

IMAGINE THERE'S NO OIL

Scenes from a liberal apocalypse
By Bryant Urstadt

On a Friday last fall, I headed to Yellow Springs, Ohio, to learn more about oil depletion and the imminent collapse of industrial civilization. I was on my way to the Second U.S. Conference on "Peak Oil" and Community Solutions, and the organizers had picked an ideal weekend for the affair. The skies were smeared an oily gray, and 4,300-horsepower military jets roared like horsemen of the apocalypse over the withered cornfields. Hurricane Rita was poised to rip into Texas and Louisiana the very next morning, and both NPR and the Christian radio stations were anticipating her landfall with rapture, speculating on the fate of the Gulf refineries, reporting that the ATMs were out of cash and the pumps were dry, describing Revelation-scale traffic. When the hurricane watch was occasionally interrupted, it was to report on the day's news from Iraq, which was not good. I myself was traveling without possessions, my bags having failed to appear when I arrived at the Columbus airport that afternoon. I did not imagine I would see them again: the airline had just declared bankruptcy, partially due to a spike in fuel costs, and I felt that I would be lucky just to get home.



I was not the only one to sense doom in the air. The idea that cheap oil had gone the way of the passenger pigeon was seeping into casual conversation, as the nation's drivers watched prices at the pump creep steadily up. Even occasional readers of the newspaper had begun to debate such matters as the stewardship of petroleum reserves, the mechanics of natural-gas terminals, and the proper placement of wind farms. Towns and cities around the country were

preparing resolutions on the impending crisis. Franklin, New York (pop. 1,219), would pass theirs in December, declaring that oil supplies had peaked and that preparations must be made; San Francisco and Portland would follow with similar resolutions of their own. Anxiety was building, and a number of the most worried were converging on Yellow Springs to discuss what, if anything, could be done.

By 5:00 P.M. we were massing at Antioch College's Antioch Hall, where we would spend the weekend listening to some of the leading thinkers in the Peak Oil movement, which argues that world oil production will soon peak and that catastrophe will follow. More than 400 conferees had come from thirty-nine states and five countries,

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from as far as London and Auckland. As might have been expected, they had arrived by way of a variety of highly efficient modes of transport, including Insights and Priuses and a Mercedes running on vegetable oil. They came on bicycle and on foot too, some having hiked in from the state campground a few miles out of town. They were of all sizes and races, old and young, and there were plenty of women. Many wore T-shirts with messages such as ASK ME ABOUT PEAK OIL, or PREPARE NOW FOR AN OIL-DEPLETED FUTURE. We met in the lobby and stuck on our nametags. There were the excited exchanges of people putting faces to names known only from online forums. The hall itself was a Victorian structure of red brick with a variety of towers, gables, and turrets, and it lent these decidedly twenty-first-century proceedings a touch of the nineteenth, as though we were assembling to see a traveling lecture on the mammals of the upper Amazon.

We moved to the auditorium to hear an opening address by Richard Heinberg, the unofficial

large consumer of resources. After waiting a while for a tremendous round of applause to subside, he went on to speak with humor and mastery, tripping lightly over the history of oil and the world it created—from Edwin Drake's first well in western Pennsylvania to the peaking of U.S. production and the subsequent upheaval during the shift toward foreign suppliers. He noted that global oil reserves were at their highest point in history, just as they had been in the United States before its peak. The global peak, he believes, will likely arrive in the next five years. He produced depressing figures about the potential energy returns of all alternatives, dashing hopes about everything from hydrogen cells and biofuel to the tar sands of Alberta.

