

3.2. Powering Agriculture Impact

Powering Agriculture has continued to have a positive impact as the Innovators continue the field testing of their clean energy solutions and some of them scale up and start selling commercially.

The following are the results reported in FY 2016 by 23 Innovators implementing in 15 countries¹.

¹ This data has been self-reported by the Innovators and reviewed by Powering Agriculture, with the exception of African Bamboo and ECO Consult who did not report any data.

During Fiscal Year 2016:



- **14** clean energy solutions have been developed (clean energy technology and/or business models)
- **65 kW** of clean energy generation capacity was installed
- **385** clean energy systems have been deployed (in Africa, Asia/Pacific, Latin America and Middle East)
- **190** tons of CO₂ equivalent has been reduced as a result of Powering Agriculture field activities



- **6,889** farmers and households have benefitted from Powering Agriculture funded clean energy solutions, **1,968 of which are women**
- **336** local professionals, **35 of which were women**, became accessible to the end-users of the clean energy technologies



- **594** people have been trained on operation and/or maintenance of clean energy systems, **94 of which were women**
- Nearly **22,000** people attended demonstrations on clean energy systems funded under Powering Agriculture
- **Approximately 7,500 women** have increased their knowledge of clean energy by attending demonstrations on clean energy systems funded under Powering Agriculture



- Approximately **USD \$1.4 million** of additional net income had been raised by the farmers using the Powering Agriculture funded clean energy solutions
- **USD \$4 million** in additional funding was mobilized from public and private investments as a result of Powering Agriculture

3.2.1. Impact on Beneficiaries

The following stories show how farmers' lives have improved due to the innovations being implemented in their countries.

BIOGAS-POWERED EVAPORATIVE COOLING FOR THE DAIRY INDUSTRY

UGANDA

SUCCESS STORY

INNOVATOR: UNIVERSITY OF GEORGIA
RESEARCH FOUNDATION



Mrs. Jemba, a smallholder farmer, and her UGARF milk chiller.

Mrs. Lidia Jemba is a smallholder farmer in the Namayumba region of Uganda that received one of the UGA milk chillers as part of the pilot program in February. She uses the chiller to chill both her milk and milk from nearby neighbors for a small fee. Mrs. Jemba's husband recently suffered a serious health issue and he has frequent doctors' appointments and associated medical bills. The additional income from the sale of the evening milk has helped the family afford to go to all of the appointments. Prior to the additional income from evening milk sales, he had to skip some appointments due to the family's limited finances.



MICRO-SOLAR UTILITIES FOR SMALL-SCALE IRRIGATION

SENEGAL

SUCCESS STORY

INNOVATOR: EARTH INSTITUTE AT COLUMBIA UNIVERSITY



Ousmane Diop surrounded by the crops irrigated by pump powered by the solar array seen in the background.

Ousmane Diop resides in the farming community of Gabar, Senegal where he is the president of the Gabar Irrigation Co-op. The area has been experiencing droughts and decline in aquifer levels, forcing the farmers to invest in drilling deeper boreholes to reach the groundwater. Ousmane cultivates 0.2 hectares of land on which he grows peppers, cabbage, carrots, onions and corn. Prior to using a solar powered pump installed by Earth Institute, Ousmane used a diesel powered pump which cost him 1,200 CFA/day (\$1.97) in fuel. Before that, he spent 8 hours a day irrigating his crops with the help of his family by transporting water from a well by hand using rope and a bucket.

He now runs the solar pump for 3 hours a day with minimal supervision. The free time he has gained from using the solar pump has allowed

him to go to the village for business-related activities and see his parents more often. His wife now cultivates her own small plot since she no longer needs to spend as much time assisting him in the field. By switching from a diesel fueled pump to a solar pump that he pays for on an hourly basis Ousmane has been saving about 4,500 CFA/month (\$7.39) during the months when it does not rain. His vegetables have improved in quality due to the avoided pollution previously produced by the diesel generator and due to his crops being irrigated more uniformly. At present, all vegetables are priced the same on the market, regardless of their quality, but Ousmane hopes that in the future he will gain more income from selling higher quality produce.

SOLAR-POWERED PUMPS FOR IMPROVED IRRIGATION

HONDURAS

SUCCESS STORY

INNOVATOR: INTERNATIONAL DEVELOPMENT
ENTERPRISES (IDE)



“iDE no solo está en la parcela, si no que en el uvazon de cada uno de nosotros”

“iDE is not only present on our land, but also in our hearts”

—Dona Linda Pérez-Manvelez

Dona Linda Pérez-Manvelez and her son Mario Pérez on their organic farm with their solar pump.

Dona Linda Pérez-Manvelez and her family live in the middle of a coffee-producing area of Marcala, Honduras. They run an off-grid, organic farm growing coffee, vegetables and raising animals and provide training to nearby farmers on how to grow coffee organically. Before using iDE’s solar pump, the farm used a human-powered treadle pump to bring water up from a nearby river and relied on a body of water lying above their land that dried up 2 years ago. Due to the solar pump’s portability, Dona’s family uses the solar pump for two applications - to transport water from the river and to pump that water into two large water tanks.

The solar pump has enabled Dona to double the size of her cultivated land from 175m² to 350m² and buy 20% more domestic animals, which rely on the drinking water pumped from the river. It has also eliminated 3 to 4 hours of daily manual labor, primarily done by Dona’s son Mario, who has since been trained on operation and maintenance of the solar pump by iDE’s in-country staff and has become employed as a regional technician attending to the nearby end-users of the solar pumps. The solar pump has also brought in an additional 9,000HNL (\$402) of annual income from the farm growing the high value tomato crop.

