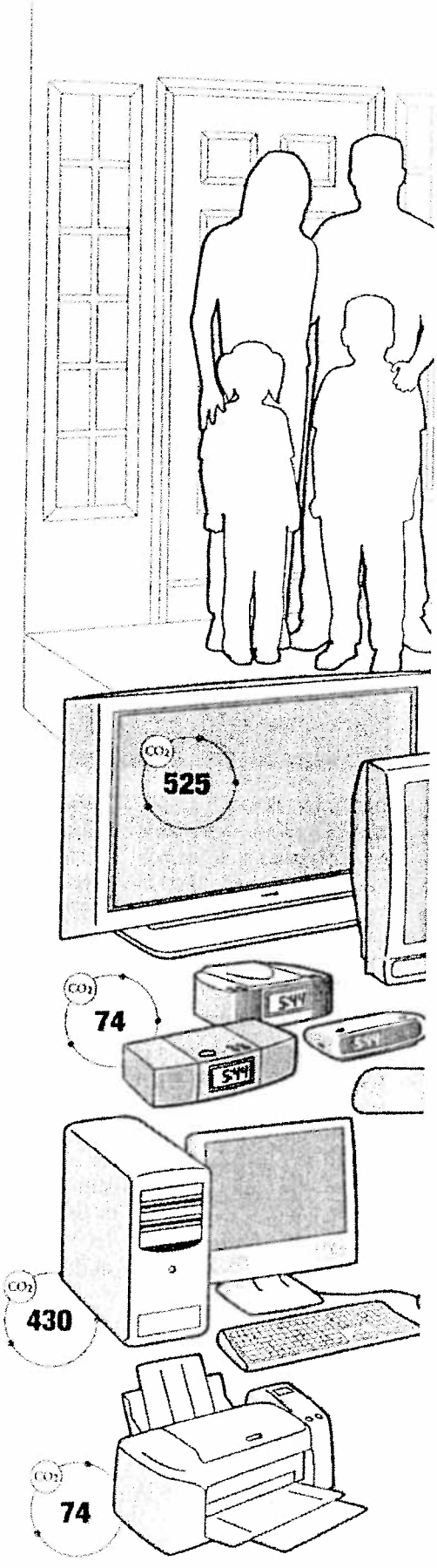
COUNTING CARBONS

How much greenhouse gas does your family produce?

BY RICHARD CONNIFF | ILLUSTRATIONS BY BRYON THOMPSON



NOT LONG AGO, THE ROLLING STONES ANNOUNCED PLANS TO ENSURE THAT an upcoming tour would not contribute to global warming: They had signed on to two forestry projects in Scotland, which would plant 2,800 trees, one for every 60 fans in the audience, and thus render the entire tour "carbon neutral." Better still, the Stones got a mobile phone company to pick up the extra cost of the saplings, about 20 cents a ticket.