As for what will happen after the oil runs out, Heinberg presented an unnerving outline. The economy will begin an endless contraction, a prelude to the "grid crash." Cars will revert to being a luxury item, isolating the suburban millions from food and goods. Industrial

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leader of the Peak Oil movement. He is not, it should be noted, its father: that honor goes to M. King Hubbert (1903–89), who was chief consultant in geology at Shell Oil during the 1950s. In a 1956 paper, Hubbert predicted that the peak of global oil production would occur in 2000. (In the same paper, he predicted that the peak of domestic oil production would occur between 1965 and 1970; in fact, it peaked in 1970.) But Heinberg is the movement's evangelist, bearing the bad news to the world. His book *The Party's Over: Oil, War, and the Fate of Industrial Societies* has sold more than 30,000 copies, an impressive number for an unadvertised title published by a small press and hardly available in bookstores. He is on the faculty of The New College of California, in San Francisco, though he does not have a Ph.D. (The New College, invented thirty years ago, is not a Ph.D. kind of place.) He had flown in from a Thursday night event in Flagstaff, Arizona, where he had delivered a lecture at Northern Arizona University, and he was headed to Maryland on Monday. In a nod to his standing, he would deliver both the first and the final speeches of the weekend.

Heinberg assumed the podium in a dark green shirt and brown knit tie. He has a little monk-like cap of hair, thin-rimmed glasses, and a reddish goatee, and in stature does not appear to be a

agriculture will wither, addicted as it is to natural gas for fertilizer and to crude oil for flying, shipping, and trucking its produce. International trade will halt, leaving the Wal-Marts empty. In the United States, Northern homes will be too expensive to heat and Southern homes will roast. Dirty alternatives such as coal and tar sands will act as a bellows to the furnace of global warming. In response to all of this, extreme political movements will form, and the world will devolve into a fight to control the last of the resources. Whom the wars do not kill starvation will. Man, if he survives, will do so in agrarian villages. It is a terrible scenario, and for delivering it, Heinberg received a standing ovation.

Heading to my rental car, I found myself immersed in a now familiar feeling, one I have experienced many times during the months I have spent reading books on Peak Oil and conversing with Peak Oilers. At those times, I move through the world in wonderment at the commonplaces of my life that are slated to vanish: the plastic pen in my pocket, the clear holder for my nametag, my fleece sweater (all made of plastic, largely derived from natural gas, the supplies of which are closely linked to those of petroleum), my shoes, pants, and shirt (all shipped at large energy cost over thousands

of miles), the money in my wallet (soon to be worthless paper), my car (naturally), and even the road it was parked on (asphalt's major component is petroleum). It is unsettling to watch the world disappear, though a little exciting too.

I had met my first Peak Oilers in July at a health-food restaurant in Manhattan, which plays host to the monthly gathering of the NYC Peak Oil Meetup Group, one of thirty-nine worldwide. The group is led by Dan Miner, a dapper man favoring crisp button-down

there were four in attendance and no leader, the original founder having vanished. Under Miner's stewardship, though, the group has flourished. By July there were nearly a hundred members, and about thirty had shown up on that particular evening; the group has since grown to more than 340.

I sat next to Philip Botwinick, a middle-aged bookkeeper, and his partner, Tom Nielsen, a corporate librarian. Botwinick, one of the more outspoken and active members of the group, is a solid man with close-cropped gray hair and a wide-eyed look; Nielsen is smaller, much



shirts and black dress shoes in the lug-soled mold. He is forty-four, a senior vice president of the Long Island City Business Development Corporation, in Queens, and not unaware of the irony of this. "I spend all day trying to get new businesses to start up in Queens, to get buildings built," he told me before the meeting started. "And in my free time, I talk about how it's all going to end." When Miner had come to his first meeting, the previous December,

quieter, and wears a hearing aid. I asked Botwinick what he expected to happen in the city. "It's going to be a nightmare, just like *Soylent Green*," he told me, referring to the 1973 film that depicts a Manhattan where fresh water and food are reserved for the rich while the poor are harvested for cannibalistic purposes. Botwinick told me that he fully expects fascism to arrive along with the economic collapse. "I'm Jewish and I'm gay," he said. "I've seen

what can happen. I know where it's going. I'm not sticking around."

