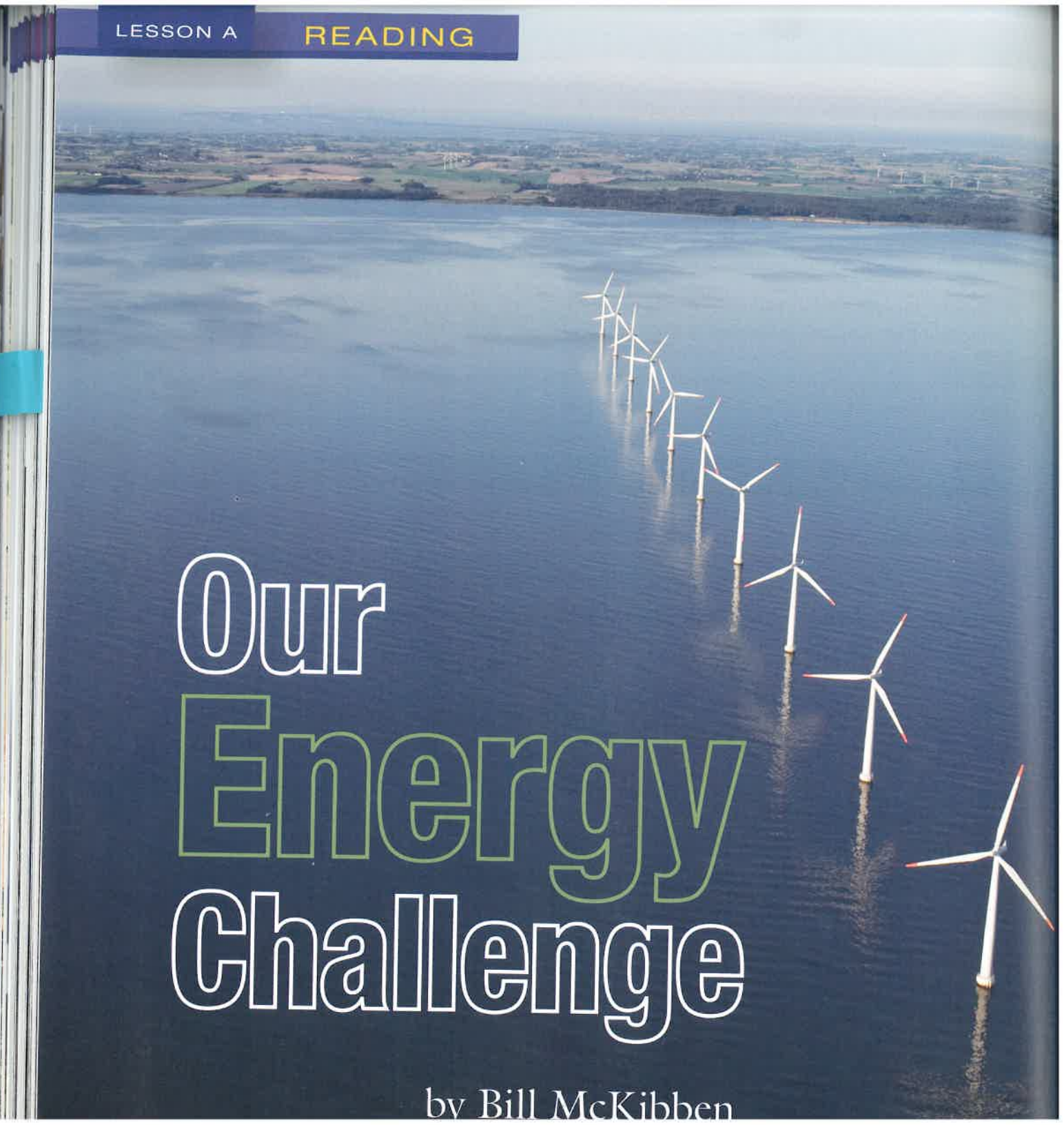
LESSON A READING



Our Energy Challenge

by Bill McKibben

> We are stuck right now—stuck between a played-out rock and a hot place. And it's an open question whether or not we can work our way free.