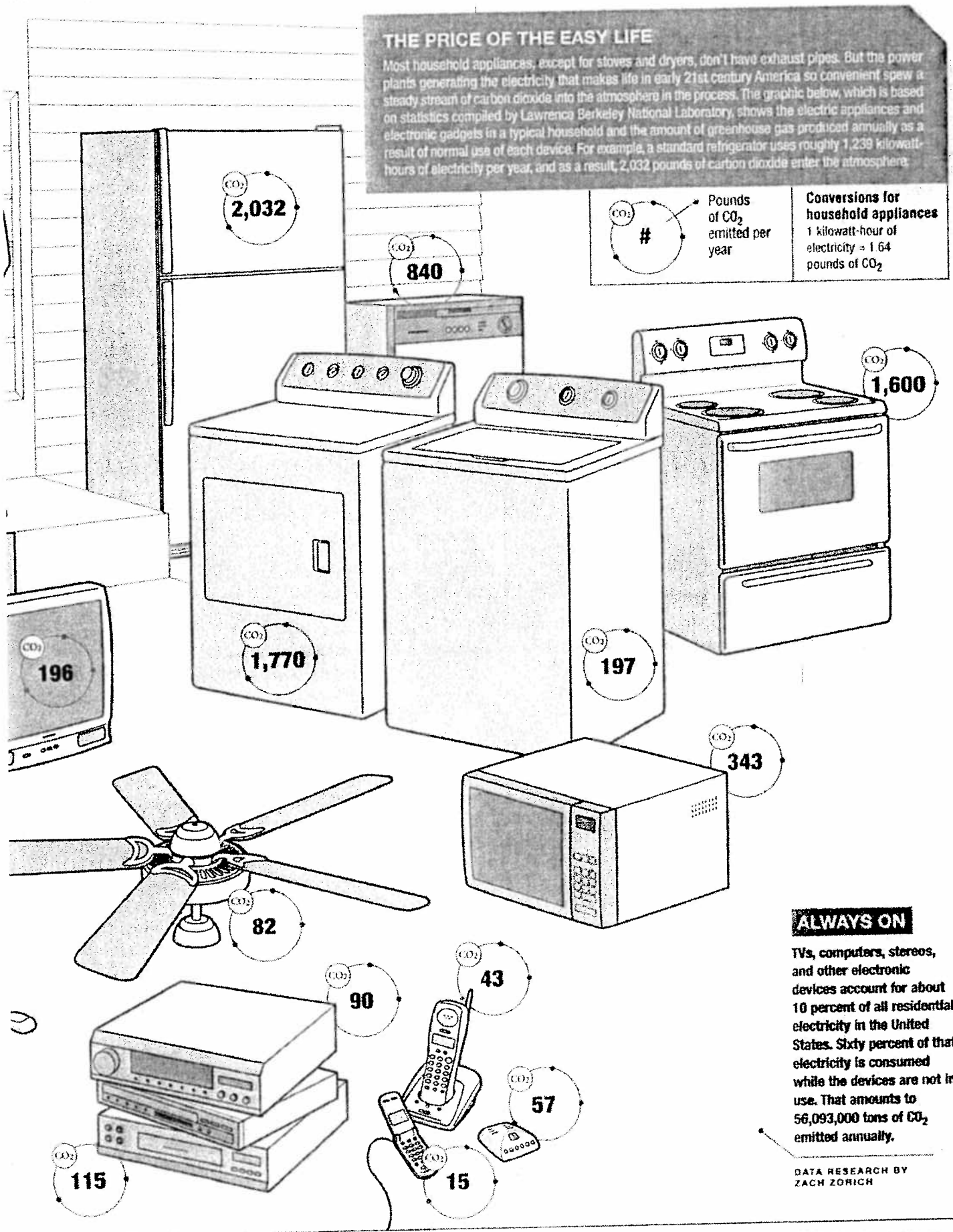
My first impulse was to laugh. Mick Jagger is a great performer, but he also personifies the jet-set lifestyle, blithely tripping from villa to penthouse on a gaudy 40-year-long plume of fossil-fuel exhaust. How could one tree possibly remove the carbon dioxide produced in getting thousands of rock-and-roll fans, let alone lights, amps, and the Stones themselves, to various stadiums on the tour? Does a pine seedling really work that hard?

My second, less gratifying impulse was to wonder, What if they're right, or at least moving in the right direction? If you believe, along with almost every scientist who has studied the issue, that global warming poses a genuine threat to humanity, doesn't this suggest that we should be doing something about it?

What would it mean to apply in our daily lives, just for argument, the kind of reductions called for in the Kyoto Protocol on greenhouse-gas emissions? At the most elementary level, could we do the math? Could we figure out how much carbon dioxide and other greenhouse gases our cars, our homes, and our work

THE PRICE OF THE EASY LIFE

Most household appliances, except for stoves and dryers, don't have exhaust pipes. But the power plants generating the electricity that makes life in early 21st century America so convenient spew a steady stream of carbon dioxide into the atmosphere in the process. The graphic below, which is based on statistics compiled by Lawrence Berkeley National Laboratory, shows the electric appliances and electronic gadgets in a typical household and the amount of greenhouse gas produced annually as a result of normal use of each device. For example, a standard refrigerator uses roughly 1,239 kilowatt-hours of electricity per year, and as a result, 2,032 pounds of carbon dioxide enter the atmosphere.



