The Land Report

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Connecting Climate and Energy in Public Imagination

David W. Orr: Optimism and Hope in a Hotter Time

Herman E. Daly: From “Know How” to “Do Now”

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Cover: *Hay Rack*, woodcut by Harry Shokler. From the Steven Schmidt Collection, courtesy of the Spencer Museum of Art, University of Kansas.

Want to share a story from *The Land Report*? Unless the writer objects, you may photocopy from the magazine or get the piece by e-mail. Write to Scott at bontz@landinstitute.org or our street address in the column at right, or call him at 785-823-5376.

The Land Institute Mission Statement

When people, land and community are as one, all three members prosper; when they relate not as members but as competing interests, all three are exploited. By consulting nature as the source and measure of that membership, The Land Institute seeks to develop an agriculture that will save soil from being lost or poisoned, while promoting a community life at once prosperous and enduring.

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At the Land

Perennial Grain Breeding
Breeder David Van Tassel is studying how the density of plants in a given area affects their growth, including seed yield. Packing plants together allows the crop to cover the ground with leaves more quickly, gives more heads per acre and makes smaller plants on average—potentially good things. But packed plants might dry the soil too early. And plants that are stunted—with small heads, thinner, weaker stalks and shorter roots—could be more vulnerable to wind or drought. Getting the most grain over five to 10 years, some of them wet and some of them dry, might take a compromise density.

Managing density could be a special challenge with perennial grains, which is our mission and something new to farming. Unlike annuals, which start from seed each year, herbaceous perennials usually reproduce clonally, increasing root and stem density. Clonal species could eventually reach a steady density, but it might be much higher than best for grain production. We want to know if we can breed perennials to control their own density, or if we'll need to thin them.

In addition to reading literature from past studies of density and yield, David has begun a greenhouse experiment with sunflowers.

He's also developing a database to track individual plants, experiments, seed populations and pedigrees for all of our breeding.

Perennial sunflowers from cross-breeding different species made seeds last year. Some plants made many, and in a few cases there were many seeds larger than those in the perennial parent plant, though still small compared with those from the annual parent. From this harvest we plan to plant select seeds in early spring.

Sheila Cox found seed in about 40 new crosses she made between annual sunflower varieties and several perennial sunflower species. Some of these seeds have been planted in the greenhouse. Sheila will try to cross results with proven hybrids, ones that had good seeds and pollen production.

More than 95 percent of the wheat hybrids that the perennial wheat program made last winter, mostly by crossing existing hybrids with the perennial intermediate wheatgrass, could not make pollen. Plant breeder Lee DeHaan's crew is crossing these with the few pollen producers to see if seeds form. Male-sterility is a common hurdle in crossing species, but over generations can be overcome to make fertile plants that don't need such babying.

From a breeding nursery for wheatgrass, which he is selecting from directly to make a grain crop, in addition to crossing with wheat, Lee found a few extremely large seeds. They were about three times the size of the usual in wheatgrass grown only as forage. In the greenhouse, the young plants from these seeds appeared so robust the he initially thought they were wheat plants, not the slower perennial. Large seed can make for rapid establishment of a plant, will make harvesting easier, and will produce better flour when milled.

New Staff Members
Maril Hazlett, Eileen Horn and Christina Arnold work for our Climate & Energy Project, which is featured in the this *Land Report*. For more about them see page 5. The project's goal is to help Midwesterners understand how the connection of energy and climate affects their lives, and what they can do about it.

New Board Member
Steve Ells is founder and chief executive officer of Chipotle Mexican Grill, which makes fast food but aims for fresh ingredients, and over its 15 years increasingly has applied ethics to how the food is raised. The publicly traded, Denver-based business has more than 640 restaurants.

Presentations Made
Wes Jackson was among interview subjects in *The 11th Hour*, an ecological crisis documentary produced and narrated by Leonardo DiCaprio, and released last fall.

Filmmaker Aaron Lucich interviewed Jackson and institute scientists Jerry Glover and Cindy Cox for *We Are What We Eat*, a documentary about the effects of how food is grown. For more, see wearewhatweeatthemovie.com.

Wes also was interviewed for a project called YERT, Your Environmental Road Trip. For a year, Mark Dixon, Ben Evans and Julie Dingman Evans are visiting all 50 states "with video camera in hand and tongue in cheek" to report on Americans and environmental sustainability. See www.yert.com.

Wes spoke at the Federal Reserve Bank in Chicago, in Charleston, South Carolina, for talks sponsored by Center for Humans and Nature, at the University of Florida in Gainesville, and in Albuquerque, New Mexico, for The Quivira Coalition. Managing Director Ken Warren spoke for a sustainability seminar at Kansas State University.

Presentations Scheduled
April 7, Pitzer College, Claremont, California.
April 9, University of California, Santa Barbara.
April 22, International Symposium on Agroterrorism, Kansas City, Missouri.

The previous dates are tentative. Call to confirm.
May 3, Webster University, St. Louis.
August 5, North American Prairie Conference, Winona, Minnesota.
September 5, Muddy Boot Organic Festival, Portland, Oregon.

For more, call or see Calendar at www.landinstitute.org.

On Climate and Energy, an Invitation—R.S.V.P.

Just over a year ago, my beloved father-in-law and I had what he calls a "spirited conversation" in the kitchen. Wes had just testified in Topeka and Lawrence against two large, coal-fired power plants proposed for western Kansas. I respectfully submitted that a successful fight against global warming would go well beyond testimony in eastern Kansas—that it would require broad, deep engagement with the citizens of the Midwest and would focus more on positive, can-do solutions than on crippling threats. As those who know me can well imagine, I got all impassioned and populist on him.

So then Wes said, "How important is this issue to you?" Full of conviction, I replied, echoing our friend David Orr, that global warming has to be at the top of the list, that if we get this wrong, everything else I care about—social justice, education, health care, ecological balance, and in the bargain our bountiful Kansas River valley and my girls' future—is threatened.

"Would you quit your job," he asked, "to work on this full time?" I loved my job and the remarkable people I worked with. I had been at the University of Kansas for more than a decade, and had long chosen security over risk in virtually all things. But without hesitation I answered, "In a heartbeat." And a few weeks later, I took a giant, incredibly uncomfortable leap into the unknown and did just that.

Fair warning: That's what climate change will do to you. The enormity of the risk—and the immediate availability of myriad solutions—dawns fully first in your mind, then moves stealthily toward your heart. Once comfortably nestled in both head and heart, the issue proves impossible to dislodge—it colors each new consumer choice, every vote and a surprising number of conversations.

We at The Land Institute, an organization long dedicated to the future of food and farmers, are determined to do all we can to get our friends and neighbors thinking, talking and learning about climate change and its solutions.

As you will see in this *Land Report*, we are looking for every angle of entry: respectful, compassionate, creative ways to begin conversations that foster dialogue rather than provoking knee-jerk reactions or dismissal. We welcome your suggestions, and challenge you to employ your most creative idea today with a skeptical co-worker, neighbor or relative.

Friends, we are in a race—to avoid the worst global warming and to adapt creatively to the changes we've already bought. We can and must win this one *together*, with the likeminded supporting the otherwise-inclined.

Are you in?

Nancy Jackson
Executive director, Climate & Energy Project

The Climate & Energy Project works to develop conversations about our state's energy future.

This past year, we've embarked on several programs that connect residents, legislators and students with balanced and credible information about climate change and energy in Kansas.

In addition to telling of our programs here, we've included tools for you, readers of the *Land Report*. In the following pages you'll find actions for combating climate change as individuals, and also tips for our collective action. In these critical times, we must work together to engage our elected leaders, friends, families and neighbors in conversation.

To learn even more, please visit our Web site, www.climateandenergy.org.

CEP
climate + energy project

Our Approach

The Climate & Energy Project seeks to reduce greenhouse gas emissions by 60 to 80 percent by 2050 and avoid triggering the worst climate change. That's a tall order.

With a small staff, an urgent mission and a dedication to spending charitable dollars wisely and well, our first task was to develop effective strategy. Put another way, we needed to figure how we might most effectively support the deepest cuts, the fastest. Here is what we discovered.

Today, much of the Midwest gets 75 percent of its electricity from coal, a tremendous source of greenhouse gas emissions. The world's coal reserves are five times larger than oil and natural gas reserves combined. So, the electric industry appeared to present the opportunity for the greatest cuts. But could they be fast?

