



# ROCKY MOUNTAIN INSTITUTE

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## NEWSLETTER

### RAIN, RAIN, GO AWAY

#### *Replacing Concrete Jungles with Real Ones*

Pittsburgh is a tough and heroic American city. It and surrounding steel towns “made the cannonballs that helped the Union win the war” (to quote Bruce Springsteen) and anchored the country’s industrial development. Who would imagine that the home of the Steelers could be threatened by something as paltry as *rain*?

Believe it. Pittsburgh can’t adequately handle its stormwater runoff, and the resulting contamination to local rivers is running it afoul of federal environmental regulations. Fines and corrective actions could cost the city hundreds of millions of dollars.

RMI is leading a process to help Pittsburgh find innovative alternative solutions that cost less and solve other problems at the same time. If successful, the techniques could be applied in hundreds of other American cities and towns that are under the same regulatory gun.

#### WHY WORRY?

In Pittsburgh, as in many cities, rainwater runs into the same pipes that transport sewage to treatment plants. With increased urbanization and its associated impervious surfaces, stormwater volume frequently floods sewers. The resulting excess of sewage and storm runoff—called combined sewer overflow, or CSO—spills into rivers and oceans, polluting them with feces, oil, dirt, heavy metals, and other contaminants.

And we are swimming in it. The U.S.

Environmental Protection Agency estimates that combined sewer overflows discharge 1.2 trillion gallons into American streams, lakes, and estuaries every year, affecting 43 million people in 1,100 cities and towns.

*Sanitary sewers*—which carry household waste separately from stormwater—can also



Jen Uncapher

overflow, usually due to illegally connected roof drains and rain seeping into cracked sewer lines. In extreme cases, sanitary sewer overflow (SSO) creates geysers of sewage that literally blow manhole covers off the street. Pittsburgh colleagues reported surfing a manhole cover floating on one such “fecal fountain.”

The EPA calls stormwater problems such as CSO and SSO “the leading causes of impaired water quality in the United States today.” These and other sources of pollution

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## RESTORATION IN ALL ITS GLORY

By L. Hunter Lovins, Executive Director

Hand-cutting weeds is a pain in the back. I should know. Ever since RMI inherited the role of custodian for the Windstar property, we've been doing a lot of it, as well as many other earthly chores to restore the land to its former glory.

The problems at Windstar are immense. The 957-acre property saw almost a century of human intervention that changed the ecology of the land. For the past two decades, little has been done to reverse that degradation, because of a philosophy that land, even if degraded, is natural, and therefore intervention by humans is wrong.

RMI has already shown on its other lands that such problems as invasive weeds can be solved, restoring ecological health through understanding the ecosystem and working with it. This approach has convinced me that a hands-off philosophy won't work when the land has lost the capacity to heal itself unaided.

And we're not the only ones who are coming to understand this.

Historically, environmental groups have put most of their energies into reducing harm to the environment. RMI has sought to provide such alternative problem-solving approaches as resource efficiency. Now the Institute is joining the growing movement in both the environmental and the business community to restore degraded environments—to invest in our natural capital, whether as a form of environmental protection, a pure economic investment, or both.

This important principle is one of four discussed in *Natural Capitalism*, a new book that Paul Hawken, Amory, and I are writing. I'll tell you more about the book as we get closer to publication (now slated for next spring by Little

Brown). It integrates all of the work RMI has been doing for almost 20 years, and joins it with such concepts as restoration.

Think about it. It may have been sensible for capitalists 100 years ago to maximize the efficiency of their scarcest resource of the time, which was people.

But that's no longer the case. Our scarcest resource now isn't people—it's nature and natural systems. It's everything from the life-support systems that cycle water and nutrients, produce oxygen, bring climatic stability, and assimilate and detoxify society's wastes to pieces of ground where people can meet their wild relatives and renew their souls.

Using resources vastly more efficiently can buy us time and money with which to craft more durable solutions. But it will not solve all our problems. Ultimately, restoration is the key if we want to preserve a healthy environment, a healthy economy, and a healthy society.

Investing in natural capital is one of the main principles of this emerging form of capitalism. That's what we're doing at Windstar, and it's something that we as a society need to learn.

Thoreau once asked, "What is the use of a house if you haven't got a tolerable planet to put it on?" Having a tolerable planet is going to take restoration of all sorts. And this means we all need to get more into the restoration mindset. Just stopping what's wrong is not enough; we have to reinvest.

So these days, if I'm not at my computer, it's likely I'm out pulling weeds. If you're serious about learning some of the fundamental principles of restoration, grab your gloves and come on out. Or, if you prefer, you can wait for the book, and join us in pulling some deeply rooted mental weeds instead.



### PERSPECTIVES

(continued from page 1)

have led to the sorry state of American rivers: in 1997, only 16 percent of the 2,111 watersheds in the lower 48 states had "good" water quality.

Existing and pending federal regulations—along with new stormwater regulations that will apply to small towns as well as cities—are expected to send treatment costs skyrocketing. Meanwhile, the EPA is requiring towns to come up with long-term control plans for CSOs; the plan for Pittsburgh and surrounding Allegheny County is due in late 1998. To eliminate SSOs, the EPA and Department of Justice are currently considering litigation or administrative action against Pittsburgh and 50 other communities in Allegheny County. Fines could total as much as \$275 million.

Conventional engineering solutions to these problems include increasing treatment plant capacity, separating sewage and rainwater systems, installing stormwater detention tanks and basins, and rehabilitating deteriorating sewer lines. Such measures could cost as much as \$1 billion in Pittsburgh alone.

