



Quarter 1 Report

October 1, 2013- December 31, 2013

**Powering Agriculture: An Energy Grand Challenge for
Development**



**Clean Irrigation Solution (CIS) for Increased
Agricultural Productivity**

I. Introduction

To increase agricultural productivity, incomes, and livelihoods of smallholder farmers, iDE and its partners have developed a clean energy irrigation pump and delivery system called Clean Irrigation Solution (CIS).

The Clean Irrigation Solution (CIS) centers on an efficient, versatile, and cost-effective piston pump that is powered by a choice of clean energy. It is revolutionary, as it has the potential to cost less than half the price of similar photovoltaic (PV) pumping systems currently on the market and allows for one pumping mechanism to be paired with several clean energy sources, including solar steam, PV, and AC power from both large and micro scale AC grids. To maximize the agricultural output and value of each drop of water pumped, the CIS technology is coupled with iDE's affordable, ultra-low-pressure drip irrigation system.

Through manufacturing cost reduction, performance improvements, a last-mile distribution network, marketing to other organizations, and partnerships with financial institutions, this project will bring the CIS to scale. This will improve the agricultural productivity of millions of smallholder farmers in developing countries while reducing greenhouse gas emissions.

The project is led by iDE's Technology and Innovation Group in the United States. Field installations and pilot sales will take place in three of iDE's country programs –Nepal, Zambia, and Honduras.

iDE is partnering with the PRACTICA Foundation and Futurepump for this project. The PRACTICA Foundation is responsible for improving the design to increase performance, farmer usability, and manufacturability. Futurepump is working with iDE to establish a manufacturing capacity for the pump, increase the global reach of sales of CIS, and become a provider of the CIS product.

II. Project Activities

The Clean Irrigation Solution for Increased Agricultural Productivity project is currently progressing on schedule. During the first quarter of this project, activities focused primarily on project set-up, promotional material development, establishing quality control procedures, designing components for manufacturability, and reducing component pricing. These tasks are the necessary first steps in establishing production of the CIS in India.



1.0 Project Set-Up

iDE created a workplan, gantt chart, and monitoring and evaluation plan for the project that were submitted to USAID on November 1, 2013. iDE attended the Development Exchange and Accelerator Workshop in December in Washington DC. As a result, iDE's PoweringAg project was featured in a US Water Partnership newsflash article (see Appendix A).

Additionally, a baseline set of data on the current CIS’s performance and cost was created. These specifications can be found in Appendix B.

2.0 Promotional Material Development

iDE developed a general informational brochure about the technology and the progress to date and our partners. The brochure can be found in Appendix C.

Futurepump, one of iDE’s partners has begun to create an instruction and installation manual for the CIS. The ultimate goal for the product is that field technicians will be able to assemble and install the system. Widespread usability and simplicity are vital to scale the distribution of the CIS. As a first step for creating the manual, Futurepump is creating 3D Solidworks models of every part and subassembly of the pump.



3.0 Establishing Quality Control Procedures

iDE, Futurepump, and the PRACTICA Foundation are establishing quality control procedures to be followed by the manufacturing network in India. We are in the process of documenting acceptable tolerances and identifying a set of tools to rapidly test tolerances and product quality.

In addition to quality control of the fabrication of the CIS in India, a bug tracker has been set up to identify issues found in the pumps operating in the field. This tracker identifies component failure, reoccurring maintenance issues, and performance issues. The data reported is from the experience of our field technicians or feedback from the farmers. Regular conference calls between engineering personnel will be held to review and solve the problems at a design level, manufacturing level, or training level. A screenshot of the Bug Tracker is below:

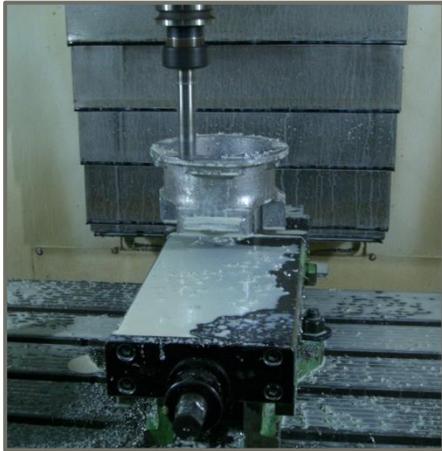
Hardware development tracker							
Part affected	Subassembly (choose)	Issue	How to fix it?	Priority	Status	Reported by	Being worked on by
18	Valve stems	Engine	fiddly to adjust and rocker bolts coming loose	new design using eccentric bolt	3	Active	QB
19	Hoses	Engine	get in way/damaged	secure somehow to frame/post	3	Active	QB
20	Cam	Engine	engine knocking	try more gradual cam shape?	3	Parked	QB
21	Cam	Engine	bearing loosened during operation		3	Active	QB
22	Engine attachment	Recirc pump	pump flexing losing efficiency		3	Active	QB
23	Engine attachment	Recirc pump	incoret poistion causing problems with lever		3	Active	QB
24	Flywheel axel	Engine	too loose		3	Active	QB
25	Arm	Rockerarm	bending	redesign - stronger and easier to manufacture?	3	Active	QB
26	Handle attachment	Rockerarm	socket needs to be located to allow maximum stroke length		3	Active	QB
27	Foot valve	Waterpump	jumping out of base plate		3	Active	QB

