



Home › Volume 41 [2006–07] › Volume 41 Number 15 › Careers and Ed: Bio the people, fuel the people

Careers and Ed: Bio the people, fuel the people

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Cars suck. I have stickers that say so and a venerable beater of a bicycle that underscores the point. But for every one of the approximately 40,000 bicycle commuters in San Francisco, there are more than 10 registered car owners, and just wishing they didn't exist won't make it so. But I'm no hater. I'm sure glad my plumber drives a van, for instance, and my gardener roommate wouldn't get very far without a pickup truck to haul all that gravel and mulch. Still, the environmental, economic, and just plain moral implications of using anything that relies on petroleum for fuel have become increasingly difficult to justify — especially since interest in and access to alternative fuels are on the uptick. Last year's mayoral biodiesel directive, when implemented, will make San Francisco the national leader in biodiesel use for municipal vehicles. In fact, the demand for biodiesel in the Bay Area could soon outstrip the current supply, and as far as getting in on the ground floor goes, the time has never been better to be involved with biofuels.

Of course, a lot of people get into biodiesel not as a career move but as a form of activist self-sufficiency that harkens back to the '70s return-to-the-land movement. The notion that one can power a vehicle on homemade fuel made from recycled cooking oil and a few bucks worth of drain cleaner is nigh-irresistible to penny-pinchers and political progressives alike, and the accessibility of the technology is such that even the least mechanically minded can pick it up with minimum instruction. *Some* instruction could be beneficial, though. Considering that two of the three major ingredients of biodiesel are highly toxic and flammable (methanol and lye), it may well behoove nascent home brewers to hone their skills in a structured environment, which local biofuel advocates are conveniently providing.

BIODIESEL 101

Jennifer Radtke knows her biofuels. Despite an incongruous educational background in Slavic languages and poli-sci, she has become one of the Bay Area's premiere authorities on brewing biodiesel and running a biodiesel station, and she has offered courses and internships in both since 2003. As one of the cofounders of the women-owned Berkeley cooperative BioFuel Oasis (which serves as a station for more than 1,600 regular customers) and an instructor for the Real Goods Solar Living Institute and the Berkeley Biodiesel Collective, Radtke is committed to the biodiesel community. She teaches five different classes covering almost every aspect of the biofuel biz for beginners and advanced users alike. Though many of her classes are held in Berkeley, you can occasionally find her holding forth in Golden Gate Park's SF County Fair Building.

For tyros to the technology, Radtke teaches a one-day introductory class covering biodiesel usage, sustainability, and home brewing. At a typical class, she opens with a presentation on biodiesel basics, listing the benefits and drawbacks of using biodiesel. Even to a nondriver like myself, the benefits appear to outweigh the disadvantages by a hefty margin.

Lower emissions and a higher rate of biodegradability are things I take for granted when thinking about biodiesel, but I certainly didn't realize it's less toxic to the human body than table salt when ingested and less irritating to the skin than a 4 percent soap-and-water solution. Biodiesel's flashpoint (the temperature at which it ignites when exposed to flames) is over 300 degrees Fahrenheit — the flashpoint of petroleum-based diesel is about 125 degrees. Most interesting to me and my low-to-no-maintenance requirements is finding out biodiesel is a natural solvent that cleans out the fuel tank and filters. (Can I get it to do my *dishes* too?) With bennies like these, who can fault biodiesel for its unfortunate tendency to burst through rubber fuel lines (discontinued since 1994) or eat through your slick new paint job? Such inconveniences seem minor in comparison to those created by toxic, flammable petroleum-based fuels.

After a comparison discussion of biodiesel to petroleum diesel and SVO (straight veggie oil), Radtke demonstrates home brewing and discusses the chemistry involved. After a lunch break, the students brew their own one-to-two-liter batch. Starting out with a quantity of recycled cooking oil, the class tests for water and free fatty acids, a process known as titration. (When water is present in the oil, the home brewer runs the risk of making soap instead of fuel.) Titration determines whether the used oil is too rancid or has been broken down too much by high fryer heat. If the oil is deemed usable, students concoct a test brew, mixing the heated oil with methanol (wood alcohol) and sodium hydroxide (lye). Here especially is where the presence of an instructor comes in handy.

Unlike the finished product, the chemical components of biodiesel have a very low flashpoint, and their toxicity is much higher. Methanol in particular can be harmful, even deadly, if improperly handled, and for this reason alone, many biodiesel advocates are still skittish about taking the last step toward home production. After walking beginners through a safe mixing procedure, Radtke discusses washing and filtering the biofuel and assessing its quality. She also discusses how to dispose of byproducts and offers additional educational resources. For people who want to practice brewing bigger batches (20 to 40 gallons) and get a more in-depth overview of the small production industry, a three-day advanced course is occasionally offered, often on an on-demand basis.

