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RMI Solutions NEWSLETTER

TIME FOR A SWITCH

RMI Helps Reframe U.S. Energy Policy

NEP Initiative facilitator Larry Susskind, far right, leads the Expert Group through a discussion of transportation. Photos: Norm Clasen

By Cameron M. Burns

What kind of world are we leaving for our children, grandchildren, and great-grandchildren? Will it be better, safer, and fairer? And will U.S. energy policy help get us there?

Today, all but the terminally uninformed realize that the number of miles per gallon our SUVs achieve and how we power our factories and homes is directly related to the health of our planet—the science is no longer an argument; how best and soonest to stabilize the climate, preferably at a profit, is the new debate. And relying more on dwindling oil from fewer places looks unwise in a dangerous world. We should chart a course, as energy innovators remarked a quarter-century ago, "between a forecast and a fantasy" and "between the unavoidable and the miraculous."

For three decades, U.S. energy policy has been driven by battles between powerful-but-narrow constituencies promoting their favorite energy technologies. Largely absent is a clear sense of what nearly everyone agrees about, and how to incorporate those consensus elements into a balanced portfolio that can deliver to the American people (and help to deliver to all people everywhere) desired energy services in ways that are secure, reliable, healthful, affordable, fair, durable, flexible, and innovation-friendly.

Throughout those three decades, RMI and its founders have been helping steer energy policy, warning of the consequences of poor energy choices and explaining the strength of efficient use, diversified supply, and truly competitive energy markets. In February 2002, these efforts achieved a new level when RMI and the Cambridge, Massachusetts-based Consensus Building Institute (CBI) assembled the Expert Group of our National Energy Policy Initiative, or "NEP Initiative"—possibly the single most important project in RMI's 20-year history.

At Airlie House in Warrenton, Virginia, on 1–3 February, RMI convened two dozen of America's most distinguished and thoughtful energy experts from the private and public sectors (but not including advocacy groups or serving public officials). Their deep experience embraced all energy sectors and phases—supply, delivery, consumption, technology, R&D, competition, and regulation.

These politically diverse luminaries came together to rethink U.S. energy policy at a time when Congressional debate has become so polarized that agreement on

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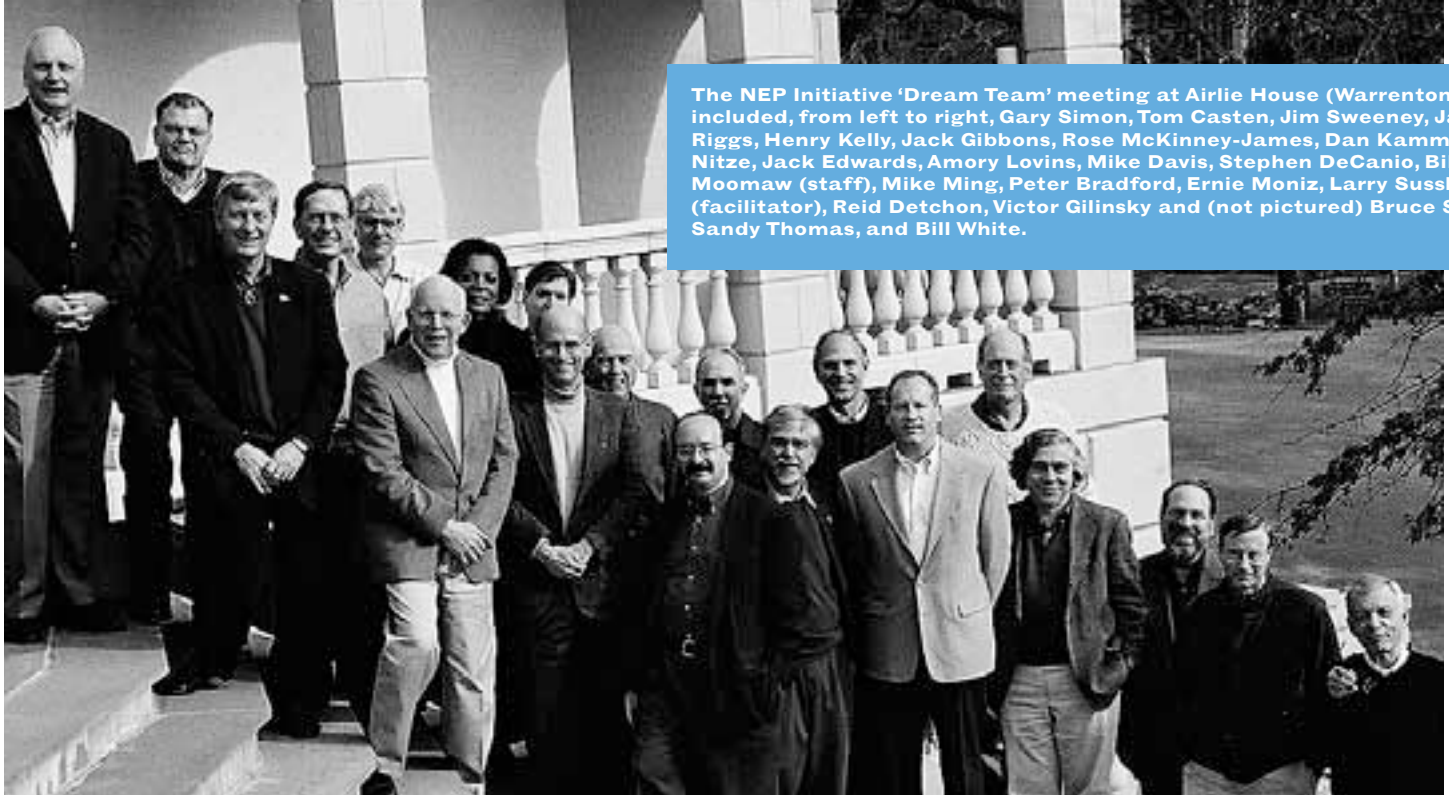


The NEP Initiative 'Dream Team' meeting at Airlie House (Warrenton, Va.), included, from left to right, Gary Simon, Tom Casten, Jim Sweeney, Jack Riggs, Henry Kelly, Jack Gibbons, Rose McKinney-James, Dan Kammen, Bill Nitze, Jack Edwards, Amory Lovins, Mike Davis, Stephen DeCanio, Bill Moomaw (staff), Mike Ming, Peter Bradford, Ernie Moniz, Larry Susskind (facilitator), Reid Detchon, Victor Gilinsky and (not pictured) Bruce Smart, Sandy Thomas, and Bill White.

effective solutions seems difficult or impossible; yet a frustrating gridlock would leave serious problems unresolved. The NEP Initiative therefore seeks to articulate a hidden consensus and fresh ideas that can command wide support and whose adoption would make contentious issues less important. It seeks to build a coherent and balanced policy framework from clear objectives and principles, rather than adopting competing constituencies' wish-lists. And its process is inclusive and transparent: by design, its sponsors (including RMI) and its funders cannot affect the outcome.

The NEP Initiative Story

The NEP Initiative started to take shape in the spring of 2001. In California, blackouts, soaring wholesale electricity prices, spiking gasoline prices, and spot shortages of natural gas were expected by many to presage similar problems nationwide. President George W. Bush's National Energy Plan, released in May, strongly emphasized supply expansion, chiefly from fossil fuels and nuclear power. It called for 1,300–1,900 new power plants (more than one a week for 20 years), plus 38,000 miles of gas pipelines and 255,000 miles of powerlines, as well as oil drilling in the Arctic National Wildlife refuge—options largely unattractive to the public and to Wall Street. (See *RMI Solutions*, Spring and Summer 2001.)

Several concerned individuals asked RMI if we could help create a new energy policy for the country—one that built on the past 30 years' experience, could command wide support, and would strengthen competitive markets and grassroots democracy. After consulting with many advisors, RMI partnered with CBI, obtained foundation funding (see box), and launched the NEP Initiative last autumn.

The average American, of course, cares little about energy, let alone energy policy. We flip a switch, a light goes on. We twist a knob to heat up dinner. We spin a dial to enjoy hot showers. We drive to the pump and tank up. And at the end of each month, we pay the bills. For most Americans, this is all simple and accepted. Less obvious, most of the time, is that the physical systems that supply our energy are vulnerable to terrorism and accidents, the regulations that govern energy supply and distribution often entrench self-interested monopolies, the consumer can't choose how energy dollars get spent, many energy sources are polluting or unreliable, and the whole policy framework has typically been opaquely designed by Washington players whose self-interests do not always coincide with the public's desires.

The NEP Initiative began with two main steps. CBI's Initial Assessment, based on in-depth off-the-record interviews with 75 diverse constituency leaders, identified points of consensus. Those then informed the Expert Group's deliberations, producing a succinct-but-direct 22-page statement on U.S. energy policy for delivery to bipartisan political "customers." The statement's unique features could enable it to exert a salutary influence as Congress debates competing energy bills for several reasons.

First, as mentioned, the policy statement is a consensus document. It was not negotiated by horse-trading between constituency representatives. Rather, it was crafted by diverse and deeply experienced energy policy experts working in an open forum, each with an equal voice. The document was written collaboratively during the 1–3 Feb. meeting in Virginia, then fine-tuned by and with the consent of the entire group.

Second, the ideas presented in the NEP Initiative are usefully specific on strategy but don't try to overspecify the tactics that policymakers will need to tweak.

Third, the Expert Group reasoned from clear objectives and principles to craft its policy recommendations, rather than starting with desired outcomes and then grafting on post-hoc justifications.

Fourth, rejecting the conventional view that cleaner and safer energy services will cost more, the Group found practical "an energy system that is much more secure, much more affordable, and much less environmentally damaging"—simultaneously.

And fifth, while reading public policy papers is usually for the recreationally challenged, and the consensus process is the enemy of perfect prose, the NEP Initiative* is refreshingly bold compared to previous attempts. It announces: "The United States, and the world, must begin a decades-long transition to an energy system that won't run out, can't be cut off, safeguards our health and the climate, stewards our world, and supports a vibrant economy. Today's patterns of energy production and consumption will not deliver these benefits for our children and grandchildren. The way we produce and use energy wastes money, threatens our environment, raises our vulnerability to accident and terrorism, and contributes to instability around the globe.

"We must create a new energy system that makes our country and the world more secure. It must be less susceptible to major disruptions and meet the needs of people today and of generations to come—providing adequate, affordable, and healthful energy services, for all, forever. The opportunity to create this new energy future is here and now. New technologies, which seemed visionary only a few years ago, today provide energy services to millions and demonstrate that this energy future is not only possible but commercially viable."

The NEP Initiative offers policies in five specific areas: transportation and mobility, electricity services, climate change, energy security, and energy research, development, and government procurement. In each area, it lists overarching long-term policy aims and suggests short-term goals and policy instruments.

The centerpiece of the NEP Initiative's suggestions for transportation (which consumes 27 percent of U.S. energy—97 percent of it as oil) is much more efficient vehicles, including aircraft. The document suggests tools ranging from revenue-neutral feebates (which encourage buying efficient and scrapping inefficient vehicles) to allowing high-efficiency vehicles to use high-occupancy-vehicle lanes, regardless of passenger load. The NEP Initiative also supports the ongoing shift to hydrogen fuel-cell vehicles, cellulosic biomass fuels, internalized costs, and land-use reforms to achieve better access with less travel.

Electricity generation was perhaps more straightforward, and the NEP Initiative's many specific recommendations would uproot the United States' centralized powerplant mentality. It urges that all ways to make and save electricity, and to coproduce heat, should compete fairly, whatever their technology and scale. (Nuclear power would be held to the same tough economic, environmental, and security standards as its competitors.)

With 39 percent of total U.S. primary energy use coming from oil, just over half of it imported, energy security is a key component of the NEP Initiative. It calls for the development of a "diversified, resilient, and environmentally sound energy system," which means lessening oil dependence, designing more dispersed supply systems, and immediately protecting risky energy chokepoints.

In the area of climate change, the NEP Initiative states: "The fossil fuel era has created the abundance and mobility that many people in industrialized countries now enjoy. To make these same benefits available to billions of people around the world who do not yet enjoy them, and to future generations, we must find less carbon-intensive and more efficient ways to deliver energy services [, possibly at lower cost] … A prudent public policy would start now to address the problem … Over time, we need to make a systematic, orderly, and fair transition from a carbon-dominated energy system to a significantly less carbon-intensive system"—one far more reliant on hydrogen and renewables.

The NEP Initiative may prove very important. As you read this, the report is being distributed on a bipartisan basis to Senators, Representatives, and political leaders at the national and regional level. It is being distributed to major news media, and it is being posted at its own website (www.nepinitiative.org), where updates and news about the NEP Initiative will be available. In a nation where energy policy is taken for granted yet is eroding social, economic and environmental goals, we expect it may make waves on Capitol Hill.

And, hopefully, the next time you flip that switch and make a powerplant turn money and fuel into climate change, you'll know that RMI is helping the American political process create a smarter, brighter energy future.

Spreading the Word

In recent months, RMI has made available on our website some important pieces of energy-related material, which we recommend to readers. First published in *The American Prospect*, RMI co-CEOs Amory Lovins and Hunter Lovins's two-part "Mobilizing Energy Solutions" is a compelling, contemporary overview of U.S. energy policy and the nation's exciting energy opportunities. (See www.rmi.org/sitepages/pid171.php#LibEnergyPol.)

Second, *Brittle Power*, the ground-breaking 1982 Pentagon study on domestic energy vulnerability by Lovins and Lovins, has been loaded onto our website, at www.rmi.org/sitepages/art7095.php. With current concerns about energy security and terrorism, *Brittle Power* is a compelling read.

** The NEP Initiative was funded by the William and Flora Hewlett Foundation, the Gordon and Betty Moore Foundation, the Wallace Global Fund, the Steve and Michele Kirsch Foundation, the Belfer Family Foundation, the GAG Charitable Corp., the Janelia Foundation.*

A Camp to Save the World?

RMI Takes on the Challenge of Refugee Settlements

text and photos by Hunter Lovins and Cameron M. Burns

Confucius said, "Real knowledge is to know the extent of one's ignorance." Not understanding large systems can cause major problems across a wide range of pursuits, from the purely selfish and extractive to the most humanitarian-minded of endeavors—including the care and support of refugees.

Every year, millions of people are displaced from their homes and become "refugees." The UN estimates that there are some 35 million refugees today, nearly half of them unrecognized under international law. Some are displaced by natural disaster, some by war, others by drought or other resource shortages. The flickering images on CNN mask vast diversity of needs, desires, and preferences. This presents an enormous challenge for humanitarian agencies, who have seen many relief efforts fail due to cultural, environmental, and technological gaps and mishaps.

In mid-February 2002, Rocky Mountain Institute and Dr. Eric Rasmussen, a Navy officer and former Fleet Surgeon for the U.S. Navy's Third Fleet, joined forces with an array of organizations working on these issues—the United Nations High Commissioner for Refugees (UNHCR), Refugees International, the UN Development Programme, the World Food Programme, the U.S. State Department, the Departments of Energy and Defense, and others—to rethink refugee-and-displaced-persons settlements from scratch.

