

In August of 2003, a heat wave enveloped Europe, killing some 35,000 people—more deaths than any single nation suffered in the Invasion of Normandy. With temperatures hovering over 100 degrees for several weeks, it was probably that continent's hottest summer in 500 years — and just one deadly example of how Earth is steadily, and dangerously, warming.

In fact, the planet's hottest 12 years on record—since reliable measurements began in 1861—have occurred over the past 17 years, according to a 2007 report by the Intergovernmental Panel on Climate Change. But that's just the start. Scientists predict that Earth's average temperature could increase up to 11.5°F by 2100—a rate more than 10 times greater than the warming witnessed in the 20th century, and possibly unprecedented in the past 10,000 years. Even conservative estimates predict the globe will heat by 2°F over the next century, possibly triggering a spiral of natural disasters far surpassing Hurricane Katrina or this summer's wildfires in the western United States.

Who's to blame? Mostly us, it appears, and our galloping consumption of fossil fuels. But, more important, people are now asking: Is there a fix? The following pages examine the issue and reveal answers that our great-grandchildren will likely debate as the climate continues to transfigure their world.

THE PLANET IS ON

THE EVIDENCE IS IN ON GLOBAL WARMING AND, MORE THAN EVER, THE PLANET'S FUTURE IS IN OUR HANDS. SO WHAT CAN NEW YORK, NYU—AND YOU—DO...BEFORE IT'S TOO LATE?



38 FACTS AND FORECASTS

The proof at hand and predictions for the future



40 REPRESSED REALITY

Knowing what we know, why aren't we doing more?



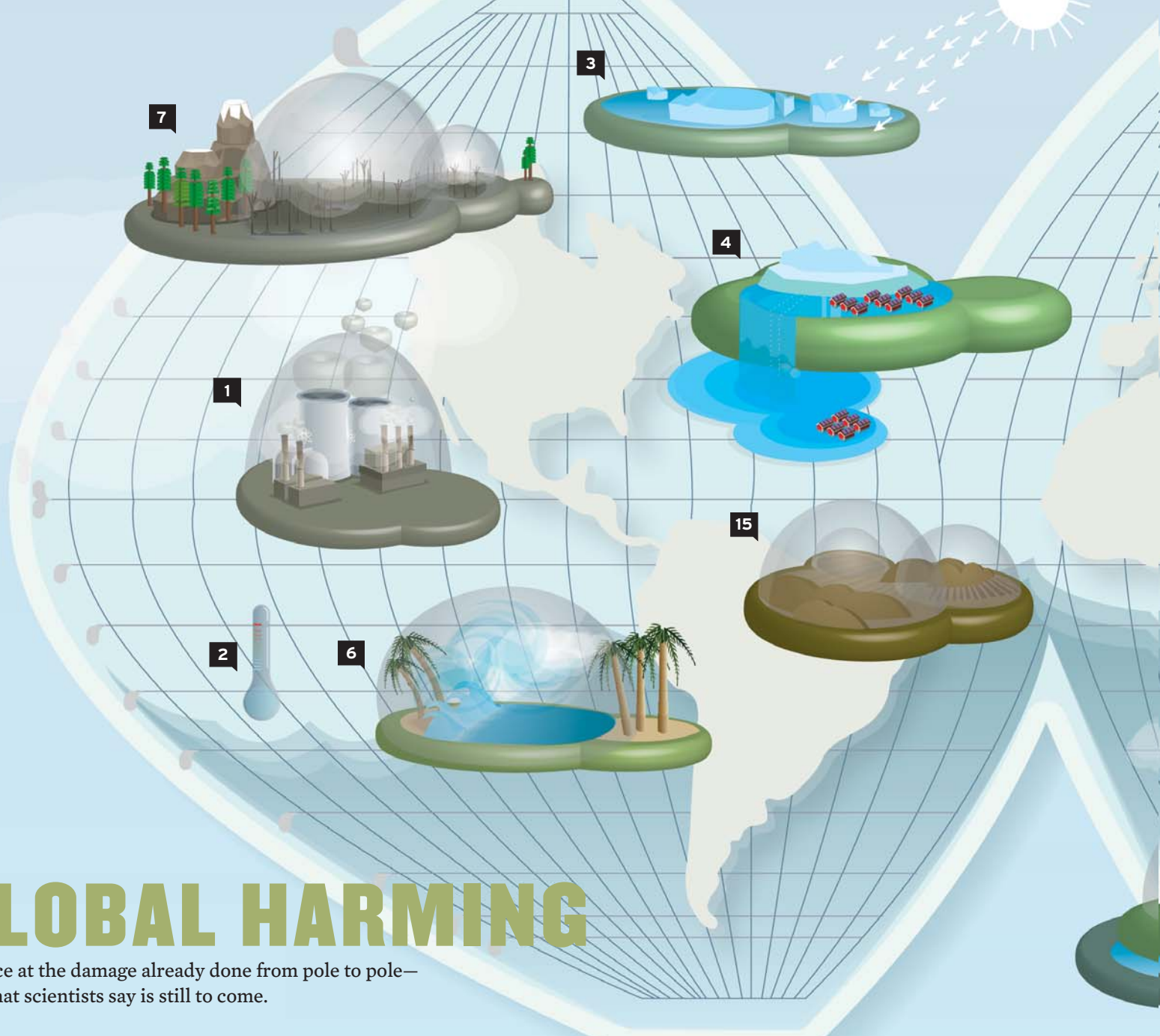
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Conservation tips within reach of almost all budgets