4.0 Designing Components for Manufacturability

Until this point, the majority of the CIS’s components have been custom machined, a costly and time consuming process. The next step to scaling production is to implement a modern

manufacturing process. In this quarter a production focus was made on the casting of the engine frame and flywheel, spin molding of the boiler, and CNC machining of the engine head and engine frame castings. Also, at the time of this report, two molds have been commissioned for plastic injection molding of components.

To implement this manufacturing improvement, design changes were made on the engine frame, cylinder head and valves. The dish frame and rocker arm were also redesigned to be easily fabricated by manual cutting and welding with the use of simple fixtures and jigs.



5.0 Component Price Reduction

Through castings, plastic injection molding, and CNC machining, significant price reductions will be achieved.

Futurepump has also begun sourcing research on lower cost solar collector dishes. The current reflector dish uses sheets of German-made Alanod reflective material, which is applied to the dish with glue. While the product is efficient and durable, it is too expensive for our target customers. Futurepump is exploring the idea of creating a plastic segmented dish that can be coated with highly reflective material, which has the potential to be lightweight, efficient and lower in cost.

III. Progress Toward Milestones

iDE has met its two proposed milestones for the first quarter.

Quarter	Milestones	Progress Toward Milestone
Quarter 1	<ul style="list-style-type: none"> • Baseline performance report created • General promotional material developed 	Completed Completed

IV. Monitoring and Evaluation

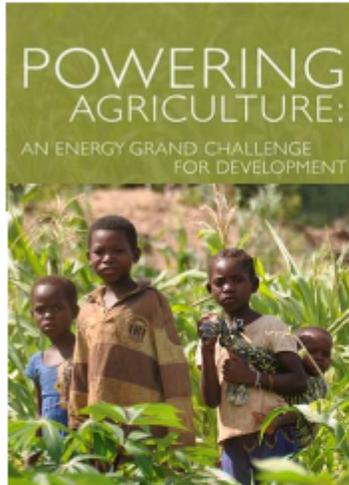
Progress toward the indicators outlined in the Monitoring and Evaluation plan will be reported on every six months. This will be included in the next quarterly report.

Appendix A: US Water Partnership Newsflash



U.S. WATER PARTNERSHIP
Working together for a water secure world.

In This Week's Issue:
[New Guidelines for Integrating WASH and Conservation](#)
[iDE and the Earth Institute at Columbia University Among the Winners -](#)
[of USAID Grand Challenge for Development](#)
[Multiple-Use Water Services Exchange Trip to Tanzania](#)
[Upcoming Events and Opportunities](#)



iDE and the Earth Institute of Columbia University Among the Winners of *Powering Agriculture: An Energy Grand Challenge for Development*

On December 11, 2013, the U.S. Agency for International Development ([USAID](#)), in partnership with the Swedish Government, Duke Energy Corporation, the German Government and the Overseas Private Investment Corporation ([OPIC](#)), announced that U.S. Water Partnership member, International Development Enterprises ([iDE](#)) and the [Earth Institute](#) at Columbia University was among the winners of the [Powering Agriculture: An Energy Grand Challenge for Development](#). The awards supports innovative projects aimed at integrating clean energy technology into the agriculture sectors of developing countries and make important strides in addressing the water-energy-food nexus issues. To learn more about the award-winning project, please click [here](#).

Appendix B: Baseline Performance

Component	Efficiency	Manufacturing Cost
Piston Pump Platform	60%	\$80
Solar Steam Power Drive	35%*	\$300
Reflective dish Efficiency	45%	
Boiler Efficiency	70%	
Solar Photovoltaic Power Drive		\$265
PV Panels (120 Watt)		\$180
PV Drive	30%	\$45
PV Motor		\$60
AC Power Drive		\$85
AC Motor		\$40
AC Drive	30%**	\$45

*Mechanical power input from steam to hydraulic power out

**Power in from panel to hydraulic power out

***Power in from grid to hydraulic power out

Appendix C: CIS General Information Brochure

iDE is an international non-profit organization dedicated to creating an enabling environment for poor rural households to participate effectively in rural market systems, so they may increase their income and begin an upward spiral out of poverty. For more than 30 years, we have focused on creating innovative solutions to development problems, through products, services, and business models.

