re:char-- Improving Soil for Smallholder farmers in Kenya with Carbon-negative Biochar

Kenya

Jason Aramburu

Organization type: for profit  
Budget: $100,000 - $250,000  
Website: http://www.re-char.com

- Climate change  
- Energy  
- Food security  
- Green business  
- Sustainable development  
- Renewable energy  
- Sustainable agriculture

Concise Summary: Help us pitch this solution! Provide an explanation within 3-4 short sentences.

Each day, over 30 Million smallholder (1-2 acre) farmers in East Africa face the triple challenge of energy scarcity, food scarcity and climate change. re:char offers a solution called biochar- a premium charcoal produced from agricultural waste. It can be burned as fuel in existing stoves or tilled into agricultural soils where it improves crop yield 20-30%. When biochar is added to soil, it also permanently sequesters atmospheric carbon.

re:char builds and sells affordable biochar kilns to small farmers in Western Kenya, which they use to produce biochar from their crop wastes. Farmers improve their income by selling the biochar as fuel or using it on-site as fertilizer. Farmers generate an average of $200-300 in additional income each year by using a re:char kiln.
**Problem: What problem is this project trying to address?**

In Western Kenya, up to 80% of people rely on agriculture as their primary source of income. The vast majority of farmers are smallholders, subsisting on the products of 1-2 acres of crop land. Their main cash crops are maize and sugarcane, which generates them an average income of $600-1000/year. These farmers make their living on some of the poorest soil in the world, and must spend up to 1/2 of their annual income purchasing chemical fertilizers. Gender inequality is rampant in the region, with women taking on a majority of the farming tasks, and maintaining the household. Local farmers in Bungoma are quite familiar with outside intervention and engagement efforts. The town is home to several prominent agricultural nonprofits and microfinance institutions. While these organizations have helped improve access to fertilizer and tools, they have also unwittingly forced many farmers into crushing debt. Many farmers also view these organizations as outsiders. re:char has found that the key to success in Bungoma is community engagement. We employ a large staff of local outreach and sales associates who grew up on farms. Our employees understand and relate to local conditions, bridging the gap between re:char and its customers. We have also chosen to locate our production and manufacturing centre here in Bungoma. We view this choice as an investment in the community, providing local skilled jobs and utilizing local merchants.

**Solution: What is the proposed solution? Please be specific!**

Several organizations have sought to fight poverty amongst smallholder farmers in Kenya. Most notable is One Acre Fund, which provides fertilizer, seeds and tools to farmers on credit. While OAF has had great success, it has not solved the root cause of soil infertility endemic to the region. Poor agricultural practices and overuse of chemical fertilizers have destroyed local soils. Each year, crop yields in Western Kenya are reduced, in spite of increasing fertilizer adoption. re:char believes that the key to improving the income of farmers is to utilize organic techniques to rebuild soils. Organic techniques like Biochar offer a renewable path to soil improvement and income generation, while sequestering atmospheric carbon worldwide. Many organizations have also sought to fight energy scarcity and improve indoor air quality through improved cookstoves (Envirofit, Stovetec, Worldstove etc). While these organization have developed innovative clean cookstove technologies, adoption has been slow. In many regions, farmers favor traditional cooking methods, leaving improved cookstoves unused. re:char takes an innovative approach by empowering farmers to produce a ‘drop-in’ replacement for wood charcoal. Biochar can be burned in existing stoves with no modification, and has already shown great adoption. Biochar also requires no deforestation. Finally, biochar is the only crop yield improvement technology that is actually ‘carbon-negative.’ A recent study in Nature indicates that global use of biochar has the potential to sequester and offset up to 12% of human CO2 emissions.

**Impact: How does it Work**

**Example: Walk us through a specific example(s) of how this solution makes a difference; include its primary activities.**

re:char designs, builds and sells its patent-pending “Climate Kiln” to smallholder farmers in Bungoma, Western District, Kenya. These kilns are produced from locally-available and recycled materials, including re purposed 55 gallon oil drums. These kilns produce high quality biochar from locally-available feedstocks (maize cobs, maize stalks, sugarcane trash). This biochar can be briquetted and burned or sold as charcoal fuel in existing stoves. The biochar can also be pulverized and added to agricultural soils, where it improves crop yield up to 30% vs chemical fertilizer. When added to agricultural soils, biochar has the potential to sequester up to 12% of atmospheric carbon. re:char provides outreach and training to local farmers in the use and operation of a Climate Kiln. We also instruct customers how to add the biochar to their soil, and how to produce and sell charcoal briquettes. re:char provides ongoing technical and training support to its customers to maximize adoption and usage. Unlike many other social enterprises, re:char owns and operates its own manufacturing facilities in Bungoma. We maintain a local staff of technicians and sales associates, providing badly needed skilled jobs in an otherwise agricultural region. We also keep detailed records and metrics to measure adoption, yield improvement, and income generation. To date, re:char has served 750 farmers in Western Kenya. We are on track to more than double this number by the end of 2011.

