

RMI Solutions

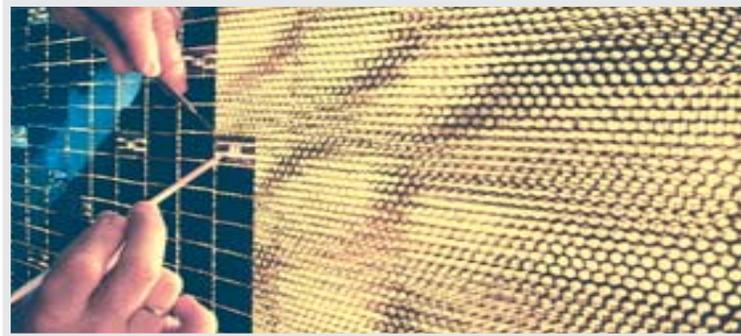
NEWSLETTER

Mobilizing Innovation

By E. Kyle Datta

Welcome to this special edition of *RMI Solutions* focusing on our consulting work.

One of RMI's key goals is persuading business leaders worldwide, starting in North America, to become natural capitalists (www.natcap.org), and ultimately to make natural capitalism a central organizing principle of commerce worldwide. Many business leaders realize that environmentally restorative practices are the right thing to do, but they're also learning that natural capitalism's overarching framework can also lower their costs and risks, stretch their investments, create striking competitive advantage, and help recruit, retain, and motivate their people.



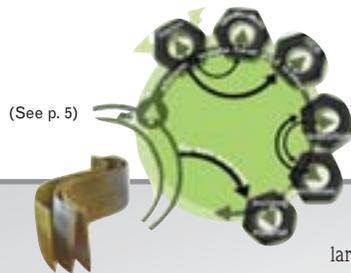
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Roughly half of the world's 100 biggest economic entities are no longer countries; they're companies. More than any other institution, business combines the leadership, management, innovation, integration, skill, speed, resources, and motivation to solve big and tough problems quickly. RMI therefore sees business as the key to rapid progress toward resource efficiency, environmental restoration, and social advancement. Putting business in the vanguard reduces reliance on governments,

which are often sluggish, conflicted, or inattentive. It's often best done in concert with civil society, but can also be driven internally, even by a narrow profit motive.

To mobilize the dynamism of business, RMI has developed a range of products and services, including design charrettes (intensive transdisciplinary roundtables), "Innovation Laboratories," strategic planning, senior management consulting, and

CONTINUED ON NEXT PAGE



(See p. 5)

All That Glitters. You gross \$25 billion, you have 165,000 employees, you've taken over the world's second largest mining company, and you want to be sustainable. Whom you gonna call? RMI, of course. (p. 3)

A Vision for a Valley. Revitalizing an inner-city industrial area with a whole-system approach can yield symbiotic benefits. (p. 5)

California Dreamin'. If you lived in California, you'd want a sensible energy strategy. Read what the City by the Bay is doing. (p. 8)

Power from the People. Here we explain how RMI is helping one firm (Invensys) help homeowners and utilities make the grid more reliable. (p. 13)

Green Development in the Desert. One of RMI's recent projects explores what's possible. (p. 16)

What Are You Doing? In this issue of *RMI Solutions*, we feature the work of our interns. (p. 22)

Board Spotlight. RMI Board member David Orr sleeps fast and has broad influence. (p. 24)

Donor Spotlight. RMI draws its support from a vast range of individuals and organizations, including a handful of celebrities like REM, the influential rock band from Athens, Georgia. (p. 25)

What's Inside

Mobilizing Innovation

Over time, our clients' conspicuous success as natural capitalists will drive rivals' emulation.

detailed technical advice to plant and product designers and to operating engineers. But how do we choose the right businesses to help advance our mission as well as theirs?

We select high-leverage corporate clients based on their purpose, prominence, integrity, impact, sector, influence, effective execution, organizational culture and coherence, and ripeness for radical improvement. We also strive to make the results measurable, scalable, replicable, and reportable. In what are often long-term relationships—our CEO's work with the leaders of one giant firm stretches back thirty-one years—RMI brings new ideas to these corporations, rearranges their mental furniture, develops the business case for adoption, and helps to create and integrate basic innovations in vision, business model, structure, culture, product, process, and market. No company is perfect (nor are we); all have room to improve; some are undertaking overdue, challenging, and fundamental reforms. We seek those firms whose desire to change, with our timely support, can make a difference far larger than either of us.

Over time, our clients' conspicuous success as natural capitalists will drive rivals' emulation. This competitive spur to wider adoption is a core reason for RMI's consultancy (or, as we prefer to think of it, "applied research," where we learn-by-doing with an expert and eager partner). But we have other reasons too. Consulting gives us the salutary discipline of market feedback and the precious experience of real-world implementation. It builds credibility and hones our skills. (We were pleased

when a major client, world-renowned for design prowess, recently told a journalist, "Our engineers were sure it couldn't be done. RMI showed them how it could be done.") Clients are also more likely to value and act on advice they've paid for. And that unrestricted income to the Institute leverages our donors' and grantors' contributions and makes our research more agile and self-directed.