track 1-04

ENERGY, OF COURSE, is not just another part of our economy. For all intents and purposes,[1] it *is* our economy. The great **economist** John Maynard Keynes once reckoned that the standard of living for most humans had at most doubled in all the millennia since history dawned—until the turn of the 18th century, when we learned how to use coal to run engines. Then, suddenly, it's as if each of us had rubbed a bottle and come away with our own genie,[2] ready to do work **on** our **behalf** for a very reasonable price. All of a sudden, living standards in the energy-using West were doubling every few decades. (There's a reason, after all, that "industrialized world" and "developed world" are very nearly synonyms.)

In essence, we were no longer stuck with the interest we could earn off the sunlight falling on the planet—no longer stuck with the energy we could harness to feed our own muscles and those of our draft animals, with the wind that filled the sails of our ships when the sun warmed some spot and created a difference in pressure. All of a sudden, we could draw on the capital[3] in the bank—those millions of years of deposits of ferns and plankton and dinosaurs that time had compressed into coal and gas and oil. We were, almost literally, like the lucky heirs of someone long dead and very rich whose will was finally deciphered.[4] And we spent without thinking twice. That spending made us who we are. Every one of our **revolutions** (the industrial, the chemical, the electronic, even the information) at its base owes its strength to this newfound blood now coursing through the veins of our economy. Most of all, perhaps, the consumer revolution.

All this was, seemingly, fine. Plan A for the human race was that we'd all get rich eventually, that everyone would harness the same energy slaves that have served the West so well. Sure, there'd be some trouble along the way: Early generations of coal-fired power plants would produce great clouds of smog in Beijing just as they once had in Great Britain; vast fleets of cars would pollute China's skies as once they had California's. But quite quickly, as more energy produced more riches, those places, too, would have the cash to install scrubbers on their smokestacks and catalytic converters on their exhaust pipes, and before long the air would clear.

◀ Wind turbines provide energy for the residents of Samsø Island in Denmark, the world's leading producer of wind-generated energy.

[1] You say **for all intents and purposes** to suggest that a situation is not exactly as you describe it, but that the effect is the same.

[2] In stories, a **genie** is a spirit that appears and disappears by magic and obeys the person who controls it.

[3] **Capital** is a large sum of money that you use to start a business, or that you invest in order to make more money.

[4] If you **decipher** a piece of writing or a message, you figure out what it says, even though it is very difficult to read or understand.

Everything seemed to be working as planned: The boom years of the 1990s saw our mass prosperity, and, of course, our massive energy use, starting to spread to Asia. But there were two little problems, new wrinkles that we hadn't considered before—and that we really didn't want to consider, even as they became more obvious. Twenty years ago, if people thought of global warming at all, it was as an unlikely and distant threat. Five years