The event, officially called the "Sustainable Settlements" charrette**, took place at El Capitan Canyon, a rustic camp and retreat center near Santa Barbara, California. Use of El Capitan Canyon was donated and the event generously hosted by co-owner Chuck Blitz. Other costs were borne by generous grants from private donors, chiefly Betty Williams, John and Judy Harding, Kathleen Barry and Bob Burnett, and Adam and Rachel Albright.

The purpose of the charrette was to bring together leaders from the aid community with some of the best integrative design practitioners for sustainable development to seek ways to manage refugee settlements more effectively. Often problems arise from well-meant but dis-integrated solutions. At a camp in Africa, for example, one aid agency delivered drinking water from wells or trucks via two-inch spouts, while another agency provided plastic distribution containers with one-inch holes. Those particular refugees weren't familiar with funnels, so the mismatch spilled thousands of gallons. The resulting mudhole was "fixed" by laying a cement slab with a sump to collect the spillage. The result, however, was that refugees getting their water could also get malaria. This is a design problem. Technologies, organizational patterns, and collaborative thinking between the aid agencies and experts in design for sustainability can solve or, better yet, avoid such problems.

A Refugee Primer

Organized refugee care is a fairly new phenomenon. In modern times, it was at the end of World War II—when an estimated 40 million Europeans were displaced—that the world community began looking at and understanding the plight of the dispossessed. In 1951, a UN meeting in Geneva wrote an international treaty, the 1951 Refugee Convention, which defined a refugee and outlined "the minimum humanitarian standards for the treatment of refugees."

Officially, a refugee is a person who "is outside her/his country of origin (or habitual residence, in the case of stateless persons) and who, owing to a well-founded fear of

*** Charrette: a very intensive, highly integrative, trans-disciplinary, roundtable workshop that brings together stakeholders and experts at the very outset of a design or problem-solving process. It yields an ambitious design product, typically conceptual with some extension into early schematic design.*

persecution for reasons of race, religion, nationality, membership of a particular social group or political opinion, is unable or unwilling to avail herself/himself of the protection to which s/he is entitled."

The problem with the 1951 Convention definition, according to David Stone of the UNHCR and Larry Thompson of Refugees International—both of whom made presentations at the Sustainable Settlements charrette—is that this UN definition leaves out quite a few folks, notably people uprooted within their own countries, so-called "internally displaced persons" (IDPs). Further confusing matters in Afghanistan—where RMI's sustainable designs might first be applied—there are "old" and "new" refugees, Thompson explained. An estimated four million "old" refugees resulted from the Russian occupation and war of the late 1970s and 1980s; the new refugees were displaced by more recent fighting and a 1999–2001 drought. In late 2001, a vast new flood of refugees was feared in the wake of U.S. military action, but international efforts to deliver relief aid inside Afghanistan, enabling Afghans to remain in their homes, were relatively successful.

Not all "refugees" are created equal. The roughly one million Afghan IDPs who could not cross international borders in 2000 and 2001 (partly because neighboring countries closed their borders) don't have the same rights as international refugees, and are often aided in only a minimal fashion or not at all. Moreover, many refugees are overlooked by the main humanitarian efforts because they integrate quickly into local populations, as have many Afghan refugees who fled to Iran and Pakistan.

The camps that refugees wind up in are usually in poor nations, and they enormously burden local societies, economies, and ecosystems, leading to a swarm of problems. Armed militia and guerrilla factions sometimes infiltrate camps and terrorize refugees; violence against women, children, and other vulnerable people is common. Sometimes those hired to run the camps come from a local population that has been at war with the refugees, prompting severe mistreatment. Locals outside the camp often resent the international aid the refugees receive, and steal whatever they can from the camp inhabitants. Sometimes the refugees themselves don't trust the aid—as workers in Sudan found when refugee mothers refused to feed their starving children because they feared the food was poisoned. Refugees are sometimes inadvertently given food, supplies, and fuels that break cultural or religious mores. Sometimes they're given food that requires considerable cooking, prompting energy-related problems like deforestation.

Above: Dr. Eric Rasmussen and RMI's Bill Browning, co-leaders of the Sustainable Settlements charrette. It was Dr. Rasmussen's extensive work in refugee camps that prompted him to question how they are conceived, created, and managed.

Even local governments can throw up obstacles. At one African camp, the UN wanted to initiate several environmental projects. The national government—which had been charging rich Western humanitarian groups big money simply to gain access to refugees within its borders—demanded $20 million from the UN to begin work. The UN refused and eventually gained access to the camp, but such extortion adds one more complex problem to the mix.

According to Refugees International's Thompson, a typical refugee camp can house 10,000 people, but camps may have hundreds of thousands of residents, as was the case with Rwandan camps in the Congo in the mid-1990s—one of which grew to 600,000. Refugee camps are supposed to be temporary, but unresolved conflicts often make it difficult for refugees to go home, and the camps can remain for decades.

The Challenge of Design

Conventional wisdom frequently leads to design choices that may make the problem worse. Conversely, there is much experience from sustainable development experts that can prompt one solution to leverage others. Latrines, for instance, are usually located in the driest part of the site. RMI's biological design colleagues, however, are quick to point out that by using the wettest part of the site, one can create ponds under the latrines, add a mixture of organisms (a "biological starter kit"), and a week or two later a highly productive ecosystem will be processing the human wastes into pathogen-free nutrients. Those in turn can be used to create excellent and culturally appropriate high-protein foods—some of which specifically boost human immune competence. So hooking up two seemingly unrelated linear needs—food in and waste out—can help meet both at lower cost.

Properly combined, today's best innovative practices can often provide for basic human needs—clean water, food, sanitation, shelter, security, light, refrigeration, telecommunications, medical care, and education—in ways that support prior populations, check the spread of poverty-inducing conditions, and restore vital habitat and infrastructure. Moreover, applying key insights from other disciplines can even help to create a sound sociology, an entrepreneurial micro-economy, and a sense of dignity and self-worth. Combining

Left: Jason Elliot, author of *An Unexpected Light* and RMI board member Janine Benyus, author of *Biomimicry*. The two authors inspired charrette participants with stories of the Afghan people and nature's adaptations to specific situations, respectively. Right: Afghan refugees Zieba Shamley of the Women's Alliance for Peace and Human Rights, Sima Wali of Women & Refugees, and Fauzia Assifi, who escaped Afghanistan by riding 18 hours in a truck's false gas tank with her two-month-old daughter. The three shared moving cultural insights into Afghanistan.

many proven solutions, normally deployed only singly, should yield very important synergies. Making the skills and techniques scaleable and portable—so refugees can take them home to help with rebuilding—could make repatriation more likely, more successful, and a nucleus for national development. And if this can be done in refugee camps, it should also help some two billion or more other people seeking to create sustainable settlement in austere conditions.

Developing Projects

So what would you do, if, say, you had a sudden three- or four-month-long influx of 100,000 people into your community, all of whom needed your immediate help? Or 200,000 people? How about half a million?

The 84 attendees at the charrette formed working groups covering all the issues of concern to UNHCR—energy, site, water and sanitation, communications, education, health, economic development, food and nutrition, construction and shelter—and were charged to envision three projects that could be implemented within 60 days. They were also given a theoretical location for their efforts: the community of Spin Boldak, near the Afghan-Pakistan border, where there is the possibility of using ideas from the charrette in a real-life setting. (Ideas generated from this charrette might also be applied along the U.S.-Mexico border, in rebuilding Kabul, and in many other settings.)

Some of the results were revolutionary. Take for example, food. It arrives in all sorts of packaging, most of which is discarded. But boxes of aid materials, for example, could be impregnated with crop seeds and spores of fungi that help them gather nutrients and hold soil. Each box panel can fit a region and season, ready to plant and create a kitchen or market garden just by putting it on the ground and watering it. Charrette participant Paul Stamets of Fungi Perfecti is already talking to packaging firms about making such boxes.

How about education? Such a "seed box" could deliver a "School-in-a-Box"—another charrette idea, supplying refugees with camp information, learning materials and school curriculum, gardening supplies, solar toys, solar-power information, you name it.

Even some of the simplest—but currently unapplied—ideas could be helpful in camps. "The first project our group developed was an assessment of the refugees themselves, an inventory of the human resources," noted RMI's Michael Kinsley, Economic Group facilitator. "There's a lot of brainpower that comes into these camps, and camp organizers should be tapping into that resource." Not only does an assessment provide humanitarian agencies with information about the population, Kinsley noted, it could empower the refugees themselves, by building self-esteem and getting them involved with camp projects. It also helps prepare them for their return home. And if the inventory goes on a smart card rather than a simpler ID card, it can also represent an unstealable personal store of value (set up with microcredit when you register) to jump-start local commerce.

An Energetic Flow of Ideas

The individual projects the charrette produced were impressive; greater details will soon be available on RMI's website and in a soon-to-be-released charrette report—www.rmi.org/sitepages/pid560.php. But it was the way in which complementary knowledge and experience was connected and woven together that made this design process unique. A poignant example of this came from the charrette's Energy Group, which comprised technology and fuels experts, solar and adobe experts, and experienced aid workers.

On their first day, group members pondered how to get the most heat and light from various fuels, and which fuels were appropriate. They came up with some good ideas, but the arrival of Afghan refugee Fauzia Assifi and an Afghan-experienced nurse-anthropologist caused the group to refine good ideas into great ones. Afghan families, Assifi explained, are accustomed to heating their feet and lower

legs by sitting together (*sandelei*) around a table, covered with a heavy quilt, with a small charcoal brazier (*manqal*) underneath—an arrangement similar to the Japanese *kotatsu*. The brazier, containing coals covered with ash, stays hot for many hours. Afghans cook, eat, and share each other's company around the manqal and often go to sleep in the same positions by leaving their legs under the brazier-warmed quilt and stretching out on their sleeping mats.

Building on Fauzia's information, the Energy Group decided that a new type of brazier insert might be in order. Fueling it—and an efficient stove/pot combination for cooking—with LPG (bottled gas) could greatly decrease the environmental damage resulting from cooking with fuelwood (and then trying to heat people with the same cooking fire). It could free up the vast fuelwood gathering time required of women and children, so they could further their education or earn more, and could avoid landmines and attackers while foraging for firewood. It would also eliminate indoor smoke, and therefore eye damage, which is chronic in Afghanistan, without many of the risks of kerosene. A trickle brazier that uses only a tiny amount of LPG would thus provide personal warmth to family groups in the evening and at night in cold climates, in a way that reinforces family cohesion and traditional practices.

The Energy Group took the discussion even further by hypothesizing that such new technology might stir the interest of gas, oil, and LPG companies—such as those now emerging in Afghanistan—which could see new markets created through technologies introduced for refugees. The discussion was rich and deep.

The roughly two dozen projects developed were then considered on an integrated basis, taking cultural, and technological appropriateness, and resource preservation into account. Yet, as the working groups pondered their projects, it became apparent that there are several larger ideals humanitarian agencies must follow. First, refugees themselves should be encouraged to lead efforts to help themselves. They know their cultures, their religions and regions and desires better than any Western aid worker. Second, the help must be appropriate—culturally, religiously, economically, technologically, geographically, and in terms of resources. And finally, aid should be coordinated from the start, and throughout the displacement period of the refugees in all areas. It is such a lack of coordination that prompted RMI's charrette in the first place.

'In tents' amounts of information: an ocean of laptops prompted ongoing commentary from all participants. Here, RMI's Ben Shepherd makes a few lunchtime comments.

Where Do We Go from Here?

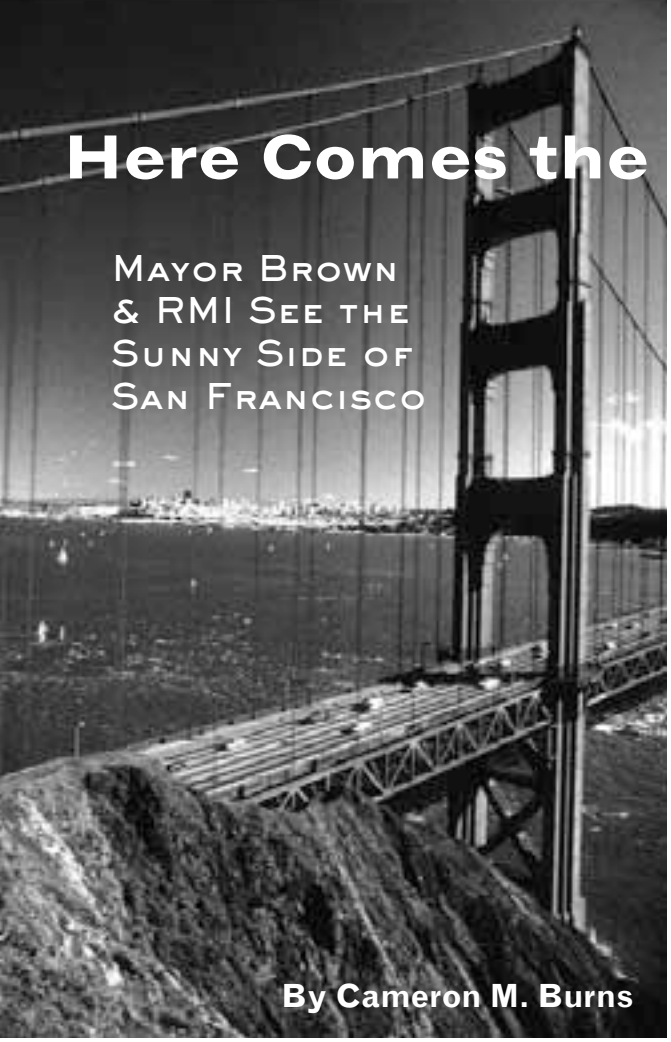
The Sustainable Settlements charrette was not undertaken to produce floorplans for camp buildings and design drawings for new cooking devices; rather, its purpose was to create a settlement design methodology and template for quickly helping displaced people—in short, a primer for aid workers. A report from the charrette will soon be published in several formats (paper, web, etc.) and shared with humanitarian organizations, aid workers, and local, regional and national government agencies. But the real benefit of the charrette will be the ongoing healthy, rich dialogues born of four modest days in the California woods.

Already several participants are pursuing both the technological projects generated and the design process that shows humanitarian workers how to approach refugee settlements. Whatever comes next, RMI and Dr. Rasmussen will be heavily involved in the continuing dialogue.

Sadly, RMI's work on refugee issues represents some depressing realities. If climate change raises sea levels enough to force out poor lowland populations, if the desertification of sub-Saharan Africa continues unabated, if other resource-related problems continue to push the world's burgeoning population from place to place and to exacerbate conflict, then RMI's work on refugee settlements will become more important in the future, not less. Reversing those trends is another key part of the responsibility we take together for a safer world.

Recommended Resources:

www.rmi.org/sitepages/art7206.php
www.thesustainablevillage.com/refugee_camps/index.html
www.cmi.arizona.edu/home.htm
www.unhcr.ch
www.refugeesinternational.org
www.wapha.org
www.villageearth.org



Here Comes the Sun!

Mayor Brown & RMI See the Sunny Side of San Francisco

By Cameron M. Burns

On 6 November, San Franciscans voted to make their air cleaner, their utility bills more stable, and their electricity supplies more reliable and secure when they approved two ballot measures that call for the city to spend $100 million on alternative energy.

