



► Nature's Favorite SUV

Penn State students deliver hope for the future of energy in the most unlikely of packages.
By DAN MORRELL

IN A GARAGE OFF HASTINGS ROAD AT PENN STATE'S Transportation Institute, a cold plate of waffles and two plastic jugs of orange juice compete for space with assorted pipes and wiring on a wooden table. Above the breakfast remnants and auto parts is a chalkboard with these words scrawled on it: "The only thing left to do is EVERYTHING."

Four grad students—among the few group members who remain on this March Friday during Spring Break—are working furiously a few feet away, and have been doing so for the last two days without the benefit of a good night's sleep.

The first formal inspection of their biodiesel- and electric-powered hybrid vehicle for the 2006 ChallengeX com-

petition is minutes away, and the students are running final checks. The contest pits a Penn State crew against 16 other teams from universities across the country to see who can come up with the best alternative-fuel vehicle: lowest emissions, most fuel efficient, still able to do 0-to-60 in less than 10 seconds.

The competition is cosponsored by General Motors and the U.S. Department of Energy, along with several smaller government and private sponsors. Both GM and the DOE also sponsored the FutureTruck programs that Penn State has been a part of in past years. Student teams transformed a Chevy Suburban into an alternative-fuel vehicle during ►►

the competition in 2000; they took on a Ford Explorer in 2002. Similarly, in ChallengeX, every team works from the same mound of clay: a 2005 Chevrolet Equinox, which is, like the Suburban and the Explorer, an SUV—not the sort of vehicle you’d expect to run on alternative fuel.

And that’s the point.

GM, which has donated an Equinox to each team, wants to develop alternative-fueled cars that will appeal to the market. Not like their predecessors—flat solar-powered cars with tiny cockpits, or

DaVinci-inspired vehicles with wings and bicycle wheels—but instead something that will attract consumers. Something that has style, storage capacity, and drink holders. “The students would probably prefer the *Junkyard Wars* model,” says Dan Haworth, associate professor of mechanical engineering and faculty adviser to the ChallengeX team. “But this competition is more realistic from an engineer’s point of view.”

Inside that market-friendly shell, the revolution quietly hums. An electric motor

complements a combustion engine that is powered by biodiesel fuel made partly with soy, and produces about half the greenhouse-gas emissions of gasoline. Most of the hybrids on the market, including the popular Toyota Prius, are powered by gasoline and a nickel-hydrate battery. The electricity for ChallengeX is generated by a pack of lithium-ion batteries, which store more energy yet weigh less than the nickel-hydrate version. The Equinox’s batteries power the electric motor, which kicks in when the Equinox needs extra power to, say, climb a hill. When the SUV is gliding down the highway, the biodiesel engine alone powers the car (and simultaneously charges the batteries).

“It’s at 680—it needs to go down to 480,” calls out team leader **Matt Shirk ’04 Eng**, a mechanical engineering grad student who is peering at a laptop perched under the Equinox’s raised hood. The “680” reading comes from the electronic throttle control wire, and it needs to be lower, so that when you hit the gas pedal, the engine responds. Shirk continues to bark data and stats to **Eric Reischer ’03 Eng**, who is dashing between the car and a computer in the corner. Reischer eventually agrees the numbers are good enough and turns the key. The car starts without hesitation. There is a collective sigh.

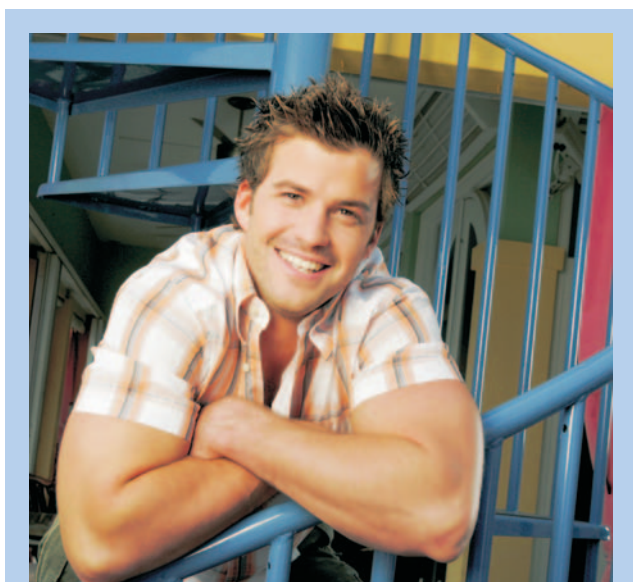
The DOE inspection is just one hurdle for the ChallengeX team, though one that has been more than two

years in the making. The first year, the students—mostly volunteers who range from Ph.D. students studying fuel science, like **Melanie Fox ’05 MS EMS**, to State College High School student Ben Carlsen—planned and modeled their vehicle on a computer. The second and third year, led by faculty advisers Haworth and associate research engineer **Gary Neal ’96, ’98 MS Eng**, they began building.

Shortly after 1:00 p.m., the DOE officials walk into the garage and ready their clipboards. There is high praise (“This is the most impressive packing I’ve seen”), and some minor chastising (“You have to hide all this wiring”), but the car passes. Next stop for the students is Mesa, Ariz., in June for a final exam: going up against the 16 other ChallengeX SUVs in tech inspection, handling, trailer tow, and acceleration events.

Shirk, the team leader, says he’d especially like to beat Wisconsin’s team, both because Penn State finished second to Wisconsin in the last FutureTruck competition, and because of the “stupid inflatable cow that they carry everywhere.” Rivalries aside, Shirk believes ChallengeX has as much to do with building the next generation of engineers as it does with building the next generation of automobiles.

“What we’re doing,” he says, “isn’t always giving the automakers grand new ideas, but it is giving the people involved a set of skills to help them develop a new technology.”



▶ JOHNNY POPULAR

THE LATEST PENN STATER TO BE PLUCKED FROM OBSCURITY by reality TV is John Devenanzio—or Johnny Bananas, as recent grads may remember him. **Devenanzio ’05 Lib** is a cast member on the current season of MTV’s *The Real World*. For those of you who are disconnected (perhaps happily) from the MTV generation, *The Real World*’s basic premise: Put seven young, attractive strangers together in a luxurious home (this year in Key West, Fla.) and watch the sparks fly. The show began in late February and appears every Tuesday at 10 p.m. through August. Early episodes show Johnny earning his nickname. —DM