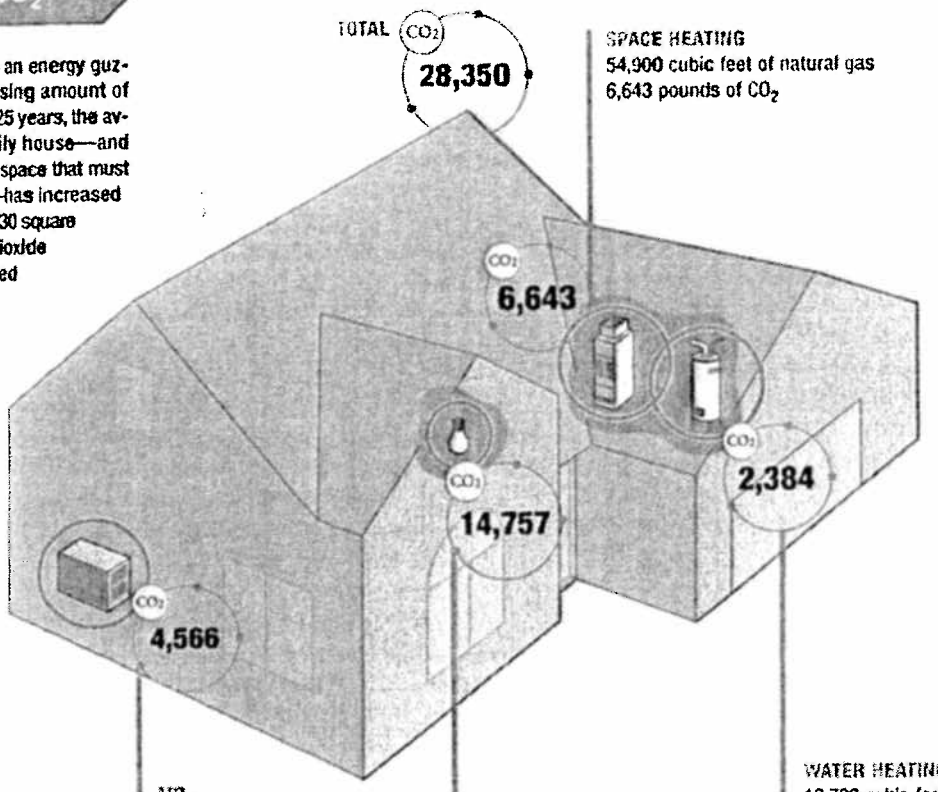
ALWAYS ON

TVs, computers, stereos, and other electronic devices account for about 10 percent of all residential electricity in the United States. Sixty percent of that electricity is consumed while the devices are not in use. That amounts to 56,093,000 tons of CO_2 emitted annually.

DATA RESEARCH BY ZACH ZORICH

HOMEMADE CO_2

A typical American house is an energy guzzler that produces a surprising amount of greenhouse gas. In the last 25 years, the average size of a single-family house—and consequently the amount of space that must be heated, cooled, and lit—has increased from 1,740 square feet to 2,330 square feet. These annual carbon dioxide emissions figures are based on national averages for a 2,000- to 2,500-square-foot house.



Source: U.S. Department of Energy, 2001 Residential Consumption Survey.

produce? Given how invested we have become in the automotive way of life, would it even be possible to reduce emissions significantly? And if we started down this line of thinking, would emissions counting join low-carb diets and real estate one-upmanship as favorite topics of cocktail party bores? Or forget the cocktail parties: Once we confronted the mathematics of a Sunday drive, would there be anything left to do, in a guilt-free way, other than crawl under a rock?

Under pressure from the Kyoto Protocol, which went into effect in February for just about every country except the United States and Australia, people elsewhere have actually begun to think about such questions, often in ways that are startling for their scale and severity. Researchers at Oxford University recently proposed demolishing 80,000 inefficient homes a year—many of them century-old structures in town and city centers—to achieve the British goal of a 60 percent reduction in greenhouse-gas emissions by 2050. (The proposal also included building 220,000 low-carbon-emission homes a year.) In Switzerland, which is watching its Alpine ice disappear, technicians set out to wrap part of a glacier in insulating foam.

Even die-hard Alaskan antienvironmentalists have begun to warm up to the idea of imposing limits on greenhouse-gas emissions, according to *The Wall Street Journal*, because homes on the coast there are already beginning to slip into rising seas. The Government Accountability Office recently reported that 180 Alaskan coastal villages are threatened because of melting sea ice and permafrost. Moving just one of them, Shishmaref, with 600 residents, would cost taxpayers $180 million.

Detroit's Big Three automakers have also tacitly accepted global warming as a political reality, agreeing in April to a 6 percent reduction in greenhouse-gas emissions from new vehicles sold in Canada by 2010. (They continue, however, to fight a California law requiring a 30 percent reduction in 10 years.)

Despite criticisms that the Kyoto Protocol limitations are too expensive, too difficult, or too heavily targeted against developed nations, one American company has gone well beyond Kyoto, apparently without giving up its competitive edge. By tinkering with manufacturing processes, DuPont says it has already cut its greenhouse-gas emissions by 72 percent from 1990 levels, despite a 33 percent increase in production. It has also reduced total energy use by 7 percent from 1990 levels, saving $2 billion.

Saying that DuPont can do it, on the other hand, doesn't necessarily make it any easier for the rest of us. Calculating greenhouse-gas emissions turns out to be dismayingly complex, and figuring out how to reduce

or mitigate these emissions is even more difficult.

The first time I bothered to consider my own family's contribution to global warming was late one night last winter, when my teenage son had taken the car on a long and unnecessary errand. As I sat up waiting for him, I scribbled the mileage and the up-front costs of his journey on the back of an envelope. Then, because the idea of wasting money wasn't going to get his attention, I started to work out the greenhouse-gas emissions. I fussed over the calculations for a while, then I threw the envelope in the trash and went to bed, partly because I knew my son would just say I was being a jerk but mostly because the numbers were too large to believe.