So why have more than seventy *Fortune* 500 firms and many abroad, including at least ten of the world's top fifty brands, hired RMI or begun discussions to do so? We daresay they're attracted by our vision across boundaries, talent for synthesis, attention to detail, biological and biomimetic orientation, deep and broad but integrated knowledge. Whole-system thinking has helped our clients profitably solve (or, better still, avoid) knotty problems in such sectors as agriculture, automaking, aviation, biotechnology, carpets, cement, chemicals, controls, electricity, electronics, engineering, finance, food and beverage, hydrocarbons, manufacturing, metals, military, mining, real estate, retail, and semiconductors. This diversity, unusual in such a small firm but made possible by our global network of associates, creates fruitfully expanding webs of cross-pollination.

These projects don't just touch RMI and business—they touch you. No matter who you are and where you live, they can make your life richer, healthier, safer, easier, and (we hope) more enjoyable. When you turn on the lights in San Francisco, know that RMI helped shape the City's strategy to get more power from renewable and distributed resources than ever before, and to use it more effectively. When you use new control tech-



nology in your home to provide better comfort at lower cost, know that RMI helped develop the initial pilot tests and persuade the industry of their value. When you drive a hybrid car, know that RMI helped launch the design revolution that brought it to market. When you buy a diamond ring for your sweetheart, know that RMI helped the company that mined it do so in ways that are better for both the miners and the Earth. And when you see a river undammed, a forest uncut, an Arctic wilderness undrilled, or a world starting in small but spreading ways to become fairer and safer, know that RMI's collaboration with our private-sector partners is helping to make it so.

Every time you choose a product, every time you travel someplace, eat something, buy something, drive someplace, flick a switch, turn a knob, or twist a key, you're making a choice. You're choosing a technology, a manufacturer, a community, a set of ideals that reflect much about you and your values. So enjoy this issue of *RMI Solutions*, and choose wisely. On your choices, as much as on what we all do together, depends the future of the world.

Kyle Datta (kdatta@rmi.org) is Managing Director of RMI's Research & Consulting group.



All that Glitters

UNCOVERING THE HIDDEN WEALTH IN A PLATINUM MINE

By E. Kyle Datta
and Lena Hansen

Imagine that you've just taken over leadership of the world's second largest mining company. It operates eight businesses in sixty-four countries, it's the largest mining company in Africa, and you want to make it energy and resource efficient while simultaneously boosting profits. What do you do and whom do you call? This is exactly the situation that faced Sir Mark Moody-Stuart, who became chairman of Anglo American in December 2002, after serving as chairman of Royal Dutch/Shell Group. In response to this challenge, Sir Mark launched a company-wide effort that has the potential to dramatically increase sustainability throughout the firm's operations.

Anglo American has revenues of \$25 billion, operating profits of \$2.9 billion, and 165,000 employees on six continents. It is the majority owner of De Beers (diamonds), the world's largest producer of platinum, the leading exporter of coal from three continents, one of the top five copper producers, and proprietor of some of the world's largest gold, base-metals, aggregates, and forestry operations.

Sir Mark recognized that Anglo American faced a major multi-faceted problem. Anglo's business must be expanded to meet rising demand for metals. At the same time, the company is exposed to the risks of rising energy costs and price volatility. Environmentally, mining results in massive amounts of waste rock (typically 90–95 percent of mined material

is waste rock or tailings), toxic residues, and carbon dioxide emissions. Extractive industries can also harm biological and cultural diversity. Socially, Anglo must address the HIV/AIDS epidemic in Africa, while operationally it strives to improve worker safety and productivity.

As part of Sir Mark's effort, Anglo hired RMI to offer an overall perspective on sustainability, and specifically to help the company reduce its energy use. When RMI began working with Anglo, the eight business units were targeting modest energy improvements of a few percentage points.

In 2003, Anglo Platinum, one of Anglo American's business units, annually emitted 4.5 million tonnes of carbon dioxide and had a total energy consumption of 21 petajoules (equivalent to the output of a 665-megawatt power plant running continuously!).



The mining industry
has an incredible opportunity
to rethink the way it does business
and to make the industry
more restorative—at a profit.

RMI worked with Anglo Platinum to set an example for the entire company of what could be accomplished using natural capitalism principles, focusing especially on radical resource efficiency. RMI's relentless emphasis on eliminating *muda* (waste), employing whole-system design principles inspired by nature, and providing technological and energy-market intelligence served as a catalyst to unlock the creativity of an impressive group of Anglo Platinum engineers, members of Anglo Technical Division, and representatives from other Anglo American divisions.

RMI's "Innovation Lab"¹ uncovered significant opportunities for Anglo Platinum, described below:

- RMI and Anglo Platinum identified over 100 separate actions that have significant potential to reduce energy intensity, increase labor productivity, and increase platinum recoveries within the next five to seven years.
- By 2010, Anglo Platinum could save thousands of gigawatt-hours and earn millions of tonnes of carbon dioxide credits every year. The annual value of these combined savings could reach hundreds of millions of Rand (tens of millions of dollars).

This effort gives Anglo Platinum a new and powerful suite of tools to manage energy consumption, which accounts for 8 percent of its costs. Given the margin squeeze caused by the rising Rand, cutting energy consumption can provide a competitive edge, help the environment, and require less capital to mine at deeper levels.

All that Glitters

Anglo American is working to significantly reduce sulfur dioxide emissions, set water use targets, enact biodiversity action plans, and monitor carbon dioxide emissions.