Given the extent of new regulations and the cost of compliance, the sentiment of town governments nationwide can be summed up as: "Yikes!"

### LOOKING FOR ANSWERS

Sounds like a good opportunity for whole-system and end-use/least-cost thinking.

Enter RMI. Supported by the Heinz Endowments, RMI's Water Associates and Green Development Services, along with the Pittsburgh-based STUDIO for Creative Inquiry, gathered water gurus, town planners, artists, engineers, citizens, and others for an October design "charrette"—a multi-day, multi-disciplinary intensive workshop. Participants explored alternative stormwater management plans for the Nine Mile Run watershed, which includes part of Pittsburgh and three other municipalities.

Traditionally, stormwater is treated like an unwanted stepchild by public works departments. Considered a nuisance, it

gets sent away through expensive networks of pipes and culverts to be dumped into rivers or streams. But should rainwater really be treated as waste? Less than three percent of all the water on earth is fresh, and all but three-thousandths of that is locked up in glaciers and icecaps or is too deep to tap.

The solutions developed at the charrette—which integrate techniques already used by many water experts and city planners—re-perceive this “waste” as a valuable and life-giving resource.

The plan is to manage each raindrop as close to where it falls as possible, absorbing it on-site and then releasing it slowly, as nature does. This reduces or eliminates damaging pulses of stormwater. Meanwhile, efficiency programs—installation of low-flow, high-performance showerheads and toilets, for example—increase system capacity. The approach could be called “distributed stormwater management.”

### INFILTRATION ISLAND

What are some of the techniques planners use to manage precipitation where it falls, treating it not as flow but as *habitat*?

Tree-planting is one: studies have shown that trees can absorb or evaporate up to 35 percent of the rain falling annually within the diameter of the tree canopy. Creative layout of parking lots can incorporate “infiltration islands,” filter strips, and other stormwater management features. Porous pavement technology adds another option.

Common now in new developments, narrower streets reduce impervious surfaces while also calming traffic, cooling microclimates, and increasing green space. Some communities are already doing this: Portland, Oregon calls it the “Skinny Streets program.” (The old wide-street standards came from 1950s civil-defense planning for heavy equipment to clear rubble after a nuclear attack.)

In some yards and many commercial landscapes, ponds, “water gardens,” and other basins gather runoff and let it infiltrate over time. “Eco-roofs”—a lighter, lower-maintenance version of old-fash-



Richard Pinkham

*A storm sewer outfall in Pittsburgh's Nine Mile Run watershed.*

ioned sod roofs—absorb water and release it slowly by evaporation, greening and cooling the city. Other options include cisterns, turf aeration, and underground storage and dispersal systems.

Many of these techniques are now common practice in new developments, but incorporating them into existing urban neighborhoods is the big challenge. Since public and private measures are equally important, public works can't solve the problems alone. How does one get Mrs. Smith to aerate her lawn or Joe's Donut Shop to install porous pavement? The charrette included a policy team to address such issues and to identify potential conflicts and synergies with local projects already in the works.

Used in concert, distributed stormwater management techniques offer a creative alternative to conventional ones. But is the approach actually cheaper? Part of the charrette's goal was to find out. Pinkham says the price to beat is roughly \$2 a gallon—that's the approximate local cost of accommodating stormwater with conventional detention systems.

If charrette policy planners can beat that, then all systems are go, since distributed stormwater management also brings with it a veritable flood of collateral benefits:

- Trees filter pollutants and shade pavement, cooling city streets. Transpiration also has a cooling effect.
- Many measures improve the landscaping of homes and businesses, increasing property values. By fostering a citywide greening, this approach produces psy-

chological and aesthetic benefits.

- Since soils, microorganisms, and plants filter many groundwater pollutants, local communities will be ahead of the game when the feds further ratchet up water-quality regulations (a likely scenario).
- Narrower streets and islands of vegetation calm traffic, reduce accidents, foster street life, and improve quality of life.

Early results from the charrette are encouraging. Facilitator Bruce Ferguson, an authority on stormwater management, called it “very successful,” noting that diverse groups of experts worked extremely well as teams, discovering numerous unanticipated benefits. The Sterrett School team, for example, pointed out the educational value in siting stormwater management systems on school campuses. With 92 schools in Pittsburgh, a big runoff problem now looks like a major educational opportunity. The policy team has already requested meetings with state regulators to discuss charrette results. Look for details in the spring newsletter.

Though it's a long way from theory to practice, the Pittsburgh charrette is one of the first national models for investigating onsite retrofit possibilities for stormwater management. Successfully implemented, the ideas generated could help turn our concrete jungles into real ones.

—AUDEN SCHENDLER

## Masterpiece Stormwater Management

RMI's local partner in organizing the Pittsburgh charrette was the STUDIO for Creative Inquiry, an outside-the-box organization if there ever was one. Part of the College of Fine Arts at Carnegie Mellon University, SFCI consists mainly of artists; the group was established to bring the perspective and tools of the arts to bear on contemporary issues.

We can hear it now: “Nice sewer system!” “Thanks—it's a Van Gogh.”



## HAPPY NEW YEAR 2000

### *It's Midnight—Do You Know Where Your Community Is?*

Talk about a hangover... Imagine it's the Monday after New Year's Day 2000. You awake to a cold, dark house. The tapwater trickles and stops. The phone circuits are busy, and the cellphone is erratic. The battery radio reports that rail and air traffic has been disrupted worldwide, global stock markets are plummeting, and the National Guard has been called out in several states.

