

USAID/A
Annual Program Statement (APS)
FY 11 & FY 12 Development Innovation Ventures
APS #M/OAA/GRO/LMA/11-2000

To apply to the Development Innovation Ventures APS #M/OAA/GRO/LMA/11-2000, the applicant submits the following project information:

Title:

Organization: Green Heat (U) Ltd., title of project: Waste 2 Energy Initiative

USAID/DIV Stage (please select by project stage, not funding requested): 1

Additional Partner(s): None

Total Funding Requested:\$ 91,710.00

Funding Requested for the first year:\$ 91,710.00

Total Dollar Value of Cost-Share/in kind contributions of applicant/partners: \$ 122,364.00

Names and Organizations of Key Project Personnel:

Expected Months of Project Duration: 12

Country (countries) where project activities will take place: Uganda

Project Sector: Renewable Energy, Waste Management, Hygiene and Sanitation

Names of other organizations to whom you have also submitted an application:

Is this activity time sensitive? No List and Explain Key Dates: N/A

Have you applied for DIV funding for this or a similar project in the past: No

Date of Previous Application:

Have you received DIV funding for this project at another stage: No

Has the applicant ever received USAID funding in the past: No

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

Dollar amount: \$

Source:

USAID/A
Annual Program Statement (APS)
FY 11 & FY 12 Development Innovation Ventures
APS #M/OAA/GRO/LMA/11-02000

Concept Note Application Form

Green Heat (U) Ltd.

Type of organization: Small Business

Primary point of contact:

USA

Uganda

Signature:

USAID/A

Annual Program Statement (APS) FY 11 & FY 12 Development Innovation Ventures APS #M/OAA/GRO/LMA/11-02000 Concept Note Technical Narrative

Organization: Green Heat (U) Ltd.

Title: Waste 2 Energy Initiative (Kampala, Uganda)

Executive Summary

Green Heat (U) Ltd is a Ugandan company that has supported small-scale biogas development in Uganda for the past three years, and is now seeking to scale its operations to include commercial biogas production. The company is seeking support to conduct a complete feasibility study of its Waste 2 Energy (W₂E) project concept. W₂E proposes to:

- (1) Collect municipal waste in Kampala, Uganda
- (2) Produce biogas via anaerobic digestion of organic wastes
- (3) Purify and pressurize the gas into LPG canisters, and
- (4) Market the gas as a safe, affordable, and renewable alternative to charcoal, firewood, and LPG, a resource that is currently in such shortage in Kampala that customers are often forced to wait over a month to refill their empty gas canisters.

W₂E produces a commercially viable renewable energy product that has numerous social and environmental benefits. Uncollected trash in Kampala enters public waterways, causing flooding that leads to property damage, waterborne illness, mosquito breeding, and death while polluting the Lake Victoria watershed. Flooding events disproportionately affect the most vulnerable residents of the city and threaten the fisheries-based livelihoods of the rural poor along the shores of Lake Victoria. The W₂E concept also attacks a root cause of deforestation—charcoal production—in a global biodiversity hotspot. W₂E provides an affordable alternative to charcoal: compressed biogas. Cooking with biogas reduces indoor air pollution while offering women a time-saving alternative to traditional cooking methods. Finally, W₂E supports climate change adaptation and mitigation while promoting energy independence and security in Uganda.

Our business proposal leverages waste as a resource, transforming a development hurdle into an investment opportunity. This project concept can easily be scaled and transferred to urban areas around Africa, supporting energy security, watershed protection, and hygiene for millions of vulnerable people. The W₂E plan is a model for social entrepreneurship, as the project is profitable while delivering essential social and environmental benefits to the poor.

Development Challenge and Expected Outcomes

(1) *Waste Management* (trash collection provided to 6,000 residents in the first year*)

Kampala's 2 million residents produce about 1000 tonnes of waste daily, 70 percent of which is organic.¹⁸ W₂E will collect 3 tonnes of trash daily.

* 3 metric tonnes of trash per day collected= 0.3% of trash generated, 0.3% x 2,000,000 residents = 6,000 residents

(2) *Energy Production* (1,500 tons of biogas produced in the first year^{**})

Civil unrest in Uganda has partially been driven by energy availability and cost. W₂E helps provide a sustainable energy solution that supports security and development in the region.

(3) *Job Creation* (steady employment offered to 25 people in the first year)

In a country with one of the highest population growth rates in the world, employment is difficult to procure. W₂E will provide employment with a fair wage to 25 individuals from the trash picker community – mainly women. All employees will be provided with personal protective equipment.