Proposition B, which garnered 73 percent of the vote, allows the city to issue a $100 million revenue bond to finance construction of solar and wind-power systems. A second complementary measure, Proposition H—which gained 54 percent of the vote—will allow city officials to issue future bonds for renewable energy projects without voter approval.

Now, San Francisco—a city often shrouded in fog—is set to become the nation's largest municipal producer of sun-generated electricity. The city's new energy supply will not only be environmentally benign, it will be immune to most types of grid/delivery failures, monopolistic behavior by suppliers, and terrorist attacks. Moreover, the City's venture is of a size that should help cut renewable electricity costs for everyone by cranking up production of solar cells and wind generators. The existing San Francisco Public Utilities Commission (SFPUC), appointed by Mayor Willie Brown, Jr., will run the new renewable energy programs.

Members of RMI's renowned energy team, working with Ed Smeloff of the SFPUC, recently helped the City craft an Energy Resources Investment Strategy, which will guide San Francisco's energy future and determine the best ways to use the $100 million in bond money. In this special interview, *RMI Solutions* talked to the Mayor about his city's new leadership role in alternative, secure energy systems.

RMI: *Mr. Mayor, suddenly San Francisco is a world leader in solar energy, and in fact, in alternative energy in general. Obviously, you're glad?*

Mayor Brown: San Francisco has long had a reputation as a city that embraces environmental quality. One of the reasons that San Francisco is a premier destination for tourists throughout the world is its natural beauty and its reputation for clean air and water. It is only natural that San Francisco's voters would support an initiative to make solar power happen on rooftops throughout the city. As a dense urban environment, it is a challenge to develop new sources of electric power while protecting environmental quality. I am proud that San Francisco will be a leader in the development of solar energy. We need to do so in a sustained, orderly manner that is cost-effective. I have put together a team of well-qualified experts at the Department of the Environment and the San Francisco Public Utilities Commission that will lead this effort.

RMI: *Were citizens reacting to last summer's electricity crisis, or was there more to it than that?*

Mayor Brown: Certainly, last year's energy crisis drew public attention to the need to

Stop Press

On 28 January, after this interview was conducted, Mayor Brown took his city's commitment to a clean future one step further when he introduced a resolution to the San Francisco Board of Supervisors that calls for San Francisco to reduce its overall greenhouse gas emissions to 20 percent below 1990 levels by the year 2012. The Mayor's plan would entail an overall reduction of about 35 percent of current greenhouse gas emissions, and far outstrips the target of seven percent below 1990 levels first proposed by the federal government before the United States withdrew from the United Nations Kyoto Protocol on Climate Change. The proposed resolution would also ensure the City's place at the forefront of global warming solutions nationally and worldwide.

"Global warming is real, and it presents a bona fide threat to the quality of life in San Francisco," said the Mayor in a statement. "We need to act now if we're going to keep San Francisco and the Bay Area a viable place to live for future generations."

develop new, clean sources of electricity as well as using existing resources more efficiently. However, San Francisco has long been aware that it is particularly susceptible to power disruptions. In December 1998 a severe problem at an electrical substation knocked out power for hours for most of San Francisco and nearby communities. It has been a goal of my administration to make San Francisco more self-sufficient in power generation. Solar power fits in well with a balanced energy strategy that includes a diverse mix of resources to assure reliable electric service. I am convinced that the voters of San Francisco agree that we need to be more energy independent as a city.

RMI: *It appears solar power hasn't been as much of a long-term public goal in California as some might like to think. The AP recently reported, "In sunny California, less than five percent of the state's electricity comes from solar power, though residents have nearly used up millions of dollars in state rebates that slash the cost of installing solar panels almost in half." Your thoughts now, as the "sunniest mayor" in America?*

Mayor Brown: California likes to think of itself as being the most innovative of the states. Back in the 1980s when I was Speaker of the State Assembly, California was on the cutting edge in promoting renewable energy technologies. California still leads the nation in the amount of installed generation of solar, wind, geothermal and biomass technologies. Unfortunately, under the administration of former Gov. Pete Wilson, the state embarked on a misguided experiment with electricity deregulation [restructuring]. As a result of policies put in place in 1994, the state's commitment to renewable energy began to decline. However, it is my expectation that with the efforts we are making in San Francisco, coupled with that of other forward-looking cities like Sacramento and Oakland, solar energy will be back on the public agenda as a long-term solution to our energy needs.

RMI: *Proponents have said that within a year San Francisco could produce up to 20 megawatts of sun-driven electricity—more than any other city in the country—by placing solar panels on the rooftops of city-owned buildings and schools. Is that a realistic time-frame?*

Mayor Brown: I don't believe that trying to install 20 megawatts in one year is realistic. If we try to do too much too fast we will likely end up increasing the cost of solar installations. Instead, we need to come up with a long-term plan that will increase the nationwide manufacturing capacity for solar modules, hopefully with some of those new facilities being located in the San Francisco Bay Area. By doing that, the cost of solar units will decline and reduce the need for public subsidies to create a market for solar energy. For 2002, we are looking at a high profile solar project on the Moscone Center, where many of the major conventions are held in San Francisco. The San Francisco Public Utilities Commission is investigating dozens of other potential sites, and they will be proposing installations on other city-owned facilities. I particularly want some of the first facilities to be accessible to students so they can get first-hand experience with a technology that will be critically important in the 21st century.

RMI: *Prop B also calls for an additional 30 megawatts to come from wind turbines placed elsewhere in the Bay area. Where is the wind strong enough for that? (By the way, did you know two Californians, Mark Jacobson and Prof. Gil Masters of Stanford, recently did the math on electricity-generated energy versus coal-generated energy and, when health programs for coal miners are factored into the equation, wind comes up cheaper? See* Science *magazine, 24 August 2001.)*

Mayor Brown: Anyone who has driven from the Central Valley to the Bay Area through Livermore on Interstate 280 cannot miss the hundreds of wind turbines that have been installed on the hills of Altamont Pass. The SFPUC is currently investigating

Mayor Willie Brown

sites in this area and elsewhere in the Bay Area for the installation of new wind turbines. In addition, I understand that private developers are considering installing wind turbines near Candlestick Park, one of the windiest areas in the city. It is possible that, some day, wind turbines along Highway 101 at the entrance to San Francisco could be a landmark for the city, just like the Golden Gate Bridge and Coit Tower are now. I am not surprised that wind power is less costly than coal-generated energy. That explains why nobody is proposing to build any coal plants in California.

RMI: *A megawatt is enough electricity to power roughly 750 homes. I've read that the plan so far calls for 50 megawatts all told (20 solar, 30 wind), which would power roughly 38,000 homes. What about pushing the solar and wind programs even further and generating more "green" power?*

Mayor Brown: A key goal of my administration is the closure of the 40-year-old Hunters Point power plant, which is a major source of air pollution in the southeast section of San Francisco. The two fossil-fueled units located at Hunters Point can produce 215 megawatts of power. So we need to develop within the city limits of San

Francisco at least that amount of reliable new power generation. I am in favor of developing clean and renewable energy in the city as part of a portfolio of resources that results in the certain closure of the Hunters Point plant. San Francisco needs to have sufficient supplies of power whenever peak demand for electricity occurs—which can be on a winter evening as well as during a summer afternoon. Therefore, our renewable energy commitment needs to be part of a larger energy plan that includes the development of state-of-the art gas-fired power plants along with investments in energy efficiency programs.

RMI: *Though nearly half of all solar panels in use around the world are made in the United States, domestic customers make up only 15 percent of the market because fossil-fuel-powered electricity in the United States is touted as being cheaper—mostly due to how the math is done. (Last year, it was reported [AP, 7 November] that Germany and Japan, whose governments heavily subsidize solar panel purchases, consume 55 percent of the world's solar power.) Is there any interest in developing other aspects of the solar and wind industry in San Francisco—say, for example, helping photovoltaic manufacturers set up shop there (as Sacramento did)—becoming America's "Solar City" or something like that? If so, have there been any estimates as to what that might do for the SF economy?*

Mayor Brown: Clearly, based on the vote in San Francisco, there is great potential for growing the market for solar power in the United States. I am interested in San Francisco tapping into that market potential. San Francisco has a talented work force and a reputation for innovation in incubating new businesses. Solar energy faces a number of barriers including insufficient manufacturing capacity, a weak financing infrastructure, and the lack of well-trained systems installers. San Francisco is well-situated to help overcome each of these barriers. The city has ample sites available for solar manufacturing and is eager to work with solar companies interested in locating here. As a major financial center, San Francisco has the talent to grow the market for solar power by making credit more widely available to homeowners and businesses. And San Francisco's educational institutions can meet the challenge of training a solar workforce.

RMI: *Some lawmakers are obviously urging independence from foreign oil and a diverse array of fuel sources. Late last year, Sen. Harry Reid (D-Nev.) and Sen. Gordon Smith (R-Ore.) introduced legislation to renew the federal tax credit for wind power and expand it to include solar, biomass, geothermal, and other renewable energies. Have you or has the city become involved in other community and/or national alternative energy initiatives?*

Mayor Brown: San Francisco is supportive of federal and state legislation that provides incentives for the development of renewable energy technologies. I have worked with California's Congressional delegation in addressing California's energy crisis, and I look forward to working with them to make San Francisco's solar initiative a success.

Certainly, our over-dependence on oil, wherever it is produced, is a major vulnerability for the United States and we need to take steps as a nation to lessen this dependence. San Francisco has been a national leader in lessening reliance on oil by developing a transportation infrastructure that largely uses electricity rather than oil for moving people around the city. Not only is San Francisco served by BART (Bay Area Rapid Transit), but we have also developed an extensive system of electric buses, trolleys and light rail. All of this rolling stock can be powered by renewable sources of electricity in the future.

RMI: *Renewable electricity has a constant price once the equipment is installed, because the "God utility" never raises the price of wind and sunbeams. Do you think this is an especially valuable attribute?*

Mayor Brown: An inflation-proof source of energy is an investment that is not only valuable for today's consumers but can be passed on to future generations. We have seen a lot of volatility in energy markets in the past year. While prices have settled down recently, there is no reason to believe that we won't see more price spikes in the future. The more power that we are able to get from God-given resources like solar and wind, the less exposure we will have to less predictable energy commodities like oil and natural gas.

RMI: *With last year's reported terrorist threat to the Golden Gate and other bridges, do you think your constituents may have in mind that solar power is more secure than power delivered from far away by vulnerable power lines?*

Mayor Brown: Since 11 September, security has been a major concern of San Franciscans. We are seeking ways to become more secure while maintaining the openness that makes San Francisco such a special place for people from all over the world. Increasing our energy self-reliance through developing modern new facilities in San Francisco is one important way we can increase our security.

RMI: *Will renewable energy help improve "environmental justice" in your community?*

Mayor Brown: Yes, as I mentioned earlier, I am committed to replacing the aging, highly polluting power plants that are located in African-American and Latino neighborhoods of San Francisco as quickly as possible. Since these neighborhoods are also where the high voltage transmission system is located, we need to assure that any power plants that are located there take advantage of the most advanced technologies available. Also, as new jobs are created by the introduction of renewable energy technologies, it is my goal the residents of these neighborhoods be the first in line in getting their benefits.

What Does Security Mean to You?

By Marty Pickett, Executive Director

In the past few months, RMI's work in resource and energy efficiency, whole-systems thinking, and the principles of natural capitalism have become as pressing as ever. While 11 September precipitated a war and highlighted major world problems, it also reinforced for Americans that security is a privilege.

Thus, RMI is being called upon to step up our work in most of our core interest areas (energy, water, communities, climate change, etc.) because they are inherently related to security. As with our past activities, our current and future projects are headed in some very important directions. These projects not only address energy insecurity created by the terrorist attacks; they also address insecurity at many levels—from economic insecurity in small communities across America and around the world to the insecurity being felt by the millions who will probably end up in refugee camps across Central Asia.

Because of the now-heightened concerns about security, I want to describe to you briefly two of our latest and most important projects.

Our energy team has been called upon from many sectors of private industry and the government to help ascertain the best energy future for the United States. RMI founders Amory Lovins and Hunter Lovins have helped the energy industry understand demand and supply for over 20 years—since the 1973 Arab Oil Embargo. Now, our energy team (Amory Lovins, Hunter Lovins, Tom Feiler, Karl Rábago, and Joel Swisher) is mobilizing to disseminate the policy recommendations generated in our "NEP Initiative" (see p. 1). The ideas contained in the document would reduce domestic energy vulnerability by shifting the architecture of the national energy system to more diverse, dispersed, renewable sources, based on a foundation of cost-effective energy efficiency. If implemented, the policy recommendations in the NEP Initiative would make supply failures impossible, mitigate climate change, support local economies, and free international policy from dependence on foreign oil.

Americans aren't the only ones dealing with insecurity. Every year, tens of millions of people are displaced by natural disasters, war caused by ethnic and religious differences, and resource shortages. These are massive populations and they move fast. In April 1994, for example, 250,000 Rwandans—fleeing ethnic violence—crossed the border into remote Northwestern Tanzania *in two days!* And even though it appears America's war on terrorism is mostly over, more than 50,000 Afghans have crossed the border into Pakistan since 1 January as they flee ongoing ethnic violence.

The settlements that refugees come to inhabit can have a devastating impact on the environments, communities, and societies within which they are located. Incoming populations are often fed, clothed, and sheltered with non-local food and materials, oftentimes generating problems from packaging and shipping materials. Sometimes the incoming population strips the local forests for fuel and building materials. Often the inhabitants require costly support from the local communities. Wastes, both human and otherwise, generated by inhabitants can have tremendous impacts on local ecosystems. Many refugee "camps" designed to last weeks and months end up being "settlements," remaining in place for years. When repatriation occurs, often the host country is left with a devastated site. Why is that? Much of the problem is attributable to poor design. Usually the camps are established piecemeal—the water people working independently of the latrine people, the housing structure people working independently of the transportation people.

Possibly RMI's most important humanitarian work ever is its current involvement in a series of workshops to design "sustainable settlements" for refugees that will provide more livable and humane communities that won't be massive burdens on the areas in which they're situated. We've partnered with Dr. Eric Rasmussen of the U.S. Navy, who has extensive experience working with refugee settlements. RMI's recent design charrette on refugee camps (see story, p. 4) developed some great ideas and a unique process, and already we're seeing interest from aid agencies whom we hope to advise.

The feedback we're getting from many Institute supporters seems to be that RMI's efforts to improve the lives of refugees, as well as guide energy experts to think through and execute a viable national energy security policy, constitute our most important work at the moment. And yes, it's a "teachable moment," a time when RMI is at its best.

Driving Sustainability in China

Thammy Evans (second from left) with Hou Yanli and Zhang Ruiying of China Sustainable Energy Program, and Krista Durlas and Christiana Lawson of Building Green Bridges.

Editor's note: At the end of October 2001, our new Mandarin-speaking public information officer, Thammy Evans, took a trip to Beijing and Shanghai to promote the Hypercar™ concept. For more on the Hypercar™ concept, please visit www. hypercar.com.

By Thammy Evans

My recent trip to China was prompted by an invitation from the newly formed U.S.-based non-profit "Building Green Bridges." BGB's mandate is to bring environmental management education to Chinese business leaders in both China and abroad. In so doing, BGB is heavily promoting the book *Natural Capitalism* in China, especially to university business schools. This bodes well for our Chinese version of the book, which will go into its third printing in June 2002.