As my veggie burger arrived, Miner called the meeting to order. "This is a city of 10 million, and we get thirty here?" he said. "People can't freak-in deal. All right, let's get this party started."

Some urban Peak Oilers do think the city can be saved with planning, and they held the floor first. One woman, whose name I did not catch, suggested tearing up all the asphalt and turning the avenues into gardens. Bicycles would glide along paths in the shadows of the buildings. It was a beautiful image and it was roundly applauded.

Conversation turned to the city's skyscrapers. According to the Peak Oilers, the buildings will be impossible to heat in the winter or to

cool in the summer, and there might not even be enough spare energy to keep the elevators running. Charles Kramer, a fifty-two-year-old copyright lawyer in thick black glasses, suggested covering them with solar panels and then putting windmills on the roofs.

"We could put gardens at the bases of the windmills," added someone in the back.

Simon Whelan, a programmer and another of the group's busiest members, had some comments about all of this. Whelan, with his wavy gray hair, looks a little like General Custer might have had he survived and prospered into his fifty-second year. He is an expert on the subject of Peak Oil and often disabuses members of their hopeful fantasies.

"I'm glad you brought up some of those ideas," said Whelan. "But you've got to think about how many kilowatts of power you need to put in to get a kilowatt out. It's called EROEI"—he pronounced this *err-oh-ay*—"Energy Returned on Energy Invested. By many calculations, working with solar panels and wind turbines, you're often getting close to zero on your EROEI. And you're trying to do it eighty stories up. That's not saying it wouldn't work, just that you might not be as ahead as you need to be." He went on for a long time about the hopeless deficiencies of alternative-energy solutions. "And now I'll stop talking," he said, and did.

The meeting moved on to the role of government. It was agreed that politicians had reached new heights of uselessness and that the Peak Oilers were on their own. Miner reported that he had tried more than once to speak with Mayor Michael Bloomberg's staff about these issues, but they had not shown much interest. "They just think I'm crazy," he said. "They don't know what to make of me." Someone else mentioned that he had gone to a debate and asked the Democratic mayoral candidates about their views on Peak Oil, but he had been ignored.

Finally, the group took up the subject of escape. Within the Peak Oil movement, "re-



localization” is the general term for the return to small towns and local economies. Violent chaos will rule after the collapse and before re-localization can be achieved, and the Oilers hope to ride this time out in self-sufficient interim communities they call “lifeboats.” Botwinick is perhaps the most committed to “not sticking around,” as he put it, and has been leading the New York group in its search for a place to build just such a lifeboat. His report at this meeting was somewhat dispiriting.

“We’re up against a lot of challenges,” he said, and then went on to describe a visit he had recently made to a self-contained community in

loves to discuss things like the capacities of specific refineries, energy routes, the different grades of oil in the world’s major wells, and the status of Europe’s strategic reserves. He is already storing cans of beans and tuna, and has put away food for his three cats too.

There were also questions from new members. “Shouldn’t we be thinking of moving somewhere really warm?” asked a young Starbucks barista who had come with her boyfriend. “Where we don’t even need to heat our homes?”

“It’s really good that you’re joining the discussion,” Whelan said. “But the warmer parts of

ONE WOMAN SUGGESTED TURNING THE AVENUES INTO GARDENS. BICYCLES WOULD GLIDE ALONG PATHS IN THE SHADOWS OF BUILDINGS. IT WAS A BEAUTIFUL IMAGE AND IT WAS ROUNDLY APPLAUDED

Vermont. Botwinick had been talking shop with a member—“asking him technical stuff like ‘How do you make decisions as a group?’”—when he mentioned that Tom, who was standing right beside him, was his “partner.” The man’s small son turned to his father and asked, “He’s not going to the Kingdom is he, Daddy?” From there the visit quickly wound down.

