Powerful Ideas,
Practical Actions

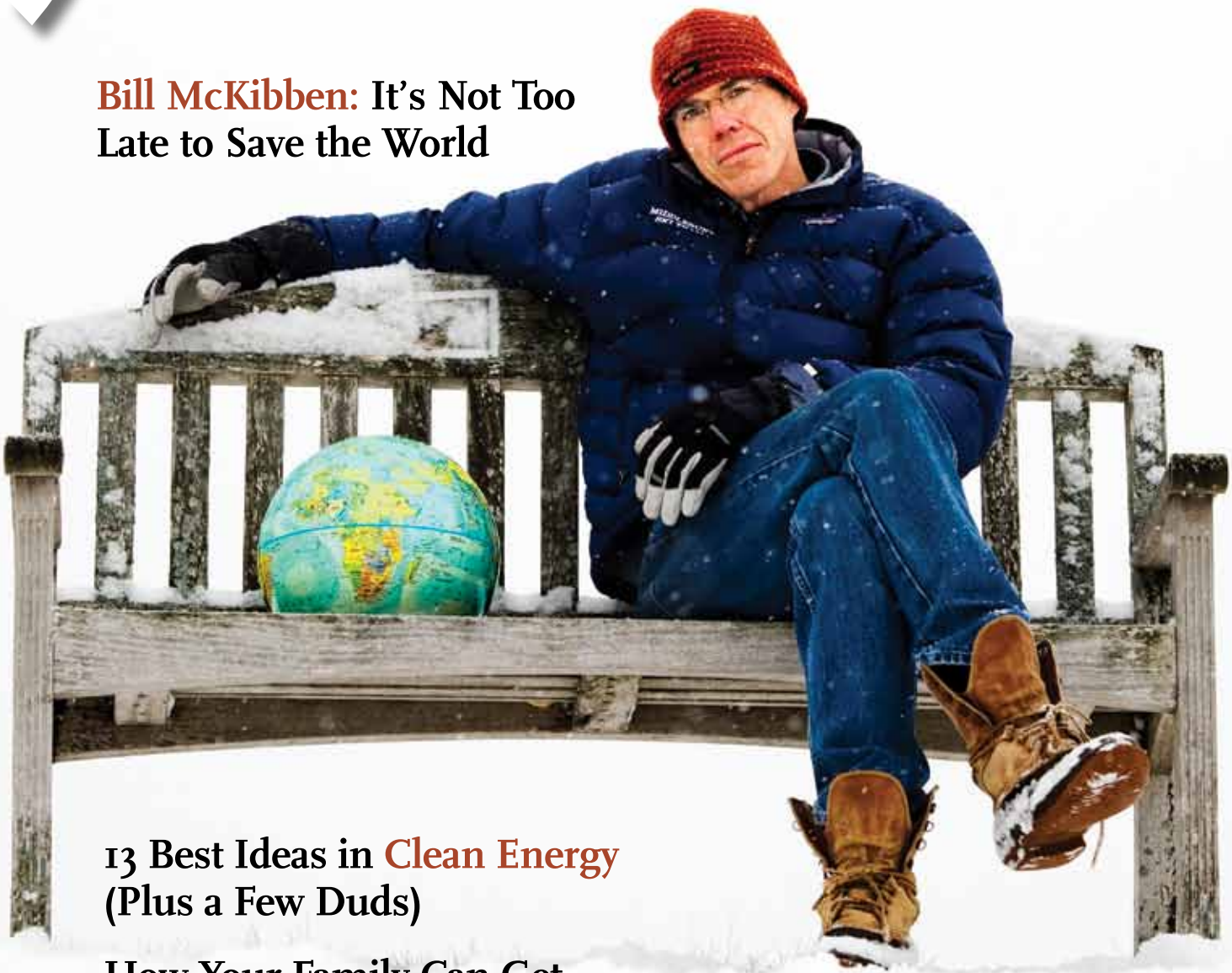
yes!

Spring 2008

Climate Solutions Special Issue

Stop Global Warming Cold

Bill McKibben: It's Not Too Late to Save the World



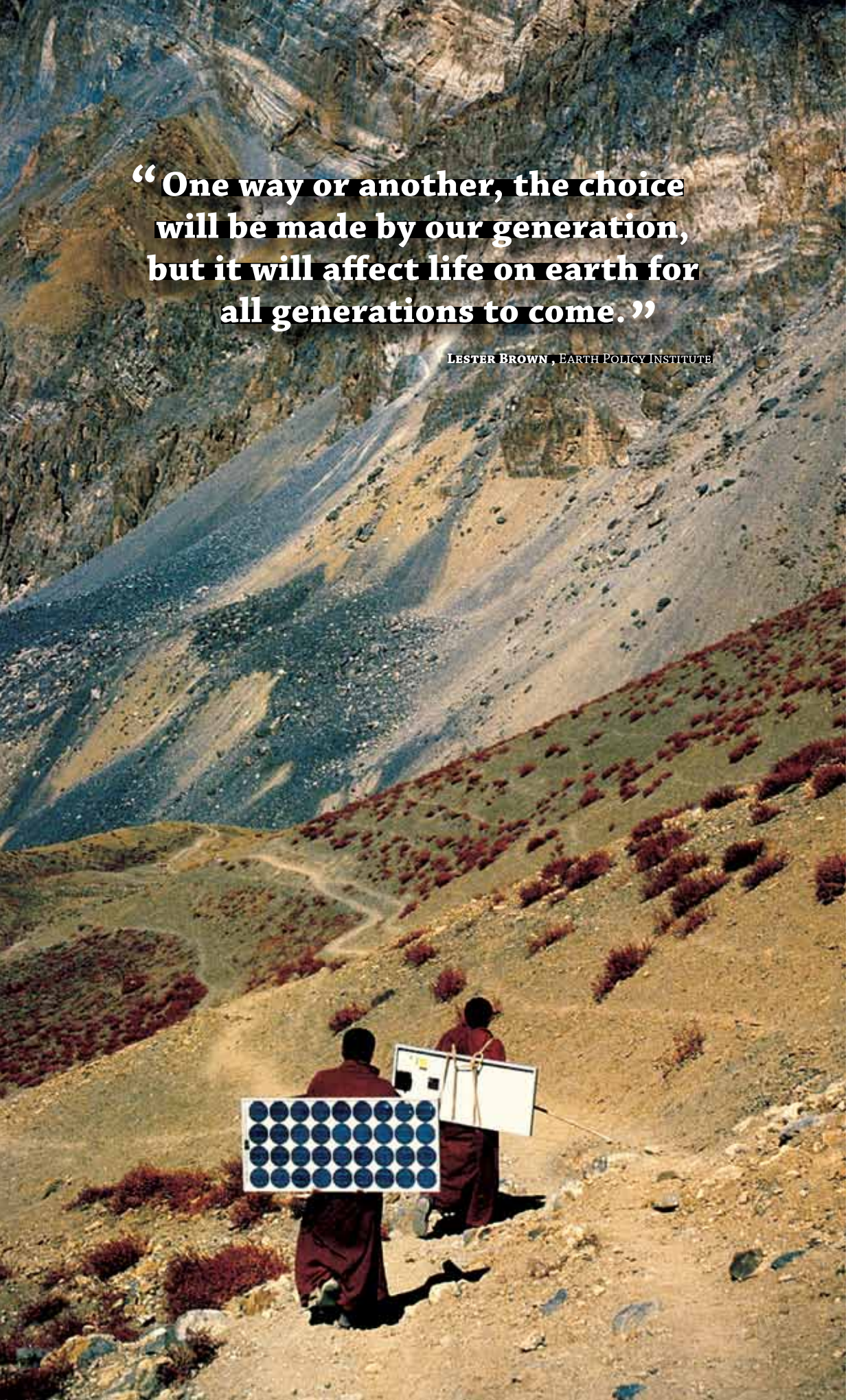
13 Best Ideas in Clean Energy (Plus a Few Duds)

How Your Family Can Get Carbon Free in 10 Years

The Secret Life of Plug-in Cars

Surprise Victory for Global Fairness

Author and climate activist Bill McKibben at home in Vermont



Tsewang Norbu was selected by his Himalayan village to be trained at the Barefoot College of Tilonia, India, in the installation and repair of solar photovoltaic units. All solar units were brought to the village across the 18,400-foot Khardungla Pass by yak and on villagers' backs.

yes! magazine
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Reprinted from the “Climate Solutions” Issue, Spring 2008

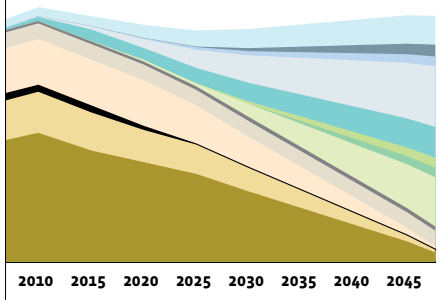
CLIMATE SOLUTIONS

Climate change used to be something that would happen far off in the future. Now the science says we have just 10 years to change course or things will get scary. What do we do? What will actually make a difference? It turns out we have the means. The question is: Do we have the will?

Bill McKibben Steps Up. *Some just talk about the weather. McKibben shows what we can do about it.*

We're in it Together. *Rich and poor countries met in Bali and decided to give global fairness a chance.*

2 Degrees from Disaster
Here's what it means to avert the worst case—by the numbers.



What's Possible in a Post-Carbon World ...

Buildings. *Carbon-neutral homes and elegant towers.*

Electricity. *Sun or coal, wind or nukes? You get to vote.*

Transportation. *Feet, bikes, buses, and an all-electric fleet.*

Food & Forests. *Changes from the ground up.*

How the Jones Family Gets Carbon Free in 10 Years

Heating, cooling. Getting to work. How you can have it all, minus the carbon.

Climate First Responders. *The people out in front changing the political climate on, well, climate.*

The Greatest Danger. *If you're not terrified, you're not paying attention. But don't get stuck there.*

First, Step Up

Bill McKibben

At any given moment we face as a society an enormous number of problems: there's the mortgage crisis, the health care crisis, the endless war in Iraq, and on and on. Maybe we'll solve some of them, and doubtless new ones will spring up to take their places. But there's only one thing we're doing that will be easily visible from the moon. That something is global warming. Quite literally it's the biggest problem humans have ever faced, and while there are ways to at least start to deal with it, all of them rest on acknowledging just how large the challenge really is.

What exactly do I mean by large? Last fall the scientists who study sea ice in the Arctic reported that it was melting even faster than they'd predicted. We blew by the old record for ice loss in mid-August, and by the time the long polar night finally descended, the fabled Northwest Passage was open for navigation for the first time in recorded history. That is to say, from outer space the Earth already looks very different: less white, more blue.

What do I mean by large? On the glaciers of Greenland, 10 percent more ice melted last summer than any year for which we have records. This is bad news because, unlike sea ice, Greenland's vast frozen mass sits above rock, and when it melts, the oceans rise—potentially a lot. James Hansen, America's foremost climatologist, testified in court last year that we might see sea level increase as much as six meters—nearly 20 feet—in the course of this century. With

Bill McKibben has been sounding the alarm on climate change since his 1989 book, *The End of Nature*. He lives in Ripton, Vermont, where he teaches, writes, and works to counter climate change.

that, the view from space looks very different indeed (not to mention the view from the office buildings of any coastal city on earth).

What do I mean by large? Already higher heat is causing drought in arid areas the world over. In Australia things have gotten so bad that agricultural output is falling fast in the continent's biggest river basin, and the nation's prime minister is urging his people to pray for rain. Aussie native Rupert Murdoch is so rattled he's announced plans to make his NewsCorp empire (think Fox News) carbon neutral. Australian voters ousted their old government last fall, largely because of concerns over climate.

What do I mean by large? If we'd tried we couldn't have figured out a more thorough way to make life miserable for the world's poor, who now must deal with the loss of the one thing they could always take for granted—the planet's basic physical stability. We've never figured out as efficient a method for obliterating other species. We've never figured out another way to so fully degrade the future for everyone who comes after us.

Or rather, we have figured out one other change that rises to this scale. That change is called all-out thermonuclear war, and so far, at least, we've decided not to have one. But we haven't called off global warming. Just the opposite: in the 20 years that we've known about this problem, we've steadily burned more coal and gas and oil, and hence steadily poured more carbon dioxide into the atmosphere. Instead of a few huge explosions, we've got billions of little ones every minute, as pistons fire inside engines and boilers burn coal.

Having put off real change, we've made our job steadily harder. But there are signs that we're finally ready to get to work. Congress is for the first time seriously considering legislation that would actually limit U.S. emissions. The bills won't be signed by President Bush, and they don't do everything that needs doing—but they're a start. »

We need a movement. We need a political swell larger than the civil rights movement—as passionate and as willing to sacrifice. Without it, we're not going to best the fossil fuel companies and the automakers and the rest of the vested interests that are keeping us from change.

» And the international community meeting in Bali in December overcame U.S. resistance and began the steps toward an international treaty that will be ready in 2009. The talks are going slowly, largely because of American intransigence, but George Bush won't be president forever, so there's at least a chance we'll re-engage with the rest of the world.

If we do, there are steps we can take. Because the problem is so big, and coming at us so fast, those steps will need to be large. And even so, they won't be enough to stop global warming—at best they will slow it down and give us some margin. But here's the deal:

We need to conserve energy. That's the cheapest way to reduce carbon. Screw in the energy-saving lightbulbs, but that's just the start. You have to blow in the new insulation—blow it in so thick that you can heat your home with a birthday candle. You have to plug in the new appliances—not the flat-screen TV, which uses way more power than the old set, but the new water-saving front-loading washer. And once you've got it plugged in, turn the dial so that you're using cold water. The dryer? You don't need a dryer—that's the sun's job.

We need to generate the power we use cleanly. Wind is the fastest growing source of electricity generation around the world—but it needs to grow much faster still. Solar panels are increasingly common—especially in Japan and Germany, which are richer in political will than they are in sunshine. Much of the technology is now available; we need innovation in financing and subsidizing more than we do in generating technology.