Your car doesn't start (although others do), so you walk to town through unplowed streets. Traffic is backed up at dead stoplights, and long lines have formed at the few gas pumps that have hand cranks. Downtown there is power from backup generators only. ATMs are dead. Crowds jam bank tellers to withdraw their

cash, and the grocery store won't accept your credit card. Hoarders have emptied the shelves, and food shipments have been suspended. Sirens wail as an angry mob gathers at town hall, demanding action...

This is what some knowledgeable people fear may happen as a result of the so-called Year 2000 Bug, or simply Y2K in geek-speak (see box below).

It is, to be sure, the darkest of a range of possible outcomes, and expert opinion on its likelihood differs widely. But the story illustrates the challenge Y2K could pose to the interdependent systems woven into modern society's infrastructure if remedial efforts fall short.

Y2K affects almost everyone, from individuals to companies, communities to gov-

ernments. There's no magic-bullet solution, no single place to act, and no one authority able to respond comprehensively.

The most effective response to this complex challenge is to address it at every level feasible—now. That means everyone not only assessing their own Y2K vulnerabilities, but also reaching out and cooperating with others with whom they are connected and interdependent.

#### A BLESSING IN DISGUISE?

No one can say what will really happen on 1 January 2000. It's like knowing exactly when an earthquake is going to strike, but not how big it will be. Programmers and technicians are whittling away at the problem, but we're still going to feel at least a tremor. The extent of the damage will be determined largely by how the rest of us collectively prepare and respond.

Ultimately, Y2K is a social problem that demands a response at the level of social institutions, argue John Petersen, Margaret Wheatley, and Myron Kellner-Jones in an important new paper, "The Year 2000: Social Chaos or Social Transformation?," which has strongly influenced RMI's thinking on the subject.

Y2K can expose the fragility of our highly interconnected society, the authors write, or it can galvanize us into making those connections stronger and more resilient. It's our choice.

People and organizations often come together in times of crisis, but cooperation and coordination occur more readily and smoothly if the necessary social relationships are developed *before* a crisis strikes. While some Y2K survivalists are building bunkers, others are pulling together with their neighbors to foresee, forestall, and prepare. A leading example of this locally oriented effort is the Cassandra Project in Longmont, Colorado. Its website (see page 5) is a useful resource and networking center for community Y2K groups.

Y2K offers an opportunity to rethink our relationships as well as our infrastructure. Many things we can do to reduce Y2K's impact also address other needs. For example, upgrading technical and information systems can make them simpler and

### *Why Y2K?*

Decades ago, when computer memory was costly, software writers saved space by dropping the "19" from the year in computers' internal clocks and calendars. Millions of programs and chips—even many built in recent years—repeated this convention.

On 1 January 2000 (if not before), these systems will read "00" as "1900" instead of "2000," and may malfunction in a variety of ways. Results will range from minor glitches to total system shutdowns. Worse, one system's failure may cause other linked systems to fail in ways that are impossible to predict.

Fixing Y2K is technically simple, but organizationally overwhelming. Billions of lines of software code must be screened and, where necessary, rewritten. Billions of potentially vulnerable microprocessors embedded throughout industrial society—in rail switches, vehicles, telecommunications networks, factories, power plants, pumps, building controls, etc.—must be found and checked. There aren't

enough programmers to identify and fix all the problems in time; one researcher estimates that more than half a million additional programmers are needed.

The federal government has yet to fix half of its critical computers. Many small businesses and communities have done little or nothing. Significant progress has been made in many areas (banking and Social Security, for example), and many researchers think that most critical systems will be ready in time. Yet it may not be enough to fix *most* of them, since problems in one or two links in a chain or network can bring whole systems to a halt or propagate incorrect electronic data, with rippling effects on other aspects of life.

Estimates for worldwide repair costs range from \$300 billion to \$600 billion, of which at least \$50 billion will be spent in the United States. Y2K-related lawsuits may cost up to \$1 trillion, and the fear of litigation is hampering some companies' collaborative efforts.—CHRIS LOTSPEICH

more efficient; strengthening communities makes them better able to solve their problems. The blessing in disguise of the Y2K preparedness effort is an opportunity to move our society in a more sustainable, self-reliant, and harmonious direction.

### WHAT CAN YOU DO ABOUT IT?

First, *identify* areas of possible disruption that directly affect you or your organization, not only in your home and workplace, but also in the systems upon which you depend in the outside world. Second, *fix* or adapt critical systems before trigger dates (of which 1 January 2000 is the most important). Third, *prepare* to respond to possible but unpredictable disruptions in services, so that you'll have alternative arrangements in place ahead of time.

Here's a short list of ways to get started:

#### Individuals

- Identify your essential devices and systems with the potential for problems, and consult with dealers or manufacturers about Y2K compliance. These might include computers, medical devices, security systems, and vehicles.
- Get to know your neighbors (if you don't already)—some folks are even throwing Y2K block parties!
- Identify neighbors with special needs (elderly, handicapped) who might need extra help.
- Discuss Y2K awareness and preparedness in civic groups.
- Encourage your local government to undertake a coordinated assessment and response. (Don't assume they're already onto it: one town near us only heard of the problem last month.)

#### Communities and Local Government

- Create a Y2K advisory committee, with representatives of all essential government and infrastructure functions. Consider public safety and emergency preparedness, water and sanitation, social services, mass transit, public works, information technology, schools, tax and finance, and legal implications.
- Assess risk to critical systems and utilities, and work with local businesses to

ensure that essential services are compliant and have contingency plans in case of disruption. These include electricity, gas, telecommunications, health care, food supply, and oil and gasoline supply.

- Hold a Y2K town meeting. Boulder, Colorado and Omaha, Nebraska have done so with positive results.