(4) *Environmental Protection* (44 acres of forest saved in first year^{**} and 1600 metric tonnes of CO₂ offset in first year^{***})

Poor waste management in Kampala leads to pollution of sensitive environmental areas within the Lake Victoria basin. W₂E protects the Lake Victoria ecological area. Fuelwood consumption is the third greatest cause of deforestation in Africa.¹ Reducing deforestation in tropical countries like Uganda by switching from carbon-intensive fuels like fuelwood and charcoal to biogas can mitigate 30 percent of global carbon emissions.^{7,8}

(5) *Public Health Benefits* (2000 families directly helped in first year)

Burning biomass in simple stoves degrades indoor air. Switching from dung, crop residues or fuelwood to biogas reduces concentrations of indoor air pollutants.¹⁰

Innovative Solution within the Competitive Landscape

Innovation

W₂E is innovative because it is a commercial-scale waste management plan for urban areas that produces energy that is easily transported to the point of use -- individual homes. To our knowledge, no business or organization in Africa produces commercial-scale pressurized biogas from municipal waste for cooking fuel even as biogas has gained popularity in East Africa. Additionally, biogas production yields a rich organic co-product that can be used as fertilizer to improve arable land. Thus, W₂E accrues benefits to environmental and human health in the context of waste management and energy production.

Competing Technologies:

The vast majority of biogas projects in the region are *small-scale* digesters, such as those our company has completed at sites around Uganda. Heifer International has installed over 350 fixed-dome biogas systems in Uganda, predominantly at small-scale zero-grazing dairy operations.^{15, 11, 16} Tanzania has also witnessed a rapid expansion in small-scale biogas systems,

^{**} By switching to biogas, the average Ugandan would save 25 bags of charcoal a year. Assuming 1000 customers to switch to biogas in year one, using conservative estimates from Dr. Holly Gibbs and the UN FAO;

$$\left(\frac{25000 \text{ bags charcoal}}{\text{year}} \times \frac{1 \text{ kg wood}}{0.23 \text{ kg charcoal}} \times \frac{0.5 \text{ kg C}}{1 \text{ kg wood}} \times \frac{1 \text{ tonne}}{1000 \text{ kg}} \times \frac{1 \text{ hectare tropical forest}}{0.405 \text{ hectare}} \right) = \frac{44 \text{ acres forest saved}}{\text{year}}$$

^{***} The proposed system would capture 300m³ of biogas each day.

$$\left[\left(\frac{300 \text{ m}^3 \text{ biogas}}{\text{day}} \times \frac{1.8 \text{ kg CO}_2}{1 \text{ m}^3 \text{ biogas}} \times \frac{1 \text{ mtonne}}{1000 \text{ kg}} \right) + \left(\frac{300 \text{ m}^3 \text{ biogas}}{\text{day}} \times \frac{0.65 \text{ kg CH}_4}{1 \text{ m}^3 \text{ biogas}} \times \frac{1 \text{ mtonne}}{1000 \text{ kg}} \times \frac{25 \text{ mtonne CO}_2}{1 \text{ mtonne CH}_4} \right) \right] \times \frac{300 \text{ operational days}}{\text{year}} = \frac{1624 \text{ mt CO}_2\text{eq}}{\text{year}}$$

from 550 digesters in 1992 to over 2,000 digesters today, and plans for the installation of 12,000 more digesters in the coming years.^{12, 14}

Compared to conventional waste management, our project offers these additionalities:

- (1) Renewable energy production
- (2) Climate change mitigation and adaptation benefits
- (3) Prevention of deforestation in a global biodiversity hotspot
- (4) No direct cost to municipal governments
- (5) Sustainable profit-generation for a private-sector social entrepreneurship

A cost-effective and viable alternative

Unlike traditional waste-management systems, which require yearly financial support from local governments, W₂E will be financially independent after capital investment. Competitive pricing will make pressurized biogas an affordable alternative to competitors' LPG canisters. Current market prices for 15-litre canisters of gas in Uganda are UGX 100,000-120,000 (roughly \$38-46) and scarcity continues to drive costs upwards. Customers often wait a month or more for LPG to become available. Fifteen litres of our product would be sold for UGX 80,000-95,000 (roughly \$30-33) per tank, offering our customers 10-30% cost savings.