We need to change our habits—really, we need to change our sense of what we want from the world. Do we want enormous homes and enormous cars, all to ourselves? If we do, then we can't deal with global warming. Do we want to keep eating food that travels 1,500 miles to reach our lips? Or can we take the bus or ride a bike to the farmers' market? Does that sound romantic to you? Farmers' markets are the fastest growing part of the American food economy; their heaviest users may be urban-dwelling immigrants, recently enough arrived from the rest of the world that they can remember what actual food tastes like. Which leads to the next necessity:

We need to stop insisting that we've figured out the best way on Earth to live. For one thing, if it's wrecking the Earth then it's probably not all that great. But even by measures of life satisfaction and happiness, the Europeans have us beat—and they manage it on half the energy use per capita. We need to be pointing the Indians and the Chinese hard in the direction of London, not Los Angeles; Barcelona, not Boston.

Building a Movement

Most of all, we need a movement. We need a political swell larger than the civil rights movement—as passionate and as willing to sacrifice. Without it, we're not going to best the fossil fuel companies and the automakers and the rest of the vested interests that are keeping us from change.

Some of us have spent the last couple of years trying to build that movement, and we've had some success. With no money and no organization, seven of us launched StepItUp in January 2007. Before the year was out, we'd helped organize 2,000 demonstrations in all 50 states—and helped take our once-radical demand for an 80 percent reduction in U.S. carbon emissions by mid-century into the halls of power.

We haven't won yet—but we're way beyond what we could have expected when we began. Last November, House Speaker Nancy Pelosi stood at a podium in front of 7,000 college students gathered from around the country at the University of Maryland and led them in a chant: "80 percent by 2050." I'm as cynical as the next guy, but it feels like our democracy is starting to work.

It will need to work much better, though. We'll need to see a whole new level of commitment—to nonviolent protest, to electioneering, to endless lobbying. We'll have to be committed to an environmentalism much broader and more diverse than we've known—younger, browner, and insistent that the people left out of the last economy won't be left out of the new one. And we'll need to see it not just here but around the world. Because they don't call it global warming for nothing. If we're going to have a fighting chance, we'll need every nation pitching in—which means, in turn, that we'll have to understand where we all stand right now.

What about China and India?

Here's the political reality check, just as sobering as the data about sea ice and drought: China last year passed the United States as the biggest emitter of carbon on Earth. Now, that doesn't mean the Chinese are as much to blame as we are—per capita, we pour four times more CO_2 into the »

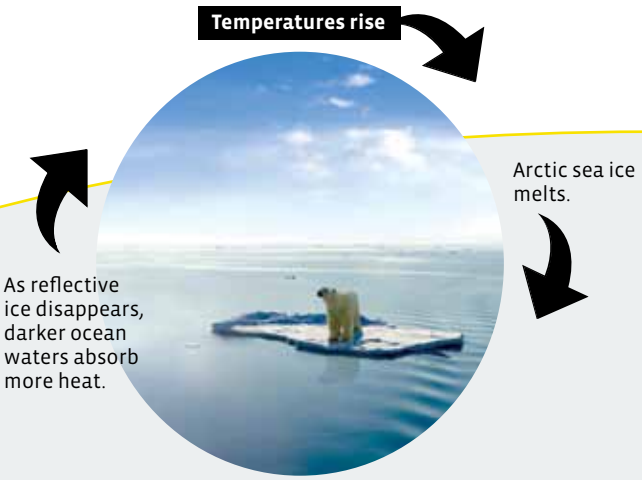
Pandora's Icebox
Climate's Vicious Cycles

Madeline Ostrander

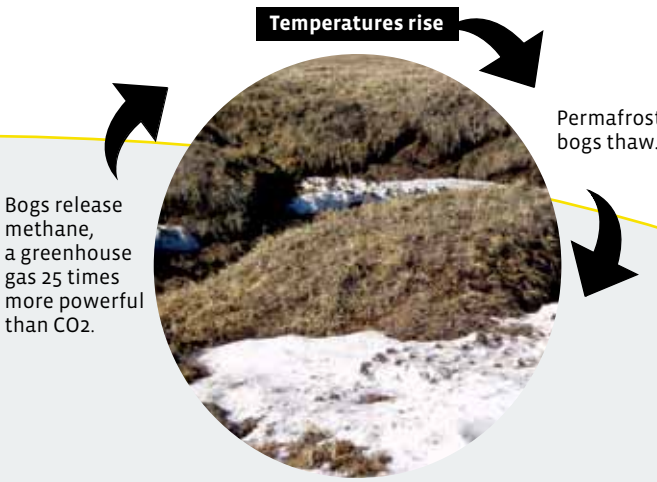
As early as 1892, Swedish chemist Svante Arrhenius devised a basic formula to explain geologic changes in climate: add carbon dioxide, things heat up. Simple.

But scientists have since learned that a little atmospheric temperature rise can unlock vicious feedback loops that speed global warming. Some of these feedbacks are already taking effect. Others may be triggered by further warming. If global temperatures continue to rise, some of these feedbacks could spiral beyond our ability to reverse them. Here are four examples.

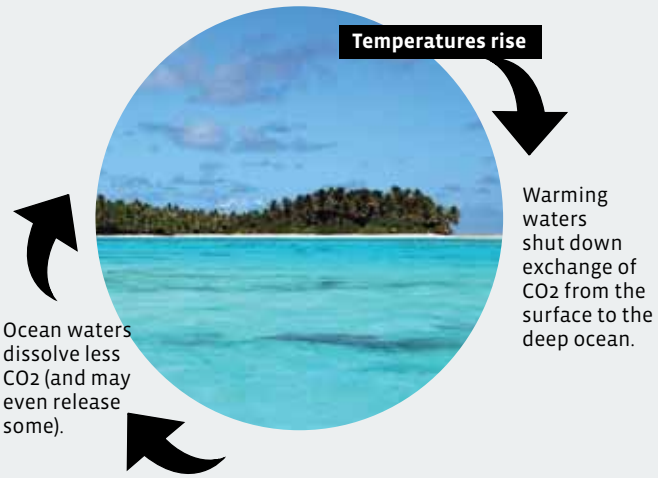
VANISHING ARCTIC ICE



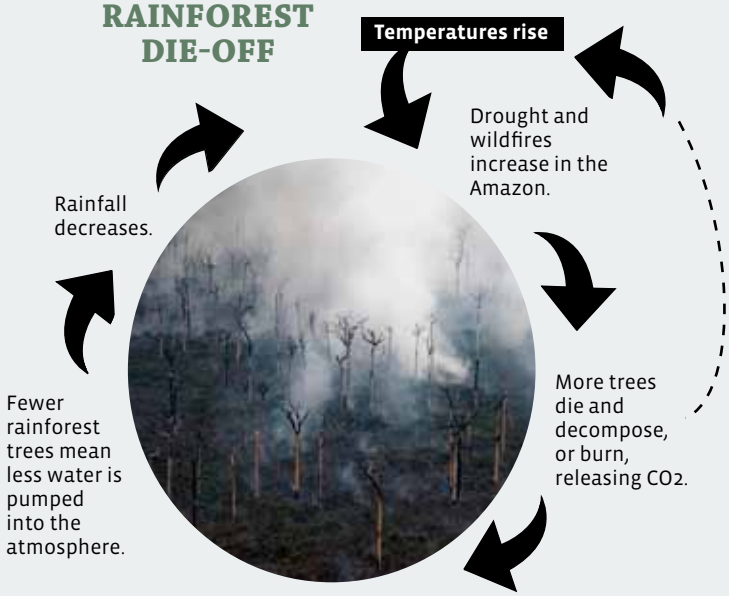
MELTING PERMAFROST



CLOGGING THE OCEAN SINK



AMAZON RAINFOREST DIE-OFF



Sources: available at www.yesmagazine.org/feedbackloop; photos from istock

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» atmosphere. And we've been doing it for a hundred years, which means it will be decades before they match us as a source of the problem. But they—and the Indians, and the rest of the developing world behind them—are growing so fast that there's no way to head off this crisis without their participation. And yet they don't want to participate, because they're using all that cheap coal not to pimp out an already lavish lifestyle, but to pull people straight out of deep poverty.

Which means that if we want them not to burn their coal, we're going to need to help them—we're going to need to supply the windmills, efficient boilers, and so on that let them build decent lives without building coal-fired power plants.

Which means, in turn, we're going to need to be generous, on a scale that passes even the Marshall Plan that helped rebuild post-World War II Europe. And it's not clear if we're capable of that any more—so far our politicians have preferred to scapegoat China, not come to its aid.

I said at the start that this was not just another problem on a list of problems. It's a whole new lens through which we look at the world. When we peer through it, foreign policy looks entirely different: the threats to our security can be met only by shipping China technology, not by shipping missiles to China's enemies.

When we peer through the climate lens, our economic life looks completely changed: we need to forget the endless expansion now adding to the cloud of carbon and concentrate on the kind of durability that will let us last out the troubles headed our way.

Another Way to be Human

Our individual lives look very different through these glasses too. Less individual, for one thing. The kind of extreme independence that derived from cheap fossil fuel—the fact that we need our neighbors for nothing at all—can't last. Either we build real community, of the kind that lets us embrace mass transit and local food and co-housing and you name it, or we will go down clinging to the wreckage of our privatized society.

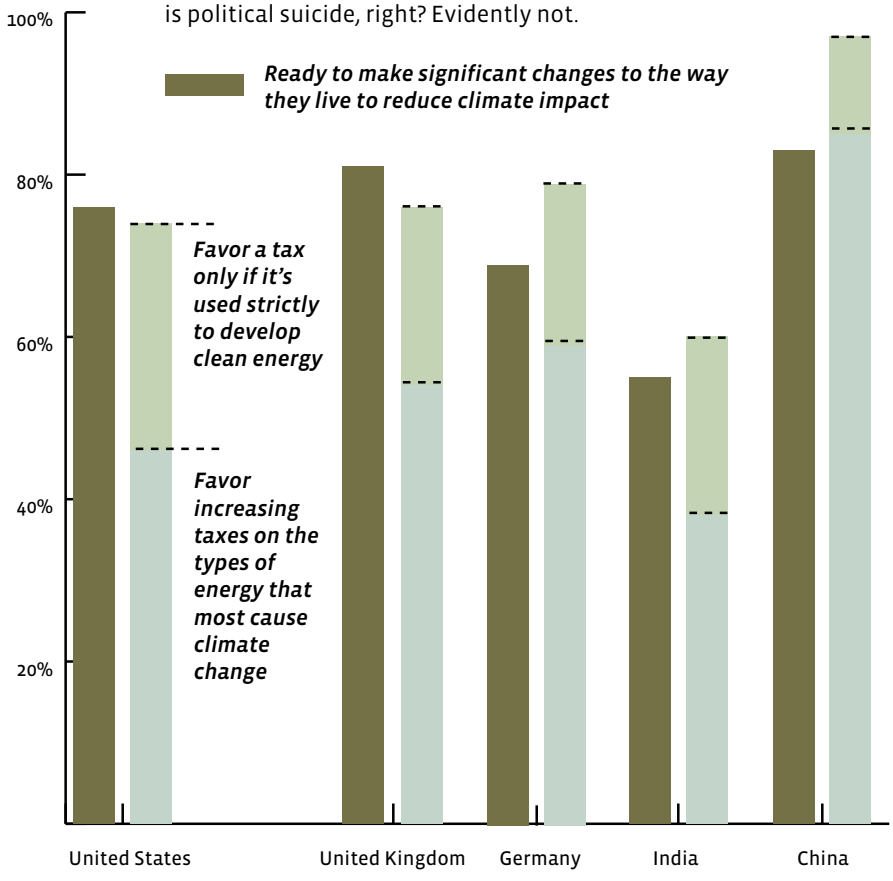
Which leaves us with the one piece of undeniably good news: we were built for community. Everything we know about human beings, from the state of our immune systems to the state of our psyches, testifies to our desire for real connection of just the kind that an advanced consumer society makes so difficult. We need that kind of community to slow down the environmental changes coming at us, and we need that kind of community to survive the changes we can't prevent. And we need that kind of community because it's what makes us fully human.

This is our final exam and so far we're failing. But we don't have to put our pencils down quite yet. We'll see.

Bill McKibben is the author of *The End of Nature*, *Wandering Home*, and *Deep Economy*, and a founder of StepItUp, which has recently joined forces with 1sky.

Who's Willing to Step Up?

Asking people to make sacrifices to stop Global Warming is political suicide, right? Evidently not.



Source: BBC World Service Poll based on interviews with 22,182 people in 21 countries in May, June, and July 2007.

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Global Fairness

ED WRAY / AP

An environmental activist (in polar bear suit) at Kuta Beach after the end of the U.N. Climate Change Conference in Bali.

Climate negotiations in Bali moved the world just a bit back from the brink

Tom Athanasiou

The international climate negotiations that took place in Bali, Indonesia, in December brought us to a new and more difficult level in the climate game that we'll be playing for the rest of our lives.

We knew going into Bali that if the old routine continued we'd be in trouble. The skeptics had been discredited; the Intergovernmental Panel on Climate Change (IPCC) had delivered clear and unequivocal warnings; Al Gore and the IPCC had won the Nobel Prize. So it's with great relief that I can say that although Bali wasn't the breakthrough that we need, the game has indeed changed. The critical next two years of negotiations have begun in earnest.

The most important change was the new stance taken by the countries of the global South, the Group of 77, or G77.

Their earlier focus had been on unity. But unity has allowed the G77's most retrograde members (the Saudis come to mind) to override the interests of weaker parties (like the Alliance of Small Island States). That's why it's so important that China, South Africa, and Brazil stepped forward from self-defeating unity to signal a new willingness to make binding commitments to limit emissions.

This was a real breakthrough, not least because the attached condition—measurable, reportable, and verifiable assistance from the industrialized to the developing countries—was widely understood as being both just and inevitable.

And that takes us to the second major development at Bali. The once radical idea that rich »

» countries have responsibilities to the poor has now emerged as a near-consensus position. Today, to be serious, you have to admit that wealthy countries became wealthy by following a fossil-fuel intensive development path that led directly to today's climate crisis. And if we truly expect today's developing countries to take a different path, we'll have to provide the means by which those countries can leapfrog over fossil-fuel dependence and directly into an efficiency- and renewables-based economy.

There's a huge challenge here. Just as rich-world politics are finally acknowledging the need for sharp domestic emissions reductions, the international community is moving ahead to an even more difficult truth. The rich cannot simply act within their own borders. They are also responsible for financing parallel reductions and the large-scale efforts to adapt to now inevitable climate change impacts in the developing world.

