

# POWERING AGRICULTURE:

AN ENERGY GRAND CHALLENGE  
FOR DEVELOPMENT



ANNUAL REPORT  
FINANCIAL YEAR 2017



# ABOUT POWERING AGRICULTURE

In 2012, the United States Agency for International Development (USAID), the Government of Sweden (Sida), the Government of Germany (BMZ), Duke Energy Corporation, and the United States Overseas Private Investment Corporation (OPIC) (collectively, the “Founding Partners”) combined resources to create the Powering Agriculture: An Energy Grand Challenge for Development (PAEGC) initiative. The objective of Powering Agriculture is to support the development and deployment of clean energy innovations that increase agriculture productivity and stimulate low carbon economic growth in the agriculture sector of developing countries to help end extreme poverty and extreme hunger.

Powering Agriculture utilizes the financial and technical resources of its Founding Partners to support its Innovator cohort’s implementation of clean energy technologies and business models for households, farms, villages, cooperatives, and industrial facilities in order to:

- (i) Enhance agricultural yields/productivity;
- (ii) Decrease post-harvest loss;
- (iii) Improve farmer and agribusiness income generating opportunities and revenues; and/or
- (iv) Increase energy efficiency and associated savings within the operations of farms and agribusinesses.

For more information, visit [PoweringAg.org](http://PoweringAg.org)



# FOREWORD

As another fiscal year draws to a close, I am excited to share new progress and achievements of Powering Agriculture: An Energy Grand Challenge for Development (PAEGC). Since taking over management of the initiative in March 2017, I have been continually impressed by the dedication and ingenuity of the 24 innovators that have been developing clean energy solutions for the agriculture sector in developing countries. Implementing in over 20 countries, Powering Agriculture innovators must overcome numerous challenges to developing appropriate technologies and establishing sustainable business models. But as they successfully engineer their products for lower price-points, find financing, or overcome last-mile distribution obstacles, it is rewarding to see how their clean energy solutions have the potential to increase the productivity, profitability and sustainability of the agriculture sector in developing countries.

In the last year, nearly all of the 24 innovators funded by Powering Agriculture have engaged in field implementation of their clean energy solutions—testing the technologies with their end users and refining their technologies and business models accordingly. As they pilot their technologies, Powering Agriculture has leveraged their experiences for the development of guides, tools, studies, and papers that share lessons learned and best practices. Through this work, Powering Agriculture extends its reach beyond its own innovators to broadly support innovation in the clean energy-agriculture nexus.

The successes of Powering Agriculture are also due to the productive partnership that underlies it. There is a talented and dedicated team of professionals who provide technical assistance to innovators and overall implementation support for the program. Many thanks also to Dr. Ryan Shelby, the program manager from 2015 to 2017, who handed over a smoothly running operation. And finally, the ongoing commitment of the founding partners continued to focus attention and bring resources to the energy-agriculture nexus. I am optimistic about the ways that our efforts will provide clean, affordable energy for farmers and agribusinesses in emerging economies.

Sincerely,

**Dr. Augusta Abrahamse**

Energy Specialist

*Program Manager, Powering Agriculture: An Energy Grand Challenge for Development*  
United States Agency for International Development (USAID)

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# EXECUTIVE SUMMARY

This annual report describes the key activities of Powering Agriculture: An Energy Grand Challenge for Development (PAEGC) implemented over the financial year period of October 2016 to September 2017. Powering Agriculture: An Energy Grand Challenge for Development represents a partnership of the United States Agency for International Development with the Government of Sweden, the Government of Germany, Duke Energy Corporation, and the Overseas Private Investment Corporation. It was launched in 2012 to support the development and deployment of clean energy innovations that stimulate low-carbon economic growth within the agriculture sector of developing countries to help end extreme poverty and extreme hunger.

Powering Agriculture will:

- Support clean energy technology and business model innovations for agriculture.
- Ensure that financial intermediaries have the capital they need to help organizations scale their clean energy innovations and reach the farmers and agri-businesses that need these technologies.
- Develop partnerships with public and private sector organizations that want to support the goals of the Powering Agriculture initiative.
- Serve as a clean energy and agricultural information resource hub for people around the world.

Some of the main activities that were implemented during the reporting year period include:

- Upscaling the MOOC training to the Caribbean -> CaribOOC: Based on the success of the inaugural course, the MOOC materials and case studies were modified for the Caribbean region and piloted with 40 participants in the spring of 2017.
- Release of an updated companion reader for the Sustainable Energy for Food MOOC.
- Publication of the Gender Integration Summary Report 2016 which examined both current efforts and future plans of Innovators to integrate gender considerations into their work.

- Publication of a series of 6 topical guides focused on integrating gender into the development and deployment of clean energy solutions (CES) for the agricultural sector.
- The continuation of the PAX webinar series, with sessions: 1) How to get your message out there – Developing an effective branding and outreach strategy; 2) Selling your innovation to smallholder farmers – Examples of commercial success by Richard Kohl; 3) Realities of the Engineering Timeline.
- Participation in various conferences, including convening of a panel titled *Lessons Learned by Early-Stage Clean Tech Innovators in Developing Countries* at the VentureWell Open 2017, and Intersolar 2017 where Powering Agriculture, along with partners University of Hohenheim and Phaesun, received an award in the category of outstanding solar projects.
- Site visits to 1 of the 11 Innovators from the 2013 cohort and 1 of the 13 Innovators from the 2015 cohort, during which progress was verified and beneficiaries were interviewed.
- Publication of the paper “Increasing Productivity through Irrigation: Problems and Solutions Implemented in Africa and Asia” in the Special Issue on Energy and Food Security in a Humanitarian Context, *Journal of Sustainable Energy Technologies and Assessments* in February 2017.
- Developed, in partnership with the United Nations Food and Agriculture Organization (FAO), the *Toolbox on Solar Powered Irrigation Systems Information and Tools for Advising on Solar Water Pumping and Irrigation*.



In the next financial year (October 2017 to September 2018), Powering Agriculture expects to implement the following major items:

- Establishment of a public-private partnership with an investment fund to support the commercialization and scale-up of clean energy technologies and innovative business models for farmers and agribusinesses.
- Hosting of the Powering Agriculture Xcelerator (PAX) program in-person workshop for the Innovators in Kenya, January 15 to 18, 2018.
- Publication and anchoring of the SPIS Toolbox with training institutions through a series of training and training of the trainers, development of new modules, and an official launch at an FAO event in March 2018.
- Continued activities related to energy efficiency in the tea sector, including assessment of similar interventions in the Rwandese and Malawian tea sector, adaptation and deployment of the existing training materials, and assessing the energy saving potential in tea factories in China, India, Sri Lanka, and Indonesia.

## ACKNOWLEDGEMENTS

The Powering Agriculture Founding Partners would like to thank the team from the Powering Agriculture Support Task Order, implemented by Tetra Tech ES, Inc., for their assistance in preparing this report.

# ACRONYMS AND ABBREVIATIONS

AC	alternating current
AIIS	Agriculture Innovation Investment Summit
BMC	Biogas Milk Chiller
BMZ	German Federal Ministry for Economic Cooperation and Development
CES	clean energy solution
DC	direct current
DDI	Diamond Development Initiative
DO	dissolved oxygen
FY	fiscal or financial year; in the case of this report refers to October 1, 2015 through September 30, 2016
FAO	Food and Agriculture Organization of the United Nations
GCD	Grand Challenge for Development
GHG	greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
HIO	high impact opportunity
HoA-REC&N	Horn of Africa Regional Environment Center and Network
HPS	Husk Power Systems
ICU	Istituto per la Cooperazione Universitaria Onlus
iDE	International Development Enterprises
IOREC	International Off-Grid Renewable Energy Conference
IR	infrared
LIC	low-income countries
M&E	monitoring and evaluation
MENA	Middle East and North Africa
MOOC	massive open online course
MOU	Memorandum of Understanding
NCSE	National Council on Science and the Environment
OPIC	Overseas Private Investment Corporation
PAEGC	Powering Agriculture: An Energy Grand Challenge for Development
PAIS	Powering Agriculture Innovator Showcase
PARRB	Powering Agriculture Requests and Reminders Bulletin
PASTO	Powering Agriculture Support Task Order
PAX	Powering Agriculture Xcelerator
PAYG	Pay-As-You-Go
PV	photovoltaic
SDG	Sustainable Development Goal
Sida	Swedish International Development Cooperation Agency
SPIS	solar-powered irrigation system
TMG	Technology Management Group
UGARF	University of Georgia Research Foundation
USAID	United States Agency for International Development
UVG	Universidad del Valle de Guatemala
VIA	Village Infrastructure Angels
VIP	Village Industrial Power
WCA	West and Central Africa



# INTRODUCTION

*This annual report describes the key activities of Powering Agriculture: An Energy Grand Challenge for Development (PAEGC) implemented over the period of October 2016 to September 2017.*

The Powering Agriculture: An Energy Grand Challenge for Development initiative represents a partnership of the United States Agency for International Development (USAID) with the Government of Sweden, the Government of Germany, Duke Energy Corporation, and the Overseas Private Investment Corporation (OPIC); collectively known as the 'Founding Partners'. The goal of Powering Agriculture is to support new and sustainable approaches to accelerate the development and deployment of clean energy solutions for increasing agriculture productivity and/or value in developing countries to help end extreme poverty and extreme hunger.

Powering Agriculture contributes to the 2030 Agenda for Sustainable Development by supporting the following goals: SDG 1 (No Poverty), SDG 2 (Zero Hunger/Sustainable Agriculture), SDG 5 (Gender Equality), SDG 7 (Affordable and Clean Energy), SDG 8 (Economic Growth), SDG 9 (Innovation), SDG 13 (Climate Action), and SDG 17 (Partnerships for the Goals).

Powering Agriculture follows the Grand Challenges for Development (GCD) model which focuses on defining problems, identifying constraints, and providing evidence-based analysis for a variety of development issues. The Grand Challenges for Development initiative is rooted in two fundamental beliefs about international development:

- Science and technology, when applied appropriately, can have transformational effects; and
- Engaging the world in the quest for solutions is critical to instigating breakthrough progress.

## 1.1 The Problem

Throughout developing countries, agriculture remains the most prominent source of livelihood for most households. As our population expands, farms and agribusiness will need to produce, process, and transport an increasing amount of food. The Food and Agriculture Organization of the United Nations (FAO) estimates that at least 70% more food will need to be produced on the same amount of agricultural land. Identifying means by which clean energy technology can be used to intensify agricultural production will be crucial in meeting this demand.

Increasing the agricultural sector's access to clean energy and efficiency technologies will enable farmers to mechanize their operations, add value to commodities through processing, and store fresh produce in refrigerated containers to extend its shelf life.

These advancements will lead to more food in the market, increased incomes for farmers and traders, and decreased dependency of the agriculture sector on fossil fuels.

Unfortunately, significant barriers exist that hinder the integration of clean energy technology in agriculture development:

- Farmers are not aware of the variety of new technologies that may be appropriate for them.
- Clean energy technologies are relatively new, therefore farmers have limited access to distributors for installation, parts, and service.
- Farmers often do not have the means to cover high capital costs associated with clean energy upgrades - and financing is seldom available.

Likewise, clean energy enterprises seeking to serve these farmers face a number of barriers:

- Limited access to debt and equity to support business development and growth.
- Low demand due to a lack of awareness by farmers and other customers of the economic and environmental benefits of the technologies.
- The client base of agricultural communities is remote, scattered, and often very poor.
- There are few examples of successful business models that have been effective in delivering clean energy solutions to the agriculture sector in developing countries.

These issues create an unproductive cycle in which suppliers and buyers are not connected, and farmers and agribusinesses are unable to leverage more cost-effective clean energy technologies. Strengthening the links between modern energy service providers and the agriculture sector will create positive feedback loops to increase productivity along major components of the agricultural supply chain:

(1) on-farm productivity; (2) cold storage; (3) transport; (4) post-harvest agriculture processing; and (5) agriculture waste for energy applications.

## 1.2 The Solution

Energy is critical to almost every aspect of the agricultural value chain, as shown in Figure 1.1 Globally, the food sector consumes 30 percent of total energy supply and generates 20 percent of global emissions.

In order to solve the challenges described in section 1.1, Powering Agriculture was launched in 2012 to:

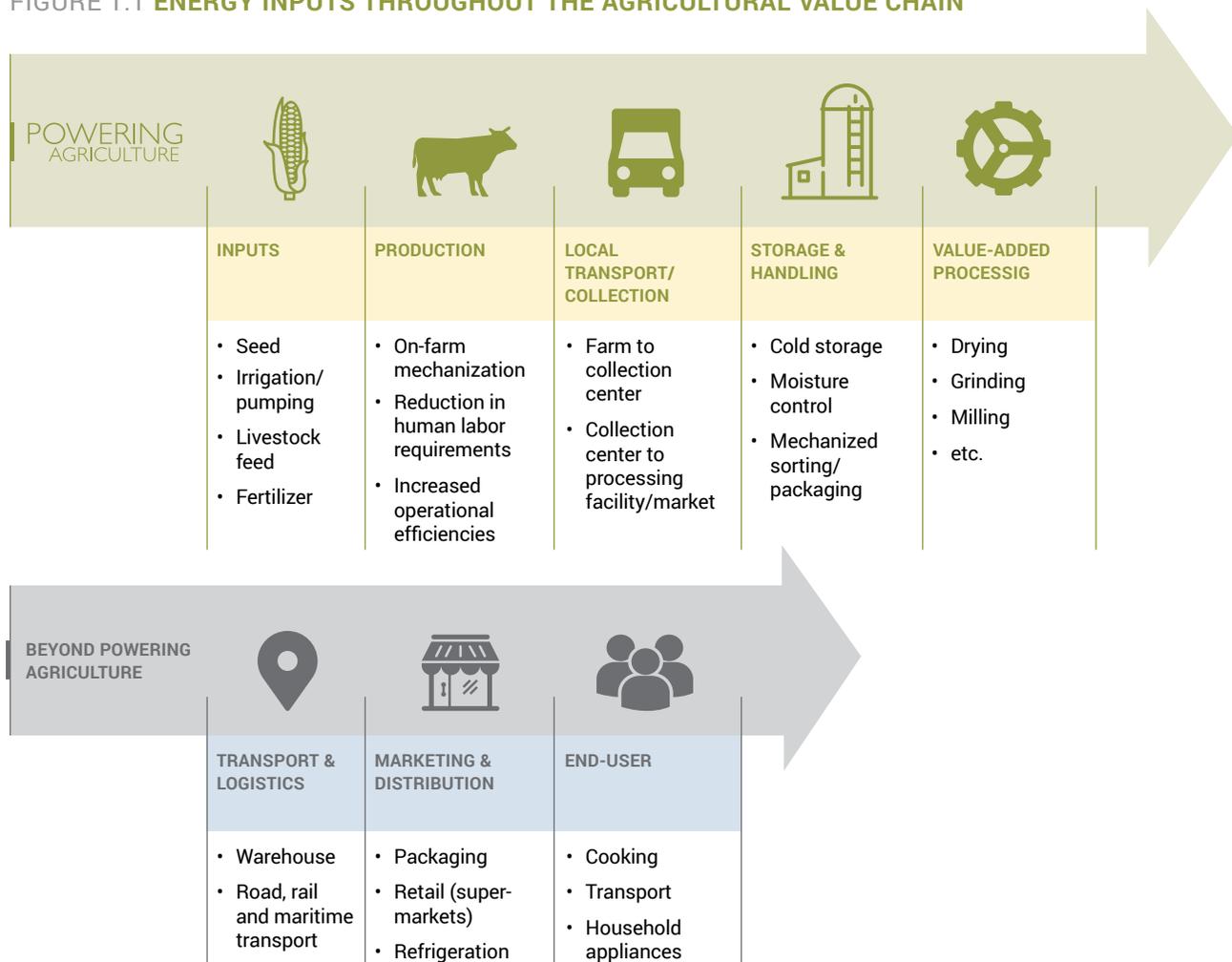
- support clean energy technology and business model innovations for agriculture;
- ensure that financial intermediaries have the capital they need to help organizations scale

their innovations and reach the farmers and farm-related businesses that need these technologies;

- develop partnerships with public and private sector organizations that want to support the goals of the Powering Agriculture program; and
- serve as a clean energy and agricultural information resource for people around the world.

The activities of Powering Agriculture are scheduled to run through 2019.

FIGURE 1.1 ENERGY INPUTS THROUGHOUT THE AGRICULTURAL VALUE CHAIN



### 1.3 The Work of Powering Agriculture

Powering Agriculture utilizes a cross-sectoral nexus approach to concurrently focus on the energy and agricultural sectors while providing technical, business acceleration, financing, and policy support to its innovators and other stakeholders.

#### TECHNOLOGY & BUSINESS MODEL INNOVATION

Powering Agriculture provides innovation grants (\$500,000–\$2,000,000) to design, pilot and deploy clean energy solutions to different points along the agricultural production cycle.

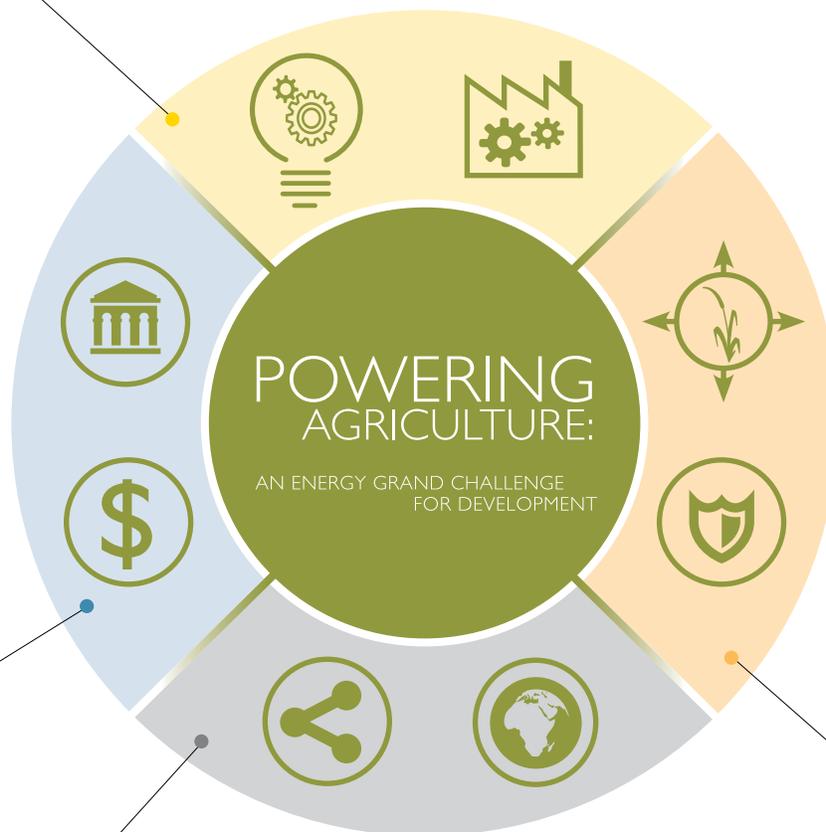
Powering Agriculture provides on demand, tailored technical assistance using the Powering Agriculture Support Task Order (PASTO) implemented by **Tetra Tech**.

#### MAINSTREAMING

Powering Agriculture utilizes the regional Powering Agriculture Hub in East Africa and collaborates with U.S. Government-led partnerships such as Power Africa and Feed the Future to integrate clean energy solutions within regional/national agriculture production and food security programs.

#### FINANCING FACILITY

Powering Agriculture leverages funds to mobilize private sector equity and debt investments within the clean energy/agriculture space.



#### KNOWLEDGE MANAGEMENT

Powering Agriculture serves as a clean energy and agricultural information resource hub for people around the world by providing knowledge products that contain detailed data on the policy, economic, gender, and energy requirements to end extreme poverty and extreme hunger in developing countries.

## 1.4 Powering Agriculture and the Sustainable Development Goals

At the United Nations Sustainable Development Summit on September 25, 2015, world leaders adopted the 2030 Agenda for Sustainable Development, which includes a set of 17 Sustainable Development Goals (SDGs) to end poverty, fight inequality and injustice, and tackle climate change by 2030. The Powering Agriculture Founding Partners and Innovators support the SDGs in a variety of ways, with a specific focus on the following SDGs:



### **GOAL 1: End Poverty in All Its Forms**

#### **Everywhere:**

Powering Agriculture supports the development and deployment of clean

energy innovations that stimulates low carbon economic growth within the agriculture sector of developing countries to help end extreme poverty.

contribute to reducing gender disparities in access to, control over, and benefit from clean energy resources, wealth, opportunities and services.



### **GOAL 7: Ensure Access to Affordable, Reliable, Sustainable and Modern Energy for All:**

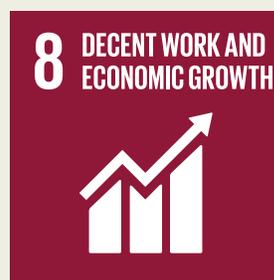
Powering Agriculture provides funding

and support to commercialize clean energy technologies and innovative business models to expand access to reliable, affordable, and clean energy services to farmers and agribusinesses.



### **GOAL 2: End Hunger, Achieve Food Security and Improved Nutrition and Promote Sustainable Agriculture:**

Powering Agriculture supports the adoption of climate-smart agricultural innovations and techniques to increase crop yields, improve the energy and water efficiency of farm operations, and reduce food insecurity in vulnerable regions to help end hunger



### **GOAL 8: Promote Inclusive and Sustainable Economic Growth, Employment and Decent Work for All:**

Powering Agriculture

supports solutions that integrate clean energy technologies and innovative business models to: (i) Enhance agricultural yields/productivity; (ii) Decrease post-harvest loss; (iii) Improve farmer and agribusiness income generating opportunities and revenues; and (iv) Increase energy efficiency and associated savings within the operations of farms and agribusinesses, while stimulating low carbon economic growth



### **GOAL 5: Achieve Gender Equality and Empower All Women and Girls:**

Powering Agriculture supports clean energy innovations that

within the agriculture sector of developing countries. This combined clean energy/ agriculture approach helps introduce inclusive and pro-poor income-generating opportunities in developing countries.



**Goal 9: Build Resilient Infrastructure, Promote Sustainable Industrialization and Foster Innovation:**

Powering Agriculture

seeks to address the concerns of water usage, food production/processing and energy consumption in the agriculture sector by supporting innovation within the energy/ agriculture nexus. Specifically, innovation is supported in emerging markets and developing countries where many farmers and agribusinesses lack access to reliable, affordable and clean energy services.



**Goal 13: Take Urgent Action to Combat Climate Change and Its Impacts:**

Powering Agriculture supports a combined clean energy/

agriculture approach that maximizes the impact of finite energy resources in order to mitigate adverse climate change effects that stem from the agriculture sector. Powering Agriculture uses the following indicators to monitor the results of global climate change mitigation/adaptation efforts: GHG emission reduction, increased investment in climate change mitigation/adaptation activities, clean energy generation, and/or energy efficiency.



**Goal 17: Revitalize the Global Partnership for Sustainable Development:**

The Powering Agriculture Founding

Partners have collectively combined resources to fund Powering Agriculture. Through this Partnership, Powering Agriculture uses a clean energy/agriculture approach to address farmers' and agribusinesses' lack of access to reliable, affordable and clean energy services for food production.



## 1.4 The Founding Partners

The Founding Partners have made financial and in-kind contributions to finance the activities of Powering Agriculture. In-kind contributions are technical assistance resources that individual Partners have committed to support the goal of

Powering Agriculture but are managed by the individual Partners themselves. USAID serves as the administrator of Powering Agriculture managing the disbursements of the finances. Table 1.1 provides a description of each Founding Partner.