A similar excursion to Lancaster, Pennsylvania, had been equally disappointing, though for somewhat different reasons. This was the country of the Amish, who have been perfecting a low-energy lifestyle for centuries, and their presence in the area was expected to be inspiring and possibly crucial. Since the Peak Oilers expect the collapse to coincide with the worst effects of global warming, including a new ice age, it was also important to know that Lancaster lay safely south of all previous glaciers. Two weeks before the meeting, Botwinick, Miner, and another group member named William Burke had driven the 160 miles in Botwinick’s Honda Civic.

“It was a fiasco,” Burke reported. “It was all strip malls and big-box stores, same as everywhere else.” There wasn’t much farmland available either. Burke, forty-seven, keeps a neat part in his hair and wears golf shirts and khakis. He works for a big-box chain—in IT, managing inventory¹—but when the crisis hits he expects the whole operation to vanish in a matter of months. He calls himself a “Peak geek” and

this country pose a lot of problems. We can’t go to the Southwest, for instance. There’s no water, and it’s going to be a desert again. And the Southeast? It’s all NASCAR and guns and born-again Christianity. How do you think we’re going to fit in?”

No one had an answer.

Around ten o’clock, Miner adjourned the meeting, and the members broke down into smaller groups. Burke mentioned that he had just been by the coin shop, and at this he withdrew a one-ounce Canadian Maple Leaf gold coin from his pocket. He is selling his stocks, he explained, and buying one gold coin each week. He is also buying silver, and when the economy vanishes he intends to use his hoard to buy farmland somewhere with the others. “I’d like to have at least 100 ounces of gold and 2,000 ounces of silver, as a minimum safety margin,” he said. “Even better would be 200 or 300 ounces of gold.” Whelan nodded. He, too, is mostly in gold.

Burke fingered the golden disc for a bit and then handed it around a little nervously. He had just paid \$450 for it, and it was only slightly larger than a quarter. It was exciting to hold.

In its glint there seemed to be a hint of the perilous future.

PPeak Oil has been called the liberal *Left Behind*. This is dismissive but, in the manner of all good put-downs, also fairly accurate. At the conference the attendees certainly did seem to be to the left of the average American. The motto of Heinberg’s New College, for instance, is “Education for a Just, Sacred and Sustainable World.” And there was general applause when

¹ No one really seemed to know why there were so many computer-oriented people in the New York group, but Whelan pointed out that Meetup groups are essentially a creation of the Internet, and thus particularly attractive to the computer-savvy.

Simon Whelan, in the course of making a comment, characterized President Bush as a “psychopathic assassin.” And the number of gray ponytails in attendance at the conference would have reassured any conservative hoping to dismiss Peak Oil as liberal nonsense.

The movement does have some conservative adherents, though they are not so numerous. The most active, indeed perhaps the only, congressman truly fretting about Peak Oil is Representative Roscoe Bartlett (R., Md.), a former professor of physiology and a true right-winger. The last two bills introduced by Rep. Bartlett give some hint as to the range of his interests: House Resolution 507, calling for “an energy project with the magnitude, creativity, and sense of urgency that was incorporated in the

Conversation, over the meal of pancakes, organic fruit, and vegan bacon, ranged widely. I heard things like:

“Men hear about Peak Oil and they want to go out and buy guns and get back to the land. Women just stop and say, ‘How will I feed my children?’”

“I met a blacksmith. He says we’ll have a lifetime’s supply of steel from all the abandoned cars, but he’ll have to switch to charcoal for his forge.”

“Charcoal’s not hard to make. You just need the right wood and a pit.”

“The ruling elite are not going down without a fight.”

“Everything shifted in me and I just knew I had to get out of my suburban home.”

AMERICANS SEEM BORN TO LOVE THE APOCALYPSE, EVEN THOUGH IT JILTS US EVERY TIME. PEAK OIL AND *LEFT BEHIND* ARE MERE FROTH ON A SEA OF DOOMSAYING THAT STRETCHES BACK TO THE PURITANS

‘Man on the Moon’ project to address the inevitable challenges of ‘Peak Oil’”; and House Bill 42, which proposed “[t]o ensure that the right of an individual to display the flag of the United States on residential property not be abridged.” He lectures on Peak Oil whenever he can, and often shows up at events where Heinberg and his colleagues are in attendance.

