

## RECYCLING

## Road Hogs

PAVING THE WAY TO CLEANER ENERGY—WITH MANURE

By Kristen Hinman

HOGS ARE BIG BUSINESS in Missouri, home to 280 “concentrated animal-feeding operations,” and the country’s seventh-biggest pork producer last year. But the honor is a dubious one to a farm’s downwind neighbors, not to mention to environmental advocates who worry about the untreated manure in vast waste lagoons.

Enter the executives at Innoventor, a design-build firm based in St. Louis, who, with the help of almost \$1 million from the Environmental Protection Agency, have created a contraption that recycles pig waste for road-paving and roofing products. The technology, which Innoventor believes has billion-

dollar potential, eliminates the need for manure lagoons and could reduce reliance on fossil fuels.

Innoventor’s machinery acts like a pressure cooker: at a certain temperature and pressure, it converts solid excrement into bio-oil while reserving the wastewater. According to Rick Lux, an Innoventor engineer, the process retains the nutrients in the wastewater and results in a liquid fertilizer suitable for spraying.

Last spring, I drove with Lux to Rehmeier Farms in St. Charles County, Missouri, a landscape dotted with hobby farms with white picket fences and carpets of corn, to check out Innoventor’s Swine-Manure-to-Energy Unit in action. There was no hint of pig in the air until we were within 25 yards of a barn. “That’s one problem I don’t have,” Rick Rehmeier told me, before describing the red that’s been bleeding across his ledgers. The last several years haven’t been good for a commodity hog farmer.

But in good times or bad, Rehmeier’s 10,000 hogs produce more than 5 million gallons of excrement annually. Some of this manure can be spread as fertilizer, but the rest of it goes to—well, waste. Innoventor currently uses his barn as a test lab; as Rehmeier sees it, a future commercial partnership would cut his fertilizer costs and, most important, free up land for him to expand his herd.

Innoventor believes the application eventually can be adapted for other forms of waste—human included. The firm’s hope is to produce almost a pound of oil per pig, every day, and to supply 20 percent of the asphalt-binder market, which was worth approximately \$11 billion last year, according to Poten & Partners, publishers of the *Asphalt Weekly Monitor*. There’s also money in the sprayable fertilizer, Lux says.

The technology passed a milestone in April, when a 300-foot stretch of test pavement went down on a busy Missouri road near a Six Flags amusement park. Lux is confident the road will hold up; he says the binder had to pass more than a dozen lab tests before transportation officials would use it. And no, he doesn’t expect drivers to raise an eyebrow. “I was out there twice on my hands and knees, putting my nose to the pavement,” he swore to me. “The road does not smell.” ■

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## SPORT

## Gaza’s Surfer Girls

RIDING THE WAVES AND TESTING HAMAS’S LIMITS

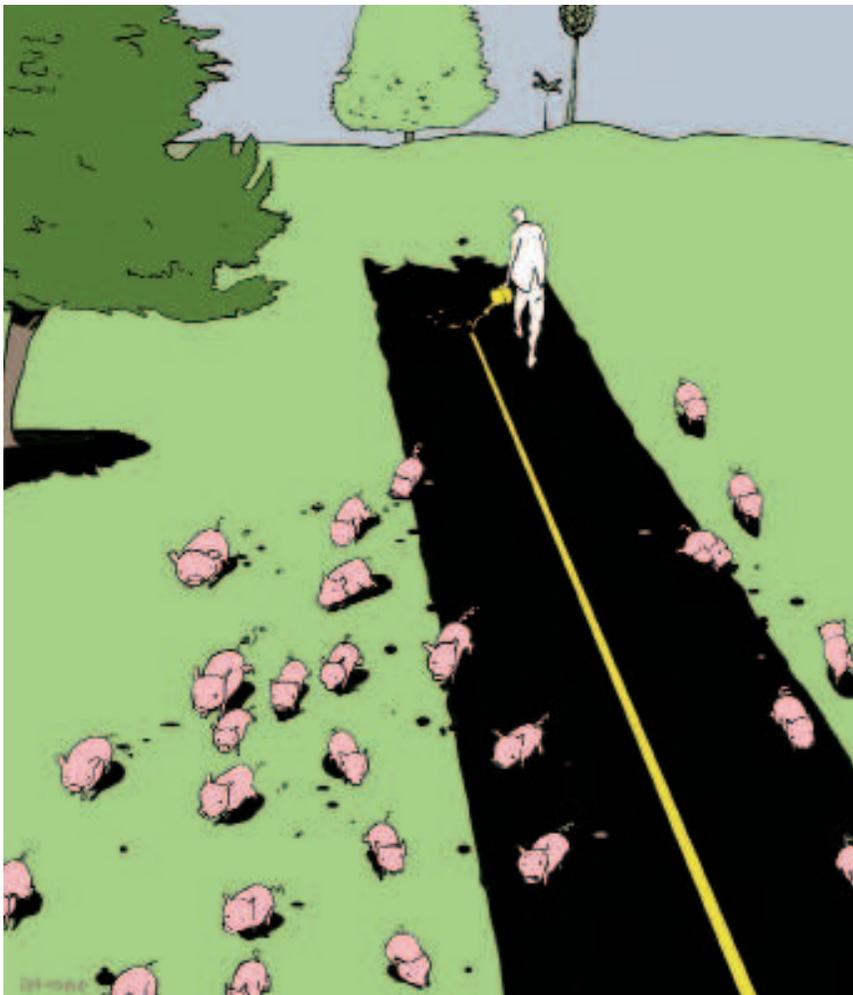
By Sarah A. Topol

AT DUSK, THE BEACH outside Gaza City is packed. Thousands of bodies cram the narrow Mediterranean shoreline, while bellowing touts ply candied apples, cotton candy, and baked yams. Rawand Abu Ghanem and I are sitting by the water.