Experts on greenhouse-gas emissions tell me that every time my car burns a gallon of gasoline, I am putting more than 25 pounds of carbon dioxide into the atmosphere as well as a smaller amount of methane, nitrous oxide, and various other toxic gases. It is easy to stumble over this fact. A single gallon of gasoline weighs only about 6 pounds. Otherwise, I couldn't carry a gas can down the highway to refill my tank. Moreover, when I put that gallon of gas in the engine, it *burns*, all too quickly. So by what dark magic could there be 25 pounds of junk released in the process?

Look at it another way: A 747 passenger jet traveling from New York to London emits about 880,000 pounds of carbon dioxide. But that is more than the plane's maximum takeoff weight. The fuel on board weighs only about 300,000 pounds.

So I did some more calculations the next day (when my son was lying low with a $113 speeding ticket): Gasoline and jet fuel (kerosene) are about 90 percent carbon. Combustion causes almost every atom of carbon in the fuel to combine with two atoms of oxygen, producing carbon dioxide. Despite our tendency to think of it as weightless, oxygen is in fact 1.33 times heavier than carbon. So the original 6 pounds of carbon combine with 15 or 16 pounds of oxygen, minus some soot, water, and other by-products, and, bingo, by driving 21 miles down the road, my car has just disturbed the balance of the planet's carbon cycle by producing 19 pounds of CO_2. Emissions released in manufacturing and transporting the gas to market add another 6 pounds to the total, meaning that effectively my car has launched 25 pounds of CO_2 into the atmosphere, where scientists say it will linger for hundreds or even thousands of years, helping to trap solar heat and turn the atmosphere into a greenhouse.

IF THE MATHEMATICS OF THE POLLUTION PRODUCED by burning a gallon of fossil fuel seems daunting, it's even worse to look the other way: what went into making that gallon. A few years ago an ecologist named Jeff Dukes was traveling in a Chevy Suburban loaded with equipment to a research site in southern Utah. Dukes, now at the University of Massachusetts at Boston, started to think about the fossil fuel that was moving him down the road.

After several months of research, he computed that a single gallon of gasoline requires about 196,000 pounds of primeval plant and animal matter, buried and compressed over millions of years. This is equivalent to the total production over a year's time from "40 acres' worth of wheat—stalks, roots, and all." If you are inclined to pursue this kind of masochistic math, it means that filling up the 32-gallon tank of Dukes's Chevy Suburban is like taking all the energy produced by plants over the course of a year on 1,280 acres of land. The numbers suggest that this just might not be sustainable over the long haul.

A crucial distinction in the global-warming balance sheet—and another stumbling block for beginners starting to count carbons—is that researchers treat fuel from current plant growth as causing zero net greenhouse-gas emissions. Yet burning wood pellets or corn-based ethanol certainly releases carbon dioxide, and in some cases more than fossil fuels. For instance, cooking your burgers over charcoal briquettes made from wood produces 11 pounds of carbon dioxide an hour, versus 5.6 pounds from propane gas. But the thinking is that the carbon dioxide emitted by renewable sources will eventually get reabsorbed through photosynthesis, as trees, corn, and other biofuel sources grow back.

The problem arises when you alter this "natural" balance by pulling fossil fuels from underground, with no means of reabsorbing the carbon. Dukes found that in a single year, 1997, the human population burned the equivalent of more than 400 times the total plant matter grown that year throughout the world, including oceanic plankton. The implication is that doing this year after year will eventually overwhelm the system.

In 2005 the concentration of carbon dioxide in the atmosphere, 380 parts per million, is a third higher than in preindustrial times. Optimistic estimates are that it will merely double over the rest of the century. But our rapidly increasing consumption of fossil fuels suggests that an optimistic scenario is unwarranted. The United States now adds 21 percent more carbon dioxide to the atmosphere annually than in 1990, almost all of it from fossil fuels. Greenhouse-gas emissions from China have increased by 50 percent in that period and will double within 20 years.

The good news is that roughly 33 percent of the American production of all greenhouse gases, or the equivalent of 17,422 pounds of CO_2 per person, comes from sources under our direct control—our cars and houses. And partly because we are so profligate, cutting that number by half may not entail much pain or inconvenience.

For instance, generating a kilowatt-hour of electricity in the United States (about what an iron uses in an hour) produces 1.64 pounds of carbon dioxide. So the typical household uses enough electricity to add more than 2,000 pounds a month of CO_2 to the atmosphere. Where I live,

SUPERSIZE AMERICA

Since 1980 residential housing nationwide has increased by 78.6 billion square feet, or 2,820 square miles, an area almost three times the size of Rhode Island.

it took about two minutes on a computer to fix this. I simply switched, via my local utility, to a supplier that gets its electricity from windmills, small hydroelectric plants, and methane from landfills. This instantly removed more than 18,000 pounds of annual pollution from the dark side of my family's ledger.

