Innovator Mini Profiles

About PAEGC

The Powering Agriculture: An Energy Grand Challenge for Development (PAEGC) initiative supports the design and expansion of sustainable business models that link clean energy enterprises with farmers and agribusinesses in developing countries. This is achieved by providing grants ($500,000–$2,000,000) to organizations to design, pilot and deploy clean energy solutions to different points along the agricultural production cycle—from obtaining agri-inputs, planting, irrigation and harvesting to processing, transportation and storage. The winning Innovators were selected through two separate competitive global calls for proposals. In 2013, 11 Innovators were selected from 473 organizations and 76 countries. In 2015, 13 innovators were selected from 871 organizations and 99 countries. The United States Agency for International Development (USAID), the Swedish International Development Cooperation Agency (SIDA), the German Federal Ministry for Economic Cooperation and Development (BMZ), Duke Energy, and the Overseas Private Investment Corporation (OPIC)—collectively, the “Founding Partners”—have combined resources to fund PAEGC.


2013 Innovators

Organization (country of implementation)

African Bamboo (Ethiopia): African Bamboo is a forestry, wood, and bio-energy company located in Addis Ababa, Ethiopia, among Africa’s largest reserves of bamboo. African Bamboo develops innovative applications for bamboo, particularly for industrial and commercial uses. African Bamboo is developing an environmentally friendly bamboo thermal modification process called ThermoBoo. Over the past two years, African Bamboo has completed the system design and engineering for the thermal modification facility. Remote-sensing technology has been utilized to take stock of the bamboo resources available in the project area. Thirty farmer cooperatives (more than 2200 farmers) have been established in order to give small-scale farmers a voice. An additional 50 farmers have been added as bamboo suppliers.

CAMCO Clean Energy (Benin, Tanzania): Camco Clean Energy is experienced in providing rural electrification through solar, biomass, small hydro, and biofuel technologies, addressing traditional charcoal production and consumption. Camco co-implements activities with Village Industrial Power (VIP)—a firm that specializes in the development of innovative biomass fueled co-generation plants. VIP steam plants are powered through the combustion of biomass waste produced at local agricultural processing facilities. The VIP Plants generate mechanical/electrical/thermal energy for use in a diverse range of agricultural activities—processing fruit, palm, rice, and cocoa; dairy pasteurization; purifying water; and powering irrigation pumps. To date, Camco and VIP have installed five 10-kW VIP units in three different applications.

Earth Institute at Columbia University (Senegal): The Earth Institute at Columbia University harnesses scientific research, education, and practical solutions to create a more sustainable world through innovation and critical thinking. Earth Institute’s solution enables a small group of farmers to use a central solar energy unit to power multiple alternate current (AC) pumps for irrigation. The proposed solution takes advantage of the benefits of solar without the high costs associated with direct current (DC) powered pumps and battery storage. To date, the Earth Institute has installed three pilot solar PV pumping systems, which will serve seven farmers each (21 total) from a single, centralized array. Farmers on the first system have been paying for the service since early 2015 with high satisfaction. During these first 7 months, the beneficiaries paid 163,200 CFA ($326 USD) for 480 hours of operations. Considering that the cost of operating fuel pumps is approximately $1.50 per hour, these hours of using the solar pumping system saved the beneficiaries roughly $394. The next two pilot systems have been installed in Senegal and are awaiting pump installations. The SEL team also started discussions with a private operator called Energie Rurale Africaine (ERA) for the scaling up of their system at a banana plantation in Tambacounda, Senegal.
EarthSpark International (Haiti): EarthSpark International is a U.S.-based, nonprofit organization with over six years’ experience working with communities, businesses, and government to bring energy access to Haiti’s unelectrified population. EarthSpark has developed a solar-diesel hybrid micro-grid system that will increase access to affordable, reliable electricity for value-added agricultural processing. In May 2015, EarthSpark energized the grid, expanding service to 430 households and businesses in downtown Les Anglais, connecting these customers to grid electricity for the first time. EarthSpark has also developed a town-scale distribution system which includes a medium-voltage line, standard electrical installation, and use of next-generation smart meters. In August, EarthSpark also helped a women-run cooperative in the area start a corn de-kernelling business that uses clean, microgrid electricity to de-kernel corn cobs in a region with ample corn production. In late September, an efficient, electric mill was installed in Les Anglais and started operation.