Together, Anglo and RMI identified new approaches that promise to revolutionize mining. For example, biological concentration of heavy metals in plants, fungi, and algae has the potential to significantly increase mining efficiency and profitability while reducing environmental impacts. Certain organisms can concentrate metals by hundreds of times. For example, the lowly carrot can accumulate 48 milligrams/kilogram of gold in just ten days, compared with a typical ore concentration of 20.8 milligrams/kilogram.

Social capital is equally important. Labor is by far the largest cost in mining, and the working conditions in conventional underground mines are extremely arduous. RMI believes the mining industry has the opportunity to deploy new ergonomic technologies such as efficient lighting, phase-change cooling vests, and other devices that will improve worker health, safety, and productivity. These and other opportunities, if taken advantage of, will make Anglo American a leader in sustainable resource extraction.

Anglo's initiatives go beyond operational improvements that increase resource efficiency. In the workplace, Anglo has a goal of eliminating all fatalities, becoming ISO 14001 certified at all its managed operations, and meeting South Africa's goal of employing historically disadvantaged South Africans in 40 percent of South African management positions. Environmentally, Anglo is working to significantly reduce sulfur dioxide emissions, set water use targets, enact biodiversity action plans, and monitor carbon dioxide emissions. Socially, Anglo is aggressively addressing HIV/AIDS and has a goal of providing antiretro-viral therapy at all of its South African operations.

In a recent presentation to Anglo American business-unit CEOs, RMI CEO Amory Lovins described how the mining industry has an incredible opportunity to rethink the way it does business and to make the industry more restorative—at a profit. Anglo American has taken the first step on a long and advantageous journey.

Sir Mark's reaction: "Very exciting."
Now the real fun begins.



Mining innovation: the lowly carrot can accumulate 48 milligrams/kilogram of gold in just ten days (typical ore concentration = 20.8 milligrams/kilogram).

Kyle Datta (kdatta@rmi.org) is managing director of RMI's Research & Consulting group. Lena Hansen (lhansen@rmi.org) is an intern at RMI.

¹ **Innovation Labs** are multi-disciplinary events in which RMI consultants and client staff members apply whole-system approaches to identify breakthrough efficiency opportunities.

RMI *in the news*

RMI CEO Amory Lovins Set to Lecture in Aspen



RMI's popular series of Aspen-area lectures ("RMIQs")* will continue this summer with a lecture by RMI CEO and Cofounder Amory Lovins. Amory will discuss RMI's latest research project, *Winning the Oil Endgame*, slated for July publication, which charts a roadmap for getting the United States completely off oil—rapidly, attractively, and profitably (even for oil companies). *Winning the Oil Endgame* will be presented

5 August 2004 at Paepcke Auditorium in Aspen (time to be announced). Be sure to make reservations, as Amory's presentations are typically standing room only. Please email develop@rmi.org with the name and contact information of each individual attending.

*RMIQ is shorthand for RMI's Quest for Solutions.

Regenerating the Cuyahoga Valley

A VISION FOR A VALLEY

By Michael Kinsley

“Let’s put our heads together, start a new country up, Underneath the river bed we burned the river down.”

“Cuyahoga,”
R.E.M.

Driving around Cleveland, most people miss the Cuyahoga Valley, except maybe crossing one of the bridges between the east and west sides of town. Looking down, one can spy a steel mill, a chemical plant, piles of gravel, and the site of the nation’s first oil refinery—all that and much more on a flat, seventy-five-square-mile plain, a gritty gray industrial area that’s a genuine icon of the Industrial Revolution.

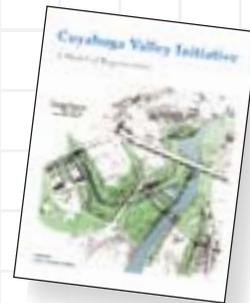
A river runs through it—the Cuyahoga River, which is famous for having burned in 1949, ’52, and ’69. The last fire helped trigger the passage of the federal Clean Water Act in 1972. But Clevelanders have a good attitude about it. The popular Great Lakes Brewing Company pours Burning River Pale Ale, and www.clevelandchaos.com sells a T-shirt that says “Flammable, Cuyahoga River: We’ll leave the river on for you.”

Besides a sense of humor, the city’s blessed with some genuine visionaries, notably the *Cuyahoga County Planning Commission* (CPC), which

in 2002 started the Cuyahoga Valley Initiative to “revitalize the Valley and make it once again an economic force, environmental treasure, and unifying element for the region.” Recognizing that natural capitalism and whole-system solutions might serve this vision, CPC drew RMI into its web early last year.

RMI’s approach was to bring together a wide variety of disciplines to evaluate multiple facets of the Cuyahoga Valley’s business, infrastructure, social, and biological ecosystems, and to apply its whole-system design methods to urban redesign. Supported by grants from the Joyce and Gund Foundations, an RMI team visited the Valley several times, met with dozens of local experts, conducted discovery and Innovation Laboratories, and in April 2004 submitted a series of recommendations in *Cuyahoga Valley Initiative: A Model for Regeneration* (www.rmi.org/sitepages/pid177.php).

RMI’s report includes several recommendations that are already gaining traction in Cleveland. The first is to designate one portion of the Valley as a “*regenerative development zone*,” which would serve as a model for the entire Valley’s regeneration. The report envisions the “zone” as a laboratory for ecological restoration and fresh ways of doing business. Depending on how it’s run, the zone might include programs that demonstrate ways to weave industry and nature together, consolidate industrial facilities, assemble parcels to make land available for development, return buried watercourses to the



earth’s surface, test ways for businesses to share resources, develop green buildings, create new pollution-mitigation and industrial clean-up businesses, and demonstrate clean energy technologies and systems.