Perhaps more than anything, the unifying trait of the Peak Oilers may be a love of information. They always seem to be carrying books, ferreting out government reports, and generally amassing news on energy supplies from around the world. They are intimate with terms such as “terawatts” and “micropower.” A discussion with a Peak Oiler can often seem like a gathering of the motivated students in a cross-disciplinary class on economics, physics, geography, and political science, and it is hard after an hour with them not to feel that the numbers add up to disaster.

Not all Peak Oil discussions, however, are lofty and professorial, for there are many practical implications to the coming collapse. At the conference’s Saturday luncheon, I met, among others, a National Guardsman just back from the desert adventure, a nurse, three autoworkers, and a financial analyst. The analyst was particularly anguished, being in the uncomfortable position of having either to advise his clients to invest in a system that would soon disappear or to recommend more honestly that they withdraw their money from his care and start a farm.

“Did you know there are no shoe manufacturers left in the United States? We’re going to need cobblers.”²

“And someone’s going to have to make canning jars too.”

Near the end of the conference on Sunday, one of the organizers, a woman named Megan Quinn, discussed plans to build a lifeboat in Yellow Springs called Agraria, and she presented a blueprint of it on a large piece of posterboard. It showed a tiny, Middle Earth–style village nestled amid trees, with rows of crops radiating outward. Quinn told us that each home will be smaller than 1,000 square feet, less than half the current average, and built with a variety of materials—including straw bales, cordwood, and stick adobe—as well as with traditional framing. Windows will be triple-glazed, with insulated shutters for extra warmth, and hot water will be heated by the sun. There will be no driveways, garages, street lights, or air conditioners. There will be root cellars.

According to Quinn, more than two dozen Peak Oilers from around the country have expressed interest in joining. As Quinn sees it, there is not very much that is optional about the plan. “If we don’t start thinking about the next generation now,” she said, “it could be the end of humanity.”

² Not strictly true. Alden and Allen-Edmonds still make shoes here in the United States, although it is odd to imagine a postapocalyptic America clad in cordovan wingtips.

After Quinn's presentation, there was a panel with Quinn and two other experts in eco-villages. The audience asked questions about the move to the lifeboats, and a number of them revealed the anxieties of a liberal in a survivalist's world.

"What do we do with the mentally ill?" asked one woman.

"You're not going to have time for people with major difficulties," said Diana Leafe Christian, the editor of the magazine *Communities*. "It's just too hard. You're going to need all hands on deck."

"I second that," said Liz Walker, the co-founder of an eco-village in Ithaca, New York.

It was a typically hard-nosed answer. The lifeboats are not shaping up to be the love-nodes of the Seventies, at least not in the first years.

Another woman stood up and asked, "What are our communities going to do about the urban exodus? There's going to be violence, social breakdown. Should we all be bearing arms?"

This is a question that comes up frequently, and makes many Peak Oilers slightly uncomfortable, but they are learning to live with it.

"You make a good point," Walker replied. "We'll make a perfect target." It was not what she had hoped to discuss, though, and she pointed out that security would be better addressed if regions could move toward locally sustainable lifestyles in advance.

"We'll want to practice compassion while being very prudent," Christian added. "We might want to think about revisiting some old issues, like guns."

Liberal or conservative, Americans seem born to love the apocalypse, even though it jilts us every time. Both Peak Oil and *Left Behind* are mere froth on a deep historical sea of doomsaying that stretches back to the Puritans, and possibly before, if one includes the apocalyptic predilections of Christopher Columbus himself.