Business Plan

Uganda's Energy Sector

According to Uganda's National Environment Management Authority, the energy resources used in Uganda include biomass/charcoal (93%, 20 million tons of wood/charcoal), petroleum products (6%, 430,000 tons of oil), hydropower (1%, 300 MW), and thermal power (3 MW).¹⁶ The dependence upon biomass for cooking is extremely high: 81.6% of households use fuelwood while an additional 15.4% use charcoal.¹⁷ Trends indicate an annual growth in energy demand of 7-8%, and already, increased energy demand has led to a rapid rise in fuelwood and charcoal prices. Consumers are increasingly turning to LPG to meet their cooking needs. As a result, there has been a consistent, country-wide shortage of LPG. W₂E will position itself to capitalize on this growing demand for gas, establishing its first plant in Uganda's capital city, Kampala, and by soon expanding into the East African regional market.

Sales Forecasts

Our initial targeted customer base will be 2,000 individuals. On average, each customer is expected to purchase three 15 liter tanks of biogas each year. Approximately 10% of the 2 million Kampala residents currently use LPG for cooking, representing an existing market of 200,000 customers. We seek to capture only 1% of the market in the first year of operations. Because our gas will be significantly less expensive than conventional LPG, and because this low cost will enable some customers to switch from charcoal or fuelwood to biogas, we believe that the market opportunity is significantly higher than this conservative projection. After the initial \$400,000 start-up investment, W₂E will become a financially viable, profit-making enterprise. Preliminary financial projections predict annual profits of \$200,000 within 5 years.

Distribution Strategy

Biogas produced will be purified and stored under pressure in gas cylinders for easy distribution. Initially, we will sell directly to customers from our production facility. As our business expands,

we will develop a distribution network of sales representatives, reaching even the most remote rural areas.

Scaling Plan

The W₂E concept will begin in Kampala, an urban center of over 2 million residents. After five years, Green Heat will have generated sufficient profit to invest in constructing additional facilities in nearby urban centers in Uganda. With a demonstrated record of success, the business will be poised to offer its services throughout East Africa within 10 years. The most rapid expansion of our business model would occur with financial incentives such as contracts from local and national governments for our urban waste management services, land subsidies, or tax relief. However, even if Green Heat were to offer its waste management services for FREE to these municipalities, the concept would still be profitable and scalable. Hence, this project can operate independently of the public sector.

Year	Direct beneficiaries ¹	Indirect beneficiaries ²	Customers ³	Key markets
2	5000	1 million	12,500	Kampala
5	15,000	2 million	37,500	Kampala, Jinja, Entebbe
10	50,000	10 million	125,000	Masaka, Nairobi, Kisumu, Dar es Salaam, Kigali, Juba, Mwanza

¹Direct beneficiaries are the estimated number of individuals who would receive direct waste management services, i.e. whose household waste would be collected by our company.

²Indirect beneficiaries would receive secondary benefits such as improved health, sanitation, livelihoods protection, etc. (from flood/pollution prevention, climate change mitigation, etc.).

³Customers are defined as the number of individuals who would reside in households using our compressed biogas. We assume 5 individuals per household (e.g. in year 2 we would sell our gas to 2500 households, representing 12,500 individuals).

Evaluation Methodology

The project will be considered successful if:

- (1) A rigorous feasibility study is completed including:
 - (a) A well-developed and externally reviewed business plan with financial projections,
 - (b) A complete market analysis,
 - (c) A scalability plan to reach millions of poor within ten years,
 - (d) Detailed engineering designs for the anaerobic digester and effluent lagoon,
 - (e) Accurate bids from reputable biogas equipment suppliers,
 - (f) An independently certified environmental and social impacts assessment,
 - (g) Signed agreements with stakeholders including the Kampala City Council Authority,
 - (h) Clear shareholding agreements and other legally-binding business documents.

- (2) Sufficient capital has been sourced to launch the project into the pilot phase.

Key Personnel

The W₂E concept leverages Ugandan and American expertise in business development, engineering & technology, agriculture, public health, sociology, energy & development policy, and environmental studies.

----- studied biogas at Kyambogo University. He collaborates with Makerere University and founded Green Heat (U) Ltd. in 2009. ----- received the 2011 World Wildlife Fund's Young Environment Achiever Award. He assists with the management of a \$2.5 million grant for small-business development.

----- is an Energy Systems Engineer at the Uganda Industrial Research Institute and holds an MS in Sustainable Energy Engineering from the Royal Institute Of Technology in Sweden. His previous projects include the Renewable Energy powered milk cooler project of the World Bank Development Marketplace (DM Project 5681), and the World Bank's Low Carbon Island Challenge.