#### Businesses and Other Organizations

- Small businesses should identify and fix vulnerable systems, including computers, time cards, cash registers, inventory and shipping software, etc.
- Larger firms should institute similar compliance efforts as appropriate for their industry.
- Businesses should work with suppliers, vendors, bankers, insurers, and other firms with which they are interdependent to reduce risks and make contingency plans.

### ACT LOCALLY

RMI does not specialize in Y2K issues. We're just trying to raise awareness of the issue, and urge you to do the same. Following the act-locally advice of the Petersen report and the Cassandra Project, RMI is helping organize meetings to encourage communities in our area to respond collectively. (We're also making our own systems Y2K compliant, of course; fortunately, our

solar-powered headquarters building isn't very vulnerable to interruptions in fuel or power supplies.)

As with most society-wide problems, the real issues are not technical. By working together with those you rely upon, you can ensure that the dire scenario that started this article is the least likely outcome, and that Y2K will turn out to be little more than a passing inconvenience.

### RESOURCES

- **The Berkana Institute**, [www.berkana.org/y2k.html](http://www.berkana.org/y2k.html). Includes the Petersen, Wheatley, and Kellener-Jones article.
- **The Year 2000 Information Center**, [www.year2000.com](http://www.year2000.com). Legal and technical aspects, vendors, daily world updates.
- **The Cassandra Project**, [www.millennia-bcs.com](http://www.millennia-bcs.com). Checklists, sample documents, links to community resources.
- **Municipal Government Checklist**, [www.angelfire.com/mn/infocrest/capersj989.html](http://www.angelfire.com/mn/infocrest/capersj989.html). For local government.
- **Public Technology, Inc.**, [www.pti.org/membership/y2k](http://www.pti.org/membership/y2k). For local government.
- **President's Council on Year 2000 Conversion**, [www.y2k.gov](http://www.y2k.gov). Overview of federal government efforts, with links.
- **Small Business Administration**, [www.sba.gov/y2k](http://www.sba.gov/y2k). Good links, checklists, and steps to take.

—CHRIS LOTSPEICH

### CLIMATE

## HAND IT TO BUSINESS

### *The Private Sector Takes the Lead on Climate Change*

As we went to press, representatives of world governments and multinational corporations were preparing for a second round of post-Kyoto climate protection talks, scheduled for 2–13 November in Buenos Aires.

Delegates will continue hammering out the specifics of a framework for reducing greenhouse-gas emissions that was agreed to

in principle in Kyoto last December. There will be much haggling, most of it unnecessary. While government negotiators continue to argue over who should bear the costs, the business community is increasingly tuning into the potential *profits* of saving fuel more cheaply than buying it ("Climate Protection Happens," summer 1998).

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“Leadership has already passed from the public to the private sector, which is exactly what should happen,” notes RMI director of research Amory Lovins. “It reinforces our belief that companies have a key—if not dominant—role to play in solving many of the world’s problems once they understand the business opportunities.”

This dramatic psychological shift began the better part of a year ago. Smart companies that were paying close attention in Kyoto are now starting to behave *as if* a carbon-trading system were already in place and the details of the regime already ratified. Some credit can probably go to RMI’s pioneering report, “Climate: Making Sense and Making Money” (fall/winter 1997), which remains one of the only publications to set out systematically the real-world business examples of profitable climate protection. Equally effective has been RMI’s modus operandi of encouraging early adopters of resource efficiency in each sector or geographic market, thereby forcing their competitors to do the same.

Business leadership is the key to climate protection. Businesses aren’t merely the implementers; they’re the fulcrum for shifting the politics of an issue. While environmental groups have done valuable work targeting governments, the greatest leverage is in influencing business behavior, which is based on practical results.

Strange, then, that many governments’ negotiators are so stuck in their everybody-take-your-castor-oil stance—despite President Clinton’s policy statement in advance of the Kyoto conference describing climate protection as profitable. Unfortunately, many climate negotiators haven’t come up for air from their immersion in economic theory to see what’s already happening in practice.

Still, there are signs of progress. In July, the President released an executive order announcing that all federal agencies should pursue external financing of energy savings. Agencies are encouraged to hire energy service companies, and get to keep half of what they save—a big new carrot instead of a stick painted orange.

Another simple incentive that Lovins is

currently promoting is a tax-code change that would help level the playing field between energy savings and energy use. Currently, businesses can expense what they spend on energy, yet they must capitalize and depreciate energy-saving investments over many years. Japan reportedly used a similar tax change to accelerate the installation of scrubbers on power plants.

The carbon-trading framework established in Kyoto is a good one, and efforts to

refine it in Buenos Aires are worthwhile. But the best way for participating governments to achieve its goals is simply to create a climate where leading businesses can get to work—and inspire emulation by the laggards.

“If [Buenos Aires] were a negotiation between business leaders rather than governments,” observes Lovins, “we would be a lot further along.”

—CAMERON BURNS

## TRANSPORTATION

### MAKING THE LEAP *China Enters the Hypercar™ Race*

The closest thing yet to a Hypercar is about to hit the road—in China.

In January, Huatong Motors will begin producing the world’s first commercial-volume vehicle that features both a composite/plastic chassis and body and hybrid-electric drive, according to *Modern Plastics*. Those are the two most important elements of the Hypercar concept developed by RMI.

The four-door Paradigm will weigh 1,793 lb.—not much more than half the weight of a similarly sized Chrysler Cirrus—and get 60 miles per gallon. That’s not yet as light nor as efficient as an optimized Hypercar could be, but it’s a promising start.