What does this mean in practice? Technology transfer, for one thing, and this time it has to mean the best of the new technologies, not the worst of the old. And large-scale funding for adaptation and poverty alleviation, because without it there's little chance of finding the global solidarity that we'll need to manage the transition. And a whole lot more.

Fortunately, Bali saw the long-overdue encounter between the climate movement and the global justice movement finally take place in earnest, and neither movement will ever be the same. Even mainline climate activists talk often now about equity, even though they fear its implications, which, frankly, they're right to do: Climate justice has the potential to raise the stakes dangerously high, so high that both our politicians and our populations could easily balk. Which is all the more reason to marvel, for today few people within the climate movement can imagine a future without justice.

Nor will the greens be the only ones transformed by this encounter. The global justice movement, which has largely built its climate politics around opposition to carbon offsets and market mechanisms, is now coming to see that such opposition is not enough. If false solutions are a terrible danger, so too is the illusion that by exposing that danger we have done all we need to do.

Our One Chance to Get it Right

To be sure, there are serious shortcomings in the final Bali Action Plan. It did not lay out national obligations for emissions reductions, nor even a global target. But the truth is that Bali was never going to lay out the details, or even a comprehensive framework. And it did manage to open the way forward.

When we get down to cases, we'll have no choice but to face the details of an extremely daunting reality. The climate threat demands emergency action. The truth here is more than inconvenient: it's shocking and even terrifying. We're going to have to get this right, and soon.

There'll be no way to do this without both trust and technology, globally and on a grand scale. Which means we'll need breakthroughs in international financing to provide the means by which poor countries can continue to develop without pushing us all over the edge into catastrophe. And such breakthroughs will depend upon negotiating "burden sharing" agreements that take proper account of not only the North/South divide, but also the rich/poor divide within both northern and southern countries.

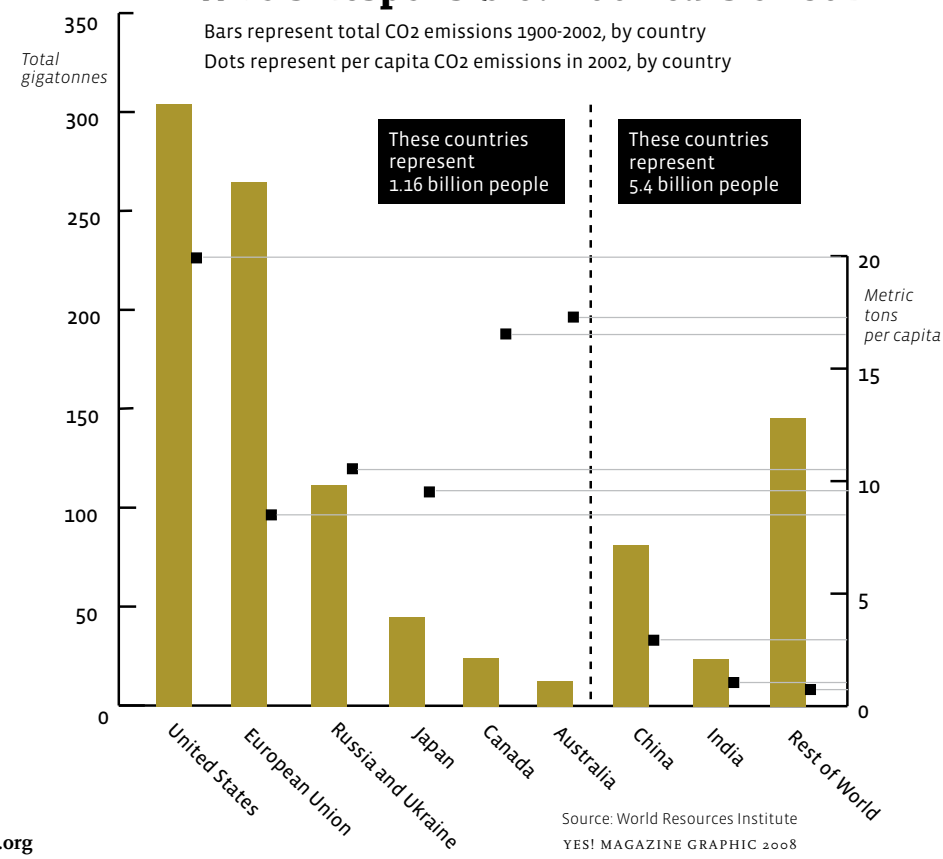
And, as if this wasn't enough, we'll also need to bring the rules and priorities of the WTO, World Bank, IMF, and others quickly into line with the imperatives of the climate regime.

All of which is to say that we'll need to put justice at the center of the climate agenda, right along with environmental adequacy in the face of an astonishingly severe threat. For without justice there will not be cooperation or solidarity. And without global solidarity, we will fail.

Tom Athanasiou is the author of *Divided Planet: The Ecology of Rich and Poor*, and co-author (with Paul Baer) of *Dead Heat: Global Justice and Global Warming*. He is the executive director of EcoEquity and a core member of the Greenhouse Development Rights team; see www.ecoequity.org/GDRs.

Who's Responsible? 100 Years of CO_2

Bars represent total CO_2 emissions 1900-2002, by country
Dots represent per capita CO_2 emissions in 2002, by country



Source: World Resources Institute
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ECUADOR

Protecting Diverse Forests and People

Rafael Correa won the Ecuadorian presidency on the strength of his promises to deliver much-needed social programs to his country's largely impoverished population. He also pledged to protect Ecuador's natural heritage of biodiversity. Add to this political mix a lot of foreign debt and a billion or more barrels of oil located under a UNESCO bioreserve in the Ecuadorian Amazon, and it's clear why some observers saw the nation as caught in a classic stalemate between development and environment.

Now, though, the ITT oil fields—located within Yasuní National Park, one of the world's most biodiverse places and home to a number of indigenous communities—have become an experiment in the possibility of having it both ways.

In May 2007, Correa proposed a unique solution: if the international community will agree to pay or excuse debt worth $350 million annually for 10 years (half the anticipated value of the oil) to help fund sustainable development in Ecuador, then the oil, the forests, and the indigenous groups threatened by the encroachment of oil companies will all be left alone.

It's a proposal that many are taking seriously. In addition to the danger posed to biodiversity and indigenous rights, development of the ITT fields would be a climate change disaster, generating an estimated 436 million tons of CO_2 and destroying a huge swath of tropical rainforest crucial to sequestering carbon and regulating weather patterns.

Though the Bali climate agreement endorsed the importance of forest preservation, it failed to safeguard against the transformation of forests into internationally traded and managed "carbon sinks" that would exclude indigenous people and traditional livelihoods from their borders. Ecuador's example may point toward a way to protect forests without compromising a future that values equity and human rights.

—Brooke Jarvis

CHINA

On Climate, Hu's Leading Whom?

Last summer, Chinese President Hu Jintao toured the country in short sleeves to show that his countrymen could turn their air conditioners down. In China, conservation is "in."

Fashions do change. Global warming denial is out of vogue. Unfortunately, though, the climate change do-nothing set is sporting a new line: "Why should we bother fighting climate change when China's emissions are increasing?"

It's true that China's galloping economy means that the country's total emissions are on the rise—they are now the world's number-one emitter. But China has also unveiled aggressive emissions reduction policies. Indeed, it may be the United States that will need to play catch-up with China, not the other way around.

China boasts one of the most fuel-efficient vehicle fleets in the world, with estimated averages of 37 miles per gallon already, in 2008. The U.S. will reach 35 mpg—by 2020.

China pumped $10 billion into clean energy in 2007 (twice the amount invested by the U.S. in 2006) and is on track to meet and exceed targets to obtain 15 percent of its energy from renewables by 2020, and 30 percent by 2050.

Already leading in solar hot water and small hydropower technology, China will likely become the world leader in solar and wind power manufacturing in the next three years. Unless the United States gets busy and starts setting higher standards for a climate friendly economy, the world may look to China as the global trend setter.

—Anna Fahey, Sightline Institute

Rooftop solar hot water tanks in the Yunnan capital city of Kunming. China is poised to overtake Europe, Japan, and North America in the manufacture of solar panels and wind turbines, and it already dominates the markets for solar hot water and small hydropower.

EVEN ROGERS PAY

We are 2 degrees

A 2-degree rise in temperature is the most the Earth can tolerate without dangerous climate change, scientists tell us. The International Panel on Climate Change says that as temperature rises, these effects will kick in:

Today

• Increasing illness and death from heat waves, floods, drought • Hundreds of millions of people lack drinking water • Weather changes shift species' ranges • Increased wildfires

GARY BRAASCH

1°C

• Grain production decreasing in low latitudes • 30 percent of species at increased extinction risk • Increasing malnutrition, waterborne disease, and infectious disease • Change in range of mosquitos and other disease vectors

www.YesMagazine.org/earthunderfire
Photo essay from Gary Braasch's book *Earth Under Fire*. At left, rising sea levels threaten the tiny Pacific Island nation of Tuvalu, inhabited by Polynesians for 3,000 years. Tuvalu residents now face a drowning country.

Here's What We Can Do

Act Quickly

U.S. emissions in

If we do nothing

Source: Blair Henry, *Climate Change: Playing to Win*

The green line is the familiar goal: 80 percent CO_2 reduction by 2050. If we get there, we're climate cool, right? Actually, if we follow that course, we have a 50% chance—a coin toss—of staying within the 2 degrees the IPCC says is the critical range. The sooner we start and the faster we decrease CO_2 emissions, the better our odds.

Protect Biological Sinks

BRASIL2 / I-S

One of the biggest threats to the Earth's ability to soak up CO_2 is deforestation, especially loss of rainforests. Think deforestation is caused by poor practices in the developing world?

Indonesia and **Malaysia** are slashing rainforest to make palm oil plantations. But they export most of their palm oil to the European Union, China, Russia, and the U.S.—traditionally for food, but increasingly for biodiesel. **Brazil** is also carving cattle pasture and sugar cane fields out of the rainforest. It's the world's No. 1 exporter of beef, feeding the EU, Hong Kong, and the U.S., and aims to double production of sugar cane ethanol, to sell to the U.S. and other countries.

What's the key to stopping deforestation? Getting the developed world to leave resources where they are, for use by locals.

from disaster.

2°C

THRESHOLD OF DANGEROUS CLIMATE CHANGE

• 15% of ecosystems affected, changing biological sinks to carbon sources • Coastal flooding • Corals bleached • Ecosystems disrupted by weakening of "ocean conveyor" system

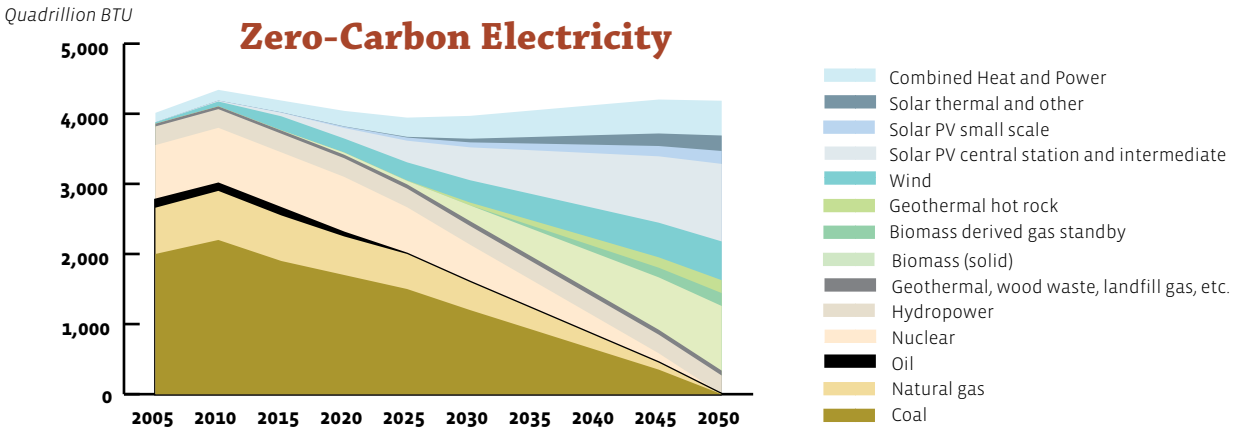
3°C

• 30% of coastal wetlands lost • Widespread death of coral reefs • Grain production decreasing • Substantial burden on worldwide health services

4°C

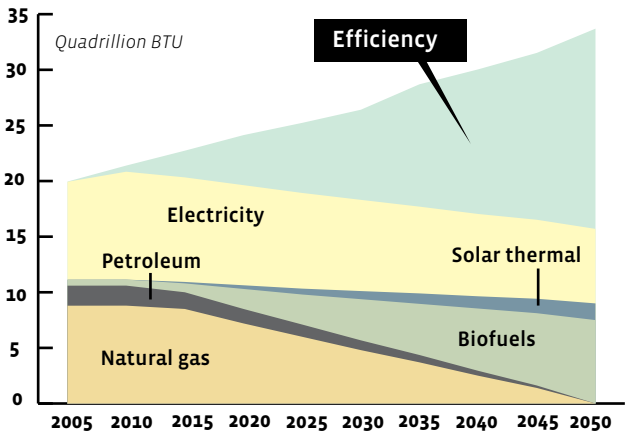
• Significant extinctions worldwide • All grain production decreases • 40% of ecosystems affected; "sink to source" changes accelerate

Zero-Carbon Electricity



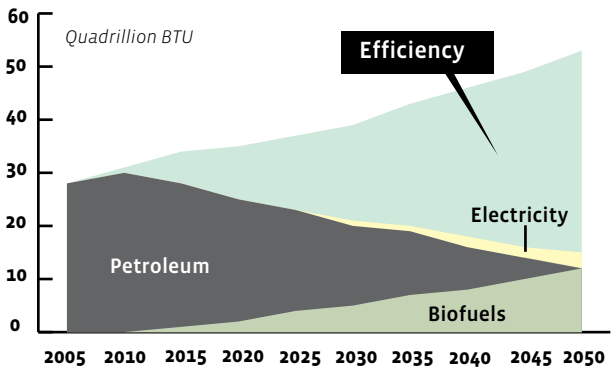
Arjun Makhijani has been thinking about cleaner, more efficient energy for more than 35 years. When he heard that we need to go fossil-carbon free by 2050, he doubted it was possible. Research changed his mind, and his book, *Carbon-Free and Nuclear-Free: A Roadmap for U.S. Energy Policy*, tells exactly how it can be done. Here's how Makhijani sees the energy supply changing for buildings, transportation and electricity. Makhijani's plan relies in part on biofuel from algae. Guy Dauncey, whose work follows in this issue, says we can go carbon neutral with clean electricity. There's no single path, other than the path that starts right now.