----- has five years of experience leading cross-cultural teams in developing countries. She studied Trypanosomiasis in Tanzania, served in the Peace Corps in Ghana, and currently supervises a team of Ugandans studying human-livestock-wildlife disease for her PhD research (UW-Madison). ----- has received two NSF awards totalling over \$150,000.

----- is professional engineer with over 10 years of experience working on water and wastewater treatment systems, renewable energy projects, and hazardous waste management. He has over 20 years of leadership experience in the Middle East, Southeast Asia, and Central America managing organizations with 30 to 500+ people.

----- received an MS from ----- University where he studied the impacts of gorilla tourism on communities. ----- co-founded a tree-planting company in 2009 where he managed 100 employees. ----- is a PhD student at Makerere University studying wild and domestic pig health.

----- is a rural sociology PhD student (UW-Madison) studying land use change, energy, and food security in East Africa, a project supported by the NSF. ----- completed a Master's degree in International Human Rights Law in Egypt where she studied the social impacts of jatropha biofuel production.

Leverage

Applicant's Leverage

Our project team members have spent hundreds of hours meeting, calling, and writing to potential stakeholders. We have written several grant applications and covered our own transport costs, hosted a website, and paid for international communications. These expenses (~\$4000) represent a significant personal investment. The team is poised to offer the in-kind contribution of \$72,000 in uncompensated time to ensure the success of the project.

$$\left(\frac{5 \text{ hours}}{\text{week}} \times 6 \text{ team members} \times \frac{40 \text{ weeks}}{\text{year}} \times 3 \text{ years} \times \frac{\$20}{\text{hour}} = \$72,000 \right)$$

Partners' Leverage

Our team has only received in-kind assistance in the form of advising from biogas research and business professionals. We will continue to develop our relationships with the Uganda Industrial Research Institute, the Makerere University Center for Research in Energy and Energy Conservation, the Uganda Investment Authority, the Kampala City Council Authority, and the

Wisconsin Bioenergy Institute, among others. Applications for financial assistance have been submitted to more than six international agencies. To our knowledge, these programs do not leverage USG funding.

Proposed Milestones

Estimated Award Start Date: 1 May 2012		
Milestone	Estimated Completion Date	Description of Milestone
1	20 May 2011	Project Memorandums of Understanding; legal review and signed
2	1 June 2011	Biogas site visit itinerary developed (Visits to operational anaerobic digesters and/or biogas equipment manufacturers in Ethiopia, South Africa, Kenya, Germany, China or India)
3	1 August 2011	Market assessment completed
4	1 September 2011	Report on site visits to biogas systems completed
5	1 October 2011	Initial system design plans completed
6	1 November 2011	Promotional materials printed, website launched
7	1 November 2011	Bids for biogas machinery production received and reviewed
8	1 December 2011	All relevant permitting and regulatory regulations identified
9	1 February 2012	Report on environmental and social impacts assessments completed
10	1 February 2012	Partnership agreements with key stakeholders signed (e.g. Kampala City Council Authority, Nasana Town Council, Ministry of Energy)
11	1 March 2012	Legal shareholding agreements signed
12	1 April 2012	Revised system design completed
13	1 May 2012	Final project feasibility report completed (including revised business plan, financial projections, market analysis, scalability plan, system designs, machinery/construction bids, environmental and social impacts assessments, partnership agreements, relevant regulatory/permitting processes, and shareholding agreements)
14	1 June 2012	Sufficient start-up capital sourced to launch pilot phase of the project

Other

Describe roles and responsibilities of any partners.

The University of Wisconsin-Madison (Center for Sustainability and the Global Environment, Business School, Nelson Institute for Environmental Studies, Wisconsin Bioenergy Initiative), the Makerere University Center for Research in Energy and Energy Conservation, and the Uganda Industrial Research Institute will provide advising and mentoring to the project team. They will assist the team members in connecting to appropriate resources and expertise.

Describe both past (if any) and planned interaction with USAID staff while implementing the project.

No USAID staff were contacted with regards to this project. We would be pleased to collaborate with the USAID Uganda mission to support their country objectives.

Note any risks to success and plans to mitigate them.