ECO Consult (Jordan): Established in Jordan in 1995, ECO Consult is a leading development firm with more than 15 years of experience working in Jordan and the Middle East. ECO Consult has organized a national advisory group in Jordan for hydroponic farming. As part of USAID’s Powering Agriculture program and Hydroponic Green Farming Initiative, they have designed indigenous hydroponic systems, incorporating materials readily available in Jordan. To date, ECO Consult has installed the hydroponic systems at four sites on a cost-share basis with the owners.

International Development Enterprises (iDE) (Zambia, Nepal, Honduras): iDE has over 30 years’ experience creating business opportunities that spread transformative products and services through the developing world. To increase agricultural productivity, incomes, and livelihoods of smallholder farmers, iDE and its partners have developed a Clean Irrigation Solution that will provide smallholder farmers across the developing world the opportunity to mechanize their farming with zero carbon emissions. The system uses the Sunflower pump, an efficient, versatile, and cost-effective piston pump powered by a Photovoltaics (PV) panel, which is coupled with iDE’s affordable, ultra-low pressure drip irrigation kit to maximize the agricultural output and value of each drop of water pumped. To date, iDE and its partners have established a manufacturing facility in India. Pumps for field testing have been installed in Nepal, Zambia, and Honduras. The Sunflower pump is appropriate for irrigating plots up to 2,000 square meters. Farmers have been using the Sunflower pump to grow bitter gourd, luffa gourd, cucumber, cabbage, pumpkin, onion, potato, and chilies. Growing these crops, farmers increased their income by 5,000 to 19,000 Rupees per growing season.

Motivo Engineering (India): Motivo Engineering specializes in connected electro-mechanical systems to solve complex challenges across diverse market segments. Motivo is developing a “Swiss-Army Knife” system—the Hybrid Agriculture/Road Vehicles with Electricity Storage and Transformation (HARVEST)—that solves a wide range of agricultural mechanization and power-related problems. HARVEST is a multi-purpose platform that provides power for plowing, well-drilling, cold storage, and transporting crops to market. Motivo’s HARVEST prototype is now functional and undergoing testing in California. Motivo is on track for the start of field testing in India in January, 2016.

Promethean Power Systems (India): Promethean Power Systems designs and manufactures refrigeration systems coupled to their thermal batteries for agricultural commercial refrigeration applications in off-grid and partially electrified areas of developing countries. Promethean’s refrigeration solution uses a thermal energy battery pack that charges on intermittent power sources such as solar power and/or a few hours of grid electricity. This provides cold storage around the clock despite inconsistent access to electricity. Promethean has deployed and commissioned over 100 milk chillers coupled to its patented Thermal Battery. To date, none of the 100 Promethean chillers have required a diesel generator.

Rebound Technologies (Mozambique): Rebound Technologies develops tailored refrigeration technologies designed to meet global energy market dynamics while reducing fossil fuel dependence. SunChill™ is a novel, off-grid refrigeration solution enabling increased agricultural productivity by: (i) Removing field heat from crops immediately following harvest, and (ii) providing continued product cooling at local markets and/or central processing facilities. Rebound completed testing of the SunChill™ prototype April 2015. In June 2015, members of the Rebound team deployed to test technology in field conditions in Mozambique. The prototype is being assembled, using mostly locally available materials, at a for-profit farm, which also serves as an incubator to teach farming skills to local women.

SunDanzer (Kenya): SunDanzer has 15 years of experience with off-grid refrigeration needs, including developing the world’s first battery-free solar powered refrigerator. Recognizing the need for affordable cold-chain technologies, SunDanzer has developed a small-scale portable cooling system tailored for use in the Kenyan dairy market. The system comprises a photo-voltaic refrigerator
(PVR) that uses solar energy to cool a chest refrigerator. To date, SunDanzer has delivered and installed 40 solar milk cooling refrigerators in Kenya.