Zero-Carbon Buildings



Source: Institute for Energy and Environmental Research

Zero-Carbon Transportation



Welcome to the Post-Carbon World

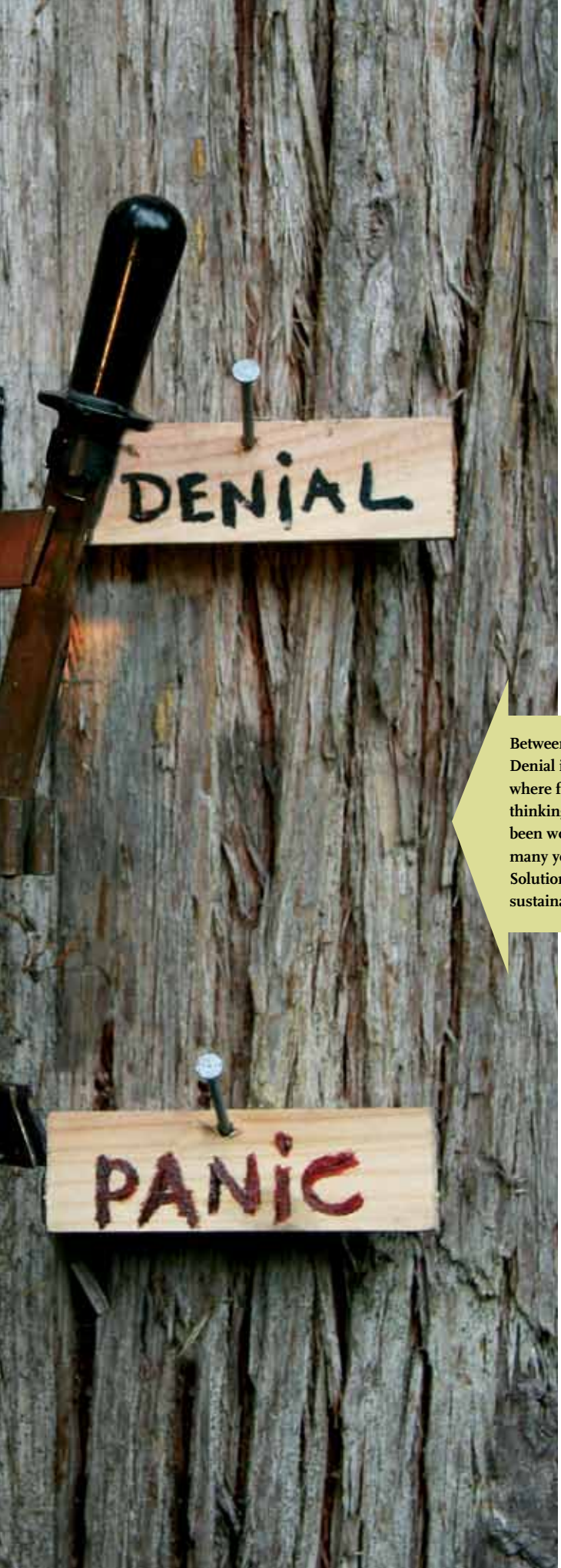
It doesn't have to be the end of the world. **BUILDINGS, ELECTRICITY** *production,* **TRANSPORTATION,** *and* **FOOD & FORESTRY** *contribute the bulk of the greenhouse gases. But climate-friendly options are ready. Author Guy Dauncey takes us out of this world as we begin to imagine some down-to-earth solutions.*

Guy Dauncey

Apollo to Earth: Houston, we're reporting a major carbon overload in the atmosphere. You're going to suffer serious overheating if you don't get it under control.

Earth to Apollo: We hear you. We spotted it 20 years ago, but the White House tells us not to worry and keeps cutting our budget. Any bright ideas?

Apollo to Earth: Hello, Houston? We have an interesting development here. We're getting clear visual signals, and they're not from Earth. Can you give us five minutes? ... You're not going to believe this, but it's true: we're not alone. We're being fed material from something called the Intergalactic



ZACH KYLE AND PAUL DUNN FOR YES! MAGAZINE

Between Panic and Denial is a place where forward-thinking people have been working for many years—Real Solutions for a sustainable world.

Archives. They say that the warming crisis is quite normal on planets that have a large store of fossilized energy. They recommend a rapid switch to simple energy, starting with the sun, wind, earth, and ocean. They're also telling us not to wait too long!

Earth to Apollo: You're creating quite a stir down here, Apollo. But that aside, how long do we have? There's talk of an 80 percent reduction in carbon emissions by 2050—will that cut it?

Apollo to Earth: 'Fraid not, Houston. They're saying 25 years, max, and similar planets that failed to make the switch suffered a 15 percent loss rate—total civilizational and ecological meltdown. Not a pretty picture. Ten million years for partial ecological recovery. You really don't want to go there, sir.

Earth to Apollo: Any advice that might help us?

Apollo to Earth: Yes. It seems that the planets that went down panicked. The Archives show that advanced intelligences get energized by vision, not fear. It's like football, sir—you win by determination and passion, not by reducing failure. The planets that failed forgot how to work together. Inspiration stopped, and the breakthroughs dried up. As the panic took over, people started hoarding and stopped believing in the future. Once that happened it was effectively all over, even though it took a couple of hundred years.

Earth to Apollo: You've got us rattled here, Apollo. Do they show any turnarounds? Any planets that were going down, that somehow made it?

Apollo to Earth: Yes—many. The Archives show that successful planets transformed their carbon crises into positive evolutionary leaps. They stopped blaming and started appreciating the intellectual capital that fossil fuels had given them, enabling them to develop solar and geothermal power. They stopped being fearful and defensive, and worked together to achieve a rapid transition. By re-igniting the creative impulse, they made the switch to new technologies and lifestyles far more easily.

Earth to Apollo: Thanks, Apollo. Seems we've got our work cut out down here. Over and out!

Guy Dauncey is a speaker, organizer, consultant, and author with Patrick Mazza of *Stormy Weather: 101 Solutions to Global Climate Change,* New Society Publishers.

The U.S. emits the equivalent of **7.26 gigatonnes** of CO_2 annually.

Our electricity production contributes **2.43 gigatonnes** of that.

WHAT WE CAN DO ABOUT ELECTRICITY

Our story of energy begins when humans discovered the secret of fire. We burned wood and brush to protect ourselves from predators, cook food, and, later, to survive the ice age. In 12th-century Europe, with the forests fast disappearing, we started burning the strange black stones we called coal. Later, we used coal to produce steam, launching the Industrial Revolution.

It is astonishing how far we have come. To anyone from the 18th century, our world today would be unbelievable. We burned the black stones, and their fossilized relations, oil and gas, and for those who have had abundant access to these resources, it has been good. But today the over-use of these fossil fuels is threatening life on Earth.

Now we are poised to move into our next era. We are coming to terms with the havoc we are creating by burning millions of years of the planet's stored sunlight in the blink of a geologic eye. And we are realizing that it is time to lay down these fossil fuels, while understanding that we could never have developed a solar photovoltaic (PV) cell, electric car, or super-efficient LED light bulb without the energy gift of those ancient life-forms. The sunlight they stored over millions of years has enabled us to build the intellectual capital necessary to meet our needs using current renewable energy from the sun, wind, earth, and oceans.

Solar energy, for example, offers an abundance of energy. Trans-Mediterranean Renewable Energy Cooperation has calculated that each year, a square kilometer of hot desert receives solar energy equivalent to 1.5 million barrels of oil. Worldwide, this is several hundred times more energy than we need. Similarly, analysts who have evaluated the solar resources in the southwest United States found that concentrating solar power could provide nearly 7,000 gigawatts of capacity, seven times more than the current total U.S. electric capacity. (Concentrating solar power uses parabolic mirrors to focus solar energy to heat a gas or liquid.)

We can also gather solar electricity directly using photovoltaics as many people are already doing in Germany, Japan, and California. We can gather energy from the wind—North Dakota alone has enough wind energy for 33 percent of current U.S. demand for electricity. We can gather energy from the waves and tides, and from underground, where the potential store of geothermal energy in granite, six to 10 kilometers down, could power all U.S. needs for 20,000 years.

The numbers do add up, especially when you look at the full global potential of each technology. The challenge is to ramp up fast enough to make the transition in time. The numbers improve considerably when you consider that we could improve efficiencies throughout our economy by two to 10 times, using today's technologies, and that the transition to electricity instead of liquid fuel for transport reduces the energy needed considerably.

Why, then, is there talk of nuclear power when it carries such dangers, and of as-yet unproven "clean" coal, with carbon capture and sequestration? The answer is probably financial—investors find it hard to walk away from their investments. They continue to side with the coal and oil industries that pay for their jet planes and mansions, even though they are fueling a climate catastrophe.

We need non-corrupted governments to cap the oil wells; lock up the coal mines; require super-efficiency in buildings, cars, and appliances; and redirect investments into renewable energy—as Sweden's government is doing with its commitment to end the country's dependency on oil by 2020. It is all doable: we just need the courage and belief to do it.

—Guy Dauncey

www.YesMagazine.org/cleanelectricity
for links and other resources

ROD DEL POZO, DELPOZOPHOTO.COM

Lummi Island Wild Co-op in Washington state launched the world's first solar-powered fishing vessel last year and is converting the rest of the reefnet salmon fleet this year. Reefnetting dates back more than 2,000 years; it uses little machinery and minimizes by-catch. The boats use the solar panels to operate seven heavy winches that position the stationary reefnet boat into the tide and haul in the nets. They use no other power sources on the boats. ***www.lummiislandwild.com***

Instead of More Coal Plants ...

What's the potential for carbon-free electricity production? Three countries—the U.S., India, and China—have plans in the next decade to build up to 850 new coal-fired plants, with an average capacity of 386 Megawatts. Together these plants would burn about 900 million tons of coal each year, producing about 2.5 billion tons of CO_2. How many coal plants could we replace if we turned to carbon-free renewables instead?

	Realizable Potential *(in Terawatt hours)*	Power Plants Replaced
Wind	4,890 (by 2040)	1,746
Solar Thermal	16,000 (by 2040)	5,714
Solar Photovoltaic	5,000 (by 2030)	1,786
Geothermal	138,000 (by 2020)	49,286

Source: citations at www.yesmagazine.org/cleanelectricity; photos from istock

YES! MAGAZINE GRAPHIC 2008

Let the Sun Shine In (and some wind, too)

Thin Solar Cells

A company in Palo Alto, California, will began manufacturing wafer-thin solar-electric photovoltaic cells by "printing" them onto aluminum foil, which insiders say will cut the cost of solar-cells in half. (Photovoltaics convert sunlight directly into electricity.) Nanosolar's aim is solar panels that cost 99 cents per watt—a number that has been the holy grail of solar cell manufacturers for 40 years. The company is one of several in Japan, Europe, China, and the U.S. racing to develop thin film solar. Nanosolar is owned by Martin Roscheisen, an Internet millionaire, with support from the founders of Google and other Silicon Valley entrepreneurs.

Offshore Wind Power

Offshore wind turbines could power the nine coastal states from Massachusetts to North Carolina, according to a new assessment of off-shore wind potential. Another study published earlier in 2007 shows that connecting dispersed wind farms into a single grid in the Midwestern U.S. can create a source of reliable, base-load (steady, rather than intermittent) power, even without storage.

Storing Wind Underground

A Dallas Center, Iowa, plant will store wind energy by pumping air underground, where it will be compressed for energy storage and later released to boost the efficiency of a natural gas turbine. A 3,000 megawatt wind farm in west Texas, being developed by TXU Corp. and Shell Wind Energy, will use a similar storage technique. The Electric Power Research Institute says there may be subterranean features under more than 85 percent of U.S. soil that could hold compressed air, making storage of large quantities of wind or solar power possible.

Adapted from: Rachels Newsletter, The Guardian, and Business Week.

Random Rays of Hope

• Production of photovoltaics jumped 50 percent in 2007 over 2006. At the end of the year, cumulative global production stood at 12,400 megawatts, enough to power 2.4 million U.S. homes.

• After almost tripling its PV production in 2006, China is believed to have more than doubled output in 2007. China is planning a 100-megawatt solar PV farm in Dunhuang City in Gansu Province, which would have five times the capacity of the largest PV power plant in the world today.

• The average price for a PV module, excluding installation and other system costs, has dropped from almost $100 per watt in 1975 to about $4 per watt.

Excerpted from "Solar Cell Production Jumps 50 Percent in 2007" by Jonathan G. Dorn, Earth Policy Institute.

Policies

Technologies

13 Best Energy Ideas (Plus a Few Duds)

Sarah van Gelder

Investments in energy projects will total $16 trillion in the next two decades. That investment—along with spending for long-lived buildings, transportation, manufacturing, and public works—could lock us into climate chaos. Or it could set us on the path toward a sustainable future. How can we make sure that this new infrastructure is climate friendly? For starters, it will have to be both highly efficient and powered by renewable energy—the sun, wind, earth, or ocean. A combination of the right policies and the right technologies can get us there. Here are our picks for the best (and a few of the worst) ideas:

Put a Price on Carbon

What: Carbon pollution costs the polluter nothing; all the rest of us pay the price. Carbon taxes and "cap & trade" mechanisms make it expensive to be a carbon polluter (see page 43 for how to do cap-and-trade right). Carbon taxes can be matched by reductions in income taxes to offset the higher prices consumers pay for energy and energy-intensive products.
Why: Making carbon emissions expensive encourages a switch to less carbon-intensive energy.
Examples: Sweden taxes CO_2 emissions, carbon-based fuels, and domestic flights, and cut taxes for labor and green fuels.

Ban the Bulb

What: Ban incandescent bulbs.
Why: Changing a 100-watt bulb to a compact fluorescent (CF) bulb cuts the equivalent of burning about 100 lbs. of coal.
Examples: Australia is banning the sale of incandescent bulbs as of 2010, and Canada, as of 2012. Brazil has replaced half its bulbs with CFs. New York is replacing traffic lights with ultra-efficient LEDs.