We have built lifeboats before, for example. Ann Lee (1736–84) moved from England to upstate New York in 1774. Her followers, snidely referred to as the Shakers, considered her the second coming of Christ; the establishment of their communities was to be the creation of a kind of heaven on earth and the preparation for Judgment Day. There were similar movements by other sects, and communities were founded in Amana, Iowa, and Oneida, New York. A group called the Harmonists founded a colony in Indiana; and when they moved to Pennsylvania, they sold their property to Robert Owen (1771–1858), a British textile magnate who tried, unsuccessful-

fully, to start his own utopian community there.³ All of the settlements shared much with the planned lifeboats of the Peak Oilers, including dense housing set in the center of commonly worked land and a sense of the community members as involved in a special and near paradisiacal undertaking.

Peak Oil springs, too, from a fertile line of scientifically based arguments for a collapse. Malthus was perhaps first in this, positing "the constant tendency in all animated life to increase beyond the nourishment prepared for it," and though his grimmest predictions have yet to be borne out, they have increased the supply of doom-minded books, including such best-sellers as *The Population Bomb* (1968) and *The Limits to Growth* (1972). The latter popularized the term "overshoot," which means that point at which population can no longer survive and must die off catastrophically; the general drift of such calculations is a recurrent theme among the Peak Oilers, who often point to the insurmountable gulf between predicted post-Peak food supplies and current populations.

Another recurring bit of science is the Second Law of Thermodynamics. Developed in part by William Thomson, later Lord Kelvin, in 1851, the Second Law details the inevitable dispersion of energy and the accompanying principle of entropy. Just as Darwin's theory of evolution was applied to society, so Kelvin's general approach was seized upon in America by intellectual get-ready men. Among these was Brooks Adams, of the famous Adams family, whose influential *Law of Civilization and Decay* (1895) suggested that societies prospered in direct proportion to their access to energy, and would decay in the same manner. More recently, Jeremy Rifkin's *Entropy* (1980) explained how the center of the industrialized world could not hold, anticipating the Peak Oil books almost argument for argument.

Nor are we strangers to exact end dates, usually arrived at after prolonged study. Among

³ *Would that the world had seen "the Devastator," an invention that Owen introduced during an 1855 meeting he held on the topic of the Millennium. The device was meant to destroy armies and thus put an end to war. An onlooker reported: "It was fixed upon six wheels, and worked by steam, both for moving itself about and for working its guns. In shape it resembled a kind of Noah's Ark. The upper part appeared to be constructed of corrugated iron. There was one tier of guns all round, and the wheels had large sithes [scythes] projecting from the nave [hub], like what is seen in the engravings of some of the old war chariots of Rome. It was stated to possess powers of destruction incredible and hitherto unheard of, and that it could discharge from its guns many thousands of shots per hour, and that it could propel itself without danger or delay over every description of road where any ordinary carriage could be moved. It had been submitted to the war authorities, and after some consideration by them was finally rejected."*

American prophets, one of the most popular was William Miller, a farmer from New England who spent years calculating the exact date of the end, drawing largely on the Book of Daniel. Eventually he announced that it would happen sometime during the year following March 21, 1843. He was soon lecturing on the topic across the country. March 21, 1844, passed, however, and the world persisted. The Millerites were more than willing to be wrong again, though, and—after some recalculations—a new date, October 22, 1844, was set. The movement rebounded and prospered. As many as 100,000 were convinced; farmers abandoned their fields, and shopkeepers closed their doors, quite sure they would not see the end of the year. The day after would be dubbed the Great Disappointment.

Being wrong does little harm to a good apocalyptic movement. The Millerites soldier on, in the form of their descendants the Seventh-Day Adventists, father to David Koresh and his prophecies. The apocalyptic worldview, in fact, is like that awful beast in the old science fiction movies—blasts from the ray guns of history only make it stronger. This odd paradox was partially explained in 1956 by a trio of sociologists from the University of Minnesota, led by Leon Festinger. In *When Prophecy Fails*, Festinger and his co-authors explained that a committed believer, faced with irrefutable evidence contradicting his belief—with what Festinger called a “disconfirmation”—would redouble rather than diminish his efforts to defend his view. Stranger yet, the more harshly reality dealt with a belief, the more feverishly the believer would work to convert others.