This seems too easy, of course. "Nobody can assure you that the electrons coming into your house are going to be green or any other color," a utility executive told me. Whether the electrons come from a coal-fired plant in a neighboring state or the nuclear power plant down the road, they all mix together in the grid. So switching is in a sense just moral bookkeeping. I pay $6 or $7 extra a month for the warm feeling that I am doing the right thing. But nothing much changes. Moreover, if everybody started acting as if global warming mattered, there wouldn't be nearly enough green electricity to go around. In my area, low- or nonemitting sources generate just 4.5 percent of the total supply.

What I accomplish by contracting for electricity from renewable energy sources is to create a market so that someone somewhere on the grid can produce more of the stuff, displacing electricity from dirtier sources. This is no small thing, another utility executive suggests: "A ton of carbon dioxide reduced someplace in the world is a ton of carbon dioxide that's not in the atmosphere."

UNFORTUNATELY, SWITCHING TO RENEWABLES ISN'T ENOUGH. Solar and wind power require acreage, they cost more per kilowatt-hour, and they are unlikely to make much of a dent in conventional energy sources anytime soon. Getting energy directly from this year's plant crop, in the form of biofuels, is cleaner and more efficient than getting it from coal or oil, but Dukes found that if we tried to supply current worldwide energy demand entirely from biofuels, it would consume at least 22 percent of the production of all land-based plants annually. The lack of good alternatives has caused some people to make global warming an argument for increasing our reliance on nuclear power. But I already live within 10 miles of two nuclear power sites that are likely to remain radioactive for thousands of years. The implication, at least for me, is that we need to consume less energy.

Like a lot of American homes, my house is a little too big and too well equipped with light fixtures, appliances, computers, cars, and yard machinery. I could ask my family to give up certain things in the spirit of righteous suffering, but they would ignore me. So my approach is to address global warming in ways that make our lives more comfortable, not less.

For instance, my daughter's bedroom is at the end of the run for heating and air-conditioning and never gets completely comfortable. A contractor could fix that using sealants to block leaks in the ductwork. The technology can reduce heating expenses by 10 to 20 percent, with a commensurate drop in greenhouse-gas emissions, according to a spokesman for Carrier, which makes furnaces and air conditioners. But what people really notice, the spokesman says, "is that they can actually cool their upstairs bedroom in summer."

Other emissions-cutting moves also qualify as improvements, not hardships. Replacing some of the lawn with ground cover would mean spending less weekend time behind a power mower, which produces more carbon dioxide, not to mention noise, per mile than any automobile. In the office, a liquid crystal display flat-screen computer monitor uses 50 to 70 percent less energy than the clunky cathode-ray tube on my desk. Because I work on my computer more than 12 hours a day, switching would eliminate 135 pounds of carbon dioxide emissions a year. Installing a dozen compact fluorescent lightbulbs around the house would eliminate 550 pounds of carbon dioxide emissions a year, and the lower electric bills would pay back their cost in just three months.

The peculiar psychology of the payback period often determines what changes we are willing to make, with four years or less the magic number. For instance, I balk at installing solar power because it would cost about $20,000, even with state subsidies, and the payback would take about 17 years. Other ways of cutting energy use—for instance, adding insulation—are more cost-effective. But focusing too much on short-term payback may be misguided. The recent doubling in the price of oil suggests that energy may cost far more than we assume at the time of a purchase. Looking for a quick payback also ignores consequences that last for centuries.

"We apply this cost-effectiveness criterion to energy efficiency, but why only to this decision?" asks Danny Parker, a researcher at the Florida Solar Energy Center. "What's the cost-effectiveness of really fine kitchen cabinets? What's the cost-effectiveness of a Mercedes? It's just not discussed." He suggests that if you look at global warming from a cost-effectiveness perspective, you might decide that the Earth is not worth saving.

With some purchases, the Internet now makes hidden costs dismayingly clear. Say you were thinking about buying an SUV like the Ford Excursion. Driving it 15,000 miles a year, you'd be producing 25,350 pounds of carbon dioxide annually. Add in methane and other by-products from burning fossil fuels and you end up with 38,000 pounds of greenhouse gas, according to www.greenercars.com, a Web site that compares different car models. This is equivalent to lofting the vehicle's own weight into the atmosphere once every 10 weeks. After a year, your SUV would be trailing the equivalent of five SUVs in its wake, like Jacob Marley's chains. Multiply that by the 20 million SUVs on the road and you start to see Alaskan villages subsiding under the Arctic seas.