The Paradigm was designed by Automotive Design & Composites of San Antonio, Texas, and most of its parts will be manufactured in the United States. Initially at least, Huatong will merely assemble the cars at its plant in Sichuan Province. However, the car was developed with Chinese money and is aimed squarely at the growing Chinese market. Huatong plans to sell 5,000 Paradigms in 1999, ramping up to 30,000 a year by 2002, and it is pushing Beijing to make the Paradigm into a national car.

Why China?

Actually, it’s not so surprising. Hypercars are what RMI calls a “leapfrog” technology—a back-to-the-drawing-board redesign that produces radically improved efficiency and performance. RMI has long maintained that leapfrog technologies make the clearest economic sense in developing countries, where industry is less heavily invested in inefficient old technologies and where people have a greater incentive to be efficient with their resources.

In the case of Huatong, the company was looking to invest in a new plant, and wasn’t particularly wedded to steel in the way a manufacturer in Detroit or Stuttgart might have been. Furthermore, Huatong was seeking to differentiate itself in a crowded Asian market: combining lightweight design and hybrid-electric drive produces a fuel-efficient, durable car that the company feels will appeal to Chinese consumers. No official word on price yet, but given its intended market, the car should be quite inexpensive.

True, a billion Chinese driving Paradigms is a worrying environmental prospect. Yet it’s not for us to tell the Chinese not to drive. Better that they should drive Paradigms than what most of us in the “developed” world are driving.

—DAVE REED



# THE VIRTUAL HYPERCAR CENTER

## *A New Website Aims to Make Hypercars™ a Household Word*

When you read an article in this newsletter about the latest Hypercar research, is your reaction:

- A) Yeah, whatever, but how does the dang thing work?
- B) Fine, but when will I be able to *buy* one?
- C) What the heck has this got to do with protecting the environment?
- D) Um, what's a Hypercar again?

If your answer is any of the above, then the new Hypercar Center website—[www.hypercar.com](http://www.hypercar.com)—is for you.

Hypercar.com contains just about everything we know about Hypercars, all organized in an easy-to-navigate format with a lively mix of text and graphics. It's designed for easy dipping in and out, so you can get a quick overview or go as deep as you like.

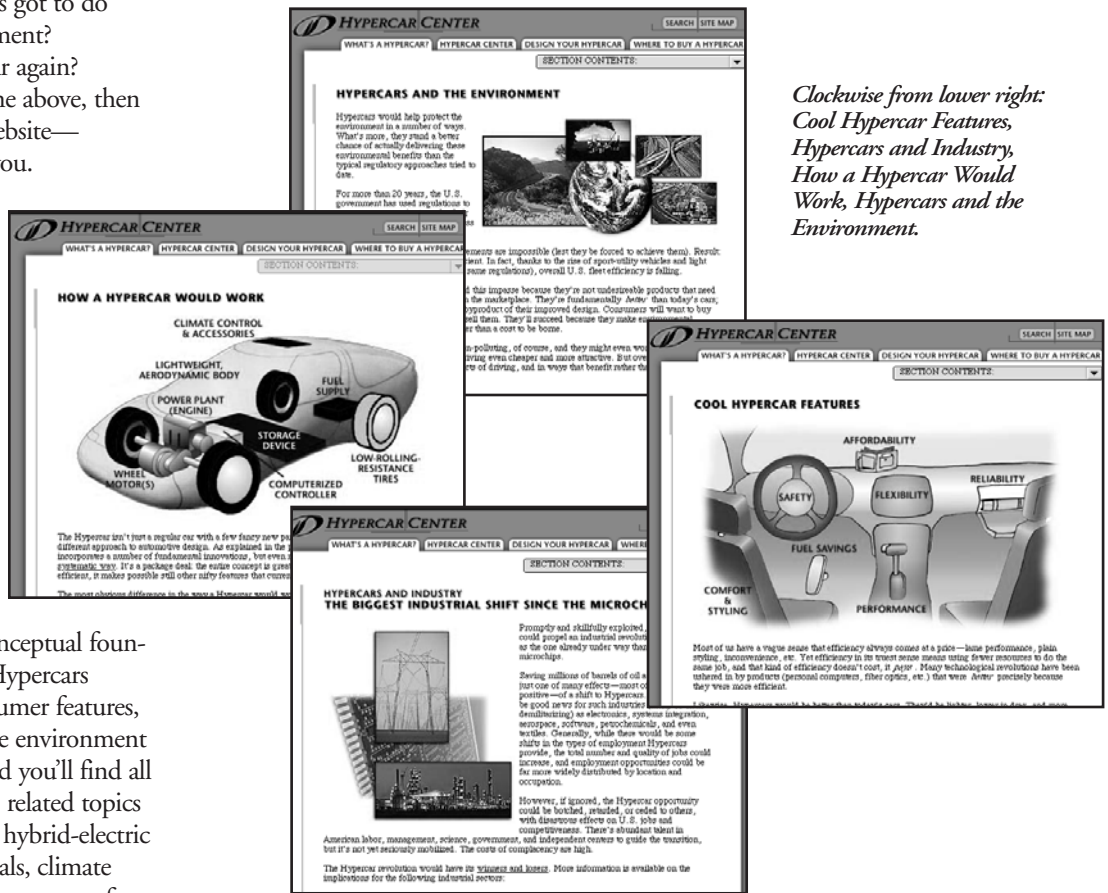
The biggest area of the site, "What's a Hypercar?," is where non-specialists will spend most of their time. There are sections on the conceptual foundations of Hypercars, how Hypercars would work, their cool consumer features, and their implications for the environment and industry. Keep going and you'll find all sorts of information on such related topics as fuel cells, battery vehicles, hybrid-electric technology, advanced materials, climate change, mass-transit policy, auto manufacturing, and energy.