That's where things really got exciting. Because in fact, the electric industry expects that the federal government will act to reduce greenhouse gas emissions, effectively putting a price on carbon dioxide, whether through cap-and-trade or an outright tax. Many utilities are seeking to reduce their exposure to such financial risks.

The United States in general and the Midwest in particular have two relatively quick and cost-effective ways to reduce greenhouse gas emissions and build a bridge to a renewable energy economy in the 21st century. First, energy efficiency and conservation can make speedy and often permanent demand reductions at considerably lower cost than new generation. Second, aggressive development of renewable energy, which is increasingly cost competitive, provides alternatives to traditional, fossil-fueled generation. Neither strategy is sufficient in itself, but together they have tremendous power to reduce emissions in the short term and create resiliency for the long haul.

Energy efficiency means using less energy to power our lives. It is the "first fuel" because it is often cheaper and easier to attain than new sources of electricity generation. Efficiency means using the best technology to get the most from energy. We get it with things like compact fluorescent lights, appliances with Energy Star certification and better building insulation and weather sealing.

Utilities tend to like technological efficiency—smart meters, programmable thermostats, building renovations. That is because we humans are fallible animals. We want to do well, but in practice, those who change key behaviors—forego summer air conditioning, for example, turn heat down at night in winter, abbreviate hot showers or hang clothes on the line—frequently revert to previous behaviors or adopt new ones. Nifty gadgets—and buildings that are tighter in the first place—allow utilities to reduce demand dependably for fairly accurate resource planning.

Of course, energy efficiency is most powerful when combined with voluntary, long-term behavior changes: conservation. Many reading these pages will be familiar with Amory Lovins' concept of the negawatt—the most powerful kilowatt hour is the one you don't use. As above, these are the toughest changes to make and to maintain—and should be pursued with vigor.

Renewable energy refers to electricity supplied from sources that are continuously replenished. They include wind, sun, geothermal, water and various forms of biomass. Kansas ranks third in wind energy potential, so much of our work at CEP focuses on supporting commercial, community and small-scale wind development.

We seek to foster conversations at every level, from grass-roots to high policy. Change in either area without the other will prove difficult to implement. Yet together, grass-roots sentiment and ambitious policy will succeed in producing speedy and permanent emission reductions, putting us on track to meet our goal of 30 percent by 2030 and 60 to 80 percent by 2050.

Climate & Energy Project Staff

Nancy Jackson, executive director, holds a master's degree in environmental history and brings experience in scholarly publishing and equities research. She raises funds for the project and keeps CEP engaged in the Governor's Wind Working Group and work groups for the Midwest Governors Association Greenhouse Gas Accord and the Presidential Climate Action Plan.

As projects director, Scott Allegrucci manages CEP's relationships with press, as well as projects including statewide wind workshops and energy efficiency public service announcements. He was director of tourism for Kansas, has a degree in anthropology, and has been an actor, writer and director.

Maril Hazlett, who holds a doctorate in environmental history, is research director. She also manages the project's Web site, www.climateandenergy.org.

Eileen Horn, community outreach coordinator, works to foster discussion with communities across Kansas. She has a master's degree in natural resources.

Helping keep all at the project in order is administrative assistant Christina Arnold, who has a bachelor's degree in journalism.

Our Projects

The Climate & Energy Project works to connect people, organizations and ideas for conversations about our energy future. This past year, we've begun several projects to give residents, legislators and students good information and get them talking about what to do.

CEP Poll

What do Kansans really think about climate and energy? Rather than accept the popular stereotypes, such as "Kansans support coal power and don't want to develop wind energy," the CEP commissioned an independent polling firm to establish a solid understanding of public opinion.

Our intent wasn't to release results, but to use them for designing our educational programs. However, the findings were so contrary to conventional wisdom that we changed our minds.

Here is what the poll found: 62 percent of Kansans agreed with the state Health and Environment secretary's decision to deny air quality permits for two proposed 700-megawatt coal burning plants. Thirty-one percent disagreed, with 7 percent unsure. Support for the decision rose to 70 percent in the Kansas suburbs of Kansas City. In western Kansas, where the plants would be built, a remarkable 51 percent favored the decision, 40 percent disagreed. In the rest of the state, 30 percent or less disagreed. The survey also found that an overwhelming 75 percent of Kansans favored a more aggressive pursuit of wind energy.

The poll has been widely cited in state and national media to challenge stereotypes of Kansans' opinions and broaden conversation about climate and energy. A January 14 *Wichita Eagle* editorial said, "The Kansas Legislature is gearing up for a potentially nasty and unproductive session on energy, with some lawmakers vowing to overturn the Sebelius administration's denial of the Holcomb coal-plant expansion. Before they get too up in arms, though, they might want to check with their constituents. … Some lawmakers rushed to dismiss the survey, saying it was commissioned by an environmental group (true, Salina's Land Institute). ... But there's nothing to indicate the poll was leading or biased. The wording was neutral and fair."

Community Wind Forums

Developing renewable energy is one of the ways we can reduce greenhouse gas emissions and prevent further climate change. Wind power is a proven technology, operational and profitable throughout the world, and the Midwest is rich in wind energy potential.

Kansas ranks third in the nation for wind energy potential. The National Renewable Energy Laboratory estimates that by 2030 the state could produce 7,100 megawatts of wind energy. Its peak summer demand is about 11,000 megawatts. But Kansas lags other states, and by the end of 2008 will field just over 1,000 megawatts.

Wind developers of all sizes can fill this gap. We especially support community wind projects, to keep revenue in the state and help rural economies. Minnesota, Iowa and Texas boast numerous successful examples of community wind, including farmer-owned cooperatives, and wind installations at schools that provide both energy and a profit. To date, however, policy supports for community wind do not exist in Kansas.

In an interview on blog.climateandenergy.org, Kansas Rural Center's executive director, Dan Nagengast, said, "I would like to see a whole new layer of economy spread out over as much of rural Kansas as possible—with lots of opportunities, with people moving back out to rural Kansas. People in cities trying to catch trains so they can move out to rural Kansas, trying to figure out how they can be a part of the rebirth. There would be another whole level of industry and jobs based on manufacturing energy technologies that don't have environmental or greenhouse gas implications. I'd like to see Kansas a much more prosperous place."

In spring CEP will work with the center to hold six Community Wind Forums in western Kansas.

The prevailing theories were that civilizations collapsed because of political, military or medical reasons—plagues. Climate was often factored out. And yet, indifference to the power of nature is civilization's Achilles' heel. —Heidi Cullen, host of the Weather Channel's *Forecast Earth*, in an interview with *The New York Times*

Take Charge!
Community Energy Forums

Concern over climate change has galvanized mainstream public interest in the environment like never before. More than anything, the Climate & Energy Project finds that people are hungry for information. Learning about climate and energy from the popular media can be difficult and confusing—and learning about it from pundits is all but impossible. By sponsoring the Take Charge! Community Energy Forums, CEP helped the public meet directly with specialists who can answer their questions.

The forums were held at Kansas Wesleyan University in Salina, Johnson County Community College in Overland Park, Kansas, and Washburn University in the capital, Topeka. By working with universities, CEP hoped to foster dialogue among students, other residents and legislators. Four hundred people attended.

They met panelists including energy utility executives, wind developers and researchers for the Intergovernmental Panel on Climate Change who took scores of questions about wind energy, energy efficiency, energy transmission, climate change and carbon regulation. Interest kept each event going well past its scheduled time.

"What is your dream for Kansas' energy future?"

That's what we asked people at our energy forums. Here are some of their answers:

"A reliable and efficient source of energy that wouldn't be damaging to the environment as well as our finances."

"To be totally dependent on renewable energy, while still protecting intact, native grasslands and the wildlife that inhabit them."

"To become a major wind energy supplier to our nation."

"A conservation consciousness among Kansans."

"A balanced set of energy options."

"Energy provided at an affordable price for poor people as well as rich."

From left, Wendell Nickell, Jerry Brown and Frank Costanza at the forum January 21 in Salina. Costanza is with wind developer Tradewind Energy. Scott Bontz photo.

What You'll Find on Our Web Site

Even for people who closely follow news about the environment, keeping up on climate and energy can be complex. For those just starting to take serious notice, finding simple, reliable information presents an even greater challenge. To help, the Climate & Energy Project developed a Web site both extensive and easily used, www.climateandenergy.org.

Early results confirm that our strategy is working. A high proportion of users spend a long time browsing through our issue summaries, glossary and other features. They follow links to resources like the Intergovernmental Panel on Climate Change, Kansas State University Extension's Energy Conservation Tips, and Windpowering America, which is a program of the Energy Department's Office of Energy Efficiency and Renewable Energy.