Of course, it's too easy (but nonetheless fair) to pick on SUVs. I drive a Volvo V70 Cross Country station wagon, a favorite of exurban environmentalists. My car

BURN, GAS, BURN

ANNUAL MILES DRIVEN PER FAMILY
11,739 in 1983
21,187 in 2001

TOTAL TRIPS
1,486 in 1983
2,171 in 2001

AVERAGE TRIP DISTANCE
7.90 miles in 1983
9.87 miles in 2001

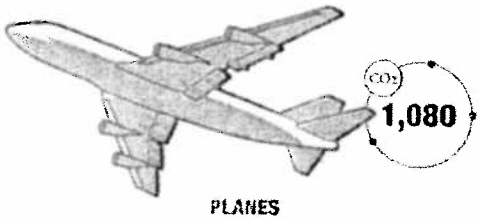
AVERAGE TRIP TO WORK
8.55 miles in 1983
12.08 miles in 2001

AVERAGE SHOPPING TRIP
5.28 miles in 1983
6.74 miles in 2001

Source: 2001 National Household Travel Survey, Oak Ridge National Laboratory.

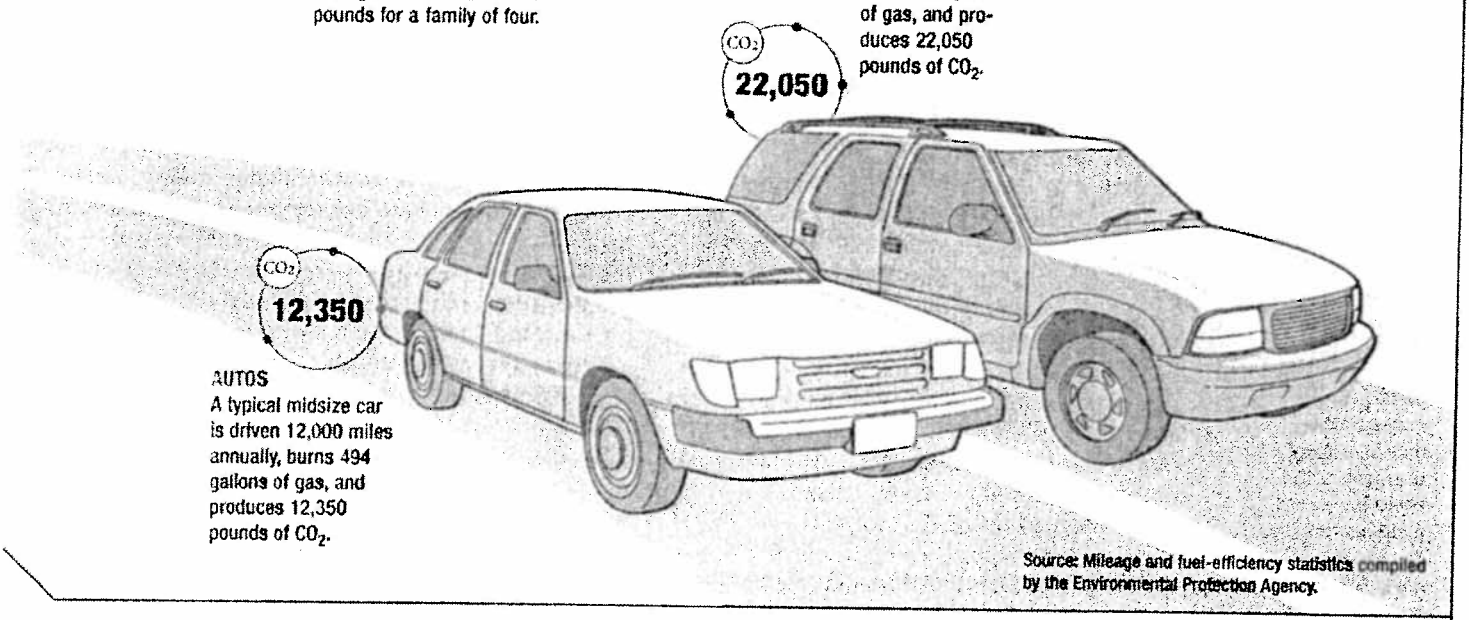
HIGHWAYS OF HEAT

Our means of transportation is so costly that even small increases in efficiency could eliminate millions of tons of CO_2.



PLANES
Domestic flights average 877 miles and produce 270 pounds of CO_2 per passenger, or 1,080 pounds for a family of four.

TRUCKS
A new SUV is typically driven 15,000 miles the first year, burns 882 gallons of gas, and produces 22,050 pounds of CO_2.



AUTOS
A typical midsize car is driven 12,000 miles annually, burns 494 gallons of gas, and produces 12,350 pounds of CO_2.

Source: Mileage and fuel-efficiency statistics compiled by the Environmental Protection Agency.

annually produces 26,000 pounds of greenhouse-gas emissions—more than two killer whales' worth of pollution. If I switched to a lightweight SUV like the Ford Escape hybrid, I could cut my greenhouse-gas emissions to 18,000 pounds. But with a lighter hybrid, like a Toyota Prius sedan, I could get down to 10,000 pounds.