Sector	Risk	Mitigation
Environmental	Effluent enters public waterways	Environmental Impacts Assessment will provide recommendations on effective mitigation strategies.
Social	Development benefits not realized	The company will hire a “Social and Environmental Accountant” to provide a yearly report on how to best achieve maximum development benefits.
Operational	Mechanical failure, poor longevity of equipment	The feasibility study will enable thorough investigation of reliable manufacturers from whom we will request bids including warranty and maintenance information.
Political	Permitting difficulties, corruption	Memoranda of understanding will be signed with all relevant government agencies. Officials will be invited to participate in a transparent planning process.
Financial	Unable to source start-up funding	At least ten grant applications will be completed within one year.

External Factors.

This project is not especially time-sensitive.

Analyze the project’s gender-disaggregated expected outcomes.

The municipal waste management benefits offered by this project will benefit the citizens of Kampala, 50% of whom are women. The improved air-quality benefits offered by switching from charcoal/firewood to biogas for cooking will disproportionately benefit women and children (90% of beneficiaries). This supports the UN Millennium Development goal of promoting gender equality and empowering women.

Environmental safeguards

Our proposal calls for an independent environmental impacts assessment. We anticipate that this assessment will identify the effluent from biogas production as a potential environmental hazard because it is detrimental to human and ecological health if released into watersheds without treatment. We propose constructing an effluent lagoon to prevent effluent from entering the watershed. This waste could be transformed into another income stream: properly treated effluent can be manufactured into a safe, high-quality commercial fertilizer.

WORKS CITED

1. Rademaekers K, Eichler L, Berg J, Obersteiner M, Havlik P. Study on the Evolution of some Deforestation Drivers and their Potential Impacts on the Costs of an Avoiding Deforestation Scheme. In: Environment ECD-Gf, ed.; 2010.
2. Hooper DU, Chapin FS, Ewel JJ, et al. Effects of biodiversity on ecosystem functioning: A consensus of current knowledge. *Ecological Monographs* 2005;75(1):3-35.
3. Laurance WF. Reflections on the tropical deforestation crisis. *Biological Conservation* 1999;91(2-3):109-117.
4. Keesing F, Belden LK, Daszak P, et al. Impacts of biodiversity on the emergence and transmission of infectious diseases. *Nature* 2010;468.

5. Oluka HB. Uganda: Tourism Potential Untapped. Available at: <http://allafrica.com/stories/201006070348.html>. Accessed March 16 2011.
6. Lepp A. Uganda's Bwindi Impenetrable National Park: meeting the challenges of conservation and community development through sustainable tourism. In: Harris R, Griffin T, Williams P, eds. *Sustainable Tourism: A Global Perspective*: Butterworth-Heinemann; 2002:212-213.
7. Alvarado LXR, Wertz-Kanounnikoff S. Why are we seeing "REDD"? An analysis of the international debate on reducing emissions from deforestation and degradation in developing countries. In: Resources ANN, ed.; 2008.
8. Paustian K, Antle JM, Shhehan J, Paul EA. Agriculture's Role in Greenhouse Gas Mitigation. In: Change PCoGC, ed. Arlington, VA; 2006.
9. Fullerton DG, Bruce N, Gordon SB. Indoor air pollution from biomass fuel smoke is a major health concern in the developing world. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 2008;102(9).
10. Tumwesige V. Installation of Biogas Systems in Uganda. In: McCord AI, ed. Kampala, Uganda; 2011.
11. Pandey B, Subedi PS, Sengendo M, Monroe I. Biogas for Better Life: An African Initiative. In: Winrock International; 2007.
12. Ukpabi C. Biogas for Better Life, An African Initiative. In; 2006.
13. Cooking Fuel Saves Lives: A Holistic Approach to Cooking in Humanitarian Settings. In: Commission WsR, ed. New York; 2011.
14. Sheya MM, Salvatory. The state of renewable energy harnessing in Tanzania. *Applied Energy* 2000;65:257-271.
15. Nalere P. Challenges of Household Investment in Domestic Biogas Technology: The Case of Heifer International in Uganda. In: *International Workshop on Domestic Biogas*. Kathmandu, Nepal; 2009.
16. Walekhwa P, Mugish J, Drake L. Biogas energy from family-sized digesters in Uganda: Critical factors and policy implications. *Energy Policy* 2009;37:2754-2762.
17. Ronald M. Uganda's untapped energy resources. *EnviroConserve Africa* 2009.
18. Sabiiti E.N. et al. "Urban Market Garbage: A Hidden Resource for Sustainable Urban/Peri Urban Agriculture and the Environment in Uganda." In *The Uganda Journal* 2004 (50): 102-109.