The 13-year-old looks up at me from where she has been tracing patterns in the sand. “What do you wear when you swim in America?” she asks. I hesitate before replying, “Not much.”

Rawand nods sagely. “When you surf in America, do people stare at you?”

ISTVAN BANYAI



“No,” I answer.

“They do here,” she sighs.

Rawand is one of four girls learning to ride the waves of the Gaza Strip. They are the newest members of the Gaza Surf Club, a community of two dozen surfers in the Palestinian coastal enclave of 1.5 million. We were supposed to surf together tonight, but Rawand took one look at the crowded beach and decided against it. “Too many people,” she declared.

Sitting in her family’s living room later, Rawand tries to explain: “It’s a great feeling when I surf, but I won’t surf when there are a lot of people around. It’s so weird for them to see a girl surfing. It gets crowded, and I just can’t handle everybody looking at me.”

A lifeguard’s daughter, Rawand grew up watching her male relatives ride Gaza’s waves; recently, she remembers, “I thought, *Okay, everybody’s surfing, why shouldn’t I?*”

But in a place where few women even swim, Rawand’s adolescent reasoning carries complicated consequences. Since Hamas took control of the territory in 2007, the militant group has been working to inculcate conservative Islam in an already traditional society. As a result, the daughters of the strip’s male surf community must navigate ever more treacherous waters.

“Our society is different than others, there’s no way the girls can surf on a crowded day,” says their surfing teacher, Al-Hindi Ashour. “To their parents they are still kids, but some people here look at them like adult females already... They may say things about them in the future.”

Rawand’s cousin Shurouk Abu Ghanem is also 13. On land, she wears a hijab, the Muslim head scarf. In the water, Shurouk stuffs her long brown curls into a cap.

All of the girls surf clothed from head to foot. They prefer to practice in groups of other surfers and swimmers (their male cousins, brothers, and fathers), reasoning that the more people in the water, the less likely that anyone on shore will notice girls on a board.

“I’m not doing anything wrong. No one has the right to say anything to my daughters or me. But in the end, I can’t live outside the traditions of my society. There are limits to where we can have



Rawand Abu Ghanem and her sister Kholoud on the beach in Gaza City

our freedoms here,” Rajab, Shurouk’s father, tells me.

So the girls and their parents agree—they won’t be able to surf after they turn 17. “Doing something only boys do means I’m unique. I’ll go to another hobby—that’s the way it works here,” Rawand says. “But I will have the same confidence. I won’t change.”

Early the next morning, we enter the water en masse. Nine surfers share three boards. A phalanx of pint-size boys accompanies us on boogie boards, forming an army of attention-deflectors moving through the water together.

Next to me, Rawand squints, gulps air, and pushes her board down, surfacing on the other side of a wave. Nearby, Shurouk swims through the surf. We line up.

It’s my turn on a windsurf board sans sail. And I’m up, adrenaline pumping, as I struggle to keep my balance in three layers of wet clothing (undergarments, a tank top tucked into spandex tights, and then a long-sleeved shirt and hiking pants on top of that). I have to bail to avoid the boogie-boarding boys—the downside of our protective detail—but it’s enough. I’m the first adult woman anyone here has seen surf, and the pack beams in unison when I rejoin them. **A**

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## WILDLIFE

### Flight Paths

RAPTORS, MINUTEMEN, ILLEGAL IMMIGRANTS—AND OTHER VISITORS TO ARIZONA’S NATURE PRESERVES

By William Powers

THE NATURE CONSERVANCY’S Patagonia-Sonoita Creek Preserve, near the town of Patagonia, Arizona (population 793), is flush with unusual wildlife. A raptor swoops down and scares a pack of javelinas into a stretch of rare riparian cottonwood-and-willow forest. Gila woodpeckers, curve-billed thrashers, and red-naped sapsackers swoop over a clear blue creek that threads through the arid landscape. A desert mule deer bolts past a Santa Cruz striped agave—a plant rarely seen in Arizona. A peregrine falcon soars overhead. And then another bird of sorts scares it off: a U.S. Border Patrol helicopter, thwacking loudly as it flies low across the sky.

I had come to see rare wildlife in several obscure nature reserves near the Mexican border, but found myself immersed in a human drama. “The locals call that area ‘Wetback Alley,’” said a guest at the Spirit Tree Inn, outside Patagonia, the 52-acre homestead/bed-and-breakfast where I was staying. “Stay

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