China is very open to the message of sustainable development, and has known for well over half a century that it cannot support a population of 1.3 billion people if they consume and waste resources as fast as Westerners. China is keen, therefore, to implement super-resource-efficient practices, and knows that these resources must be replenished—if not augmented—in order to maintain sustainable economic growth.

Despite the prevalence of the phrase "environmental protection" in China, it appears that the world's largest nation is well behind the West in the percentage of movers and shakers who actually understand sustainable development to the degree that it is understood in the West. As a result, implementation of sustainable practices in China tends to be either simple or superficial. For instance, 60 percent of Shanghai's taxis (of which there are 40,000, serving a population of 13 million) run on liquid petroleum gas (LPG), but other mechanisms for saving energy and resources—such as double-glazing and insulation—are considered too expensive for the return on investment.

Lifecycle analysis and design for the environment were brand-new concepts to the great majority of students, professors, and researchers whom I met, never mind concepts like biomimicry or the third natural capitalism principle of shifting to a service-based economy. This is in part due to the lack of materials available in Chinese, and also to the wholesale lack of Chinese examples to which government and business leaders can relate. Individual municipalities are moving towards government-led implementation of sustainable development, with Tianjin's Ecocity being a prime example. Building on RMI's Alexis Karolides's meeting a year ago with the Tianjin Environmental Protection Bureau, I met with TEPB's Ms. Yang Jienan to discuss Ecocity, which is envisioned as a zero-waste industrial park. If it succeeds, it will be the first in the world.

Since Beijing won the bid to hold the Olympics in 2008, renewed vigor in learning about sustainability abounds, not least because Beijing has pledged to make these Olympics the most technologically advanced and environmentally sustainable ever. The "Green Olympics," as China calls it, is attracting a lot of interest and investment from the rest of the world, which is eager to have a slice of China's growing economy. The World Bank approved a $349 million loan this year to the city of Beijing to help environmental cleanup, and the European Union and Japan have promised another $17 million in aid for sustainable development.

There is a conference at least once a week in China related to sustainable development and environmental protection. Many of the participants are non-Chinese, and many have little to do with green or sustainable development. Since China is so inexperienced with sustainable development, the nation will need to take care in avoiding "paper tiger" or "white elephant" consultants. As a result, the Energy Foundation, in partnership with the Packard Foundation, has set up the China Sustainable Energy Program to assist the nation's transition to a sustainable future by promoting efficiency and renewables. As my position at RMI is partly funded by the Energy Foundation, I took the opportunity to meet CSEP's Transportation Officer, Mr. He Dongquan, and its Sustainable

China boasts 1.3 billion people and an estimated billion bicycles (Shanghai alone has over six million). With a high demand for automobiles, but limited oil and polluted air, China is a perfect opportunity for the Hypercar strategy.

Development Officer, Ms. Zhang Ruiying.

China recognized long ago the need to move to alternative fuels. China imports 20 percent of its oil already, yet has a fleet of only 15.5 million vehicles. That's one car for every 84 people, compared to one car for every 1.3 people in the United States, and China's vehicle fleet is growing at an annual rate of 3.8 percent. If China had one car for every 1.3 people, China would have a fleet of some 970 million cars, which is almost 50 percent more than today's worldwide fleet.

My main reason to go to China was thus to bring the Hypercar™ concept to Chinese research groups, universities, and businesses. The concept won a warm reception, and every group to whom I introduced it wanted to know more. Perhaps more exciting still is that the Chinese realize the Hypercar concept might bolster China's ailing auto industry to the point of leapfrogging the West. Chinese auto experts are already hotly debating the need for China to build its own auto brand. The groups to whom I spoke did not seem entirely confident that China could achieve this—certainly not on her own. At each show of hesitation, I made a comparison of China's present widespread use of mobile phones and DVDs to the West's slow adoption of these technologies. Admittedly, the leap to advanced automotive technology is larger, especially as China does not have a well-established advanced composites industry, but it is an intriguing comparison.

Despite a population of 1.3 billion and a growing economy eagerly consuming the latest goods, China still manages to emit less carbon dioxide than the United States, and lies in third place in global carbon dioxide emissions behind India. China's fast-growing car population is also likely to be the nation's fastest-growing source of carbon dioxide emission. The advantages, therefore, of adopting the Hypercar model as its future automobile paradigm are significant.

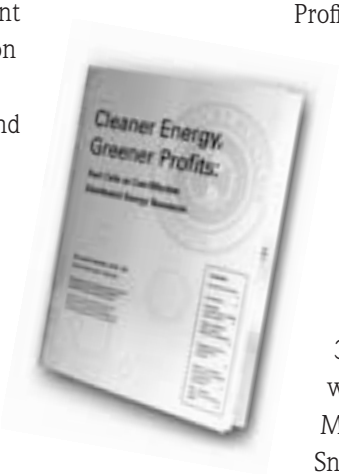
If the Hypercar design captured just half of China's rapidly expanding auto market after 2005 and conventional cars saw a 25-percent improvement in fuel efficiency, there would be a large reduction in greenhouse gases emitted by cars in China. Under this scenario, by 2020, even with the expected 50 percent increase in vehicle-miles traveled, there would be a 33 percent reduction in fleet carbon dioxide emissions compared to the conventional car equivalent. Without Hypercar vehicles, carbon dioxide vehicle emissions in China would rise by 450 percent, despite the improvements in conventional cars.

Were current trends to continue and China's per capita oil consumption ultimately to equal the current U.S. rate, Chinese demand alone would exceed total oil production in the world today by 18 percent. China is already heading on a path toward importing half of its oil by 2010, and possibly 75 percent if its oil by 2020. At 225 million tons of oil per annum, that is about as much oil as OPEC currently produces in two months.

The economic and security advantages of being able to reduce China's dependence on foreign oil by a third are not lost on the Chinese. Nor is the advantage of learning from RMI lost on Beijing University's Institute of Environmental Engineering. After my presentation to the Institute, the Head of the Institute, Professor Ni, not only presented RMI with ten copies of *Factor Four* translated into Chinese by the Institute, but also offered RMI a three-month visiting scholar position at the Institute of Environmental Engineering. In the interest of whole-systems thinking, RMI is working on putting together a three-month program whereby several of our research staff would provide the Institute with insights into our many areas of work and how they interact. In return, RMI is seeking to arrange international funding to offer Beijing University's Institute of Environmental Engineering a fellowship position at RMI. The future holds many exciting opportunities for RMI and China.

RMI Releases *Cleaner Energy, Greener Profits*

The January announcement by the Bush Administration that it will back a plan by the Energy Department and the auto industry to develop hydrogen-based fuel cells for autos bodes well for RMI's latest research paper, *Cleaner Energy, Greener Profits: Fuel Cells as Cost-Effective Distributed Energy Resources.*



The paper came off the printing press at the end of January. *Cleaner Energy, Greener Profits*, by RMI researcher Joel N. Swisher, PE, examines the role of fuel cells as a source of electric power in the competitive energy economy of the near future.

Fuel cells convert hydrogen fuel to electricity at high efficiency through a chemical reaction, without combustion and with negligible emissions. They can be used to power vehicles or to provide electric power and useful heat for domestic, commercial and industrial use. In the latter role, they are considered "distributed" power sources, because, unlike a large power plant, they can be placed near where power is needed and they can be added in small increments as needed. Other advantages are that they provide extremely consistent power, and are not particularly subject to failure due to sabotage or accidents.

Swisher, who earned his Ph.D. in energy and environmental engineering from Stanford University, concludes that fuel cells can be cost-effective even at their present costs, if users can capitalize on their advantages as distributed sources.

Supported by a grant from the W. Alton Jones Foundation, Cleaner Energy, Greener Profits will be distributed to media and to organizations, researchers, agencies, and various firms in energy-related fields. The paper is available to the public for $15 plus $5.50 for shipping and handling. To request copies, call RMI at 970-927-3851, email orders@rmi.org, or write to Publications, Rocky Mountain Institute, 1739 Snowmass Creek Road, Snowmass, CO 81654. The document can also be downloaded from the energy pages of RMI's website (www.rmi.org/sitepages/pid171.php).

Being Green, Being Happy, Making Money

RMI's educational activities recently went a new direction when RMI researcher/consultant David Payne began teaching a Colorado Mountain College-Aspen campus course, "Be Green, Be Happy, Make Money." The course explores the intersections of environmentalism, spiritualism, and capitalism, and helps steer would-be entrepreneurs, among others, onto green paths. The course kicked off in the fall of 2001 with overcapacity enrollment, and in response to demand it is running again this semester under the title "Being Green, Being Happy, Making Money: Taking the Next Steps Toward Sustainability in Our Personal and Work Lives." The course has also spawned a "discussion/action salon"— a group of valley residents that's meeting on a regular basis to discuss issues related to sustainability (recent topics have included recycling, winter habitat, hunting, and community elders).


David Payne

"RMI has long wanted to be more involved locally," said RMI Executive Director Marty Pickett, "and this class is proving to be a great venue for broad local interaction. Besides, Dave is really passionate about teaching and I'm sure his enthusiasm shines through."

The course provides a non-adversarial introduction to modern environmentalism and whole-systems approaches to global challenges and related opportunities. It begins with a review of the health of the planet, from climate change to toxic buildup, and a survey of the policies and technologies that show the best hope for success. A cross-section of leading environmental thinkers—from the "left" and the "right"—gets introduced and their ideas are debated. The relationship between spiritualism and environmentalism is explored, as is the emerging alignment of business and the environment.

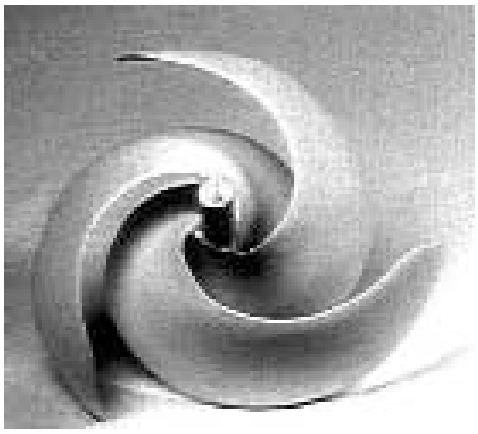
Also, the class identifies real issues that are relevant to local residents, discussing ways to improve our lives while preserving and restoring the world around us.

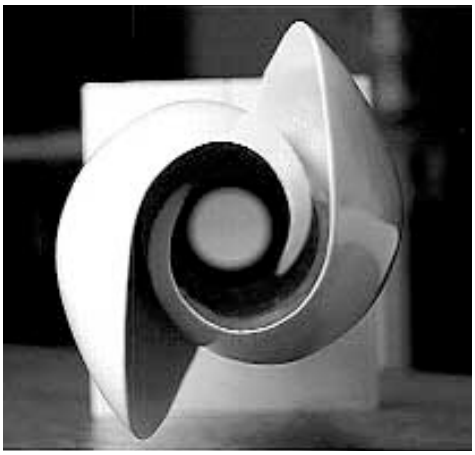
"Teaching this course has been invigorating," said Payne. "Connecting with members of the community in a creative dialogue about sustainability has really personalized the message of *Natural Capitalism* for all of us, while helping RMI to refine and 'ground' its message at the community level."

RMI Helping the Cutting Edge of "Turbo-machinery"

Although RMI's Amory Lovins is perhaps best known for his role as a cross-fertilizer of energy and resource efficiency, he's also a recovering experimental physicist and likes to stay abreast of the latest technical developments in efficiency.

Recently he became an advisor to Pax Fluid Systems, Inc., of San Rafael, California. Founder Jayden Harman is "an Australian naturalist who is an avid diver, and a cutting-edge designer using biomimicry," according to Lovins.





Two Pax impeller prototypes. Fluid is drawn into the center of the spiral before being pushed out smoothly along its axis.

After decades of study of the plant and animal kingdom, including thousands of hours underwater, Harman developed and patented a completely new type of impeller (a spinning shape that moves the fluid around it). Lovins suspects it could revolutionize such fluid-moving machinery as pumps, fans, propellers, mixers, and turbines. Pax's impeller design is based on a logarithmic spiral known as a Phi Ratio, Fibonacci Sequence, or Equiangular Spiral. In three dimensions, these patterns are called recessive spirals. They occur in many places in nature, yet few designers have ever mimicked them. ("To visualize a recessive spiral, picture the inside of a conch shell," Harman noted). Two of the many such shapes are shown above.

When rotated in water or air, the impeller makes the fluid flow smoothly in a vortex, like water exiting a bathtub. In contrast, the most common kinds of conventional pumps and fans sling the fluid outward and bounce it off a curved wall to make some of it move in the desired direction. This more violent and indirect method causes turbulence and hence is inherently less efficient than laminar flow.

By smoothly accelerating the fluid centripetally (towards the center) with very little turbulence, Pax's impellers lessen vibration and reduce or even reverse heat gain, while delivering more thrust with virtually no cavitation (causing flow so turbulent that the water is torn apart and bubbles form). While design optimization continues, Harman has already found that an impeller based on a recessive spiral can spin at 6,000 rpm underwater with no cavitation. "You can't do that even with a smooth cylinder because of the surface drag!" Lovins said.

Harman has also been exploring some counterintuitive applications. When one of his impellers is attached to the front of a submarine hull, rather than slowing down the craft due to increased surface area, it makes it go about 11 percent faster.

Lovins has been advising Harman informally for several years and is now an inaugural member of Pax's Advisory Board, helping get the concept widely applied. Pax has also supplied prototype impellers to a natural design exhibit at Nike headquarters organized by RMI board member Janine Benyus, the author of *Biomimicry*.

"Not only are impellers of this shape potentially far more efficient," noted Lovins, "they are remarkably quiet, and gentle on anything that goes through them—like, say, fish through a hydroelectric turbine. This could be very big, and has many obvious applications. If this invention—or rather, rediscovery of nature's genius—fulfills its promise, it could be one of the greatest technical breakthroughs in energy efficiency in a long time."

Dear RMI Readers and Supporters,

As you've probably read, we are now asking for a $20 donation in return for an annual subscription to our newsletter (three issues). You can read the newsletter online anytime at www.rmi.org without a subscription. However, if you enjoy it, we hope you'll contribute anyway.

Also, we apologize if you received your copy of *RMI Solutions* at the wrong address, or if you requested an email notification and instead received a hard copy in the mail. Please, if you would like changes made in your mailing address or in how you receive RMI information, contact Ruth Klock at 970-927-3851, or email her at ruth@rmi.org.

RMI's Rábago Helps Austrian Consumers Know Their Power

Senior RMI energy staffer and former Texas Public Utility Commissioner and former U.S. Deputy Assistant Secretary of Energy Karl R. Rábago played a key role in helping citizens of Upper Austria learn more about their electricity usage. Recently, the regional parliament of Upper Austria adopted an electricity service labeling requirement that will ensure customers know how their electricity was generated. The idea gained momentum when Rábago explained the importance of consumer information at a conference in Wels, Austria, in March 2001. Rábago was in Austria to speak at a conference and accept an Energy Globe Award for the Green-e Certification Program (www.green-e.org) he helped develop. It's run by the Center for Resource Solutions, a non-profit organization based in San Francisco, California. Rábago sits on the board of CRS and chairs the Green Power Board that oversees the Green-e Program.