BUDGET WORKSHEET

	Quantity	Unit Cost	TOTAL	In-Kind	USAID DIV
PERSONNEL (36.5% of project budget)					
Salary	6 team members	\$12,000	\$72,000	\$64,000	\$8,000
Fringe benefits	6 team members	\$600	\$3,600	\$3,600	\$0
Stipend to cover incidental cos	6 team members	\$500	\$2,500	\$0	\$2,500
		TOTAL	\$78,100	\$67,600	\$10,500
			(Cost-sharing)	(87%)	(13%)
COMMUNICATIONS (1.6% of project budget)					
Phone	12 months	\$180	\$2,160	\$0	\$2,160
Internet Access	12 months	\$100	\$1,200	\$0	\$1,200
		TOTAL	\$3,360	\$0	\$3,360
			(Cost-sharing)	(0%)	(100%)
TRAVEL (13.8% of project budget)					
International Travel to Uganda	3 people	\$3,000	\$9,000	\$6,000	\$3,000
International Travel to Biogas S	5 people	\$3,500	\$17,500	\$7,000	\$10,500
Local Travel in Kampala	12 per month	\$250	\$3,000	\$1,500	\$1,500
		TOTAL	\$29,500	\$14,500	\$15,000
			(Cost-sharing)	(49%)	(51%)
REGISTRATIONS & PERMITTING (20.6% of project budget)					
Land Acquisition & Title	1 title/deed	\$20,000	\$20,000	\$0	\$20,000
Uganda Investment Authority	1 permit	\$0	\$0	\$0	\$0
Uganda Energy	1 permit	\$3,000	\$3,000	\$0	\$3,000
Miscellaneous	10% of budget	\$21,000	\$21,000	\$10,500	\$10,500
		TOTAL	\$44,000	\$10,500	\$33,500
			(Cost-sharing)	(24%)	(76%)
CONSULTING SERVICES (26.4% of project budget)					
Legal Services	2 consul tants	\$2,500	\$5,000	\$2,500	\$2,500
Financial Advising	2 consul tants	\$2,500	\$5,000	\$2,500	\$2,500
Business Advising	2 consul tants	\$2,500	\$5,000	\$2,500	\$2,500
Engineering/ System Design	2 consul tants	\$7,500	\$15,000	\$7,500	\$7,500
Environmental Impacts Assess	2 consul tants	\$7,500	\$15,000	\$7,500	\$7,500
Social Impacts Assessment	2 consul tants	\$5,000	\$10,000	\$5,000	\$5,000
Graphic design	2 consul tants	\$750	\$1,500	\$750	\$750
		TOTAL	\$56,500	\$28,250	\$28,250
			(Cost-sharing)	(50%)	(50%)
OTHER MISC. OFFICE EXPENSES (1.2% of project budget)					
Website hosting	12 months	\$10	\$120	\$120	\$0
Brochure printing	250 brochures	\$1	\$250	\$0	\$250
Poster printing	3 posters	\$200	\$600	\$0	\$600
Business cards	500 business card	\$1	\$500	\$250	\$250
Promotional Video developmen	2 films	\$500	\$1,000	\$1,000	\$0
Stationary & office supplies	12 months	\$12	\$144	\$144	\$0
		TOTAL	\$2,614	\$1,514	\$1,100
			(Cost-sharing)	(58%)	(42%)
		PROJECT BUDGET	\$214,074	\$122,364	\$91,710
			(Cost-sharing)	(57%)	(43%)

COST NARRATIVE

REQUEST

We are requesting US\$91,710 from the USAID Development Innovations Program to complete a detailed feasibility study for our proposed W₂E concept. With USAID's financial assistance and endorsement, our cross-cultural team of young, ambitious innovators will be able to complete the following activities within one year:

- 1) Develop detailed, site-specific designs for biogas and wastewater treatment systems
- 2) Visit successful biogas businesses and projects to inform our project
- 3) Conduct an independent environmental and social impacts assessment of the project
- 4) Refine business proposal and promotional materials to secure investment
- 5) Acquire land for the proposed project
- 6) Complete the registration and permitting process for the proposed project
- 7) Identify appropriate investors, granting agencies, or loan programs for our business.

The key questions we hope to answer with the support requested are as follows:

- 1) Which site location maximizes environmental and social benefits?
- 2) Which system design safeguards worker health, public health, and the environment?
- 3) What will be the physical and chemical characteristics of the effluent?
- 4) How much organic waste is available using the proposed collection practices?
- 5) How much gas can be generated using the proposed technology?
- 6) What is the most effective marketing and sales strategy for our products?
- 7) What is the most appropriate financing mechanism for this project?
- 8) How can we establish an effective monitoring and evaluation plan?