If you're having trouble visualizing how Hypercars are ever going to get off the drawing board, head to "Hypercars: The Future," where you can download a full-color mockup magazine. The March 2002 edition of *Road & Wheel* test-drives the first commercial Hypercar, tours a Hypercar plant, describes how Hypercars became a reality, and, through a variety of ads, conveys some of the Hypercar business opportunities in store.

Warning: the "Where to Buy a Hypercar" area is a bit of a tease, since Hypercars don't yet exist. But go there anyway to learn how to urge manufacturers to start making them and government to support them. Answer a simple question and you'll be eligible to receive a free "I'd Rather Be

a range of possible Hypercar stories. The media are in fact one of the main audiences for the website, which is part of a campaign supported by the Joyce Foundation to "make Hypercars a household word."

You too can help spread the word about



*Clockwise from lower right: Cool Hypercar Features, Hypercars and Industry, How a Hypercar Would Work, Hypercars and the Environment.*

Driving a Hypercar" bumpersticker.

Those with a professional interest in Hypercars and related technologies will want to visit the "About the Hypercar Center" area, where they can learn about the Center's consulting services and staff. The password-protected "Members Area" gives Hypercar Center clients and subscribers access to extensive proprietary research.

Finally, the "Press Materials" area helps members of the media find information on

Hypercars. Tell your friends, your car dealer, your mechanic, your uncle who drives a Coupe de Ville, the neighbor who always has the latest everything. You don't have to have all the answers—just tell 'em to go to [hypercar.com](http://hypercar.com).

—DAVE REED

*Hypercar.com is best viewed with Java-enabled web browsers such as Netscape 3 or Explorer 4 or higher. For those who don't have one of these browsers, the site gives instructions for downloading them for free.*

## GLOBAL WARMING: WHAT YOU CAN DO

By Rick Heede, RMI Research Scholar

*I'm concerned about global warming, and I want to be part of the solution. What should I do?*

—Sarah Milton, Tucson, Arizona

Most of us feel pretty helpless in the face of enormous problems such as global warming. The problem may seem vast and far beyond our control, but in truth we, the people, are the ultimate consumers of nearly everything and therefore can greatly reduce our impact on climate. Most of the solutions are simple, are under our personal control, and can give us better lives at lower costs.

In this column I'll focus on the principal greenhouse gas—carbon dioxide—which is produced by burning fossil fuels. The average American causes about 22 tons of the stuff to be emitted every year. That's six times the world average, which is itself about twice as much as what climate scientists think the planet can handle without harming the climate.

In America, about a fifth of the carbon dioxide is emitted directly or indirectly by residences. Nearly a third comes from transporting people, goods, and materials—mostly from personal vehicles—and about a sixth comes from commercial buildings and services. The rest is attributable to industry and agriculture.

Let's look at a few effective ways to trim your personal climate "footprint."

### IN YOUR HOME

Install energy-efficient showerheads and faucet aerators, and wrap your water heater. If you have a natural-gas water heater, these inexpensive (\$25–45) retrofits will reduce household carbon-dioxide emissions by nearly half a ton, while saving you about \$60 annually on energy

and water. (The savings are even greater if you have an electric water heater, because electric heaters, powered by fuel-burning power stations, are that much less efficient to begin with. If you have one, plan on switching to gas when it's ready for replacement.)

Other good bang-for-the-buck retrofits: install compact fluorescent lamps, give your heating and/or cooling equipment a tune-up, seal and insulate ductwork, and weatherize and insulate your home.

Planting shade trees cuts emissions two ways: trees cool your home, and they pull carbon from the atmosphere as they grow. Factors vary greatly, of course, but in Southern states a 10-year-old

tree can reduce cooling energy demand by 12–18 percent (saving roughly 130 pounds of carbon dioxide per year)—and the tree will "fix" 5–20 pounds or more of the gas annually.

Hundreds of other carbon- and dollar-saving measures can be done in most households—see the RMI book *Home-made Money* for details.

### AT WORK

Turning off a typical 130-watt desktop computer at the end of the day will cut emissions by nearly 1,400 pounds of carbon dioxide per year, and reduce electric bills by an average of \$66. Turn off the monitor if you'll be gone for more than five minutes—screen-savers don't reduce power consumption. When replacing computers, printers, and copiers, get those with the EPA "Energy Star" label, and make sure their energy-saving features have been activated.

Recycle newsprint and office paper and always buy recycled paper. Of

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DEAR ROCKY

## COUNTING THE COST OF COMMUTING

A lot of the inefficiency in our society is due to market failures—people and institutions not behaving in an economically rational way. Typically, that's because they simply don't have enough information about the choices available to them. So improving resource efficiency is largely a matter of getting information into people's hands.

Former RMI staffer Lysa Usher is doing just that in her new job as head of the city of Aspen's Transportation Options Program. TOP recently published a brochure that takes aim at a huge market failure in our Colorado valley with high-caliber information.

Because of Aspen's high housing prices, many workers commute from more affordable communities 30, 40, 50, or more miles away. Rush-hour traffic—made worse by a multi-year road-widening project—makes their journeys even longer and more frustrating. Yet many keep driving solo, despite excellent bus service and ride-sharing programs.

TOP's brochure simply shows commuters how much their driving is costing them, and how much they could save by riding the bus or carpooling. You commute daily from Glenwood Springs in a midsize car? You're out of pocket \$2,678 a year—that's the cost of gas, oil, maintenance, tires, and parking, never mind fixed costs like insurance and financing. Ride the bus and you'll save up to \$1,823. Carpool with two other people and you'll save \$1,786.

