

Cooking up innovation

Massachusetts Institute of Technology

While Scot Frank '08 was interning in China as part of the MIT International Science and Technology Initiatives (MISTI) program in 2005, he visited the rural Himalayan plateau — which opened his eyes to an energy crisis.

There, he learned, people cook and heat their homes using biomass fuels — namely, wood and yak dung. These fuels expel a climate-changing agent called black carbon and contribute to deadly indoor pollution, among other side effects.

Now Frank's startup, One Earth Designs — which has its roots at MIT — is helping end the Himalayan plateau's dependency on biomass fuels by providing its people with solar-powered cooking devices.

Released in December after years of tweaking, One Earth's first cooker, dubbed SolSource, is already being used by roughly 4,000 people in the Himalayas. More than 2,000 additional orders have been placed across the world, says Frank, now the CEO of One Earth.

Data suggest that the cooker — a device that resembles a satellite dish, harnessing the sun to cook food or boil water in minutes — has reduced the use of biomass fuel on the plateau by 70 percent, Frank says. Since nearly half the world's population uses biomass fuels, "this technology could really reach all corners of the globe," Frank says.

Frank, whose undergraduate degree is in electrical engineering and computer science, attributes part of his success to MIT, where he found the intellectual capital and entrepreneurship resources to develop his prototype and co-found One Earth. "The MIT network and ecosystem has enabled this whole process in going from idea to product," Frank says.

The rest of the credit goes to his One Earth team — including co-founder and chief operating officer Catlin Powers and several MIT alumni — who remained engaged throughout years of rigorous field-testing and roadblocks. "At any point in time we could have given up, but we've kept going, so that's why we're here today," Frank says.

At the nexus of many issues

Using biomass fuels causes a wide range of problems for the people of the Himalayan plateau, Frank says: Girls spend long hours collecting the fuel sources amid temperatures that can drop to minus 40 degrees Celsius, wood collecting is fined in certain areas, yak dung is scarce and better used as a fertilizer, and the World Health Organization estimates that indoor air pollution produced by stoves is responsible for an annual 500,000 premature deaths in China, and nearly 3.5 million premature deaths worldwide.

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Additionally, the plateau is often referred to as Earth's "third pole," as it's home to the world's largest nonpolar ice masses. According to research conducted by NASA and the Chinese Academy of Sciences, black carbon deposits from biomass fuels settle on this ice, causing it to melt faster than the world average.

Research conducted by One Earth and the Harvard School of Public Health, Frank says, suggests that each cooker — which is lightweight and portable — abates four tons of black carbon per year, and can save SolSource owners who are connected to the power grid an average of \$30 per month in electricity costs.

"You don't realize it, but fuel is the fulcrum about which the entire Himalayan plateau pivots," Frank says. "By solving the fuel crisis there, we operate at the nexus of many issues."

One Earth is now creating modified versions of its cookers for recreation and disaster response in the United States. To develop the technology, One Earth enlisted help from a variety of innovators, including MIT professor emeritus David Gordon Wilson and Tom Chi, the inventor behind Google Glass and Google's self-driving car. The company has now launched a Kickstarter campaign to cover manufacturing costs.

"It's been very great feeling that we can co-design a product in the most unlikely and resource-constrained of places and now have it come back to the States," Frank says. "Creating something that can impact the lives of families in need abroad, and then impact our own families back home, is really inspiring."

In 2009, One Earth won the \$100,000 St. Andrews Prize for the Environment, one of the world's most prestigious such prizes; in 2010, it won \$667,000 in the Dutch Postcode Lottery Green Challenge.

Innovating beyond the classroom

To develop the SolSource prototype, Frank initially spent long hours in MITERS, a student-run lab with a variety of equipment and electrical engineering tools. There, he found student engineers to work on his prototype and received sage advice from faculty mentors — namely, Wilson and Rajeev Ram, a professor of electrical engineering and computer science.

"At MITERS, you really have the opportunity to take the concepts you use in class and apply them to creating a product that could make its way into people's hands," Frank says.

With a model prototype, he joined a team that won \$3,000 in MIT's IDEAS Competition in 2008; the group would go on to win additional funding from MIT's \$100K Entrepreneurship Contest and further funding from MIT's Public Service Center.

These funds supported One Earth's early visits to the Himalayan plateau to field-

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test its prototype. Frank says this is where he learned, perhaps, his greatest lesson in innovation: To make a truly successful invention, you need to test it out in the world.

“This was a time when we noticed this was real, not just for our classmates: People will actually need this product,” he says. “If we didn’t address their concerns, not only would you be missing out on solving a world issue, but we’d be letting people down.”

As someone who has been inventive and socially conscious since childhood, Frank says MIT helped foster his drive for creating social change through problem-solving and innovation. “MIT really does create some of the best problem-solvers in the world,” he says. “It sets people up with the skills and resources to solve today’s pressing problems and develop technology that really changes the world.”

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