Without USAID support, our project will be delayed indefinitely until we are able to source enough start-up funding to conduct the feasibility studies needed to craft a detailed business plan. Rapid action ensures that we can capitalize on the excitement already generated by this proposal. External support is critical in order to leverage risk at the pilot stage.

EXPENSES JUSTIFICATION

PERSONNEL

- *Salary:* estimated as follows: $6 \text{ team members} \times \frac{5 \text{ hours}}{\text{week}} \times \frac{40 \text{ weeks}}{\text{year}} \times \frac{\$20}{\text{hour}} = \$72,000$
- *Fringe benefits:* estimated as follows: $6 \text{ team members} \times \frac{\$50}{\text{month}} \times 12 \text{ months} = \$3,600$
- *Stipend:* A \$500 one-time stipend is requested for five of the six team members (Team member ----- is legally unable to receive a stipend).

COMMUNICATIONS

- *Phone:* The team will be making international calls to USA, Uganda, India, China, and Germany

- *Internet Access:* The USA team members have access to free internet. The Ugandan team members are requesting support to purchase 1GB per month from ORANGE© (~50,000 UGX= \$20/month, \$20 X 5 team members X 12 months = \$1200)

TRAVEL

- *International Travel to Uganda:* ----- and ----- will cover their own transport costs to Uganda for project activities. ----- will require \$3000 to cover airfare and basic accommodation for a 3 week visit.
- *International Travel to Biogas Sites:* ----- will provide her own transport to biogas sites in Addis Ababa, Ethiopia. ----- will provide his own transport for any biogas visits. -----, -----, and ----- are requesting \$3500 for one international trip to India or South Africa to visit a biogas installation.

REGISTRATIONS AND PERMITTING

- UIA permit is free. Uganda Energy Regulatory Authority registration is \$3000.
- We are assuming that land acquisition will be around \$20,000 for deed and title. We need only 70 meters X 100 meters of land, fair estimate based on current land prices.

CONSULTING SERVICES

- These are initial estimates based upon conversations with experts in Uganda.
- System Design estimates are based upon consultation with a company in India.
- Competitive bidding will be conducted as required to ensure cost effective solutions for identified needs.

OTHER MISCELLANEOUS OFFICE EXPENSES

- Initial estimates are based upon providing professional marketing materials that are locally produced in Kampala.

Application for Federal Assistance SF-424

Version 02

*1. Type of Submission: *2. Type of Application * If Revision, select appropriate letter(s)

Preapplication [gJ] New

[gJ] Application Continuation *Other (Specify)

Changed/Corrected Application Revision

3. Date Received: 4. Applicant Identifier:

5a. Federal Entity Identifier:

*5b. Federal Award Identifier:

State Use Only:

6. Date Received by State: | 7. State Application Identifier:

8. APPLICANT INFORMATION:

*a. Legal Name: Green Heat (U) Ltd.

*b. Employer/Taxpayer Identification Number (EINITIN): *c. Organizational DUNS:

d. Address:

*Street 1: _____

Street 2: _____

*City: _____

County: _____

*State: Kampala

Province: _____

*Country: Uganda

*Zip / Postal Code N/A

e. Organizational Unit:

Department Name:

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix: _____ *First Name: _____ Middle Name: _____

*Last Name: _____

Suffix:

Title:

Organizational Affiliation:

*Telephone Number:

Fax Number:

*Email:

Application for Federal Assistance SF-424

Version 02

*9. Type of Applicant 1: Select Applicant Type:

R. Small Business

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

*Other (Specify)

*10 Name of Federal Agency:

USAID

11. Catalog of Federal Domestic Assistance Number:

CFDA Title:

*12 Funding Opportunity Number:

M-OAA-GRO-LMA-11-02000 _____

*Title:

Development Innovation Ventures _____

13. Competition Identification Number:

98.001 _____

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

*15. Descriptive Title of Applicant's Project:

Waste 2 Energy Initiative

Application for Federal Assistance SF-424 Version 02

16. Congressional Districts Of:
 *a. Applicant: _____ *b.
 Program/Project: N/A

17. Proposed Project:
 *a. Start Date: May 2012 *b. End Date: April 2013

18. Estimated Funding(\$):

*a. Federal	_____	91,710
*b. Applicant	_____	122,364
*c. State	_____	
*d. Local	_____	
*e. Other	_____	
*f. Program Income	_____	
*g. TOTAL	_____	214,074