You can lead commuters to water, but will they drink? God only knows. People are confoundingly wedded to their cars, even when driving to work means sitting in traffic. Privacy, convenience, and comfort are all important factors in commuters' transportation choices.

TOP can only alert people to the cost of their choices. The market will have to take care of the rest.



RMI NEWS

## NEW BOARD MEMBERS

RMI is proud to welcome three distinguished new members to its Board:

- Ruth Adams, a former director of the Program on Peace and International Cooperation at the MacArthur Foundation, and former editor of *The Bulletin of the Atomic Scientists*.
- Adam Albright, President of the ARIA Foundation, a director of the Natural Resources Defense Council and Redefining Progress, and Chair of Populations Communications Inter-

national.

- Christine Loh, a member of the Hong Kong legislative council and founder and Chair of the Citizens Party.

## NEWSLETTER ONLINE

Question: what's better than using 100-percent recycled paper? Answer: using no paper at all.

You can read your paperless RMI newsletter anytime simply by visiting our website ([www.rmi.org](http://www.rmi.org)). Better still, we'll notify you by email when each new edition of the newsletter has been posted.

If you would like to receive this service, simply email us at [orders@rmi.org](mailto:orders@rmi.org).

*New Staff*



Norm Clasen

*From left: marketing assistant Shawn Considine, land manager David Tice, and VP for special projects and general counsel Marty Pickett. Not pictured: maintenance worker Jose Gomez, development director Judy Moffatt, housekeeper Melissa Newsom, and development writer/researcher Mark Scott.*

## GLOBAL WARMING

*(continued from previous page)*

course, every kind of industrial and commercial building can cost-effectively be upgraded to save energy and cut carbon emissions.

### TRANSPORTATION

The average American's car burns 570 gallons of gasoline a year. Each gallon saved keeps 20 pounds of carbon dioxide out of the atmosphere. Obviously plenty of room for improvement there.

Carpooling just one day a week will save

the average commuter more than a half-ton of carbon dioxide a year, and you can do even better by using mass transit. These and other techniques—keeping your car well tuned, avoiding short trips, combining trips, minimizing idling, slowing down, properly inflating tires—are discussed in Jonathan Fox-Rubin's "Rethinking Automobility" column in the spring 1998 newsletter.

Each American, I am told, consumes as much energy as a sperm whale. We can readily trim that down to an orca-sized impact on the globe's climate while saving money for our family and helping ensure a livable planet for our grandchildren.

## The Newsletter

The *Rocky Mountain Institute Newsletter* is published three times a year and distributed to more than 22,000 readers in the U.S. and throughout the world.

Please ask us before reproducing, with attribution, material from the *Newsletter*.

Although space constraints prevent us from printing letters to the editor, we want to hear your comments, criticism, or praise relating to any article printed in the *Newsletter*. Please address all correspondence to:

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## About the Institute

Rocky Mountain Institute is an independent, nonpartisan, nonprofit research and educational foundation with a vision across boundaries.

Seeking ideas that transcend ideology, and harnessing the problem-solving power of free-market economics, our goal is to foster the efficient and sustainable use of resources as a path to global security.

Rocky Mountain Institute believes that people can solve complex problems through collective action and their own common sense, and that understanding interconnections between resource issues can often solve many problems at once.

Founded in 1982, Rocky Mountain Institute is a §501(c)(3) /509(a)(1) public charity (tax-exempt #74-2244146). It has a staff of approximately 45 full-time, 48 total. The Institute focuses its work in several main areas—corporate practices, community economic development, energy, real-estate development, security, transportation, and water—and carries on international outreach and technical-exchange programs. Its E SOURCE subsidiary (4755 Walnut St., Boulder, CO 80301, 1-800-E SOURCE, [esource@esource.com](mailto:esource@esource.com), [www.esource.com](http://www.esource.com)) is the leading source of information on advanced techniques for electric efficiency.

## 1998 YEAR IN REVIEW

Here are the highlights of RMI's year so far:

### Energy

- ☛ Presented "Putting Central Power Plants Out of Business" to the Aspen Energy Forum and advised energy and auto firms on adopting RMI's strategy for a rapid transition to a climatically benign hydrogen economy.
- ☛ Published a rebuttal to oil-depletion concerns in *Science* (see page 11).
- ☛ Submitted testimony on alternatives to a proposed power plant on Maui.
- ☛ Received recognition by the Heinz Award in the Environment category for Amory Lovins's "contribution to the understanding of energy use and alternatives to traditional fossil fuels and nuclear power."

### The Hypercar Center<sup>SM</sup>

- ☛ Briefed and consulted for numerous corporate, government, and nonprofit clients on the Hypercar<sup>TM</sup>, and continued its rapid progress to the market via proprietary projects.
- ☛ Delivered "Advanced Composites: The Car is at the Crossroads" at the Society for the Advancement of Materials and Process Engineering Conference—producing a cover story in the November 1998 *SAMPE Journal*.
- ☛ Created a comprehensive Hypercar website (page 7).
- ☛ Received widespread coverage, including a three-page feature in the senior trade journal *Automotive Industries*.

### Green Development

- ☛ Helped Monsanto plan a five-year redevelopment of its 1.5-million-square-foot St. Louis campus according to sustainable design principles.
- ☛ Organized and conducted a charrette for Ecotrust in Portland, Oregon to design "the first natural capitalist building."
- ☛ Worked with two leading firms to develop a prototype green office building.
- ☛ Facilitated development of scenarios on

affordable housing for the Aspen Institute's Aspen Community Forum.