Make Fuels from Waste

What: Transform landfill methane, animal manure, or straw and other agricultural wastes into fuel.
Why: These produce energy without competing with food production. Methane capture reduces emissions of a greenhouse gas 25 times more potent than CO_2.
Cautions: Genetically modified microbes designed to break down cell walls in order to convert agricultural waste into a fuel are possible sources of life-destroying super bugs. Also, in some cases, agricultural waste may be more valuable as organic fertilizer, displacing artificial nitrogen fertilizers that emit nitrous oxide, a powerful greenhouse gas.

Nuclear Guarantees

What: Using taxpayer money to subsidize nuclear power.
Why: Investors know that nuclear power isn't economical without subsidies to cover waste disposal and catastrophic insurance. Nuclear power is expensive, a potential target for terrorism, and a source of nuclear weapons materials.

Coal Plants

What: Allow new coal plants only after sequestration technology is proven and required, and only if mountain-top removal is ended. Meanwhile, clean up and increase efficiency of old coal plants—or shut them down.
Why: Coal-fired plants account for 70% of greenhouse gas emissions from electricity production. Technology to safely capture CO_2 from the coal stack remains unproven.
Examples: Germany has cut coal use by over a third since 1990 through increased efficiency and by substituting wind power.

Food-Based Biofuels

What: Ethanol, palm oil, soy oil, and other food crops yield little net energy, drive up food costs, use up scarce fresh water, and harm the environment.
Also: A new study shows that just under half the biofuels studied cause more environmental disruption than fossil fuel burning.

Plug In Cars, Scooters, Bikes, and Trains

Why: Plug-in hybrids and electric cars are efficient and—when powered by renewables—climate friendly. (See page 37.)

Net Metering, Feed-In Tariffs

What: Require utilities to buy renewable energy produced by households or independent energy producers at a price set in advance.
Why: A known market with a set price provides certainty that spurs investment. A decentralized clean energy system results, which taps the entrepreneurship of many diverse players.
Example: As a result of Germany's Renewable Energy Act of 1999, which includes a feed-in policy, renewable energy jobs are up to 200,000, renewable energy is at 12% of total energy production, and annual installation of solar PV systems exceeds those in all other countries combined.

Localize Economies

What: Make, service, buy, and sell locally whenever possible.
Why: Cuts the climate costs of long-range transport. Local economies support long-term jobs, living within ecological means, diverse cultural expression, resilience, and decentralized power.
Also: Use scarce energy for essential transport, not for shipping Florida oranges to California.

Build Smart Grids

What: It's like the Internet, only for electricity. Smart grids can transport electricity from many, decentralized sources—including wind, solar, and other sources whose output varies over time—to where the demand is, in real time.
Why: Smart grids facilitate transition to renewable energy and vehicle-to-grid storage schemes (see page 37).

Shift the subsidy

What: Shift government subsidies from climate-trashing fossil fuels to climate-friendly renewables and energy efficiency. Each year, U.S. taxpayers subsidize the oil and gas industry to the tune of $39 billion and the coal industry by $8 billion.
Why: You get what you subsidize.
Examples: Belgium, France, and Japan have phased out subsidies for coal. China, Indonesia, and Nigeria have cut subsidies.

Grow Trees

What: Preserve forests as part of ecosystems. Plant trees in cities and suburbs—especially fruit and nut trees.
Why: Trees sequester carbon, underpin diverse life-supporting ecosystems, reduce the heat in population centers, feed people, and provide vital resources.
Examples: Ecuador is seeking international help to preserve virgin forests, home of indigenous peoples. (See page 25.)
Caution: Forests should be managed to enhance local ecosystems, indigenous control, and water and soil conservation.

Tax Credits for Renewables

What: Tax credits for those who install climate-friendly technology.
Why: A tax credit makes renewables affordable and builds the market to achieve economies of scale.
Examples: A tax credit of up to $2,000, available under the U.S. Energy Policy Act of 2005, helped to achieve a growth rate of 83% in PV installations in 2007, according to the Earth Policy Institute.

Profits for Efficiency

What: Build incentives for conservation by de-coupling utility profits from sales.
Why: If utilities can profit through selling efficiency, they will do so.
Examples: California, Oregon.

Get Efficient

What: Efficiency upgrades for appliances, cars, electronics, industry, buildings. Recycling. Waste reduction. This is the low-hanging fruit.
Why: These are the cheapest and least challenging to the American Way of Life, and can cut associated carbon emissions by half or more. Long-term jobs for efficiency retrofits strengthen the economy.
Examples: Germany and Japan require some cars, appliances, and office equipment to be recyclable.

Livable Communities

What: Compact communities where people can walk, bike, or take the bus.
Why: This is the most efficient way to live. It builds community and improves quality of life, especially for youth and elderly. And it can have major carbon benefits.
Examples: Most of Europe, where quality of life is high and emissions are half those of the United States.

WHAT WE CAN DO ABOUT TRANSPORTATION

Ten years ago, many people thought the transportation fuel of the future would be hydrogen. Then came the hopes of biofuels. Today, both dreams have gone, fallen to the reality of their full life-cycle energy equations and unsustainable sources.

There will still be a role for hydrogen, and for biofuel where it can be harvested sustainably from sewage, algae, seaweed and prairie grass. The emerging winner, however, is electricity. The electric vehicle, far from being dead, is being reborn as both pure electric (EV) by Tesla, G-Wiz, and Modec and as a Plug-in Hybrid Electric Vehicle (PHEV).

Our exploration of post-carbon travel should start with our legs, however. Our ancestors walked all around the planet, so let us reclaim the right to walk in safety and beauty on our Earth. Let us redesign our communities and suburbs with winding lanes that lead to woodlands and village stores. If 5 percent of our post-carbon travel is by foot, that's a 5 percent reduction in our need for liquid fuel.

Next comes the bicycle. In Copenhagen, Denmark, 33 percent of commuters bike to work. In Davis, California, where they have been building bike routes since the 1960s, 17 percent of commuters do the same. In Paris, the government has placed 20,000 Vélib' ("vélo liberté," or "bicycle freedom") bikes on the city's streets for anyone to use for a small charge. If your muscles ache, a quick electric conversion will make your bike fly up the hills. In snow-clad winters, cyclists ride with studded tires. If 10 percent of our trips are by bike, that's a cumulative 15 percent reduction.

Then there's transit. Boulder, Colorado, has redesigned its service to make the buses smaller and more frequent—increasing ridership five-fold. Hasselt, Belgium, has made its buses free, paid for by city taxes—increasing ridership 10-fold. In transit-friendly cities, buses have GPS and electronic timetables, so you know exactly when they'll come. We need to make a huge public investment in transit, bus rapid transit (like light rail transit, but on regular roads) and luxury commuter coaches with laptop plug-ins and frappuccinos. If 20 percent of our trips are thus, that's a cumulative 35 percent reduction, but since hybrid buses still need liquid fuel, we'll call it 30 percent.

Add teleworking and teleconferencing for 5 percent, trains and high speed trains for 5 percent, and ridesharing for 5 percent, and we've reduced our liquid fuel need by 45 percent. Now turn to cars. Since 80 percent of the car trips we take are within battery range of an EV or PHEV, this can further reduce our need for liquid fuel. If we use modern lightweight materials, trimming a vehicle's weight by as much as 80 percent, demand falls to around 5 percent, which could be covered by biofuels from wastes or algae.

To reduce the need for long-distance trucking, we must rebuild our local economies to meet most of our needs, and use hydrogen-enhanced hybrid biofueled trucks for what's left. For ocean shipping, the answer may be wind-powered SkySails and hydrogen harvested on mid-ocean platforms from the sun, wind and waves. For flying, maybe slow biofueled helium dirigibles, but otherwise, no easy answers.

A hundred years ago, most people were either walking, or riding a horse. The carbon age has provided us with a stepping stone between the past and the future. It is time to step off it, and into the future.

—Guy Dauncey

www.YesMagazine.org/coolcars
for links and other resources

IAN PAGE-ECHOLS, V8MEDIA.COM

Of the original 1,115 EV1's produced in 1997, only 40 or so still exist. These were disabled by General Motors and given to universities and museums with the stipulation that they not be driven as electric vehicles.

The Secret Lives of Plug-ins

Passionate and eclectic alliances are fueling hybrid passion, and, well ... it's electric

Sherry Boschert

Marc Geller of San Francisco has driven gasoline-free in electric cars for six years and more than 65,000 miles. A sales rep for a solar installer, he often travels hundreds of miles in a day without using a drop of oil.

Felix Kramer of Redwood City, California drives a Toyota Prius he had converted to a plug-in hybrid—one that, unlike standard hybrids, plugs into a regular 110-volt wall socket for recharging overnight. Kramer typically gets more than 100 miles per gallon in daily driving.

Both men say that driving on electricity has not inconvenienced them. It's been easier, in fact, because they seldom or never have to stop at a gas station.

The hard part was getting the cars.

Geller and thousands of other drivers were clamoring to buy the more than 5,000 leased electric cars, trucks and SUVs that California clean-air regulators forced automakers to produce between 1996 and 2003. As told in the 2006 documentary *Who Killed the Electric Car?*, once the state's Zero Emission Vehicle Regulation in 2003 no longer mandated electric cars, the car companies reclaimed the leased cars and crushed them for scrap. Geller co-founded the nonprofit Plug In America *(www.PlugInAmerica.org)* and helped lead a grassroots protest movement that saved more than 1,000 of the vehicles, one of which he drives today.

Kramer wanted a car that used electricity, but he didn't want to stop every 120-250 miles to recharge, as electric cars must. Plug-in hybrids go 10-60 miles on electricity but also have a gasoline tank and engine, so that they operate like conventional hybrids for long distance driving. Kramer founded the nonprofit California Cars Initiative *(www.CalCars.org)*, which generated a wildfire of demand for plug-in hybrids.

Why are they so driven to plug in their cars? And why the surge of activity around plug-in vehicles in the past year?

People concerned about climate change like the idea of moving away from gasoline-powered cars and trucks, which produce 33 percent of U.S. greenhouse gas emissions. Groups like the Rainforest Action Network and Global Exchange have formed an unusual alliance with conservative organizations that see liberation from foreign oil as a necessary step in improving national security. Former CIA Director and defense hawk James Woolsey (whose own home is partly solar-powered) calls the campaign for plug-in cars an alliance of hawks, tree huggers, do-gooders, religious evangelicals, and farmers (whose biofuels could be the backup fuel to electricity in plug-in hybrids).

Many environmentalists had to overcome an initial fear that driving on electricity would be dirtier than driving on gasoline, since more than half of U.S. electricity comes from coal, a notorious polluter. That fear turned out to be unfounded. Dozens of studies have shown that all-electric vehicles »

AMANDA KOVATTANA
AMANDAKOVATTANA.BLOGSPOT.COM

Sherry Boschert offers Sierra Club convention-goers a test ride in an electric car. She was competing with automakers who had paid convention organizers $3,000 per car for the right to offer rides in their green cars.

» are cleaner than conventional cars, hybrids, or futuristic hydrogen fuel-cell vehicles even if you count pollution from power plants as well as from tailpipes (called well-to-wheels emissions).

The Natural Resources Defense Council teamed up in 2007 with the Electric Power Research Institute to release the most detailed and sophisticated study of electric drive ever done. Plug-in hybrids can decrease greenhouse gas emissions by 7 percent to 46 percent between 2010 and 2050 compared with gas cars and conventional hybrids, depending on such variables as number of hybrids on the road and carbon emissions from the grid. The more it runs on electricity, the cleaner the car. (See *www.epri-reports.org.*) In fact, driving an all-electric vehicle cuts greenhouse gas emissions up to 65 percent, according to my review of more than 40 studies on well-to-wheels emissions.

And as more clean, renewable power gets added to the electrical grid—something that has to happen to have any hope of mitigating climate change—plug-in vehicles will get even cleaner.

That's just the start of the benefits of plugging in. The Federal Energy Regulatory Commission and utilities across the United States are studying plug-in cars equipped to feed some of the electricity stored in car batteries back to buildings or to the grid if needed. The most exciting application of this vehicle-to-building (V2B) or vehicle-to-grid (V2G) technology is to store intermittent renewable energy like wind or solar power.

The sun doesn't always shine, and the wind doesn't always blow, making it hard for society to rely on these ubiquitous forms of renewable power. The wind tends to blow mostly at night, when few people are awake to use wind power. Nighttime also happens to be the time when plug-in cars tend to be recharged. Wind power could be stored in the batteries, either for driving or for use by other parts of society through V2B and V2G.

The Sacramento, California, Municipal Utility District estimated, for example, that plug-in cars with V2G capability in just 39 percent of local households could store enough wind power on summer nights to feed the grid 1,500 MWh of electricity—about half the demand for a peak hour of summer cooling. Wireless communication systems would leave enough charge in the car for driving. Utilities might even pay drivers up front for the power, leading Federal Energy Regulatory Commissioner Jon Wellinghoff to dub plug-in cars "cash-back hybrids."

Drivers, utilities, environmentalists, and national security hawks all see something to like in plug-in vehicles. Consumers might make a profit of $400-$2,500 per year by buying less gasoline and having V2G contracts, Wellinghoff estimates. Utilities are interested in V2G because it can help "level" demand for electricity, shifting some demand to nights and reducing peak strain on power plants during the day. Environmentalists like the ideas of increasing renewable power use (the U.S. Department of Energy estimated that V2G cars could more than double our access to wind power) and of reducing reliance on conventional peak-demand power plants, which tend to be the dirtiest. National security hawks cheer the move away from petroleum and the fact that every building with solar panels and every plug-in car with V2G constitutes "distributed" energy that is less vulnerable to terrorist attack than a centralized power plant.

Today, advocates like Geller and Kramer are encouraged by the growing momentum for plug-in cars like the ones they drive every day, and frustrated at the same time. New plug-ins probably won't be available from major automakers until 2009, but a number of small companies hope to offer conversions of hybrids to plug-in hybrids starting in 2008. Meanwhile, consumers needn't sit quietly and wait, says Geller—they can help ensure that plug-ins hit the road and avoid political detours.

The more people who call the car companies at the phone numbers listed at *www.PlugInAmerica.org* and say they don't want gasoline-dependent cars, the sooner we'll see plug-ins, he suggests. "Tell them, 'I won't buy another new car unless it has a plug on it. No plug? No deal,'" says Geller. "Then we'll get these cars."

