Letter of Interest Form
All applicants MUST use this form to apply

Development Innovation Ventures (DIV) aims to find and support breakthrough solutions to the world's most important development challenges. DIV seeks applications that have ideas for addressing development challenges more effectively and more cheaply. If you have a great idea, please submit a Letter of Interest (LOI) to DIV using this form. **Citations should be provided whenever possible, and assumptions used to generate estimates should be clearly explained.** Please submit the final LOI to DIVApplications@usaid.gov. Once you submit a LOI, it will undergo a competitive review and if successful, we will ask you to submit a full application.

For additional information about DIV, examples of great projects that we support, and our application process and timeline, please visit DIV's website at http://www.usaid.gov/div/. **Please carefully review our Annual Program Statement available on our website before submitting your LOI.**

I. Eligibility Checklist

DIV welcomes applications from many types of organizations including foundations, U.S. and non-U.S. non-governmental organizations (NGOs), faith-based organizations, U.S. and non-U.S. private businesses, business and trade associations, international organizations, U.S. and non-U.S. colleges and universities (public and private), civic groups, regional organizations, etc.

Applicants must meet the following minimum requirements (check all that apply):

☒ Applicant is a legally recognized organizational entity under applicable law.

☒ Applicant's activities take place in the countries for which USAID provides assistance. If the project covers other countries, the DIV grant can only be used for activities in USAID presence countries.

☒ Applicant is not an organization from a country that is ineligible for assistance under the Foreign Assistance Act, as amended, or related appropriations acts.

II. Organization Information

A. Organization legal name:

B. Organization type (please select from dropdown menu): For-profit company

If 'Other', please specify:

C. Organization address:

Street Address
City: Kampala
State/Region:
Zip/Postal Code:
Country: Uganda

D. Contact information:

Primary point of contact		Secondary point of contact	
Name:			
Title:	CEO	Title:	CTO
Telephone:		Telephone:	
E-mail:		E-mail:	

III. Overview Information

A. Project title: Sustainable Alchemy: Transforming Africa's Waste Problem into Energy and
B. Fertilizer Opportunities
C.

D. DIV stage (please select from dropdown menu): 1

E. Which of the following best describes the sector your innovation addresses? (please select from dropdown menu) Other

If 'Other', please specify: Municipal Solid Waste, Energy, & Agricul

F. Partner organizations: Makerere Univ. Ctr for Research in Energy & Energy

G. Conservation, UW-Madison Nelson Institute

H.

I. Total funding requested (USD): 100000

J. Proposed cost share (USD): 300000

K. Country/countries where the project will take place: Uganda

L. Expected duration of project activities (months): 18

M. Has the applicant ever received USAID funding in the past? No

N. Has the applicant received USG funding for this or a similar project? No

IV. Project Information

A. Development Challenge and Your Solution

What development challenge are you addressing? What solution are you proposing? What is the magnitude of this challenge in the proposed country of implementation, as well as globally (include relevant statistics)? What about this particular solution gives it the potential to significantly impact the development challenge in a way that has not been feasible before? If applicable, describe previous experiences implementing or testing the solution and any evidence of successful development impact. Please provide relevant data and citations in support of your statements. (1/2 page limit)

DEVELOPMENT CHALLENGES IN UGANDA

Chronic power outages retard economic development, with peak demand reaching 445MW and available capacity rarely exceeding 300MW (2011 Energy Reg. Authority). Over 1,800 tons of uncollected municipal solid waste (MSW) –70% of it organic– enter public waterways each day (Takahirwa 2012), causing floods that spread waterborne illness, damage property, and may be responsible for 75% of pollution in Lake Victoria (Odada 2004). Farmers struggling to feed the world's third-fastest growing nation face one of the highest rates of soil depletion on the planet but use less fertilizer per hectare than in any other East Afriican country because commercial fertilizers are expensive and shortages are common (Namaazi 2008). Agricultural expansion is the leading cause of deforestation in this biodiversity hotspot, as decreasing yields force farmers to encroach on critical habitat for wild gorillas and chimpanzees (Rademaekers 2010).

THE SOLUTION

A proven technology, anaerobic digestion, could transform these development hurdles into investment opportunities. We seek to divert 100 tons of organic waste each day from Kampala's Kitezi landfill, convert this waste to biogas, and combust the biogas to produce 1 MW of renewable electricity for the national grid. The digested wastes will be sold as a nutrient-rich fertilizer, making us the first company in Uganda to produce commercial fertilizer for the local market. The liquid fertilizer will be sold directly to commercial growers during off-peak seasons to supplement irrigation. The solid fertilizer will be marketed through a woman-to-woman sales network that will facilitate last-mile distribution to rural small-holders. This last aspect of our business model is what we seek to learn more about through Stage 1 funding. Identifying, recruiting and training entrepreneurial women to test and sell our fertilizer is critical to penetrating the fertilizer market.