Being able to link facts about climate and energy science to your daily life and environment makes you more likely to act on what you know. One of the site's goals is to cultivate feelings of connection, belonging and stewardship. Ultimately, it is this sense of place that will make the difference in addressing climate change.

The Features

Exploring the Issues
Succinct, comprehensive summaries of climate change, renewable energy, energy security, energy efficiency and energy transport.

For Digging Deeper
Fact sheets, glossary, library of resources and a timely blog.

How to Act
Practical steps for energy use, with pointers for farms, businesses and congregations, and protecting natural resources.

Pass It On
Tell someone else what you've learned about climate and energy, and share your thoughts with legislators, too.

Newsletter
Provide your e-mail address to receive our quarterly newsletter, *Currents,* for news about climate and energy, our work, interviews with climate and energy specialists and profiles of work by everyday people.

Edward C. Robison III photo, as used on the Climate & Energy Project's Web site.

Want to Make a Difference Today?

By using efficient technologies that are already available, the American Council for an Energy Efficient Economy says, we could slash by almost 80 percent the cost of heating, cooling and lighting our workplaces and homes. Even modest increases in energy efficiency could eliminate the need for 600 new power plants projected on current use patterns, growing population and replacement of old plants.

From our Web site, here's a sample of tips for efficiency and conservation. For more, see www.climateandenergy.org/TakeStep/TakestepsOverview/Index/htm.

For Free

■ Appliances can draw power even when not in use—an unseen drain called phantom load. Consider plugging your TVs, DVD players, computers, etc., into power strips, then pull that one plug when you turn them off.

■ Small, rechargeable electronics like cell phones and iPods continue to draw up to 95 percent of the electricity even when fully charged. Only plug them in when you need to charge them. When they are fully charged, unplug the charger from the outlet.

■ At night during the winter, lower your thermostat 7 to 10 degrees.

■ Know that for every degree you raise an air conditioner thermostat in summer, energy consumption falls 3 to 5 percent.

■ Myth: Once the air conditioner is on, you should leave it on all summer. Really, you can turn it on only at night to help you sleep.

■ Use the microwave, Crock-Pot and toaster oven more often than the stovetop or oven, which use much more energy.

■ Lower the temperature on the hot water heater to no more than 120 degrees. Water heating can account for 14 to 25 percent of the energy consumed in your home.

For $25 and Less

■ Use compact fluorescent lights, replacing first the incandescent bulbs in fixtures that you use most. If every U.S. household replaced their five highest-use fixtures with compact fluorescents, we would prevent the emission of greenhouse gases equivalent to the annual emissions from more than 8 million cars. You can also save up to $67 on energy costs over the lifetime of a single bulb.

■ Check your furnace or air conditioner filter every month, and clean and replace it as needed. Dirty filters increase bills and shorten appliance life.

■ Insulate hot water tanks, hot water pipes and exposed ductwork in basements, attics and crawlspaces.

■ Seal and weather-strip doors and windows.

From $25 to $500

■ When buying any appliance, check not just purchase price, but what energy costs will be over the product's life. Check for EnergyStar labels.

■ Get a home energy audit. Check with your utility company for someone who provides this service.

■ Install a programmable thermostat that will adjust the temperature automatically during hours no one is home.

■ Add extra insulation to your attic. Ideally, all U.S. homes should have between R-38 and R-49. Also seal and insulate basements and crawlspaces.

■ Do you need to replace your water heating system? Consider a tankless water heater, which provides on-demand hot water rather than keeping 40 gallons hot constantly.

Conversation Starters

To start and to continue a conversation about climate change and energy is often challenging. The ideas are complex, and can invoke conflicting desires.

At the Climate & Energy Project, we've found that because of the field's complexity, there are several entry points, including science, technology, economics, national security and moral responsibility. On the next two pages we've pulled together some of the most thorough research in these areas and highlighted the main points.

So next time someone asks, "Why should I care about climate change?" you'll be ready with an answer.

The Science

Due to rising concern about climate change, in 1988 the United Nations established the Intergovernmental Panel on Climate Change. The IPCC released reports in 1990, 1995, 2001 and 2007. Here are the main points, taken from the 4th Assessment's Executive Summary for Policymakers, at www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.

■ Eleven of the last 12 years (1995-2006) rank among the 12 warmest in the record of global surface temperature since 1850.

■ Evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases. Of particular concern are the melting of Arctic sea ice and ice sheets, which have historically acted to reflect substantial energy coming from the sun, and might now contribute to accelerated warming. Similarly, the southern oceans, which have historically absorbed carbon dioxide, are increasingly unable.

■ Atmospheric concentrations of carbon dioxide today are more than 30 percent greater than at any other time in the past 700,000 years. Global increases in carbon dioxide concentration are due primarily to fossil fuel use, with land-use change—including the growth of cities, the clearing of forests and the spread of agriculture—providing another significant but smaller contribution.

■ Changes in extreme weather, together with sea level rise, are expected mostly to hurt natural and human systems.

■ Many effects can be reduced, delayed or avoided by reducing rapidly our global greenhouse gas emissions. Many of those reductions are available at cost savings and could be achieved all but immediately. The longer we delay, the more it costs, both to halt climate change and to deal with its effects.

The Economics

Taken largely from "Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?" produced by McKinsey & Company. The report is at http://www.mckinsey.com/clientservice/ccsi/greenhousegas.asp.

■ Annual greenhouse gas emissions in the United States are projected to rise from 7.2 billion tons in 2005 to 9.7 billion tons in 2030—an increase of 35 percent. That is the path to avoid. McKinsey says we can reduce greenhouse gas emissions 3 to 4.5 billion tons at costs less than $50 per ton. Nearly 40 percent of those reductions could be achieved at negative cost—that is, with positive economic returns over the lifecycle of the investment. Achieving these reductions at the lowest cost to the economy will require strong, coordinated action—and soon.

■ McKinsey estimates the following savings by sector. Energy efficiency in building and appliances: 710-870 million tons. Increasing fuel efficiency in vehicles and the carbon intensity of transportation fuels: 340-660 million tons. Improvements in industry, including process changes, motor efficiency and combined heat and power: 620-770 million tons. Increasing forest stocks and improving soil management practices to sequester carbon in soil: 440-590 million tons. Changing power generation to include more wind and solar, possibly nuclear, and eventually carbon capture and storage: 800-1,570 million tons. This is the most capital-intensive category.

■ Much of the technology required to cut emissions dramatically is available today. To unlock that potential, we need strong policy. For strong policy, we must recognize the collective effect of individual decisions, embrace paybacks in five to 10 years rather than the currently desired two to three years, and do away with traditional mismatches between who pays the cost of reduction and who gains the benefit—such as homebuilder vs. homeowner, landlord vs. renter. As one energy efficiency specialist in Kansas says, "We could have it really good. We just have to decide to have it really good." Even the most economically beneficial options will require a new set of aggressive policies.

■ Many of the most economically attractive abatement options are "time perishable": Every year we delay producing energy-efficient commercial buildings, houses, motor vehicles and so forth, the more negative-cost options we lose. The cost of building energy efficiency into any product is typically a fraction of the cost of retrofitting it later or retiring it before its useful life is over. In addition, the earlier our savings are realized, the fewer new power plants need to be built. In short: Sooner is better and much cheaper.

■ Almost everything we do to cut greenhouse gas emissions will stimulate new businesses and economic opportunities. For example, in addition to the energy savings, every million dollars invested in energy efficiency also creates more than 20 jobs.

National Security Implications

The nonprofit researcher CNA Corp. assembled 11 retired generals and admirals to prepare a report called "National Security and the Threat of Climate Change." It's at securityandclimate.cna.org/report/. Following are excerpts.

■ "Projected climate change poses a serious threat to America's national security." —from the report's executive summary

■ "We never have 100 percent certainty. We never have it. If you wait until you have 100 percent certainty, something bad is going to happen on the battlefield …. The Cold War was a specter, but climate change is inevitable. If we keep on with business as usual, we will reach a point where some of the worst effects are inevitable." —Army Gen. Gordon R. Sullivan

■ "Climate change will provide the conditions that will extend the war on terror. You have very real changes in natural systems that are likely to happen in regions of the world that are already fertile ground for extremism. Droughts, violent weather, ruined agricultural fields—these are the kinds of stresses we'll see more of under climate change." —Navy Adm. T. Joseph Lopez

■ "Focus on conservation and on energy sources that aren't based in carbon …. Solving the energy problem solves a real security problem. You get to choose your points of engagement. It's like one of the things your grandmother told you. 'Don't go looking for trouble. If you find trouble, you have to deal with it—but don't go looking for it!'" —Air Force Lt. Gen. Lawrence P. Farrell Jr.