TABLE 1.1. POWERING AGRICULTURE FOUNDING PARTNERS

ORGANIZATION	DESCRIPTION
<p>United States Agency for International Development</p> 	<p>The American people, through the USAID, have provided economic and humanitarian assistance worldwide for nearly 50 years. <a href="http://www.usaid.gov">www.usaid.gov</a></p> <p><b>USAID's support and implementation of Powering Agriculture is coordinated by USAID's Bureau for Economic Growth, Education and Environment (E3).</b></p>
<p>Government of Sweden</p> 	<p>The Swedish International Development Cooperation Agency (Sida), an authority under the jurisdiction of the Swedish Ministry for Foreign Affairs, focuses on improving living conditions for developing nations around the world. <a href="http://www.sida.se/English/">www.sida.se/English/</a></p> <p><b>Sweden's support for Powering Agriculture is coordinated by Sida's Unit for Global Economy and Environment.</b></p>
<p>Government of Germany</p> 	<p>The Federal Ministry for Economic Cooperation and Development (BMZ), develops the guidelines and the fundamental concepts on which German development policy is based. It devises long-term strategies for cooperation with the various players concerned and defines the rules for implementing that cooperation. These are the foundations for developing shared projects with partner countries and international development organizations. All efforts are informed by the United Nations' Sustainable Development Goals. <a href="http://www.bmz.de/en">www.bmz.de/en</a></p> <p>The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH implements the German contribution to the Powering Agriculture Energy Grand Challenge on behalf of BMZ. The GIZ Project <i>Sustainable Energy for Food – Powering Agriculture</i> is not only contributing to the global initiative but backing up PAEGC efforts by additional pilot projects, research, and capacity development.</p> <p>GIZ Powering Agriculture runs a Nairobi-based hub for East Africa, to take advantage of the vast potential for the energy/agriculture nexus and to capitalize on the fact that most of the Powering Agriculture Innovators are implementing their projects in East Africa. With staff on the ground and close proximity to the American, Swedish, and German embassies and Missions in East Africa, the hub activities include pilot projects and studies as well as capacity building. The hub is meant to function as an accelerator for regional as well as supra-regional knowledge exchange, particularly focusing on the Powering Agriculture Innovators located in the region..</p>
<p>Duke Energy</p> 	<p>Duke Energy, one of the largest electric power companies in the United States, supplies services in a sustainable manner - affordable, reliable, and clean. <a href="http://www.duke-energy.com/">www.duke-energy.com/</a></p> <p><b>Duke Energy's support for Powering Agriculture is coordinated by Duke's Federal Government Affairs unit.</b></p>
<p>The Overseas Private Investment Corporation</p> 	<p><b>OPIC is the U.S. Government's development finance institution. It mobilizes private capital to help solve critical development challenges and in doing so, advances U.S. foreign policy.</b> Because OPIC works with the U.S. private sector, it helps U.S. businesses gain footholds in emerging markets, catalyzing revenues, jobs and growth opportunities both at home and abroad. OPIC achieves its mission by providing investors with financing, guarantees, political risk insurance, and support for private equity investment funds. <a href="http://www.opic.gov/">www.opic.gov/</a>.</p> <p><b>OPIC's support for Powering Agriculture is coordinated by OPIC's Agriculture and Project Finance unit.</b></p>

## 1.5 The Innovators

Powering Agriculture held two global innovation calls in 2012 and 2014 to source solutions within the clean energy/agricultural nexus that:

1. Enhance agricultural yields/productivity;
2. Decrease post-harvest loss;
3. Improve farmer and agribusiness income generating opportunities and revenues; or

4. Increase energy efficiency and associated savings within the operations of farms and agribusinesses – while stimulating low carbon economic growth within the agriculture sector of developing countries.

Table 1.2 presents an overview of the entities referred to as “Innovators” that were selected to receive funding. See Chapter 3 for a fuller description of each Innovator.

TABLE 1.2 2013 AND 2015 INNOVATOR COHORT INFORMATION

2013 COHORT	INNOVATOR	PROJECT NAME	COUNTRY OF IMPLEMENTATION	START DATE	END DATE	AWARD VALUE
1	<b>African Bamboo (COMPLETE)</b>	Thermal treatment of agricultural goods based on a demand driven and energy-efficient biomass combustion unit	Ethiopia	10/1/2013	9/30/2017	\$1,041,145
2	<b>Camco Advisory Services (CANCELLED)</b>	Biomass Mini-Grids for Palm Oil Producing Communities in Benin and Tanzania	Benin, Tanzania	10/1/2013	3/7/2016	\$999,805
3	<b>The Earth Institute at Columbia University (COMPLETE)</b>	Micro-Solar Utilities for Small-Scale Irrigation in Senegal	Senegal	10/1/2013	3/31/2016	\$1,082,161.67
4	<b>EarthSpark International (COMPLETE)</b>	Smart Grid on Main Street: Powering Agricultural Processing with Sustainable Energy Services	Haiti	10/1/2013	3/31/2017	\$1,091,315
5	<b>ECO Consult (COMPLETE)</b>	Hydroponic Green Farming Initiative	Jordan	10/1/2013	6/30/2017	\$1,149,707
6	<b>iDE (COMPLETE)</b>	Clean Irrigation Solution (CIS) for Increased Agricultural Productivity	Honduras, Nepal, Zambia	10/1/2013	6/30/2017	\$1,499,831
7	<b>Motivo Engineering, LLC (COMPLETE)</b>	Hybrid Agriculture/Road Vehicle with Electricity Storage and Transformation (HARVEST)	India	10/1/2013	5/12/2017	\$861,158
8	<b>Promethean Power Systems (COMPLETE)</b>	Solar-powered Milk Chilling in Rural India	India	10/1/2013	6/30/2017	\$992,980.00

9	<b>Rebound Technologies (COMPLETE)</b>	Solar Cooling for Horticultural Preservation	Mozambique	10/1/2013	3/31/2016	\$1,375,853
10	<b>SunDanzer Refrigeration</b>	Sustainable Milk for Africa through Refrigeration Technology	Kenya	10/1/2013	9/30/2017	\$999,588.37
11	<b>University of Georgia Research Foundation</b>	Renewable Energy-Powered Evaporative Cooling for Small-Holder Farmers	Uganda	1/3/2014	7/31/2017	\$1,000,000
12	<b>Experience International (CANCELLED)</b>	Solar Powered Cold Storage and Ice Making Facilities for Fishing Communities in Eastern Indonesia	Indonesia	10/1/2013	04/20/2014	\$1,000,000

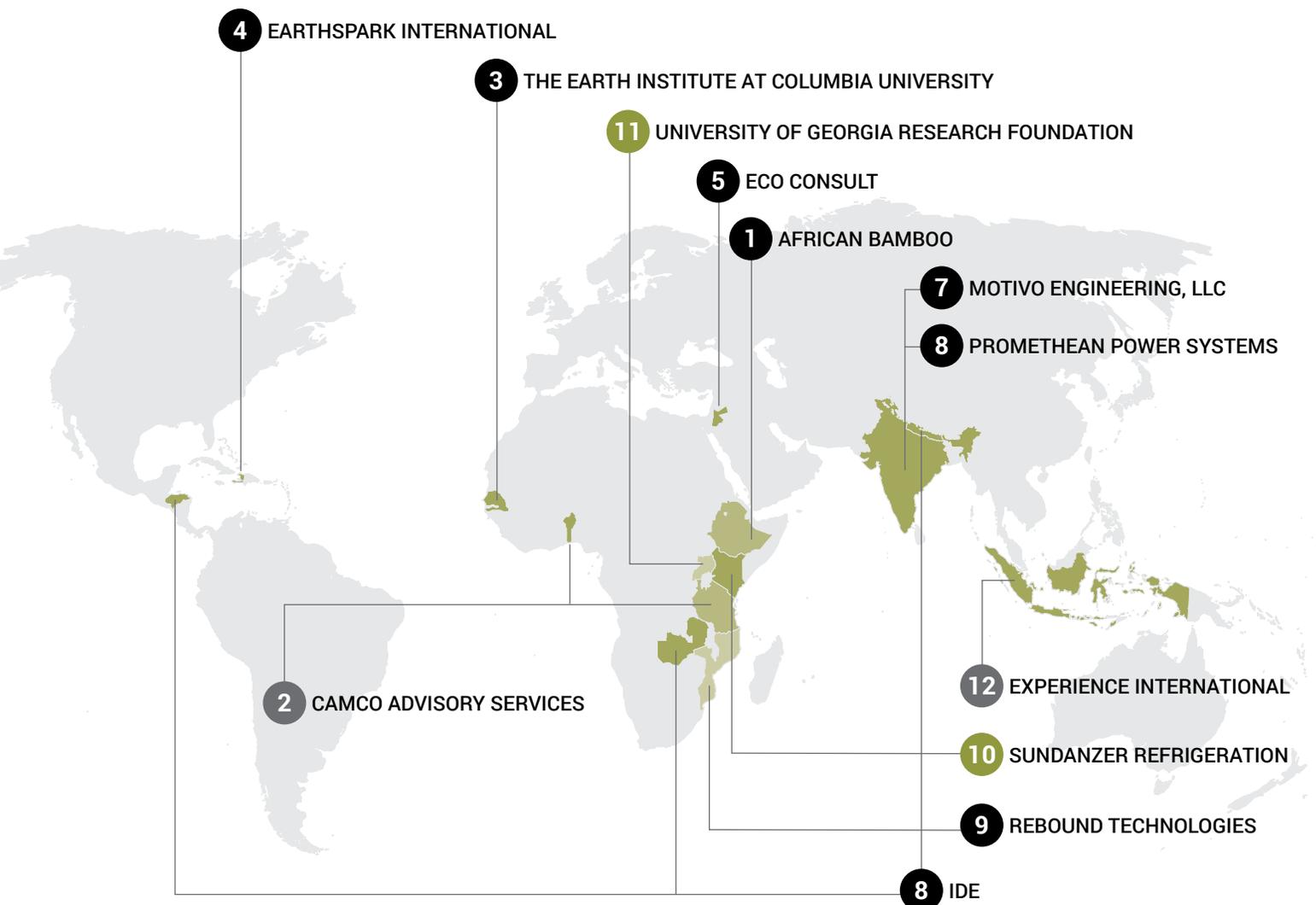


TABLE 1.2 2013 AND 2015 INNOVATOR COHORT INFORMATION (CONTINUED)

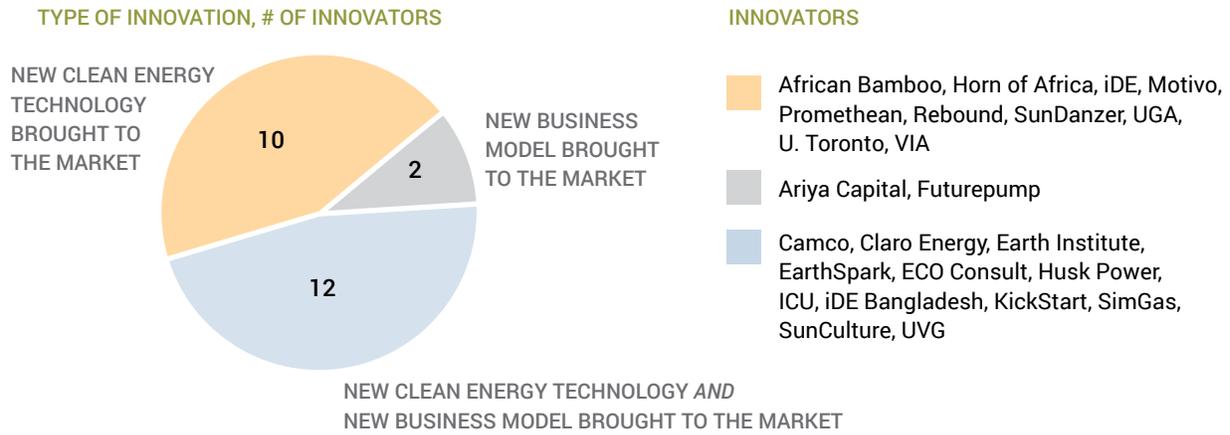
2015 COHORT	INNOVATOR	PROJECT NAME	COUNTRY OF IMPLEMENTATION	START DATE	END DATE	AWARD VALUE
1	<b>Ariya Capital Group Ltd</b>	Powering Agriculture with Renewable Energy	Kenya; Tanzania; Uganda	2/10/2016	2/10/2019	\$1,905,700
2	<b>Claro Energy</b>	Launch low-cost on-demand pay-as-you-go irrigation service using solar trolley systems to cut irrigation costs in half	India	12/3/2015	12/3/2018	\$500,000
3	<b>Futurepump (Kenya) Ltd</b>	Sunflower Pump - A working capital facility & after sales investments to support a growing solar irrigation business in Kenya	Kenya	12/29/2015	12/29/2018	\$1,999,563
4	<b>Governing Council of the University of Toronto</b>	Field Evaluation of Passive Aeration System for Aquaculture	Bangladesh	1/18/2016	1/17/2019	\$500,000
5	<b>Horn of Africa Regional Environment Center and Network</b>	Improving coffee production and quality using Infra-red technology	Ethiopia	2/2/2016	2/2/2019	\$434,780
6	<b>Husk Power Systems</b>	Hybrid Solution- Biomass and Solar PV: Clean Energy Intervention in the food belts of Nigeria and Ghana	Ghana; Nigeria	1/21/2016	1/21/2019	\$1,282,418
7	<b>Istituto per la Cooperazione Universitaria Onlus (ICU)</b>	PV integrated irrigation systems in Jordan and Lebanon	Jordan; Lebanon	12/10/2015	12/10/2018	\$499,688
8	<b>iDE (Bangladesh)</b>	Renewable micro-grids for off-grid fish hatcheries and surrounding communities in Bangladesh	Bangladesh	12/14/2015	6/30/2018	\$499,748
9	<b>KickStart International</b>	To increase access to affordable, high-performance solar-powered irrigation technology amongst poor smallholder farmers in rural Kenya	Kenya	12/10/2015	12/10/2018	\$500,000
10	<b>SimGas Tanzania Ltd</b>	Biogas Milk Chilling to increase productivity and double the income of East African dairy farmers	Kenya; Rwanda; Tanzania	12/11/2015	12/11/2018	\$499,998

11	<b>SunCulture</b>	SunCulture: Scaling up distribution of smallholder tailored agro-solar irrigation kits across Africa	Kenya; Tanzania; Uganda; Zambia	12/11/2015	12/11/2018	\$2,000,000
12	<b>Universidad del Valle de Guatemala</b>	Private-Sector Financed Community Solar Power Grids (ComGrids) and Agricultural Accelerators in Off-Grid Communities in Guatemala	Guatemala	12/14/2015	12/13/2018	\$499,008
13	<b>Village Infrastructure Angels</b>	Solar Agro-processing Power Stations for 5000 Households	Indonesia; Papua New Guinea; Philippines; Vanuatu	12/11/2015	12/11/2018	\$1,762,400

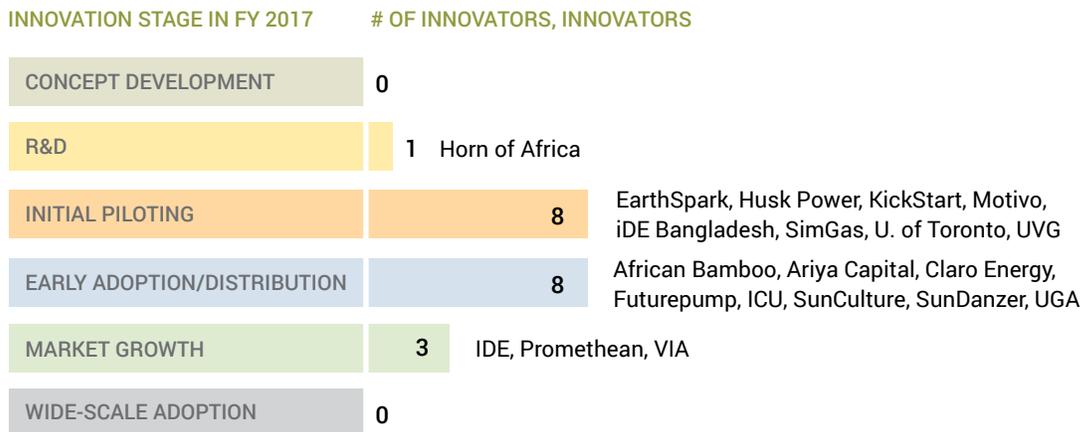


Tables 1.3 through 1.8 provide a more detailed breakdown of the clean energy solutions being funded by Powering Agriculture, their areas of focus, and where they are being implemented.

**FIGURE 1.3 FOCUS OF INNOVATION**



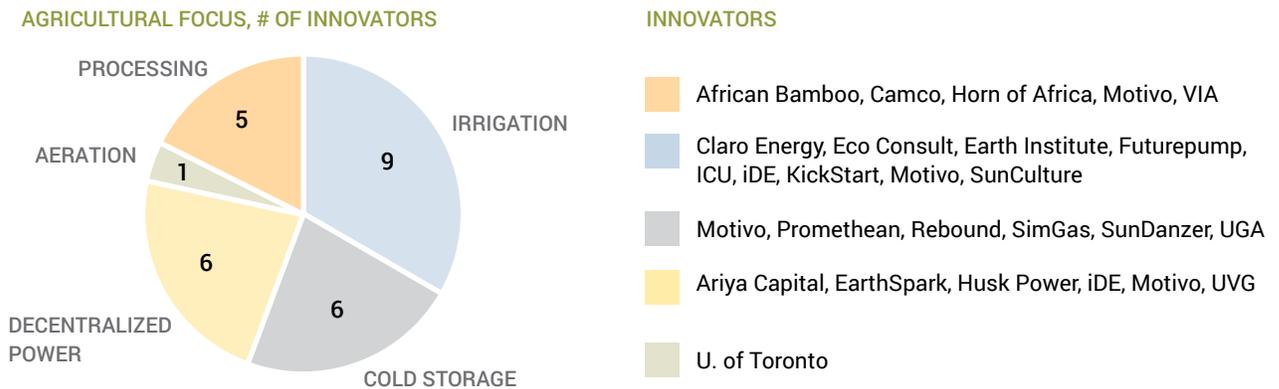
**FIGURE 1.4 INNOVATION STAGES ACHIEVED IN FISCAL YEAR 2017**



**FIGURE 1.5 CLEAN ENERGY SOURCE USED FOR POWERING AGRICULTURE INNOVATIONS**



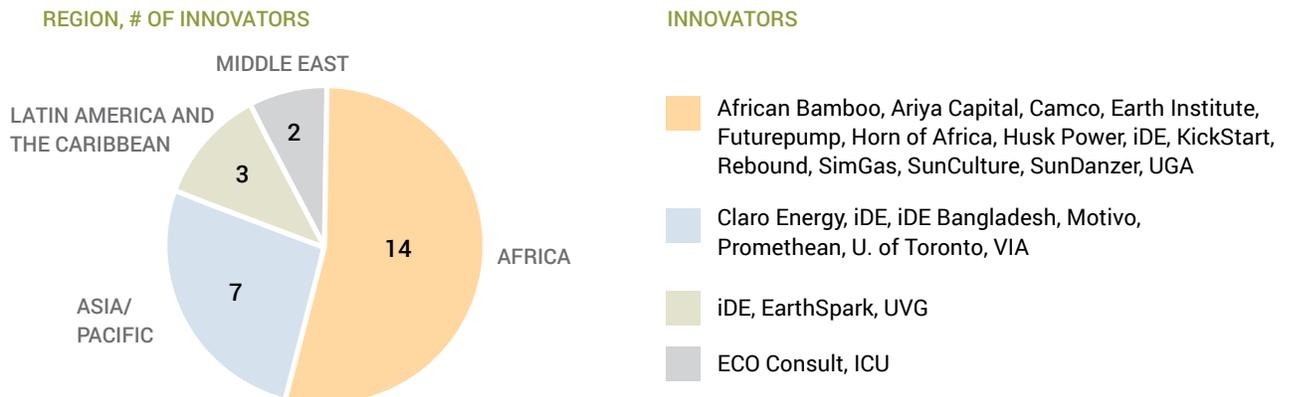
**FIGURE 1.6 AGRICULTURAL FOCUS OF POWERING AGRICULTURE INNOVATIONS**

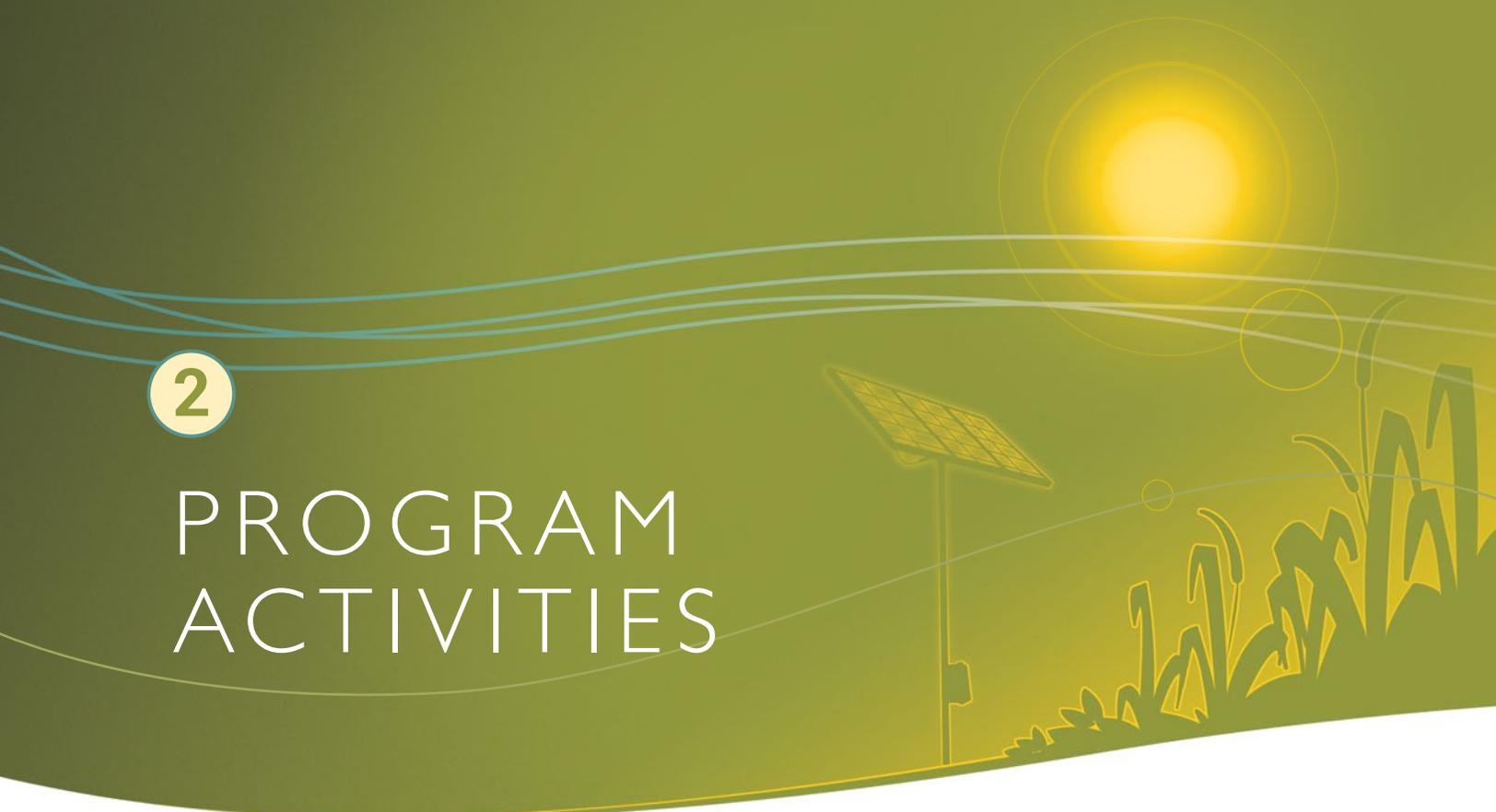


**FIGURE 1.7 PRODUCT SEGMENTS FOCUSED ON BY POWERING AGRICULTURE INNOVATORS**

PRODUCT SEGMENT	# OF INNOVATORS	INNOVATORS
AGRO-FORESTRY PRODUCTS	2	African Bamboo, Camco
AQUACULTURE	3	iDE Bangladesh, Motivo, U. of Toronto
DAIRY	5	Motivo, Promethean, SimGas, SunDanzer, UGA
FRUIT	1	Horn of Africa
HORTICULTURE	12	Ariya Capital, Claro Energy, Earth Institute, ECO Consult, Futurepump, ICU, iDE, KickStart, Motivo, Rebound, SunCulture, UVG
STAPLE CROPS	6	Claro Energy, EarthSpark, HuskPower, ICU, Motivo, VIA

**FIGURE 1.8 REGIONS IN WHICH POWERING AGRICULTURE INNOVATORS ARE WORKING**



The top half of the page features a green and yellow gradient background. On the left, a white circle contains the number '2'. To the right, there is a stylized illustration of a rural landscape. It includes a solar panel on a pole, a field of crops (possibly corn), and a bright sun in the upper right corner. The sun is surrounded by several concentric circles, suggesting a glow or light rays. The overall aesthetic is clean and modern, with a focus on clean energy and agriculture.

## 2

# PROGRAM ACTIVITIES

*The following are highlights of the main program support activities that were implemented during the reporting period.*

### **2.1 Mainstreaming**

One of Powering Agriculture's goals is to draw attention to the importance of the clean energy/agriculture nexus and the role that it can play in increasing agricultural productivity. Sharing knowledge and experiences gained through the program and the work of Innovators is an important means of achieving that goal. Powering Agriculture continues to collect and analyze information, and disseminate the findings and lessons learned through a variety of channels. These efforts are described in the following sections.

#### **2.1.1 Raising the Public's Awareness**

Powering Agriculture continued to: communicate the program's objectives and activities, share Innovator success stories, build awareness of the clean energy/agriculture nexus, and disseminate results and knowledge from the initiative. These communications activities were conducted using a variety of tools and approaches, as shown in Table 2.1, as well as through stories published in various print and online media outlets, and participation in conferences and workshops.

