

FLETCHER D-PRIZE COMPETITION

2023-24 Academic Year

Energy Challenges

Sell solar lamps to hard-to-reach communities

We challenge you to design a new social enterprise that distributes off-the-shelf pico solar lamps to underserved markets. Millions of families lack energy access, and a solar lamp is often the first step families take toward energy security. Fletcher D-Prize will award up to \$20,000 to teams with a plan to launch a pilot of this work selling 500 pico solar lamps with a vision to reach 100,000 beneficiaries within five years and scale country-wide.

The Poverty Problem

Almost 600 million people in sub-Saharan Africa light their homes using kerosene lamps.¹ This has enormous poverty implications. Kerosene is dim, costs a minimum of \$35 per year to keep fueled, pollutes indoor air, creates health problems, and causes fires.^{2,3,4,5} The problem is particularly acute in rural Africa, where kerosene rates can be 35% higher than in urban areas.⁶

Alternatives, like mini grids, solar home systems, and pico (handheld) solar lamps have made progress against this issue. The World Bank Group's *Lighting Africa* program launched in 2009 with a goal of providing solar energy access to 250M people, a goal that was achieved ten years later.⁷

¹ <http://www.lightingafrica.org/about-us/>

² Lam, Nicholas; Smith, Kirk; Gauthier, Alison; Bates, Michael. Kerosene: A Review of Household Uses and Their Hazards in Low- and Middle-Income Countries. *J Toxicol Environ Health B Crit Rev.* 2012; 15(6): 396–432.

³ <https://www.lightingafrica.org/wp-content/uploads/2014/10/SolarAid-Impact-Report-2014.pdf>

⁴ Howe, Charles; Lawrence, Joanne; Patel, Hitendra. *SolarAid: Revolutionizing the Way to Make Energy Affordable for Everyone.* Hult International Business School Publishing. January 2012.

⁵ E. Mills, "The Specter of Fuel-based Lighting," *Science* 301, 1263 (2005).

⁶ Cost of Kerosene in Africa Threatens Access to Lighting. *Lighting Africa*, 2012.

<http://lightingafrica.org/cost-of-kerosene-in-rural-africa-threatens-access-to-lighting>

⁷ https://www.lightingglobal.org/wp-content/uploads/2020/02/14005VIV_OFF-GRID-SOLAR-REPORT-V13-Exec-Sum-AW4vis.pdf

However, many communities are left out of this progress. Lighting Africa suggests most of the next decade will build on the existing networks, and will distribute larger systems that provide even more energy. This means that communities who are too poor to afford larger systems, and that aren't yet part of the existing distribution network, may be left out.

The Proven Intervention

Fortunately, there is a proven solution. Pico solar lamps are a high quality product that provides up to 20 times more illumination than kerosene lamps.⁸ They are also a cost-effective alternative, as they cost as little as \$3 per unit.⁹

Pico solar lamps immediately and positively affect a family's economic situation. For example, a 2017 Acumen study found that the poorest households will spend 10% of their income on energy. Switching to solar resulted in 1-2% of total cost savings. (Note, this study was done when kerosene prices were historically low, so the impact could be potentially higher).¹⁰

More importantly, pico solar lamps are an entry point.¹¹ Many of the solar distribution networks started a decade ago began with pico lanterns. Pico solar lamps are a good entry level product because they provide a low cost way for many families to get on the first rung on the energy ladder.

Your Distribution Challenge

We will award up to \$20,000 to a team that creates a new social enterprise distributing pico solar lanterns to drastically underserved communities that are outside existing solar delivery networks.

You must have a vision to grow your enterprise and directly reach 100,000 customers within 5 years. Our award is meant to be a first step toward this vision by supporting a small test pilot of the enterprise that sells roughly 500 pico solar lamps.

For example, in the past D-Prize has supported [Altech](#) (DRC), [Easy Solar](#) (Sierra Leone), [Essmart](#) (India), and [Deevabits Green Energy](#) (Kenya).