■ "The path to mitigating the worst security consequences of climate change involves reducing global greenhouse gas emissions. Achieving this outcome will also require cooperation and action by many agencies of government." —from the report's recommendations

The Moral Responsibility

Several religious traditions have spoken about moral responsibility for addressing the threat of climate change:

■ "As a matter of stewardship and justice, Christians must take action now to reduce global warming pollution and stand in solidarity with our brothers and sisters around the world whose land, livelihood and lives are threatened by the global climate crisis." —General Board of Church and Society of the United Methodist Church

■ "At its core, global climate change is not about economic theory or political platforms, nor about partisan advantage or interest group pressures. It is about the future of God's creation and the one human family. It is about protecting both 'the human environment' and the natural environment. It is about our human stewardship of God's creation and our responsibility to those who come after us." —U.S. Conference of Catholic Bishops

■ "The same love for God and neighbor that compels us to preach salvation through Jesus Christ, protect the unborn, preserve the family and the sanctity of marriage, and take the whole Gospel to a hurting world, also compels us to recognize that human-induced climate change is a serious Christian issue requiring action now." —Evangelical Climate Initiative

■ "For Jews, the environmental crisis is a religious challenge. As heirs to a tradition of stewardship that goes back to Genesis and that teaches us to be partners in the ongoing work of Creation, we cannot accept the escalating destruction of our environment and its effect on human health and livelihood. Where we are despoiling our air, land and water, it is our sacred duty as Jews to acknowledge our God-given responsibility and take action to alleviate environmental degradation and the pain and suffering that it causes. We must reaffirm and bequeath the tradition we have inherited which calls upon us to safeguard humanity's home." —Coalition on the Environment and Jewish Life

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A hundred years after we are gone and forgotten, those who never heard of us will be living with the results of our actions. —Oliver Wendell Holmes

Carbon Dioxide Regulation: Not If, But How and When

Part of our work at the Climate & Energy Project includes fostering public dialogue by addressing timely issues. Late last year, Kansas' secretary of Health and Environment denied a permit to expand a coal-fired power plant. It was the first U.S. power plant denial treating carbon dioxide as a pollutant. The power company and legislators are fighting this. CEP Executive Director Nancy Jackson addressed one of their arguments in a January 17 essay for the *Wichita Eagle*.

In Kansas energy debates, we have heard a lot lately about "regulatory uncertainty." But what does that mean, exactly? Earl Watkins, chief executive officer of Sunflower Electric Power Corp., has asserted that regulatory uncertainty is bad for business ("Regulatory process needs to be certain, impartial," January 15 Opinion). So has Amy Blankenbiller, CEO of the Kansas Chamber of Commerce. They are right. Businesses do need a set of clear and consistent rules.

Ironically enough, that is precisely why some of the nation's leading corporations—and largest greenhouse gas emitters—are calling for carbon dioxide regulation.

As Duke Energy CEO Jim Rogers said last year, when elected to chair the Edison Electric Institute, "I've seen several surveys that say 70 or 80 percent of the executives in our industry think there will be carbon regulation. In a sense, we're all building our business plans around the carbon scenario. The only issue is what the regulations will look like and when they'll be implemented."

Duke and other corporate superstars, including Caterpillar, Deere & Co., Dow Chemical, General Electric and Shell, have formed the U.S. Climate Action Partnership. Together, they are working toward a cap-and-trade system that would, in effect, put a price on carbon dioxide and other greenhouse gases.

These Fortune 500 companies believe they can "slow, stop and reverse the growth of U.S. emissions while expanding the U.S. economy." Presumably, they know a little something about economic success and regulatory certainty.

They also know that if you're not at the table when the rules get set, you're on the menu later. That is why they are actively working to shape carbon dioxide regulations. Kansas businesses should do the same.

Kansas Health and Environment Secretary Rod Bremby's decision in October did not create regulatory uncertainty; it reflected regulatory uncertainty:

■ As of July 2007, members of the 110th Congress had introduced more than 125 bills, resolutions and amendments specifically addressing global climate change and greenhouse gas emissions. Decisions made now under the specter of such regulations may be deemed imprudent under law and subject retroactively to penalty.

■ In the past 18 months, proposals for 20 coal plants have stalled nationwide because of public concerns about air pollution, increases in greenhouse gases, rapidly climbing economic costs and future liability.

■ Regional agreements between governors in the Northeast, West and, most recently, Midwest provide clear targets for emission reductions and allow for a cap-and-trade system that would put a price on carbon emissions.

Neither Bremby nor Gov. Kathleen Sebelius is "out front" on this issue. They are, in fact, arguably behind—22 states already have climate action plans and another 14 are creating plans.

Regulatory certainty is needed, and in the wake of Bremby's decision, Kansas has a historic opportunity to lead the nation in creating it. Let's stop considering false choices between economic vitality and climate stability, and start talking instead about how we achieve both.

The people that are opposed to the CO_2 never talk about that (life-sustaining) aspect of it. I have yet to have any of them mention anything about CO_2 being necessary for life. All they focus on is there's too much CO_2. —Jay Emler, chairman of the Kansas Senate Utilities Committee, in the *Salina Journal*

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It is most realistic to talk not of immediate solutions, but of comprehending problems well enough that intervention does not make them worse. Each conflict is but the tail end of a long series of prior events and processes. In our historical arrogance, we fail to see the context of today's dilemmas. —Joseph A. Tainter, *On the Edge of Scarcity*

Icon of industrial revolution, the spectacularly inefficient steam locomotive, meets icon of modern renewable energy, the wind turbine,
oil-burner for public relations. Minutes later it skirted Lawrence Livermore National Laboratory, which harnesses nuclear energy for bo

at Altamont Pass in California. Union Pacific runs this 1943
mbs. Scott Bontz photo.

Climate Policy: From "Know How" to "Do Now"

Herman E. Daly

The recent increase in attention to global warming is very welcome. Most of the attention seems to be given to complex climate models and their predictions. That too is welcome. However, it is useful to back up a bit and remember an observation by physicist John Wheeler: "We make the world by the questions we ask." What are the questions asked by the climate models, and what kind of world are they making, and what other questions might we ask that would make other worlds? Could we ask other questions that would make a more tractable world for policy?

The climate models ask, "Will carbon dioxide emissions lead to atmospheric concentrations of 450-500 parts per million, and will that raise temperatures by 2 or 3 degrees Celsius, by a certain date, and what will be the likely physical consequences in climate and geography, and in what sequence, and according to what probability distributions, and what will be the damages inflicted by such changes, as well as the costs of abating them, and what are the ratios of the present values of the damage costs compared with abatement expenditures at various discount rates, and which discount rate should we use, and how likely is it that new information learned while we are constructing the model will invalidate the results?"

What kind of world is created by such questions? Perhaps a world of such enormous uncertainty and complexity as to paralyze policy. Scientists will disagree on the answers to every one of these empirical questions.

Could we ask a different question that creates a different world? Why not ask, "Can we systematically continue to emit increasing amounts of CO_2 and other greenhouse gases into the atmosphere without eventually provoking unacceptable climate changes?"

Scientists will overwhelmingly agree that the answer is no. The basic science, first principles, and directions of causality are very clear. Swedish chemist Svante Arrhenius discovered a century ago that CO_2 could act as a greenhouse gas. Focusing on the principles creates a world of relative certainty, at least as to the thrust and direction of policy.

True, the rates, sequences, and valuations are uncertain and subject to debate. But as long as we focus on measuring these inherently uncertain empirical consequences, rather than on the certain first principles that cause them, we will overwhelm the consensus to "do something now" with ditherings about what we might someday consider

doing if ever the evidence is sufficiently compelling. I am afraid that once the evidence is really compelling, then our response will also be compelled, and policy choice will be irrelevant. To make the point more simply, if you jump out of an airplane you need a crude parachute more than an accurate altimeter. And if you also take an altimeter with you, at least don't become so bemused in tracking your descent that you forget to pull the ripcord. We should be thinking in terms of a parachute, however crude.

The next question we should ask is, "What is it that is causing us to systematically emit ever more CO_2 into the atmosphere?" It is the same thing that causes us to emit more and more of all kind of wastes into the biosphere, namely our irrational commitment to exponential growth forever on a finite planet subject to the laws of thermodynamics.