WHY NOW? WHY UGANDA?

With the World Bank predicting global MSW production to double to 2.2 billion tons/year by 2025, urban areas worldwide urgently need financially sustainable models for MSW management. Uganda is the ideal testing ground for designing urban biogas systems in a resource limited setting. The Ugandan government just announced 20 year rate guarantees

of US$ 0.115/kWh for biogas electricity. With more than 200 micro-scale biogas systems across the country, Ugandans are familiar with the technology's basic principles.

B. Objectives and Anticipated Results

What are your objectives and the anticipated results for the proposed level of DIV funding support? How would DIV support help you meet your goals for the innovative solution? (1/2 page limit)

Anaerobic digester technology is not new. Commercial systems are operational worldwide, and our team has visited successful projects on three continents. We've seen that the technology almost always works, but the business models sometimes fail. Biogas systems are context-specific, as the value chains associated with waste collection, energy production, and fertilizer development vary by region.

We wish to pilot a business model that addresses the unique needs of the African market. The value of waste collection and energy production is relatively well-articulated in Uganda, and policy incentives have illuminated a clear pathway to biogas energy commercialization. However, our financial models, which are based on three years of biogas research in Uganda, Germany, and Wisconsin, suggest that a viable fertilizer product–including a last-mile distribution network–is essential for long-term financial sustainability. In order to make a strong financial case for private-sector investment in biogas technology for Africa, the potential for the fertilizer market must be demonstrated.

Our team currently has the resources and expertise needed to construct a low-cost, micro-scale digester that will produce up to one metric ton of fertilizer daily.This digester will be fed the same mix of organic waste that we expect to feed to the 100-ton system to be built later. With generous financial support from the Swedish International Development Agency, the Bill & Melinda Gates Foundation, and the in-kind support from colleagues at the University of Wisconsin and Makerere University, system construction will begin in March 2013. We have also budgeted for nutrient and soil testing. By drawing upon agronomy expertise at Makerere and Wisconsin, we can develop a suitable fertilizer product. But we need additional support to penetrate the market.

We seek DIV Stage 1 funding of $100,000 to support the recruitment and training of a woman-to-woman entrepreneurial sales force for our fertilizer product. We would like to train rural smallholder women farmers how to use our fertilizer and engage these women in the process of refining our product and services. DIV support will enable us to recruit existing networks of women farmers who can help us test, develop, and eventually sell our fertilizer product. We hope to partner with TargetMobi, a marketing and sales platform developed by entrepreneur Chris Lukoyo, a diaspora Ugandan who currently lives in Madison, Wisconsin.

C. Potential Impact & Scale

What is the possible magnitude of impact your proposed solution could have on the stated development challenge, both in the country described above and globally (include relevant statistics)? Who and how many will the solution directly impact? Who and how many will the solution indirectly impact? Provide a definition of direct and indirect "beneficiary" as it relates to your project's potential impact, and explain your methodology for calculating the anticipated number of beneficiaries. What is the maximum level of scale your innovation could reach in the

long-term, both in the country described above and globally? What are possible avenues for scale up over the next 3 – 10 years? (1/2 page limit)

PUBLIC HYGIENE BENEFICIARIES
Direct: 2,000 (proof-of concept), 200,000 (per full-scale)
On average, urban residents in the region generate about 0.5 kg of waste per day. Our proof-of concept system will accept 1 ton of waste per day (e.g. waste from 2,000 people). A scaled system could accept waste from 200,000 residents.
Indirect: 3,000,000 Kampala residents +2,000,000 fishermen
All citizens benefit from cleaner streets and trash-free waterways. Keeping waste out of public sewers prevents trash from clogging waterways and causing massive flooding. Keeping urban run-off out of the Lake Victoria watershed protects the drinking water of urban residents and the livelihoods of fishermen from deleterious effects of pollution. Our proof-of-concept system will need to be scaled before these benefits are realized.