Sherry Boschert is author of *Plug-in Hybrids: The Cars That Will Recharge America* (New Society Publishers) and is on the board of Plug In America.

www.YesMagazine.org/electriccar to see the trailer for *Who Killed The Electric Car?*

Total global emissions are the equivalent of **31.6 gigatonnes** of CO_2 annually.

The world's agricultural meat industry contributes **5.7 gigatonnes** of that, and **6.3 gigatonnes** comes from forest destruction.

WHAT WE CAN DO ABOUT FOOD & FORESTS

The farm industries that put beef, pork, and dairy on our dinner tables account for 18 percent of global greenhouse emissions—a larger share than all the world's transportation.

Animal agriculture unleashes some of the most baneful greenhouse gases—methane from cows' stomachs (25 times stronger than CO_2) and nitrous oxide from animal manure and the use of nitrogen fertilizer (298 times more potent than CO_2). And too often, both cows and animal feed are raised on slashed and burned rainforest land, releasing more CO_2.

The solution lies on our dinner plates. We need to eat less meat and dairy, turning instead to the tastes, pleasures, and health benefits of vegetarian food. If locally grown and organic, so much the better, since organic farming stores carbon in the soil, and eating locally grown reduces the carbon emissions from shipping. Research shows that organic farming can produce as much food as industrialized farming in the developed world and increase yields two to threefold in developing countries (because many of their existing farming methods are less productive to begin with).

The destruction of the world's tropical rainforests releases 17 percent of the world's carbon emissions. We must go out of our way to protect the forests in the Amazon, Congo, and Indonesia by buying threatened forests, placing them in trust for indigenous inhabitants, and paying for policing against illegal loggers.

Gaviotas, a social experiment in the barren savannah lands of eastern Colombia, provides one inspiring model. The visionary *Gavioteros* have created a thriving carbon-neutral community complete with hospital, solar water treatment plant, and wind turbines. By planting trees, they have begun changing local rainfall cycles and restoring ancient rainforest—all in what was an almost uninhabitable landscape, proving that anything is possible.

Another miracle goes by the name terra preta—rich, black charcoal soil that stores huge quantities of carbon while making the land more fertile (see page 42).

As we enter the post-carbon world, we must learn how to reharmonize farming and forestry with nature's carbon cycles.

—Guy Dauncey

Interested? Read about journalist Alan Weisman's journey to remote Gaviotas at www.yesmagazine.org/gaviotas

www.YesMagazine.org/foodandforests
for links and other resources

DAGMAR NELSON, MILKAWAY.SMUGMUG.COM

Eighteen percent of the climate change problem is associated with raising, feeding, and transporting meat. Cutting back on meat consumption is a way to immediately reduce climate impact.

Appalachia

Down a Greener Road Slowly—but Surely

Madeline Ostrander

More than a decade ago, when farmers, loggers, and entrepreneurs from Ohio, Kentucky, Virginia, Tennessee, and West Virginia set out to re-energize flagging local economies, they weren't thinking about climate change. They were creating jobs and building communities. But as they rediscovered local living, they set in motion a regional economy that can last in a low-carbon world. They formed the Central Appalachian Network (CAN) to reinvest in their region's ecology and people.

Central Appalachia is rich in ecological capital: hardwood forests, rivers, and productive farmland. For more than a century, Appalachian wealth has been overused and undervalued—with timber, coal, and tobacco shipped to distant markets, leaving behind local communities wrestling with poverty and ecological devastation.

In 1997, CAN partners opened the region's first "kitchen incubator" in Athens, Ohio, a shared kitchen space approved by the health department and available to local farmers and chefs for new business ventures that use regional food. A second kitchen incubator launched a few years later in Tennessee, in a renovated former primary school. These two facilities hatched hundreds of businesses and generated millions of dollars in organic, local sales.

CAN's strategies have yielded powerful results. In Virginia and Tennessee, former tobacco growers turned to organic vegetables. Soils at organic farms, according to Rodale Institute research, capture carbon (bound up in compost and organic matter) and keep it out of the atmosphere. And the vegetables now make shorter trips that use less fuel. These growers now sell thousands of cases of local organic fruits and vegetables and free-range eggs every week. The high quality "seconds" from these farms reach low-income families through a partnership with a food bank.

Several CAN groups have brought climate-friendly sustainable forest practices to 14,000 acres of timberland, letting trees grow older and managing soil to store more carbon. CAN partners have also raised $3 million of ginseng under forest shade. New flooring businesses have sprouted, using sustainable wood dried in solar and wood-waste kilns.

They created an art and farmers' market where several hundred West Virginia artisans now sell pottery, wood, and food. West Virginia stores, eager to cash in on new business opportunities, began featuring their local wares.

CAN partners now operate loan funds that support environmentally and socially responsible businesses. To date, CAN has invested more than $14 million in local businesses whose products range from solar hot water heaters to arctic char, a freshwater fish that can be raised in reclaimed mine pits.

More than 1,000 farms and small businesses now provide 750 grocers,

HHFF

ROANOKE TIMES

Jason Rutledge's Healing Harvest Forest Foundation is one of the regional initiatives promoting responsible forestry in the Appalachians. He uses horse-powered forestry and ecosystem science "to address human needs for forest products while creating a nurturing coexistence between the forest and the human community."

supermarkets, and other retail venues with sustainable food, wood, and other products. The vast majority of these products are selling regionally within a 400-mile radius, reducing shipping by 75 percent or more. The essential infrastructure for regional, sustainable economies is emerging, including produce packinghouses and regional distribution networks.

It's not just "foodies" and "hippie farmers," but working families, low-income seniors, farmers, and entrepreneurs who together are creating everyday products for ordinary folks.

At a farmers' market, a patron offered this reflection on the region's burgeoning green economy: "I used to think 'living green' was just about what I had to give up, but now I feel like my life is much richer because of it."

Anthony Flaccavento, executive director of Appalachian Sustainable Development—a member organization of CAN—contributed substantially to the content and ideas in this piece.

Putting the Trees Before the Horse

Healing Harvest Forest Foundation combines old and new. Its forestry practitioners rely on horse-drawn carts, which may seem quaint, but their logging techniques are inspired by some of the best ideas in forest science. Workhorses can selectively take out trees more gently than machines, leaving young understory poplars and oaks intact so they can mature into the next timber giants. Healing Harvest trains apprentices to cut the "worst first." Trees prone to insect infestation—with cracks, dead limbs, and scars—become saw logs and pallet lumber. Occasionally, practitioners harvest high-grade logs from "worst first" trees for furniture and flooring. The strategy promotes "all ages" forests, with 50-year-old trees next to saplings, creating a diverse ecosystem that supports wildlife and healthy soils.

"When practicing restorative forestry … we believe we are creating a 'carbon positive' method," says Healing Harvest president Jason Rutledge. "We grow the healthiest trees to as large as possible, increasing carbon storage."

Interested? www.healingharvestforestfoundation.org

www.YesMagazine.org/Rutledge
Jason Rutledge's vision of a sustainable Appalachia

Terra Preta, a Solution Buried in the Dirt

Brooke Jarvis

With so many nutrients caught up in the life cycles of lush forest plants, most soil in the Amazon Basin is nutrient-poor clay. But throughout the region, pockets of fertile, dark soil ("terra preta" in Portuguese) can be found.

Terra preta is the product of slash-and-char agriculture practiced centuries ago by indigenous farmers who baked wood to charcoal and worked it into the soil. Centuries later, the soil they created remains the region's most fertile farmland: productivity is higher, far less fertilizer and fallow time are required, and soils support a larger variety of more nutritious crops.

But the real reason that terra preta is big news today is that these dark soils represent the possibility of natural, long-term carbon sequestration, a way to return some of the carbon once stored in fossil fuels back to the ground.

Carbon in charcoal does not reoxidize to become CO_2, as does the carbon stored in plants when they decompose. Nearly half of the carbon content of biomass that is charred and returned to the soil can remain stable for hundreds and even thousands of years—keeping carbon out of the atmosphere far longer than other, more cyclical biological sinks like no-till farming or planting trees.

The challenge with agrichar (as modern bio-charcoal is called) is to avoid the negative side effects that plague many biofuels. Producing biomass for agrichar doesn't have to come at the cost of deforestation or increased industrial farming. Instead, the millions of tons of agricultural waste discarded every year—plus municipal and yard waste, manure, and even, potentially, sewage—can be used, much of their carbon sequestered for centuries rather than returning quickly to the atmosphere as CO_2.

In addition to reducing the amount of carbon circulating into the atmosphere, agrichar also creates some handy by-products: bio-oil and gases that can be used to generate heat and electricity.

The Amazing Power of Green Slime

Margit Christenson

Soybeans and corn have long dominated the biofuels arena, leaving unassuming, unicellular algae overlooked as a viable energy crop. Far more efficient than their agricultural counterparts, algae are also a biological sink, consuming the carbon dioxide we spew into the atmosphere. The more CO_2 algae consume, the more they reproduce and grow into a rich source for biofuels, forming a beautiful, green, and gooey cycle.

The vitality of algae relies on carbon dioxide. Co_2 emissions from industrial plants can be pumped through algal screens, reducing emissions into the atmosphere by 40 to 80 percent and feeding one of the most efficient biofuel sources known to scientists. The captured CO_2 emissions are released when the algae biofuel is burned, but because the CO_2 waste is recycled, it replaces a fossil fuel.

The oil in algae can be converted into biodiesel and its carbohydrate components into ethanol. Both burn cleaner than coal or petroleum, and neither relies on deforestation and land depletion like most biofuels. While an acre of oil-palm trees, now the world's largest source of biodiesel, produces approximately 650 gallons of oil, algae has the potential to produce more than 10,000 gallons of oil per acre.

Start-up costs are high to mass-produce algae, a plant that's fussy about temperature and levels of CO_2. But the payoff could be vast.

Michael Briggs of the University of New Hampshire Biodiesel Group hypothesizes in his 2004 report that one-eighth of the Sonoran Desert in the southwestern United States, if dedicated to algae farming, could supply the transportation fuel needs of the United States.

Claim Your Piece of the Sky —It's Going Fast

DAVIS AYER

Peter Barnes

The atmosphere is different from private property—all living beings share it, which makes it a commons. But that doesn't stop corporations from trying to privatize it by persuading Congress to grant them free pollution rights in the future, becoming, in effect, landlords of our common sky.

Who *should* own the sky? Polluting corporations? The government? Or all of us as co-owners? How we answer this question will determine the kind of carbon capping system we have.

The Right Price for Carbon

From a climate perspective, we want carbon prices to be as high as possible: the higher the carbon price, the less dirty coal we'll burn, and the more we'll invest in clean alternatives like wind and solar power.

At present, the price of emitting carbon is zero. The right price of carbon is the price that maintains climate stability. Capping carbon (without allowing offsets) will move us toward that price.

A carbon cap functions through the issuance of permits, the number of which is reduced each year. As the number of carbon permits falls, their price rises, and this spurs investment in clean alternatives.

Carbon permits can be traded, giving businesses flexibility in reducing emissions. To simplify the capping process, carbon would be capped where it enters the economy, not where it enters the atmosphere. This could be easily administered because only a few hundred companies bring fossil fuels into the U.S. or "produce" it here. Imports of products from countries with low carbon prices would face border fees, which would financially protect climate-friendly manufacturers and workers.

This falling carbon cap is the best way to guarantee a pre-determined decrease in carbon emissions by a predetermined date. That's because it's an absolute limit on emissions, rather than just an incentive or a regulation.

The idea of pollutant cap and trade got its first major test with the Clean Air Act of 1990, which cut sulfur-dioxide emissions and is widely considered a success.

In 2005, the European Union was less successful when it applied the sulfur model to carbon. Big companies used their political clout to get free permits, which led to huge windfalls for them, and higher prices for everyone else, and no reduction in carbon emissions.

Europe's experience shows that capping carbon can generate large private windfalls or equally large public revenues, depending on how it is set up.

How to Cap Carbon

Carbon capping comes in three varieties: In cap-and-giveaway, permits are given free to historic polluters, leading to high windfalls for these companies. In cap-and-auction, permits are sold to polluters, and the government collects the revenue. In cap-and-dividend, permits are also sold, but the income doesn't go to the government—it goes to all of us equally. This would be similar to the Alaska Permanent Fund, which draws from an investment fund built with state oil income to pay all Alaskans equal yearly dividends.

The cap-and-dividend system reduces carbon emissions while protecting household incomes. The system works by auctioning permits and returning the revenue to all residents equally. Since everyone gets the same amount back, you gain if you conserve and lose if you guzzle. The winners are thus everyone who conserves fossil fuel—plus our children who inherit a stable climate.

How Carbon Capping Works

If done right, a descending economy-wide carbon cap is the single best tool to fight climate change. If done wrong, a cap won't reduce emissions sufficiently and will transfer hundreds of billions of dollars from families to corporate polluters.

The right way
- Cover all carbon as it enters the economy
- Sell permits rather than giving them away free
- Allow no offsets
- Rebate permit revenue to individuals in the form of dividends

The wrong way
- Exempt sectors or industries
- Give polluters free permits
- Put the burden of higher energy costs on families

Peter Barnes is a writer, senior fellow at the Tomales Bay Institute, and former president of Working Assets Long Distance. This article was excerpted from *Climate Solutions: A Citizen's Guide* (Chelsea Green, 2008).

Beyond Lightbulbs

The Jones Household Goes Carbon Free in 10 Years

START HERE

YEAR 1

A Big Difference from Small Changes

The family starts off with easy changes: They wash clothes in cold water and air dry them in the summer, replace incandescent bulbs with compact fluorescents (CFLs), turn off their computer when not in use. That's an instant, virtually free savings of 6,200 pounds of CO_2. They make one simple transportation change: One of the adults commutes by bus three days a week—enough to see whether it can be done, but keeping the second car just in case. That's worth another 2,200 pounds. They're down to 51,600 pounds and it hasn't cost them anything but the price of the CFLs and a clothesline. They're actually saving money.

60,000 lbs
– 8,400 lbs
51,600 lbs

YEAR 2

Home Improvement

They stop donating so much heat to the outdoors: attic and basement insulation, sealing and insulating heat ducts, and patching the large air leaks typical of standard construction saves them a whopping 7,100 pounds. These savings aren't free up front, but the savings in heating and cooling bills will repay the cost over time. Besides, Mrs. Jones is handy with home repair, and does a lot of this work herself. Down to 44,500 per year.