But the truth is that a lot of American families, mine among them, can't afford to replace their cars right now. "That's OK," says Jim Kliesch of the American Council for an Energy-Efficient Economy, the nonprofit behind www.greenercars.com. The idea is simply to get people thinking about environmental consequences next time they buy a car. Even stepping up from the Volvo V70 to a car that gets an extra two miles a gallon avoids about a ton of greenhouse-gas emissions annually. By neglecting to think about such things, Kliesch says, we get locked into purchases we could regret for years, or generations, to come.

FOR A LOT OF PEOPLE AND ORGANIZATIONS FEELing stuck on the wrong side of the global-warming balance sheet, one solution is to offset the emissions they cannot eliminate. In essence, they pay somebody else not to pollute, or they pay for activities like planting trees that are assumed to remove carbon dioxide from the atmosphere. As a practical alternative for individual consumers, the retail market in emissions offsets is promising—but not yet ready for prime time.

Most trading in carbon dioxide offsets now occurs only on a large scale. It works like this: One company installs new equipment to cut its emissions by 5,000 tons. Then it sells the right to emit 5,000 tons to a buyer for whom new equipment would be too costly. To avoid simply swapping pollution from one place to another, these so-called cap-and-trade systems usually involve a gradual, government-ordered reduction in overall emissions. As the cheaper reductions get put into place, participants move on to the more difficult reductions, and the trades become steadily more pricey. Selling emissions rights helps defray the cost of making reductions.

To some people, reforestation projects, like the ones the Rolling Stones arranged, seem like the most appealing way to offset emissions. In one case, a power company paid $13.7 million to reforest 100,000 acres of U.S. Fish and Wildlife Service land in Mississippi in the expectation that every acre of trees would absorb enough carbon dioxide to offset 150 tons of greenhouse-gas emissions over the life span of the trees. But critics say such these schemes are much less effective than advertised.

"Basically, they're selling a warm, fuzzy feeling," says

GREEN

- Honda Insight
- Toyota Prius
- Honda Civic Hybrid
- VW Jetta Diesel
- Honda Civic
- Toyota Echo
- Toyota Scion XA

MEAN

- Ford Excursion
- Hummer H2
- GMC Yukon XL K2500
- Chevrolet Suburban K2500
- Land Rover Range Rover

Dennis King, a University of Maryland researcher and the author of an EPA-funded study of carbon sequestration. Young trees don't actually start to sequester significant amounts of carbon dioxide for 20 years, he says, and it takes a tree 100 years to remove a measly 3,000 pounds of carbon dioxide from the atmosphere—assuming the tree survives drought, fire, flood, disease, and other afflictions. But, King says, the buyer "gets to dump a ton of carbon into the atmosphere with 100 percent certainty" today. Moreover, most of the carbon that gets sequestered in these forestry projects will eventually be released again when the trees die and decompose—or get harvested. "The numbers don't look good when you work them out," King says.

The danger of such projects is that they risk discrediting the market in greenhouse-gas emissions just as it is starting to get off the ground. One Swiss multinational, the Holcim Group, recently pulled out of a mitigation scheme, with an executive predicting that loose accounting standards will produce "other Enrons" among the companies developing such projects and "other Arthur Andersens" among the auditors.

A FOOL'S FORMULA

Carbon dioxide makes up more than 80 percent of greenhouse gases that cause global warming. The rest is composed of methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride released by burning fossil fuels.

Proponents of offsets are acutely aware of the need to protect the credibility of their burgeoning market. The Chicago Climate Exchange, the leading marketplace, started trading carbon dioxide emissions in 2003, with members like IBM and International Paper committing themselves to a voluntary schedule of reductions. Exchange chairman Richard Sandor says it uses the National Association of Securities Dealers to audit its transactions. A company that fails to deliver on emissions-reduction claims, he says, can expect to be treated the same as a company that overstates its earnings. This is a polite way of saying that CEOs could end up in court and their company stock in the doghouse.

But determining what is a legitimate way to reduce greenhouse-gas emissions—and how to account for it—is going to be a long, messy process. Moreover, the scale of the problem is unlike anything previously attempted. For instance, Statoil, the Norwegian energy company, has engineered a drilling platform in the North Sea to pump a million tons of carbon dioxide back underground every year. Construction alone cost $100 million. Geologists believe that it is a permanent way to keep carbon dioxide out of the atmosphere.

The problem, says climate scientist Ken Caldeira of Lawrence Livermore National Laboratory, is that even assuming a modest attack on global warming, "we would need to build one of these a day for the next 50 years to maybe get halfway there."

SO WHERE DOES THIS LEAVE MY FAMILY AND YOURS as we roll down the highway trailing our vast burden of greenhouse-gas emissions? Individuals can also buy offsets to compensate for the things we haven't yet figured out how to reduce. But how many? A shortcut is to take the share of greenhouse-gas emissions under the average American's individual control—call it 10 tons, for simplicity—and multiply that by the number of people in the household. For my family of five, I would need 50 tons of offsets a year.