If we overcome the growth idolatry we could then go on to ask an intelligent question like, "How can we design and manage a steady-state economy, one that respects the limits of the biosphere?" Instead we ask a wrongheaded, growth-bound question: "By how much will we have to increase energy efficiency, or carbon efficiency, to maintain customary growth rates in gross domestic product?" Suppose we get as an answer, "We need to double efficiency in 10 years," and we actually achieve this. So what? We will then just do more of all the things that have become more efficient and therefore cheaper, and will then emit more wastes, including greenhouse gases. A policy of "efficiency first" does not give us "frugality second"—it makes frugality less necessary. In the 19th century words of William Stanley Jevons, "It is wholly a confusion of ideas to suppose that the economical use of fuel is equivalent to a diminished consumption. The very contrary is the truth."

And further, "Now, if the quantity of coal used in a blast-furnace, for instance, be diminished in comparison with the yield, the profits of the trade will increase, new capital will be attracted, the price of pig-iron will fall, but the demand for it increase; and eventually the greater number of furnaces will more than make up for the diminished consumption of each."

In modern words, if we increase miles per gallon we are likely to travel more miles because it is cheaper.

Or suppose instead of driving more we save the money. What then do we do with it? Travel by airplane? Buy a second house? Invest in nuclear power or ethanol production? Better to pay it to our psychiatrist for the low-energy service of listening while we confess our sins. Yes, but doesn't that help him pay for his airplane trip or second house? Jevons has us by the tail: "It is wholly a confusion of ideas to suppose that the economical use of fuel is equivalent to a diminished consumption. The very contrary is the truth."

Our energy policy is all about "efficient patterns of consumption" and not at all about "sustainable aggregate levels of consumption." It is wholly a confusion of ideas to suppose that an efficient pattern of energy consumption is equivalent to, or even leads to, a sustainable aggregate level of energy consumption.

But if we go for "frugality first"—sustainability first—as our direct policy variable, with something like a carbon tax or a cap-auction-trade system, then we will get "efficiency second" as an adaptation to more expensive carbon fuels. "Frugality first gives efficiency second, not vice versa" should be the first design principle for energy and climate policy. Efficiency is an adaptation to scarcity that makes it less painful; it is not the abolition of scarcity, the so-called "win-win" solution beloved by politicians.

The second thing wrong with our misleading question is its assumption that we need to maintain current growth rates in gross domestic product. There is a lot of evidence that GDP growth at the current margin in the United States is in fact *uneconomic* growth—that is, growth that increases social and environmental costs faster than it increases production benefits, growth that accumulates "illth" faster than it accumulates wealth. I know that there is still poverty in the world and that GDP growth in some countries is still economic. That is all the more reason to stop uneconomic growth and free up resources and ecological space for truly economic growth by the poor. That should be the second design principle.

You will not find the term "uneconomic growth" in the index of any economics textbook. My word processing program even underlines it in red warning me that I probably made a syntactical error! But it is not hard to see how the reality of uneconomic growth sneaks up on us. We have moved from a world relatively empty of us and our stuff, to a world relatively full of us, in just one lifetime. The world population has tripled in mine, and the populations of cars, houses, livestock, refrigerators, TVs, etc., have increased by much more. As we transform natural capital into manmade capital, the former becomes more scarce and the latter more abundant—an inversion of the traditional pattern of scarcity. This inversion is furthered by the fact that manmade capital is often private property while natural capital frequently is an open-access commons.

In the empty world economy the limiting factor was manmade capital; in the full world it is remaining natural capital. For example, the annual fish catch used to be limited by the number of fishing boats; now it is limited by the remaining stocks of fish in the ocean and their capacity to reproduce. Barrels of petroleum extracted used to be limited by drilling rigs and pumps; now it is limited by remaining deposits in the ground, or by capacity of the atmosphere to absorb the products of its combustion.

There seems to be a race between peak oil and global warming, between source and sink limits—but both are natural capital, so for my point it does not matter which proves more limiting. Economic logic stays the same—it says invest in and economize on the limiting factor. But the identity of the limiting factor has changed, and we have not adapted. We continue to invest in manmade capital rather

than in restoration of natural capital. This further depletes natural capital and eventually drives down the value of complementary manmade capital, while spewing external costs all over the place.

The reason that mainstream economists do not see this is that they think manmade capital and natural capital are substitutes rather than complements. With substitutes you don't have a limiting factor, so economists can overlook effects on scarcity. I am not sure why they do this, but suspect that they prize substitution's mathematical tractability more than complementarity's conformity to the first law of thermodynamics. Furthermore, conformity to that finitude is ideologically inconvenient, because it slows down growth. Some of you may have a better explanation, but the fact remains that natural resource flows and capital funds are treated as substitutes—when natural resources are included in the production function at all, which usually they are not!

In addition to this monumental error on the production or supply side, we have an equally monumental error on the utility or demand side—the failure to take seriously that beyond a threshold of absolute income already passed in the United States, welfare or self-evaluated happiness becomes a function of relative income rather than absolute income. Since it is impossible to increase everyone's relative income, further absolute growth in GDP becomes a self-canceling arms race.

Enough of what is wrong. Can one offer a reasonable policy based only on first principles? Yes—one such policy is called ecological tax reform, a stiff severance tax on carbon, levied at the well head and mine mouth, accompanied by equalizing tariffs on carbon-intensive imports, and by rebating the revenue by abolishing regressive taxes on low incomes. Such a policy would reduce total carbon use, give an incentive for developing less carbon-intensive technologies, and redistribute income progressively. Yes, but how do we know what is the optimal tax rate, and wouldn't it be regressive, and is there really a "double dividend," as some have claimed, etc.? Once again we make the world by the questions we ask. We need to raise public revenue somehow, so *why not tax carbon extraction heavily and compensate by taxing income lightly, especially low incomes?* More generally, tax the resource throughput—that to which value is added—and stop taxing value added. Whether you tax the throughput at the input or output end is a matter of convenience, although I generally prefer the input end because depletion is spatially more concentrated than pollution. Also, higher input prices induce efficiency at all subsequent stages of the production process, and limiting depletion ultimately limits pollution, at least in a gross aggregate sense.

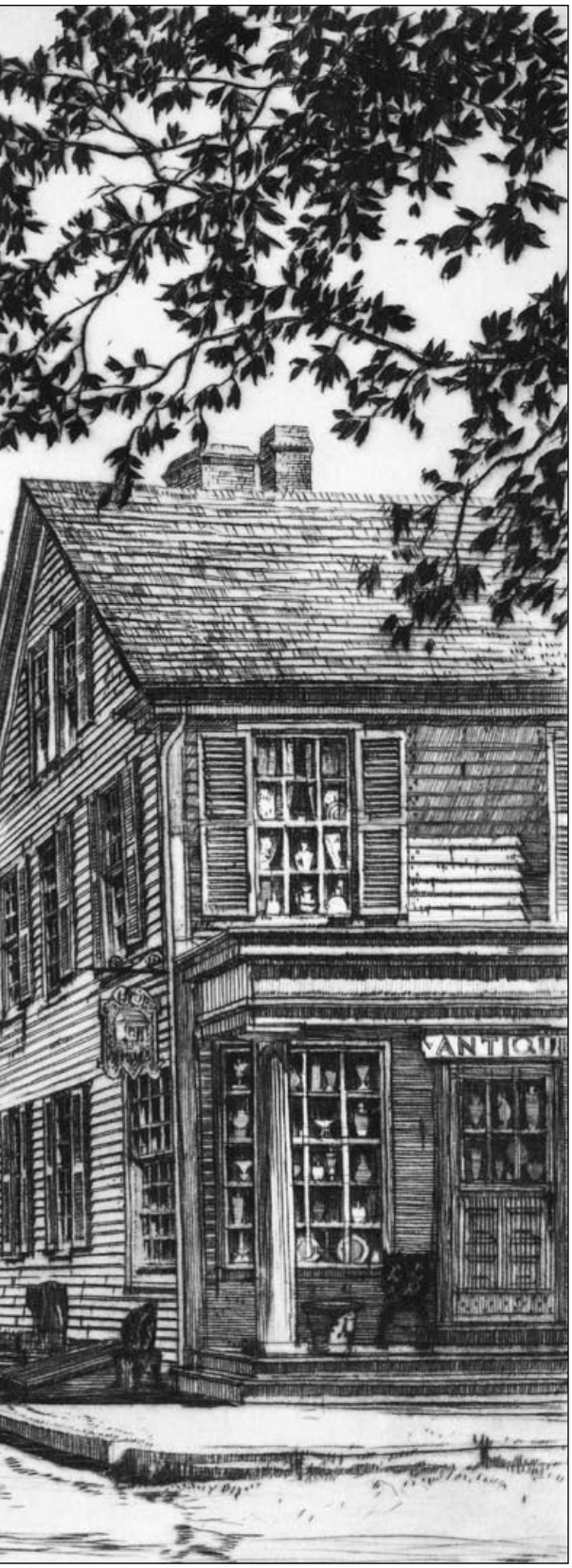
Tax bads—depletion and pollution—not goods—income. Does anyone imagine that we currently tax income at the optimal rate? Better first to tax the right thing and later worry about the "optimal" rate of taxation, etc. People don't like to see the value added by their own efforts taxed away, though we accept it as necessary up to a point. But most people don't mind seeing resource scarcity rents, value that no one added, taxed away. And the most important public good served by the carbon tax would be climate stability, a benefit in which everyone shares, but whose loss would be regressively distributed. The revenue from the carbon severance tax could be rebated to the public by abolishing other taxes, especially regressive ones. And even though the incidence of the tax by itself is regressive to income, it has the advantage that it is paid by all consumers, including the income tax evaders and avoiders.