Rábago has long been a champion of electricity labeling—informational labels provided by utilities to customers with their electric bills. "With the responsibility of choice comes the need for information," he said, "and most customers get more information from the label on bottled water than they get with their electric bills." The idea for electricity labeling is an outgrowth of other policy changes designed to give customers more information power in the marketplace. Not too long ago, the Food & Drug Administration required that all food in the United States be labeled with ingredients and nutrients, so that consumers would know exactly what they were putting into their bodies.

Electricity labeling is similar, though not quite the same. Because no one can tell you exactly where the electrons in your socket come from, electricity labeling tells you the supplier's shares of generation from coal, gas, nuclear or renewable (solar, wind, biomass, geothermal, or small hydropower) resources. "A major barrier to customer participation in energy issues is lack of accurate information about how electricity is made," he said, "and surveys reveal most people don't know or have incorrect beliefs about the mix of resources used to generate their electricity."

For more than seven years, Rábago has been advocating labeling for electricity. The Green-e Program requires labeling for green power products, and Rábago has taken his message to three continents and dozens of community and national leaders, often holding up bottled water at meetings to illustrate the basic labeling concept.

Like water for electricity: RMI's Karl Rábago, touting electricity labeling—with his ever-present water bottle—in Austria.

"I was honored to receive the award for CRS's innovative Green-e Certification program," he said, "but hearing that they have now adopted the electricity labeling concept is a real treat!"

Upper Austria is the first part of Europe to create such a scheme, but we're optimistic that others will follow their lead. Certainly, Rábago will keep showing off his bottled water at meetings.

For more information, see www.esv.or.at/cinformation/energie_ooe/elwog_e.htm.

NatCap in Your School?

Are you using *Natural Capitalism* in a class? Know someone who is? If so, we'd like to know about it. RMI is currently compiling a database of university academics and teachers (undergraduate and graduate level) working in the areas of business, architecture, engineering, and environmental science who are either using *Natural Capitalism* case stories or would like to. The Institute is beginning to explore ways to have "NatCap" courses added to university curricula, to create executive education programs, and to develop a Corporate University based on the concepts of sustainability and corporate social responsibility.

RMI has already begun discussions with representatives at the University of Colorado at Boulder, where one of the professors from the Business School is looking at developing a "Sustainable Business Venturing" class.

If you know of anyone using *Natural Capitalism* (the book) or natural capitalism (the philosophy) in the classroom, or of anyone who would like to, please contact Randi Lowenthal at randi@rmi.org.

Please include your contact information and a brief description of the way in which you've been using *Natural Capitalism*.

The Genome Institute Takes Off

The summer issue of *RMI Solutions* described a new project RMI was undertaking with the Global Academy. Called the Genome Institute, it hosts multi-stakeholder dialogues in the United States and internationally on key issues of genetic technology, and disseminates information and ideas on diverse related topics.

In 2001, GI held major international fora in London and Paris. Additionally, it co-sponsored conferences with the Association of Native American Physicians and the Mayo Clinic, focusing on the changing patterns of cancer in American Indian and Alaskan Native Communities. The emerging debate on the human genome and the consequences of its manipulation is one of the primary issues being considered within indigenous peoples' health care.

"The [Global Academy] forum explored the impact of genetic engineering on man from the perspective of the humanities, which will contribute to human development in the new century."

—Jiang Zemin, President of the People's Republic of China

The Genome Institute also worked with the Cleveland Marshall Law School to host a groundbreaking conference focusing on genetic discrimination in employment and insurance. The conference, called "Genes and Justice," saw some remarkable discussion.

The Genome Institute fora are unique events. Following the inaugural conference held in 2000 at Peking University in China, Jiang Zemin, President of the People's Republic of China, wrote: "…The [Global Academy] forum on genetics held in cooperation with Peking University was a success. The forum explored the impact of genetic engineering on man from the perspective of the humanities, which will contribute to human development in the new century."

The new Global Academy website.

"The Global Academy is happy to invite RMI to join the Genome Institute as an equal partner to build on our earlier successes," said Walter Link, chair of the Global Academy. "This addition to our team will strengthen the Genome Institute's unique mission to convene in-depth dialogues that go beyond the usual attack–counterattack communication style and deep into these challenging issues. Our generation bears the responsibility to decide what we want to do in regard to this groundbreaking technology that has, literally, eternal consequences. We would be well advised to find deeply considered and commonly acceptable solutions."

In 2002, we will develop a program to keep the dialogue meetings going. As it looks now, these will probably be held in key communities throughout the United States and around the globe. The format is likely to be that of a typical town hall meeting—orderly yet inclusive.

Also for this year, we are in the process of creating a "Genetic Controversy and Environmental Ethics" conference in June. The Center for Theology and the Natural Sciences asked us to co-create this public conference (to be held at U.C. Berkeley) to bring together teaching faculty from a variety of disciplines to draw an integrative picture of our Planet Earth from a variety of perspectives.

"This partnership with Global Academy is enabling RMI to work in an area that Amory and I have long been concerned about, much more effectively than if we tried to do this work alone," said Hunter Lovins, RMI's co-CEO (Strategy). "Genetic manipulation has the potential to do an enormous amount of good; it might also do a lot of harm. It is vital in a democratic society that the public take an active role in making the decisions that will determine the future of all of us."

And, finally, in the coming months we will launch our website (www.genomeinstitute.info).

"The website will describe many of the exiting events that the Genome Institute has already hosted and will include a resource center/library where visitors can download PDF files of papers and articles relating to genomics issues," noted Jane Shea, Project Director.

The Genome Institute website will be accessed through its own URL, the Global Academy homepage (www.theglobalacademy.org), or RMI's website (www.rmi.org).

RMI's Hunter Lovins being interviewed by Bill Moyers on *Now*.

RMItes Getting Lots of Bigtime Air

No—we've not been snowboarding in the Olympics. Rather, RMI has been receiving a gratifying amount of broadcast press coverage in recent months, primarily because RMI's work in energy, security, and resource efficiency has become more important that ever.

"The recent media interest in RMI is a great indication of the quality of our work and our ability to speak about it," said Jenny Constable, RMI Media Director. "All of these recent interviews are available on the web, and are well worth checking out."

Bill Moyers, PBS's veteran journalist anchor recently launched a new show, *Now*, and RMI's co-CEO (Strategy), Hunter Lovins, was one of his first guests.

Moyers's topic for the 18 January broadcast was President Bush's energy plan. Lovins was featured shortly after interviews with Larry Klayman of Judicial Watch, Dan Becker of the Sierra Club, and environmentalist Tom Smith, and with typical panache, explained clearly and concisely how U.S. energy policy lacks common sense. (Indeed, Hunter was so effective that several broadcast viewers sent accolades for her "voice of reason," as one supporter put it.) The interview has been added to our website, at www.rmi.org/sitepages/pid513.php, and a transcript is available online at www.rmi.org/sitepages/art7232.php and www.pbs.org/now/transcript/transcript_full.html (scroll down).

Meanwhile, on 6 February, RMI's co-CEO (Research) Amory Lovins appeared on National Public Radio's *Talk of the Nation*. The subject of the broadcast was U.S. dependence on foreign oil. NPR's Neil Conan interviewed some of the big players in the current oil/energy debate, including Sen. Frank Murkowski (R-Alaska), a leading proponent of drilling in the Arctic National Wildlife Refuge and the ranking member of the Energy & Natural Resources Committee. John Podesta of the Natural Resources Defense Council and Charlene Coon of The Heritage Foundation also appeared on the broadcast. It can be heard at http://search.npr.org/cf/cmn/cmnpd01fm.cfm?PrgDate=02/06/2002&PrgID=5.

Amory had been featured on the same program on 3 January, talking about Hypercars™.

Finally, on 20 February, RMI's Karl Rábago appeared on WBUR (Boston University) radio's *On Point* show, hosted by Jack Beatty. The topic was President Bush's recent climate change policy, and the discussion is excellent (especially Karl's points). "Under the Bush plan, companies would be given tax breaks and other incentives to cut back on emissions," explains WBUR's website. "Rather than focusing on cutting overall greenhouse emissions, the Bush plan seeks to cut 'greenhouse gas intensity,' or the amount of gases emitted per million dollars of economic output." Along with Rábago, Beatty interviews Vijay Vaitheeswaran, environment and energy correspondent with *The Economist* in London, and Peter Altman, Director of the Texas SEED Coalition, an Austin-based environmental group.

"It was a pleasure to be part of the renewed public debate on the important issue of global climate change," Rábago noted.

The broadcast is available online at http://realserver.bu.edu:8080/ramgen/w/b/wbur/oneunionstation/2002/02/spc_0218b.rm.

RMI Website Growing Like a Weed

As most supporters know, our website is growing quickly—indeed, faster than we know how to feed it. It is the repository for everything RMItes do, and is becoming a key reference for academics, policymakers and educators. Recently, we gathered the numbers on the website, and found out a few statistics about www.rmi.org.

"During the first week of 2002, www.rmi.org averaged over 1900 visitors per day!" said RMI Webmaster Bill Simon. "Our visitors are primarily from North America and Europe, but with our website, RMI's information is reaching users in Japan, India, Malaysia, China, Belgium, Poland, Turkey, and Korea—to name a few countries.

"The site is chock-full of information about everything RMI: research, staff, facilities. Currently it's at 555 pages, but it's growing every week. Some sections worth noting are: the 'Library' of free downloadable PDFs; the 'Bookstore' of RMI publications; 'Newsletter(s)' (current and back issues); our 'Calendar of Events' page; the 'RMI for Kids' page; and how to 'Support RMI'. Wait until you see what we've got planned for 2002!"

Between 1 and 20 December 2001, www.rmi.org averaged 1,631 visitors per day. The ten highest ranking pages were:

1. "Recent Hypercar News," with 1,980 visitors; 2. "Energy," with 1,766 visitors; 3.

"Natural Capitalism Research and Consulting Overview," with 1,755 visitors; 4. "About RMI," with 1,605 visitors; 5. "Fall/Winter 2001 Newsletter PDF," with 1,604 downloads; 6. "The Hypercar Concept," with 1,412 visitors; 7. "Library/Energy," with 1,227 visitors; 8. "Current Newsletter," with 1,179 visitors; 9. "Buildings and Land," with 1,153 visitors; and 10. "Education and Outreach," with 1,088 visitors.

As for *Brittle Power*, the remarkable, out-of-print 1982 work on energy insecurity by Amory and Hunter Lovins, it saw a rather large number of downloads in the roughly three-week period in December—539.

RMI Books Still Selling Well

As of early Fall, *Natural Capitalism* had sold a whopping 42,500 hardcover copies (with publisher Little, Brown and Co. reporting 5,500 left in stock) in the United States, along with 22,500 paperbacks. In the United Kingdom, Earthscan, the British publisher, said recently that figures for UK sales are 4,570 (hardback) and 4,010 (paperback) to date. It is also in Chinese, Danish, German, Italian, Japanese, and Portuguese, with more languages on the way.

"Both are still continuing to sell well and we are promoting it at every opportunity," said Earthscan's Nim Moorthy recently. "I think it is well on its way to becoming an Earthscan classic!"

Meanwhile, *Green Development: Integrating Ecology and Real Estate*, RMI's classic 1998 work on the subject, has sold 4,527 copies and is in its sixth printing.

Dear Rocky

by Amory B. Lovins

Dear Rocky Mountain Institute,

Having just read your paper "A Strategy for the Hydrogen Transition," my wife Karen and I have a couple of questions about hydrogen. What are the environmental repercussions of large-scale hydrogen production?

Virtually none negative (using a climate-safe method) and many positive. It could be environmentally bad if done in a dumb way, such as splitting water with electricity from coal-fired or nuclear power plants, but those are typically uneconomic.

What are the environmental repercussions of adding large amounts of water to our ecosystem due to Hypercar vehicle exhaust?

Favorable net, because burning gasoline in present cars adds a lot more water. Since gasoline has a formula close to CH_2, every carbon atom burned also yields one water molecule. Fuel cells are more than twice—nearer 3–4 times—as efficient as internal combustion engines (fuel to wheels), so water emissions go down. Moreover, the kinds of cars we favor (www.hypercar.com) are also several times more efficient. For example, Hypercar, Inc.'s *Revolution* concept car is 5–5.5 times as efficient as a normal midsize SUV in its class, so they'd reduce water emissions by at least 2.5 times. And of course the water released by a fuel cell comes from either natural gas (in which case the oxygen was already in the atmosphere and the H_2 in the ground) or electrolyzed water (in which case the water is simply returning to the hydrologic cycle from whence it came).

Globally, more than two-thirds of the fossil-fuel atoms being burned today are not carbon but hydrogen, and that fraction is rising as part of the normal "decarbonization" of the fuel mix as the mix shifts. The nominal formulae are C_2H to CH for coal, CH_2 for oil, CH_4 for natural gas, and H_2 for pure hydrogen, so you can work this out from the respective tonnages of fuel burned.

How much water per mile would be produced by a Hypercar vehicle?

John Sheridan, via email

The *Revolution* concept SUV as currently designed would use 7.5 pounds of H_2 to go 330 miles, or 0.0227 pounds of H_2/mile. Since hydrogen has a molecular weight of one and oxygen 16, 0.0227 pounds of H_2 in the form of water weighs 0.0227 x 18/2 = 0.204 pounds of H_2O/mile, or 0.093 liter/mile, or 0.0245 U.S. gallons/mile—less however much you turn into coffee in the proposed dashboard dispenser and drink!

—Amory Lovins

Editor's note: There will be a quiz on Monday!

Unique Green Building and Development Projects

Compiled by
Ben Shepherd and
Lauren Yarmuth

Now on CD-ROM

Photo: Ecolonia

Editor's note: RMI's Green Development Services recently released Green Developments 2.0 CD-ROM, a *well-organized and beautifully illustrated work by GDS's Ben Shepherd and Lauren Yarmuth (with additional review by other GDS staffers). It includes project descriptions, information on financing, marketing, and returns on green building projects around the world. To order your copy, send check or money order for $25.50 (which includes postage) to RMI, 1739 Snowmass Creek Road, Snowmass CO 81654-9199 or visit www.rmi.org. In this issue of* RMI Solutions*, we highlight a few of the more unusual and interesting projects featured in* Green Developments 2.0.

Chesapeake Bay Foundation

Location: Annapolis, Maryland

Country: USA

Owner/developer: Chesapeake Bay Foundation

Architect: Smith Group

Completion Date: 2000

Project Type: Commercial/Office

Building Type: New Construction

Project Size: 32,000 square feet

Project Description: The Philip Merrill Environmental Center is the Chesapeake Bay Foundation's new headquarters and the first building to receive the U.S. Green Building Council's highest LEED rating of platinum. In design, construction and operation, the Center reflects the Foundation's mission to protect and restore the Bay and is a valuable resource not only for the 100 people who work there, but also for the nearly 100,000 members and volunteers of the Foundation.

CBF built the Center on a "cradle-to-cradle" philosophy, ensuring that all materials are made of recycled materials or created through processes that do not damage the environment. When materials within the building wear out, they are recycled. The developers have certainly undertaken extensive materials research and selection, and the Merrill Center may be the world's "greenest" office building.