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New York City and NYU bid to make themselves sustainable urban centers



GLOBAL HARMING

A glance at the damage already done from pole to pole—and what scientists say is still to come.

FACTS

1 POISON IN THE AIR

Greenhouse gases—caused by burning fossil fuels such as oil, coal, and gas—can stay in the atmosphere for centuries, trapping heat from the Earth's surface and warming the planet. Greenhouse gas emissions jumped 70 percent between 1970 and 2004. Ice cores suggest that the current atmospheric concentration of carbon dioxide—the greenhouse gas most produced by humans—far exceeds the natural range of the past 650,000 years.

2 WARM WATER

Oceans have absorbed 80 percent of the heat we've added to the climate, increasing average water temperatures even at depths of almost 10,000 feet.

3 ON THIN ICE

The Arctic warmed twice as fast as the rest of the planet over the past 100 years. Its cap of sea ice has shrunk by an average of 8.4 percent each decade since the 1970s, and this year reached a record low. The less Arctic ice there is to reflect sunlight, the more heat the sea absorbs.

4 RISING TIDE

For the past two millennia, the sea level has risen between 0.1 and 0.2 millimeters per year. Rates have averaged 10 times that in the past century, and 30 times that since 1993.

5 OH-NO-ZONE

First observed in the early 1980s, the hole in the Antarctic ozone—the stratospheric gas that protects Earth from ultraviolet light—now grows to an area larger than Antarctica most years. At the South Pole itself, ozone depletion reached 99 percent in early October 2006.

6 PERFECT STORMS

Tropical sea surface temperatures during the hurricane season have increased 1°F since 1970, possibly boosting the intensity of North Atlantic storms. The number of category four and five hurricanes—registering winds of more than 131 mph—has nearly doubled worldwide since then.