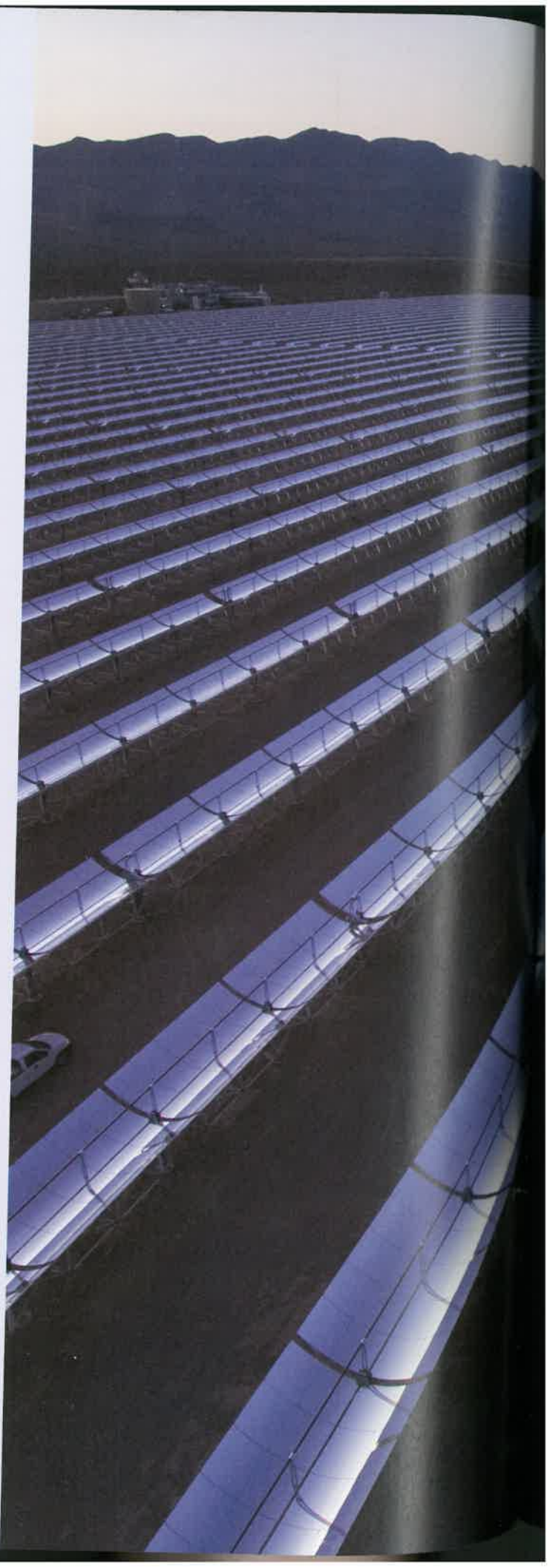
D ago, most people hadn't heard of peak oil.[5] Now they are the twin jaws of a closing vise,[6] limiting our options at a time when options are what we desperately need. Examined carefully, they may tell us what the future looks like—a future where we are running out of some of the energy we need and can't use the rest for fear of wrecking the atmosphere. A future that, all of a sudden, looks nothing like what we've long assumed.

Let's do a little math to see why. The Energy Information Administration, an arm of the U.S. government, forecast last year that, all things being equal, world energy consumption would

E increase 50 percent by 2030. That's a good round number, **summing up** the desire of people across the world for refrigerators, televisions, ice cubes, hamburgers, motorbikes, and maybe even a little air conditioning in the tropics.

[5] **Peak oil** is the point at which the earth's supply of oil begins to decline.

[6] A **vise** is a tool with a pair of parts that hold an object tightly while you do work on it.