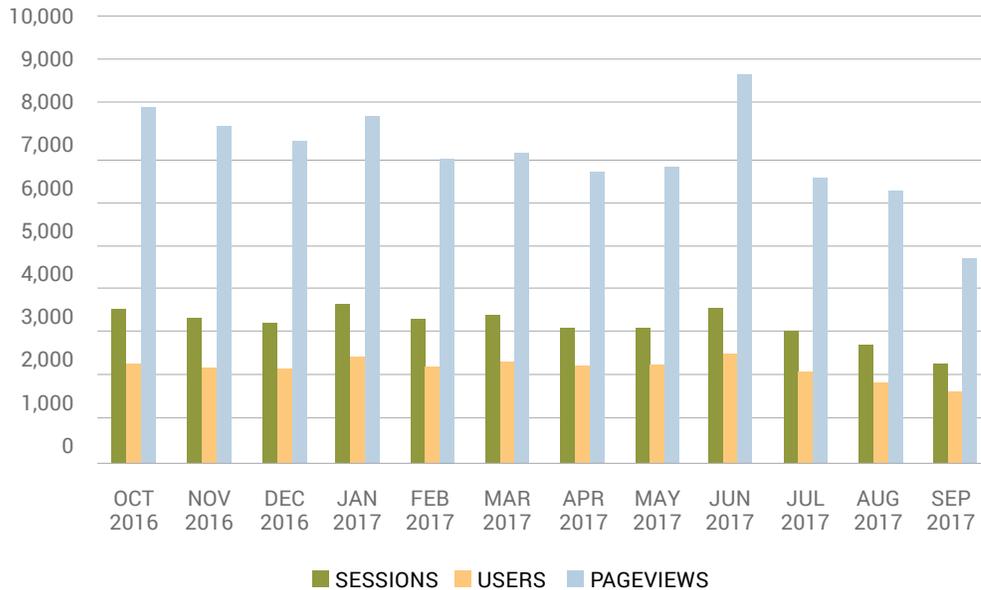


TABLE 2.1 POWERING AGRICULTURE COMMUNICATION PLATFORMS

PLATFORM		PURPOSE	CONTENTS
<b>Powering Agriculture website</b> <a href="http://www.poweringag.org">www.poweringag.org</a>		Powering Agriculture's primary public website; Communications and Outreach for Information Dissemination about the program	Official documents Calls for Proposals Outreach information (press releases, news articles, videos, event information) Resources
<b>Powering Agriculture Portal on energypedia.info</b> <a href="http://www.energypedia.info/wiki/Portal:Powering_Agriculture">www.energypedia.info/wiki/Portal:Powering_Agriculture</a>		Networking with experts; Research; mutual knowledge exchange	Thematic pages Articles and reports Studies Event announcements
<b>Powering Agriculture E-Newsletter</b>		To raise awareness of Powering Agriculture, its activities, and the successes of its Innovators	News Success Stories Event announcements
<b>@Poweringag Twitter Account</b>		To raise awareness of Powering Agriculture, its activities and the successes of its Innovators	News Event announcements
<b>Powering Agriculture Facebook Account</b>		To raise awareness of Powering Agriculture, its activities and the successes of its Innovators	News Event announcements Innovator Promotion
<b>Powering Agriculture Dashboard</b>		To inform senior management of the Founding Partners of programmatic and Innovator updates	News Event Announcements Resources

**Powering Agriculture Website.** The Powering Agriculture website is the principal information repository for program news and information. Website traffic during the reporting year is shown in Figure 2.1

FIGURE 2.1 POWERING AGRICULTURE WEBSITE ANALYTICS



**Powering Agriculture Newsletter.** Powering Agriculture disseminated 4 editions of its newsletter during the reporting period, as shown in Table 2.2.

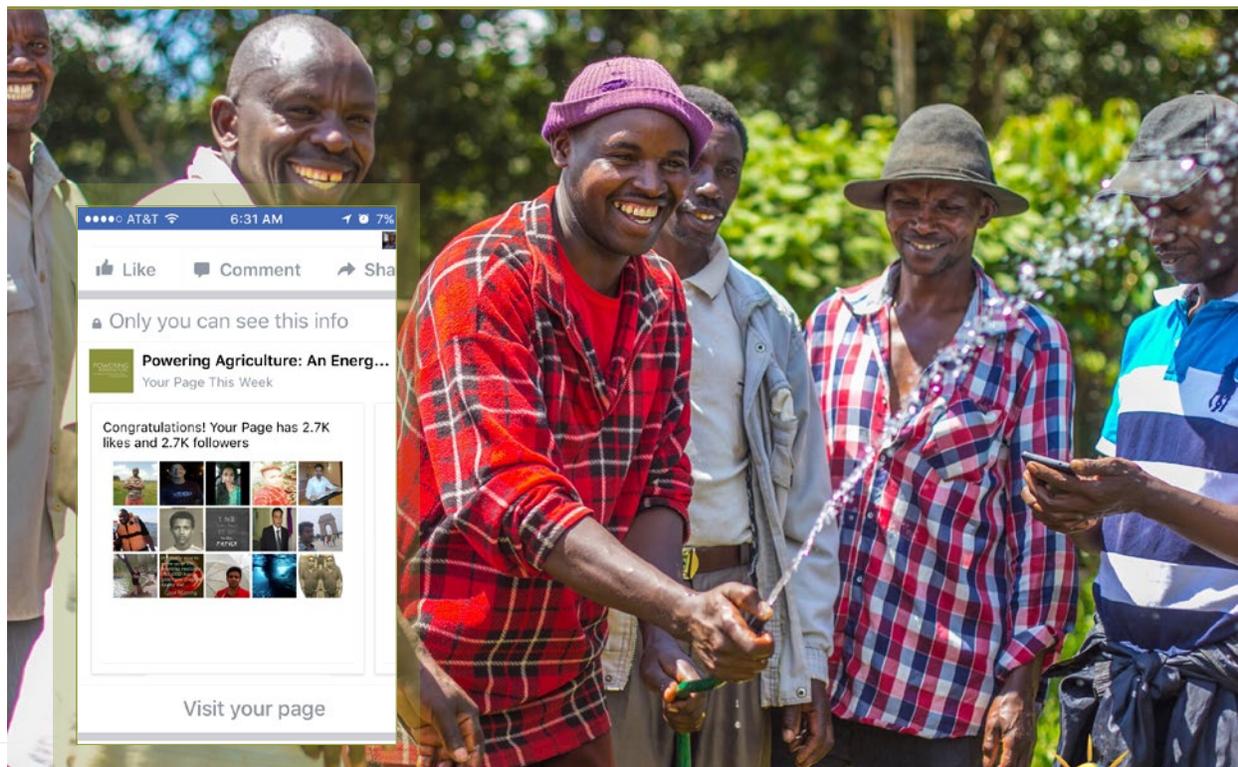
TABLE 2.2 POWERING AGRICULTURE NEWSLETTER DATA FY2017

DATE OF NEWSLETTER PUBLICATION	# OF CONTACTS	OPEN RATE (21% – INDUSTRY STANDARD*)	CLICK RATE (8.5% – INDUSTRY STANDARD*)
October 25, 2016	4,563	32%	12%
January 25, 2017	4,589	33%	17%
April 27, 2017	4,577	31%	11%
July 27, 2017	4,580	27%	14%

**Social Media Activities.** The Powering Agriculture Facebook and Twitter accounts were used to post Innovator and program news, along with relevant energy/agriculture nexus stories. Social media also was an important tool in promoting the Powering Agriculture CaribOOC (described in Section 2.3.2). Powering Agriculture publicized the availability of the Gender Guides (described in Section 2.6) through a series of posts on the two accounts. Table 2.3 presents highlights of the year’s social media activities.

TABLE 2.3 **POWERING AGRICULTURE SOCIAL MEDIA ACTIVITY FY2017**

OUTLET	FOLLOWERS	NUMBER OF POSTS IN FY2017	HIGHEST CLICKS/ PROFILE VISITS	LARGEST REACH/ TOP TWEET
	2,999	127		2,683: PoweringAg innovators @SunDanzer_Intl @KickStart_Intl @iDEorg speak at @VentureWell Open #vwopen2017 #poweringag pic.twitter.com/n4FZILbnSD
	2,777	46		4,618 Impressions: On International Women's Day, Powering Agriculture is proud to recognize all of our Innovators who are working to improve the lives of women and girls through their clean energy solutions! March 8, 2017



**Wiki Portal Powering Agriculture.** The Energypedia Wiki Portal *Powering Agriculture* published a multitude of articles focusing on the interface of energy and agriculture, in order to create awareness and provide an overview on clean energy technologies for the food sector. Strong emphasis was given to promoting the value of energy efficiency in improving agricultural production. Over the course of the fiscal year, page views of the portal nearly doubled from 43,000 to more than 77,000. The portal consists of 127 articles on the clean energy/ag nexus, 70 prepared by Powering Agriculture itself.

**Media Coverage.** During the reporting year, Powering Agriculture reduced active media outreach. Despite this, the Powering Agriculture initiative and its Innovators still received coverage in 68 stories by various media as presented in Table 2.4.

TABLE 2.4 **FY 2016 POWERING AGRICULTURE MEDIA COVERAGE**

MEDIA OUTLET	TITLE	LINK	INNOVATOR
ASEE PRISM	Disruptive Development	<a href="http://www.asee-prism.org/disruptive-development/">http://www.asee-prism.org/disruptive-development/</a>	UGARF
Microgrid Knowledge	EarthSpark's Haiti Microgrid "Fared Comparatively Well" in Hurricane Matthew & Other News	<a href="https://microgridknowledge.com/haiti-microgrid/">https://microgridknowledge.com/haiti-microgrid/</a>	EarthSpark
The Better India	Two Men from the US Are Helping Dairy Farmers in Rural India Keep Milk Chilled without Electricity	<a href="http://www.thebetterindia.com/73124/promethean-power-systems-milk-chiller-electricity/">http://www.thebetterindia.com/73124/promethean-power-systems-milk-chiller-electricity/</a>	Promethean
Microgrid Knowledge	Microgrid Rebuilding Continues as Haiti Struggles to Recover from Hurricane Matthew	<a href="https://microgridknowledge.com/microgrid-rebuilding-haiti/">https://microgridknowledge.com/microgrid-rebuilding-haiti/</a>	EarthSpark
Bloomberg	U.S. Startup Plans Africa Expansion With Solar Kits	<a href="http://www.bloomberg.com/news/articles/2016-10-31/u-s-startup-plans-africa-expansion-with-sun-powered-water-kits">http://www.bloomberg.com/news/articles/2016-10-31/u-s-startup-plans-africa-expansion-with-sun-powered-water-kits</a>	SunCulture
Engineering.com	Fighting Poverty Through Better Design	<a href="http://www.engineering.com/Design-Software/DesignSoftwareArticles/ArticleID/13527/Fighting-Poverty-Through-Better-Design.aspx">http://www.engineering.com/Design-Software/DesignSoftwareArticles/ArticleID/13527/Fighting-Poverty-Through-Better-Design.aspx</a>	KickStart International
AidEx	KickStart Founder Nominated for AidEx Humanitarian Hero 2016	<a href="http://www.aid-expo.com/humanitarian-hero-award-2016">http://www.aid-expo.com/humanitarian-hero-award-2016</a>	KickStart International
Thomson Reuters	Solar irrigation cuts drought risk, emissions for Kenya's farmers	<a href="http://news.trust.org/item/20161128111008-4wcbo">http://news.trust.org/item/20161128111008-4wcbo</a>	Futurepump
UNREASONABLE.is	When Smallholder Farmers Succeed, Their Kids Go to School	<a href="https://unreasonable.is/smallholder-farmers-succeed-kids-go-school/?utm_content=buffer29e16&amp;utm_medium=social&amp;utm_source=facebook.com&amp;utm_campaign=buffer">https://unreasonable.is/smallholder-farmers-succeed-kids-go-school/?utm_content=buffer29e16&amp;utm_medium=social&amp;utm_source=facebook.com&amp;utm_campaign=buffer</a>	SunCulture
Rebound Technologies	Rebound Technologies and Lineage Logistics to Collaborate on IcePoint™ Project	<a href="http://rebound-tech.com/lineage-collaboration">http://rebound-tech.com/lineage-collaboration</a>	Rebound Technologies
Rebound Technologies	Southern California Edison Validates IcePoint™	<i>no link - part of newsletter above</i>	Rebound Technologies
Finance for Resilience/Fire Awards	The Fire Awards announce four finalists	<a href="http://www.financeforresilience.com/news/06-12-2016/finalists-prepare-bnef-summit/">http://www.financeforresilience.com/news/06-12-2016/finalists-prepare-bnef-summit/</a>	VIA
<a href="http://plurrify.net/">http://plurrify.net/</a>	#46 KickStart International, Jenna Rogers-Rafferty	<a href="http://plurrify.net/episodes/46-kick-start-international.html">http://plurrify.net/episodes/46-kick-start-international.html</a>	Rebound Technologies

MEDIA OUTLET	TITLE	LINK	INNOVATOR
Inspir'ation News	Sustainable irrigation: The pump of the future helping farmers in Kenya	<a href="http://www.inspiration.news/en/2016/12/02/sustainable-irrigation-the-pump-of-the-future-helping-farmers-in-kenya/">http://www.inspiration.news/en/2016/12/02/sustainable-irrigation-the-pump-of-the-future-helping-farmers-in-kenya/</a>	Futurepump
Finance for Resilience/Fire Awards	Solar Agro-processing Power Stations	<a href="http://www.financeforresilience.com/priority/solar-agro-processing-power-stations/">http://www.financeforresilience.com/priority/solar-agro-processing-power-stations/</a>	VIA
FarmBiz Africa	Solar pump helps farmer rear fish away from the river	<a href="http://www.farmbizafrika.com/profit-boosters/solar-pump-rear-fish-away-from-the-river">http://www.farmbizafrika.com/profit-boosters/solar-pump-rear-fish-away-from-the-river</a>	Futurepump
Clean Leap	Tapping into sunshine	<a href="http://cleanleap.com/tapping-sunshine">http://cleanleap.com/tapping-sunshine</a>	Futurepump
National Geographic	Could Climate Change Build Big Business in Kenya?	<a href="http://www.nationalgeographic.com/people-and-culture/food/the-plate/2016/12/could-climate-change-build-a-business-boom-in-kenya/">http://www.nationalgeographic.com/people-and-culture/food/the-plate/2016/12/could-climate-change-build-a-business-boom-in-kenya/</a>	Futurepump
Forbes	Forbes 30 Under 30 - Energy: Samir Ibrahim	<a href="http://www.forbes.com/profile/samir-ibrahim/">http://www.forbes.com/profile/samir-ibrahim/</a>	SunCulture
Ashden	Longlist announced for the 2017 Ashden Awards	<a href="http://www.ashden.org/blog/longlist-announced-2017-ashden-awards">http://www.ashden.org/blog/longlist-announced-2017-ashden-awards</a>	Futurepump, SunCulture
AgFunder News	How One Startup is Deploying Agtech in Developing Markets	<a href="https://agfundernews.com/how-one-startup-is-deploying-agtech-in-developing-markets.html">https://agfundernews.com/how-one-startup-is-deploying-agtech-in-developing-markets.html</a>	SunCulture
All Africa	East Africa: Clean Energy Firms in East Africa Go Online to Raise Funds for Expansion	<a href="http://allafrica.com/stories/201701120096.html">http://allafrica.com/stories/201701120096.html</a>	SimGas
nextbigwhat	Pune-based Promethean Power Systems' Innovation Keeps Milk Safe in Rural India	<a href="https://www.nextbigwhat.com/pune-based-promethean-power-systems-innovation-keeps-milk-safe-in-rural-india-297/">https://www.nextbigwhat.com/pune-based-promethean-power-systems-innovation-keeps-milk-safe-in-rural-india-297/</a>	Promethean
AgFunder News	BREAKING: AgFunder Innovation Awards 2016 Winners Announced	<a href="https://agfundernews.com/ag-funder-releases-winners-inaugural-agfunder-innovation-awards.html?utm_content=buffer810d9&amp;utm_medium=social&amp;utm_source=twitter.com&amp;utm_campaign=buffer">https://agfundernews.com/ag-funder-releases-winners-inaugural-agfunder-innovation-awards.html?utm_content=buffer810d9&amp;utm_medium=social&amp;utm_source=twitter.com&amp;utm_campaign=buffer</a>	SunCulture
Guardian	The tech solutions helping to improve livelihoods of African farmers	<a href="https://www.theguardian.com/dia-geo-partner-zone/2017/jan/25/the-tech-solutions-helping-to-improve-livelihoods-of-african-farmers">https://www.theguardian.com/dia-geo-partner-zone/2017/jan/25/the-tech-solutions-helping-to-improve-livelihoods-of-african-farmers</a>	Futurepump
Business Standard	Eventual sweet taste of success	<a href="http://www.business-standard.com/article/companies/eventual-sweet-taste-of-success-11701300014_1.html">http://www.business-standard.com/article/companies/eventual-sweet-taste-of-success-11701300014_1.html</a>	SunCulture
Economic Times of India	How Promethean Power Systems is revitalizing dairy farming industry	<a href="http://cio.economictimes.indiatimes.com/news/corporate-news/how-promethean-power-systems-is-revitalizing-dairy-farming-industry/56908332">http://cio.economictimes.indiatimes.com/news/corporate-news/how-promethean-power-systems-is-revitalizing-dairy-farming-industry/56908332</a>	Futurepump

MEDIA OUTLET	TITLE	LINK	INNOVATOR
Food + City	How a Little Startup Fixes a Big Food Chain Gap	<a href="https://www.foodandcity.org/digital/2017/2/16/how-a-little-startup-fixes-a-big-food-chain-gap">https://www.foodandcity.org/digital/2017/2/16/how-a-little-startup-fixes-a-big-food-chain-gap</a>	Prometheam Power
Climate News Network	Solar Energy Powers Sustainable Solutions	<a href="http://climatenewsnetwork.net/solar-energy-sustainable-solutions/">http://climatenewsnetwork.net/solar-energy-sustainable-solutions/</a>	Futurepump/SunCulture
Engineering for Change	As Costs Fall, Designers Take a New Look at Solar Irrigation	<a href="https://www.engineeringforchange.org/as-costs-fall-designers-take-a-new-look-at-solar-irrigation/">https://www.engineeringforchange.org/as-costs-fall-designers-take-a-new-look-at-solar-irrigation/</a>	Futurepump
The India Express	Bulk milk coolers: A cool way to chill for dairies and farmers	<a href="http://indianexpress.com/article/india/bulk-milk-coolers-a-cool-way-to-chill-for-dairies-and-farmers-bmc-4538749/">http://indianexpress.com/article/india/bulk-milk-coolers-a-cool-way-to-chill-for-dairies-and-farmers-bmc-4538749/</a>	Promethean
Engineering for Change	A solar thermal aerator prototype could improve aquaculture in developing countries	<a href="https://www.engineeringforchange.org/solar-thermal-aerator-prototype-improve-aquaculture-developing-countries/">https://www.engineeringforchange.org/solar-thermal-aerator-prototype-improve-aquaculture-developing-countries/</a>	University of Toronto
Farmbiz Africa	Farmer buys a cow from irrigation savings	<a href="http://www.farmbizafrika.com/profit-boosters/solar-irrigation-savings-buy-cow-for-farmer">http://www.farmbizafrika.com/profit-boosters/solar-irrigation-savings-buy-cow-for-farmer</a>	Futurepump
Ashden	2017 Ashden Awards: the finalists	<a href="http://www.ashden.org/awards/2017/international">http://www.ashden.org/awards/2017/international</a>	SunCulture & Futurepump
NextBillion	KickStart and VisionFund to Bring Affordable Irrigation to African Farmers	<a href="http://nextbillion.net/news/kick-start-and-visionfund-to-bring-affordable-irrigation-to-african-farmers/">http://nextbillion.net/news/kick-start-and-visionfund-to-bring-affordable-irrigation-to-african-farmers/</a>	KickStart International
London Stock Exchange	Companies to Inspire Africa	<a href="http://www.lseg.com/resources/companies-inspire-africa">http://www.lseg.com/resources/companies-inspire-africa</a>	SunCulture, Futurepump, EarthSpark, Husk Power
Your Story	Human capital: A primary barrier to scale for Indian cleantech startups	<a href="https://yourstory.com/2017/04/cleantech-startups/">https://yourstory.com/2017/04/cleantech-startups/</a>	Promethean Power
Bloomberg New Energy Finance	10 Companies chosen as 2017 New Energy Pioneers at tenth annual Bloomberg New Energy Finance Summit in New York City	<a href="https://www.bloomberg.com/news/articles/2017-04-24/ten-companies-recognized-as-2017-new-energy-pioneers-by-bnef">https://www.bloomberg.com/news/articles/2017-04-24/ten-companies-recognized-as-2017-new-energy-pioneers-by-bnef</a>	SunCulture
Youth Ki Awaaz	These Young Entrepreneurs Found A Genius Way To Light Up 300 Villages In Bihar	<a href="https://www.youthkiawaaz.com/2017/04/husk-power-systems-brings-electricity-to-rural-bihar/">https://www.youthkiawaaz.com/2017/04/husk-power-systems-brings-electricity-to-rural-bihar/</a>	Husk Power Systems
Power for All	Claro Energy: scaling solar irrigation in India (and Africa)	<a href="http://www.powerforall.org/blog/2017/5/4/claro-energy-scaling-solar-irrigation-in-india-and-africa">http://www.powerforall.org/blog/2017/5/4/claro-energy-scaling-solar-irrigation-in-india-and-africa</a>	SunCulture
Your Story	From Boston to the interiors of India, this initiative has come to rescue farmers straining to sustain the dairy industry	<a href="https://yourstory.com/2017/05/promethean-power-systems-2/">https://yourstory.com/2017/05/promethean-power-systems-2/</a>	Futurepump

MEDIA OUTLET	TITLE	LINK	INNOVATOR
Business Standard	Husk brings electricity to power-hungry Indian villages	<a href="http://www.business-standard.com/article/companies/husk-brings-electricity-to-power-hungry-indian-villages-117052100125_1.html">http://www.business-standard.com/article/companies/husk-brings-electricity-to-power-hungry-indian-villages-117052100125_1.html</a>	Husk Power Systems
Daily News and Analysis	Sons of the soil help transform India	<a href="http://www.dnaindia.com/india/report-sons-of-the-soil-help-transform-india-2451293">http://www.dnaindia.com/india/report-sons-of-the-soil-help-transform-india-2451293</a>	Husk Power Systems
Standard Digital	Strategic advice helps solar irrigation company overcome barriers to market scale	<a href="https://www.standardmedia.co.ke/business/article/2001242689/strategic-advice-helps-solar-irrigation-company-overcome-barriers-to-market-scale">https://www.standardmedia.co.ke/business/article/2001242689/strategic-advice-helps-solar-irrigation-company-overcome-barriers-to-market-scale</a>	SunCulture
Ashden	2017 Ashden Award winners announced	<a href="https://www.ashden.org/news/2017-ashden-award-winners-announced">https://www.ashden.org/news/2017-ashden-award-winners-announced</a>	Futurepump
Thomson Reuters	Multi-billion dollar Africa-India partnership aims to eradicate energy poverty	<a href="http://news.trust.org/item/20170612080410-43ue2">http://news.trust.org/item/20170612080410-43ue2</a>	Husk, Futurepump, Claro
African Business Review	Three East African sustainable initiatives win prestigious energy awards	<a href="http://www.africanbusinessreview.co.za/technology/2846/Three-East-African-sustainable-initiatives-win-prestigious-energy-awards">http://www.africanbusinessreview.co.za/technology/2846/Three-East-African-sustainable-initiatives-win-prestigious-energy-awards</a>	Futurepump
Ashden	Futurepump   The future's bright for farmers in Kenya	<a href="https://www.ashden.org/winners/futurepump#continue">https://www.ashden.org/winners/futurepump#continue</a>	Futurepump
Dhaka Tribune	Milk Money	<a href="http://www.dhakatribune.com/opinion/op-ed/2017/06/24/milk-money/">http://www.dhakatribune.com/opinion/op-ed/2017/06/24/milk-money/</a>	Promethean Power
The Financial Express	BRAC Dairy Eliminates Milk Spoilage	<a href="http://www.thefinancialexpress-bd.com/2017/06/26/75017/BRAC-Dairy-eliminates-milk-spoilage">http://www.thefinancialexpress-bd.com/2017/06/26/75017/BRAC-Dairy-eliminates-milk-spoilage</a>	Promethean Power
IAmWire	How We Are Delivering Economic Prosperity and Transforming Rural India at Claro Energy	<a href="http://www.iamwire.com/2017/06/claro-energy/154242">http://www.iamwire.com/2017/06/claro-energy/154242</a>	Claro
VOANews	Bringing the Internet to the World's Far-flung Corners	<a href="https://www.voanews.com/a/bringing-internet-to-the-worlds-far-flung-corners/3931208.html">https://www.voanews.com/a/bringing-internet-to-the-worlds-far-flung-corners/3931208.html</a>	SunCulture
Wicked Local Brookline	Brookline innovator puts a twist on technology to beat the heat	<a href="http://brookline.wickedlocal.com/news/20170707/brookline-innovator-puts-twist-on-technology-to-beat-heat">http://brookline.wickedlocal.com/news/20170707/brookline-innovator-puts-twist-on-technology-to-beat-heat</a>	Promethean Power
News Hour	Promethean Power Systems Partners with USAID-backed Program to Help Bangladeshi Dairy Farmers	<a href="https://newshour.online/2017/07/13/promethean-power-systems-partners-with-usaid-backed-program-to-help-bangladeshi-dairy-farmers/">https://newshour.online/2017/07/13/promethean-power-systems-partners-with-usaid-backed-program-to-help-bangladeshi-dairy-farmers/</a>	Promethean Power
Nepali Times	Sun and Water	<a href="http://nepalitimes.com/article/nation/solar-irrigation-to-bring-home-farmers,3832">http://nepalitimes.com/article/nation/solar-irrigation-to-bring-home-farmers,3832</a>	Futurepump