Setting policy in accord with first principles allows us to act now without getting mired in endless delays caused by the uncertainties of complex empirical measurements and predictions. Of course the uncertainties do not disappear. We will experience them as surprising consequences, both agreeable and disagreeable, requiring midcourse correction. Recognizing the need for midcourse corrections should be a third policy design principle. But at least we would have begun a process of moving in the right direction. To continue business as usual while debating the predictions of complex models in a world made even more uncertain by the questions we ask is to fail to pull the ripcord. The empirical consequences of this last failure, unfortunately, are all too certain.

The attempt to blame the other man for finity will be one of the defining themes of the politics of the next few decades.

—George Monbiot in Britain's *The Guardian*.

Summer Shadows, by Samuel Chamberlain. Etching, 11 by 8½ inches. Courtesy of The Birger Sandzen Memorial Gallery, Lindsborg,



Kansas.

Optimism and Hope in a Hotter Time

David W. Orr

We like optimistic people. They are fun, often funny, and very often capable of doing amazing things otherwise thought to be impossible. Were I stranded on a life raft in the middle of the ocean and could have either an optimist or a pessimist as companion, I'd want an optimist, providing he did not have a liking for human flesh.

Optimism, however, is often rather like a Yankee fan believing that the team can win the game when it's the bottom of the ninth, they're up by a run, with two outs, a two-strike count against a .200 hitter, and Mariano Rivera in his prime is on the mound. The optimist is optimistic for good reason. Red Sox fans, on the other hand, believe in salvation by small percentages and hope for a hit to get the runner home from second and tie the game. Optimism is recognition that the odds are in your favor; hope is faith that things will work out whatever the odds. Hope is a verb with its sleeves rolled up. Hopeful people actively defy or change the odds. Optimism leans back, puts its feet up and wears a confident look, knowing that the deck is stacked.

I know of no good reason for anyone to be optimistic about the human future, but I know lots of reasons to be hopeful. How can one be optimistic, for example, about global warming?

First, it isn't a "warming," but rather a total destabilization of the planet brought on by the behavior of one species: us. Whoever called this "warming" must have worked for the advertising industry or the Siberian Bureau of Economic Development.

The Intergovernmental Panel on Climate Change—the thousand-plus scientists who study climate and whose livelihoods depend on authenticity, facts, logic and repeatability of experiments—put it differently: A hotter world means rising odds of

- More heat waves and droughts.
- More and larger storms.
- Forest dieback.
- Changing ecosystems.
- More tropical diseases in formerly temperate areas.
- Sea levels rising much faster than once expected.
- Losing many things nature once did for us.
- Lots of things becoming rare, such as Vermont maple syrup.
- More and nastier bugs.
- Food shortages due to drought, heat and more and nastier bugs.
- More death from climate-driven weather.

■ Refugees fleeing floods, rising seas, drought and expanding deserts.

■ International conflicts over energy, food and water.

■ And, eventually, runaway climate change to some new stable state most likely without humans.

Some of these changes are inevitable, given the volume of carbon dioxide and other heat-trapping gases we've already put into the atmosphere. There is a lag of several decades between the emission of greenhouse gases and the weather headlines, and still another lag until we experience their full economic and political effects. The sum total of the opinions of climate experts goes like this:

■ We've already warmed the planet by 1.4 degrees Fahrenheit.

■ We are committed to another degree of warming.

■ It's too late to avoid trauma.

■ But it might not be too late to avoid global catastrophe including runaway climate change.

■ There are no magic bullets.

■ It is truly a global emergency.

The fourth item above is anyone's guess, since the level of heat-trapping gases is higher than it has been in the past 650,000 years and quite likely for a great deal longer. We are playing a global version of Russian roulette, and no one knows for certain what the safe thresholds of various heat-trapping gases might be.

Scientific certainty about the pace of climate change over the past three decades has a brief shelf life, but the pattern is clear. As scientists learn more, it's mostly worse than they previously thought. Ocean acidification went from being a problem a century or two hence to being a crisis in a matter of decades. Melting of the Greenland and Antarctic ice sheets went from being possible hundreds of years hence to a matter of decades in one case and a century or two in the other. The threshold of perceived safety went down from perhaps 560 parts per million carbon dioxide in the atmosphere to perhaps 450 ppm. And so forth.

Optimism in these circumstances is like whistling as one walks past the graveyard at midnight. There is no good case to be made for it, but the sound of whistling sure beats the sound of the rustling in the bushes beside the fence. It doesn't change the probabilities one iota, nor does it much influence lurking goblins. Nonetheless, we like optimism and optimistic people. They soothe, reassure and sometimes motivate us to accomplish a great deal more than we otherwise might. But sometimes optimism misleads, and on occasion badly so. This is where hope enters.

Hope requires us to check our optimism at the door and enter the future without illusions. It requires a level of honesty, self-awareness and sobriety that is difficult to summon and sustain. I know a great many smart people and many very good people, but I know few people who can handle hard truth gracefully without despairing. We seize on anything that distracts us from the unpleasant. It's rather like in *A Few Good Men* when beleaguered Marine Corps officer Jack Nicholson tells defense attorney Tom Cruise: "You can't handle the truth!" T. S. Eliot less dramatically noted the same tendency in *Four Quartets: Burnt Norton*: "Human kind cannot bear very much reality."

Authentic hope, in other words, is made of sterner stuff than optimism. It must be rooted in the truth as best we can see it, knowing that our vision is always partial. Hope requires the courage to reach farther, dig deeper, confront our limits and those of nature, work harder *and* dream dreams. Optimism doesn't require much effort, since you're likely to win anyway. Hope must hustle, scheme, make deals and strategize.

How do we find authentic hope in the face of climate change, the biological holocaust now under way, the spread of global poverty, seemingly unsolvable human conflicts, terrorism and the void of adequate world leadership?

I've been thinking about the difference between optimism and hope since being admonished recently to give a "positive" talk at a gathering of ranchers, natural resource professionals and students. Presumably the audience was incapable of coping with the bad news expected from me. I gave the talk that I intended, a mixture of good and bad news. The audience survived, but the experience caused me to think more about what we say and what we can say to good effect about the kind of news that readers of this journal reckon with daily.

The view that the public can only handle happy news rests on a chain of reasoning that goes like this:

■ We face problems that are solvable, not dilemmas that can be avoided with foresight but are not solvable, and certainly not losses that are permanent.

■ People can't handle much truth.

■ So resolution of different values, and significant improvement of human behavior otherwise necessary, are impossible.

■ Greed and self-interest are in the driver's seat and always will be.

■ So the consumer economy is here to stay.

■ But consumers sometimes want greener gadgets.

■ Capitalism can supply these at a goodly profit and itself be greened a bit, but not improved otherwise.

■ So matters of distribution, poverty and political power are nonstarters.

■ Therefore, the focus should be on problems solvable at a profit by technology and policy changes.

■ Significant improvement of politics, policy and governance are unlikely and probably irrelevant, because better design and market adjustments can substitute for governmental regulation and thereby eliminate most of the sources of political controversy—rather like Karl Marx's prediction of the withering away of the state.