**About You**

**Organization:**
re:char

**First Name**
Jason

**Last Name**
Aramburu

**Twitter**
http://www.twitter.com/re_char

**Facebook Profile**
http://www.facebook.com/pages/rechar/271000604348

**About Your Organization**

**Organization Name**
re:char

**Country where this project is creating social impact**

**How long has your organization been operating?**

15 years
Is the project that you are entering related to this organization?
Yes

The information you provide here will be used to fill in any parts of your profile that have been left blank, such as interests, organization information, and website. No contact information will be made public. Please uncheck here if you do not want this to happen.

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**Innovation**

**What stage is your project in?**

Operating for 1.5 years

**Share the story of the founder and what inspired the founder to start this project**

re:char was founded by Jason Aramburu, a 2007 graduate of Princeton University. Jason studied ecology and soil science at Princeton, and served as a soil science fellow at the Smithsonian Tropical Research Institute (STRI) in Panama. At STRI, Jason developed a deep understanding and appreciation for the needs of smallholder farmers. It was here that he discovered the concept of biochar. For centuries, Central American farmers have produced charcoal from waste to improve soil quality. Jason believed that this technique could be applied in other regions with poor soil. Jason connected with several talented mechanical engineers in New York, and launched re:char out of a crowded metal shop in Brooklyn, NY. Together, the team designed and built an inexpensive kiln that could be deployed globally. The team identified Kenya as an ideal first market due to its poor soil quality, economic stability, and high percentage of farmers. After launching in Bungoma, Jason was named an Echoing Green Fellow. This first outside funding allowed re:char to expand its reach. Since 2010, the company has gone on to raise over $300,000 through grants, and has reached a total of 750 farmers in Western Kenya.

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**Social Impact**

**Please describe how your project has been successful and how that success is measured**

To date, re:char has served over 750 smallholder farmers in Western Kenya with biochar technology. These farmers have improved their crop yield an average of 20-30% by using biochar. They have also saved between $200 and $300 each annually by reducing their dependence on chemical fertilizer.

We estimate that approximately 10,000 tonnes of CO2 (The annual emissions of 2,000 US automobiles) has been offset to date through biochar production in Bungoma.

As a company, re:char has been successful in the sale and deployment of its Climate Kiln technology. The company is currently revenue positive, and has relied solely on grant funding to aid development to date. re:char has developed a patent-pending manufacturing process to produce its kilns locally at low cost. Presently, the company can produce an average of 300 kilns per month using locally-available materials and local labor.

**How many people have been impacted by your project?**

101-1,000

**How many people could be impacted by your project in the next three years?**

More than 10,000

**How will your project evolve over the next three years?**

re:char has perfected its manufacturing and sales process, and seeks to scale and replicate this process throughout Kenya and East Africa. With a $10,000 investment, re:char can build a new manufacturing center anywhere in East Africa, and train local staff to operate it. Each manufacturing center can produce and sell 300 kilns a month, reaching revenue breakeven in approximately 3 months.

re:char believes this ‘local hub’ model can be replicated throughout East Africa, and can build and deploy other value-added agricultural technologies. By the end of 2011, we seek to double production and serve over 1,500 farmers in Bungoma. By early 2012, re:char will expand its reach across Kenya, through projects in Eldoret, Mombasa and Kilifi, serving nearly 5,000 farmers in Kenya.

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**Sustainability**

**What barriers might hinder the success of your project and how do you plan to overcome them?**

Through our experience, the strongest barrier to success in Kenya is community engagement/involvement. Smallholder farmers do not respond to traditional forms of advertisement or marketing (television, print etc). Instead, they rely heavily on word of mouth and community reputation when considering the purchase of new technologies. re:char has found that the key to gaining the trust of these farmers is to integrate within the community. We have located our manufacturing facility within the community we serve, and have hired local staff. We find that by making an investment in Bungoma, we are accepted and respected in the community.

We have also identified competition and patent infringement as a strong barrier to success. Many successful products in Kenya must compete against inferior, lower-priced ‘knockoffs.’ While re:char products have not yet been copied, we have preempted knockoffs by developing a robust and efficient local manufacturing process and supply chain. We can provide a level of quality and local service that competitors cannot, all while keeping our price low.