MEDIA OUTLET	TITLE	LINK	INNOVATOR
How We Made it in Africa	Start-up snapshot: Talking business with solar irrigation company	<a href="https://www.howwemadeitinafrica.com/start-snapshot-talking-business-solar-irrigation-company/59230/">https://www.howwemadeitinafrica.com/start-snapshot-talking-business-solar-irrigation-company/59230/</a>	SunCulture
Recycling Today	Closed Loop Ventures invests in Rebound Technologies	<a href="http://www.recyclingtoday.com/article/closed-loop-ventures-invests-rebound-technologies/">http://www.recyclingtoday.com/article/closed-loop-ventures-invests-rebound-technologies/</a>	Rebound Technologies
The Business Tribune	Generation Innovation	<a href="http://thebusinesstribune.net/2017/07/generation-innovation/">http://thebusinesstribune.net/2017/07/generation-innovation/</a>	Futurepump
ASME	Solar-Powered Aeration Boosts Developing World	<a href="https://www.asme.org/engineering-topics/articles/technology-and-society/solarpowered-aeration-boosts-developing-world">https://www.asme.org/engineering-topics/articles/technology-and-society/solarpowered-aeration-boosts-developing-world</a>	University of Toronto
PV Magazine	ecoligo launches new solar project on crowd investing platform	<a href="https://www.pv-magazine.com/press-releases/ecoligo-launches-new-solar-project-on-crowdinvesting-platform/">https://www.pv-magazine.com/press-releases/ecoligo-launches-new-solar-project-on-crowdinvesting-platform/</a>	Ariya Capital
Floral Daily	Kenya: Crowdfunded solar systems for Bondet Farm	<a href="http://www.floraldaily.com/article/11184/Kenya-Crowdfunded-solar-systems-for-Bondet-Farm">http://www.floraldaily.com/article/11184/Kenya-Crowdfunded-solar-systems-for-Bondet-Farm</a>	Ariya Capital
Sustainable Brands	Trending: Emerging Tech Poised to Slash Food Waste Across the Value Chain	<a href="http://www.sustainablebrands.com/news_and_views/waste_not/sustainable_brands/trending_emerging_technologies_aim_eradicate_food_waste_">http://www.sustainablebrands.com/news_and_views/waste_not/sustainable_brands/trending_emerging_technologies_aim_eradicate_food_waste_</a>	Rebound Technologies
Rural Marketing	'With Solar Pumps, Power is finally in the Farmers' hands'	<a href="https://www.ruralmarketing.in/interview/technology/with-solar-pumps-power-is-finally-in-the-farmers-hands">https://www.ruralmarketing.in/interview/technology/with-solar-pumps-power-is-finally-in-the-farmers-hands</a>	Claro
Rural Marketing	Claro Energy bags 1 MW Solar Projects in Madhya Pradesh	<a href="https://www.ruralmarketing.in/industry/technology/claro-energy-bags-1-mw-solar-projects-in-madhya-pradesh">https://www.ruralmarketing.in/industry/technology/claro-energy-bags-1-mw-solar-projects-in-madhya-pradesh</a>	Claro
City Lab	An Unlikely Pairing of Sustainable Development and Hip Hop	<a href="https://www.citylab.com/life/2017/09/when-sustainable-development-meets-hip-hop-pitch-and-flow/539832/?utm_source=twb">https://www.citylab.com/life/2017/09/when-sustainable-development-meets-hip-hop-pitch-and-flow/539832/?utm_source=twb</a>	SunCulture
Solutions Summit	Solutions Summit: A catalytic gathering at United Nations Headquarters during UN General Assembly week	<a href="http://www.solutions-summit.org/">http://www.solutions-summit.org/</a>	SunCulture
EEP Success Stories	SimGas equipped to provide 750 Biogas Milk Chillers to East African smallholder dairy farms in 2018	<a href="http://eepafrica.org/about-us/success-stories/success-story-reg7107-simgas/">http://eepafrica.org/about-us/success-stories/success-story-reg7107-simgas/</a>	SimGas
Jordan Times	More farms use solar energy to pump water	<a href="http://www.jordantimes.com/news/local/more-farms-use-solar-energy-pump-water">http://www.jordantimes.com/news/local/more-farms-use-solar-energy-pump-water</a>	ICU

## 2.1.2 Training and Conferences

### **Energy efficiency trainings and audits efforts.**

Tea processing requires intensive energy input that is often costly and unsustainable. This presents an opportunity for significant energy saving. To tap this potential, Powering Agriculture Partner GIZ joined forces with the Kenya Tea Development Agency (KTDA), the Ethical Tea Partnership (ETP), Taylor's of Harrogate, and Mars Drinks to build capacity in energy efficiency in East Africa. By the end of September 2017, 68 KTDA tea factories in Kenya have received energy audits and more than 500 KTDA staff have been trained on energy efficiency (EE) measures conducted by The Strathmore University Energy Research Centre. The 11 "early movers" –the first factories that received audits, training, and recommendations for energy efficiency measures– on average reduced electricity by 11% and firewood consumption by 10%. This equates to an annual energy cost saving of more than USD65,000 per factory.

### **Toolbox on Solar Powered Irrigation Systems.**

Powering Agriculture in partnership with the United Nations Food and Agriculture Organization (FAO), developed the *Toolbox on Solar Powered Irrigation Systems. Information and Tools for Advising on Solar Water Pumping and Irrigation*. The Toolbox is designed to enable advisors and practitioners in the field of solar irrigation to provide broad hands-on guidance to end-users, clients, policy-makers, and financiers. It covers critical aspects such as assessing the water requirements, comparing the financial viability, determining farm profitability, highlights critical workmanship quality aspects, and much more. Three international training workshops with a total of over 80 participants were held in Rwanda, Germany, and Chile, during which the

Toolbox and its key features were presented. The participants included representatives from government irrigation, agriculture, and energy bodies, agricultural extension agents, experts from solar pumping and irrigation companies, and rural development practitioners. While the toolbox will be officially launched in March 2018, the online version is already available on the wiki platform of [energypedia.info](https://energypedia.info/wiki/Toolbox_on_SPIS): [https://energypedia.info/wiki/Toolbox\\_on\\_SPIS](https://energypedia.info/wiki/Toolbox_on_SPIS).

### **Upscaling the MOOC training to the Caribbean**

-> **CaribOOC**. More than 1,300 participants learned about new and sustainable approaches to clean energy solutions for increasing agriculture productivity by participated in Powering Agriculture's Massive Open Online Course (MOOC) on Sustainable Energy for Food (<https://poweringag.org/mooc>) in the early part of 2016. The strong interest proved both the relevance of the topic and the power of massive open online learning. Based on the success of the inaugural course, the MOOC materials and case studies were modified for the Caribbean region. The course –named CaribOOC– was piloted in Spring 2017 with 40 participants. CaribOOC was run in partnership with GIZ Project REETA (Renewable Energy and Energy Efficiency Technical Assistance), GIZ Academy for International Cooperation (AIZ), and the Inter-American Institute for Cooperation on Agriculture (IICA), with support of TH Köln and the University ISA, Santiago.

**VentureWell Open 2017**. Powering Agriculture convened a panel at the VentureWell Open 2017 on *Lessons Learned by Early-Stage Clean Tech Innovators in Developing Countries*. The panel, which took place on March 24, 2017, was comprised of representatives from iDE, KickStart International, and SunDanzer and



Powering Agriculture, and was moderated by Powering Agriculture's Program Manager. Panelists shared insights and lessons learned in response to common challenges identified in the Powering Agriculture mid-term assessment of the 2013 Innovators' progress to date. The presentation can be accessed here: <https://venturewell.org/open-2017-papers-presentations-posters/>

**Solar Milk Cooling Award for University Hohenheim at Intersolar.** In May 2017, Powering Agriculture Partner GIZ, along with the University of Hohenheim and Phaesun, won an award at the annual Intersolar Conference held in Munich, Germany, in the category of outstanding solar projects. Phaesun specializes in the sale, installation, and operation of off-grid

photovoltaics and wind energy systems. The award-winning system uses solar energy for cooling milk in Kenya and Tunisia. The concept maintains the cold chain for storage and transport of milk, which is particularly critical in off-grid regions. The system is based on conventional direct current refrigerators equipped with a smart component. The cooling power demand is adapted to the solar energy generated each hour and batteries are replaced by thermal energy storage in the form of ice. The project's potential positive effects on society and the economy, as well as the favorable business case won over the panel of judges. <http://www.intersolar.de/en/news/article/intersolar-award-here-are-the-winners-for-2017-our-anniversary-year-2542.html>

## 2.2 Knowledge Management

The generation, analysis, dissemination, and application of knowledge on the clean energy/agriculture nexus leverages lessons learned from Powering Agriculture's Innovators to further promote the integration of clean energy solutions within agricultural supply chains, and adapt clean energy solutions to the developing country context. Powering Agriculture has produced numerous publications and studies (described below) and through the regional Powering Agriculture Hub in East Africa and collaborations with U.S. presidential initiatives such as Power Africa and Feed the Future, further works to mainstream knowledge gained from the implementation of Powering Agriculture.

### 2.2.1 Research and Studies

*Powering Agriculture has released two publications on irrigation during the reporting period.*

**Journal publication on irrigation.** Powering Agriculture's paper on "Increasing Productivity through Irrigation: Problems and Solutions Implemented in Africa and Asia" was published in the *Special Issue on Energy and Food Security in a Humanitarian Context, Journal of Sustainable Energy Technologies and Assessments* in February 2017. The paper presents three major problems inhibiting the spread of irrigation in areas where agricultural productivity heavily depends on rainfall: lack of access to water, lack of access to energy, and lack of access to finance. It discusses how these problems are interconnected, complicating the use of technological solutions addressing them, and analyzes several solar irrigation approaches tackling these problems in Asia and Africa supported under Powering Agriculture. Access

the abstract here: <https://poweringag.org/news-events/news/increasing-productivity-through-irrigation-problems-solutions-implemented-africa>

### Global Study on Solar Powered Irrigation

**Systems (SPIS).** The state of the art of SPIS is comprehensively documented in the Powering Agriculture publication *Solar Powered Irrigation Systems (SPIS). Technology. Economy. Impact* [https://energypedia.info/wiki/Solar\\_Powered\\_Irrigation\\_Systems\\_-\\_Technology,\\_Economy,\\_Impacts](https://energypedia.info/wiki/Solar_Powered_Irrigation_Systems_-_Technology,_Economy,_Impacts)—expected to be published in December 2017. In addition, FAO and Powering Agriculture joined forces to get a closer look at the present challenges of SPIS and prepared SPIS country profiles of India, Kenya, Mexico, Morocco, Nepal, and Senegal. It develops recommendations for further research and development, capacity building, and structural support needed for further uptake of solar irrigation worldwide.

**Cost and Benefits of CES Technologies.** In 2015, Powering Agriculture with the FAO published the study *Opportunities for Agri-Food Chains to Become Energy Smart* <https://poweringag.org/docs/opportunities-agri-food-chains-become-energy-smart>. The study presents a cost-benefit analysis (CBA) methodology which would show social and economic, as well as ecological, co-benefits of a specific clean energy solution in a food value chain. The methodology takes into account both financial and economic considerations which allows the real net benefit of an investment to be quantified.

The methodology has successfully been tested in three value chains (rice, fruits and vegetables, milk) in four countries (Philippines, Tunisia, Tanzania, Kenya). Case studies on two Powering Agriculture Innovators were included in the



two-part study *Costs and Benefits of Clean Energy Technologies in the Milk, Vegetable and Rice Value Chain*. (Part I: *Intervention Level*, Part II: *Impact at Scale*), FAO & GIZ, which is forthcoming.

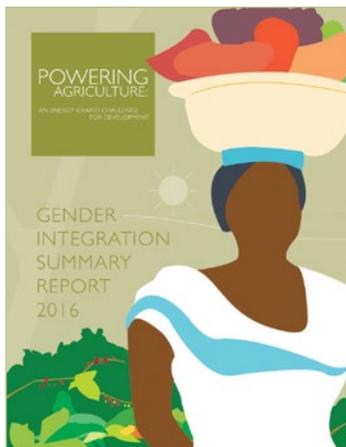
**MOOC Reader.** In early 2017, Powering Agriculture released an updated companion reader for the Sustainable Energy for Food MOOC (held in 2016). The reader is an online publication, which covers climate change, energy input in agriculture value chains, renewable energy sources and technologies, energy efficiency, policies and regulations, and business models for projects in the Nexus. The reader is accessible via <https://poweringag.org/docs/mooc-reader>. The MOOC reader was rated as best performing publication in the [respective energypedia](#) newsletter that promoted the reader.

**Solar Milk Cooling: Analysis of Dairy Value Chains in India and Kenya and Business Model Development.** Powering Agriculture Partner GIZ has been collaborating with the Renewable Energy and Energy Efficiency Partnership (REEEP) to map out the cold chain along the dairy value chain in both India and Kenya in order to identify the most suitable entry points for CES. The research was backed up by stakeholder interviews and stakeholder workshops in both countries. Results will feed into Powering Agriculture's future activities in the milk value chain. Download the info graphic and key findings factsheet [here](#).

**Study: Renewable Energy and Energy Efficiency in the Southern African Biotrade and Small Agricultural Sector.** Biotrade includes the cultivation, harvest, processing, packaging, promotion, and marketing of products made from or including indigenous plants. Energy constraints in the southern African and international biotrade have to some extent held back the full potential of the industry's development and, if not overcome, will continue to retard its growth. Powering Agriculture conducted a study that examined current energy practices across the various biotrade value chains (e.g., marula, baobab, moringa, devils claw, and others) and identified viable agricultural businesses and entry points for further improvements. The study aimed to identify untapped potentials for social and economic benefits, i.e., rural employment, women's economic involvement, poverty alleviation and the creation of sustainable businesses. Click [here](#) for download of the full report.



## 2.3 Gender



Powering Agriculture continued its efforts to ensure that gender issues are considered by the Innovators in the design, development, and deployment of their clean energy solutions (CES). During the reporting period, Powering Agriculture published its Gender Integration Summary Report 2016 which examined both current efforts and future plans of Powering Agriculture Innovators to integrate gender considerations into their work. The report identifies gender-related planning and monitoring and evaluation (M&E) activities completed to date, future innovator plans for gender integration, and demand-driven technical assistance needs, and it presents lessons learned at both the innovator

and program level. The report can be accessed here: <https://poweringag.org/docs/gender-integration-summary-report-2016>.

Powering Agriculture also published a series of 6 topical guides focused on integrating gender into the development and deployment of CES for the agricultural sector. The practical guides can assist innovators and others working in the clean energy/agriculture nexus and related fields to better reach and serve women—a large, important, and often overlooked market segment.

Although the guides were geared towards the needs of the Powering Agriculture innovators, they have received praise from Power Africa and the USAID Gender Champs, and they have had uptake by other programs including the Women in African Power group.

The guides cover the following areas:



### CES DEPLOYMENT

The insights contained in this guide will help unlock the potential demand for a CES among women farmers in particular, who have been under-targeted and underserved. It also provides best practices on how to integrate gender at all levels: individual, community, and within the CES organization.

*The guide includes a checklist that can help in developing a gender-responsive strategy to increase the sales of CES technology to both female and male clients.*



## PRODUCT DEVELOPMENT

Ensuring that a clean energy solution's product development process encompasses both a male and female perspective is good for business. There are five stages to the product development process; each stage has unique gender considerations. This guide describes these stages, and points out gender consideration strategies that can be applied to each.

*It also includes a useful checklist that will help in the design of a gender-responsive product development process. that will help in the design of a gender-responsive product development process.*



## FINANCIAL PRODUCTS

Women make up nearly half of the agricultural labor force in developing countries. However, access to financing continues to be a challenge for women. In most countries, the share of female smallholders who can access credit is 5 percent–10 percent lower than for male smallholders. Unlocking demand for a technology at a relatively low risk can be accomplished by developing and facilitating access to gender-responsive financial products via partnerships with existing financial institutions or in-house programs.

*The guide also includes a checklist that can be helpful in developing a portfolio of appropriate financial products and services to increase the sales of CES technology to both female and male clients.*



## MARKETING

This guide helps in developing a marketing approach that encompasses both female and male users, and is based on international best practices in gender-responsive marketing. Gender analysis, communication, accessibility and ease of use are all discussed.

*The guide includes a practical checklist that will help to assess the extent to which marketing strategies effectively target and reach both male and female clients.*

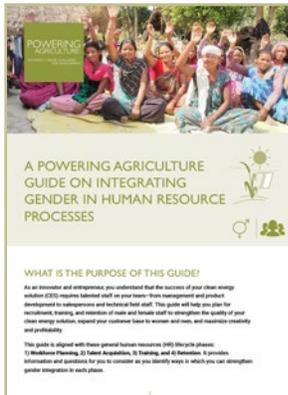


## MONITORING AND EVALUATION

This guide outlines why integrating gender into monitoring and evaluation (M&E) makes good commercial sense, and the best practices for integrating gender into the M&E of a clean energy solution (CES).

Collecting good data is only the beginning—using data about how a CES technology is positively impacting the quality of life, well-being, incomes, and productivity for male and female farmers, as well as small and medium enterprises, can be powerful and profitable.

*The guide includes an illustrative list of gender-descriptive indicators to assess the impact of a CES on women and men.*



## HUMAN RESOURCES

Women account for a large share of the global consumer market, and drive many purchasing decisions within households—including in the agricultural sector in developing countries. To reach this crucial segment, women need to be included in product development, marketing and sales, and on management and technical teams.

*This guide aligns with four general human resources (HR) lifecycle phases: 1) Workforce Planning, 2) Talent Acquisition, 3) Training and 4) Retention, and provides information and questions to be considered when identifying ways in which gender integration can be strengthened in each phase.*



## 2.4 Partners Meeting

The Partners held their annual Partners Meeting at GIZ headquarters in Bonn, Germany, March 28–29, 2017. This section summarizes the topics of discussion and decisions over the course of the two-day meeting.

Key topics of discussion included:

- FAO analysis of Solar-powered Irrigation Systems (SPIS) and “INVESTA Study” on the costs/benefits of specific technologies supported through Powering Agriculture
- Experience of GIZ’s East African Hub, including innovator participation in regional conferences and connection with GIZ pilot projects and studies
- Status of the long-envisioned financing facility, and progress on its implementation through the creation of a Global Development Alliance (GDA), USAID’s public-private partnership (PPP) mechanism.
- Progress of the Powering Agriculture innovators and measures of their success
- The future of the Powering Agriculture Grand Challenge (beyond the 2019 timeframe)

The Partners agreed on a number of key points over the course of the meeting. These included:

- Partners were in favor of Powering Agriculture Partner GIZ’s continuation of the regional hub in East Africa and pursuit of establishing additional regional hubs potentially in MENA, West Africa and/ or India.

- GIZ will investigate the availability of existing market analyses for focal CES technologies (SPIS and cold storage) and will propose knowledge product(s) deemed beneficial in this.
- It was decided that business acceleration support should be continued for a subset of the 2013 innovator cohort and for select innovators from the 2015 cohort through 2019, based on the best possibility for commercial success as determined by the Powering Agriculture’s business accelerator advisor.
- It was agreed that a study will be designed to examine the overall impact of the Power Agriculture program and success/shortfalls of innovators supported. The study will be conducted in 2019.
- Partners agreed to continue pursuing the establishment of a financing facility with remaining pooled funds via USAID’s GDA Annual Program Statement (APS) process which invites prospective partners to work side-by-side with USAID and other interested organizations to build transformational partnerships that foster and leverage market-based approaches to solve critical business and development challenges.
- Continuation of Powering Agriculture is favored by all Partners post-2019, however the exact nature and focus for the effort will require further discussion. Partners will consider the possibility of expanding the technical focus of the Grand Challenge and/ or seeking additional resource partners.

# 3



# INNOVATORS

## 3.1 Innovator progress

The Power Agriculture Initiative promotes the development and deployment of clean energy innovations that increase agriculture productivity and stimulate low carbon economic growth in the agriculture sector of developing countries to help end extreme poverty and extreme hunger. To this end, Powering Agriculture has supported Innovators that:

- Increase the visibility of clean energy solutions
- Have developed new clean energy product prototypes using technology unavailable in developing markets, or have modified existing products in developed markets for use in developing markets
- Have increased access to clean energy asset financing
- Have pushed the boundaries on viable clean energy business model creation.

Innovator success is tracked in multiple ways, including:

- Completion of project milestones
- Achievement of targets for numbers of installations and beneficiaries
- Advancing from one stage to the next on the innovation ladder
- Creation of and refinement of business models to profitably commercialize their innovation through:
  - Properly identifying a market segment and value proposition for the technology
  - Developing a distribution strategy for their innovation
  - Effectively and sustainably providing after-sales service to customers

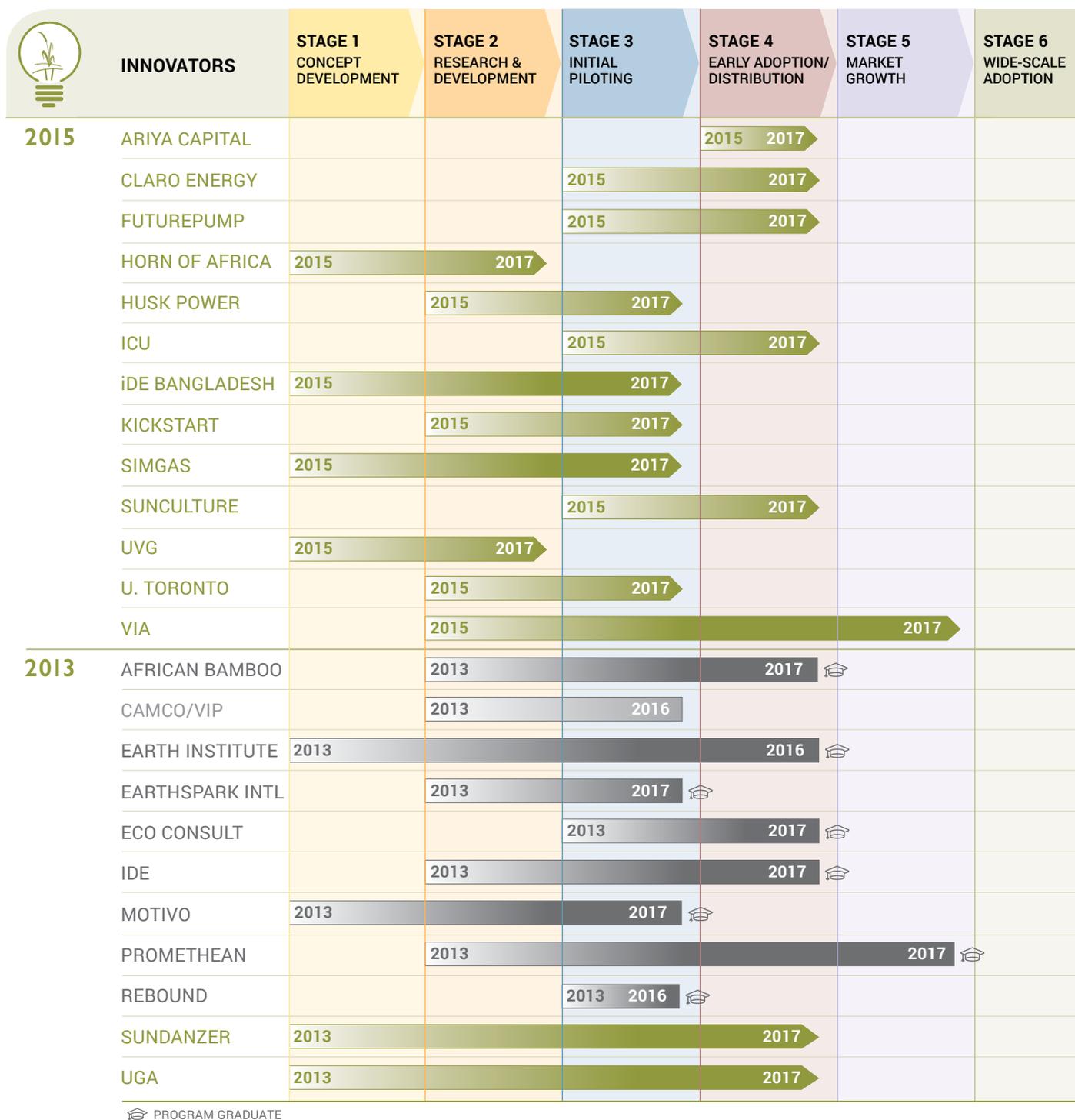
During the reporting period, six of the eleven innovators of the 2013 cohort ended their award and graduated from Powering Agriculture: African Bamboo, EarthSpark International, ECO Consult, iDE, Motivo Engineering, and Promethean Power Systems. Almost all of the 2015 Innovator cohort are now focused on pilot demonstrations and field testing and one of them expects to finish earlier than originally planned. During the period, many innovators made progress on refining their clean energy solutions and have gained significant insights into the importance of value engineering, incorporating end-user feedback into designs, performance/price trade-offs, and the competitive landscape for their target customers. In terms of commercial viability, Powering Agriculture supports a mix of non-profits and private companies, the latter of which range from newly incorporated startups to venture-backed companies with tens of millions of dollars raised in equity. Therefore some innovators may never have a sustainable business model, nor find private investors interested in funding their organizational growth. Others have a solid business foundation and have identified potential sustainable revenue streams from the product related to the award. Generally, the innovators with significant progress towards becoming sustainable have strong local partnerships and intimate knowledge of the local market –needs, willingness/ability to pay. Only one innovator has achieved scale attributed in part to its focus on large scale businesses as opposed to the individual end users.