Three-quarters of people living in extreme poverty earn their living from small farms, so we help poor rural farmers increase their agricultural productivity. In water and sanitation, iDE helps develop sustainable businesses to supply latrines and water filters to low-income households in a manner that allows for profit generation along the supply chain while maintaining a price appropriate for poor households.

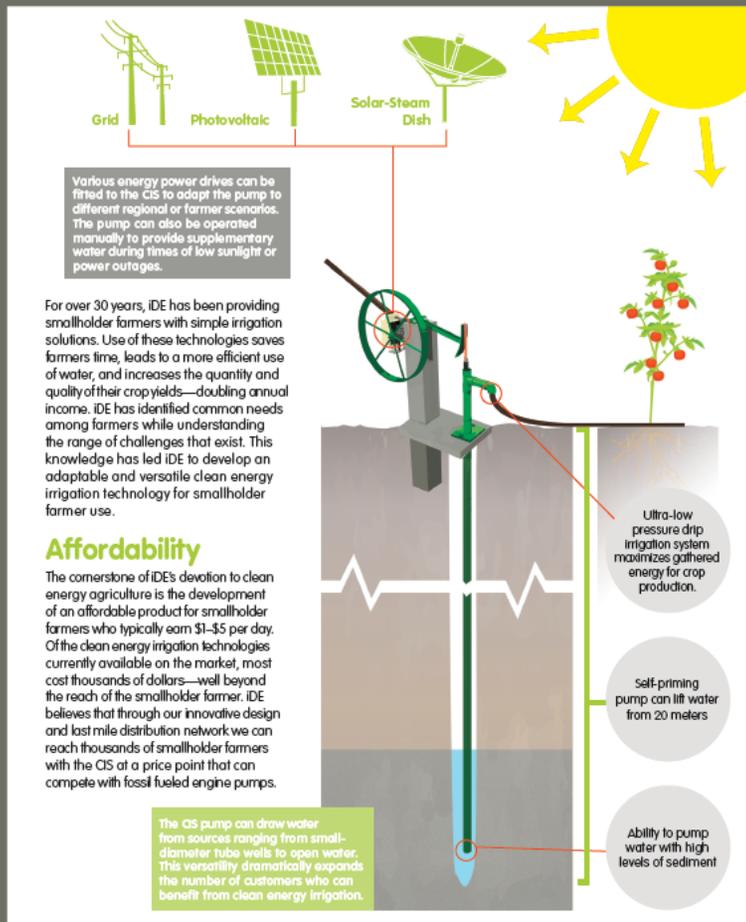
This product is made possible through the support of the Powering Agriculture: An Energy Grand Challenge for Development Partners: the United States Agency for International Development (USAID), the Swedish Government, Duke Energy, and the German Federal Ministry for Economic Cooperation and Development (BMZ). It was prepared by iDE and does not necessarily reflect the views of the Powering Agriculture partners. Further information about Powering Agriculture can be found at www.PoweringAg.org.

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CLEAN IRRIGATION SOLUTION (CIS)



TECHNOLOGY



COLLABORATION

Production

iDE has field tested several iterations of the CIS pump and power drives in Ethiopia, Ghana, and Nepal. Currently, iDE is making final design modifications to increase the pump's efficiency and is establishing manufacturing capabilities in India for scaled production of the CIS. Sales of the CIS will be piloted in Zambia, Nepal, and Honduras, and our partners will help to scale sales globally.

Partners

iDE recognizes that big ideas need collaboration to succeed. We have partnered with organizations who share our values around developing innovative cutting-edge, clean energy technologies that are commercially viable for smallholder farmers.

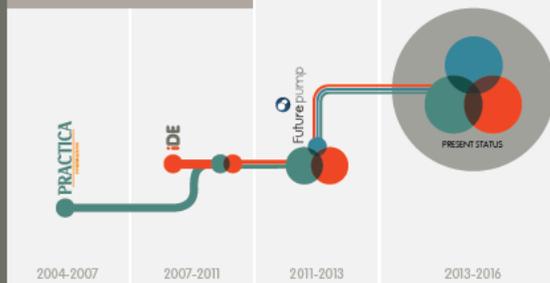


Based in the Netherlands, PRACTICA has worked in developing countries to implement pumping, manufacturing, and water accessing technologies, including cutting-edge solar pumping technology, for over a decade. iDE has been proud to partner with PRACTICA for over 8 years.



Futurepump is a for-profit company devoted to creating solar pumping technology for the smallholder farmer. The founder of the company was inspired by the work of PRACTICA and iDE in the creation of a solar steam-driven pump. With this inspiration and built on past knowledge of bringing clean energy technology to the market, Futurepump was formed.

SOLAR PUMPING TECHNOLOGY INITIATIVE For Smallholder Farmers



With our partners, iDE is transforming the CIS from an idea to a commercial product.