7 ACRES ABLAZE

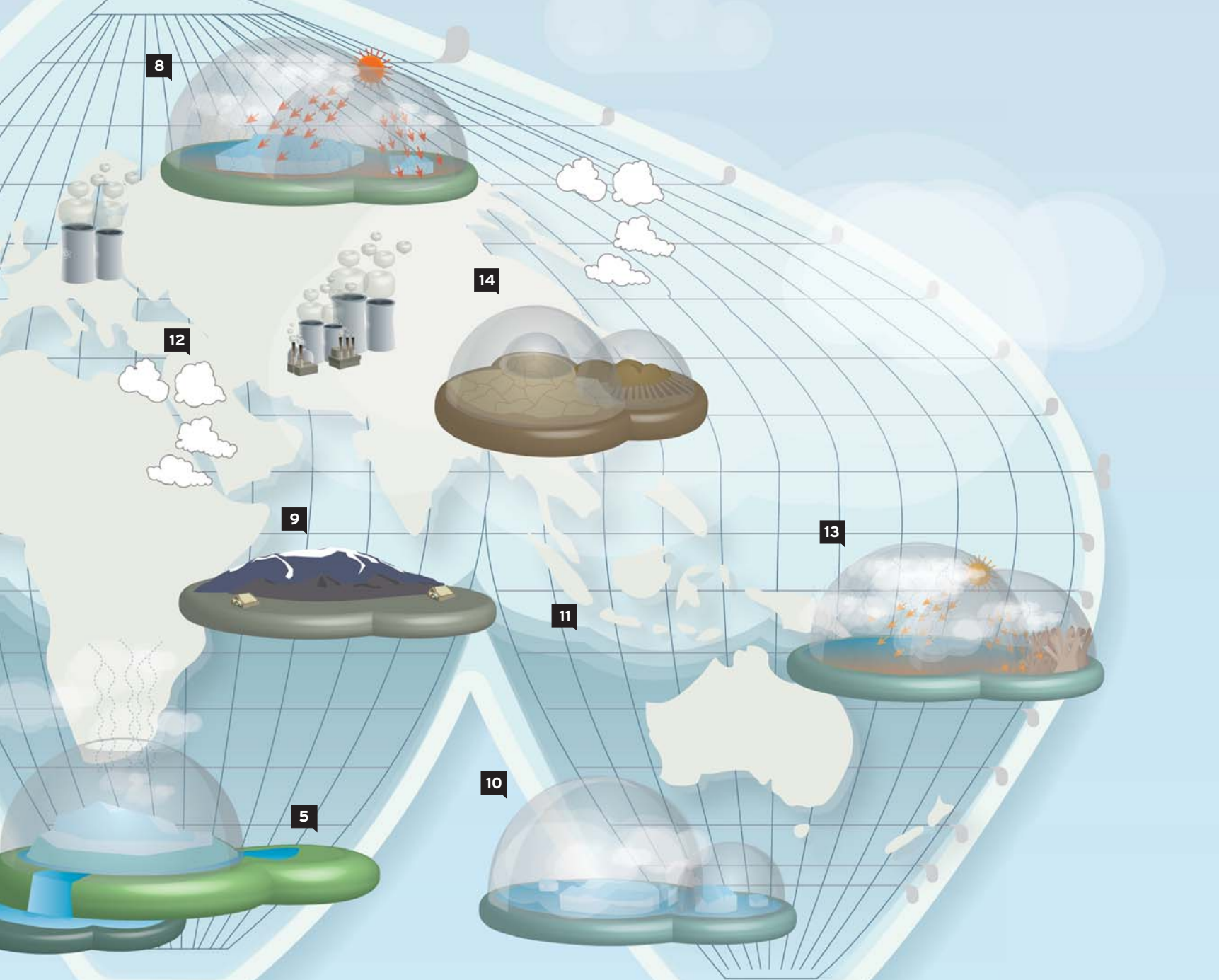
Significant drought affected 52 percent of the United States in 2006 and contributed to a record wildfire season in which almost 10 million acres burned.

8 NOT SO PERMANENT

The top layer of permafrost has increased in temperature by 5.4°F since the 1980s, causing some to thaw for the first time in more than 125,000 years. As it melts, permafrost releases concentrated volumes of the greenhouse gas methane.

9 GOODBYE, GLACIERS

The 11,000-year-old ice caps of Mount Kilimanjaro in Tanzania have melted by about 82 percent over the past century—and could be gone altogether by 2020.



10 SHRINKING ANTARCTICA

In the space of 35 days in 2002, about 1,255 square miles of Antarctica's Larsen B ice shelf disintegrated into the ocean. Until this event, scientists estimate the sheet measured more than 700 feet in thickness and had likely existed for 12,000 years. It is now 40 percent of its previous size.

FORECASTS

11 SUBMERGED

If current warming trends continue, sea levels could rise as much as 3.5 inches by 2100. However, the real danger is if Greenland's ice sheet begins to rapidly melt. Even if only part of it slides into the Atlantic, this would cause flooding along the Gulf Coast and the eastern seaboard from Boston to Miami, while places such as Bangladesh would become uninhabitable. If the ice sheet melts completely, as some scien-

tists predict, it could raise sea levels

by 23 feet, submerging much of Florida and threatening London and Los Angeles.

12 CARBON OVERLOAD

Experts predict global emissions of carbon dioxide will jump an additional 75 percent by 2030.

13 LOSS OF LIFE

By 2050, more than a million species of plants and animals may be on the road to extinction as a result of global warming. Nearly 30

U.S. states could lose their official state trees or flowers, and seven may lose their state birds, as changing climates make those locations less habitable.

If summer ocean temperatures increase by just 1.8°F, the world's coral reefs—considered the “rain forests of the ocean” for their rich, delicate ecosystem—could cause them to die en masse. During one of the warmest periods on record in the late 1990s, about 16 percent of reefs worldwide were severely damaged.

14 UNQUENCHABLE THIRST

By 2050, nearly one-sixth

of the world's population—including some in the western United States—will face water shortages as they receive 10 to 30 percent less snowpack runoff than today.