Powering Agriculture funding continues to be catalytic. Four innovators are expanding to nearby countries. Innovators are using Powering Agriculture funding to leverage other financial support, including six innovators who have received grants, asset financing, funding from various impact funds, and, in the case of one innovator, Series C venture funds. Three innovators have also received in-kind support from other programs. As their projects yield positive results, the Innovators are also gaining visibility for their work, with several of them winning awards or being listed as finalists.

- Promethean won the Confederation of Indian Industry's **Significant Achievement in Innovation award**.
- VIA was shortlisted by the **India Innovation Lab for Green Finance** as one of the top 3 ideas out of 72 ideas submitted in the 2016-2017 cycle.
- VIA was a 2017 **Fire Awards** Finalist and also shortlisted for the 2016-2017 India Lab cycle.
- SunCulture was chosen as a New Energy Pioneer by **Bloomberg New Energy Finance**.
- SunCulture was named one of The 5 Most Innovative International Pre-Series A Startups by the inaugural **AgFunder Innovation Awards**.
- SunCulture was awarded a grant by the **Microsoft Affordable Access Initiative**, which will be used to focus on expanding their irrigation system with technology including sensors, cameras, and drones.
- Futurepump received the **2017 Ashden International Award** for Energy and Water for their solar-powered irrigation technology.

Figure 3.1 shows the 2013 and 2015 Innovators and their progress along the stages of innovation as of September 2017, as determined by the Innovators.

FIGURE 3.1 2013 AND 2015 INNOVATORS AND THEIR STAGES OF INNOVATION AT SEPTEMBER 2017



The following profiles provide a snapshot of each Innovator’s clean energy solution and their progress to date, as of September 2017. Visit [www.poweringag.org/innovators](http://www.poweringag.org/innovators) for a more detailed profile and the most up to date information about the Innovators’ work including links to news article and video clips.



# AFRICAN BAMBOO



**PROJECT**  
Biomass-Powered Thermal  
Processing of Ethiopian Bamboo

**INNOVATION STAGE 4**  
Early Adoption/Distribution

**CLEAN ENERGY SOURCE**  
Biomass

**AGRICULTURAL FOCUS**  
Processing

**PRODUCT SEGMENT**  
Agro-Forestry Products

**COLLABORATOR(S)**  
Heartland Global (USA)

**LOCATION APPLIED**  
Southern Nations, Nationalities,  
and Peoples' Region (SNNPR), Ethiopia



[www.african-bamboo.com](http://www.african-bamboo.com)

## CLEAN ENERGY SOLUTION

African Bamboo's solution is an environmentally friendly bamboo thermal modification process called ThermoBoo, a modern value-added processing techniques that promises to increase the earning potential of farmers. Through ThermoBoo, a chemical-free process, decay factors such as rot and insects are virtually eliminated, and the thermally-modified bamboo fiber can be further processed into sturdy panels that can be marketed to a range of domestic and international buyers. The ThermoBoo process involves the combustion of biomass dust—a technological approach that is completely new to Ethiopia. Through the project's successful implementation of a processing facility, African Bamboo envisions the improvement of the livelihood of the local community through job creation by forming new micro and small enterprises for bamboo forest harvesting and transportation, bamboo forest thinning, and micro charcoal production from low quality bamboo culms.

## PROGRESS UPDATE

By the end of the Powering Agriculture Award in September 2017, African Bamboo had concluded the lease agreement at Hawassa Industrial Park for a facility of 16,500 m<sup>2</sup> for its factory space for the manufacture and export of its bamboo-based composite boards. It has also completed testing, pre-certification and pre-labelling of the boards and defined mechanical, electrical and utilities requirements to start production. African Bamboo also concluded long-term supply agreements for the bamboo raw materials and bulk purchase agreements for all inputs. It has signed various sales contracts, letters of intent for investment and identified 120 buyers in Europe and United States. At full-scale production, African Bamboo expects to produce 600,000 m<sup>2</sup> per year resulting in prospective annual earnings of Euro 2.5 million to 6,000 farmers. The abdication of the use of diesel fuel - which is the widespread practice in Ethiopia - and its replacement by biomass residues generated during the production process will reduce the greenhouse gas emissions by a certifiable amount of 16,700 tCO<sub>2</sub>e per year.



# CAMCO



## PROJECT

Building Markets for Efficient Biomass Power Provision in Africa

## INNOVATION STAGE 3

Initial Piloting

## CLEAN ENERGY SOURCE

Biomass

## AGRICULTURAL FOCUS

Decentralized Power

## PRODUCT SEGMENT

Agro-Forestry Products

## COLLABORATOR(S)

Village Industrial Power (VIP) (USA)

## LOCATION APPLIED

Oueme region in Benin, and the Kigoma and Mufindi regions in Tanzania



[www.camcocleanenergy.com/africa](http://www.camcocleanenergy.com/africa)  
[www.villageindustrialpower.com](http://www.villageindustrialpower.com)

## CLEAN ENERGY SOLUTION

CAMCO's partner Village Industrial Power (VIP)'s solution is a small scale combined heat and power mobile steam plant powered through the combustion of biomass waste produced at local agricultural processing facilities to generate mechanical/ electrical/thermal energy. VIP's carbon neutral engine is fuel flexible, using waste such as maize cobs, coffee parchment, mango pits, and bagasse to generate energy that can be used for agricultural activities such as processing and drying; dairy pasteurization; pumping and purifying water. VIP's mobile power plant unit is robust, reliable, and on demand, enabling farmers to process their own crops and participate directly in the value chain.

## PROGRESS UPDATE

By the end of the Powering Agriculture Award in March 2016 CAMCO and VIP had installed five units in three locations. Three palm oil processing businesses in South Eastern Benin had tested the VIP unit in order to displace diesel consumption that is used in running the expeller press and the kernel and fiber separator. The VIP mini-grid in the village of Uchindile, Tanzania, electrified over 15 shops, homes, and a hospital while a rural clinic near Kigoma, Tanzania tested the VIP

unit to power a submersible pump, provided hot water for the laundry and powered other equipment with the electricity produced by the unit. Training on the operation and maintenance of the units was provided at all sites.

Through a networking event organized by the Powering Agriculture, VIP met Factor(e) Ventures, an engineering and business incubator, and was helped by them to capture the lessons learned from the Powering Agriculture beta pilots and incorporate those into both the gen3c units, the business model and market entry strategies. In 2017, with funding from Shell Foundation, VIP ran 6 pilots in Kenya in the fruit and vegetable and maize drying sectors and was able to validate the value proposition, increasing farmers' incomes by up to 7 times, and the business model for the farmers based on a lease to own model. Three VIP units are currently installed in Kenya with two under contract for sales. An additional 4 units have been shipped from India for designated customers. VIP has also moved manufacturing to India which has allowed for the reduction of the cost of the unit by half with further cost reductions to be realized at scale.



# THE EARTH INSTITUTE AT COLUMBIA UNIVERSITY



## PROJECT

Micro-Solar Utilities for Small-Scale Irrigation in Senegal

## INNOVATION STAGE 4

Early Adoption/Distribution

## CLEAN ENERGY SOURCE

Solar Photovoltaic

## AGRICULTURAL FOCUS

Irrigation

## PRODUCT SEGMENT

Horticulture

## COLLABORATOR(S)

The MDG Center West and Central Africa (Senegal)

## LOCATION APPLIED

Potou, Senegal



[www.earth.columbia.edu](http://www.earth.columbia.edu)

## CLEAN ENERGY SOLUTION

Earth Institute's solution will enable a small group of farmers to use a central solar energy unit to power multiple alternate current (AC) pumps for irrigation. Farmers in Senegal typically use either labor or cost and energy intensive crop watering practices. The proposed solution takes advantage of the benefits of solar without the high costs associated with direct current (DC) powered pumps and battery storage. This power will be accessed by farmers with prepaid electricity cards issued by a micro-utility, and sold through local vendors who will benefit from a small commission. Recognizing that a major obstacle to technology adoption is financing, a tariff-based financing model will allow customers to cover their appliance loans in small payments added into their micro-utility bills. This innovation will allow farmers, even with small land holdings and/or little access to capital, to benefit from irrigation.

## PROGRESS UPDATE

By the end of the Powering Agriculture Award in March 2016, Earth Institute had installed three shared battery-less solar PV pumping systems in Potou, Senegal. The

three shared systems serve 21 farms, including a farm run by a women's cooperative, and are now seeing maximum utilization. Farmers experienced a 29% average increase in agricultural production, and 24 tons of CO<sub>2</sub> equivalent emissions were avoided by not having to use diesel pumps. Eight persons have been trained on how to service the pumping systems. The project is now seeking partnerships for scaling up, adoption and local maintenance contracts.





# EARTHSPARK INTERNATIONAL



## PROJECT

Smart Grid on Main Street:  
Electricity and Value-added  
Processing for Agricultural  
Goods in Rural Haiti

## INNOVATION STAGE 3

Initial Piloting

## CLEAN ENERGY SOURCE

Solar Photovoltaic

## AGRICULTURAL FOCUS

Decentralized Power

## PRODUCT SEGMENT

Staple Crops

## COLLABORATOR(S)

Entreprises La Foi  
(Haiti)

## LOCATION APPLIED

Les Anglais, Haiti

[www.earthsparkinternational.org](http://www.earthsparkinternational.org)

## CLEAN ENERGY SOLUTION

EarthSpark's solution is a solar-diesel hybrid micro-grid system that will increase access to affordable, reliable electricity for value-added agricultural processing. By improving farmers' ability to process agricultural goods, the value of their products is maximized and their livelihoods improved. By providing technical guidance and facilitating access to financing for local partners, EarthSpark is assisting agribusinesses in upgrading equipment to efficient electric mills for breadfruit processing and electric dekerneling for corn.

## PROGRESS UPDATE

By the end of their Powering Agriculture Award in March 2017, EarthSpark had expanded the microgrid in Les Anglais from a pilot stage with 54 connections to a town-sized, solar-powered smart grid providing power to residents and commercial clients through a total of 452 connections. The project identified and supported acquisition of three agricultural processing technologies – a corn mill, a corn thresher, and a deep fryer. While these items haven't yet shown a significant economic benefit, the entrepreneur-owners continue to refine their business models to increase profitability.



In October 2016, Category 4 Hurricane Matthew made landfall in Les Anglais, inflicting serious damage on the town and affecting EarthSpark's clients. The grid fared well, considering the intensity of the storm. It was estimated that 40% of the solar panels were damaged and the distribution grid needed to be nearly rebuilt but the power electronics and battery bank were left unscathed. EarthSpark is raising funds for the grid's rehabilitation and plans to be fully functional once again by the end of 2017.



# ECO CONSULT



## PROJECT

A Hydroponic Green Farming Initiative

## INNOVATION STAGE 4

Early Adoption/Distribution

## CLEAN ENERGY SOURCE

Solar Photovoltaic

## AGRICULTURAL FOCUS

Irrigation

## PRODUCT SEGMENT

Horticulture

## COLLABORATOR(S)

El Wir Farm in Zarqa River and one large farm in the Highlands. The community households cluster will be identified during the feasibility study

## LOCATION APPLIED

Jordan; Middle East and North Africa region

[www.ecoconsult.jo](http://www.ecoconsult.jo)

### CLEAN ENERGY SOLUTION

ECO Consult's solution is an integrated model of hydroponic and photovoltaic farming to compete with conventional greenhouse technology and drip irrigation systems in Jordan. For Farmers in one of the ten most water-scarce countries in the world, hydroponics offers an excellent opportunity for farmers to increase their income while reducing their water use. To make the technology attractive to large-scale commercial farms, ECO Consult will retrofit a multi-span greenhouse with advanced hydroponic technologies and photovoltaic panels to generate enough power to operate the lighting, pumping, and air moderation systems. The adoption of these new technologies will realize additional sources of income and new employment opportunities, including women and youth for rural households.

### PROGRESS UPDATE

By the end of the Powering Agriculture Award in June 2017, ECO Consult had established the first community of practice/network for hydroponic farming in Jordan by focusing on expanding the knowledge and use of hydroponics by Jordanian farmers, private companies and suppliers. They reached more than 530 people

through 19 field days, which provided attendees with hands-on training and a peer-to-peer educational experience, and trained more than 200 people through a series of 7 workshops. ECO Consult also established 22 demonstration sites—nearly quadrupling the target of six sites—with the majority of them located at households or community-based organizations. ECO Consult established a partnership with Wageningen University (WUR) in the Netherlands which included technical assistance from WUR, capacity building and 'train the trainers' sessions held in the Netherlands and in Jordan. The activities completed under the program have increased the visibility and awareness of hydroponic farming throughout Jordan; established a strong network of farmers, universities, government agencies, and international donors; and created an environment in which adoption of hydroponic farming should continue to expand.

ECO Consult will implement a second project that will target large farms with high-value crops for export markets and involve the Dutch private sector. The Dutch companies will provide hydroponic equipment and technical support (system monitoring and operation) for 2 to 3 years.



iDE



## PROJECT

Solar-Powered Pumps for Improved Irrigation in Honduras, Nepal, and Zambia

## INNOVATION STAGE 5

Market Growth

## CLEAN ENERGY SOURCE

Solar Photovoltaic

## AGRICULTURAL FOCUS

Irrigation

## PRODUCT SEGMENT

Horticulture

## COLLABORATOR(S)

PRACTICA Foundation (Netherlands),  
Futurepump Ltd (UK)

## LOCATION APPLIED

Honduras; Nepal; and Zambia



[www.ideorg.org](http://www.ideorg.org)

## CLEAN ENERGY SOLUTION

iDE and their partners' solution is a clean irrigation system that will provide smallholder farmers across the developing world the opportunity to mechanize their farming with zero carbon emissions. Globally, there are more than 800 million smallholder farmers, many of whom manually lift and haul over four tons of water daily to irrigate their farmland. The system uses the Sunflower pump, an efficient, versatile, and cost-effective piston pump powered by a 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 for up to 1,500 square meters of arable land.

By the end of this project, iDE's goal was to have a commercially available solar pump product for farmers irrigating up to 2,000 square meters of high-value dry season vegetables. Use of the Sunflower pump allows farmers to increase their farm productivity, and thus their income.

## PROGRESS UPDATE

By the end of the Powering Agriculture Award in June 2017, iDE had pioneered a new product category of solar pump. iDE worked with its partners, Futurepump and the PRACTICA Foundation, on the development and refinement of the Sunflower pump—now branded as the SF1—a highly efficient piston pump powered by an 80-watt PV panel. This latest version of the pump, featuring a 40% reduction in weight and volume while retaining efficiency, was tested at sites in Kenya and began shipping to Nepal and Zambia. iDE installed 1,064 pumps for testing at 48 active field sites; 80 in Honduras, Zambia, Nepal. An additional 4 pumps have been installed in the USA, Bangladesh, Burkina Faso, and Cambodia, which shows iDE's progress towards global distribution. As a result of these field tests, iDE and its partners have gone through five design iterations of the pump. In addition, 80 pumps have been sold to iDE's private sector partners for sales to end users in Zambia and Nepal.



# MOTIVO ENGINEERING



## CLEAN ENERGY SOLUTION

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 brings a low cost, infrastructure-less electrification and mechanization for farmers. HARVEST is a multi-purpose platform that provides power for plowing, well-drilling, cold storage, and transporting crops to market. The system utilizes power from varied energy sources such as solar panels, wind turbines, micro-hydro turbines, or the grid to enable increased productivity all along the agriculture value chain. The entire system is operated at the community level, and facilitated by mobile communication technology for scheduling, billing, and payments. HARVEST democratizes opportunity in agriculture by making available to entire communities huge gains in productivity, reduce reliance on increasingly expensive imported diesel, and creating new skilled jobs for men and women in rural areas in deploying, managing, and maintaining the HARVEST equipment.

## PROJECT

Hybrid Vehicles with Exportable Power for Community-Based Agriculture Mechanization

## INNOVATION STAGE 3

Initial Piloting

## CLEAN ENERGY SOURCE

Hybrid

## AGRICULTURAL FOCUS

Cold Storage, Decentralized Power, Irrigation, Processing

## PRODUCT SEGMENT

Aquaculture, Dairy, Horticulture, Staple Crops

## COLLABORATOR(S)

The KVK Foundation (India), Feuerlabs (USA)

## LOCATION APPLIED

Rangareddy, Telangana, India



[www.motivoengineering.com](http://www.motivoengineering.com)

## PROGRESS UPDATE

By the end of the Powering Agriculture award in May 2017, Motivo Engineering had shipped, assembled, and field tested two HARVEST prototypes in India. The primary use of the HARVEST during field testing was for field leveling, with the systems also being used for hauling and to power lighting for village gatherings. During the initial testing, Motivo learned that HARVEST can accept solar power, but the solar array originally installed was not large enough to effectively recharge the tractor. Based on this information, they tripled the solar array to decrease charging time and re-assess the feasibility of solar charging of HARVEST. Motivo's beneficiaries primarily see the HARVEST as a mechanism to reduce expenses on light duty field preparation. Beneficiaries reported that they experience a reduction in crop production expenses resulting in savings that are either used for additional crop production or paying for general household expenses including food and child education. Future plans may include a larger-scale pilot test using up to 50 units. One of the lessons learned was that the expectation of HARVEST to fully replace diesel tractors had not considered all the nuances of specific agricultural tasks. Motivo found that the HARVEST was more appropriate for lighter-duty tasks.



# PROMETHEAN POWER SYSTEMS



**PROJECT**  
Reducing Milk Spoilage  
through Solar Powered  
Milk Chilling in Rural India

**INNOVATION STAGE 5**  
Market Growth

**CLEAN ENERGY SOURCE**  
Energy Efficiency,  
Solar Photovoltaic

**AGRICULTURAL FOCUS**  
Cold Storage

**PRODUCT SEGMENT**  
Dairy

**COLLABORATOR(S)**  
Hatsun Agro (India),  
Orb Energy (India)

**LOCATION APPLIED**  
India

[www.coolectrica.com](http://www.coolectrica.com)

## CLEAN ENERGY SOLUTION

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 in India. A major obstacle in setting up cold chain networks is the lack of reliable electricity to run refrigeration systems in villages and farming areas. Diesel generators are often used to provide electricity for milk chilling, a non-ideal solution with high operating costs and negative environmental impact. Promethean's refrigeration addresses one of the main obstacles in setting up cold chains in villages and farming areas. Dairy processors can collect raw milk from remote dairy farmers and keep it cold in a rapid milk cooler, reducing the time that milk is unchilled by 75 percent. Increasing access to milk while decreasing bacteria and spoilage supports food security and consumer health in India, where 42 percent of children under the age of five are malnourished. Promethean's clean energy solution improves access to forward markets, higher income for the dairy farmers, and wealth creation through increase in herd size.

## PROGRESS UPDATE

By the end of the project in June 2017, Promethean sold over 600 units, of which they have deployed and commissioned over 460 milk chillers coupled to its patented Thermal Battery. Today this technology is enabling over 25,000 dairy farmers to chill their milk without diesel generators to get their milk to the market safely. None of the 250 Promethean chillers in the field have required a diesel generator. As deployment of the chillers continues, Promethean has been able to adapt the solar component design to address specific logistical needs of dairy partners and has seen increased adoption of the chilling solution as a result. Promethean's solution gives farmers a larger time window to bring their milk to the village center so they can be more productive with crops and other income-generating tasks. It's a win for the dairy processor because they collect more quality milk and they make more profits as value-added products demand high quality milk. It's a win for the environment as there is no longer a need for pollution-causing diesel generators. It's a win for the consumers because they are drinking healthier milk. And it's a win for the farmers because their livelihoods improve.



# REBOUND TECHNOLOGIES



## PROJECT

SunChill: Solar Cooling for Horticultural Preservation in Mozambique

## INNOVATION STAGE 3

Initial Piloting

## CLEAN ENERGY SOURCE

Solar Thermal

## AGRICULTURAL FOCUS

Cold Storage

## PRODUCT SEGMENT

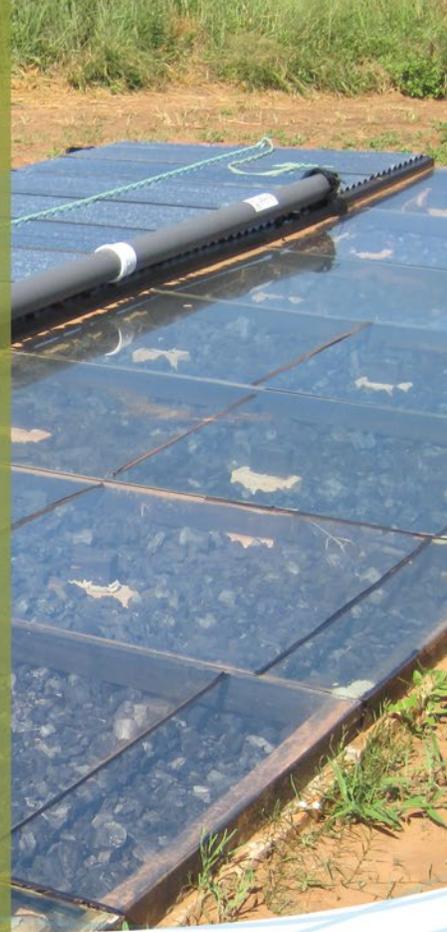
Horticulture

## COLLABORATOR(S)

Colorado State University, TechnoServe, Mozambique Organicos

## LOCATION APPLIED

Inhambane Province, Mozambique



[www.rebound-tech.com](http://www.rebound-tech.com)

## CLEAN ENERGY SOLUTION

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. Removing field heat from horticultural products can double shelf life and reduce spoilage rates that often exceed 40 percent in developing countries. This clean energy solution transforms 50°C solar thermal energy into 10°C refrigeration using solid refrigerants and local, non-precision components. These characteristics enable production of a low cost, low-maintenance technology that reduces spoilage and benefits smallholder farmer livelihoods. The low-cost system enables increased horticultural production both for domestic and export consumption, generating additional income for smallholder farmers and increased access to nutritional fruits and vegetables while generating both manufacturing and service based employment.

## PROGRESS UPDATE

Rebound completed the Powering Agriculture project in March 2016 by validating a SunChill™ field demonstration unit in Mozambique which cooled 43 kg of tomatoes during the pilot. The total project effort resulted in the completion of the engineering work that forms the technology foundation. Remaining is the industrial design work necessary to move SunChill™ to a commercialized product available for deployment. Rebound has utilized some of the data and incorporated lessons learned from field testing SunChill™ into its latest IcePoint™ technology for the US market.



# SUNDANZER



## PROJECT

Solar-Powered Refrigeration  
for Kenyan Dairy Farms

## INNOVATION STAGE 4

Early Adoption/Distribution

## CLEAN ENERGY SOURCE

Solar Photovoltaic

## AGRICULTURAL FOCUS

Cold Storage

## PRODUCT SEGMENT

Dairy

## COLLABORATOR(S)

Winrock International (USA)

## LOCATION APPLIED

Nakuru Region, Kenya



[www.sundanzer.com](http://www.sundanzer.com)

[www.winrock.com](http://www.winrock.com)

## CLEAN ENERGY SOLUTION

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. In rural areas, 85 percent of Kenya's 800,000+ dairy farms do not have access to refrigerated storage and transportation, resulting in less than half of the milk produced reaching dairy processors. The system comprises a photovoltaic refrigerator (PVR) that uses solar energy to cool a chest refrigerator. This uses phase-change materials—substances which are capable of storing and releasing large amounts of energy—as energy storage. SunDanzer also developed milk can blankets to retain the cold temperature as farmers transport the milk to the collection site. With effective cold-chain storage, this clean energy solution aims to increase dairy farm productivity and income by significantly decreasing milk spoilage. This can play a major role in the livelihoods of approximately one million smallholder dairy farming families in Kenya.

## PROGRESS UPDATE

To date, SunDanzer has delivered and installed nearly 70 solar milk cooling refrigerators in Kenya, and installed two units in Rwanda. The second generation units currently being installed are roof-mounted, a more cost-effective option than the previous generation, which were pole-mounted. Most units continue to be installed at dairy farms, with camel milk processors being among the newest customers. SunDanzer and their partner Winrock International co-hosted a 2-day Renewable Energy Cold Chain workshop and field visit in February 2017, with over 70 attendees. In their third phase of deployment, SunDanzer expects to install an additional 25 units in Kenya and 75 units in other countries by early 2018. SunDanzer's project has been extended to May 2018. Users have stated that the solution has provided benefits that include adding financial security to the household, cell phone charging which saved time and added income to the household, as well as food preservation.