As scientists, Festinger et al. needed to test their theory, and their unwitting test subject was a middle-aged homemaker in Lake City, Illinois, with a deep interest in the occult. They call her Marian Keech, and in 1954 she began receiving messages from a being called Sananda, of the planet Clarion, which she relayed to a small group of followers. The transmissions included much about aliens, Sananda’s relation to God, paths to enlightenment, and also the news that the world would be flooded on December 21, 1954. Only the pure believers would be saved, spirited away the night beforehand in flying saucers.

In expectation, members of the group—which had been infiltrated by Festinger’s crew—neglected their families, quit their jobs, and moved, leaving bills unpaid. On the night of December 20, Keech and her followers assembled in her back yard to wait for the saucers, which failed to arrive, as they always do. After a few hours of dismay and confusion, however, Keech said she had just received a new message that clarified some of the earlier information. The group had, in fact, averted the flood by way

of their advanced spiritual development. It was identical, as Festinger points out, to the behavior of Miller and his followers a century earlier. As Festinger writes: “A man with a conviction is a hard man to change. Tell him you disagree and he turns away. Show him facts or figures and he questions your sources. Appeal to logic and he fails to see your point.”

Peak Oil has already met with a major setback of its own: the peak is overdue. Hubbert, as noted, expected oil to peak by 2000. But worldwide production of oil, which in 2000 averaged 68,344,000 barrels a day and did dip slightly in 2001 and 2002, was by 2003 slightly greater, at 69,154,000; 2004 and 2005 were greater still; and by March 2006, production was averaging 73,761,000 barrels a day. In response, Peak Oilers point out that Hubbert did not anticipate the OPEC crisis and the ensuing energy-conservation movement, both of which have delayed the peak. It is a sensible rebuttal—and we may find that the peak looks more like a plateau in the end—but it also fits Festinger’s mold precisely.

Yet try as one might, the Peak Oilers cannot be dismissed as madmen in sandwich boards. Petroleum is inarguably a limited resource: it may peak tomorrow, or it may peak a few decades from tomorrow, but the peak is inevitable. As Chevron’s own advertisements note, we are burning two barrels of fuel for every new one we find, and there is no way to see that equation as favorable. In the United States, for example, according to BP’s *Statistical Review of World Energy 2005*, we used the rough equivalent of 17.1 billion barrels of oil in energy in 2004, including all conventional sources of energy, from oil to coal to nuclear. That includes about 6.9 billion actual barrels of oil burned.

How will we replace that oil? (And we will not even begin to imagine a world in which the Chinese and Indians consume energy as the Americans do.) Coal, of course, is standing by. Already we use the equivalent of 4.1 billion barrels of oil in coal each year, most of it for electricity. We could double this usage—the coal is available—but we would also be doubling the number of mountains we turn inside out and the number of plains we strip, and the effect on the climate might well be dark enough to provoke the crash anyway. As for clean coal technologies, they would require yet more mountains erased.

Or take nuclear energy, which, in a sign of how tight things are looking, is starting to seem like a good idea even to ardent environmentalists. There are today 103 nuclear power plants in the United States. Together, in 2004, those plants produced the rough equivalent of 1.4 billion barrels of oil in energy, or 13 million barrels

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per plant. To replace the oil we're using—and there are a number of ways in which the electricity generated from nuclear plants would be a less efficient substitute for petroleum, such as in cars, but never mind that for the moment—would require the construction of about 427 more nuclear plants, given average production today. If oil doesn't peak for thirty years, this might be a practical option. If oil peaked yesterday, a fortified farm in the wilderness starts to look like a more viable solution.