ENERGY SECURITY BENEFICIARIES
Direct: 100 (proof-of-concept), 10,000 (per full-scale)
100 kg of organic waste roughly translates into 1kW of electricity. On average, Ugandan electricity customers consume electricity at a rate of about 0.1kW. Therefore, for every 10kg of waste processed, we generate enough electricity for one person. Our proof-of-concept project will process about 1,000 kg of waste per day, generating enough electricity for 100 people. A full-scale system could provide power for 100,000 people.
Indirect: 34 million (the population of Uganda)
Widespread power outages retard national economic development. With Uganda's fast-growing and rapidly urbanizing population, electricity demand will only continue to rise. We applaud the Ugandan government's commitment to hydropower, but a sustainable energy future in an era of climate change requires a diversified energy portfolio. Unlike solar, wind, or hydropower, which are impacted by severe weather events, electricity generated from biogas can be used to meet demand in any weather since people continuously produce waste.

FOOD SECURITY BENEFICIARIES
Direct: 300 (proof-of-concept), 30,000 (per full-scale)
Each 1,000 kgs of waste we process will produce 900 kgs of high quality fertilizer. We estimate an effective application rate of 1,000 kg/acre. The average subsistence farm in Uganda is about 5 acres. Our proof-of-concept system will produce about 300 tons of fertilizer in the first year, enough for about 60 family-farms to increase yields. Assuming an average family size of 5, we help feed 300 people each year. At scale, each system could produce enough fertilizer to help feed 30,000 people.

Provide the most appropriate estimate of who the solution will directly and indirectly affect.

	Direct	Indirect
Now?	2400	0
In 3 years?	240000	34000000
In 5 years?	1200000	80000000
In 10 years?	2400000	150000000

D. Competitive Landscape

What are existing common practices or competing solutions that seek to address the same development challenge as your innovative solution? What makes your solution more appealing to public and/or private sector stakeholders in comparison with these alternatives? Describe the cost-effectiveness of your innovation including the difference in estimated cost/per development outcome for your innovative solution and that of competing solutions or existing practices. If your solution is a completely new idea or does not have market competition, explain why you believe it is likely to generate or maintain interest from the public and/or private sector, including cost considerations. (1/2 page limit)

SIMILAR PROJECTS

Heifer International has installed over 350 fixed-dome biogas systems in Uganda, predominantly at dairy operations. Members of our team have constructed 26 small-scale systems at orphanages and schools. However, biogas projects of this scale cannot confront Kampala's MSW problem. At Kampala's Kitezi landfill, a methane recapture project will mitigate greenhouse gas emissions and generate electricity, but it will not divert newly generated MSW from the landfill. A start-up in Kenya called Sanergy plans to transform waste into energy and fertilizer. However, Sanergy focuses on latrine waste, not MSW. Commercial fertilizer companies in Uganda import fertilizer from Kenya or Germany. Shortages in supply occur regularly, and the chemical fertilizers currently used are damaging to the environment when applied regularly.

WHY HASN'T THIS BEEN DONE ALREADY?

Several companies have attempted similar projects, but failed because they did not recognize the importance of fertilizer in the business model. Local leaders also complained that these companies did not understand existing norms surrounding MSW management in the city, and thus proposed MSW collection procedures that displaced existing informal sector actors. Our team is committed to community engagement at every step of the value chain.

COST - EFFECTIVENESS

We create extra income for women who organize and supervise waste sorting in the markets and for informal sector waste collectors who bring organic waste to our site. Waste is diverted from the already over-full Kitezi landfill, extending the life of this public resource and saving the Kampala City Council Authority the cost of a new landfill. Our electricity will be purchased by the Uganda Electrical Transmission Company Ltd. through a 20-year rate-guarantee of US$0.115/KWh. This rate guarantee ensures a fixed return on the investment, which has made our business appealing to multiple investors. Our woman-to-woman sales force will have the opportunity to earn income from their commissioned sales of fertilizer to neighbors and friends. Fertilizer from biogas digesters has been shown to increase crop yields by 60 - 172% on Ethiopian smallholder farms (Edwards et al. 2012). Our fertilizer will be competitively priced at 100 USD/ metric ton, offering our customers significant savings in a country where 2011 prices for these fertilizers were no less than 727 USD/metric ton.

E. Measuring Success

Briefly, how do you propose to evaluate the development impact of your solutions and how will you generate relevant implementation lessons? Approaches to evaluation will vary by solution, but evaluation plans for both public and private sector solutions should include steps to measure the social impacts in some way and to evaluate the potential impact and scale and cost-effectiveness

assumptions provided above. How is your evaluation structured to inform future scale up? (1/2 page limit)

We plan to partner with the University of Wisconsin-Madison Nelson Institute for Environmental Studies (USA) and the Center for Research on Energy and Energy Conservation (CREEC) at Makerere University (Uganda) to measure our successes and challenges. At the proof-of-concept stage, researchers and students at these universities will work in tandem with us to evaluate and assess social and environmental benefits and options for future scale-up. Below, we describe our measurement approaches by sector.