# UNIVERSITY OF GEORGIA RESEARCH FOUNDATION

## PROJECT

Biogas-Powered  
Evaporative Cooling  
for Uganda's Dairy  
Industry

## INNOVATION STAGE 4

Early Adoption/Distribution

## CLEAN ENERGY SOURCE

Biogas

## AGRICULTURAL FOCUS

Cold Storage

## PRODUCT SEGMENT

Dairy

## COLLABORATOR(S)

Smallholder Fortunes (Uganda)

## LOCATION APPLIED

Wakiso District, Uganda



[www.ovpr.uga.edu/ugarf](http://www.ovpr.uga.edu/ugarf)

### CLEAN ENERGY SOLUTION

UGARF has developed a two-component device (branded as "EvaKuula") powered by biogas which is extracted from cow manure. The device delivers a mild heat treatment followed by gentle evaporative cooling process that keeps the milk fresh overnight. This provides a refrigeration alternative to cold-chain facilities, as there is limited access to electricity, and kerosene and solar-powered options thus far have proved too expensive and difficult to operate in the local context. Partnered with Smallholder Fortunes, UGARF is refining the design of the refrigeration device, and testing it with farmers in Uganda. UGARF is working with local manufacturers to field-test the device and will secure financing and bring production of the units to commercial scale. The EvaKuula brings numerous

benefits to smallholder dairy farmers such as decreased milk spoilage, increased production and profits, and biogas for lighting and cooking. Also, by extracting biogas from cow manure, greenhouse gas emissions from fermenting cow manure is mitigated.

### PROGRESS UPDATE

As of September 2017, UGARF had deployed 34 EvaKuula units, with 5 additional units to be installed in the coming months. Half of the beneficiaries using the product are women, who have been successful users and provided important word-of-mouth marketing for the technology. User input has been an important piece of the product design process, with input from women ensuring that the product incorporates factors that are female-friendly. UGARF hopes to expand into Rwanda in the future. Next steps include conducting value engineering to lower the manufacturing cost well below the price point for the units. UGARF's award has been extended to March 2018.



**PROJECT**  
Powering Agriculture  
with Renewable Energy

**INNOVATION STAGE 4**  
Early Adoption/Distribution

**CLEAN ENERGY SOURCE**  
Solar Photovoltaic, Wind

**AGRICULTURAL FOCUS**  
Decentralized Power

**PRODUCT SEGMENT**  
Horticulture

**COLLABORATOR(S)**  
African Solar Designs  
(Kenya)  
Windfire Group  
(United Kingdom)

**LOCATION APPLIED**  
Kenya, Tanzania, Uganda

# ARIYA CAPITAL GROUP LTD



## CLEAN ENERGY SOLUTION

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. Agriculture is a cornerstone of Kenya's economy, with horticulture and the export of flowers serving as a major employers and energy costs accounting for 15 percent of input costs of Kenyan agriculture. These services will be structured to minimize the up-front investment required by farmers. A mixed technology approach, using various DRE and energy efficiency solutions, will allow flexibility in designing energy systems tailored for each user. By helping East African horticulture exporters to increase their bottom line, employees on their farms—ranging from 1,000 to 25,000 per farm and 50% women—and the associated local communities can benefit from greater job security and improved living standards. Other impacts include reduced carbon emissions, improved productivity, and reduced water usage resulting from farms using more sophisticated agriculture and horticulture techniques, and where legislation permits, the export of excess power to the grid or through micro-grid designs that permit supply to other local businesses and communities.

[www.ariyacapital.com](http://www.ariyacapital.com)

## PROGRESS UPDATE

Ariya commissioned their first systems in August 2017 totaling 200kWp, with installation of the third and fourth systems totaling 117kWp system to be commissioned by mid December 2017, and several others to follow in 2018. The systems are located on farms, include remote monitoring, and are used to power pumping, refrigeration, lighting, irrigation and fertilizer dispersal. While many farms have access to the national grid, the Ariya systems ensure consistent, reliable power for their operations. Ariya's future plans include developing two business models: one that will target smaller clients (200-300kW) and one for larger clients (5 MW). The majority of Ariya's horticulture customers employ more than 50% women. Following a number of tenders and expressions of interest Ariya has shortlisted three qualified engineering, procurement, and construction companies that they work with for the construction of the power plants.



# CLARO ENERGY



## PROJECT

Low-Cost Pay-Per-Use Irrigation Using Solar Trolley Systems

## INNOVATION STAGE 4

Early Adoption/Distribution

## CLEAN ENERGY SOURCE

Solar Photovoltaic

## AGRICULTURAL FOCUS

Irrigation

## PRODUCT SEGMENT

Horticulture, Staple Crops

## LOCATION APPLIED

India



[www.claroenergy.in](http://www.claroenergy.in)

## CLEAN ENERGY SOLUTION

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. This will enable villages in India to irrigate independently to the monsoon patterns or the availability of power to operate ground water pumps. The service will meet the needs of a wide range of farmers who do not own pumps, with no upfront capital costs incurred. The farmer will call a toll-free line, pre-pay, and schedule irrigation service at his field. The project will increase farmers' productivity and income, while decreasing GHG emissions. Also, the project will create employment in rural, agricultural communities, as villagers have the opportunity to become local irrigation service providers.

## PROGRESS UPDATE

Claro Energy has installed 5 fixed solar systems and 25 trolley systems, all of which are currently being used in fields for irrigation and serving 30-40 farmers per day. A pre-paid card system is now being used for remote activation of the pump/cart systems. 350 farmers are

currently benefitting from the systems, with roughly 30% of those being women. Claro has a staff of 10 professionals available to provide technical assistance to users, and continues to conduct trainings and demonstrations. Design changes are being completed for the next version of the pump, with farmer feedback driving the changes. Claro expects to produce 25 trolleys of the new design by the end of 2017.





# FUTUREPUMP



## PROJECT

Solar-Powered Refrigeration for Kenyan Dairy Farms

## INNOVATION STAGE 4

Early Adoption/Distribution

## CLEAN ENERGY SOURCE

Solar Photovoltaic

## AGRICULTURAL FOCUS

Cold Storage

## PRODUCT SEGMENT

Dairy

## COLLABORATOR(S)

Winrock International (USA)

## LOCATION APPLIED

Nakuru Region, Kenya



[www.futurepump.com](http://www.futurepump.com)

## CLEAN ENERGY SOLUTION

The Sunflower pump is an easy-to-maintain solar irrigation pump, built around a simple piston pump arrangement. Futurepump has made the product cheaper and will offer it on finance, in order to lower the upfront barriers to solar technology. The project will have a major impact especially for women and children which take on much of the labor burden of manual irrigation or carrying fuel pumps. Using irrigation water that does not rely on engine pumps productivity can be doubled, in addition, the growing season can be extended through the dry season, during which produce brings higher market prices.

## PROGRESS UPDATE

At the end of FY2017, Futurepump had shipped over 750 Futurepump solar pumps from their factory in India to Kenya, with more due for shipment in the coming months. They also recently shifted from direct sales to selling through a national network of distributors in

Kenya. Pay-as-you-go financing has been implemented through partnerships with two of Kenya's largest banks and remote monitoring of systems is scheduled to begin in early fiscal year 2018. Futurepump has utilized more detailed monitoring and evaluation techniques to identify that customers of the SF1 solar pump are expected to save \$100-\$200 a year from reduced fuel and labor costs. In addition to labor savings and reliable energy, many customers use the additional income or monetary savings to pay school fees for their children or grandchildren. One of Futurepump's female customers, Hakima Muhammed, runs a .25-acre tree nursery, which supplies the local community with indigenous, exotic, ornamental, and fruit trees. Since installing the SF1 pump, watering—formerly a laborious, time-consuming task—has been made efficient, takes much less time, and can be combined with other tasks. More of Hakima's story can be viewed here:

<https://youtu.be/Pin7vLBF6iQ>.



# HORN OF AFRICA REGIONAL ENVIRONMENT CENTER AND NETWORK

## PROJECT

Improving Coffee Production and Quality Using Infrared Technology

## INNOVATION STAGE 2

Research & Development

## CLEAN ENERGY SOURCE

Biogas

## AGRICULTURAL FOCUS

Processing

## PRODUCT SEGMENT

Fruit

## COLLABORATORS

University of Hohenheim (Germany)  
University of Massachusetts–Boston (United States)  
Oromia Coffee Farmers Cooperative Union (Ethiopia)

## LOCATION APPLIED

Ethiopia



[www.hoarec.org](http://www.hoarec.org)

## CLEAN ENERGY SOLUTION

Horn of Africa's solution uses state-of-the-art infrared technology to reduce coffee pulp drying time from several days to hours. In Ethiopia, where coffee accounts for 60 percent of the export earnings, the quality of coffee harvested will be improved with this process by decreasing exposure of coffee to fungi and other undesirable elements. 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. By reducing the time farmers spend in coffee processing, the time saved can be used for other productive uses which will help them generate additional income.

## PROGRESS UPDATE

HoA-REC&N has been working on developing a biogas digester and an infrared (IR) dryer to dry coffee beans. Two potential suppliers have been identified for the

IR dryer, with test drying conducted in early 2017. HoA-REC&N constructed and commissioned four bio digesters which were tested with two different coffee feedstocks—husk and pulp. The tests showed that the coffee pulp resulted in higher yields of biogas. Further experiments are to be conducted for the optimum yield. Additional experiments were conducted to analyze the effectiveness of coffee drying at different temperatures and power (these include thermal, microwave, and infrared). The results showed that the moisture level of coffee dried using infrared has decreased to the required amount. HoA-REC&N has identified two sites, including a large privately-owned coffee farm, to pilot their technology. Beneficiaries of the technology will include 8 coffee cooperatives, comprising 7,000 coffee farmers who will be able to sell a larger quantity of coffee due to reduced drying times. Future plans include the integration of the IR dryer and the bio digester units, following the optimization of the dryer.



#### PROJECT

Biomass and Solar PV Hybrid Minigrids for Off-Grid Farming Communities

#### INNOVATION STAGE 3

Initial Piloting

#### CLEAN ENERGY SOURCE

Biomass, Solar Photovoltaic

#### AGRICULTURAL FOCUS

Decentralized Power

#### PRODUCT SEGMENT

Staple Crops

#### COLLABORATORS

Diamond Development Initiatives (Nigeria)

Technology Management Group (Ghana)

#### LOCATION APPLIED

Ghana, Nigeria

# HUSK POWER SYSTEMS



[www.huskpowersystems.com](http://www.huskpowersystems.com)

#### CLEAN ENERGY SOLUTION

Husk Power will install a hybrid solution that combines a biomass gasification system with a solar PV system. Husk Power's solution will expand access to electricity in rural, off-grid communities in Tanzania and Nigeria and extend the hours available for agricultural operations. 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 electricity is distributed to rural households and micro-enterprises through a mini-grid system—providing a better quality, cheaper way to meet their needs for energy. Agricultural uses that will be powered include irrigation pumps, agro-processing mills, and drying and heating processes. The biomass plant converts abundant agricultural residue, such as maize cobs, rice husks, coffee husks, and cotton stalks, into electricity. Agricultural operations will be able to continue processing during nighttime hours, while also providing cost effective power to customers during

daytime with solar PV and night time with Biomass gasification system.

#### PROGRESS UPDATE

Husk Power is installing their second hybrid solar/biomass plant at a site in Mogororo, Tanzania. Five additional units will be constructed by the end of FY18 – all located in Tanzania. The systems will provide 24/7 power, with a discounted tariff for daytime usage in order to pass on the cost benefits of the lower cost of power generation from solar PV. Husk Power is working with a partner to identify sites for system installation in Nigeria. At each site, 3 professionals will be trained to operate the systems. Husk's systems currently use SparkMeter, a product developed as spin-off of the work done by Powering Agriculture Innovator EarthSpark International during their award.





# iDE BANGLADESH



## PROJECT

Renewable Microgrids for Off-Grid Fish Hatcheries and Surrounding Communities

## INNOVATION STAGE 3

Initial Piloting

## CLEAN ENERGY SOURCE

Wind, Solar Photovoltaic

## AGRICULTURAL FOCUS

Decentralized Power

## PRODUCT SEGMENT

Aquaculture

## COLLABORATORS

Renewable World (United Kingdom)  
Electro Solar Power Ltd. (Bangladesh)  
United Finance Company (Bangladesh)  
Rahimafrooz Renewable Energy Ltd. (Bangladesh)

## LOCATION APPLIED

Bangladesh

[www.ideorg.org](http://www.ideorg.org)

### CLEAN ENERGY SOLUTION

Off-grid fish hatcheries in Bangladesh, and their surrounding communities, rely extensively on diesel and kerosene –both costly and polluting– to provide electricity needed to pump water and provide light. The proposed solution is a micro-grid powered by economically viable renewable sources that replaces diesel generation. The renewable energy micro-grid is expected to reduce energy costs and increase productivity for hatcheries and household fish-raisers while also providing domestic energy access. The system will power hatchery water pumping activities while supplying households with renewable power through an innovative metering technology. The mobile metering and billing system will allow users to pay for their electricity using mobile money, either pre- or post-usage. The innovative joint venture business model will ensure that hatcheries and surrounding households can afford the technical solution by bringing private sector investment that would otherwise not be attracted to renewable grid development. The use of fish hatcheries as a hub for clean power generation provides a guaranteed, niche market with

a higher level of sustainable and economic success. The project will reduce diesel costs and increase profits and sales for the hatchery, sales of fingerlings to local farmers, employment, and sustainability of aquaculture practices.

### PROGRESS UPDATE

iDE Bangladesh has facilitated installation of microgrid systems by a private company at two fish hatcheries and surrounding communities in Bhola, and Patuakhali districts of coastal Bangladesh. As of September 2017, the systems are serving a total of 35 fish ponds and 16 households. The electricity being generated is used for water pumping at the hatcheries, and to power household appliances such as lights, fans, and refrigerators in the communities. The proposed solution aims to replace 2,800 liters/year of diesel at the hatcheries and 600 liters in both communities, removal of kerosene to electrify 40% of households without Solar Home Systems (SHS), and provide 6 extra hours of lighting and 4 hours of fan for 60% of households with SHS through 2017 and 2018.



**PROJECT**  
PV-Integrated Drip Irrigation  
and Fertigation Systems

**INNOVATION STAGE 4**  
Early Adoption/Distribution

**CLEAN ENERGY SOURCE**  
Solar Photovoltaic

**AGRICULTURAL FOCUS**  
Irrigation

**PRODUCT SEGMENT**  
Horticulture, Staple Crops

**COLLABORATORS**  
Nur Solar Systems (Jordan)  
Mena Solar (Lebanon)

**LOCATION APPLIED**  
Jordan, Lebanon

# INSTITUTE FOR UNIVERSITY COOPERATION (ICU)



[www.icu.it](http://www.icu.it)

## CLEAN ENERGY SOLUTION

ICU will install a drip irrigation system powered by PV solar energy at pilot farms in Jordan and Lebanon. As one of the world's driest regions, Jordan and Lebanon have widespread use of inefficient irrigation methods, resulting in the waste of large amounts of water. The system supports fertigation, which provides the possibility of fertilizer distribution through the irrigation system. Farmers will be supported in access to financing for the installation of the system. The CES will provide a complete package for purchase and installation, including training and access to knowledgeable extension agents and companies' staff.

The PV-Drip Irrigation System will result in reduced CO<sub>2</sub> emissions and energy costs. In addition, the drip and fertigation system will reduce water and fertilizer use by up to 30% compared to traditional systems due to efficient and localized application.

## PROGRESS UPDATE

The project has installed 6 PV-Integrated Irrigation Systems in Lebanon, and 4 in Jordan, for a total capacity of 87kW. As a result of the Powering Agriculture project's visibility, ICU's partner in Lebanon

has installed an additional 600 kW of solar-powered irrigation systems. Some benefits from use of the systems include farming of previously unused land and extended growing seasons, both of which result in increased income. Fertigation also minimizes over-fertilization, which reduces costs. During the second half of 2017, ICU organized 8 commercial events between Jordan and Lebanon to introduce the system to new potential customers.





**PROJECT**  
Affordable, High-  
Performance Solar  
Irrigation for  
Smallholder Farmers

**INNOVATION STAGE 3**  
Initial Piloting

**CLEAN ENERGY SOURCE**  
Solar Photovoltaic

**AGRICULTURAL FOCUS**  
Irrigation

**PRODUCT SEGMENT**  
Horticulture

**COLLABORATORS**  
Angaza Design  
(United States)  
Encap Technologies  
(United States)

**LOCATION APPLIED**  
Kenya



# KICKSTART INTERNATIONAL



## CLEAN ENERGY SOLUTION

KickStart and its partners will focus on designing a clean energy solution with the farmer in mind—a high-performance yet easy to assemble, highly mobile, robust and durable unit that requires minimal maintenance. KickStart will design a foldable, flat pack solar irrigation pump that is easy for farmers to install. KickStart’s clean energy solution will not only greatly reduce the cost of the irrigation hardware but, through the introduction of a PAYG mechanism, will provide farmers with flexible financing options that will further promote affordability and, therefore, demand.

On average, farmers who adopt one of KickStart’s best-selling human-powered irrigation pumps increase their household income by 400% and over 1,000,000 people have taken a major step out of poverty as a direct result of using these innovative tools.

## PROGRESS UPDATE

KickStart and its partners are conducting two parallel R&D processes on the first generation prototypes of both a low-cost solar PV irrigation pump and an optional pay-as-you-go (PAYG) financing platform. Kickstart’s Product Innovation Development and Field

[www.kickstart](http://www.kickstart)

Market teams have completed the lab and field testing of the first solar pump and PAYG system prototypes. Field testing included deployment of 21 Prototype 1 solar pumps, 10 of which were equipped with PAYG Prototype 1. Across demonstration sites and private farms, 43 adults are benefitting from the CES, 17 of whom are women. Kickstart is currently testing three payment models using their first generation PAYG system based on time passed, time-used and a hybrid model combining both options.

Building upon the lessons learned during the field and lab tests conducted, the design for their second solar pump prototype has been completed, manufacturing is underway, and the pump will be field tested in the coming fiscal year. PAYG prototypes will be ready for deployment in the coming months.



# SIMGAS TANZANIA



## PROJECT

Biogas Milk Chilling to Increase Productivity and Incomes of Dairy Farmers

## INNOVATION STAGE 3

Initial Piloting

## CLEAN ENERGY SOURCE

Biogas

## AGRICULTURAL FOCUS

Cold Storage

## PRODUCT SEGMENT

Dairy

## COLLABORATORS

SimGas BV (Netherlands)  
SNV (Netherlands)

## LOCATION APPLIED

Kenya, Rwanda, Tanzania



[www.simgas.org](http://www.simgas.org)

## CLEAN ENERGY SOLUTION

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. The Biogas Milk Chiller sparks a revolution in the dairy industry; it is the first link towards a reliable milk cool chain from cow to dairy. SimGas offer a solution to provide milk chilling at micro-scale, for farmers with up to 10 dairy cows, that run independently from the power grid, and that comply with the International milk cooling standard. 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 amount of manure produced by a cow creates enough biogas to refrigerate her own milk, while leaving enough biogas to cook a meal for the household. The SimGas Biogas Milk Chiller will empower small dairy farmers to guide their own development; the milk chiller 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. In addition, the use of clean energy (biogas) for cooling and other purposes, such as cooking, will help reduce deforestation and carbon emissions.

## PROGRESS UPDATE

SimGas is currently focused on work in Kenya, with plans to begin operations in Rwanda in FY2018. They have 10 pilot installations in Kenya and Tanzania. SimGas has been conducting lab and field testing on several different models of milk chillers. Recent human centered design research conducted together with IDEO.org was used to modify the milk chiller design, resulting in reduced gas consumption, which allows for extended biogas availability for cooking in addition to cooling. They are currently testing 3 units of this latest prototype design at model farmers of Kenya's largest dairy processor. SimGas expects to begin mass production of the biogas milk chiller in the coming year.



# SUNCULTURE

## PROJECT

Scaling the Distribution of Tailored Agro-Solar Irrigation Kits to Smallholder Farmers

## INNOVATION STAGE 4

Early Adoption/Distribution

## CLEAN ENERGY SOURCE

Solar Photovoltaic

## AGRICULTURAL FOCUS

Irrigation

## PRODUCT SEGMENT

Horticulture

## COLLABORATORS

REEEP

## LOCATION APPLIED

Kenya, Tanzania, Uganda, Zambia



[www.sunculture.com](http://www.sunculture.com)

## CLEAN ENERGY SOLUTION

As a result of switching to solar irrigation, smallholder farmers will realize significant benefits. These benefits include increased production of higher value produce, cost savings, and more efficient use of time. Time saved on farming and water gathering can be directed to other more productive activities. In addition, SunCulture's system has environmental benefits - in the next year, current SunCulture farmers will save 1.9 billion liters of water and generate over 64,000 kilowatt hours of power annually – all this while growing over 8.4 million kilograms of fresh fruit and vegetables.

## PROGRESS UPDATE

Since the beginning of the Powering Agriculture award, SunCulture has deployed AgroSolar Irrigation Kits (ASIKs) across East Africa which allowed farmers to provide better nutrition, higher quality education,

and healthcare for themselves and their families. They have trained 25 technicians, 8 Agronomists, and 4 Area Sales Representatives that provide agronomy support from planning through harvest, as well as installation and after-sales support to the beneficiary farmers. SunCulture has also started to develop distribution partnerships in Tanzania and Zambia. SunCulture recently launched their latest product—the RainMaker—which utilizes a smaller, less expensive pump, incorporates wireless soil and weather sensors, and can support household uses as well as agricultural applications. The response to the RainMaker has been very positive, and the company hopes to expand their distribution partnerships across the continent next year. In addition to RainMaker, SunCulture has also launched its Pay-As-You-Grow financing platform, making its products and services more accessible to for potential customers.



# UNIVERSIDAD DEL VALLE DE GUATEMALA (UVG)



## PROJECT

Private Sector Financed  
Community Solar Microgrids  
and Agricultural Accelerators

## INNOVATION STAGE 3

Initial Piloting

## CLEAN ENERGY SOURCE

Solar Photovoltaic

## AGRICULTURAL FOCUS

Decentralized Power

## PRODUCT SEGMENT

Horticulture

## COLLABORATORS

Development Ventures  
(United States)  
Greeneryze S.A. (Guatemala)

## LOCATION APPLIED

Guatemala



[www.uvg.edu.gt](http://www.uvg.edu.gt)

## CLEAN ENERGY SOLUTION

UVG uses an innovative approach to developing low-cost utility companies in agricultural communities in Guatemala that are not connected to the grid, called Community Accelerators. Each Accelerator will consist of a localized photovoltaic (PV) mini-grid and will be operated by a local for-profit service provider company that also provides agribusiness service. This “utility in a box” approach is designed so that private sector financing can be used to fund the establishment of Accelerators, making this clean energy solution scalable in low-income agricultural communities in Guatemala without additional donor funding. The project will facilitate investment by two agricultural communities in Guatemala to power agricultural production/processing equipment (such as irrigation systems and/or cold storage facilities).

## PROGRESS UPDATE

The project team has selected five pilot sites and expects to begin initial installation of 2 minigrid systems in the coming year. The systems will be used to power a variety of equipment, including a

cold room, an air dryer for coffee beans, and irrigation systems. Future plans include training associated with greenhouse operations, which require electricity, as well as training on the use of a de-husker to support agricultural activities. The project has also succeeded in sourcing two impact investors—one Guatemala-based and one international—and is in the process of completing the legal requirements for the investments to proceed.





# UNIVERSITY OF TORONTO

## PROJECT

Field Evaluation of a Passive Aeration System for Aquaculture

## INNOVATION STAGE 3

Initial Piloting

## CLEAN ENERGY SOURCE

Solar Thermal

## AGRICULTURAL FOCUS

Aeration

## PRODUCT SEGMENT

Aquaculture

## COLLABORATORS

BRAC Enterprises (Bangladesh)  
Curiositate

## LOCATION APPLIED

Bangladesh



[www.mie.utoronto.ca](http://www.mie.utoronto.ca)

## CLEAN ENERGY SOLUTION

In many low-income countries aquaculture is a large industry and improving the quality of aquaculture pond water has the potential to increase fish yields, raise incomes, and improve food security. University of Toronto's 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 low 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 heated water will rise and mix the pond, spreading oxygen-rich water from the top through the entire depth of the pond. The passive aeration system will increase pond dissolved oxygen level, improve water quality and allow for increased density of fish stock, higher yields of fish, as well as larger fish that have a higher market value and demand. At higher levels of dissolved oxygen, fish feed is also used more efficiently, which reduces feed and operation costs.

## PROGRESS UPDATE

Using the Powering Agriculture funding, refinement of the device design has continued in order to use the solar thermal energy more efficiently in the aeration process. The University of Toronto has built and deployed 17 solar aeration devices at 10 fish farms in Bangladesh. Each installation includes a control pond, along with the experimental pond. Additional installations are planned for late 2017/early 2018 for an additional 33 devices.

The project is gathering data from the installed devices and three prototypes of new versions of the solar aeration device are planned for manufacturing and installation; the test results will be compared with the performance of previous versions.

To assess the technology, surveys have been conducted for all farmers who will participate in the study and will provide essential data on fish production, the impact of the device, gender-based challenges with the technology, fish farming practices, household conditions (size, income, education), and their interest in the technology. Furthermore, the farmers have received detailed training for using devices, and working principle of the device in the ponds.