15 AGRICULTURE

More frequent floods and droughts will decrease crop production, especially in low-altitude, subsistence regions. While the number of people worldwide facing food shortages is expected to fall by 2085—from 521 to 300 million—global warming will offset the decline, pushing the total back up by 69 to 91 million.

THE DENIAL JUSTIFICATION

WHY WE PUT THE ENVIRONMENTAL TIME BOMB ON THE BACK BURNER

by Sharon Tregaskis

with Jason Hollander / GAL '07 / and Nicole Pezold / GSAS '04

IMAGINE A MAMMOTH METEOR blazing toward Earth. When it will arrive and whether it will hit directly is debatable, but scientists are unanimous on one thing—it's coming. And they're trying desperately to motivate everyone to take action before it's too late.

While this scenario is science fiction, a similar danger—just as daunting and apocalyptic—is on the horizon. Researchers now almost universally believe that catastrophic climate change, caused primarily by carbon dioxide emissions, is more a matter of “when,” rather than “if.” NASA climate scientist James Hansen predicts that we have perhaps a decade to halt our runaway greenhouse gases, otherwise we will guarantee for our children a fundamentally different planet—one where sea ice no longer blankets the Arctic, where storms relentlessly buffet coastal communities, and conflicts over scarce fresh water and shifting climactic zones rock international relations. And yet global carbon emissions are rising at unprecedented rates, and Americans are expected to produce ever-greater volumes of carbon dioxide in coming years.

Our inaction, in part, boils down to how we think. As with the meteor hurtling in our direction from millions of miles away, the science for measuring climate change and its future

effects is complicated, and so far most evidence comes from distant, barely habited places. We, and our leaders, are easily distracted by closer issues—war, terrorism, disease, race relations, economic distress. “People get motivated with near-term dangers, but this is different,” says Tyler Volk (GSAS '82, '84), a biologist and core faculty member in NYU's new environmental studies program. “It's not like the Hudson River is suddenly full of mercury and everyone is threatened.”

As individuals, we may not deny the mounting evidence of global climate change, but we do harbor an inherent desire to keep our minds on other things. In his 1974 Pulitzer prize-winning book *The Denial of Death*, social scientist Ernest Becker argued that “the essence of normality is the refusal of reality,” echoing Freud who believed repression to be our natural self-protection. In order to tolerate all sorts of inequities, we will often support or rationalize the status quo even when it contradicts our own self-interest, says

NYU social psychologist John Jost, who calls this phenomenon “system justification theory.”

Last spring, Jost collaborated with graduate student Irina Feygina (GSAS '10) and Mount Sinai Hospital psychologist Rachel Goldsmith to investigate how system justification theory interacts with environmental attitudes. Among their findings: Most people who believe that society is generally fair are also skeptical about the forecasted climate crisis. “There are psychological obstacles to creating real, lasting change,” Jost says, “in addition to all of the scientific, technical, economic, and political obstacles.” Because of this, he notes, denial is far easier and more convenient than supporting a carbon tax, paying more for high-efficiency technology, or giving up cheap goods shipped through elaborate, fuel-guzzling supply chains.

Even so, denial is getting harder, as scientists gain an increasingly nuanced understanding of the mechanics—and the consequences—of climate change. In February, the UN's Intergovernmental Panel on Climate Change issued its most strongly worded report yet on the extent to which humans have already altered the climate and how this will change



our future. “There's no question sea levels will rise,” says David Holland, a mathematician and director of the Center for Atmosphere Ocean Science in the Courant Institute of Mathematical Sciences. “What's not clear is how long it will take.” Holland has dedicated his career to understanding the implications of changing weather patterns, traveling to Greenland to study the deterioration of ice



“THERE ARE PSYCHOLOGICAL OBSTACLES TO CREATING REAL, LASTING CHANGE,” SAYS PROFESSOR JOHN JOST, “IN ADDITION TO ALL THE SCIENTIFIC, TECHNICAL, ECONOMIC, AND POLITICAL OBSTACLES.”

mate change will affect the average sports fan.

This public conversation is slowly trickling up to policy makers. In April, a cadre of retired U.S. generals and admirals offered the chilling statement that climate change was “a threat multiplier” for global security and the fight against terrorism, as it will further destabilize desperate regions in the Middle East, Africa, and Asia. Even George W. Bush, who rejected the Kyoto climate accord in 2001, for the first time acknowledged global climate change in last winter’s State of the Union address. “The problem is, among other things, ideological,” Jost says, “and it needs to be addressed at that level, as well as at other, more technological levels.”

