

Harnessing the power of waste

August 5 2015, by Leah Burrows

What are you wearing right now? It's not a pickup line—it's a measure of your carbon footprint. If you're sporting any man-made fabrics, like polyester, Dacron or rayon, you're clothed in chemicals derived from nonrenewable fossil petroleum. Buttons? Underwear with an elastic waistband? Acrylic socks? All petroleum-based.

In fact, you wash your clothes in petroleum, scent your home with petroleum, make up your face with petroleum. Although alternatives to fossil-fuel energies, like solar and wind power, are becoming cheaper and more common in homes, petroleum still reigns supreme in countless consumer goods.

But not for long, if Lisa Dyson '97 has her way.

Dyson is co-founder and CEO of Kiverdi, a sustainable-oil startup in Berkeley, Calif., which converts carbon-rich waste—trash, wood and agricultural residue—into oils that can be used to manufacture plastics, polyesters, nylons and other products that are typically petroleum-based.

"When people think about oil, they think about fuel for their cars," Dyson says. "But plastic comes from a barrel of oil, so when plastic is manufactured or disposed of, carbon dioxide is dumped into the atmosphere. There is a better way to make plastic."

Kiverdi harnesses microorganisms—nature's best chemical refineries—to convert carbon waste into usable [carbon compounds](#). The process is similar to how, in fermenting alcohol, single-celled yeast and

bacteria convert carbohydrates into ethanol. The difference: Kiverdi's microorganisms brew oil.

The greatest challenge Dyson and Kiverdi co-founder John Reed face is convincing customers their oils are cheaper and more efficient than [petroleum](#)-based chemicals. "Right now, many companies want to make plastic that is more sustainable, but those options aren't always the most economical ones," she says. "Our job is to change that."

Which isn't easy, even for a theoretical physicist.

A Southern California native, Dyson came to Brandeis to study mathematics. But after meeting physics professors Robert Meyer, Marcus Grisaru and Silvan Schweber (now all emeriti) and learning more about physics and its research options, she fell in love with the field. After graduating, she studied [quantum field theory](#) on a Fulbright Fellowship at the University of London before earning a PhD at MIT, where she wrote a dissertation on [string theory](#).

"I always loved the problem-solving aspect of physics," Dyson says. "No matter how hard the problem was, physics always provided a framework for tackling it."

Such problem-solving techniques work in the business world, too, she says. After working as a researcher at several universities, including Stanford and Princeton, Dyson joined the Boston Consulting Group, where she tackled a new kind of problem—helping people manage and run their businesses.

When Dyson and Reed founded Kiverdi in 2008, they came face to face with the realities of running their own business. After a few years of boot-strapping, the company expanded in 2011, developing partnerships with chemical manufacturers and receiving grants from the U.S.

Department of Energy.

"String theory is so much easier than running a business," Dyson admits. "At least in physics, math will give you an answer. Answers don't come that easily in business."

Yet, she says, "now we have the potential to impact the world. That's what gets me up in the morning."

Provided by Brandeis University

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