Safer water and better public hygiene: Better public hygiene can be quantified by measuring how much trash is removed from the Byogwera market where we will work. Every day, when waste arrives at our site, we will weigh it to determine how much was removed from the market (we anticipate about 1 ton daily). Shortly before we begin collecting waste, we will conduct interviews with a random sample of market residents to assess how they perceive waste to affect their health (e.g., disease incidence, anxiety), hygiene, and drinking water safety. Because contamination of water is a complex problem, we will not be able to rely on quantitative measurements to assess the impact of our pilot project, but will look to interview data for qualitative measures. We will also repeat these interviews with market residents during and after pilot operations.

Improved energy security: Using gas meters, we will evaluate how much energy we produce daily on our site in response to changes in MSW inputs.

Improved crop yields: We are hiring an agronomist to design test plots to test fertilizer efficacy on common crops at our farm site in Mpigi (20 km from Kampala), and to perform laboratory-based nutrient analyses of fertilizer and soil. We will train a network of 50 women smallholder farmers to use the fertilizer on their fields and, in exchange for free samples of our fertilizer we will solicit their feedback on their experiences using our fertilizer. We expect that these farmers will become saleswomen for us and we hope to expand this sales network to 200 women within 5 years

F. People

Describe the composition of the project team, including partner organizations (if any), that will be responsible for implementing the proposed project. Explain how the project team possesses the skills and experience necessary to achieve the proposed objectives. (1/2 page limit)

CORE TEAM

Our four founding members represent a new generation of social entrepreneurs that believe in international collaboration. ---------- is a PhD student at Makerere University who studies conservation and agriculture, holds an Msc in Primate Conservation from Oxford-Brookes (UK) and has managed a small tree-planting company that employed over 100 people. ----- has extensive experience engaging local communities. ---------- is an MSc student studying biogas, and founder and owner of Green Heat (U) Ltd., a highly successful company that has installed 26 small-scale anaerobic digesters around Uganda. ----- is considered Uganda's premier biogas expert. ---------- and ---------- are both PhD students at one of the top agricultural and energy research universities in the United States, the University of Wisconsin-Madison. ----- is a microbial ecologist and former Peace Corps Volunteer (Ghana 03-05) who first visited Uganda in 2001. ----- is a

sociologist with a molecular biology Bsc degree who worked in Egypt for 2.5 years and now researches agriculture and economic development in Ethiopia. ----- and ----- have worked with the Wisconsin Bioenergy Institute since 2010 to assess Wisconsin's biogas opportunity. The women have won three prestigious National Science Foundation grants. This team has been working together for more than 2 years and has secured over $160,000 for this project, including grants from the Swedish International Development Agency and the Gates Foundation, among others.

OUR PARTNERS

The team has spent significant time developing relationships with key stakeholders including government officials (Presidential Advisors, KCCA, ERA, UMEME, REA), private sector (slaughterhouses, Uganda Carbon Bureau), and civil society (market committees). This project enjoys strong institutional support from the University of Wisconsin-Madison and Makerere University Center for Research in Energy and Energy Conservation. Departments throughout the UW-Madison community support this project, including the African Studies Program, the Energy Institute, the Global Health Initiative, the Business School, the Uganda Village Health Project, and the Nelson Institute for Environmental Studies. The project team has also established strong relationships with the private sector including DVO Anaerobic Digesters (the largest on-farm anaerobic digester installation company in North America), BioFerm Anaerobic Digesters (Madison, WI), and others.

V. Submission

Please email your completed LOI in MS Word or compatible format to DIVApplications@usaid.gov. Please do not send any additional attachments or information. Once you've submitted your LOI, you will receive a confirmation that we have received it. Your LOI will undergo a competitive review and if successful, we will ask you to submit a full application. Please carefully review our Annual Program Statement available at http://www.usaid.gov/div/ before submitting your LOI.

By submitting this LOI, your organization is certifying that the answers to the questions are accurate to the full extent of your organization's knowledge.

~~Name of authorized representative~~ _____ ~~Date~~ _____

For additional information about DIV, examples of great projects that we support, and our application process and timelines, please visit our website at http://www.usaid.gov/div/.