Chesapeake Bay Foundation's Philip Merrill Environmental Center

Ecolonia

Location: Alphen aan den Rijn

Country: Netherlands

Owner/developer: Bouwfonds Woningbouw bv, Delft

Completion Date: 1992

Project Type: Residential

Building Type: New Construction

Project Size: 87,500 square feet

Project Description: Ecolonia is an ecological housing project developed to influence the integration of sustainable design and building into the Dutch market. The main focus is on energy, materials, and organic design based on the Dutch National Environmental Policy Plan. The design team included Novem (Netherlands Agency for Energy and the Environment), Bouwfonds—the largest developer of housing in the country, and Lucien Kroll, a Belgian designer, to devise the urban development plan.

The project encompasses 101 homes that are one, two and three stories, semi-detached, and with a small lake in the center of the project that serves for recreation and storage. The homes reduce energy consumption through minimizing heat losses, utilizing passive solar energy with east/west building orientations, and underfloor heating.

Condé Nast Building at Four Times Square

Location: New York, New York

Country: USA

Owner/developer: The Durst Organization

Completion Date: 1999

Project Type: Commercial/Office

Building Type: New Construction

Project Size: 1,600,000 square feet

Location Description: On Times Square in Manhattan

Project Description: A cornerstone of redevelopment in New York's famous Times Square, the Condé Nast Building at Four Times Square is a 47-story office tower with ground floor retail and entertainment space that's also green and built at market rate. The office tower has two distinct orientations: the side facing Broadway takes on the active and dynamic character of Times Square, while the side facing 42nd Street offers more sober characteristics of the mid-town Manhattan business community. The building top reflects the principal structural support system, and it expresses, in a high-technology style, the project's location at the intersection of Broadway and 42nd Street—"The Crossroads of the World."

The office tower features efficient gas-fired absorption chillers, two fuel cells, and a state-of-the-art curtain wall that incorporates photovoltaic panels. The air delivery system provides 50 percent more fresh air than industry codes, setting new standards for interior air quality. A network of recycling chutes serves the whole building. This project exemplifies a new standard for construction processes as well as for the use of sustainable materials.

John Heinz National Wildlife Refuge

Location: Philadelphia, Pennsylvania

Country: USA

Owner/developer: U.S. Fish and Wildlife Service

Completion Date: 2000

The Heinz Center

Project Type: Education

Building Type: New Construction

Project Size: 16,520 square feet

Project Description: The John Heinz Cusano Environmental Center is both a visitor center and educational facility. The Center is located in one of the most urban settings of the over 500 wildlife refuges in the U.S. Fish & Wildlife system.

The major sustainable design features of the Heinz Cusano Center focus on energy, construction materials and water use. Energy efficiency is helped by a design that maximizes daylighting, natural ventilation, and solar heating. Interior lighting is energy-efficient. Added insulation and a geothermal heating system will further reduce the building's environmental impact.

An ecological wastewater treatment system, the Marsh Machine, will demonstrate the cleaning power of wetlands and make a strong statement about the preciousness of our water resources. In addition, parking will be on a porous paving system for improved stormwater management, and rainwater will be harvested for irrigation.

Battery Park City

Location: New York, New York

Country: USA

Owner/developer: Albanese Development Corporation

Completion Date: 2002

Project Type: Residential

Building Type: New Construction

Project Size: 92 acres

Location Description: In New York City, overlooking the Hudson River

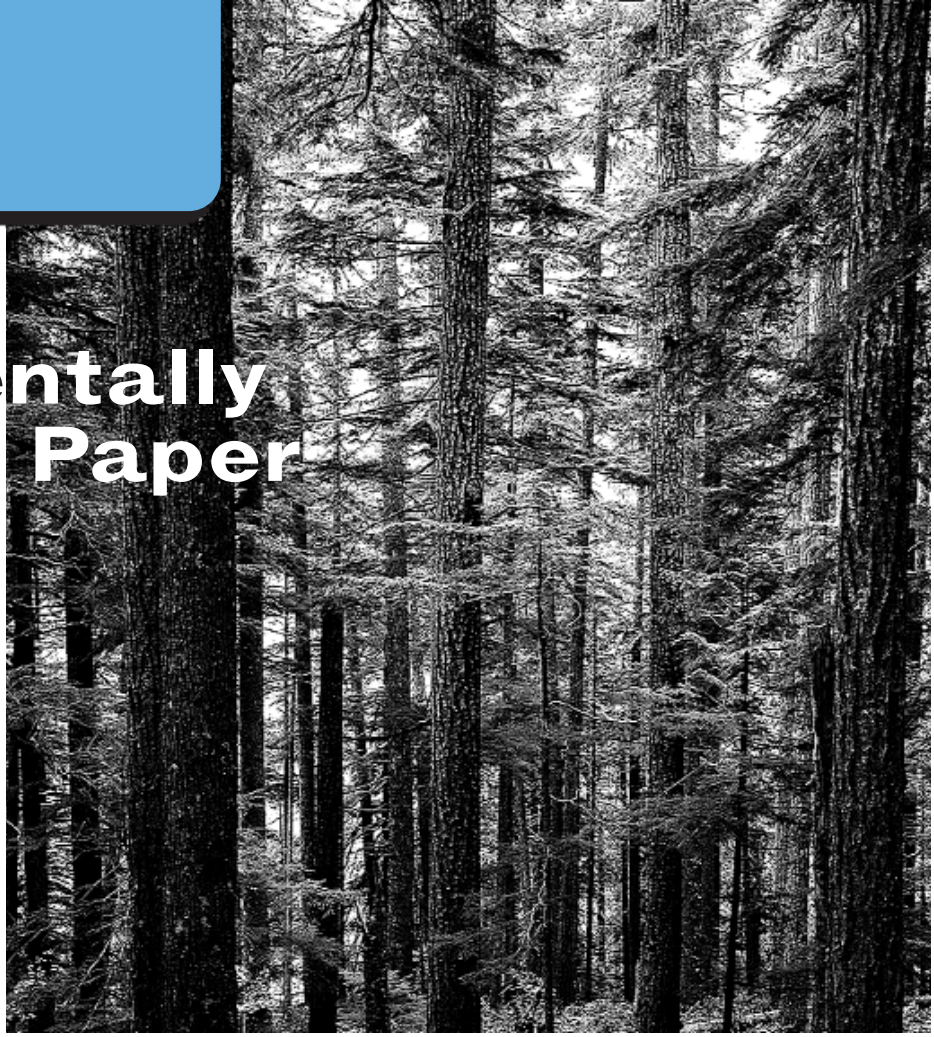
Project Description: Manhattan's Battery Park City will be the first green multifamily high-rise. The first of six buildings slated for the area by the Battery Park City Authority (BPCA) is a 25-story, 337,000 square-foot apartment building, which broke ground in March of 2001.

Battery Park City

The building is expected to be 30 percent more energy-efficient than state codes require. A technological approach pushed up building costs by about 15 percent compared with similar apartments. An average apartment is expected to rent for $3,000 a month. The privately financed $95 million building will overlook the Hudson River and face the Statue of Liberty. The 250 units should be completed in late 2002.

The green guidelines were developed for BPCA, Fox & Fowle Architects, Flack & Kurtz, RMI, and NRDC. These will cover energy efficiency, indoor environmental quality, resource conservation, operation and maintenance, water conservation, and site management.

Choosing Environmentally Preferable Paper



By Chris Lotspeich

And so it is written: paper has been a universal symbol of civilization since ancient cultures pounded and wove reeds into sheets of papyrus. For millennia it has served as a conveyor of knowledge, carrier of ideas and dreams, herald of our triumphs and tragedies, and repository of history.

Today most of the world's paper products are made from trees that are harvested, pulped, and processed in facilities that can cost upwards of a billion dollars each. Paper consumption continues to rise despite increased recycling and the Electronic Age promise of the "paperless office." Concerns have also grown about the environmental impacts associated with paper production: air and water pollution, lost biodiversity, fire risks, and declining forest and stream health. Yet trees are a renewable resource, and many kinds of paper are recyclable. Efforts to reconcile the economic benefits and environmental effects of papermaking continue worldwide.

Americans—especially on the job—use paper as if it grew on trees, so to speak. A typical office worker goes through roughly 100–200 pounds of paper annually. The United States leads the world in paper use, but not in recycling (although we're improving). According to the EPA, paper in its various forms accounts for 40 percent of all U.S. solid waste. Office paper constitutes one quarter of that; we still throw away more than 80 percent of the paper used in the workplace. In 2000, Americans recovered 48 percent of the paper we use for recycling, totaling roughly 50 million tons, an all-time record. We still trail such countries as Japan and Germany, each of which boasts paper recycling rates in the low-to mid-50-percent range.

Paper does not lend itself well to generalization. There are many varied types of paper for a range of uses. Office paper is made with different fibers, fillers, and processes than newspaper; newsprint differs from cardboard; and cardboard is made with techniques and ingredients that differ from those of paperboard (the stuff in cereal boxes). Tissue papers, such as paper towels and toilet rolls, are in their own category. And for understandable reasons there isn't much interest in recycling them after use. Characteristics including basis weight, opacity, and brightness differentiate paper, even for stationary and printing uses alone. "Waste" or scrap paper is also segregated into differing grades and categories, and mixing them can reduce their value and recyclability. Non-wood fibers are used to make an increasing amount of paper. Which is best, and what are the tradeoffs?

RMI is regularly asked about the environmental aspects of paper use and recycling. I faced many of these same questions when I researched environmentally-friendly paper for printing the book *Natural Capitalism* by Paul Hawken, Amory Lovins, and Hunter Lovins. With the help of our publisher Little, Brown and Co. and New Leaf Paper company (www.newleaf.com), we selected New Leaf EcoBook 100, an uncoated book paper made with 100 percent post-consumer waste, and processed chlorine-free. This product offers environmental benefits, high quality, and cost-competitiveness.

This article attempts to address a few of the issues involved and to provide a rough guide for purchasing and managing paper

for office and printing applications, considering both environmental and economic factors. These opinions are mine, but I hope you find them useful.

Reduce, Reuse, Recycle

This familiar refrain provides a good guide to using resources, including paper. Reducing paper use is always the best first step. There are many ways to do this without sacrificing the services that we want from paper: information display and storage, portability, and convenience. A few suggestions include: print and copy on both sides of office paper. Share subscriptions and use services that help keep you off mailing lists to help reduce junk mail and cut costs. You can contact the Direct Marketing Association and ask to be removed from mailing lists. (Mail Preference Service, c/o DMA, P.O. Box 9008, Farmingdale NY 11735. The Center for a New American Dream offers a similar service—see www.newdream.org/junkmail.) Use email and electronic document storage rather than printing out. Perhaps you are reading this RMI newsletter online, rather than having a paper copy printed out and mailed to you.

Reuse the blank sides of paper for draft print jobs or memo pads. Some cardboard boxes (especially those with a burst strength of 200 pounds or more) are worth more reused than recycled.

Recycle paper to the fullest extent practicable. Keep different types of paper separate, as defined by your local recycling program or vendor. Purchase paper with recyclability in mind; for example, reduce the variety of paper types you buy, and avoid colored or glossy paper. Buy recycled paper to "close the loop" of recycling. If you can't find a local recycling center, consider shredding paper for animal bedding, insulation, or compost.

Purchasing Preferences

This is a subjective guide to purchasing paper, in descending order from most to least environmentally preferable. Cost varies, and depends on how much paper you buy.

1. Agricultural residues (e.g., straw, sugarcane bagasse, banana fiber, etc.). Agricultural residues are byproducts of crops grown for other purposes rather than specifically as pulp and paper feedstocks, but they can be used to produce high-quality paper. In this sense, such residues are considered a "waste" product. U.S. agricultural residues alone could produce enough paper to meet the world's needs if fully utilized. Such paper's cost may vary significantly, and is often higher than more common wood-based paper because these are newer "specialty" products, and are made in smaller lots. Unfortunately, some small-scale non-wood papermaking in poorer countries uses processes that pollute local groundwater.

2. Postconsumer (wood fiber) recycled paper. This refers to recycled paper that has been used by a consumer (person or organization), then collected and returned to a mill to make more paper. In this sense, postconsumer residues are a waste product. The "postconsumer" designation is important because many paper companies return presale paper cuttings and scraps (often called "mill broke") into the process and call it recycling. This is a positive and desirable practice, but limited in its potential scope for reducing use of primary or virgin fiber (and thereby reducing tree harvesting), and is not as ecologically preferable as postconsumer paper. Paper cannot be recycled over and over ad infinitum. A certain percentage of the wood fibers in postconsumer paper break in the recycling process, so new fiber is often added over time to maintain strength (the quantity and type depending on the paper product). Use the highest percentage of postconsumer fiber content possible. Cost varies with quantity purchased and paper type; typically, the higher the postconsumer content, the higher the cost. Often the cost is competitive with primary-fiber paper when it is purchased in larger quantities.

"According to the EPA, paper in its various forms accounts for 40 percent of all U.S. solid waste generated."

(Some analysts prefer post-consumer paper to agricultural byproducts, arguing that making paper from waste paper is more resource-efficient. Both approaches are important, and I leave it up to you to choose. Indeed, mixing recycled fiber with nonwood fiber for strengthening can yield a good blend.)

3. Certified sustainably-harvested wood fiber. This is wood fiber harvested in an environmentally sensitive manner. In some cases the industry concentrates on making paper from tree species that are relatively plentiful, and avoids species that are rare or have high ecological value. The definition of "environmentally sensitive" varies depending upon conditions, as there is no official or global standard. Various organizations provide certification of this process; certain standards and certifiers are more rigorous and respected than others. The Forest Stewardship Council (www.fscoax.org), the Certified Forest Products Council (www.certifiedwood.org), and the Smartwood Alliance (www.smartwood.org) are among the certification organizations. Cost varies, but is often competitive.

CONTINUED ON NEXT PAGE

Resources:

For an overview of these issues and solutions, see *Natural Capitalism's* Chapter Nine, "Nature's Filaments" (www.natcap.org).

- **Conservatree** offers information on environmentally preferable paper issues: www.conservatree.com
- **Co-op America's** WoodWise consumer guide: www.woodwise.org
- **Environmental Defense's** "Action Guide to Greener Paper": www.ed.org/pubs/Brochures/GreenerPaper/
- **Rainforest Action Network's** "Cut Waste, Not Trees" and "The Wood User's Guide": www.ran.org
- **Resource Conservation Alliance** offers paper and wood waste reduction information: www.rca-info.org
- **The SimpleLife** "Guide to Tree-Free, Recycled, and Certified Papers": www.simplelife.com

4. Purpose-grown non-wood fiber crops (e.g., hemp, kenaf, bamboo). These non-tree plants are grown to produce fibers for making paper. (These are not "waste" fibers, in contrast to agricultural residues, which are byproducts of plants grown for other purposes). Cost varies but is typically higher than wood-fiber paper, due to smaller-scale production, less investment in harvesting and processing technologies, and other factors. Organizations that offer further information include Fiber Futures (www.FiberFutures.org), Agripulp (www.agripulp.com), and Vision Paper (for kenaf) (www.visionpaper.com).