ORGANIC MECHANICS

It doesn't take long for the would-be home brewer to want to start tinkering with processors. For the mechanically unsavvy, Radtke offers an equipment-building workshop for five participants at a time (often in conjunction with co-instructor Alan Pryor of the Berkeley and Alameda Biodiesel co-ops or alternatively through Real Goods). Hoarding industry secrets doesn't seem to be an issue for biofuel distributors teaching people how to make their product. In fact, a common denominator among backyard biodiesel advocates seems to be their genuine desire to spread the knowledge of their chosen vocation far and wide. Plus, as Radtke points out, most of her processor-builder students actually come from outside the Bay Area, some from as far away as Southern California, where stations like BioFuel Oasis and the SF Biofuel Cooperative have yet to materialize.

This is a paradox that Radtke and Melissa Hardy, also of BioFuel Oasis, hope to address in their upcoming five-day intensive class, *How to Start Your Own Biodiesel Station* (Feb. 18–23), walking students through the process, from procuring fuel and testing it to applying for the required permits and necessary funding. Other topics of interest to the budding entrepreneur include zoning and taxation laws, equipment building and maintenance, and even market development. By the end of the course, participants should have a clear vision and a working business plan to get them started in the distribution biz.

In addition to that course, BioFuel Oasis holds monthly fuel filter–changing workshops on-site (next scheduled for Jan. 21). Since biofuel has such a solvent effect, cars that have just recently switched over from regular diesel run the risk of clogging from the leftover residue dredged out by the introduced biofuel. For a \$10 to \$20 sliding scale fee and about 30 minutes of time, attendees learn to replace their filters, a much preferable option to waiting until they clog on the freeway. Registration and information for any of these classes can be found on the following Web sites: www.backyardbiodiesel.org, www.biofueloasis.com, and (for classes connected with the Solar Living Institute) www.solarliving.org.

MASTERS OF THE BREW

Of course, even the acknowledged masters of their craft were once beginners too. For Jennifer Radtke and dozens of other home brew aficionados in the Bay Area and around the country, the force behind their fascination is one Maria "girl Mark" Alovert. With a background in grassroots activism, girl Mark is one of the nation's most vocal proponents of home-brewed biofuels and the inventor of the ubiquitous appleseed processor, which can be made cheaply from an old hot-water heater and a handful of hardware store components. Her self-published *Biodiesel Homebrew Guide* is considered the definitive guide to home brewing, and her two- to four-day seminars for beginners and advanced students alike fill up months in advance. In addition to teaching and touring, girl Mark is a member and sometime moderator of several biodiesel forums and the instigator of a peer-reviewed home-brewing and equipment-building Web site known as the Collaborative Biodiesel Tutorial (www.biodieselcommunity.org). A schedule of her classes and tour dates can be found online at www.girlmark.com and www.localb100.com.

For San Franciscans who'd like their introduction to biofuel to be a little closer to home, the San Francisco Biofuels Cooperative (www.sfbiofuels.org) offers once-a-month orientation meetings where interested parties can get practical advice on everything from where to buy a diesel car to how to advance the biofuel community's agenda. More than 200 members strong, the co-op's pumping station shares a location with Incredible Adventures (www.incadventures.com), a local adventure tour company that runs its biofueled fleet all the way to Baja. Co-op members can pay the premium price for biodiesel at the pump (currently \$3.65 per gallon) or volunteer a couple hours per month to purchase their biofuel for less. Hailing from the old People's Food System, former Rainbow Grocery cofounder and SF Biofuels Cooperative Board of Directors member Bill Crolius is also a driving force (with Ben Jordan and Trevitt Schultz) behind the People's Fuel Cooperative (www.peoplesfuel.org), a biodiesel delivery operation. Taking the long view on energy sustainability, Crolius envisions a future in which even biodiesel will be obsolete, but for the interim, he and his co-op compatriots believe it serves an essential role in weaning people off fossil fuels.

David Dias, advanced transportation and technology project coordinator at City College, organizes workshops on a variety of alternative fueling technologies, including biodiesel, natural gas, and SVO. He also heads the Biodiesel Conversion Club, an extracurricular group dedicated to

converting muscle cars such as El Caminos into biodiesel road warriors. Most of the workshops cost money but are open to the general public. Contact Dias for details at (415) 550-4455 or ddias@ccsf.edu.

For nondrivers this is something of a nonissue, but for people who aren't quite ready to give up the family car or rely on their vehicle the way contractors do, the siren song of home brewing is a seductive one. It doesn't take much space either: a corner of your garage or the back of a toolshed will do. In light of our national crude addiction and the wars being waged on its behalf, biodiesel is a compelling product; and while there is a San Francisco-based large-scale biodiesel production company in the works (www.sfbiodiesel.com), the reality is that low-cost biodiesel on demand is still a few years away — a reality that makes home brewing an attractive solution and, in time, perhaps even the ultimate answer. *



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