***19. Is Application Subject to Review By State Under Executive Order 12372 Process?**
 D a. This application was made available to the State under the Executive Order 12372 Process for review on _____
 D b. Program is subject to E.O. 12372 but has not been selected by the State for review.
 [8] c. Program is not covered by E. O. 12372

***20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes", provide explanation.)**
 D Yes [8] No

21. *By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)
 [8] ** I AGREE
 ** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions

Authorized Representative:

Prefix: _____ *First Name: _____
 Middle Name: _____
 *Last Name: _____
 Suffix: _____

*Title: Team Member

*Telephone Number: _____ Fax Number: _____

* Email: _____

*Signature of Authorized Representative: _____ *Date Signed: _____

Application for Federal Assistance SF-424

Version 02

***Applicant Federal Debt Delinquency Explanation**

The following should contain an explanation if the Applicant organization is delinquent of any Federal Debt.

N/A

BUDGET INFORMATION - Non-Construction Programs

OMB Approval No. 0348-0044

SECTION A -BUDGET SUMMARY						
Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. USAID/DIV	N/A	\$	\$	\$ 91,710.00	\$ 122,364.00	\$ 214,074.00
2.						0.00
3.						0.00
4.						0.00
5. Totals		\$ 0.00	\$ 0.00	\$ 91,710.00	\$ 122,364.00	\$ 214,074.00
SECTION B - BUDGET CATEGORIES						
6. Object Class Categories						
GRANT PROGRAM, FUNCTION OR ACTIVITY						Total (5)
	(1)	(2)	(3)			
a. Personnel	\$ 74,500.00	\$	\$	\$	\$	\$ 74,500.00
b. Fringe Benefits	3,600.00					3,600.00
c. Travel	29,500.00					29,500.00
d. Equipment	0.00					0.00
e. Supplies	2,614.00					2,614.00
f. Contractual	56,500.00					56,500.00
g. Construction	0.00					0.00
h. Other	47,360.00					47,360.00
i. Total Direct Charges (sum of 6a-6h)	214,074.00	0.00	0.00	0.00	0.00	214,074.00
j. Indirect Charges						0.00
k. TOTALS (sum of 6i and 6j)	\$ 214,074.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 0.00	\$ 214,074.00
7. Program Income	\$ 0.00	\$	\$	\$	\$	\$ 0.00

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Prescribed by OMB Circular A-102

SECTION C NON-FEDERAL REVENUES				
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8. USAID/DIV	\$ 122,364.00	\$	\$	\$ 122,364.00
9.				0.00
10.				0.00
11.				0.00
12. TOTAL (sum of lines 8-11)	\$ 122,364.00	\$ 0.00	\$ 0.00	\$ 122,364.00

SECTION D FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	\$ 91,710.00	\$ 28,715.00	\$ 39,815.00	\$ 13,715.00	\$ 9,465.00
14. Non-Federal	122,364.00	31,882.67	40,299.33	27,216.00	22,966.00
15. TOTAL (sum of lines 13 and 14)	\$ 214,074.00	\$ 60,597.67	\$ 80,114.33	\$ 40,931.00	\$ 32,431.00

ESTIMATES OF FEDERAL FUNDS NEEDED					
(a) Grant Program	(b) First	FUTURE FUNDING PERIODS (Years)			(e) Fourth
		(c) Second	(d) Third		
16. USAID/DIV	\$ 500,000.00	\$ 294,100.00	\$ 189,500.00	\$	\$ 208,022.00
17.					
18.					
19.					
20. TOTAL (sum of lines 16-19)	\$ 500,000.00	\$ 294,100.00	\$ 189,500.00	\$	\$ 208,022.00

SECTION F OTHER BUDGET INFORMATION	
21. Direct Charges:	22. Indirect Charges:

23. Remarks: The "Other" category comprises registration and permitting costs (\$44,000) and communications expenses (\$3,360). Cost narrative has more info.

ASSURANCES - NON-CONSTRUCTION PROGRAMS

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0040), Washington, DC 20503.

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee- 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.
7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally-assisted construction subagreements.
10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.
11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).
12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).
14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.
15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.
16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."
18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

<p>* SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL</p> <p><u>Completed on submission to Grants.gov</u></p>	<p>*TITLE</p> <p>_____</p>
<p>*APPLICANT ORGANIZATION</p> <p>_____</p>	<p>* DATE SUBMITTED</p> <p><u>Completed on submission to Grants.gov</u></p>