(Non-wood fiber papers are not easily compared to wood-based paper, because the specifics of each situation determine which approach is more or less environmentally preferable. Such comparisons can be difficult and controversial. I suggest that you do your homework and decide for yourself. I generally prefer using non-wood fibers where they have been grown in a more benign way than fiber from even sustainably-managed forests. However, in certain circumstances I prefer paper made from plantation trees over paper made from hemp or kenaf. I believe that some high-yield tree species—even in plantations—provide greater ecological services than a comparable acreage of high-fiber non-wood crops such as hemp or kenaf. But many [if not most] tree plantations are not managed in an environmentally optimal manner.)

A Few Other Factors for Consideration

Chlorine. Paper of any fiber source should to be as chlorine-free as possible. Chlorine is used to bleach paper to make it white, but its use produces such toxic substances as dioxins. Oxygen and ozone are two alternative methods for whitening paper. Choose unbleached paper wherever possible.

Genetic manipulation. Forest products companies are increasing research on and use of genetically modified tree species to increase, for example, the rate and amount of growth. In general I don't think it is worth the risk to create new species and propagate them into the environment, as there are safer alternatives such as using fiber and paper more productively. I recommend avoiding the purchase of genetically modified organisms (GMOs).

Basis weight. This refers, in effect, to the weight and thickness of each sheet of paper. Reducing basis weight can save paper without changing the number of pages you are using, essentially by "lightweighting" each piece. But before you put your paper on a diet, consult with your colleagues and clients to be sure that the strength, opacity, and other factors you all desire or require are satisfied. Environmental Defense changed its newsletter from 61-pound basis weight paper to lighter 47-pound stock, a 25 percent reduction in paper used to provide the same number of pages—or, put another way, to provide the same surface area for communicating the desired number of words and images. Johnson & Johnson reduced one product's packaging basis weight from 30-pound to 28-pound paper, saving 230,000 pounds of paper and $450,000 per year. In another product group, carton sizes were reduced, partitions eliminated, and printed inserts downsized, saving 132,750 pounds of folding cardboard, 523,000 pounds of corrugated cardboard, and about $990,000 annually.

Buy in quantity. The more paper of any type you buy at a time, the less each unit will cost you and the easier it will be to specify (and afford) particular characteristics such as recycled content or nonwood fiber. Consider working with other companies and organizations to coordinate bulk buys of environmentally preferable paper. Agreeing upon the many factors such as roll size, brightness, basis weight, and storage may not be easy, but such coordination can save money and maximize environmental benefit. Consult with a broker, who may be able to help arrange larger-volume purchases, as well as research specialty paper providers.

RMI on Paper

As a leader in promoting resource efficiency, RMI is making every effort to support those companies producing the very best in recycled papers. We have made a major commitment to using recycled papers that are manufactured chlorine-free. We use soy-based inks whenever possible, and printers that are environmentally committed. As you may have noticed, RMI is now identifying the paper style and company on all our printed materials where it is applicable. In the case of this newsletter, we found that New Leaf's 60-pound Eco-Offset paper best suited our needs.

Paper rolling through the *Glenwood Springs Post-Independent's* press. A typical five-edition-per-week newspaper, with a circulation of 12,000, uses roughly 4,039 pounds of newsprint per day. Photo: Jeremy Heiman

Conserving paper saves trees. A primary motivation of paper recycling and conservation is to reduce logging. But it is hard to equate quantities of paper saved to quantities of wood or acres of forest preserved. There are many variables involved: supply and demand dynamics, multiple potential uses for a given tree (e.g., many paper or lumber products), co- and by-products, differing paper production methods and ingredients, wood moisture content, etc.

In a basic sense, most forest products companies use wood quite efficiently; a tree might be cut for lumber, with smaller pieces and chips going to paper production, and sawdust powering the sawmill or paper mill. Non-fiber byproducts of pulp and paper production, such as "black liquor" delignification wastes, are often burned at the mill for energy.

Still, the less paper we use, the fewer trees will be harvested. In general, it takes a little more than one ton of wood to make a ton of newsprint, and roughly 2–3 tons of wood to make a ton of office copier or printer paper. Each Sunday edition of *The New York Times* uses about 75,000 trees; a large paper mill can consume about 75 acres of clearcut trees per day.

World paper demand is growing steadily. However, this does not mean that trees and forests cannot be saved, nor that a deforested future is fate. Rather, it implies that the future is choice, not fate, and that the choice can be made with great flexibility. The more systematic, pervasive, and comprehensive are the savings, the more forest extraction will be avoided regardless of the reallocation of demand pressures and supply flows. If you want to make a balloon smaller, don't just squeeze it one place and make it bulge somewhere else; rather, let out some air. More efficient and productive use of wood fiber at every stage of the forest products sector—from the tree through the mills to the consumer and recycler—could allow us to reduce the world's wood consumption cost-effectively by 50 percent, and possibly by as much as 80 percent or more. Every twig's worth of paper we conserve adds up to help reduce the demand for more logging. By using more smarts and less stuff, each of us can pitch in at home and at work to help supply the services people want from wood with less harm to our environment.

Chris Lotspeich, an independent consultant and former RMI Senior Associate, researched and negotiated the use of the paper in the book Natural Capitalism. *He also conducted the research that formed the basis for* Natural Capitalism's *Chapter Nine, "Nature's Filaments" (see www.natcap.org). He can be reached at chrislot@secondhill.com.*

Doug Linney: a Truly Concerned Citizen

When you read about Doug Linney on his website (www.nextgeneration.org/linneyforebmud/) for the November 2000 East Bay Municipal Utility District's (EBMUD) Ward 5 board of directors election, two things quickly spring to mind. First, Linney knows what he's doing. Second, Californians know Linney knows what he's doing, and they support him.

A longtime clean water and clean air advocate (among other things), Linney has been up to his eyes in politics for over 20 years, the last six of those as head of The Next Generation (TNG), a Bay Area-based political campaign management firm. TNG helps individuals, organizations, and businesses in political campaigns with campaign management, political and communications strategies, and grassroots organizing. The organization has successfully worked on campaigns to protect natural areas of California, slow global warming and pollution, conserve and clean up water, and a raft of other political and environmental issues. But Linney has always kept himself out of political office—at least until the EBMUD seat came along. "I thought it would be a great chance for me to help shape environmental policies from a slightly different perspective," Linney said in a recent interview.

"… As an avowed environmentalist, we believe Linney will constantly prod the district to continue placing water conservation measures at the top of its priority list," wrote the *Oakland Tribune* in an endorsement. "We urge voters to elect Linney for EBMUD Ward 5." The list of community leaders who supported Linney includes dozens of leaders and organizations from the Bay Area and the state government. Although he had two opponents in the race, Linney still managed to pull in a whopping 55 percent of the vote. After his first year, he said, "While EBMUD already has a great environmental ethic, I think there is much more it can do in both the energy and water efficiency areas.

"I've always been very political," he said recently. "In high school, one of my passions was politics—I would go to political rallies for presidential candidates and walk precincts before I was old enough to vote. I gradually became an environmentalist in college during the mid-70s, inspired by my professors in environmental studies and by environmental leaders such as David Brower, Amory Lovins, and Mark DuBois."

Most Californians who've had any interest in environmental issues in the last half century have found themselves attracted to the activities of the late David Brower, a former RMI board member. Although many never make the connection between energy and the environmental benefits of efficiency, Linney did, and he's been a fan of Brower protégé Amory Lovins ever since the latter wrote *Soft Energy Paths* (1977).

Linney grew up in San Jose, California, and has always lived in the Golden State. He received his BS from U.C. Davis in environmental science and public policy. Linney's long-standing interest and work in environmental matters crystallized through his creation of The Next Generation (see www.nextgeneration.org/), which he founded in 1996 to assist in the political aspects of environmental fights. "I enjoy the energy and the finality of campaigns," he notes. "You work really hard, make your best case to the voters, and on a date certain, a decision is made. Then you get to move onto the next campaign. It's real time, and real world. It keeps me in touch with how people are thinking and feeling about the environment.

"One of the most exciting campaigns I've been involved in lately was managing the effort to pass a $100 million solar and renewable energy bond for the City of San Francisco [see page 8]. It was supported very enthusiastically by every sector of the San Francisco community and won with 73 percent. There is now interest from many other cities in passing similar measures."

Linney also keeps himself in touch through his hobbies, which reflect his great love of the outdoors and his passion for action. "I regularly bicycle to work—15 miles round-trip," he notes, "And I ride centuries (100 miles) three or four times a year. I'm also a very avid guitar player and whitewater rafter."

Before his work with TNG and EBMUD, Linney was Political Director for the California League of Conservation Voters (CLCV). He currently serves on the board of directors for CLCV, the Planning and Conservation League, and the Coalition for Clean Air. Linney has been married for 17 years and with his wife Susan has two children, Olivia (12) and Spenser (8). They live in Alameda.

"As environmentalists, it's our role not only to point out the many environmental problems that are wreaking havoc with our planet," he said, "but to craft elegant and politically acceptable solutions to solve these problems."

Ruth Adams

RMI Board Member

RMI Board member Ruth Adams believes that current events portend an active future for RMI, in energy and security issues.

Adams was elected to RMI's Board of Directors in 1997 on the strength of a career full of contributions in the field of world security. Energy security is inextricably intertwined with U.S. involvement in the Middle East, she said, and the events of 2001 will draw RMI deeper into the national and international discussion of security. "RMI has a busy future," Adams said, "because energy is the overwhelming issue in our present situation."

Now retired, Adams is the former editor of *Bulletin of Atomic Scientists*, "a magazine of science and world affairs." She first met Amory Lovins when she published one of his articles in the *Bulletin*. Though she doesn't work for the publication any more, Adams is still quite active in the security arena. In addition to serving on RMI's Board, she's on the Federation of Atomic Scientists' National Council, and she's active in work to eliminate the threat of nuclear weapons. "It remains a very serious matter," she said.

Adams also continues to participate in other global security forums. She has for many years participated in an ongoing series of world security discussions called the International Conferences of Scientists on World Affairs, better known as the Pugwash Conferences, held since 1957. The purpose of the Pugwash Conferences is to bring together, from around the world, influential scholars and public figures concerned with reducing the danger of armed conflict and seeking cooperative solutions for global problems. The Pugwash Conferences take their name from the location of the first meeting, the village of Pugwash, Nova Scotia, Canada. Adams is now involved in organizing the 51st Pugwash Conference, now scheduled for San Diego in August.

She is also a course director for Isodarco, the International School on Disarmament and Research on Conflicts, also known as the Italian Pugwash Group. This is an Italian-based NGO that brings together people with a great variety of experiences and approaches relating to security problems. Isodarco held sessions and published books relating to terrorism as early as the 1970s, long before this subject became fashionable with mainstream security analysts. The Italian Pugwash Group has a special focus on youth, with many of its participants in their 20s.

And just recently, Adams stepped down from her post as Board Chairwoman at the Institute for Policy Studies, a group that does research and exerts influence in the areas of global economic justice, sustainable communities, economic and social rights, security, and culture.

Adams was also program director for the MacArthur Foundation, which has provided support to RMI. (Amory Lovins is the recipient of a MacArthur Fellowship.)

Though energy security, and global security generally, are important issues for RMI, other aspects of the Institute's work are equally important, Adams asserts. Instituting the concepts laid out in the 1999 book *Natural Capitalism* could have a huge influence on the use of resources worldwide.

"One of the most dynamic moves RMI has made has been the publication of *Natural Capitalism*," she said.

—Jeremy Heiman

RMI's Distance-Learning Project Unfolds

By David Payne

In *Business Dynamics: Systems Thinking and Modeling for a Complex World*, author John Sterman wrote, "Accelerating economic, technological, social and environmental change challenge managers and policymakers to learn at increasing rates, while at the same time the complexity of the systems in which we live is growing. Many of the problems we now face arise as unanticipated side effects of our own past actions. All too often, policies we implement to solve important problems fail, make the problem worse, or create new problems."

Dave Payne, the consummate teacher, with schoolkids at RMI's headquarters. It was RMI's extensive educational activities from which the distance learning project grew. Photo: Cameron M. Burns

It's important to know our past so we can avoid problems in our future. In a nutshell, that means education. Much of RMI's mission has traditionally focused on education—from individual homeowners who want to go off the grid to world leaders looking for sensible energy policies. Now, we're going farther, so to speak. With generous support from the Overbrook and Summit Foundations and from R.E.M. (yes, the rock band), RMI has recently developed an educational system for use over great distances—much like telecommuting systems used by college students.

The subject matter for our "distance-learning" project is natural capitalism, the rapidly-spreading business philosophy. "NatCap" provides many models for enhancing profits while solving problems and increasing competitive advantage, as well as a framework for moving toward an economy that takes into account the true value of these resources. Our initial audiences are in Brazil, where RMI has been working with diverse organizations for several years.

Natural Capitalism and Whole-Systems Thinking

Simply put, whole-systems thinking is about seeing the big picture—all the players in a system and how they fit together. It's also about understanding how and why impacts on one part of the system affect other parts of the system. Whole-systems thinking also allows us to identify the "high-leverage points" in systems, avoiding costly, superficial, symptom-oriented solutions that often cause more problems than they solve.

So how do you apply whole-systems thinking to your business, your home, and your life? These questions are answered in the Understanding Whole Systems (UWS) learning module, a self-directed interactive learning program. The UWS learning module will take the combined form of a CD-ROM and website.

The CD-ROM features readings and case stories, video and audio clips, and supporting tools and exercises. Case studies as diverse as Hypercar, Inc. and Midwestern corn farming are used to teach the subject and demonstrate its relevance.

Additionally, because CD-ROMs can become obsolete quickly, ours will come in a special format that allows portions of it to link to a website. The website has up-to-date information, recent case studies, updated links to other websites, downloadable documents, and discussion servers. Interactive programs in support of the module, including videoconferencing and live web chat sessions, will be offered on a case-by-case basis.

The module will be tested at an executive training center in São Paulo, Brazil, called the Amana-Key Institute. Amana-Key has over 4,000 corporate executives in its active alumni group. RMI will also distribute the program through various executive education and university graduate school programs as well as directly through the RMI website. The always far-sighted Farley Sheldon, our late Development Director, really believed in this program and felt its potential was vast. Undoubtedly, she'll be right once again.

Next Steps

The UWS project is the first initiative in RMI's emerging educational program, the Natural Capitalism Academy. In the coming year, the NatCap Academy's distance-learning program will offer modules on a broad range of topics—appropriate for audiences with interests and expertise in business, government, and civil society. The modules will include introductions to the environmental, social, and financial implications of natural capitalism, along with practical tools and exercises for implementing NatCap. Ultimately, the NatCap Academy will develop active "learning communities" focused on issues related to natural capitalism. The Understanding Whole Systems project is the first step on this exciting new path. Come join in and learn with us by surfing over to www.natcapacademy.org/uws/!