One RMI recommendation in particular caught the eye of several local leaders. “Industrial symbiosis” is an innovative form of industrial collaboration that turns wastes and by-products into inputs for other industrial operations. As Yale’s Marion Chertow puts it, industrial symbiosis “engages traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, and/or by-products” (www.yale.edu/forestry/bios/chertow). Proven in places like Denmark’s Kalundborg and Holland’s Musselkanaal, it’s particularly valuable in the Cuyahoga Valley because its business opportunities don’t depend on prospects for future industrial expansion.

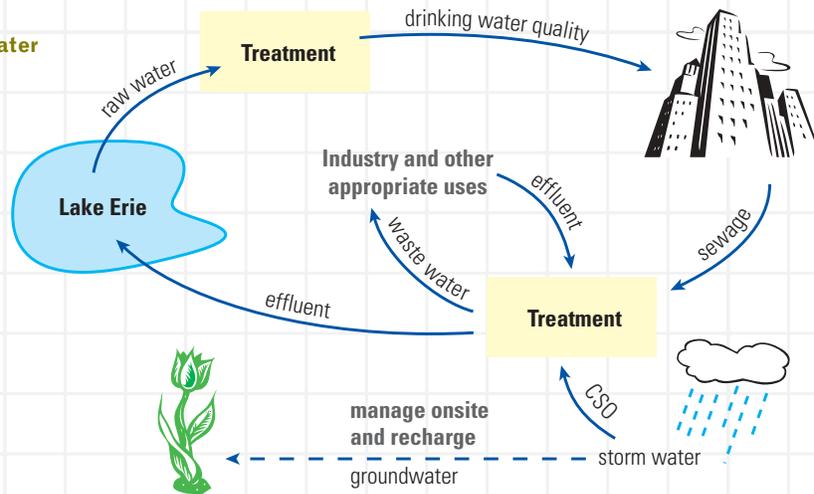


Regenerating the Cuyahoga Valley

Cascading Uses of Water (potential):

Utilities have the option to provide treated wastewater (gray water) to industries and other appropriate uses.

Diagram from "Using Water Wisely,"
Cuyahoga Valley Initiative: A Model for Regeneration



The report focuses quite a bit of attention on the river itself, as well as its related watercourses. Indeed, it suggests that the Cuyahoga River—a former national symbol of pollution—could become a model of restoration as the community helps it and its local tributaries reestablish their natural biological capacity to sustain and repair themselves. Among the prescriptive suggestions are stabilizing banks, adding permeable bulkheads, and establishing vegetation that will treat many urban pollutants and allow the maintenance of navigable waterways while reducing sedimentation. (This technique is so powerful that in Shanghai, Dr. John Todd recently used strips of green plants to turn canals from cesspools into clear, pure water.)

Cleveland is currently investing billions in stormwater infrastructure to reduce pollution releases during storms. But urban landscapes can instead be redesigned to absorb water into the soil where it falls, recharging groundwater and nourishing biological systems. RMI previously showed how to do this in Pittsburgh (*Reevaluating Stormwater: The Nine-Mile Run Model for Restorative Redevelopment*: www.rmi.org/store/pid2174.php to purchase a printed version or www.rmi.org/images/other/W-ReevalStormwater.pdf to download the 11-megabyte report). Now RMI is urging the Cuyahoga community to consider diverting some of its

stormwater investment into decentralized, eco-friendly, and potentially less expensive landscape solutions.

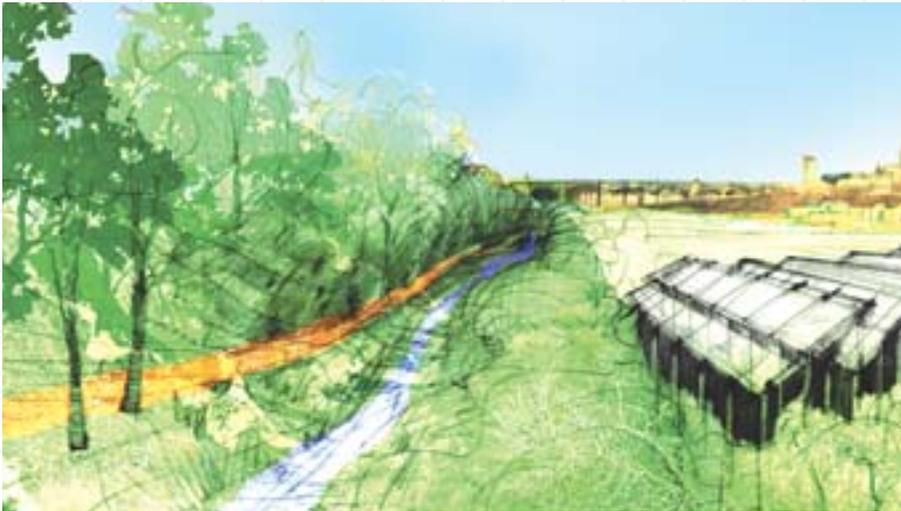
In *A Model for Regeneration*, RMI also recommends developing an energy investment strategy (EIS) that includes a forward-looking mix of energy resources—definitely efficient use, and probably cogeneration, wind, methane-gas capture at landfills, and gasification of industrial, medical, and municipal wastes. This would lower consumer costs and air pollution, create local jobs and more reliable power, and increase the local economic multiplier—all of which would help avoid the next blackout. Locals recall

