

Carbon-negative energy, a reality at last – and cheap too

In Berkeley, Calif., All Power Labs is turning out machines that convert cheap and abundant biomass into clean energy and rich, efficient charcoal fertilizer



by [Daniel Terdiman](#)

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Tom Price, the director of strategic initiatives at All Power Labs, demonstrates the company's PowerPallet, a machine that converts biomass into carbon-negative energy. (Credit: Daniel Terdiman/CNET)

BERKELEY, Calif. -- In 2007, officials from this famously liberal city [shut off the electricity](#) to an artists space known as the Shipyard. That action, which forced the artists there to seek a new way to power their flamethrowers, is the origin story of a company that now produces what it says is the world's only carbon-negative power source. Located in one of the grittiest areas of town, where train tracks, garbage, and broken down [cars](#) are far more prevalent than the hippies Berkeley is famous for, [All Power Labs](#) has set up shop inside the Shipyard. Run by CEO [Jim Mason](#) -- who owns the space -- the 5-year-old startup now produces technology used to transform dense biomass like corn husks or wood chips into clean, sustainable, and cheap energy. All Power Labs makes machines that use an ancient process called gasification to turn out not only

carbon-neutral energy, but also a carbon-rich charcoal by-product that just happens to be a fertilizer so efficient that Tom Price, the company's director of strategic initiatives, calls it "plant crack."

Gasification, in which dense biomass smoldering -- but not combusting -- in a low-oxygen environment is converted to hydrogen gas, is nothing new. Price said that ancient cultures used it to enrich their soils, and during World War II, a million vehicles utilized the technology. But after the war, it more or less vanished from the planet, for reasons unknown. Until Mason needed a way to power his flamethrowers, that is.

All Power Labs has taken gasification and combined it with two of the Bay Area's most valuable commodities -- a rich maker culture and cutting-edge programming skills -- to produce what are called PowerPallets. Feed a bunch of walnut shells or wood chips into these \$27,000 machines and you get fully clean energy at less than 10 cents a kilowatt hour, a fraction of what other green power sources can cost.

Global climate change is a result of too much carbon being put into the sky, most scientists agree, and most energy sources, even others based on biomass, contribute to the problem. That's because, Price said, burning the biomass releases the carbon back into the atmosphere. By comparison, because there's no combustion in All Power Labs' gasification process, the carbon isn't released into the air.

Rather, it is pulled from the biomass and converted into charcoal. Thanks to gasification and the fact that that charcoal can be put back into the ground, the process of releasing carbon is reversed, Price argued.



The machine generates charcoal waste -- but the charcoal is rich with carbon and makes a very efficient fertilizer. (Credit: Daniel Terdiman/CNET)

That's why All Power Labs has already sold more than 500 of its machines -- many to some of the world's poorest nations. During a recent visit to the company's headquarters, it had orders pending from Ecuador, the Dominican Republic, Haiti, Thailand, Nicaragua, Mexico, and Chile, among others. That's because, Price said, while many energy sources in the developing world can cost 50 or 60 cents per kilowatt hour, a PowerPallet can do it for a dime.

Since its founding five years ago, the company has been doubling its revenues every year and now does \$5 million in sales. One reason for that growth is that dense biomass is everywhere. Think about America's heartland, where corn grows as far as the eye can see. Or California's Central Valley, where walnuts are a major crop. All those cobs and shells can now be used as the basis for cheap energy. Similarly, startups are generating electricity with the machines in Liberia, and Italian farmers are buying them because that country offers lucrative incentives to produce renewable power. To an Italian farmer, Price said, a PowerPallet is "an ATM machine."

In some countries, it can cost \$5,000 a month to power a cell phone tower, Price said. But a PowerPallet could do the job for a fraction of the cost, meaning the machine could pay for itself in months. And that alone is a huge opportunity for the company given that a third of the 650,000 cell towers in Southeast Asia and Africa are off the grid, Price said.

Patented but simple

All Power Labs has gotten several patents for its technology, mainly having to do with its innovations in system control, integration, and configuration. But the PowerPallets are still relatively simple, at least as far as their users are concerned. For one, thing Price explained, much of the machine is made with plumbing fixtures that are the same everywhere in the world. That means they're easy to repair.

At the same time, while researchers at the 50 or so institutions that have bought the machines are excited by opening up the computer control system and poking around inside, a guy running a corn mill in Uganda with a PowerPallet "will never need to open that door and never will," Price said.

For now, All Power Labs is making only 10 kW and 20 kW versions, though the US Department of Energy and the University of Minnesota recently gave the company a grant to build a 100 kW version. And while the system can't convert every form of biomass, Price said that one of the company's biggest aims is to make it possible to use any organic material. He estimated that goal is about five years away.

All of this explains why the company now employs more than 30 people. And the fact that last year, the City of Berkeley honored All Power Labs with a proclamation on its fifth birthday. The city didn't quite appreciate the irony of granting that honor given the company's origins, Price said.

Now, All Power Labs is turning out a machine a day and slowly but surely building a business that it hopes will one day contribute to the reversal of global warming. That may well be overly ambitious, but at the very least, the company has carved out an impressive niche for itself in the power business, an industry dominated by some of the biggest, richest, and most powerful outfits in the world. But Price isn't worried that All Power

Labs will incur those rivals' wrath. "They don't even know we're here," Price said. "By the time they figure it out, we'll be everywhere."

Correction (Sunday, 10:35 a.m. PT): This story originally misstated the cost of generating power using All Power Labs' machines.

Read the story from the website [here](#).