Within the United States, a schism has grown between communities that favor ambitious carbon reduction strategies and those in which change seems remote. More than 400 cities and several states, including New York, California, and Massachusetts, have decided that they can’t wait for the federal government to craft effective policies, and have themselves initiated efforts to reduce greenhouse gas emissions and hold the Environmental Protection Agency to more vigorous

enforcement. (See “The Green Apple,” page 44.)

But without federal support, it’s an uphill battle, says Richard B. Stewart, director of NYU’s Center on Environmental & Land Use Law. “[Current U.S. law] is totally inadequate,” says the professor, who from 1989–91 headed the *Exxon Valdez* oil spill prosecution as assistant attorney general in charge of the Environment and Natural Resources Division of the U.S. Department of Justice. “There are no statutes that specifically address the causes or consequences of climate change.”

Statutes may not exist yet, but the momentum seems to be growing, says philosopher and director of environmental studies Dale Jamieson, who sees a parallel between the climate campaign and the Civil Rights Movement or widespread efforts to enact smoking bans, where over time, a moral and personal imperative emerged. “There’s no way of addressing this unless people come to see it as an ethical issue that changes what they see as right and wrong, how they live, and what kind of world they’re going to leave to their children,” says Jamieson, adding, “The question [remains] whether we’re going to act, and whether it will be meaningful.”

sheets, and is especially concerned with the vulnerable coastlines on every continent that will eventually be submerged. “We’re going to have to move cities,” he says. “If it’s going to flood in 1,000 years, we can take a breather. If it’s within 100 years, that’s a problem.”

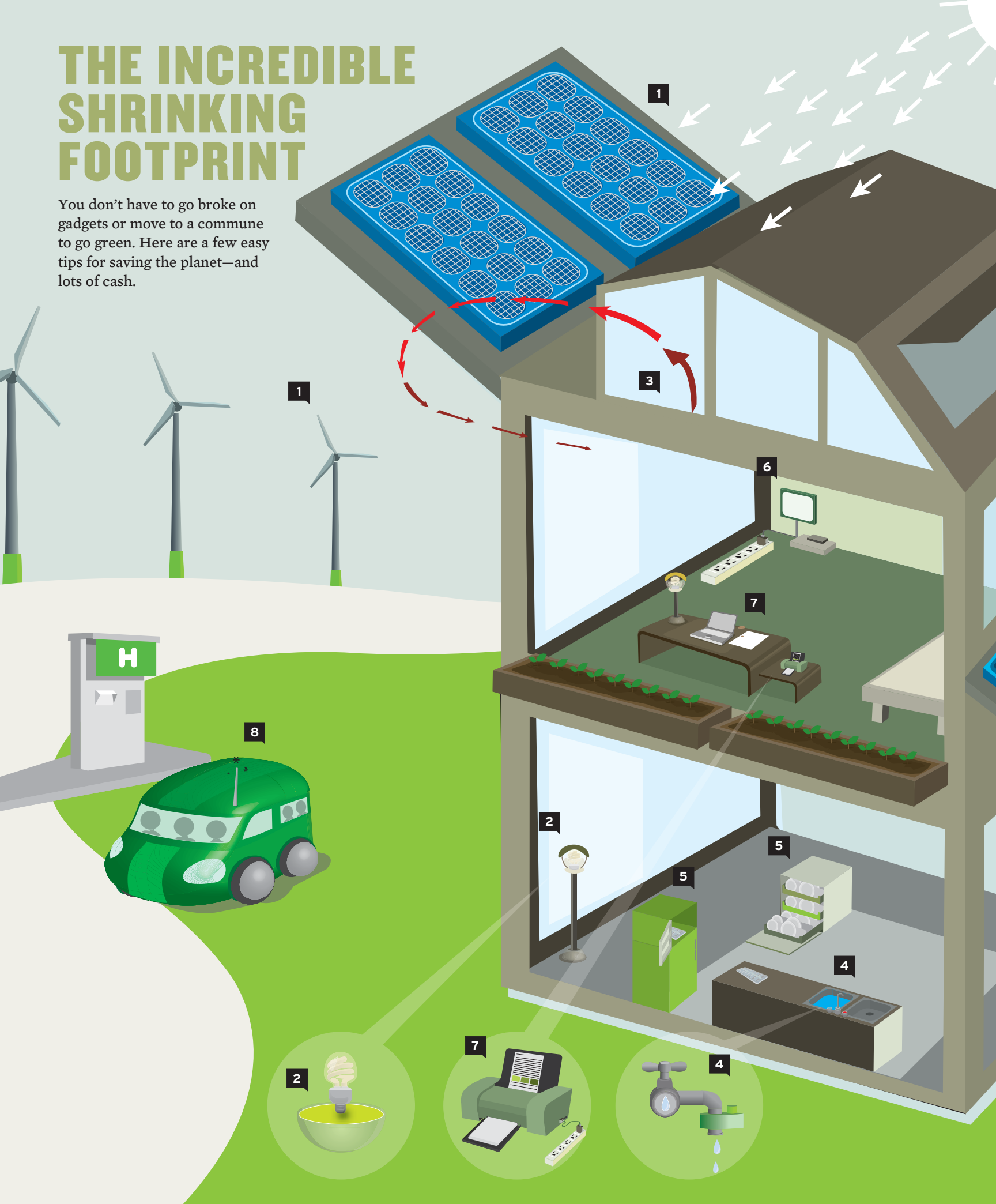
As scientists like Holland puncture many of our excuses for doing nothing, the status quo itself is shifting. More than