As for hydroelectric power, it currently provides roughly 439 million barrels worth of energy per year. Aside from the unsightliness of a nation with more than ten times as many dams, it isn't an option: most sites that could generate significant power have already been dammed.

Overall, alternative energy sources currently provide only 6 percent of our total energy, and given the current state of technology, it seems impossible that they could pick up the slack anytime in the next decade or two. Martin Hoffert, an emeritus professor of physics at New York University, along with a number of other co-authors, laid out this sobering fact in an article in *Science* in 2002. To grow enough biomass to meet the energy needs of the world, for example, would require more than 10 percent of the landmass of the world, or the rough equivalent of all of the land that is under cultivation already. Even growing enough to meet a tenth of the world's energy needs would require an enormous program of cultivation, and one run without the benefit of fertilizers made from natural gas or of machinery powered by petroleum to cultivate and transport those crops.

Solar and wind power, for their part, are wondrously clean but woefully inefficient. John Turner, in a 1999 article in *Science*, estimates that powering the United States with solar panels would require a square of photovoltaic cells roughly 160 kilometers on a side, or about 26,000 square kilometers, an array the size of Massachusetts. By contrast, in all the years between 1982 and 1998, about three square kilometers of cells were shipped to customers.

The numbers remain daunting even on the local scale. To equal the output of a thousand-megawatt nuclear power plant, the retired Princeton geologist and oil-industry consultant Kenneth Deffeyes notes in his book *Hubbert's Peak: The Impending World Oil Shortage*, one would need to build five square miles of solar panels or turbines. As he puts it: "Solar and wind power participate in what I call the energy-material paradox. If materials were cheap, I could build large energy collectors. If energy were cheap, I could produce large amounts of raw materials. If neither materials nor energy is cheap, I have a problem. At the moment, solar and wind power are developing in

specialized areas. Neither is an immediate, large-scale solution to the energy problem."

Deffeyes, it should be added, believes that oil production peaked in 2005. And Burke's coin, for which he paid \$450, is now worth about \$574.

Four from the New York group had made the trip to Yellow Springs, and as the conference came to a close, I found myself once again in their company. They were among the last to leave, lingering in a bunch near the center of the auditorium. Miner himself, though, was rushing around the room, trying to find out who among the speakers might be available for a conference he and his group were hoping to sponsor in the city. It would be called "Petrocollapse New York." In the afternoon, Botwinick, Nielsen, and Whelan would be headed to the conference in Maryland, to hear Heinberg again as well as a few others, including Rep. Bartlett.

Despite a weekend of heavy doomsaying, though, the group was in noticeably high spirits. One of the last speeches had been entitled "Armageddon or Eden," and from the tone of the New Yorkers it seemed they harbored hope that the post-carbon world might be more the latter than the former. After all, though many of our conveniences will vanish, so too will McMansions, traffic jams, Circle Ks, golf courses in Nevada, wars on the other side of the world, and maybe even Stone Phillips and Katie Couric. In their place will be a closer relationship to the natural world, and perhaps what Whelan envisions as a return to a more spiritual life.

I asked Whelan what he thought about Agraria and the possibility of riding out the grid crash in Ohio. This struck him as not quite the best choice, as he had come to believe that the United States might be a lost cause entirely. New Zealand was looking far more promising. "It's temperate," he said. "It's not crowded. It's isolated. I think it would be a great place to start building the post-Peak Oil world."

Botwinick was wearing a shirt with an illustration of a dairy cow on the front. He had bought it from a farm in Cornwall, Connecticut, where he has been going on weekends in order to accustom himself to the agricultural life. He was learning to butcher livestock, a necessary skill and one that let him "get closer to his food sources." In November, he said, he would be helping to kill a pig, an important milestone for a lifelong New Yorker who "didn't even have a front lawn" when he was a kid. He was hoping to make the move to a lifeboat by 2007.

He asked me if I had bought any gold yet, and I admitted that I had not.

"Just buy some," he said, in a kind way. He was looking out for me. I said I thought I might. ■