Designing Your Social Enterprise

We believe a successful social enterprise must eventually solve a handful of challenges. Your pilot should plan to focus on building and testing just a few of these pieces.

⁸ <https://www.greenlightplanet.com/solar-lights-shop/sun-king-pro-200/>

⁹ https://www.lightingglobal.org/wp-content/uploads/2020/02/14005VIV_OFF-GRID-SOLAR-REPORT-V13-Exec-Sum-AW4vis.pdf, page

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¹⁰ <https://acumen.org/wp-content/uploads/2015/10/Report-The-Economic-Impact-of-Solar-Lighting.pdf>

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https://d-lab.mit.edu/sites/default/files/inline-files/First-Steps-How-Early-Adopters-Climb-the-Solar-Energy-Ladder_White-Paper-1.pdf

I. Choosing a market for high impact

We are most interested in supporting an enterprise that reaches communities that will otherwise not be served in the next decade. This will capture the most impact, but also positions your enterprise for success. Our internal research concludes that new solar enterprise scales fastest when operating in unsaturated markets, where manufacturers have less control over margins, and competition for outside growth funding is lighter.

A good starting point would be to consider which countries have the least electrification solutions. This [Lighting Global report](#) notes that 716M people do not have access to electricity, with 588M of those in sub-Saharan Africa (page 14 and 15). This [World Bank online dataset](#) also forecasts what electrification rates could be in the next decade. You may also consider mobile penetration and mobile money penetration rates, as most existing networks were built to use PAYGO mobile technology. We encourage entrepreneurs to target countries that are expected to be the least served.

It's worth considering that energy needs vary widely within countries. An estimated 2% of rural homes have access to the energy grid, compared to 30% in urban areas.¹²

A successful enterprise will capture marginal impact. We define this as reaching communities that otherwise wouldn't be reached by someone else. Because of this, we have a bias for rural-focused enterprises, and those operating in countries with low electrification rates and low mobile money penetration rates.

II. Selecting a quality product

We encourage teams to sell a solar product that is high quality and meets global industry standards. Drawing from extensive field testing, D-Prize endorses Greenlight Planet solar lamps.

Many solar products now come equipped with PAYGO technology, which allows customers to pay for their lamps using installments through mobile money. We recognized the value of PAYGO technology, but also understand this means communities without high mobile phone and mobile money penetration will be left out. Because of this, we have a bias for models that can resolve this problem.

A successful team will select a product that meets quality standards, and is reliably available off-the-shelf.

III. Designing your sales model

We are seeking entrepreneurs with creative ways for improving sales agent networks.

¹² Howe, Charles; Lawrence, Joanne; Patel, Hitendra. SolarAid: Revolutionizing the Way to Make Energy Affordable for Everyone." Hult International Business School Publishing. January 2012.

Our internal research found that fielding sales agents was a universally strong delivery model. Customers require trust, which is naturally provided by localized agents. Deploying a team of sales agents also requires less upfront capital vs other models, like a franchise.

However, we believe there is room for more creative ways to improve sales agent models. For instance, we believe deeper sales agent training, creativity on managing and supporting agents, or different incentive structures *could* produce a more effective enterprise.

A successful enterprise will use their pilot to test whether their sales model produces a large number of sales compared to the costs of developing the agent network. An ideal applicant will have a basic model of their unit economics (ie, the cost to produce one sales agent or regional sales team, compared to the number and dollar amount of sales they bring in),

IV. Financial Sustainability

We are seeking teams who have solutions to a working capital problem. For example, almost all distributors sell lamps on credit. It can take months to collect and during this time distributors don't have cash on hand to order the next shipment of lamps. Sales dry up.

A successful enterprise will use their pilot to test whether their financing structure can work at a larger scale. An ideal applicant will have a basic financial model to demonstrate their ability to grow despite existing constraints on working capital. Applicants who do not address this concern around working capital will be declined.

Ready To Apply?

Download a First Round Application Packet and start creating your proposal at <https://sites.tufts.edu/dprize/>.

Questions? Email Ariane Theis at Ariane.Theis@tufts.edu.