RMI *in the news*

Help Us Make a Better Website

Www.rmi.org, RMI's 1000+-page website, is one of the Institute's most important outreach tools. On it you can make an on-line donation, take a virtual tour of RMI's headquarters building, purchase books, download free RMI publications, and read this newsletter. In February the website had over 81,000 visitors, averaging roughly 2,800 per day—talk about influence! Now, we're trying to make it better, and we want your input. Recently, RMI Webmaster Bill Simon added a website user survey to the site to get feedback from our users. Your comments will help guide us in reorganizing and restructuring the website and prioritizing its information. The survey asks about general demographics, your computer set-up, and your computer experience. A link to the survey can be found under the "New & Notable" section on the right side of the homepage, or you can go straight to www.rmi.org/sitepages/pid1082.php. Thanks in advance for your kindly taking a few minutes to let us know how we are doing!





One of the possible future scenarios found in *Cuyahoga Valley Initiative: A Model for Regeneration*.

Illustration: Stephen Manka, Urban Design Center

with a groan that last August’s black-out originated near Cleveland.

Cleveland could become an international standard for regenerating industrial brownfields. Demonstrating integrated ways to overcome various environmental and redevelopment challenges—and selling the concepts, services, products, and forms of social and economic organization needed to do so—could provide a sort of professional niche for the Cuyahoga Valley.

To launch and sustain this challenging process will probably require the community to create a lead organization to oversee, coordinate, and drive the process. Among many tasks, the new nonprofit could coordinate overall implementation, prioritize proposed projects, and market the effort to the community. It should be governed by people from a wide array of local interests and with varied skills.

When carried out, many of RMI’s recommendations can be expected to generate real costs that will be easily measured, reported by the press, and understood by the public.

But they will also generate significant and substantial value that’s often less straightforward to measure, but when measured and understood will support “demand pull” for the investments.

Thus, a key recommendation is measuring the value of public and private assets before and after, to illuminate this initiative’s practical effects and their potential value to other communities and other regions. Indicators might include jobs, land values, land assembly (preparing multiple parcels for development), multiplier effects, water quality, public use of new green space, volume of waste recycled, energy intensity, miles of trails built, acres of wetlands restored, miles of streams daylighted, and even picnickers on Sunday afternoons.

Restoration of any city’s industrial areas requires many millions of dollars, normally a significant burden. But in *A Model for Regeneration*, RMI shows that a regenerative, whole-system approach, in addition to restoring the environment, rebuilds value where none seemed evident. By putting waste to work (or designing it out), using resources more efficiently, and transforming many problems into opportunities, a whole-system approach saves money, generates income, increases land values, and creates jobs—thereby paying a significant part of the bill, or, we hope, a good deal more than it costs. We can’t wait to see how things develop.

Michael Kinsley (kinsley@rmi.org) is the cofounder of RMI’s economic renewal program.



Photo courtesy Cuyahoga County Planning Commission

San Francisco Rides New Wave of Energy Planning with RMI's Help

By Jenny Constable

How has California's City-by-the-Bay managed its power after the failed restructuring of the state's electricity industry?

In late 2001, the City of San Francisco was faced with the real possibility that it would soon run out of power if demand continued to grow, and that it would have to rely on old, unreliable, polluting sources to meet existing demand. At the time, the only proposal under consideration was for a new 540-megawatt gas-fired power plant. City leaders were unwilling to be hostage to the power market manipulation that they experienced during the power crisis earlier in the year, and they called RMI to help them chart an alternate course.



"Distributed generation and energy efficiency can be a major, if not the most important, part of a plan that improves reliability, reduces emissions, and provides local jobs."

Ed Smeloff
Assistant general manager
SFPUC

Joel Swisher, Ph.D., team leader of RMI's Energy and Resources Services, explains, "When we started advising the city, its default plan would have left it utterly dependent on one independent owner of generation, building one huge new plant."

San Francisco's energy system has unique challenges. The city is located at the end of a peninsula on the west side of San Francisco Bay. Electricity generated outside the city must be imported via a single transmission corridor up the peninsula. The city's location at the end of a long transmission system helps make it the part of California most vulnerable to power outages, according to a report by the California Energy Commission.

To offset potential problems with the transmission lines, the California Independent System Operator, a state agency that sets reliability criteria, mandates some electrical generation inside the city. Currently, there are two generating facilities: forty-five-year-old Hunters Point and thirty-eight-year-old Potrero Hill.

According to Ed Smeloff, assistant general manager for power policy and planning at the **San Francisco Public Utilities Commission (SFPUC)**, the "generation that's currently in the city is needed but antique. If you had a car like that, you wouldn't recognize it."

RMI *in the news*

RMI's Greener Speaks at Case Western "Net Impact" Meeting



In mid-February, RMI's Commercial & Industrial Services team leader **Catherine Greener** addressed the "Net Impact" chapter at **Case Western Reserve University's Weatherhead School of Management**. She led a discussion on the most serious sustainability issues, about careers in the field, and about how individuals can become "change agents" within organizations.