- ☛ Consulted for the Aspen Skiing Company on green initiatives.
- ☛ Began work on an expanded second edition of the *Green Developments* CD-ROM for release in 1999.

### Profitable Climate Protection

- ☛ Circulated RMI's paper "Climate: Making Sense and Making Money" among corporate leaders and policymakers; built consensus around its theme; and identified many sympathetic firms that could lead a movement toward advanced energy efficiency.

### Water

- ☛ Helped the U.S. Environmental Protection Agency develop projects demonstrating the "daylighting" (de-culverting) of streams in greater Boston's Charles River watershed.
- ☛ Helped the EPA develop provisions for the first wastewater discharge permit to incorporate end-use efficiency.
- ☛ Organized a stormwater-management charrette for greater Pittsburgh (page 1).
- ☛ Peer-reviewed an EPA strategy paper on water efficiency.

### Corporate Sustainability

- ☛ Completed (with business author Paul Hawken) the manuscript of *Natural Capitalism*, due for publication in spring 1999, and an accompanying *Harvard Business Review* article.
- ☛ Delivered reports on efficiency assessments of six STMicroelectronics facilities in North America and Europe.
- ☛ Performed an assessment of World Bank environmental operations at its Washington, D.C. headquarters.
- ☛ Presented a keynote address, "Negawatts for Fabs," by videoconference and webcast to the Environmentally Benign Semiconductor Manufacturing Association's conference at Stanford University (page 11).

### Economic Renewal

- ☛ Held the first national Economic Renewal training seminar in Glenwood Springs, Colorado.
- ☛ Completed projects in two timber-dependent towns focused on reducing dependency.
- ☛ Completed the book *Beyond Timber Dependency*, scheduled for publication in early 1999.
- ☛ Conducted sustainable-development workshops in British Columbia, Colorado, Hawai'i, Illinois, Missouri, New Jersey, and Washington state.
- ☛ Began reorienting Economic Renewal for consulting and training of development practitioners.

### Windstar Land Conservancy

- ☛ Successfully raised \$3.1 million for the Securing the Future capital campaign, ensuring the permanent protection and stewardship of the Windstar land, and prepared to pay off the last land-purchase bridge loan.
- ☛ Formed a "Friends of the Windstar Land" group to support restoration work and outdoor education. More than 500 people made gifts in memory of John Denver.
- ☛ Submitted the final draft of the Windstar Land Management Plan to the Pitkin County Open Space and Trails Board and to the Great Outdoors Colorado Trust Fund.
- ☛ Completed installation of an irrigation system and initiated an integrated weed management program.

### Communications and Outreach

- ☛ Responded to roughly 2,000 queries on topics related to RMI's work.
- ☛ Obtained coverage of RMI in hundreds of media, including *The Economist*, *Business Week*, the *Digital Journey* TV series, and National Public Radio.
- ☛ Hosted nearly 1,000 visitors.

## THINKING, DOING, AND ANNUALLY, ASKING

*The ancestor of every action is a thought.*

—Ralph Waldo Emerson, 1841

Dear Friends,

At Rocky Mountain Institute, we wish fundraising worked like Disney's First Law, "Wishing will make it so," but it doesn't.

To make it as efficient as we can, we maintain a low-key, ask-once, remind-once approach. If you're reluctant to give us money, that's OK: we're equally hesitant to ask for it. (To preserve your privacy, too, RMI neither sells, rents, nor lends its mailing list.)

Overcoming our hesitancy is our confidence in the value of what your gift makes possible: time to think, to conduct research, to consult, educate, inform, and persuade. Thinking, which often gets a bad rap as the opposite of doing, is work; it requires energy and time.

We are not academics in an ivory tower; as a "do-tank," we take our thoughts to market. Your donations and our earnings (half our revenue so far this year, partly from our third for-profit spinoff) buy the time it takes for thoughts to yield efficient and sustainable actions.

RMI is an unusual nonprofit, emphasizing the marketplace benefit of its ideas and practices—as a glance at page 10 of this newsletter will suggest. Through whole-system, least-cost, end-use thinking, RMI shows the private sector that it can serve the common good at a profit, and the public sector that it can capitalize on natural resources by saving them. We are motivated by sustainability, which isn't for the short term. Our goal is the sort of resource efficiency that can yield—to paraphrase South Africa's new water law—"enough, for all, for ever."

You have the opportunity—Rocky Mountain Institute is that opportunity—to invest in a portfolio of ventures with strong returns to our common future.

And you can count on the dollars you've earned and donated to pay dividends in the work we've done and the work still before us.

Sincerely,



L. Hunter Lovins  
President & Executive Director



Amory B. Lovins  
Vice President & Treasurer

### NEW PUBLICATIONS

"**Negawatts for Fabs**" (E98-3). Paper printouts of overheads for a technical lecture on potential energy savings in micro-chip fabrication plants. 7 pages, \$3.00 plus shipping & handling.

"**Amory Lovins: Composite Crusader**" (T98-4). Profile in *Automotive Industries* (September 1998). 3 pages, \$2.00 plus S&H.

"**Is Oil Running Out?**" (E98-5). Letter in *Science* (2 October 1998) arguing that oil will become uncompetitive before it is unavailable. 2 pages, \$2.00 plus S&H.

*For shipping and handling charges, please call our Publications Department.*

### INSTITUTE SUPPORTERS

Our sincere appreciation is offered to these friends who have contributed to RMI. Please let us know if your name has been omitted or misspelled so it can be corrected in the next issue. Donations received between 1 May and 31 August 1998 are listed. Numbers in parentheses indicate multiple donations.

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