Disguised as optimism, this approach is, in fact, pessimistic and condescending about our capacity to face the truth and act creatively, courageously and even nobly in dire circumstances. So we do not talk about limits to

growth, unsolvable problems, moral failings, unequal distribution of wealth within and between generations, emerging dangers, impossibilities, technology gone awry or necessary sacrifices. "Realism" requires us to portray climate change as an opportunity to make a great deal of money, which it may be for some, but without saying that it might not be for most, or mentioning its connections to other problems, or the possibility that the Four Horsemen are gaining on us. We are not supposed to talk about coming changes in our "lifestyles," a telling and empty word implying fashion, not necessity or conviction.

Instead, solving climate change is reduced to a series of wedges supposed to eliminate so many gigatons of carbon without any serious changes in how we live. There is no wedge called "suck it up," because that is considered too much to ask of people who have been consuming way too much, too carelessly, for too long. The "American way of life" is thought to be sacrosanct. In the face of a global emergency, brought on in no small part by the profligate American way of life, few are willing to say otherwise.

So we are told to buy hybrid cars, but not asked to walk, travel by bikes or go less often, even at the end of the era of cheap oil. We are asked to buy compact fluorescent light bulbs, but not to turn off our electronic stuff or not buy it in the first place. We are admonished to buy green, but seldom asked to buy less, repair what we already have or just make do. We are encouraged to build green buildings that are used for maybe 10 hours a day for five days a week, but we are not told that we cannot build our way out of the mess we've made, or to repair existing buildings. We are not told that the consumer way of life will have to be rethought and redesigned to exist within the limits of natural systems and better fitted to our human limitations. And so, as Peter Montague once put it, we continue to walk north on a southbound train.

And maybe, told that its hindquarters are caught in a ringer, the public would panic, or would despair from doing what could save us from the worst outcomes possible. This is an old view of human nature epitomized in the work of Edward Bernays, a nephew of Sigmund Freud and founder of modern public relations. Public order, he thought, had to be engineered by manipulating people to be dependent and dependable consumers. People who think too much or know too much were in his view a hazard to social stability.

Maybe this is true and maybe gradualism is the right strategy. Perhaps the crises of climate, equity, security and economic sustainability will yield to the cumulative effects of many small changes without any sacrifice at all. Maybe changes now under way are enough to save us. Maybe small changes will increase the willingness to make larger changes in the future. And state-level initiatives in California, Florida and the Northeast are changing the politics of climate. Wind and solar energy are growing more than 40 percent per year, taking us toward a different regime. Maybe a carbon cap and trade bill will be enough. Maybe we can win the game of climate roulette at a profit and never have to confront the nastier realities of global capitalism and inequity, or confront the ecological and human violence that we've unleashed in the world.

But I wouldn't bet the earth on it.

For one, the big numbers give us no margin for safety and none for delay in reducing carbon dioxide levels before we risk triggering runaway change. "Climate," as Wallace Broecker once put it, "is an angry beast, and we are poking it with sticks." So call it prudence, precaution, insurance, common sense or what you will, but this should be regarded as an emergency like no other. Having spent any margin of error we might have had 30 years ago, we now have to respond fast and effectively or else.

That's what the drab language of the fourth report from the Intergovernmental Panel on Climate Change is saying. What is being proposed, I think, is still too little, too late—necessary but not nearly sufficient. And it is being sold as "realism" by people who have convinced themselves that to be credible they must understate the problem.

Second, climate roulette is part of a larger equation of violence, inequity and imperialism, of exploitation of nature and people, even across generations. In other words, heat-trapping gases in the atmosphere are a symptom of something a lot bigger. To deal with the causes of climate change we must look deep for what took us to the brink of destroying the human prospect and much of the planet. It did not happen accidentally but is, rather, the logical working out of long-standing assumptions, philosophy, worldview and unfair power relations.

The wars, gulags, ethnic cleansings, militarism and destruction of forests, wildlife and oceans throughout the 20th century were earlier symptoms of the problem. We've been playing fast and loose with life for some time, and must discuss the changes needed to conduct public business fairly and decently over the long haul.

What do I propose? Simply this: that those of us concerned about climate change, environmental quality and equity treat the public as intelligent adults who can understand the truth and act creatively and courageously in the face of necessity. Act like a doctor talking to a patient with a potentially terminal disease.

There are many good precedents for telling the truth. Abraham Lincoln did not pander, condescend, evade or reduce moral and political issues to economics, jobs and happy talk. Rather, he described slavery as a moral disaster for slaves and slave owners alike. Winston Churchill in the dark days of the London blitzkrieg in 1940 did not talk about defeating Nazism at a profit and the joys of urban renewal. Instead he offered the British people only "blood, toil, tears and sweat."

And they responded with heart, courage, stamina and sacrifice. At the individual level, faced with a life-threatening illness, people more often than not respond heroically. Every day, soldiers, parents, citizens and strangers do brave

and improbable things in the full knowledge of the price they will pay.

Telling truth means that the people must be summoned to a level of extraordinary greatness appropriate to an extraordinarily dangerous time. People, otherwise occupied with trivial celebrity foibles, must be asked to again be citizens, to know more, think more, take responsibility, participate publicly, and, yea, suck it up. They will have to see the connections between what they drive and the wars we fight, the stuff they buy and crazy weather, the politicians they elect and the spread of poverty and violence. They must be taught to see connections between climate, environmental quality, security, energy use, equity and prosperity. As quaint and naive as all this might sound, people have done it before, and it has worked.

Telling the truth means that we will have to speak clearly about what led us to the brink of disaster. If we fail to deal with causes, no Band-Aid will save us for long. The problems can in one way or another be traced to the irresponsible exercise of power that has excluded the rights of the poor, the disenfranchised, and every generation after our own. This is in no small way because of political money aiding and abetting theft of the public commons, including the airwaves, where deliberate misinformation is a growing industry. Freedom of speech, as Lincoln said in 1860, does not include "the right to mislead others, who have less access to history and less leisure to study it." But the rights of capital over the media now trump honesty and fair public dialogue, and will continue to do so until the public reasserts its legitimate control.

Telling the truth means summoning people to a higher vision than that of the affluent consumer society. Consider the well studied but little noted gap between the stagnant or falling trend line of happiness in the last half-century and that of rising gross domestic product. That gap ought to have reinforced the ancient message that, beyond some point, more is not better. If we fail to see a vision of a livable, decent future beyond the consumer society, we will never summon the courage, imagination or wit to get there.

So, what does a carbon-neutral, increasingly sustainable society look like? My picture is communities with these things:

- Front porches.
- Public parks.
- Locally owned businesses.
- Windmills and solar collectors.
- Locally owned farms and better food.
- Bike trails.
- Summer baseball leagues.
- Community theaters.
- Better poetry.
- Neighborhood book clubs.
- Bowling leagues.
- Better schools.
- Vibrant and robust downtowns with sidewalk cafes, great pubs serving microbrews, and more kids playing outdoors.
- Fewer freeways, shopping malls, sprawl, television.
- No more wars for oil or anything else.

Nirvana? No! Humans have a remarkable capacity to screw up good things, but we can still create a future a great deal better than what is now in prospect. And what we must do to avert the worst effects of climate change are mostly the same things we would do to build sustainable communities and economies, and to improve environmental quality and prospects for our children.

Finally, I am an educator and earn my keep by perpetuating the quaint belief that if people only knew more, they would act better. Some of what they need to know is new, but most of it is old, very old. On my list of things people ought to know:

- The laws of thermodynamics, which tell us that economic growth only increases the pace of disorder, the transition from low entropy to high entropy.
- The basic sciences of biology and ecology—how the world works as a physical system.
- The fundamentals of carrying capacity, which apply to yeast cells in a wine vat, lemmings and humans alike.

But they ought to know, too, about human fallibility, gullibility and the inescapable problem of ignorance. So I propose that schools, colleges and universities require their students to read Marlowe's *Dr. Faustus*, Mary Shelley's *Frankenstein* and Melville's *Moby Dick*. I would hope that they would learn to distinguish things that we can do from those that we should not.

Hope, authentic hope, can be found only in our capacity to discern the truth about our situation and ourselves and summon the fortitude to act accordingly. In time the truth will set us free from illusion, greed, ill will and self-imposed destruction.