University of Georgia Research Foundation (Uganda): The University of Georgia Research Foundation (UGARF) is a nonprofit entity housed within the University of Georgia in the United States that enhances UGA’s excellence as a research and higher education institution. To date, UGARF has completed a baseline study and identified smallholder farmer households to participate in their study. They have continued to perfect performance of the device and installed a demonstration unit at a partner site in Wakiso District. The initial stages have begun for the manufacture of 25 units that will be deployed among the participants. UGARF has also developed training materials that will be used to train participants before systems are installed on their farms.

2015 Innovators

Ariya Capital Group (Kenya, Uganda, Tanzania): Ariya Capital Group (Ariya) is an experienced fund manager that develops, structures, invests, and manages clean energy and infrastructure projects throughout sub-Saharan Africa. Ariya’s project will provide end to end cost-effective, low-risk renewable energy generation and energy efficiency services to local flower and horticulture farms in Kenya, Uganda, and Tanzania. The project will provide flower farms and horticulture groups with dependable, cost effective, green energy solutions, which ultimately impact their bottom line. Increased reliability of power will allow farmers to use more sophisticated techniques, such as hydroponics and aeroponics, which lead to improved productivity and reduced water usage.

Claro Energy (India): Claro Energy provides off-grid solar power pumping solutions to power-deficient regions in India. Claro Energy intends to offer a pay-per-use irrigation service that uses a portable solar pump. The portable design will provide affordable, convenient, and on-demand irrigation. The project will enable farmers to irrigate larger amounts of farmland, increase production during the summer season, and invest funds saved on the purchase of diesel in more efficient technologies.

Futurepump (Kenya): Futurepump represents the commercial arm of a partnership that has spent the past ten years developing and perfecting the Sunflower solar irrigation pump. The Sunflower pump is an easy-to-maintain solar irrigation pump, built around a simple piston pump arrangement. Productivity can be doubled through the use of irrigation water that doesn’t rely on engine pumps. The growing season can be extended through the dry season, during which produce brings high market prices. Small vegetable farm profits can be increased as much as 45% through the use of a solar pump, while reducing their reliance on fossil fuel.

Horn of Africa Regional Environment Center and Network (Ethiopia): The Horn of Africa Regional Environment Center and Network (HoA-REC&N) is an autonomous institution under Addis Ababa University. HoA-REC&N focuses on environmental concerns and sustainable development options within the Horn of Africa. The proposed solution uses state of the art infrared technology to reduce coffee pulp drying time from several days to hours. Reduced drying time minimizes the post-harvest loss that occurs when using the conventional sun drying process. Biogas generated from coffee pulp and coffee husk will be used to power the bioreactors used for infrared drying. The project will significantly reduce the time farmers spend processing their coffee crop.

Husk Power Systems (Ghana, Nigeria): Husk Power Systems (HPS) designs, installs, and operates biomass and solar photovoltaic (PV)-based power plants. Husk Power will install a hybrid solution that combines a biomass gasification system with a solar PV system. The biomass plant uses a proprietary downdraft gasification technology that converts abundant agricultural residue into electricity. The system will power a mini-grid that produces electricity for residential, as well as agricultural, needs. The hybrid plant uses a combination of solar and biomass – both abundant resources in the communities selected for installation. Agricultural operations will be able to continue processing during nighttime hours, as the biomass plant will provide power when the solar PV system is not operating.

Institute for University Cooperation (ICU) (Jordan, Lebanon): The Institute for University Cooperation (ICU) was established in 1966, and is recognized as an NGO for development cooperation by the European Commission and the Italian Ministry of Foreign Affairs. ICU will install a drip irrigation system powered by PV solar energy at pilot farms. The system supports fertigation, which provides the possibility of fertilizer distribution through the irrigation system. The project will provide energy savings, as farmers will rely on photovoltaic systems for their irrigation energy needs, taking advantage of the 300+ sunny days in their areas.

International Development Enterprises (iDE) Bangladesh (Bangladesh): International Development Enterprises (iDE) has over 30 years’ experience in designing and delivering market based anti-poverty programs. The proposed solution will replace diesel
generation with a micro-grid powered by economically viable renewable sources. The system will power hatchery water pumping activities and provide household-level renewable power through an innovative metering technology. The project will provide many economic benefits to the hatcheries using the system, as well as the surrounding communities, including reduced diesel costs due to the use of clean energy, increased profits and sales for the hatchery, increased sales of fingerlings to local farmers, increased employment, and increased sustainability of aquaculture practices.