**PROJECT**  
Solar Agro-Processing  
Power Stations

**INNOVATION STAGE 5**  
Market Growth

**CLEAN ENERGY SOURCE**  
Solar Photovoltaic

**AGRICULTURAL FOCUS**  
Processing

**PRODUCT SEGMENT**  
Staple Crops

**LOCATION APPLIED**  
Indonesia, Papua  
New Guinea,  
Philippines, Vanuatu



# VILLAGE INFRASTRUCTURE ANGELS (VIA)



[www.villageinfrastructure.org](http://www.villageinfrastructure.org)

## CLEAN ENERGY SOLUTION

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. These small villages typically do not have access to a electricity or diesel mill for crop processing, and must rely on manual processing, or travel long distances to use a mill. 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. 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.

## PROGRESS UPDATE

From a target of 200-500 solar mills, VIA and its main partner, Project Support Services, have delivered over 230 solar mills to market to date, including 150 as

cash sales and 80 on 3-5 year lease agreements, with additional units being ordered. From a target of \$3 million of investment to be mobilized over the award period, VIA has secured over \$2,000,000 and has at least \$1 million more under negotiation. As a result of funding received from Powering Agriculture, VIA's partner has spun off a company focused on a solar-powered agro-processing equipment, Agsol, which was accepted, together with another VIA supplier of Internet-of-Things (IoT) sensors, to a prestigious technology accelerator run by CSIRO. VIA has also deployed 2,000 households of pay-as-you-go lighting kits alongside the solar mills, the first and largest deployment of PAYG solar in the Pacific region. VIA provides seven kinds of solar mills, each suited to a specific task such as a rice huller, corn sheller, flour grinder, or coconut/cassava grater. All seven solar mills have been warmly received by communities, but the cassava grater most of all, as it not only reduce hours of manual processing for women, but apparently has improved the taste of the national dishes, laplap, tuluk and simboro.

### 3.2 Powering Agriculture Impact

Powering Agriculture has continued to have a positive impact as the Innovators conduct the field testing of their clean energy solutions and some of them scale up and start selling commercially. The data presented in this section is based on their self-reporting against Powering Agriculture's 10 performance indicators.

**Performance Results:** Table 3.1 depicts the progress made by the Innovators against Powering Agriculture's performance indicators in FY 2017 and over the life of the grand challenge.<sup>1</sup>

TABLE 3.1

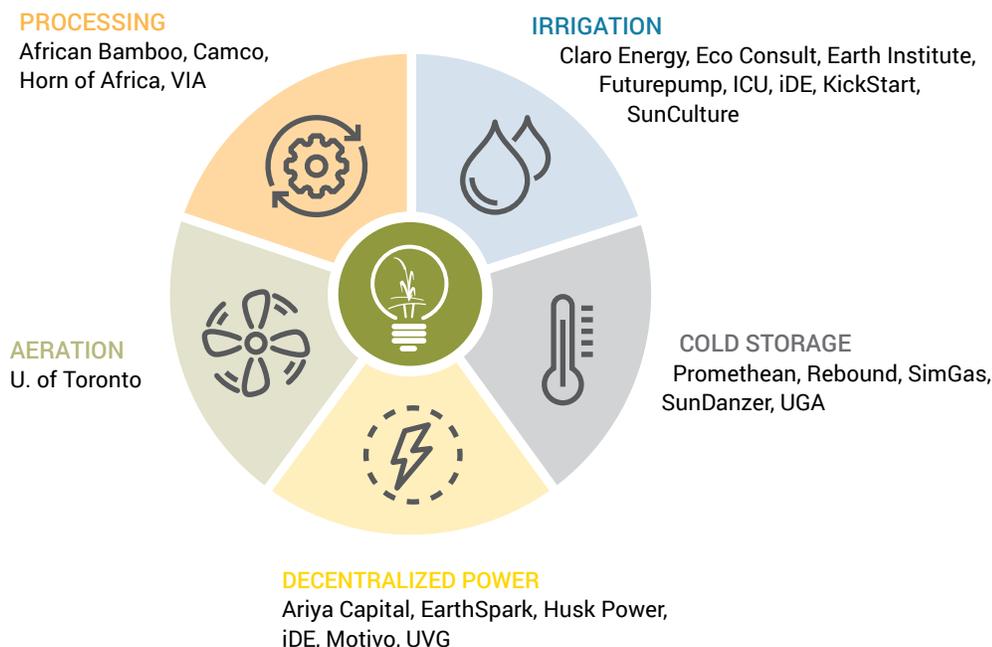
IMPACT	FISCAL YEAR 2017 <sup>2</sup>	POWERING AGRICULTURE TOTAL
	<b>12</b> clean energy solutions developed (technologies and/or business models)	<b>36</b>
	<b>619 kW</b> of clean energy generation capacity installed	<b>857 kW</b>
	<b>1,393</b> clean energy systems deployed through Africa, Asia/Pacific, Latin America and Middle East	<b>1,900</b>
	<b>19,610</b> beneficiaries reached, such as farmers, households and agribusinesses, as a result of Powering Agriculture support.	<b>29,950</b>
	Between <b>4%</b> and <b>300%</b> increase in yield obtained by beneficiaries, as a result of Powering Agriculture support	
	<b>USD \$2.3 million</b> additional funding mobilized by innovators in support of their clean energy solutions	<b>\$9.6 million</b>
	<b>1,590 tCO<sub>2</sub>e</b> reduction, as a result of innovators field activities	<b>1,820 tCO<sub>2</sub>e</b>
	<b>2,960</b> people trained on O&M of clean energy systems and their benefits, including <b>1,020</b> women	<b>4,610</b> people <b>1,120</b> women
	<b>15,630</b> people increased their knowledge of clean energy technologies through attending demonstrations, as a result of Powering Agriculture support, including <b>5,760</b> women	<b>37,140</b> people <b>13,230</b> women
	<b>543</b> professionals provided services to clean energy system users, as a result of Powering Agriculture support, including <b>111</b> women	<b>1,041</b> professionals <b>172</b> women

<sup>1</sup> These results were aggregated among innovators, based on Powering Agriculture's review of innovators' self-reported data available to date. ECO Consult is excluded because its award was managed by USAID Jordan Mission with a different performance indicator framework.

<sup>2</sup> FY FY 2017 data includes partial data from SunCulture; complete data was not received by the time of this report's publication.

**Innovators Contribution to FY 2017 Results:** The following graphs illustrate results achieved by the Innovators aggregated by their agricultural focus as per below.

FIGURE 3.2 **INNOVATOR AGRICULTURAL FOCUS**



The results are presented for both FY2017 and for the life of the grand challenge. The 2017 fiscal year been the most active year for the installation of clean energy systems under Powering Agriculture, as demonstrated in Figures 3.3 and 3.4. This is because both the 2013 and 2015 cohorts of innovators were in installation mode; the 2013 cohort was finishing up and the 2015 cohort was ramping up.

The scale of the systems installed ranged greatly, from an 80 Watt pump to a 200 kW roof-top and ground-mounted hybrid solar PV system. The largest capacity of clean energy has been installed to provide general decentralized power, primarily due to the size of the mini-grids compared to other technologies

supported by Powering Agriculture. Ariya Capital has been the biggest contributor to the capacity installed under the program, its 2 systems more than tripling the total amount of kilowatts installed in 2016<sup>3</sup>.

Solar PV powered irrigation represents the second largest amount of kW installed under the program, as a consequence of the high number of pumps deploying in the field, shown in Figure 3.4. This reflects that a number of these innovators, namely Futurepump, iDE, and SunCulture, who have already reached *distribution* or *market growth* stages according to the self-reported categorizations depicted in Figure 3.1.

<sup>3</sup> 65 kW was installed under Powering Agriculture in Fiscal Year 2016.

FIGURE 3.3 CLEAN ENERGY CAPACITY INSTALLED UNDER POWER AGRICULTURE

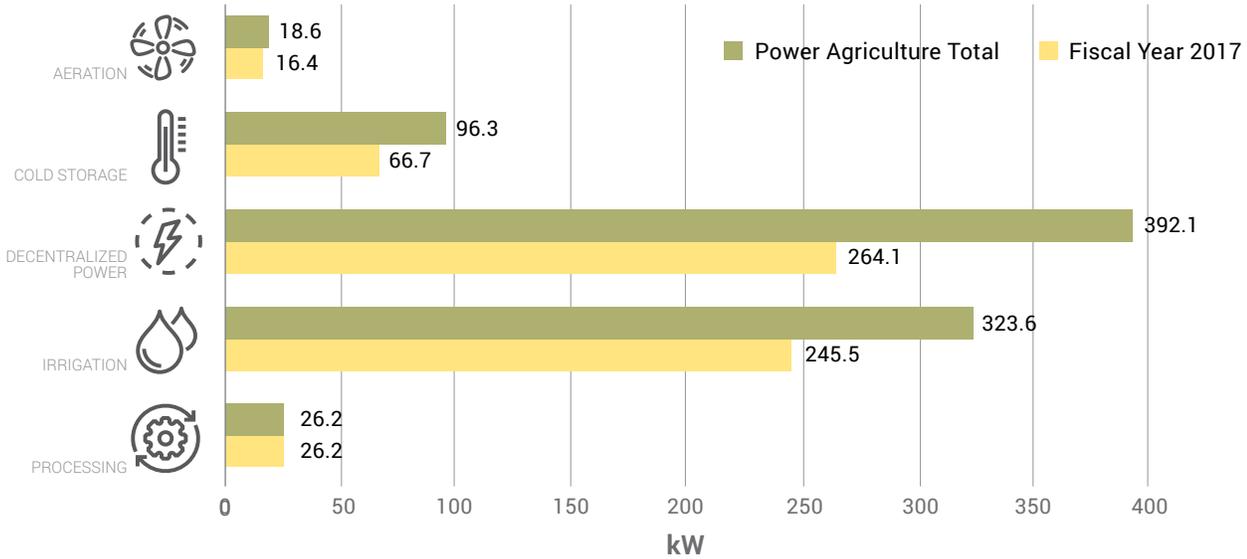
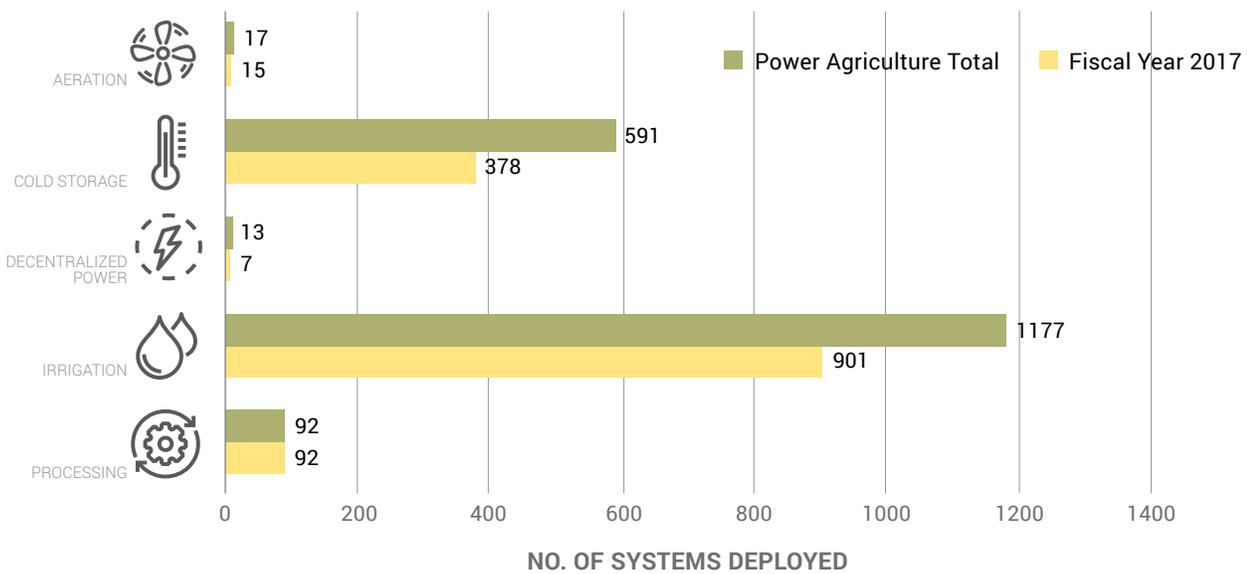


FIGURE 3.4 NUMBER OF CLEAN ENERGY SYSTEMS DEPLOYED UNDER POWER AGRICULTURE



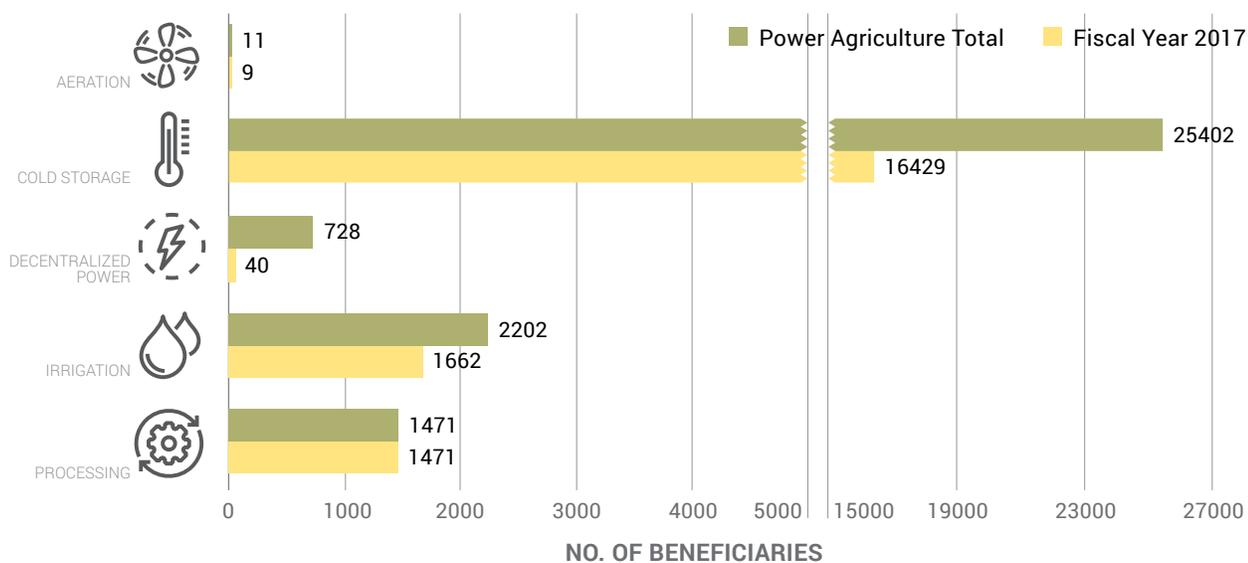
Powering Agriculture has already begun to positively impact households, farmers, and agribusinesses as beneficiaries benefit from the deployed CES units under operation or in use. The largest number of systems deployed has been for irrigation, in part due to the number of innovators in this category who are further along the innovation ladder (as noted above).

Cold storage represents the next largest number of systems deployed under the program, due in part to the fact that these technologies are household-scale, all under 1 kW in size. The only exception is Promethean Power’s industrial scale milk cooler<sup>4</sup>.

<sup>4</sup> While Promethean’s coolers are large in capacity, the solar component of their design is only 1kW, serving as a power source for a pump transporting the milk from the cooler to the tank.



FIGURE 3.5 **BENEFICIARIES OF CLEAN ENERGY TECHNOLOGIES UNDER POWER AGRICULTURE**



The largest number of beneficiaries<sup>5</sup> have been reached in the area of cold storage. A large portion of these results are due to the contribution of Promethean Power focused on providing cold storage to the regional milk collection centers, rather than directly to individual dairy farmers. Each system benefits between 40 and 85 farmers, who bring their milk to the distribution points. The projects in Irrigation have also resulted in significant beneficiaries, however since this technology is dominated by household-scale technologies,

it tracks closely with numbers of systems deployed.

The lowest number of beneficiaries reached is in the area of aeration as there is only one innovator within that sub-sector and they have just started initial piloting of their technology this year. Similarly, only 7 decentralized power units have been deployed this year as majority of the innovators in that area continue working through the *research and development* or *initial piloting* stages of their innovations.

<sup>5</sup> For the purpose of Powering Agriculture, beneficiaries are defined as households, agribusinesses or commercial customers who benefit from having access to the Powering Agriculture funded clean energy solutions (CES). This number only counts direct beneficiaries. Indirect beneficiaries, such as all members of households, are not included in these counts.

### 3.2.1 Success Stories



# MOTIVO

Hybrid Vehicles with Exportable Power for Community-Based  
Agriculture Mechanization

India



Motivo has been working with the KVK Foundation to pilot its HARVEST electric tractor to a group of 47 farmers in the village of Maharajpet outside of Hyderabad, India. The farmers share the two HARVEST tractors that take turns preparing fields for the monsoon growing season and recharging via a 2.25 kW solar array. The farmers have quickly adapted to the unconventional feature set and form factor of the HARVEST and have realized that it serves a valuable role on the farm. One group of farmers who are orchard owners now use the HARVEST to clear brush and spray in between their mango trees, an area too confined for diesel tractor use and

work that was traditionally done manually. Another group of farmers who grow onions, chilies, and other vegetables use the tractor to grate their fields and then haul the churned-up grass to the market to be sold as cattle feed. In addition to its functionality as a tractor, HARVEST's high-powered flood lights are frequently used to light remote portions of the farm for critical or emergency tasks that must be carried out at night such as bore well repairs. Already, three of the farmers that use the tractors have inquired with Motivo where they can purchase HARVEST for themselves.

### 3.2.2 Success Stories



ICU

Solar PV-Integrated Drip Irrigation and Fertigation Systems

Jordan



Jaber Hamed Mahmoud Battah with his daughter on his farm in Northern Jordan.

Jaber Hamed Mahmoud Battah lives on a farm in Zarqa, Jordan, along with his family of nine. The family-owned farm produces squash, eggplant, and cauliflower which are sold at the market, as well as fodder for a handful of animals living on the farm. One of the farm's biggest challenges is the high cost of diesel necessary to irrigate the land—which is why Jaber decided to participate in ICU's *PV Drip Irrigation and Fertigation Systems* project.

ICU not only supported the installation of the system, but also brought together agricultural public agencies, private companies, and credit

institutions, which allowed Jaber to have a 10kW drip solar irrigation and fertigation system installed. Without access to finance, which allows Jaber to pay for the system over 5 years, he would not be able to afford the switch to solar-powered irrigation. In a mere 3 months of the system's operation he has saved over \$300, which will go towards his family's expenses. Looking ahead, Jaber wants to invest into expansion of his family farm. He is a proud owner of the new technology and hopes it will catalyze knowledge sharing in his community, particularly among students.

### 3.2.3 Innovator Progress on Gender Integration

Innovators have been actively working to collect sex-disaggregated data, hire more women in key technical positions, integrate gender into baseline surveys with CES surveys, and create entrepreneurship opportunities for women to use or sell CES. Out of the 12 innovators who responded to a recent survey (with 55% response rate), 89% reported that they have collected and reported sex disaggregated data in the past year<sup>6</sup>. Over half (56%) reported that they hired more women in key technical/professional positions, while 44% integrated gender into baseline surveys with CES users and consulted with both male and female users

regarding CES development. Close to one-quarter of the innovators (22%) reported that they created entrepreneurship opportunities for women to use or sell their CES, as well as captured sex-disaggregated impact data on time and labor savings

All innovators are collecting sex-disaggregated data when reporting about people – some more effectively than others. Two out of the 19 innovators being supported by Powering Agriculture in financial year 2017 have achieved 50/50 gender parity in working with men and women either as CES beneficiaries, trainees, or technical staff made available to the beneficiaries; the majority are still working

FIGURE 3.6 PERCENTAGE OF INNOVATORS REPORTING GENDER INTEGRATION ACTIVITIES<sup>6</sup>

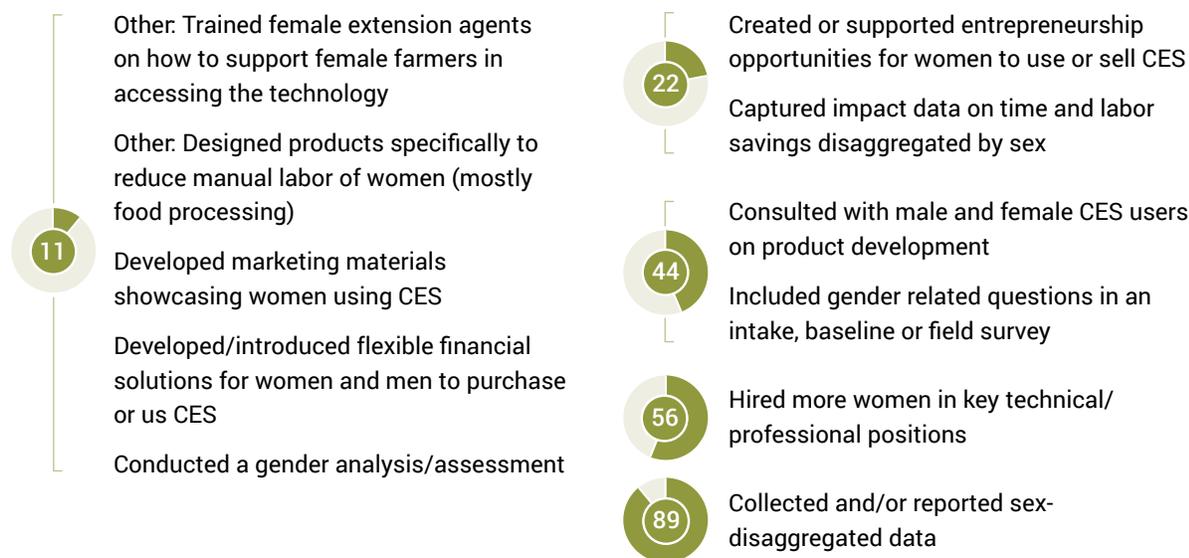


Figure 3.6 Responses are from 12 innovators who responded to a recent Powering Agriculture survey implemented by PAX that included questions regarding gender integration (more than one response was allowed per innovator). The response rate of innovators was 55%, so this is illustrative rather than representative.

<sup>6</sup> A survey implemented by PAX in September 2017 included questions regarding gender integration. The response rate of innovators was 55%, so the results were illustrative rather than representative.

on closing this gap. The majority of the Innovators (9 out of 19) are only reaching between 20% and 50% women, and 8 out of 19 Innovators are reaching less than 20% women. The innovators have been most successful at reaching women through training sessions on their clean energy technologies, with three innovators exceeding a ratio of 50% women.

When it comes to direct beneficiaries, only UGA has exceeded 50/50 gender parity, while 50% of the innovators providing improved energy services to beneficiaries this year only reached between 0% and 20% female beneficiaries. Below are descriptions of how several of the innovators are actively working to close this gender parity gap.

FIGURE 3.7 INNOVATOR ENGAGEMENT WITH WOMEN DURING FY 2017<sup>7</sup>

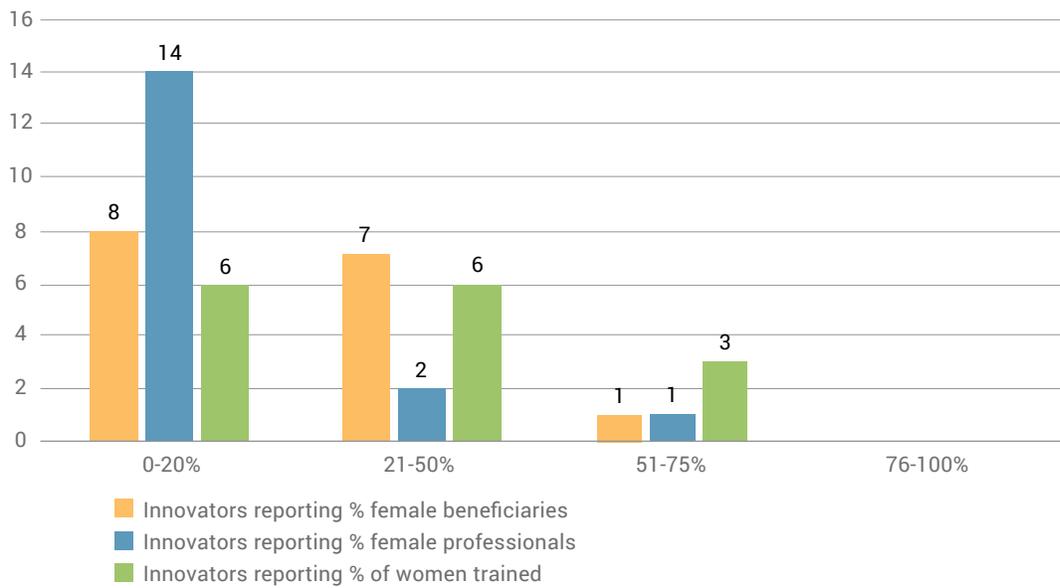


Figure 3.7 Data is based on aggregated sex-disaggregated data (cumulative to date) reported by PAEGC innovators. Only a portion of innovators are at a stage where they are collecting data about people, out of which a minority did not report sex-disaggregated data.

<sup>7</sup> This data is based on self-reported disaggregates of Powering Agriculture performance indicators for 2017 fiscal year available to date.



## Innovator Gender Integration Lessons Learned in 2017



***Gender analysis improves marketability of a product—and can also ensure product design is fit for purpose.***

**SimGas** revised their marketing survey to include collection of gender analysis information in 2016. After collecting data in 2017, they learned critical information to inform their marketing and product design:

1. Men and women's roles caring for cows varies by household, which means they need to do a careful intake survey with both the man and woman in each household farm to identify how much manure is being produced—and bio-gas generated—which is lower seasonally when cows graze.
2. Women are predominantly in charge of cooking—and once they use cook stoves with biogas, they don't want to go back—which also means they are unhappy when they run out of bio-gas.