ever, information on the science—and prospective horrors—abounds. Pop culture has gone green, from Al Gore’s Oscar-winning 2006 documentary *An Inconvenient Truth* to the Weather Channel’s regular program *Forecast Earth*. Every major magazine—*Time*, *Vanity Fair*, *Rolling Stone* to name a few—has produced a “green” issue, and even *Sports Illustrated* reported on how cli-

ILLUSTRATION BY DAN PAGE

THE INCREDIBLE SHRINKING FOOTPRINT

You don't have to go broke on gadgets or move to a commune to go green. Here are a few easy tips for saving the planet—and lots of cash.





HOME

1 You may not be ready to invest in home solar panels, but switching to green power now adds less to your monthly bill than the cost of one Starbucks tall chai latte. Most electric companies offer green energy options, such as Consolidated Edison Company of New York's Green Power, a mix of wind and hydropower, which helps an average household reduce annual carbon dioxide emissions by about the amount that a car spews over 5,325 miles—almost a round-trip drive from New York to Los Angeles.

2 Everyone's talking about how compact fluorescent lightbulbs use two-thirds less energy and last up to 10 times longer than regular bulbs. But have you actually replaced the ones in your home? We thought not. Switching five regular lightbulbs with CFLs can save \$60 a year. If every U.S. household did it, we'd save a trillion pounds of greenhouse gases.

3 Heating and cooling account for 50 to 70 percent of the energy used in the average home, so turn off *Extreme Makeover: Home Edition* and weatherproof your house! Weather stripping or caulking drafts around windows and doors can save a household of four more than 30 percent, or almost \$500 a year, on utility bills.

4 To get your eight glasses a day you could buy three bottles of water at your local Kwik-E-Mart—or just attach a filter directly to your faucet. A filter lasts four months and costs about \$20 to replace, which equals an annual savings of up to \$3,000—and a whole lot of plastic.

5 Energy Star appliances gobble half as much energy and water as standard models, and if one in 10 U.S. households used them, the greenhouse gas emissions saved would eventually be equivalent to planting 1.7 million acres of trees—minus the backache.

6 While you're out, your electronics don't just go to sleep—they're up, sucking energy. Electronics in standby are responsible for one percent of the world's carbon dioxide emissions. To make sure TVs, cell phone chargers, stereos, and more are off the grid while you're away, hook them up to outlet timers or power strips that can be turned off in one flick.

7 Don't forget to green your home office. By design, laptops use up to 50 percent less energy than desktops, and inkjets use up to 90 percent less than laser printers.

For more information on how to use less, visit www.energystar.gov.

CAR

8 Cars generate almost 1.1 billion tons of carbon dioxide emissions each year, and with the national average gas price hovering around \$3 per gallon, cutting your consumption could mean more green for the environment—and your wallet.

• Hybrid cars can reduce smog by 90 percent and significantly cut down how much you pay at the pump. A 40-mile round-trip commute to work in a hybrid will average \$500 in gas each year but can cost three times that in a standard SUV. An added bonus: For a limited time, newly purchased hybrids can earn more than \$3,000 in tax credits.

• If you're not ready for a hybrid, buying a car that gets 30 mpg instead of 20 can save \$3,750 in fuel costs over five years—and even more if gas prices continue to rise.