**KickStart International (Kenya):** KickStart was established in Kenya in 1991 with the mission to lift millions of people in Africa out of poverty quickly, cost-effectively, and sustainably. KickStart will design a foldable, flat pack solar irrigation pump that is easy for farmers to install. KickStart’s partner, Encap Technologies produces pumps that are both low cost and highly efficient and only require small solar panels. KickStart aims to transform the food and income security of smallholder farmers by enabling them to transition from rain-fed subsistence farming to year-round commercial irrigated agriculture. Over the next 6 years, KickStart plans to sell approximately 270,000 pumps across 16 countries in Sub Saharan Africa and estimates that 30% of these could be solar powered.

**SimGas Tanzania, Ltd. (Kenya, Rwanda, Tanzania):** SimGas is a design and production company with facilities in the Netherlands and East Africa that focuses on clean, affordable, and high quality energy and sanitation solutions. SimGas is developing the first off-grid, biogas-powered milk chiller at farm level to help milk supply meet demand: the SimGas Biogas Milk Chiller (BMC). It helps small dairy farmers to reduce milk losses and meet quality standards required to access the formal sector. The BMC runs on biogas, produced with an on-farm biogas digester. The SimGas Biogas Milk Chiller will empower small dairy farmers to guide their own development; the BMC can greatly improve the income of small dairy farmers, help supply to meet demand, help farmers to access the formal dairy market, and contribute to improved nutrition.

**SunCulture (Kenya, Tanzania, Uganda, Zambia):** SunCulture, based in Nairobi, Kenya, sells the AgroSolar Irrigation Kit (ASIK), an entirely solar-powered drip irrigation system that makes it easier and cheaper for farmers to grow a wide variety of crops. As a result of switching to solar irrigation, smallholder farmers will realize significant benefits, which include increased production of higher value produce, cost savings, and more efficient use of time.

**University of Toronto (Bangladesh):** The University of Toronto will oversee a small team conducting research focused on design, and analysis of the new aquaculture aeration technology. The proposed solution is a new aeration method that does not require electricity, has few maintenance requirements with no moving parts, and is inexpensive to fabricate and deploy in Lower Income Countries. The system uses heat that is captured through a solar thermal absorber plate and transferred to the bottom of the pond to heat the bottom water. The system will allow for increased density of fish stock, higher yields of fish, as well as larger fish that have a higher market value and demand.

**Universidad del Valle de Guatemala (Guatemala):** The Universidad del Valle de Guatemala (UVG) is a private, not-for-profit, secular university located in Guatemala City, Guatemala. UVG uses an innovative approach to developing low-cost community utility companies in off-grid agricultural communities called Community Accelerators. Each Accelerator will consist of a localized PV mini-grid and will be operated by a local for-profit service provider company that also provides agribusiness service. The project will provide access to clean energy to operate irrigation systems and cold storage facilities. Micro-financing will allow operators to provide services at an affordable price, while generating enough revenue to remain profitable year-round.

**Village Infrastructure Angels (Indonesia, Papua New Guinea, Philippines, Vanuatu):** Village Infrastructure Angels (VIA) was incorporated in 2012 with the mission to make poverty-alleviating infrastructure affordable to everyone through long-term loans. VIA plans to install solar mills in villages in Indonesia, Papua New Guinea, Philippines, and Vanuatu. These mills will deliver services to up to 10,000 households. Small mills will be installed, with an appropriate capacity for the village, through a microfinancing program. The mills will be used to process staple crops, such as rice, corn, and cassava, that require processing before eating, and make up the majority of the diet of rural villagers. Use of solar mills will increase productivity for rural farmers, while decreasing the amount of manual processing required. The time saved in manual labor can be redirected to other efforts that will increase income, particularly for women who are the primary source of labor for agro-processing. Cost savings will be realized in the reduced consumption of diesel fuel, and reduced time spent traveling to mills in remote villages.