage) - 1 year

Since the proof of concept has been established in France where the solar flux is not sufficient but allowed experiments to establish the proof of concept. A scientific publication will be released soon as the parts of the prototype are working independently. Now, we need to assemble every part and make them collaborate together. In this purpose, we need to move the company from France to Spain where the solar flux allows good environmental and scientific conditions to operate in real situations. As a consequence, we need to move at the [CENTA](#) facilities in Sevilla (Spain). We plan to compare contaminated water and treated water to check that, as expected, persistent substances are broken down by the solar energy and that the water is purified.

Patent applications will be submitted to protect the market from large companies able to control the price on the market. However, Small and medium enterprise will be allowed to use the technology as an open source project.

Step 3: The construction of the device in Ghana – 2 years

As soon as the scientific results demonstrate that the technology is able to provide safe drinking water and electric power from solar energy and wastewater (while reducing fossil fuel consumption), Bio-S-TEAM will transfer the technology to a company working in the field of the social and solidarity economy based in Ghana to build up the final product and receive a technical training. The goal is to build-up an automation system able to manage the solar tracking, switch to the use of another energy system when necessary, handle energy and water storage and distribution.

This step will also enable to check how much fuel the technology can save and how much GHG emission is prevented from being emitted.

Step 4: Business development in South Asia, America, South Europe and Australia

As soon as the automation system is fully implemented, able to handle smart grid communication protocols and use cryptocurrency for trading energy and water, the commercialization will become worldwide.

To get more information, please [click here](#) to watch the video