**Tell us about your partnerships**

re:char has partnered with ACON, a Bungoma-based nonprofit that trains local farmers in organic techniques like biochar. Through ACON, re:char has greatly expanded its reach and respect in the community. re:char has also partnered with agricultural NGOs throughout East Africa and Haiti to pilot-test its Climate Kiln in future markets. Partner orgs include Komaza (Kilifi, Kenya), The Mzembite Forest Centre (Beira, Mozambique) and Earthspark International (Les Anglais, Haiti).

**Explain your selections**

re:char is funded by generous grants from several leading social enterprise NGOs and foundations. In 2010 we received a $50,000 grant from the Hitachi Foundation’s Yoshiyama Young Entrepreneur’s Program. We also received a $60,000 grant from Echoing Green, a leader in the social enterprise movement. Finally, we received a $260,000 grant from the Dutch Postcode Lottery Green Challenge (funded and administered by the Doen Foundation) in late 2010. These grants supported our initial deployment and technology development.

re:char is currently shortlisted for inclusion of biochar in the Kenyan National Climate Change Response Plan. This policy will provide a combined...
$25 million dollars to implement new climate change mitigation technologies throughout Kenya. It is estimated that this policy will be approved in late 2010. Finally, as a for-profit entity, re:char is currently revenue positive. We sell our kilns to local farmers at a price of $35-50, and generate sufficient margins to sustain and grow manufacturing, marketing and sales operations. We are exploring ways to leverage microfinance as a means to increase adoption of our technology.

How do you plan to strengthen your project in the next three years?

Over the next 3 years, re:char will expand its management team to develop and deploy production hubs throughout East Africa. We will seek out and hire a CFO with experience selling products to smallholder farmers. We will use this expertise to identify other potential markets in East Africa, and quickly scale up our model. We will also explore other value-added agricultural products that we can build and sell through our local hubs. Presently, there are few affordable options for smallholder farmers to procure innovative technologies. As re:char grows, we will expand our product line to meet these needs. To sustain our growth, re:char will seek to raise an approximately $1M series A financing in late 2011. We have already received strong commitments from several prominent equity investors and venture capital firms, and will likely procure additional grant funding from existing funder Doen Foundation.

Challenges

Which barriers to employment does your innovation address? Please select up to three in order of relevancy to your project.

PRIMARY
Lack of skills/training

SECONDARY
Lack of efficiency

TERTIARY
Underemployment

Please describe how your innovation specifically tackles the barriers listed above.

re:char’s technology and training provides farmers with the skills and knowledge to utilize organic farming techniques to boost crop yield and generate income. Through our efforts, we can free farmers from the need to purchase expensive chemical fertilizers. Our technology improves the overall efficiency of a smallholder farm, generating more food/acre for less money. re:char’s technology provides farmers with additional income-generating opportunities through the production and sale of biochar as fuel. Our local manufacturing hubs also provide skilled jobs and job training in otherwise agricultural regions.

Are you trying to scale your organization or initiative? If yes, please check up to three potential pathways in order of relevancy to you.

PRIMARY
SECONDARY
Leveraged technology

TERTIARY
Influenced other organizations and institutions through the spread of best practices

Please describe which of your growth activities are current or planned for the immediate future.

re:char began with a small group of farmers in one village in Bungoma, Kenya. We now serve over 750 farmers in 20 villages around Bungoma, and are poised to double this number by year’s end. re:char has developed and deployed a patent-pending technology for biochar production that is low-cost, and well-suited to local materials and conditions. This technology has been critical to our success. re:char has influenced several local agricultural nonprofits to adopt organic techniques to improve yields and reduce the cost burden to farmers.

Do you collaborate with any of the following? (Check all that apply)

Government, NGOs/Nonprofits, Academia/universities.

If yes, how have these collaborations helped your innovation to succeed?

re:char is collaborating with the Kenyan and British governments to include biochar in the Kenya National Climate Change Response Plan. This plan will subsidize biochar technologies for millions of Kenyan farmers. In Bungoma, we work closely with ACON, an NGO dedicated training in organic farming methods. We believe local NGO's represent a huge opportunity to enter new markets and gain the trust of new customers. re:char is closely aligned with academia. At our headquarters in Bungoma, we host academics and researchers seeking to evaluate the success of new agricultural technologies. We currently host PhD students from UC Berkeley and University of Edinburgh conducting biochar field trials. We work closely with biochar researchers at Cornell University and the UK Biochar Research Centre.

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