"Drawing a diverse crowd from Net Impact and the public, Ms. Greener challenged the audience to think differently about... sustainability, to consider whether sustainability means maintaining the status quo or pushing people and organizations to change the traditional business paradigm,"

reported the Net Impact newsletter *Leading Business*. "She also spoke about current trends in sustainability, such as newly developed measurement systems. Finally, she encouraged the participants to become passionate change agents for sustainable practices by emphasizing that every job is a potential career in corporate social responsibility."

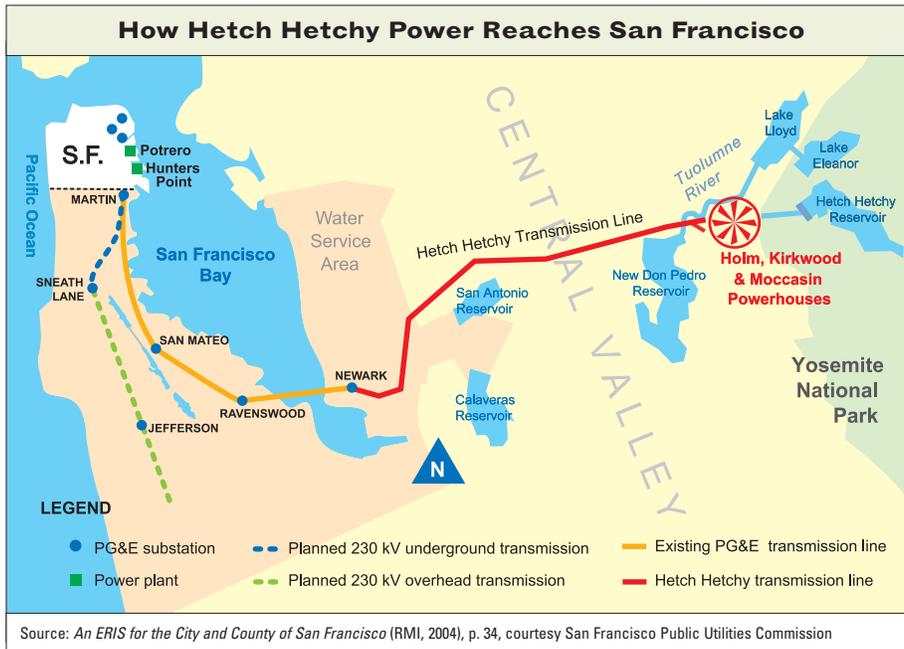
Net Impact, evolved from **Students for Responsible Business**, is a network of up-and-coming business leaders "committed to using the power of business to create a better world." The organization (www.net-impact.org) boasts over 9,000 members and offers many educational and issues-oriented programs.

Energy Resource Investment Strategy (ERIS) goes beyond traditional Integrated Resource Planning (IRP) to reflect lessons learned and to localize the strategy. ERIS is a modern version of IRP with a few twists and some extra whole-system thinking.

California Energy Commission have regulatory authority over San Francisco's electricity system, the city must propose the options it wants, and back them up with compelling analysis, to win support for its plan.

RMI's team worked toward consensus on typically controversial and political issues by incorporating the city's electricity planning goals. These goals came out of a process initiated by the SFPUC and the San Francisco Department of Environment (SFE) in 2001 and 2002. The agencies held a series of neighborhood meetings and established a list of eight goals, which call for the city to maximize energy efficiency, develop renewable power, support environmental justice, and reduce air pollution, among other targets.

The RMI team subsequently produced *An Energy Resource Investment Strategy (ERIS) for the City and County of San Francisco*. This product grew out of the Integrated Resource Planning (IRP) that had been utilities' key tool for meeting demand while minimizing costs



In addition, the Hunters Point plant sits in a low-income, minority community that bears an unequal share of the pollution for San Francisco's electricity generation. A second city goal was to right a long-standing environmental wrong by closing that plant, but how to make that happen was unclear.

"Utilities in California haven't been able to build new power plants since electric industry restructuring took effect," explains Swisher. Independent developers are finding that they can't build coal-fired plants because of the state's emission standards, and it's risky to build a gas plant because of volatile fuel prices.

In addition, power lines are hard to site, especially in cities where most land is developed. The alternatives are energy efficiency, distributed generation, and renewable resources—and that is exactly how the city wanted to proceed.

Since no one had really done it before, the first step was to create a detailed plan to meet San Francisco's increasing demand for electrical services without a large power plant. RMI's first report to the city, completed in early 2002, showed that other options existed. The next phase of RMI's work was to give the city a portfolio of best options and complete data. Since the California Independent System Operator, the California Public Utilities Commission, and the

RMI *in the news*

Former RMite Talks Biomimicry in Paris

In January, former RMI intern (and current biomimicry project associate) **Jeremy Faludi** presented a talk on biomimicry at the **Better World Business Forum** in Paris, convened by the French firm **Utopies**, a consultancy dedicated to encouraging social and environmental responsibility in business. Other speakers included Dr. Michael Braungart, Gunter Pauli, and RMI Board member Ray Anderson. More recently, Jeremy visited Dr. Julian Vincent at the University of Bath (UK) to cement arrangements (pending funding) for a joint project between the University and RMI to develop a biomimetic desiccant dehumidifier.





before restructuring. IRP helped utilities examine how their resources fit together—what would be needed where and when—and find profitable ways to meet their obligations.