Bob Wilkinson

Bob Wilkinson

From watershed management to climate change, the logic of multiple benefits based on existing technologies and sound investment is increasingly becoming a theme in my work. An EPA-sponsored project I'm running for RMI is exploring the multiple benefits of air pollution prevention and the reduction of greenhouse gas emissions. We're exploring exciting opportunities ranging from intelligent land-use planning (like Village Homes in Davis, California) and green building strategies (see GDS's work) to energy efficiency, renewable energy options, and transportation alternatives. (Check out the Lovinses' 1997 climate paper on RMI's website.) Similar multiple benefits approaches are appearing in the RMI work I'm doing with the Inland Empire Utilities Agency in Southern California. Local water management options, including efficiency improvements, local groundwater recharge, and pollution prevention, are being linked together in ways that save significant amounts of energy, water, and wastewater, as well as greenhouse gas emissions. All of these opportunities are cost-effective, technically feasible, and environmentally beneficial. The common theme in this work is sound investment in technologies and techniques that are designed to achieve more than one benefit. An important opportunity in this work is to develop both information and policy strategies that support, encourage, and incentivize these investments.

Jenny Constable

Jenny Constable

I'm charged with promoting RMI's work to the media—from national television to small town newspapers. Just keeping track of the many projects going on in the building is a big task, but it's important because I have to explain our complex ideas to members of the media—sometimes to folks who've never heard of us.

In the past, RMI's media work has been very reactive, only responding to inquiries that we receive. As part of an effort to get our word out to different audiences around the world, I'm working on ways to make it more proactive. This starts with simple research and a well-organized database, so we'll know who might be interested in doing stories on RMI's specialties. I also follow up with timely information for interested media outlets and work on long-term relationships with our best contacts. Eventually, I hope that our work with the media and other public outreach efforts will make RMI a household name and a source that reporters turn to for high-quality, cutting-edge information.

Joanie Henderson

Joanie Henderson

I have been working with Hunter Lovins on her next book, *The Human Dimensions of Natural Capitalism*, which is the sequel to *Natural Capitalism: Creating The Next Industrial Revolution*. By exploring motives, such as that which would compel a person to help someone on a neighborhood street corner or make a powerful CEO decide she will turn her company upside-down to become socially responsible, this new work guides the reader through the human facets of the movement toward sustainability.

I have also been working on the development of the Natural Capitalism Academy. This is a joint endeavor of RMI and The Global Academy to bring the principles of natural capitalism to the forefront as the central organizing principle of business.

Additionally, until recently I've been laboring away on the Oberlin College: Climate Neutral by 2020 project. This is a very exciting and ambitious undertaking. All sources of greenhouse gases were inventoried within the college boundaries, reduction scenarios designed, and methods of mitigating the remaining emissions developed as a means of making Oberlin College a climate neutral campus by the year 2020.

A Hearty Thanks to All

Dale Levy, Development Director

Several years ago I witnessed a woman's joy when she gave $1 million to an organization helping people in developing nations. This woman knew what she wanted to do with her money, she was intentional, and the result was purposefulness, power, and happiness. Such joy isn't limited to the wealthy.

Inspired Philanthropy: Creating a Giving Plan, by Tracy Gary and Melissa Kohner, provides suggestions for giving. The authors' basic premise is that by learning how to match your giving with your values, you can make your charitable giving catalytic. They supply narrative as well as exercises to help a person bring about the

changes he or she wants. Concepts from the book include:

- when you donate money to a cause you believe in, you're giving power
- write a check that doesn't break the bank; you'll be lighter on your feet
- seven out of ten Americans—a far greater percentage than Americans who vote—give away money to nonprofits
- impulsive giving is not good stewardship of resources, probably does not promote the deepest values of the donor, and rewards only asking rather than solid work
- reasons that individual giving is disorganized: individual donors are ashamed of the little amount they give; donors are disillusioned about effectiveness of charities and don't know how to establish a smart, organized plan; people are overwhelmed with the sheer number of requests; and many are unsure of how much they can afford to give—it's important to find out
- creating a giving plan will not only make you a more effective giver, it will make you an inspired giver
- the ability to respond to crises is one of traditional philanthropy's strongest assets. Progressive philanthropy, on the other hand, analyzes and responds more to cause than effect. And, last but not least
- knowing what you feel passionate about is the first step.

Staff Spotlight | Michael Kinsley

A talent for painting is not generally a résumé requirement for economic development consultants. But Michael Kinsley, co-founder of Rocky Mountain Institute's Economic Renewal department, re-creates scenes around his Colorado home in vibrantly colored oil paintings, characterized by brushwork reminiscent of the impressionist or post-impressionist schools of painting.

Kinsley, now 54, started painting at the age of 40. "I just had a hankering to do it," he said. He had no training in art, but his father was a hobby painter, as was one of his more influential teachers in school.

"Some people would call it impressionist," he said of his style. "But it's not impressionist in the strict sense of the definition." His work, he said, is influenced by the painting of Paul Cézanne and Edgar Payne, a California impressionist. He's also learned a lot from his friendship and study with three Russian artist-teachers who regularly visit the Aspen area to teach and show their work.

Self-taught at first, Kinsley has attended a number of workshops that have sharpened his technique. He paints in oils, going straight to the canvas without a preliminary sketch. His paintings are almost always landscapes, though he occasionally paints a still-life or a portrait. Carrying a compact paint set, he paints along hiking trails and roadsides. He prefers the low-angle light of morning or evening, looking for man-made elements, such as a road, a house, or a ruin to bring harder lines into a composition. Kinsley rarely spends more than two hours on an outdoor painting, but often paints larger canvases based on his smaller outdoor efforts. He maintains a studio in a corner of his living room, where he touches up his field paintings and executes the larger works. His painting, like every artist's, has changed and evolved. His medium went from pastels to oil paints. His compositions, at first landscape fragments or studies, evolved into more sweeping, complete scenes. His brush strokes have gotten stronger and his technique has loosened up.

Painting has an important place Kinsley's life, though he is also an enthusiastic skier, hiker, and whitewater kayaker. He's received recognition in the form of awards at the Glenwood Springs Fall Art Festival, and he sells perhaps three paintings per year. He's had paintings in several local art shows, and in the past has shown work in two Aspen galleries. His paintings have also graced the covers of RMI's annual reports and adorn the walls of RMI's Southeast Annex.

Kinsley's decision to take up painting was colored in one way by his work at RMI. "I think one of the reasons I do it is that what we do here is to create long-term, broad-scale change," he said. "You don't get to see the immediate results of your work. In contrast, a painter sees immediate results from each brush stroke. In that way, it's unambiguous."

—Jeremy Heiman

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We want to hear your comments. Please address all correspondence to:

Cameron M. Burns, Editor
Rocky Mountain Institute
1739 Snowmass Creek Road
Snowmass, CO 81654-9199
tel: (970) 927-3851
fax: (970) 927-3420
newslet@rmi.org
www.rmi.org

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Our staff shows corporations, communities, individuals, and governments how to create more wealth and employment, protect and enhance natural and human capital, increase profit and competitive advantage, and enjoy many other benefits—largely by doing what they do more efficiently.

Our work is independent, nonadversarial, and transideological, with a strong emphasis on market-based solutions.

Founded in 1982, Rocky Mountain Institute is a §501(c)(3)/509(a)(1) public charity. It has a staff of approximately 50. The Institute focuses its work in several main areas—business practices, climate, community economic development, energy, real-estate development, security, transportation, and water—and carries on international outreach and technical-exchange programs.

Our sincere appreciation is offered to these friends who have contributed to RMI between 1 September and 31 December 2001. Numbers in parentheses indicate multiple donations. Please let us know if your name has been omitted or misspelled so it can be corrected in the next issue.

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Zen and the Art of Being 'Principled'

Farley—always smiling.

By Cameron M. Burns

Most RMI supporters and visitors are intimately familiar with RMI co-CEO (Strategy) Hunter Lovins, her life's work, and her remarkable vision for the world. Yet, by knowing Hunter, they also get a glimpse into the life and work of Hunter's late mother, Farley Hunter Sheldon—a visionary in her own ways, a character, a gem, and a clear guiding light for all who beheld her.

Until two years ago, Farley Sheldon was RMI's development director. Early last year, age began taking its toll on RMI's grand dame and mobility became problematic for the 89-year-old, so Farley retired from RMI. On the evening of 29 December 2001, she died peacefully in her home, in Hunter's arms.

Farley was more than just Hunter's real mom and a surrogate mother to Amory. She was a devoted, thoughtful part of RMI for many years and the Institute's first development director. Farley's typical greeting to most anyone included a sincere smile and kind compliment—whether you deserved it or not.

If one were to describe Farley's life in one word, it would be "principled." Farley held tightly onto her beliefs like few other women of her age and few other people ever. She was the ultimate idealist—and though many readers and supporters are unaware, her idealism took root in a young Hunter and Amory Lovins, and helped shape today's Rocky Mountain Institute.

Farley Hunter Sheldon was born in Roderfield, West Virginia, and grew up in the town of Welch, where her father worked as a coal mine operator. Later she would organize in the coalfields with labor pioneer John L. Lewis—not to mention build and fly a light plane, show-jump in Madison Square Garden, and other remarkable feats amidst what Hunter once tallied as about 16 careers. But we get ahead of our story.

In college Farley was an excellent student. Indeed, when Duke University decided to start a law school, school officials scoured the nation looking for the brightest minds. Along with future President Richard Nixon, Farley was one of 32 young people chosen for the privilege—a considerable achievement when you consider that this was in the mid-1930s, when women generally weren't considered for such advancement.

After law school, Farley married a lawyer from Durham, NC, and began a new life in a big house, with servants and all the luxuries of the privileged class (indeed, the sorts of things most of us who knew her later might not associate with Farley). She had a son, Will, and worked on family law and juvenile issues. Marriage, of course, couldn't contain Farley—at least not that one, so she packed up Will and moved on. Indeed, settling down was about as far from Farley's mind as going back to Welch.

Through the 1940s, Farley headed north, and eventually made her way to Washington, DC. World War II broke out, and Farley pitched in, working for the War Production Board, finding workers for wartime industry. One of Farley's specific tasks was to find workers for the mica mines (to make radio capacitors). Farley learned that there were hundreds of men building—of all things—a recreational dam up a holler in Tennessee. Farley tried and failed repeatedly to get this skilled workforce transferred. "She went to her boss and said 'I don't know why, but I can't seem to get those workers transferred off that dam!'" Hunter remembers. Only later did Farley learn that the dam, being built near a place called Oak Ridge, was to power the supersecret Manhattan Project. Farley had tried her best to keep a nuclear bomb from being built. "The dam she kept trying to stop was, it later turned out, meant to make power to run the calutrons to enrich uranium for the Hiroshima bomb," notes Amory. "Her instincts were very sound."

After the war, Farley went further north, ending up in New York, where she met and fell in love with Paul Sheldon, a rangy blond professor at New York University. They married and moved to Ripton, Vermont, where they winterized a summer house for year-round use (their next-door neighbor was poet Robert Frost, whose horses Farley minded). In 1950, Farley gave birth to a daughter, Hunter. Brother Paul came along two years later.

In 1951, Paul, Sr. took a job at Occidental

College in Pasadena. The family moved to a little town in the San Gabriel Mountains, Sierra Madre. (To Farley, then an Easterner, California sounded so primitive that she hauled a washing machine and other white goods across the country, only to find them in all the stores.) Young Hunter loved the outdoors and ranch activities, but quickly found she hated public school. Farley's solution? Start her own, of course—in this case, the Sequoia School, which exists to this day. (If that sounds familiar, it was Hunter who 23 years later persuaded Amory that they should start their own Institute.) Sequoia's guiding principle was that students learn by doing, by experiencing, so travel was a big part of the curriculum.

Farley and Paul were also organizers in the black and Hispanic communities in Los Angeles. Figures like Cesar Chavez (who founded and led the first successful farm workers' union in the United States) and labor organizer Saul Alinsky often sat around the Sheldon dinner table—much the way cross-fertilizers of resource efficiency would later become regular visitors to RMI.

In 1965, while Hunter was starting high school at CRMS (Colorado Rocky Mountain School) in Carbondale, Farley made a career move and went to work for Los Angeles County, serving for many years as a researcher, counsel, and administrator. At one point during the Vietnam War, while Farley was working for the County, she was approached by a colleague who urgently wanted to copy some documents. Never one to stifle the free flow of information, Farley let the copying be done on her machine after other employees had gone home. The documents turned out to be the Pentagon Papers—proof that the federal government had been lying to Americans about the war. (Not surprisingly, the sharing of information has been a hallmark of RMI since its inception.)

In the late 1960s, Farley was invited to a Duke University Class of '37 reunion dinner at the White House by her old classmate, President Nixon. Farley wanted to go—the chance of a lifetime for a girl from the coalfields. But she felt it would be wrong to accept the hospitality of the man conducting the Vietnam War. So regretfully, she declined in a very polite letter. Years later, Farley learned it had had a profound effect on Nixon. Having surrounded himself with "yes men," Farley's very different message—telling him of her beliefs, not what he might've wanted to hear—was one of the few that unambiguously reached Nixon's ears.

Eventually, Farley's daughter Hunter and her colleague Amory Lovins started Rocky Mountain Institute. Farley moved out to Colorado soon after to lead Pitkin County's newly established Health & Human Services Department, where she served as director in 1984 and 1985 (she also served as director of Senior Services from December 1985 to February 1986). According to current director Nan Sundeen, Farley helped Human Services define its role, by first assessing what the needs of the county were. She also worked to establish several county amenities, including the Castle Creek Terrace assisted living facility, and the Seniors' Council. "She really had a vision and was able to get people to follow her," said Sundeen. "She was a big advocate of human services her entire life. She really helped Pitkin County's Health & Human Services' departments to understand their roles and to work collaboratively. Prior to that, they acted as separate entities."

In 1986, she came to RMI full-time as development director, and quickly created a fundraising style that remains unique. Farley performed the difficult job of asking for contributions gracefully without multiple mass-mailings and dinnertime phone calls. In a time when nonprofits turned to the hard sell, Farley stood by her principles.

"We have a motto," she told Auden Schendler, then *RMI Solutions* editor, in 1998, "'putting all our begs in one askit,' making just one appeal a year for individual operating support. Obviously we need money to operate, but we try not to make it the focal point of RMI's image. So many excellent, environmentally-oriented nonprofits have ruined their images by pushing too hard. We try to avoid that." Her strategy paid off: RMI has met payroll every month for its 20 years (though sometimes not by much). "Hers is the toughest act I'll ever follow," said current Development Director Dale Levy.

In a 1998 tribute to Farley, Schendler wrote: "RMI's director of development for 12 years, Farley has not lost her enthusiasm for the Institute's mission.... Many staff children haunt the Institute. One, a three-year-old named Lily, is shy enough to hide behind her mother's legs in the kitchen. Visiting for lunch one afternoon, Lily whispers: 'I want to sit next to Farley.' There are few better indicators of the effectiveness of the soft sell, of kindness, and of the quality of people."

"I shall miss her," Hunter said. "Farley has been a major influence on my life, always encouraging me to seek ways to make the world a better place, from early advice to leave a campsite cleaner than I found it, to always doing more than her share of whatever work there was to be done. She was a believer in the goodness of people, and the power of an idea. She hated cynicism and loved optimism. She was my greatest role model, but also my best friend."

A memorial service for Farley is scheduled for 16 March 2002, 4:00 p.m., at the Snowmass Chapel in Snowmass Village. The service will be led by Dr. Edgell Pyles.

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