Equipped with this knowledge, SimGas went back to the drawing board to redesign their bio-digester to consume less bio-gas. They knew if they did not take this into consideration that women who would potentially use the bio-gas fed cookstoves would not be interested in their product. Recognizing that men and women work together as dairy farmers, they tested the milk chiller prototype with 10 dairy farms in Kenya and Tanzania with 10 couples, intentionally working with *both* husband and wife.

**UGA** previously produced a butter-churner CES that failed in its first iteration because it was designed for people standing; they quickly realized through consultation with women

that they churn butter while sitting—so they redesigned the technology for use while sitting. UGA applied this learning to their EvaKuula design and marketing process, emphasizing that it is critical to pay attention to gender in design because the product will be “dead on arrival” if the female-friendly factors are not incorporated. They find it critical in product design to hold focus group discussions with women, present products, “let them tear it apart,” and redesign accordingly. UGA also recognizes the important role household decision-making plays in this process. They don't look at a household as a whole, but rather at the individuals within it—men, women, and children. For example, they know that if they want to meet with women in Ghana, they can only meet Sundays after church because their spouses would not allow them to meet on Mondays.



***It is a powerful marketing strategy to identify women already organized in groups to introduce CES products, as women organize socially and naturally spread the word.***

**UGA** strategically selected women as both of their “star farmers” to demonstrate the EvaKuula. Women naturally organize themselves in relational social groups, so they see it as a strategic marketing approach to work with women as they naturally spread information through word-of-mouth. Although UGA does not systematically seek out women's groups to market their product to, they are delighted when they find an already organized one to work with. Women who are already organized in a formal or informal village savings and loans association (VSLA) pool money together and are attractive

as a target market. UGA observed that when women are organized in a group, the decision-making process is driven by camaraderie—and also insulated from nay-saying negative comments about the technology from their husbands. However, UGA finds that it is critical to listen to a women’s group narrative and work only with those that are internally motivated, rather than an externally motivated group that may not be enthusiastic if payback is required for the technology. In the future UGA plans to implement a “church lady model” to market the EvaKuula, building trust among influential church members; strong community relationships and word-of-mouth are key to reaching their target markets in sub-Saharan Africa.



***Achieving meaningful female participation and decision-making***

***often does not occur naturally, but rather requires deliberate activities and a gender-responsive monitoring and evaluation plan to drive teams toward identifying and overcoming challenges in women’s participation. These include identifying and addressing critical issues such as gender-based violence.***

UVG was successful in achieving 50% active female participation in conducting town hall-style community meetings to ensure that every aspect of the project is discussed transparently with all members of the community and stakeholders, and that the communities agree to each step of the process. However, this required deliberate action. For example, UVG carefully counted and made intentional efforts to empower women as meeting participants and decision-makers in a variety of different consultation meetings they organized. Across all trainings, the number of women participants

exceeded that of men (59 women vs. 39 men). In an agribusiness training program with the 9 de Enero Mayan community, with the purpose of providing training to community members to establish/expand their own agribusinesses, UVG divided community members into 3 groups of: 7 men, 14 women and 14 youth. The training course also utilized practical, “real life” examples to support learning of all participants. In another community meeting on project costs, UVG reported that 12 of the 43 participants were women, 10 of whom had voting power.

These activities are underpinned by UVG’s commitment to integrating a gender-specific outcome in their M&E plan: *Accelerators support gender equality in access to and benefit from clean energy in target communities.* They made a specific target—that 50% of beneficiaries of new income generation opportunities created by the Accelerators will be female, and chose to measure the percentage of producers utilizing value addition processes who are female and the percentage of Accelerator operators who are female.

As project roll-out continues, UVG plans to engage women in the community, including: interviewing women to ensure trainings are compatible with their time availability; better understand female expectations and needs regarding CES, including specific safety issues concerning access to and use of energy; conducting a safety audit of the accelerator to ensure that it can be safely used by women (prevention of gender-based violence); recruiting women as CES operators; holding special training and business incubation sessions with women; and including women in the design of the accelerator’s organizational structure.



***CES can reduce women's labor and time—but may displace their paid labor; recognizing this and identifying alternative income-generating and entrepreneurship opportunities is critical.***

**Horn of Africa (HOA)**'s biodigester will significantly reduce the labor- and time-intensive coffee drying process, which is disproportionately performed by women. However, this means that women may lose their jobs—and income source. Using the slurry from biodigesters creates another income-generating opportunity through mushroom production and sales. HoA identified that their CES creates a slurry by-product from the biogas that may be utilized in mushroom cultivation. Horn of Africa (HoA), supported by the PASTO gender integration specialist, is in preliminary stages of formulating a gendered market analysis to identify the feasibility of supporting female entrepreneurs to cultivate and sell mushrooms. HoA will explore the possibility of supporting cooperatives with the female laborers to purchase the slurry and produce and sell mushrooms. A gender analysis will identify barriers and opportunities for women becoming successful entrepreneurs in mushroom production and sales through the mushroom value chain. This will include assessment of the women's skills, desire, household decision-making, and other cultural norms to identify gaps. Potential partners will be identified that may address barriers.



***Customer intake surveys that collect gender-specific data from both women and men from the same household can help target appropriate distribution of CES in pilot phases.***

**University of Toronto**, with Powering Agriculture's technical assistance, tailored

surveys to give to both men and women individually within one household, with additional questions to provide more information regarding gender roles on fish farms. In 2017, surveys were implemented monthly, and to ease the survey process and make items accessible to women, University of Toronto hired a new female staff member. The survey results identified that more than 1/3 of farms currently have female participation; this information was used to select fish farmers to participate in the study. UT will continue monthly surveys, collecting data from both male and female household members once the devices are installed, ensuring that the female staff person collects data from the female farmers. These surveys will provide more background on gender-based challenges with the technology.



***CES can serve as a disruptive technology that promotes gender equality—but timing is critical when entering traditional communities to first establish trust and gain traction with CES.***

**Claro Energy's** mobile irrigation technology relies on cab drivers operating from village to village. In the rural Indian context, it is culturally taboo for a local village woman to drive them. As they just recently introduced the CES with 24 men and 11 women, they intentionally did not attempt to disrupt this cultural barrier. However, they will be observing differences in behavior and CES adoption between women and men, and once the CES gains traction hopes that women will also take on the mobile service vehicle on their own. Claro is in preliminary stages of identifying foundations and organizations that may support them in further identifying and tailoring engineering solutions and products to meet women's needs. Claro has

identified one location where there is an existing woman-only self-help group of 200 women. Claro is engaging with Powering Agriculture to identify strategic entry into this female-only market with their mobile irrigation technology.

### Innovator Plans for Gender Integration in 2018

Out of the 12 innovators (55%) who responded to a recent survey, 11 (92%) have plans in the upcoming year (2018) to conduct any type of gender integration activity. The majority of innovators (64%) plan on creating entrepreneurship opportunities for women to use or sell their CES, 55% plan on consulting

with both male and female CES users on product development, 46% plan on hiring more women in key technical/professional positions, and 36% intend on collecting and reporting on sex-disaggregated data. Approximately one-quarter of innovators reported plans in the coming year to engage in other gender integration activities, such as conducting a gender analysis, writing a case study about gender impacts of their technology, developing marketing materials showing female users of CES, introducing flexible financial solutions for purchasing CES, capturing sex-disaggregated time and labor savings data, and integrating gender equality into CES user surveys.

FIGURE 3.8 PERCENTAGE OF INNOVATORS REPORTING PLANNED GENDER INTEGRATION ACTIVITIES IN 2018

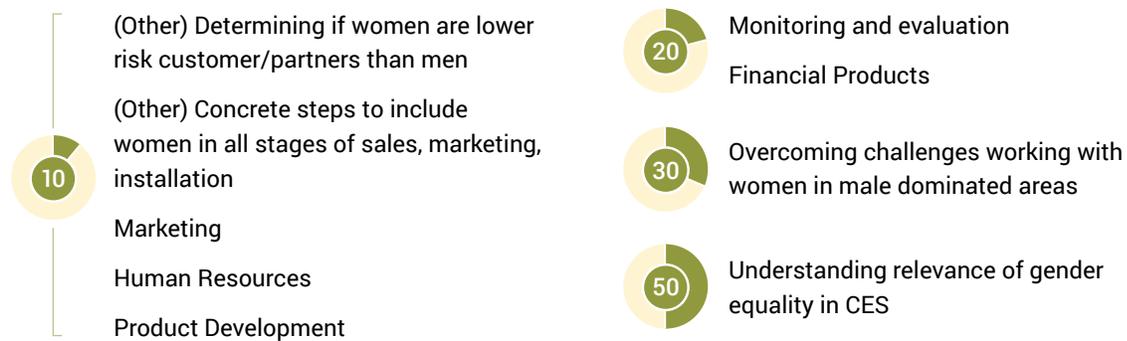


Figure 3.8 Responses are from 12 innovators who responded to a recent Powering Agriculture survey implemented by PAX that included questions regarding gender integration (more than one response was allowed per innovator). The response rate of innovators was 55%, so this is illustrative rather than representative.

Out of the 12 innovators (55%) who responded to a recent survey, nine expressed interest in learning more and/or receiving additional support about specific CES topics. Half of the innovators expressed desire to further understand relevance of gender equality in CES, one-third to overcome challenges working with women in male-dominated areas, 20% in

financial products and M&E, and 10% in product development, human resources, marketing, including women throughout all stages of CES, and determining if women are lower risk customers compared to men. Efforts will be made to offer tailored support through remote technical assistance and through the upcoming PAX workshop in January 2018.

**FIGURE 3.9 PERCENTAGE OF INNOVATORS INTERESTED IN LEARNING ABOUT GENDER INTEGRATION IN SPECIFIC CES TOPICS**



*Figure 3.9 Responses are from 12 innovators who responded to a recent Powering Agriculture survey implemented by PAX that included questions regarding gender integration (more than one response was allowed per innovator). The response rate of innovators was 55%, so this is illustrative rather than representative.*



### 3.3 Innovator support

Powering Agriculture continued to provide various types of support to both Innovator cohorts in order to enhance the chances of the successful deployment of their clean energy solutions.

#### 3.3.1 Implementation Support

Powering Agriculture continued to use the Powering Agriculture Support Task Order (PASTO), which is implemented by USAID contractor, Tetra Tech, to provide a variety of support, including:

- implementation assistance such as feedback on milestones, guidance on M&E
- assistance with compliance with USAID policies and procedures including award modification
- templates/manuals/guides for Innovators' use
- Promotion of Innovator progress on the website, on social media (Facebook and Twitter), at conferences, and to the media
- Site visits to two innovators working in 3 countries to verify progress and interview beneficiaries

#### 3.3.2 Business Acceleration Support

Powering Agriculture continued to provide customized and individually-tailored acceleration support to the Innovators through the structured program called the Powering Agriculture Xcelerator - PAX. This support is provided by VentureWell, in association with Investors' Circle, under the PASTO contract. The program provides:

- **Portfolio managers:** Assigned portfolio managers implement customized work plans developed based on ongoing innovator specific needs assessment. Regular check-

ins with innovators are conducted in order to provide advice, feedback, and suggested action items. Technical Assistance is provided with the end goal of developing and validating a business model and bringing the innovation to market sustainably.

- **Ongoing innovator-specific needs assessment:** Assessments are based on regular check-in discussions with portfolio managers, an internal scorecard tracking system, periodic survey of innovators, observations from in-person workshops, and collaboration with USAID and fellow PASTO supporters.
- **Peer mentoring through cohort groupings:** This is comprised of individual connections among innovators, as well as webinars addressing topics relevant to sub-groups.
- **Investor-readiness assessment and coaching:** Funding needs and strategy are determined, along with identification of and introductions to potential funders.

The goal of the support is to develop and sustain the innovations in the marketplace to realize lasting impact. Because the innovators are pursuing different business models in different regions and are at different points of the innovation life cycle, the individual support is a critical component of the program's success.

Through PAX, innovators received the following over the reporting period.

- Training on industry best practices from experts through three PAX-organized webinars on branding, sales, and product development.
- 79 instances of assistance on business issues

- 66 referrals/linkages/partnerships/connections

See Figures 3.10 and 3.11 for the breakdowns of the type of support.

In-country technical assistance was also provided to one Innovator to conduct a landscape analysis and identify potential distribution partners for their product.

FIGURE 3.10 INSTANCES OF TECHNICAL ASSISTANCE

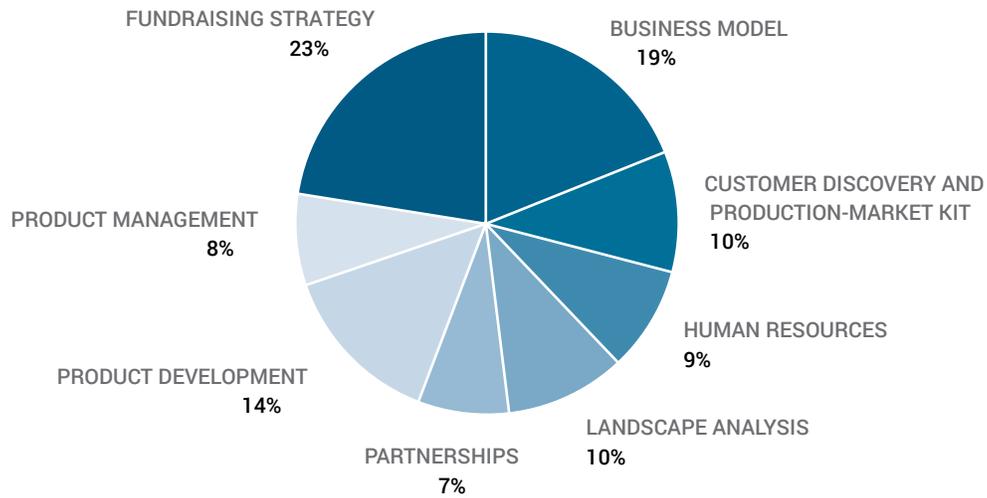
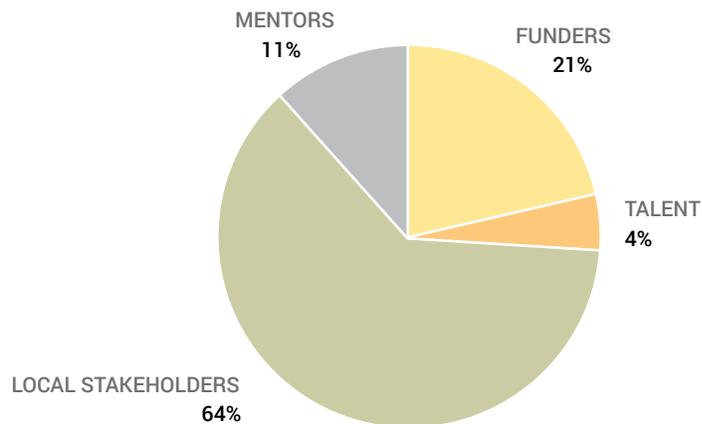


FIGURE 3.11 INTRODUCTIONS AND REFERRALS



**Innovator feedback on PAX:** A survey was conducted of the Powering Agriculture innovators to provide feedback on the value of the PAX support over the year. In open-ended survey responses, many participants highlighted the personalized support they received from portfolio managers as having positively impacted their team's progress. Specifically, respondents appreciated how portfolio managers "answered specific questions" and served "as a knowledgeable sounding board to talk through various strategic decisions." The topics discussed in calls with portfolio managers that were most relevant to respondents were "feedback on fundraising strategy" and "review of investor materials." With the exception of "human resources" all topics were deemed "very" or "extremely relevant" by at least three participants, indicating the diverse needs of participants and the importance of tailored support. Innovators reported a multitude of ways in which their innovations benefitted from check-in calls with portfolio managers, including furthering their understanding of business models and fundraising strategies, and identifying potential partners.

**Specific examples of how PAX services positively impacted innovators strategy:**

*“ Great support on organizational strategy, fundraising and approaching investors and partners. Investor deck review was also very helpful as well as fundraising overview. ”*

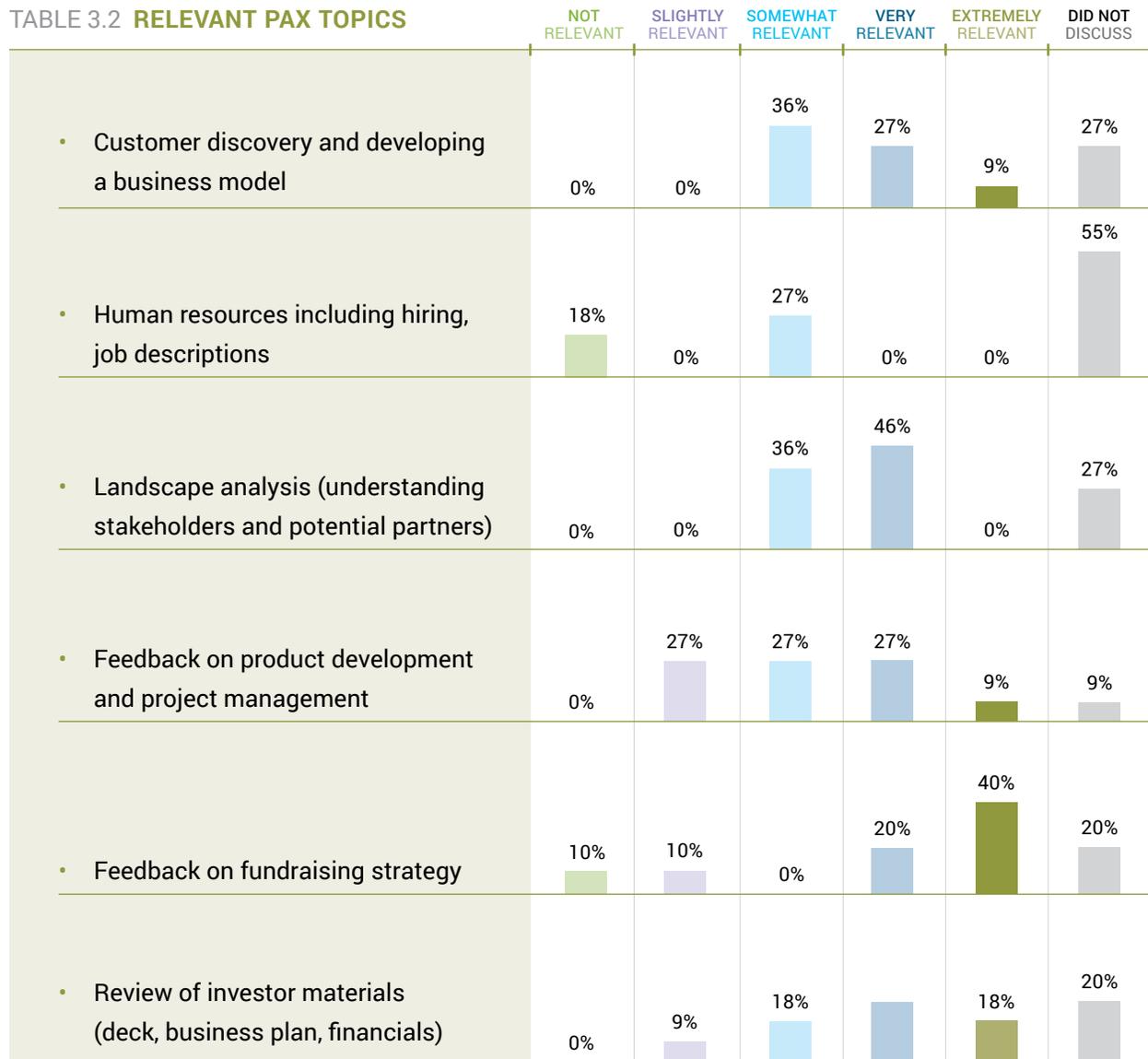
*“ The PAX team provided valuable assistance whilst we were developing the business plan, company overview materials, and pitch deck. ”*

*“ Understanding how the PAEGC grants contribute to an “overall” goal has been invaluable to devise the implementation strategy. ”*

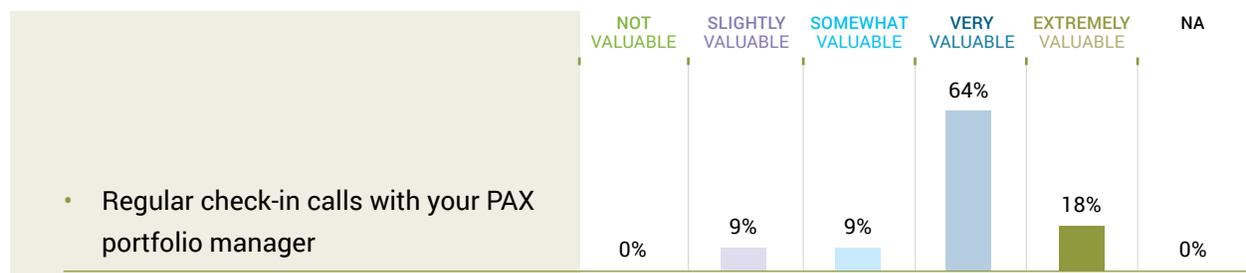
*Comments have been edited for clarity*

**How relevant were the following topics discussed during your check-in calls with your PAX portfolio manager?**

TABLE 3.2 RELEVANT PAX TOPICS



**How valuable were the following types of support provided by PAX?**



## Networking

Since respondents entered the PAX program two years ago, about two-thirds (63%) reported exchanging knowledge or ideas with other PAX innovators, planning to collaborate, or collaborating with them. In open-ended responses, two participants noted that PAX helped them connect with potential partners and investors rather than with other PAX innovators, noting “PAX had introduced us to a number of potential investors” and “They assisted with making connections with relevant potential partners in Bangladesh.”

FIGURE 3.12 PLEASE INDICATE YOUR HIGHEST LEVEL OF INTERACTION WITH OTHER POWERING AGRICULTURE INNOVATORS



In addition to introductions and referrals as depicted in Figure 3.11 on page 73, Powering Agriculture has also facilitated collaboration among the innovators through the in-person events, pairing of innovators with complementary experiences, using one innovator’s experience to educate the other.

Since respondents entered the PAX program two years ago, about two-thirds (63%) reported exchanging knowledge or ideas with other Powering Agriculture innovators, planning to collaborate, or collaborating with them.

### 3.3.3 Gender Support

Powering Agriculture continued to use PASTO to provide on-demand technical support to strengthen gender integration into innovators’ projects. In FY2017, a total of nine innovators made use of the gender integration support available to them.

- 4 instances were phone consultations,
- 3 instances were requests for resources and materials to support a specific activity,
- 1 instance was to provide technical support to integrate gender into a baseline survey, and
- 1 instance was to plan for an in-person technical support visit.

Due to innovators’ time constraints and the nature of gender integration as an on-demand activity, fewer innovators utilized this service than the number that could potentially benefit from support. However, some innovators utilized gender integration support in 2016 during planning or baseline survey implementation, and were implementing these planned gender integration activities in 2017 without need of additional assistance



# 4

# FINANCIAL INFORMATION

*The following financial information on Powering Agriculture's budget, contributions, and disbursements is confidential and limited for distribution only to the Powering Agriculture Partners.*

# 5

## LOOKING AHEAD

*Powering Agriculture plans to implement the following major activities over the next financial year of October 2017 to September 2018*

- **Powering Agriculture Accelerator (PAX) Workshop:** Powering Agriculture will hold the Powering Agriculture Xcelerator (PAX) workshop for the Innovators in Kenya in January 2018. The PAX workshop is an opportunity for the Powering Agriculture awardees to come together as an innovation community. The goal is to utilize the contractors for PASTO and PAX as well as external facilitators to address innovator challenges in order to prevent them from becoming barriers to success. The four-day workshop will be immersive and intense, with the emphasis on active team participation. Topics will include: end-user and customer finance; enabling environment and regulatory issues; raising capital; early-stage investment overview; valuation; founderhood, management, and leadership.
- **SPIS:** Anchoring of Toolbox with respective training institutions through a series of training and training of the trainers. Additional new modules are in the planning stages and include *Irrigation, Market Analysis* for SPIS, and *Financing Models*. An *International Forum on Solar Energy Technologies for Small-Scale Agriculture* is planned to be conducted by the FAO during March 2018. The Toolbox on SPIS will be officially launched at this event.
- **EE in Tea:** Building on the experiences gained from the Kenyan tea sector, Powering Agriculture and ETP are assessing possibilities for similar interventions in the Rwandese and Malawian tea sector. Among other activities, it is planned to deploy the training material developed and adapt it to local circumstances. Reaching for global

upscaling, Powering Agriculture and ETP are currently assessing the energy saving potential in tea factories in China, India, Sri Lanka and Indonesia.

- **Financing Facility:** Powering Agriculture has been advancing the goal of establishing a public-private partnership to mobilize financing for the clean energy-ag nexus. Potential partners have been identified and it is anticipated that an award will be made under USAID's Global Development Alliance process in FY18.
- Publication in December 2017 of "Solar Powered Irrigation Systems (SPIS). Technology. Economy. Impact." which presents the state of the art of SPIS.





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