“When the wave of restructuring came along, planning became a bad word,” says Swisher. “Some people thought Adam Smith’s invisible hand would take care of it.... There’s a window in time now where people are seeing that restructuring didn’t fulfill its promise, creating both a risk and an opportunity. The risk is that the progress in energy efficiency, distributed generation, and renewables brought by IRP will be lost.

But there’s now an opportunity to get it right—to combine the powerful market forces of procuring generation at the lowest cost while planning for the best portfolio of energy efficiency, distributed generation, and renewable resources.”

ERIS goes beyond traditional IRP to reflect lessons learned and to localize the strategy. It’s a modern version of IRP with a few twists and some extra whole-system thinking.

First, it looks not just at what costs might be, but also the risks if estimates are wrong. ERIS doesn’t assume the status quo, but looks at what the best options would be, for example, if faster economic growth increases

demand beyond expectations. This approach reveals that a different strategy can be profitable in the long run.

“Even if renewable resources are more expensive initially, they bring fewer risks. They act as a physical hedge against risks because their price doesn’t vary with market movements,” says Swisher. “And you can quickly build them as needed, rather than building a big plant and risking being stuck with huge costs if you guessed wrong.”

The energy team also looked for the leverage points within the system that would lead to the largest reductions in investment. ERIS differs from other methods by studying the power grid from the bottom up—from the lights and appliances back to the power plant—not the other way around. It begins with the customers, how they use energy, and how the system delivers electricity to them, then delves into grid costs and generation options. This allows one to ask whether it’s cheaper to save energy or to produce and deliver it. ERIS also looks carefully at *where* investment should be focused, right down to the neighborhood level, to defer or avoid the most investment, especially in the costly distribution system. This approach

RMI *in the news*

Amory Gets [More] Major Coverage

RMI CEO and Cofounder Amory Lovins earned some pretty big press attention this past winter when he was the subject of feature articles in *Harvard Magazine* and the *New York Times*. In the *Harvard Magazine* story, deputy editor and article author Craig Lambert wrote about Amory’s vision for “the Hydrogen Powered Future.” The article is really a feature—a good one, mind you—about Amory *and* hydrogen power, but we’re not complaining, especially since it ran to nearly ten full pages.

Meanwhile in the *Times* story, on the front page of the business section, staff writer Barnaby Feder wrote about Amory’s uncanny way of landing jobs with big oil companies whom he then advises about the demise of their industry. Or, as the 28 February 2004 headline stated: “Iconoclast Gets Consultant Fees to Tell Big Oil It’s Fading Fast”—not bad work if you can get it. Among the article’s reverberations: Amory’s 2,600-word *Wall Street Journal Online* interview, run 25 March, on “Breaking the Crude-Oil Habit Makes Good Business Sense” (see <http://webreprints.djreprints.com/964310632392.html>).



ERIS studies the power grid from the bottom up—from the lights and appliances back to the power plant—not the other way around.

can also result in a more reliable system, since most power failures originate in the distribution grid.

While writing the San Francisco ERIS, RMI also worked with the agencies to write the city's **Electricity Resource Plan**, which became city policy.

Cal Broomhead, energy programs manager for SFE, explains, "It was an iterative process, so earlier versions of the ERIS helped in the development of the plan." The plan lays out a framework for San Francisco's energy policy. The San Francisco ERIS, which was finalized after the plan, provides the data behind the policy.

Broomhead adds, "I have a piece of the ERIS photocopied and taped

on my office wall. It's a table showing year by year how much energy we need to get from which sources. It will show where we're on track, and where we're not making it."

The San Francisco ERIS brought more local challenges to light. Like most of California, the city experiences daily summer peaks in electricity usage in the late afternoon. But it also has daily winter peaks that occur at night. In years with mild summers and colder winters, the winter peaks eclipse the summer peaks. Because of this characteristic, solar power alone can't solve San Francisco's energy problems; energy efficiency is necessary to reduce peak usage.

According to Broomhead, this realization proved important. "The project...

even changed my activities, so I'm now continuing to make programs focus on peak load rather than overall kilowatt-hour savings."

In the short term, the San Francisco ERIS calls for substantial investments in energy efficiency and the installation of four small city-owned combustion turbines as peak capacity generators. This will allow the closure of the Hunters Point plant by 2005 and significantly reduce carbon dioxide, nitrous oxide, and other pollutant emissions within the city. The new peakers will rarely run but will provide needed insurance against blackouts.

RMI *in the news*

Data Center Design Collaborator Wins 2003 R&D 100 Award

Los Alamos Laboratory's **Wu-chun Feng** was the keynote speaker at RMI's **Data Center Charrette** last year. His presentation on the pioneering, low-energy Green Destiny super-computer project applied most of the RMI principles of design and set the perfect tone for the charrette. Last fall, the Green Destiny team (which includes **Michael Warren** and **Eric Weigle**) and their supercomputer won an *R&D* 100 Award in the category of electronics.



"Green Destiny ... [is a] 240-processor cluster that takes up just [half a square meter of floorspace for its cabinet] and requires no cooling," according to *R&D* magazine. "The most power that it draws is only 5.2 kilowatts. It has had no unscheduled failures or downtime due to its less complex building blocks and fewer transistors, which run at lower speeds. Green Destiny boasts up to ten times higher performance/power ratio than other supercomputing platforms."