You can get your offsets wholesale at about $1.30 a ton. An individual can register with the Chicago Climate Exchange as an exchange participant for a onetime fee of $250, then contact a broker to place an order. The typical minimum order is 2,500 tons. But Amerex, a Houston brokerage, says it will take smaller orders, with a base commission of $150. The hitch for me is that trades on the Chicago Climate Exchange are anonymous, and buyers do not know what kind of offset projects they have purchased until after a transaction is complete. So you can get stuck with offsets involving reforestation projects.

The gold standard in offsets are the ones that pay other people to use less fossil fuels—the only way to get at the root of the global-warming problem. Several services come close to fitting the bill. The Better World Club, an environmentally oriented alternative to AAA, sells offsets to help people "travel guilt free." But it has donated money for only one project so far, a $13,000 replacement of inefficient oil-burning furnaces in public schools in Portland, Oregon. TerraPass, a start-up by students at the University of Pennsylvania's Wharton School, offsets emissions by investing in wind power and reduction of methane emissions in agriculture. But it's also small.

I ended up at the Solar Electric Light Fund, a nonprofit that installs hundreds of solar photovoltaic systems a year in developing countries. According to www.self.org, a $100 donation prevents 10 tons of greenhouse-gas emissions from kerosene lanterns and diesel generators in places like Bhutan and Tanzania—and it's tax deductible.

I went to bed thinking that, for $500, I had at last made my household carbon neutral. But in the middle of the night I woke up from a dream in which Inuits balanced on a vast mathematical and moral equation made of ice, which was rapidly melting. I lay there in the dark, listening to the sound of warm air rushing through the heating ducts. ☒

DISCOVER MORE (also see Resources, page 85)

TerraPass personal carbon trading service: www.terrapass.com.

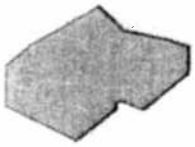
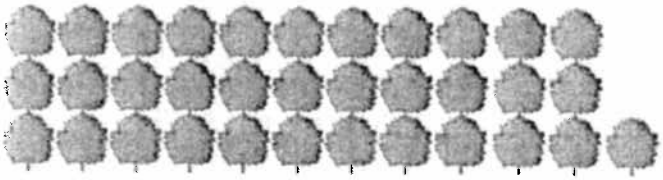
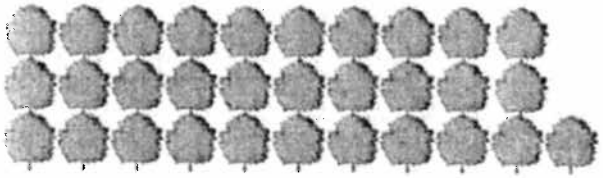
Chicago Climate Exchange voluntary program for carbon-credit trading: www.chicagoclimatex.com.

The Better World Club, an environmentally friendly auto association: www.betterworldclub.com.

The Solar Electric Light Fund for third-world villages: www.self.org.

JUST PLANT A FEW TREES, RIGHT?

Trees draw carbon dioxide out of the atmosphere through photosynthesis, so one potential way to offset some greenhouse-gas emissions is to plant more forests. But most trees don't sequester significant amounts of carbon during the first few years after planting. Moreover, when trees succumb to forest fires or begin to decay, they release carbon back into the atmosphere. An acre of fast-growing softwood trees, such as pines, can take in as much as 5 tons of carbon dioxide a year as they enter their peak years of growth at around age 15. Hardwood trees grow more slowly but tend to keep their carbon locked away longer. An acre of walnut trees, for example, can take in as much as 2.2 tons of carbon dioxide a year as the trees enter their peak years of growth at around age 25. The graphic below gives a rough indication of how many walnut trees would have to be planted—and allowed to mature for at least 25 years—to offset the carbon emissions of a typical family of four and the nation at large from just one year.

A YEAR OF ENERGY		TREES TO OFFSET
 SINGLE-FAMILY HOUSE creates 28,350 pounds of CO_2	=	 34 WALNUT TREES
 TWO FAMILY VEHICLES creates 26,500 pounds of CO_2	=	 31 WALNUT TREES
 ALL U.S. RESIDENTIAL ENERGY creates 1,350,300,000 tons of CO_2	=	 11 MILLION ACRES OF WALNUT TREES
 ALL U.S. TRANSPORTATION (cars, trucks, planes, and trains) creates 2,063,850,000 tons of CO_2	=	 16 MILLION ACRES OF WALNUT TREES
 ALL U.S. FOSSIL-FUEL USE creates 6,372,900,000 tons of CO_2	=	 50 MILLION ACRES OF WALNUT TREES