• If 1,000 people shared their 20-mile round-trip commute with just one other person, it would save almost 20,000 pounds of carbon dioxide and about \$3,000 in gas each day—so hop on the bandwagon (literally) to get your share.

9 Consider riding a bicycle for shorter commutes or taking public transportation when it's available. Leaving your car in the garage just two days a week will reduce your greenhouse gas emissions by about 1,600 pounds each year.

To find out more about saving money on gasoline, visit www.fueleconomy.gov.

AFTER-LIFE

10 Each year, Americans inject the planet with more than 800,000 gallons of embalming fluid and more than 180,000,000 pounds of nondegradable steel caskets, which create considerable waste to produce. Cremation is no better: You could fly to the moon and back 83 times on all the energy used for cremations in one year.

To make your last act on this Earth one that will benefit it, reserve a plot at a green burial ground, where your biodegradable wooden or cardboard casket helps reduce after-life pollution. At roughly \$2,500, a green funeral also costs about half that of a conventional one.

To learn more about green funerals, visit www.naturalburial.org.

THE GREEN APPLE

WITH LOOMING CLIMATE CHANGE, A SWELLING POPULATION, AND CRUMBLING INFRASTRUCTURE, THE CONCRETE JUNGLE AIMS FOR A SUSTAINABLE MAKEOVER

by Sharon Tregaskis

WHEN THE TIME CAME for Jonah “Cecil” Scheib to leave Dancing Rabbit, the 280-acre Missouri eco-village he co-founded in 1997, one destination rose immediately to the top of his relocation list: New York City. A self-described “ecological activist” and civil engineer, Scheib had installed solar energy systems on six

homes in his decade on the land before becoming NYU’s first director of energy and sustainability in late April. “New York offered the possibility to have a low impact,” he says, “because of the shared walls, the tall buildings, the dense population, and access to locally and organically grown food through the city’s farmer’s markets.”

The Big Apple may boast more green credibility than most urban centers in the United States, thanks to its high density and extensive mass-transit system, but with a million new residents expected to call New York City home by 2030, it also faces a stark imperative to avert the dangerous synergy of rapid population growth, soaring energy consump-

tion, and an aging infrastructure already operating at near-peak capacity. Stir in concerns about global climate change and the capacity of unpredictable weather patterns to transform the city’s low-lying areas into wetlands, and the mandate for action becomes crystal clear. “We need a cultural change on the part of our infrastructure and planning agencies,” warns Rae Zimmerman, professor of planning and public administration in the Robert F. Wagner Graduate School of Public Service. Without such an overhaul, she’s “not optimistic about

our ability to respond to some of the projected consequences of global climate change.”

While not yet an overhaul, change appears on the horizon. Last fall, Mayor Michael Bloomberg (HON ‘03) created an Office of Long-Term Planning and Sustainability to tackle precisely such issues, and on Earth Day, April 22, 2007, announced PlaNYC 2030, which aims to, among other things: reduce the city’s global warming emissions by more than 30 percent over two decades; repair the city’s outdated water and electrical systems;

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ensure that all New Yorkers live within a 10-minute walk of a park; and implement a controversial pricing scheme to reduce vehicle traffic and emissions in Manhattan. The estimated \$32 billion, 127-point plan—which even puts invertebrates to work, with mussels serving as river-cleaning bio filters—is slated to receive funds from a mix of city, state, and federal sources over the next two decades. “I don’t think any [city] has attempted to deal with [sustainability] in as comprehensive a fashion as this,” says Daniel Doctoroff, deputy mayor for economic development and rebuilding.

But PlaNYC isn’t the only green game in town. In May 2007, the Clinton Climate Initiative, a project of former president Bill Clinton, engineered a several-billion-dollar loan fund to finance green retrofits of existing buildings in 16 cities, including New York, and Manhattan Borough President Scott Stringer recently launched Go Green East Harlem, an initiative aimed to make the neighborhood a model green community.

Not that New York had much choice. Brownfields cover 7,600 acres of New York City, about nine times the size of Central Park, and in central Harlem, one in four kids has asthma, one of the highest rates ever documented for a neighborhood in the United States. Throughout the city, levels of asthma-causing soot currently exceed Environmental Protection Agency (EPA) limits. And then there’s the infrastructure: **By 2030, 70 percent of the city’s power plants will have passed the half-century mark and much of the city’s water and subway systems—only about 40 percent of which are considered in good repair—will turn 100.** “Even in the shape NYC transit is in, it’s still better than places where it doesn’t exist,” says assistant research professor Allison L. C.