I can think of 40 reasons why none of their projects can possibly succeed and 40 different tones of wry cynicism in which to express my well-documented doubts. But I also know it is more humanly beautiful to risk failure seeking for the hidden springs than to resign to the futurelessness of the wasteland. —Theodore Roszak, *Where the Wasteland Ends*

Variation on the Theme: An Invited Response

Conn Nugent

I was intrigued and absorbed by David Orr's examination of optimism versus hope. He skillfully draws us into an enjoyable opportunity to argue about the shifting meanings of American English. Orr favors hope. "Hope is a verb with its sleeves rolled up," Orr writes. I suppose so. But hope is also a verb in pajamas, gazing longingly out the window for somebody to come over and rescue it. Hopeful lives near wistful. Personally, I like being optimistic. Optimism—which Orr describes as "the recognition that the odds are in your favor"—also connotes a certain plucky chin-up-ness that defies those odds. "Optimism is an historical duty," Bernard Lown once said.

Whatever. Really, it's just potaytoe versus potahtoe, another occasion for fun with our hypermutable vernacular. The really tough challenge Orr poses is found a little deeper into his piece: how to talk to our nonspecialist fellow citizens. Orr was prompted to think about appropriate language after "being admonished recently to give a 'positive' talk." Who among public speakers has not been urged to avoid gloom? Who doesn't try to strike a balance between the dismal facts of global change and a desire to engage the audience? As Orr wisely observes, it is hard—and morally dubious—to elaborate on the "total destabilization of the planet" and then pitch 10 Easy Things You Can Do at Home. "Telling truth means that the people must be summoned to a level of extraordinary greatness appropriate to an extraordinarily dangerous time," Orr writes. "They will have to see the connections between what they drive and the wars we fight, the stuff they buy and crazy weather, the politicians they elect and the spread of poverty and violence." He concludes: "… Authentic hope can be found only in our capacity to discern the truth about our situation and ourseleves and summon the fortitude to act accordingly. In time the truth will set us free from illusion, greed, and ill-will and self-imposed destruction."

I would be happy if the laws of this republic were written by David Orr and people who see the world as he sees it. I admire their values, and could depend on their characters. Their public policies would be generous and farsighted.

But I am wary of "the truth" in general. And I do not believe that an appreciation of a particular set of facts about the relationships between consumer behavior and climate change ratifies the more astonishing assertion that burning oil and coal implies more "violence, inequity and imperialism" than relying on human and animal muscle power. That's not what I read in human history. I would say that the Petroleum Age has just made the scale of everything bigger: more poverty but more wealth, more disease for some and greater longevity and less suffering for others, more brutality and more erudition, greater eruptions of violence and more regimes of peace and security. It is difficult—to say the least—to persuade the billion bourgeois grandchildren of landless peasants that their family history is embedded in the darker narrative of "the ecological and human violence that we've unleashed in the world." Sure, maybe so, but it's been enjoyable. And way more comfortable.

In a way, I am more simpleminded about our human dilemma. I believe that the ecological and social damage wrought by the emission of greenhouse gases will be contained and mitigated when the prices of carbon fuels are considerably more expensive—say four times more expensive—than they are today. Many argue that such a rise is already well under way, and that a fourfold increase in the price of a barrel of oil, adjusted for inflation, will be reached within two decades. I believe that projection grievously underestimates:

- Russian oil reserves and Russian national ambitions.
- The ingenuity of petroleum geologists and engineers.
- The stimulating effect of higher prices on exploration and development.

I think humans will burn petroleum at high levels for many years to come, and that the conservation of oil in Country X will allow Country Y to burn more, thanks to an already-integrated global market. And don't forget those centuries' worth of coal seams and tar sands.

I am for speaking truth to power. Moral suasion can work. I want David Orr on the hustings, ceaselessly. But nothing matters nearly so much as prices and costs. Those of us whose lives have profited from the Age of Petroleum can best serve our descendents and their planet by speeding the rate of carbon price increases through changes in fiscal public policy. Carbon tax, anyone?

Human history becomes more and more a race between education and catastrophe. —H. G. Wells, *The Outline of History*

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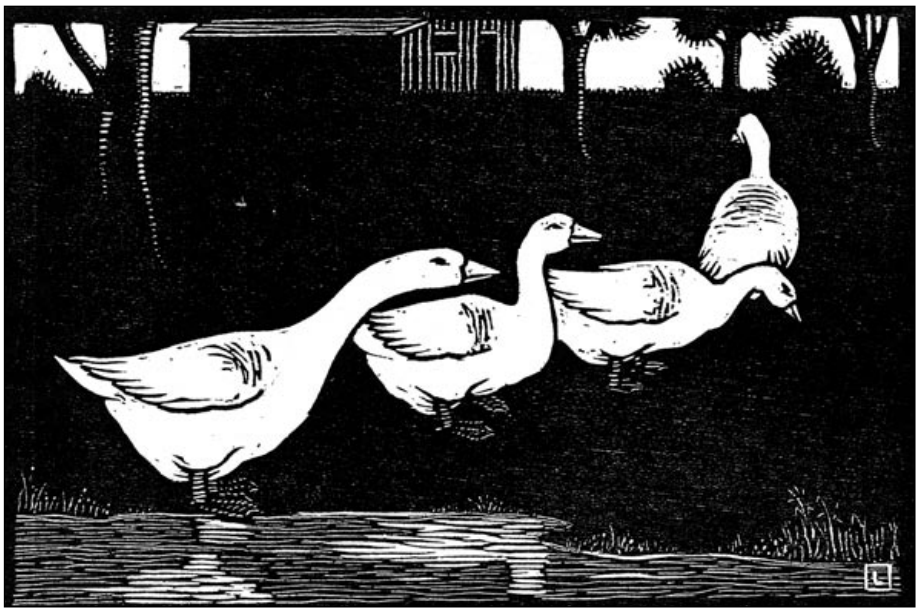

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The Writers and Artists

Harry Shokler, 1896-1978, helped develop silk screen printmaking, and made oil paintings, etchings and wood engravings.

Edward C. Robison III is a photographer in Douglas County, Kansas. He is co-author of *The Kansas Landscape: Images from Home.* More of his photos are at ECR3.com.

Herman E. Daly is an ecological economist and professor of public policy at the University of Maryland. His books include *Beyond Growth* and *Ecological Economics.*

David W. Orr is a professor of environmental studies and politics at Oberlin College. His books include *Earth in Mind* and *The Nature of Design*.

Conn Nugent is executive director of J. M. Kaplan Fund in New York City, and chairman of The Land Institute's Board of Directors.

Samuel Chamberlain, 1895-1975, was an artist and teacher at Massachusetts Institute of Technology.

Herschel Logan, 1901-87, grew up on a farm near Winfield, Kansas, and helped found Prairie Print Makers.

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Notes on the History of World Energy Use

Vaclav Smil is a professor at the University of Manitoba, and explores energy in many books. Here are bites from a trim one efficiently packed with information, *Energies: An Illustrated Guide to the Biosphere and Civilization.*

■ "Energy is the only universal currency: One of its many forms must be transformed to another in order for stars to shine, planets to rotate, plants to grow, and civilizations to evolve. Recognition of this universality was one of the great achievements of 19th century science, but, surprisingly, this recognition has not led to comprehensive, systematic studies that view our world through the powerful prism of energy."

■ The total mass of domestic animals, dominated by large ungulates, is now perhaps as much as 20 times the total of all wild vertebrates, and the mass of our species is an order of magnitude larger than the total for all wild mammals.

■ By the 1850s wood, charcoal and straw were still dominant fuels everywhere except in a few European countries, and the total annual per capita combustion of all fuels was less than 1,100 pounds of wood equivalent. By the mid-1990s the global per capita annual output of fossil fuels and primary electricity was about 3,300 pounds of oil equivalent. In gross energy terms this is a nearly eightfold rise, but because prevailing energy conversion efficiencies in 1850 averaged around just 15 percent, whereas now they reached about 40 percent, the average per capita consumption of useful energy was about 20 times higher, an unprecedented change after centuries of stagnation or marginal growth.

■ Global per capita consumption of electricity has grown roughly sixfold between 1950 and 2005.

■ "Since 1900 the world's cultivated area increased only by about a third, but with more than a fourfold increase of average yields the total crop harvest rose almost sixfold. This gain has been due largely to more than eightyfold increase of energy inputs to crop cultivation."

■ Synthetic ammonia, made with natural gas, now provides nearly half of the nitrogen taken up by the world's crops. Because crops supply about three-fourths of all nitrogen in metabolized proteins—the rest coming from oceans and grazing—at least every third person worldwide, and perhaps two out of every five people, gets his dietary protein from synthetic nitrogenous fertilizers.

■ "We will never know the exact figure, but the development and deployment of nuclear weapons and associated delivery systems has consumed at least one-tenth of all commercial energy used worldwide since 1945."

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