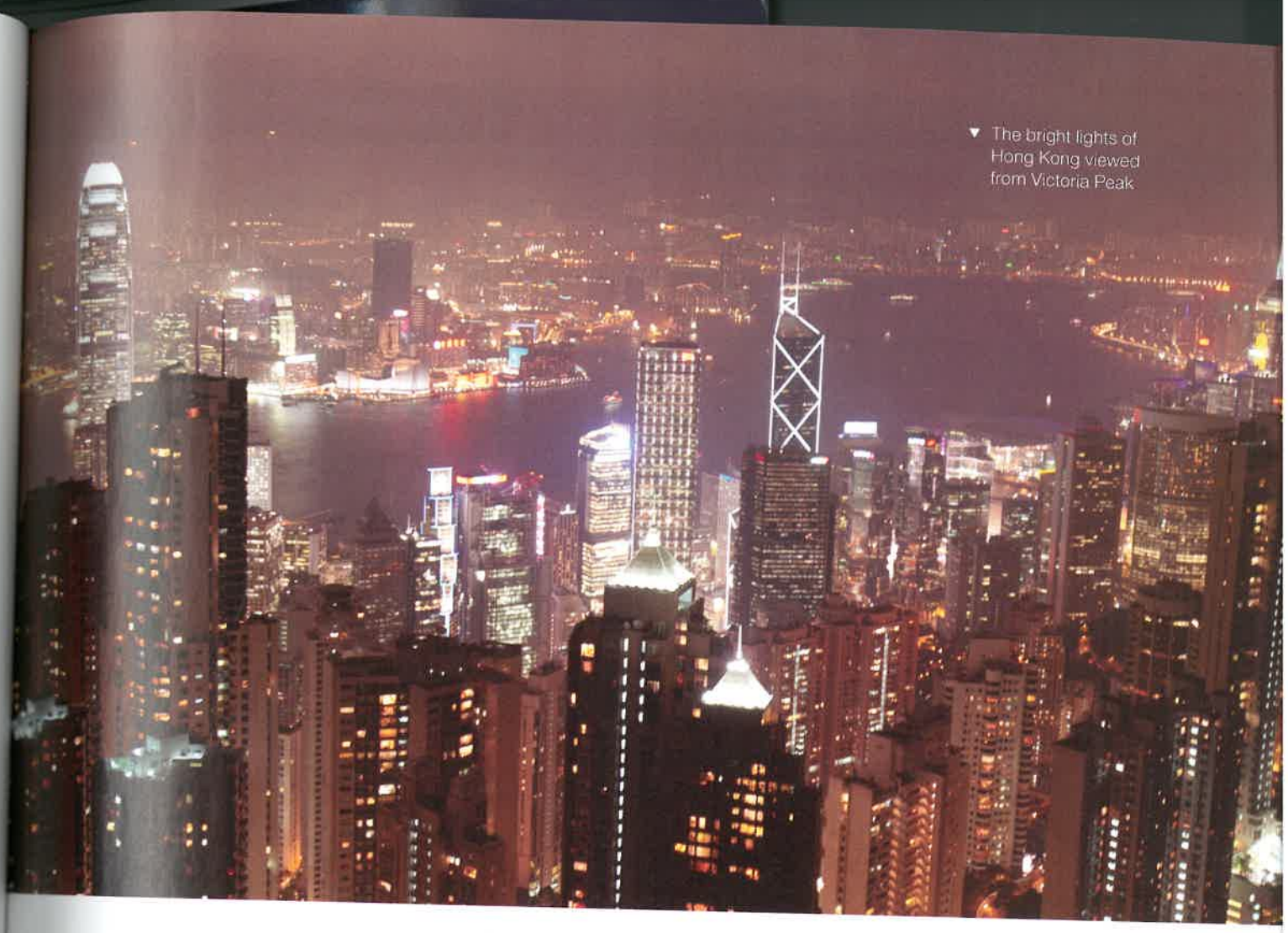
At Nevada Solar One, one of the world's largest solar power plants, 182,000 mirrors turn throughout the day to catch the sun's energy. The concentrated heat generates enough electricity to power 14,000 homes. Many more solar plants are in development as nations seek clean, renewable solutions to the world's energy crisis. ▶

But it's not at all clear where that energy can come from, because we happen to be alive at the moment when the oil is starting to run out. In November 2008, the International Energy Agency estimated that production from the world's mature oil fields was declining 6.7 percent a year, a rate that is expected to get even worse over time. **Offsetting** this decline will require finding a new Kuwait's worth of output every year, or somehow squeezing that much more from existing fields. Many observers think we've already passed the peak of oil production. An optimist in this world is someone who thinks it might still be a matter of years. But there's little question where the future lies, which is why the cost of a barrel of oil recently spiked to $147. It took the **prospect** of a Great Recession to bring it back down to $40. Curbing[7] high gas prices with recurrent economic slumps is probably not the smartest of remedies.

What are the options? There are the other fossil fuels. But natural gas will last us only so long. The obvious **substitute** is coal, of which we have quite a bit—except that coal brings us squarely to the other horn of this dilemma. It's the dirtiest of our fuels: Burn it and you **automatically** release lots and lots of carbon dioxide into the atmosphere, and that carbon dioxide is the culprit behind global warming. Which, like peak oil, is happening rather faster than we might like.