“If we have solar, the we don’t have to use human force. I am very excited. We can have time to do other things... I think it will lead to more money and a better life”

—Herminia Gutierrez, coffee farmer benefiting from iDE solar pumps and slow-drip irrigation in Honduras

SOLAR-POWERED REFRIGERATION FOR DAIRY FARMS

KENYA

SUCCESS STORY

INNOVATOR: SUNDANZER



Suzanna Nyaywia has benefitted from SunDanzer's solar milk refrigerator.

Suzanna Nyaywia is one of few female dairy farm operators in Nyandarua County, Kenya. She runs a medium sized farm which produces 90 to 140 liters of milk a day, depending on the season of the year. The farm is located 2 kilometers from the national grid and does not have access to a diesel generator, so the milk that is produced in the afternoons is cooled with the water from a nearby river. This method was often not sufficient, resulting in 80 to 120 liters of milk being rejected by the dairy cooperative due to bacterial growth every week. The rejected milk was then given away to the farm workers for free.

The solar refrigerator piloted by SunDanzer has allowed farms to chill 30 to 40 liters of evening milk every night and sell it to the dairy cooperative the following morning. As a result, the number of milk rejections have gone down, which, in return, has motivated the farm to invest in more cows. Since the solar refrigerator installation they have doubled their herd and with the additional income have been able to purchase supplementary cow feed, which has increased individual cow production by 3 liters of milk a day. Subsequently, Suzanna has benefited from a salary increase, which she used to pay for her children's school fees.

REDUCING MILK SPOILAGE THROUGH SOLAR-POWERED CHILLING

INDIA

SUCCESS STORY

INNOVATOR: PROMETHEAN POWER SYSTEMS



Dairy Collection Center Operator S. Ambika (left) weighs milk brought in by a dairy farmer (right).

S. Ambika has been a dairy collection center operator for 7 years. She is the main operator in her wife-and-husband team operating one of Hatson Dairy collection centers in Manjemadu, India. Prior to Promethean having installed a grid powered milk chiller, the operators had to transport the collected milk to the nearest chilling center which was 8 kilometers away two times daily. By the time they would reach the facility one 40 liter can would be rejected due to bacterial growth.

Since the installation of the new milk chiller, the collection center expanded their opening hours from one hour in the morning and in the evening

to 2 hours in the morning and 4 hours in the evening. As a result, more farmers can reach the collection center in time to sell their milk. The number of visiting farmers had doubled and the daily quantity of chilled milk collected by the center grew from 610 to 1,530 liters. Two farmers encountered at the center said they have purchased 2 additional cows each because the chiller guarantees them access to the organized dairy value chain into which they can sell their milk. One of the farmers brings double the quantity of milk as before, earning additional \$72 a month. Another farmer sells 50% more milk than before, which has increased his monthly income by \$67.

SOLAR-POWERED PUMPS FOR IMPROVED IRRIGATION

NEPAL

SUCCESS STORY

INNOVATOR: INTERNATIONAL DEVELOPMENT
ENTERPRISES (IDE)



Members of Janachetana Farmer Cooperative in Kailali District in Nepal react positively to the solar pump installed by IDE to irrigate their plots.

Janachetana Farmer Cooperative in Kailali District of Nepal consists of 25 members who are primarily women. The cooperative leases small sections of its 0.17 hectare plot to group members, who mainly grow cabbage, tomatoes, cauliflower and cucumbers. The cooperative allows women to take loans on various agricultural inputs and gives an additional source of income from the crops grown on these plots, on top of the profits gained from their larger, family-owned land.

The group received IDE's pilot solar pump to field test in the spring of 2016. Previously, the members used a hand pump and buckets to water the crops. Since the installation the cooperative members report a 10-15% yield increase and no water shortages, which they used to encounter with a hand pump. They like that they no longer have to spend time on manual labor and find the pump's design to be beautiful.

SOLAR-POWERED PUMPS FOR IMPROVED IRRIGATION

ZAMBIA

SUCCESS STORY

INNOVATOR: INTERNATIONAL DEVELOPMENT
ENTERPRISES (iDE)



Miriam and Edward Lwabila have benefited greatly from iDE's solar pump. Their children are no longer hungry, have 3 meals a day as opposed to one, and perform better in school due to their improved concentration.

Miriam and Edward Lwabila live on a farm in Chibombo, Zambia with 4 of their children, where they grow onions, cabbage, corn and peppers. In July 2015 they received a portable solar pump from iDE which has changed their lives dramatically. Prior to the installation of the solar pump, the family used a treadle pump to irrigate their land and irrigated with buckets using the water from their well before that. The laborious watering methods took 6 hours a day, with their children contributing additional 2 to 3 hours of their time each. The family was able to cultivate only 10 basins and all yielded produce was consumed on-farm.

The arrival of the solar pump has enabled the family to expand their cultivated land to 40

basins and sell 90% of their crops to a nearby market through traders that come to them. Not only has their yield increased from 1-2 bags to 3-10 bags a week, the improved quality of the produce has prompted a 50% increase in unit price asked on the market. With the increased income, the family has invested in their own business shop, school fees for their 4 children, and was able to purchase a car this year. The diet of the family has improved as well to include higher value vegetables, fish, more meat and soft drinks and the children eat 3 meals a day, as opposed to one. Miriam proudly shared that her children's school results have shown improvement because they are able to concentrate better due to no longer feeling hungry.