51,600 lbs
– 7,100 lbs
44,500 lbs

YEAR 3

House and Car

The bus commute's gone well, so Mr. Jones now buses to work all the time. They've worked on consolidating trips outside work, and find they can do without the second car altogether. That's 5,900 pounds gone. They finish weatherproofing their house: beefing up wall insulation, weatherizing doors and windows, and upgrading to high performance windows. Another 1,800 pounds disappear. They're at 36,800.

44,500 lbs
– 7,700 lbs
36,800 lbs

YEAR 4

Shed Carbon on Vacation

Instead of flying for their annual vacation, the Joneses take the train: a leisurely way to save 7,200 pounds every year. (If they took the bus, they'd save even more.) They're at 29,600 pounds per year—halfway there a year early.

36,800 lbs
– 7,200 lbs
29,600 lbs

YEAR 5

Car Upgrade

Time to replace the car. Thanks to consumer demand, electric cars have become widely available, and they buy one. Even charging on dirty power, they save 9,000 pounds. Household total is now 20,600.

29,600 lbs
– 9,000 lbs
20,600 lbs

Brooke Jarvis and Doug Pibel

Meet the Joneses. They're your average U.S. energy consumers. They haven't yet upgraded to energy-efficient appliances, their house needs better insulation, and they keep the place as cool in the summer and warm in the winter as most Americans do. The two adults commute 30 miles each per day, in separate cars with average fuel efficiency, and every year they each drive an additional 4,500 miles running errands and taking their child to soccer games and violin practice. The family takes one vacation trip per year, flying to visit grandparents 1,350 miles away. How much CO_2 do their house and cars produce? We figure it at 60,000 pounds, or 10 tons for each family member.

Lately, though, the Joneses have been reading about climate change, and they're getting worried. Ecological crisis has never felt so urgent before. Even little Joey Jones is talking greenhouse gases—he learned at school that scientists are predicting a worldwide climate catastrophe that will change the rest of his life, unless we stop the worst effects by making big changes in the next ten years. The Joneses decide: change is necessary, and they're ready to do their part. But how much can they really do? A lot, it turns out.

In 10 years, without sacrificing their way of life, the Jones family eliminates the CO_2 emissions that their home and transportation used to create—the bulk of their carbon footprint.

Count Your Carbon

Want to keep up with the Joneses? Here are the numbers we used. Use them to find—then shrink—your own carbon footprint.

	CO_2 output, in pounds
Gallon of gas	**19.36**
Gallon of fuel oil or diesel	**22.38**
Kilowatt hour of electricity (national average)	**1.43**
Therm of natural gas	**11.71**
Gallon of propane	**12.67**
Per passenger:	
Airplane mile	**1.28**
Train mile	**0.42**
Long-distance bus mile	**0.18**
Local mass transit mile	**0.50**
Electric bike mile	**0.02**

The Rest of the Story

The Joneses only changed their housing and transport habits. How can you go further?

Eat meatless. For every day of the week you skip meat, you'll save 215 lbs. per year.

Buy local. Most food eaten in the U.S. has traveled 1,500 miles to your plate.

Be a low-impact consumer. Choose local products, reduce the stuff you buy, and save embedded energy by buying used.

Reduce waste. Stop junk mail, reduce packaging, and reduce the 2,020 lbs. each American's waste produces annually.

Avoid the McMansion. A smaller house saves a lot of carbon: on average, 11.4 lbs. of CO_2 per square foot per year.

YEAR 6

Hot and Cold

They improve their water system, including insulating their hot water heater and their pipes, and also lower the temperature of their water heater: 1,000 pounds down. When the old refrigerator kicks the bucket, the Joneses buy a new energy-efficient one and finally unplug a second fridge in the garage, knocking off another 1,300. Total remaining: 18,300.

20,600 lbs − 2,300 lbs = 18,300 lbs

YEAR 7

Close to Home

Grandma and Grandpa retire and move nearby. The Joneses now vacation within the range of their electric car, saving 3,300 pounds of CO_2 each year. The city converts its bus fleet to clean electricity, which saves another 1,200 pounds. They're down to 13,800.

18,300 lbs − 4,500 lbs = 13,800 lbs

YEAR 8

A Few More Things Around the House

An efficient clothes washer saves carbon on its own, and saves dryer time. With all the money they're saving, they decide it's time to invest in a solar hot water system. Total: 2,000. Leaving 11,800.

13,800 lbs − 2,000 lbs = 11,800 lbs

YEAR 9

Electric Bikes

While the Joneses have been on this journey, their town has responded to citizen pressure and gone bike friendly. The new bike paths make it easy for both to ride to work. To ease the hills, they buy electric bikes. There are four months of the year when they can't bike, so they continue their usual commute patterns then. Savings: 3,500. Total remaining: 8,300.

11,800 lbs − 3,500 lbs = 8,300 lbs

YEAR 10

Green Power

The Joneses' furnace has been groaning and working overtime. They replace it with an electric heat pump, which also cools the house in summer. They also buy certified green, renewable power from their electric company, and the switch from coal plants eliminates the remaining 8,300 pounds of CO_2 produced by the electricity for their house and car.

8,300 lbs − 8,300 lbs = 0 lbs

Sources: Rocky Mountain Institute, Bureau of Transportation Statistics, Environmental Protection Agency, Department of Energy, University of Chicago.
Illustration by Kayann Legg / I-S

Leading the Way

As U.S. leaders take half-measures or worse, youth, evangelicals, mayors, and others step into the void

SHADIA FAYNE WOOD

At Power Shift 2007 in November, young people put politicians on notice. They want action, not more rhetoric, on an issue that will define their lives.

Youth Feel the Power

They have the most to lose, but they've got the energy to win

Shadia Fayne Wood

"MAMA, WHAT'S THAT?" a little girl urgently asked her mother. I was visiting the National Museum of Natural History one morning in Washington, D.C., when I overheard this conversation.

"It's a polar bear, honey," her mother said after looking at a giant photograph of a polar bear clinging to the remains of an iceberg in the midst of the vast ocean.

"Why is everything melting, mama?" Looking at her daughter, the mother seemed to ponder the question, and then just turned away as her little girl gaped up at the photo.

I was floored. This, in a nutshell, is how youth are left to deal with a problem that we had little part in creating.

I wanted to kneel down beside this child and tell her that I'm sorry. I'm sorry that we now have to fight for our future. I'm sorry that children her age are already dying from the impacts of climate change and from the extraction, processing, and use of dirty energy in New Orleans, in Iraq, in Detroit, on Native American reservations, and the list goes on. I wanted to explain why, because that is at least what is owed to us.

And I wanted to tell her that she's not alone. There's a whole world of youth mobilizing around this issue, and we are only getting stronger.

The Youth Climate Movement began for me at the World Summit on Sustainable Development in 2002. I was 15

years old, in South Africa helping draft the Youth Caucus Energy Policy. It was not the first time I had learned about climate change, but it was the first time the impacts felt real to me. I listened to youth that had their own personal stories of the impacts of climate change in their lives. I watched political leaders negotiate my future in a haphazard way. This scared me to my core, and it became clear to me that something needed to be done.

During the next years, I worked with those same youth, and many others, to develop the Energy Action Coalition, which unites a diversity of youth-led organizations to create just climate solutions on campuses, in communities, and nationally.

That same coalition went on to create the Campus Climate Challenge, a campaign on over 700 campuses and high schools in support of just climate solutions.

It was many of the same youth who were among the group that envisioned and brought to life Power Shift 2007, the first national youth summit aimed at solving the climate crisis.

Youth are motivated. We have the raw passion, the edge, and now—through skill shares, youth-led conferences, panel discussions, and the largest youth convergence on climate change in history—we have the skills and the knowledge to make our vision a reality.

As youth, we are literally fighting for our lives. We are from communities already feeling the impact of climate change, and we are from the generation that has the most to lose.

We are scared of the destabilization in our climate, but we also see this as an opportunity to shift our society and to be allies to the people who are especially affected by climate change—communities of color, indigenous communities, and low-income communities.

Youth are tired of living in a broken system built on the back of racism. And we are ready for this opportunity to change the systems to actually serve the people—all people.

In November, 6,000 of us gathered in Washington, D.C., for Power Shift 2007. What was it like?

Power Shift 2007 was a transformation we could feel in our stomachs. We talked late into the night, questioning what we knew and speaking truth to what we are building. We participated in the largest lobby day on global warming, demanding that any climate legislation include 5 million new green jobs, a moratorium on coal-fired power plants, and a reduction in fossil fuel emissions of 80 percent by 2050 and 40 percent by 2020. This is not the ideal; this is what is necessary. We danced on the front lawn of the Capitol of the United States of America. We poured in from all over the country and from different parts of the world to be part of it. Power Shift 2007 was excitement palpable enough to wear.

Whether we are gathering in the thousands, hundreds, or by the handful, we are realizing our potential as climate activists. We experience our power, and we feel the love for one another. The movement is alive and breathing the smoggy air all around us.

The momentum is building. My generation outnumbers the baby-boomers by 3 million, and we are the largest age group in the United States. We are in every congressional district, and polls show that youth are coming out to vote in larger numbers than ever before.

And we are organizing. Here in the United States, if our representatives are not doing their job to push for bold and just climate solutions for all peoples then they should start browsing the job ads to get ready for November 2008.

We must each carry this burning fire within us as we work in our local communities, remembering to tend it and take care of ourselves so that it does not burn out. Our movement stays strong when we are strong. So, share your dinners, your fears, and your hopes. Love those around you, so we can truly have a power shift.

Shadia Fayne Wood, 20, is editor of itsgettinghotinhere.org, *Dispatches from the Global Youth Climate Movement*, and an organizer and photo-journalist.

Evangelicals & Climate Scientists

Genesis of an unlikely alliance

Calvin B. Dewitt

Twenty-eight senior evangelical leaders and world-renowned climate scientists took a leap of faith when they met at Melhana, a secluded Georgia plantation, in December 2006.

Years of politically charged dissent over evolution had distanced the mostly pro-Bush, socially conservative evangelicals from scientists—and the case for preventing global warming. But the Melhana group had reasons to believe that understanding between the two sides was possible. Reverend Richard Cizik, a leader with the National Association of Evangelicals and organizer of the Melhana meeting, had converted from a climate skeptic to a believer four years previously at a Christian environmental forum. As he heard evidence of shrinking ice caps and increasing hurricane intensity, he had an experience "not unlike my earlier conversion to Christ," he says. Cizik has since fought staunch opposition within the evangelical movement to speak out for action on climate change.

The tension between the climate scientists and evangelicals dissolved at Melhana. "We quickly came to realize that we shared exactly the same reverence and the same con- »

FERMI PROJECT, FERMIPROJECT.COM/Q

Rev. Rich Cizik and Majora Carter of Sustainable South Bronx discuss environmental stewardship and why Christians should care at the 2007 Q gathering.

» cern about what is happening to the creation," said James McCarthy, Harvard scientist and president-elect of the American Association for the Advancement of Science.

Together the group drafted an "Urgent Call to Action," stating, "We believe that the protection of life on Earth ... requires a new moral awakening to a compelling demand, clearly articulated in Scripture and supported by science ... We pledge to work together at every level to lead our nation toward a responsible care for creation."

In the year since Melhana, evangelicals have continued to seek urgent action on global warming. The Evangelical Climate Initiative has run a series of ads defining the issue as a moral imperative, and Reverend Jim Ball, representing more than 100 evangelical leaders, testified in July before the Senate Environment and Public Works Committee, calling for a "vigorous response" to climate change, including cap-and-trade, a carbon tax, and policies that protect the poor. In August 2007, Cizik led another group of evangelicals and scientists through Alaska to witness firsthand glacial melting and the devastation of an island village off the Alaska coast.

The climate of discussion is changing within the evangelical community, giving renewed hope for Earth—a hope that is widely shared by other faiths and communities.

Calvin B. Dewitt is an ecologist, professor, cofounder of the Evangelical Environmental Network and the Au Sable Institute, and author of *Earth-Wise: A Biblical Response to Environmental Issues*.

Mayors Stand Up

Cities lead where feds fear to tread

Madeline Ostrander

In the vacuum left by federal inaction on climate change, social movements have launched in unexpected places—including city hall.

In 2005, Seattle Mayor Greg Nickels rallied mayors across the country to commit to Kyoto standards in their cities. "We hoped against hope that we would sign up 141 cities, one for every country that had signed onto Kyoto," Nickels says. But he unleashed a groundswell. Three years later, nearly 800 mayors, representing 1 in 4 Americans, have signed the Mayors Climate Protection Agreement.

Some of the cities most actively pursuing climate protection lie in red states. For instance, in Texas in 2006, a bipartisan coalition of roughly 30 cities and towns fought off eight proposed coal-fired power plants—a win driven by the fiery energy of Laura Miller, then mayor of Dallas, who spent three months haranguing on coal in larger cities and in towns so tiny they held public hearings in barns. Two hundred miles away in Austin, Mayor Will Wynn has put in place some of the country's most ambitious climate goals: all city operations and new single-family home construction must be carbon-neutral in less than 15 years, not through offsets but by relying on solar, wind, and biomass.

Other cities on the Nickels climate team have longstanding green reputations. Mayor Richard Daley declared his goal to make Chicago "The Greenest City in America" in 2002, after years of promoting city gardens, green buildings, and urban renewal. Chicago's climate program now targets city infrastructure, with plans to meet 20 percent of municipal electricity demand through renewables within the next five years. Chicago also claims the highest installed photovoltaic energy production of any city outside California.

Likewise, Portland, long known for promoting transit, bicycles, and livability, is one of the first cities to propose a carbon tax, targeting builders that fail to meet stringent energy efficiency targets on new construction.

Other cities have taken more modest steps toward Kyoto goals: public education, tree planting, handing out compact fluorescents. But their collective action makes the case that more is possible.

At a November congressional field hearing, the mayors of Miami, Seattle, New York, and Trenton excoriated the federal government for failing to regulate greenhouse gases. The hearing concluded a two-day U.S. Conference of Mayors meeting on climate in Seattle, during which New York City Mayor Michael Bloomberg called on Congress to fund more clean energy research, raise gas mileage

POP!TECH INSTITUTE

Van Jones of the Ella Baker Center for Human Rights discusses the Green Collar Revolution at Pop!Tech 2007.

standards, and institute a carbon tax. "I believe it's time for both ends of Pennsylvania Avenue to come together around a national strategy on climate change and to lead the way on an international strategy," he said. "And I believe that until they do, it's our job as mayors to point the way forward."