In the summer of 2007, for instance, the Arctic melted. By the end of the summer, there was 22 percent less sea ice than ever observed before. A comparable melt the following summer briefly opened the Northwest and Northeast Passages simultaneously, very likely offering human beings their first chance to circumnavigate[8] the Arctic on open water. This melt was 30 years ahead of the computer forecasts about global warming. It **confirmed** that we were warming the planet. There was no other explanation on offer. Worse, it was one of a number of feedback loops that would amplify that warming: Instead of the nice, white sheet of ice covering the Arctic, a mirror that reflected 80 percent of incoming solar radiation back out to space, we all at once had big pools of blue water, which absorb 80 percent of those rays of the sun. We'd kicked off the warming, but now nature was taking over and doing the

[7] If you **curb** something, you control it and keep it within limits.
[8] If you **circumnavigate** something, you sail all the way around it.



▼ The bright lights of Hong Kong viewed from Victoria Peak

job on her own. And that wasn't the only such feedback. As permafrost thawed in northern tundra, for instance, carbon dioxide and methane, another greenhouse gas, began to seep out into the atmosphere. The warmer seasons we were producing led to the spread of various pests that killed tens of millions of acres of trees across the North American West—and the fires all that dead wood fueled added new clouds of carbon to the atmosphere. We weren't producing it directly, but it all led back to us. Our cars and factories had clearly triggered a worldwide reaction, which in retrospect shouldn't surprise us. After all, we were taking millions of years' worth of stored carbon—all those old ferns and plankton—and pouring it into the atmosphere in the course of a few generations. Why wouldn't it cause problems?

Even now, only two decades after the public first heard of global warming, we're clearly on the edge of one tipping point[9] after another. The data predict rapid increases in drought (because warm air holds more water vapor than cold) and **correspondingly** rapid rises in deluge and flood (because what goes up must come down), shocking expansion in the range of disease-bearing mosquitoes, and equally shocking shrinkage in the size of the ice fields that water the cities of the Andes and the Asian subcontinent. Perhaps most ominously, new research on the great ice fields in Greenland and the west Antarctic is threatening to make us **redefine** the phrase "glacial pace."[10] Undermined[11] by the warming seas, the ice sheets were suddenly surging toward the ocean. One study published last fall said that a sea-level rise of six and a half feet this century was within the realm of possibility. That's a civilization-shaking number. It turns much of the world's most fertile land into the equivalent of Myanmar's Irrawaddy Delta, where paddies were recently flooded with seawater by Typhoon Nargis. It puts the human enterprise in doubt in ways we've never considered before—or rather, only once before, at the height of our **nuclear** terrors.

◀ An office building in Manhattan, New York, consumes energy into the night.

[9] A **tipping point** is a stage in a process when a big change takes place.
[10] The phrase **"glacial pace"** means moving very slowly, like a glacier.
[11] If you **undermine** something such as a feeling or a system, you make it less strong or less secure than it was before, often by a gradual process or by repeated efforts.

One of America's foremost climatologists, NASA scientist James Hansen, has given us a number to define the new boundary condition for life as we know it. He and his team studied the historical relation between atmospheric carbon and phenomena like sea-level rise (for all of human history until the industrial revolution, the air held no more than 275 parts per million CO_2) and then examined the latest real-time data from planet Earth. Their conclusion? "If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted . . . CO_2 will need to be reduced from its current 385 ppm [parts per million] to at most 350 ppm." We're too high now, in other words—that's why the Arctic is melting. Global warming is not a problem for the future; it's a crisis for this moment.

Instantly, 350 became the planet's most important number, the 98.6[12] of an entire globe. And scrambling back to it will require change on a scale hard to imagine. Essentially, says Hansen, we'd need to stop burning coal anywhere on the planet by 2030—and sooner in the developed world. (We could, alternatively, trap the carbon dioxide coming from power-plant smokestacks and store it underground somewhere, but that technology has been slow to develop.)

Closing down the fossil-fuel economy would mean a loss of vast sums of money already sunk into old technology that still has decades of useful life; we'd need to stop bailing out brokerage houses and start bailing out coal-fired boilers. And unless you have a plan for convincing Americans, and the rest of the world, that they don't want refrigerators after all, it would mean we'd need to find other sources for all that energy.

That's the task of our generation.

[12] **98.6** is the average human body temperature in degrees Fahrenheit.