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de Cerreño, director of the NYU-Wagner Rudin Center for Transportation Policy and Management. “But if you don’t put in the appropriate investment to maintain good repair, then in the long term it can’t be sustainable.” That logic became startlingly clear this summer when a steam pipe dating to 1924 burst under a Midtown Manhattan street, sending a geyser of water, asbestos, and asphalt into the air. A few weeks later, much of the transit system was paralyzed following a brief, but violent rain storm.

Perhaps the most critical change, however, must come in design and construction, because buildings generate close to 80 percent of the city’s carbon output and, by 2030, the city will need 265,000 more housing units. Manhattan boasts a skyrocketing green building industry, including such efforts as 7 World Trade Center and the Hearst Tower, both awarded gold

certification by the U.S. Green Building Council. But the tallest, greenest of them all will be the Bank of America Tower at One Bryant Park, slated to open in 2008 with USGBC’s top honor, a platinum certification, for its high energy efficiency, extensive use of natural daylight, storm water runoff controls, and use of local materials for construction. “We need to look at buildings that create no new CO₂, that are using materials that are renewable resources,” says Bank of America Tower architect Robert Fox, a member of the mayor’s sustainability advisory board and the founding chairman of USGBC’s New York chapter.

NYU faces many of the same challenges confronting the city—from aging infrastructure to a projected student body growth of 13 percent by 2032—and over the past year, its approach to tackling them has gone from piecemeal to high priority. In October 2006, the university launched a Green

Action Plan with the formation of a 40-plus-member Sustainability Task Force of faculty, students, and administrators to inventory the university’s ecological impact and suggest improvements. Other features of the plan include a \$400,000 purchase of wind energy credits to mitigate the energy purchases the university makes from Con Edison—garnering kudos from the EPA as the largest bulk-wind-power buyer in higher education and in New York City—and a new state-of-the-art co-generation plant, which will significantly reduce pollutants and emissions in the area and will allow NYU to take an additional 23 buildings, for a total of 30, off of the overtaxed Manhattan power grid. The university also launched an environmental studies major this fall that offers classes taught by experts from various NYU schools.

“The sleeping giant is waking,” says Jeremy Friedman (GAL ’07), who as a senior co-authored the

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"The sleeping giant is waking," says Jeremy Friedman (GAL '07), who as a senior co-authored the 115-page report "Greening the Urban Campus, A Sustainability Assessment of New York University," and now serves as project administrator for the Task Force. Friedman

helped select the winners of 15 grants for NYU's \$250,000 Sustainability Fund, which subsidizes projects including a feasibility study of wind and solar installations on campus, a bicycle salvage effort, and promotion of the green renovation of the Gallatin School of Individualized Study, which will feature recycled furniture and special heating and cooling systems. Among the most visible changes will be NYU gardener George Reis's transformation of a 3,000-square-foot plot behind the Coles Sports Center into a chemical-free display bed planted with native species and maintained using organic principles. Says Reis: "My intention is to make NYU number one in the U.S. for sustainable gardening in an urban campus."

The moves all mark a national trend in higher education as leaders respond to the environmental pleas that many student activists have been making for years. In March, NYU President John Sexton signed

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on to the ambitious American College & University Presidents Climate Commitment, a pledge by campus heads to go carbon neutral—completely eliminating their greenhouse gas emissions—and to bolster teaching and research on sustainability. Already, more than 300 college and university presidents have joined the effort, toward a goal of 1,000 signatories by December 2008.

Building on this collaborative spirit, last June, NYU became a PlaNYC Challenge Partner along with eight other campuses, each of which pledged to reduce their

greenhouse gas emissions by 30 percent within the next decade—13 years ahead of PlaNYC's 2030 target. "We have a long way to go," says Executive Vice President Michael C. Alfano, who formed the Sustainability Task Force. "But my hope is that 10 years out, we're acknowledged as a leader, not only in talking and planning, but in implementation."

Transforming an institution the size of NYU won't come cheap, though many of the green initiatives already under way promise significant long-term financial ben-

GREEN ROOFS, SUCH AS THIS ONE IN THE WEST VILLAGE, CAN REDUCE AIR POLLUTION BY ABSORBING CARBON DIOXIDE, OFFSET THE HEAT TRAPPED BY CITY STREETS AND BUILDINGS, AND LOWER HEATING AND COOLING COSTS.



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