Madeline Ostrander served as a program manager and then consultant for the U.S. Conference of Mayors Environment Program prior to joining the *YES!* magazine staff as associate editor.

Green Jobs For All

People left out of the fossil fuel economy stand tall in the green economy

Ian Kim

Global problems demand world-class leadership from every sector. Fortunately, the right kind of leadership and organization is emerging to meet the challenges of climate change.

These new leaders are addressing questions too often overlooked in mainstream debate: Can we build solutions that involve and include everyone, especially those most vulnerable to the impacts of climate change? How do we provide all people with equal protection from climate disasters, as well as equal access to environmental solutions and opportunities?

In November, at the Energy Action Coalition's Power Shift conference, more than 6,000 bright-eyed students and youth from all over the country converged on Washington, D.C., to demand bold solutions for the climate crisis. Simultaneously, thousands more self-organized in small and large groups for the national "Step It Up" day of action to call for change.

And in December, the president signed a tepid Energy Bill. While the package left many environmental activists disappointed—and rightly so—there was at least one provision tucked into the Energy Bill that should give everyone something to cheer about: The Green Jobs Act of 2007.

For the first time in history, a U.S. law addresses both the climate crisis and the poverty crisis by investing in green-collar job training. The Green Jobs Act authorizes $125 million annually for greening the nation's workforce, enough for training up to 30,000 people every year for jobs in emerging "green" sectors like the solar and wind industries, green building construction, biofuel production and more. Even more unprecedented, it allocates $25 million for "green pathways out of poverty," providing targeted resources for low-income individuals who have the greatest need for training and career pathways in the clean energy economy.

Many grassroots and advocacy groups worked hard all year to achieve this victory, including the Apollo Alliance, the Workforce Alliance, the Center for American Progress, the Energy Action Coalition, the Ella Baker Center for Human Rights, and Green For All. The Act's provisions were inspired by the local successes of grassroots organizations like Sustainable South Bronx, People's Grocery, the »

» Green Worker Cooperatives, and Solar Richmond.

It is especially important to note the growing number of "eco-equity" champions within Congress: House Speaker Nancy Pelosi, Representatives George Miller, John Tierney and Hilda Solis, and Senators Hillary Clinton and Bernie Sanders all helped push, pull, and carry this victory across the finish line.

To be sure, we still have a long way to go. These victories are just the beginning—small down-payments on the massive, necessary investments we must make to curb global warming.

But what you can see here is the start of a dream team of solutioneers—a coalition of some of the nation's best environmentalists, labor union leaders, social justice activists, and business entrepreneurs, all working together and cultivating strong relationships with the right lawmakers.

We need solutions at every level, from people in every sector, if we are to save ourselves from the climate crisis. Indeed, efforts are doomed if they get stuck in elite subcultures instead of including broad, vibrantly diverse coalitions.

What's exciting is that it appears the right elements are beginning to come together, with the potential to turn this climate crisis—one of the biggest challenges in human history—into a moment for deep, radical social change in this country.

Ian Kim is the director of the Green Collar Jobs Campaign at the Ella Baker Center for Human Rights.

Communities in Transition

Less carbon—more skills and connection

Doug Pibel

Rob Hopkins was teaching permaculture in Kinsale, Ireland, when he encountered the concept of peak oil. Hopkins and his students were shocked at the looming prospect of a world without cheap energy, and at the absence of plans to deal with the repercussions. Rather than wait for someone else to act—government or otherwise—they figured out how to address the problem, one community at a time.

Hopkins says, "The idea emerged that the future with less oil could be preferable. But we need to rediscover what was actually good about life before cheap oil."

Their work led to the Transition Towns movement,

which claims 26 communities as members in the United Kingdom, with 400 more worldwide expressing interest in becoming transition communities—people taking charge of preparing their communities to make a graceful entry into a low-energy world.

The essence of the Transition Town concept is building resilience at the community level. As Hopkins points out, it is only in the last half-century that oil has become the central force in all aspects of our lives, moving people, moving food, and removing both the sense of community and the skills for local mutual support.

During World War II, Hopkins says, Victory Gardens were an important part of the food supply. At the time, growing food in the back yard was not a great challenge—most people were at most a generation away from some sort of home food production. Those who were not had ready access to the knowledge of neighbors or elders.

In the years since World War II, we've so absorbed the notion that food should come from trucks that a Victory Garden would be beyond the capability of most. Similarly, cheap clothing shipped across the world has made sewing a quaint thing of the past. Skills that were commonplace less than 100 years ago have disappeared. What we've lost, says Hopkins, is resilience.

The Transition Towns movement aims to rebuild that, from the ground up. One key to the success of the movement has been that it invites people on a journey of change, starting where they are right now, rather than using fear or guilt as motivators. The news about peak oil and climate change is still poorly understood by many; helping people adjust to what seems very bad news is part of the transition town program.

Equally important is an emphasis on solutions and positive possibilities. Hopkins offered a 10-week "Skilling Up for Powerdown" course in Transition Town Totnes, where he now lives. The course took participants from an introduction to peak oil and climate change through all aspects of transition life—food, housing, energy, money, and personal preparation. Transition Town Totnes has an active program of planting nut trees in private and municipal spaces, an exercise in making carbon-consuming trees a food source.

Citizens of Transition Town Westcliff, in the United Kingdom, are exploring how to prepare for a carbon-constrained world. The town is creating an Energy Descent Action Plan. From top to bottom: community gardens, sustainable transportation, and a cardboard classroom.

PHOTOS BY FRED ROBINSON, DEBBIE BURNETT, AND GRAHAM BURNETT

They've introduced the Totnes pound, a local currency that has seen 10 thousand one-pound notes go into circulation in the last year.

Transition Town initiatives are purely grassroots. That is a matter of necessity, since even local governments are behind the curve on the issue. It is also a matter of preference. If a low-carbon future means reliance on community resources, no one knows those better than the locals.

The Transition Towns movement responds to the challenges of peak oil, climate change, and sustainability. Not a happy combination. But, says Hopkins, "It feels to me that one of the reasons the Transition Towns movement has grown so fast is that it is positive in a time where it is hard to find positivity, solutions-based in a time when the problems are so glaringly obvious, and fun, in a time where we're not supposed to have time for that any more."

Doug Pibel is *YES!* Managing Editor.

Unions, Churches, & Schools

The power to make a green transition

Doug Pibel

TWO NEW GROUPS in the state of Washington are melding an awareness of the urgency of climate change with the organizing tools of the Industrial Areas Foundation to produce jobs that employ young people and can't be moved overseas.

Founded in Chicago in 1940 by Saul Alinsky, the Industrial Areas Foundation (IAF) fosters social change by organizing among natural allies in trade unions, churches, education, nonprofits, and other voluntary associations. The IAF is founded on a belief in deep democracy, and it draws its members and leaders from all strata of society.

The Spokane Alliance, an IAF affiliate started in 2002, took on as an early project a demand that the Bonneville Power Administration (BPA) stop hiring out-of-area workers for public-works projects. When 750 Spokane Alliance members showed up at a hearing to negotiate with the BPA, the result was a commitment to local hires, with 80 percent of the work on a half-billion dollar repair job done by locals.

In a world where buildings produce more than »

» 30 to 40 percent of CO_2, the future is in making buildings cleaner. The building trades that belong to the Spokane Alliance are training young people in the skills that will transform existing buildings and build new ones to operate on tiny carbon budgets. Negotiations with the Spokane School Board around a $161 million bond for energy efficiency in school buildings resulted in training 63 apprentices during building retrofits. An offshoot of the Spokane Alliance, Sustainable Works NW, is working on four retrofit projects, with more in the pipeline.

Soph Davenport is a young sheet-metal worker from the Puget-Sound based Sound Alliance. "In college, I did some token stuff about the environment," Davenport says, "but I had no sense of being able to do anything about climate change. Now I'm doing something that really makes a difference."

"That sense of purpose is critical for the many young people who will not be going to college," says Tom Cruver, of the Bethel Education Association. In his 37 years of teaching, Cruver has seen a steady decline in programs to prepare young people for the trades. He's joined with the Sound Alliance to push for developing a skill center in the Bethel School District, near Tacoma, Washington, to bring back the classes that give direction to kids not headed for college.

During the next 30 years, 75 percent of buildings will be replaced nationally, according to Dick Harmon, IAF Northwest lead organizer. With green building techniques, new buildings can reduce energy use by more than half, Harmon says. The IAF plans to be there, putting its empowered citizens to work in "good green jobs that can't be outsourced."

Stopping climate change is not a job for the elite. "You have to have the middle class and the working poor to build political power to do anything about climate change," Harmon says. The Spokane and Sound Alliances and their citizen leaders are making those groups leaders in confronting climate change.

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If you're really paying attention, it's hard to escape a sense of outrage, fear, despair. Author, deep-ecologist, and Buddhist scholar Joanna Macy says: Don't even try.

The Greatest Danger

BRIAN HAMILTON, SIRBRIAN.COM

Joanna Macy

How do we live with the fact that we are destroying our world? What do we make of the loss of glaciers, the melting Arctic, island nations swamped by the sea, widening deserts, and drying farmlands?

Because of social taboos, despair at the state of our world and fear for our future are rarely acknowledged. The suppression of despair, like that of any deep recurring response, contributes to the numbing of the psyche. Expressions of anguish or outrage are muted, deadened as if a nerve had been cut. This refusal to feel impoverishes our emotional and sensory life. Flowers are dimmer and less fragrant, our loves less ecstatic. We create diversions for ourselves as individuals and as nations, in the fights we pick, the aims we pursue, and the stuff we buy.

Of all the dangers we face, from climate chaos to permanent war, none is so great as this deadening of our response. For psychic numbing impedes our capacity to process and respond to information. The energy expended in pushing down despair is diverted from more crucial uses, depleting the resilience and imagination needed for fresh visions and strategies.

Zen poet Thich Nhat Hanh was asked, "what do we most need to do to save our world?" His answer was this: "What we most need to do is to hear within us the sounds of the Earth crying."

Cracking the Shell

How do we confront what we scarcely dare to think? How do we face our grief, fear, and rage without "going to pieces?"

It is good to realize that falling apart is not such a bad thing. Indeed, it is as essential to transformation as the »

» cracking of outgrown shells. Anxieties and doubts can be healthy and creative, not only for the person, but for the society, because they permit new and original approaches to reality.

What disintegrates in periods of rapid transformation is not the self, but its defenses and assumptions. Self-protection restricts vision and movement like a suit of armor, making it harder to adapt. Going to pieces, however uncomfortable, can open us up to new perceptions, new data, and new responses.

In our culture, despair is feared and resisted because it represents a loss of control. We're ashamed of it and dodge it by demanding instant solutions to problems. We seek the quick fix. This cultural habit obscures our perceptions and fosters a dangerous innocence of the real world.

Acknowledging despair, on the other hand, involves nothing more mysterious than telling the truth about what we see and know and feel is happening to our world. When corporate-controlled media keep the public in the dark, and power-holders manipulate events to create a climate of fear and obedience, truth-telling is like oxygen. It enlivens and returns us to health and vigor.

Belonging to All Life

Sharing what is in our heartmind brings a welcome shift in identity, as we recognize that the anger, grief, and fear we feel for our world are not reducible to concerns for our individual welfare or even survival. Our concerns are far larger than our own private needs and wants. Pain for the world—the outrage and the sorrow—breaks us open to a larger sense of who we are. It is a doorway to the realization of our mutual belonging in the web of life.

Many of us fear that confrontation with despair will bring loneliness and isolation. On the contrary, in letting go of old defenses, we find truer community. And in community, we learn to trust our inner responses to our world—and find our power.

You are not alone! We are part of a vast, global movement: the epochal transition from empire to Earth community. This is the Great Turning. And the excitement, the alarm, even the overwhelm we feel, are all part of our waking up to this collective adventure.

As in any true adventure, there is risk and uncertainty. Our corporate economy is destroying both itself and the natural world. Its effect on living systems is what David Korten calls the Great Unraveling. It is happening at the same time as the Great Turning, and we cannot know which way the story will end.

Let's drop the notion that we can manage our planet for our own comfort and profit—or even that we can now be its ultimate redeemers. It is a delusion. Let's accept, in its place, the radical uncertainty of our time, even the uncertainty of survival.

In primal societies, adolescents go through rites of passage, where confronting their own mortality is a gateway to maturity. In analogous ways, climate change calls us to recognize our own mortality as a species. With the gift of uncertainty, we can grow up and accept the rights and responsibility of planetary adulthood. Then we know fully that we belong, inextricably, to the web of life, and we can serve it, and let its strength flow through us.

Uncertainty, when accepted, sheds a bright light on the power of intention. Intention is what you can count on: not the outcome, but the motivation you bring, the vision you hold, the compass setting you choose to follow. Our intention and resolve can save us from getting lost in grief.

During a recent visit to Kentucky, I learned what is happening to the landscape and culture of Appalachia: how coal companies use dynamite to pulverize everything above the underground seams of coal; how bulldozers and dragline machines 20-stories high push away the "overburden" of woodlands and top soil, filling the valleys. I saw how activists there are held steady by sheer intention. Though the nation seems oblivious to this tragedy, these men and women persist in the vision that Appalachia can, in part, be saved and that future generations may know slopes of sweet gum, sassafras, magnolia, the stirrings of bobcat and coon, and, in the hollows, the music of fiddle and fresh flowing streams. They seem to know—and, when we let down our guard, we too know—that we are living parts of the living body of Earth.

Speaking the truth of our anguish for the world brings down the walls between us, drawing us into deep solidarity. That solidarity is all the more real for the uncertainty we face.

This is the gift of the Great Turning. When we open our eyes to what is happening, even when it breaks our hearts, we discover our true size; for our heart, when it breaks open, can hold the whole universe. We discover how speaking the truth of our anguish for the world brings down the walls between us, drawing us into deep solidarity. That solidarity, with our neighbors and all that lives, is all the more real for the uncertainty we face.

When we stop distracting ourselves by trying to figure the chances of success or failure, our minds and hearts are liberated into the present moment. This moment then becomes alive, charged with possibilities, as we realize how lucky we are to be alive now, to take part in this planetary adventure.

Joanna Macy is a scholar of Buddhism, general systems theory and deep ecology, whose latest book is *World as Lover, World as Self*. She lives in Berkeley, CA. www.joannamacy.net

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