GD, as it's known by its handlers, is also highly reliable under austere conditions. The computer ran continuously for ten months in an uncooled 85–90° F warehouse hallway—unheard-of in the supercomputer world, where giant chiller systems are the norm. In February 2003, GD was shut down for two months to test new alpha- and beta-release hardware (e.g., upgrading the clock speed of the processors from 0.67 to 1 gigahertz while using no more power). After the upgrade, "GD+" has again run with zero unscheduled downtime.

Much credit goes to **Chris Hipp**, another charrette participant, who when at RLX led the development of blade servers. Although the initial cost for blade servers was about 50–75 percent higher because of their low production volume (ultimately they should cost less because there's less to them), associated costs for cooling and power supply were about ten times lower than usual. The total cost of ownership therefore fell by three- to fourfold. And while GD is more like a Toyota *Corolla* than a Ferrari, says Feng—its peak speed of 160 gigaflops is far slower than the world's fastest supercomputers'—there are many computational problems where the tortoise beats the hare...starting with computations that take longer than the mean time between failures for a superfast but far less reliable system.



San Francisco ERIS

"I have a piece of the ERIS photocopied and taped on my office wall."

Cal Broomhead
Energy programs manager, SFE

Over the medium term, the strategy deals with the lack of diversity in San Francisco's incoming transmission routes with the addition of the proposed Jefferson-Martin line, which will import electricity from further west than existing lines. When it is completed, the additional capacity should allow Potrero Hill to close, further improving air quality.

"One of the most important findings is that over the long term if we want to end fossil-fuel generation in the city, we will need to advance the technology of fuel cells," Smeloff notes.

By 2020, the city hopes to make that a reality. "When they do that, San Francisco becomes a city without central generation," Kitty Wang of RMI's energy team notes. "It will be based on a distributed model, similar to what RMI proposes in *Small Is Profitable*."

The San Francisco ERIS presents scenarios to guide decisions toward the city's goals, including scenarios for the uncertain costs and performance of fuel cell technology. Energy efficiency programs are key to the plan, but it's hard to predict how much energy a program will save because so much of its adoption is dependent on variable factors like human behavior. The San Francisco ERIS accounts for this with scenarios that help city agencies manage discrepancies in the effectiveness of efficiency programs. These contingencies make the ERIS more robust.

Above all, the San Francisco ERIS proves that the city does not need another central power plant to meet its needs. "Distributed generation and energy efficiency can be a major, if not the most important, part of a plan that improves reliability, reduces emissions, and provides local jobs," notes Smeloff.

The RMI energy team's next moves include delivering the ERIS approach to other municipalities and states.

"Our thought is that there's a whole new wave of planning reemerging," says Swisher. "RMI wants to stay ahead of this wave and help utilities meet their customers' service needs in the cleanest, most reliable, and most economical way."

Jenny Constable (jenny@rmi.org) is RMI's Media Director. The RMI team for the San Francisco ERIS project was led by Joel Swisher (jswisher@rmi.org) and included Kitty Wang, Will Clift, Amory Lovins, Odd-Even Bustnes, and Joanie Henderson. Funding for this project was generously provided by the Gordon E. and Betty I. Moore Foundation, the Energy Foundation, the San Francisco Foundation, the New-Land Foundation, an anonymous family foundation, and Watt Stopper, Inc.



RMI *in the news*

Taxing Gasoline for All the Right Reasons

Gasoline taxes in the United States are much lower than in Europe, resulting in cheap fuel and America's high per-capita consumption of it (not to mention high per-capita carbon emissions). One organization that supports RMI is stirring things up by asking Americans to *volunteer* additional "virtual taxes" when they buy fuel.



Members of **Voluntary Gas Tax** (www.gastax.org) sign up and pay a surcharge on each gallon of gas they purchase; the donations are then distributed to socially- and environmentally-active organizations that members have voted for.

The effort was started by Brian Skinner of San Francisco, who reported that he and his friends first conceived of the as-if gas tax while discussing everyday solutions to world problems.

RMI is one of the recipients of Voluntary Gas Tax grants, which is fitting since we, too, are working to get Americans off gasoline and other oil products.

"Of course, this plan will not single-handedly solve our problem of excessive consumption of non-renewable fuel, but it provides additional incentive for subscribers to conserve, it provides money to good environmental organizations, and it is a great educational tool," said Alan Field, a Voluntary Gas Tax member who alerted RMI to the effort. "It gets people thinking, even if they don't choose to subscribe."

Power from the People

DEMAND RESPONSE COMES HOME

By Katherine Wang, PE,
E. Kyle Datta, and
Joel Swisher, Ph.D., PE



The U.S. electric power system is in disarray. As a nation, we have lurched from the Western economic power crisis of 1999–2000 to the Eastern reliability power crisis of 2003. Neither more studies nor more blackouts have changed what's been built—an excessive quantity of large generation plants dependent on relatively few major transmission lines. On current course, financial distress and reliability disasters remain the grid's inevitable destination.

The fastest and cheapest option is using electricity more efficiently, so we needn't make and transmit so much of it to produce hot showers and cold beer. But electricity is usually mispriced, and forty-eight states reward distribution utilities for selling more electricity and penalize them for cutting customers' bills. In 1989, state utility regulators nationwide unanimously voted for reform, but only California and Oregon actually have smart incentives today, California having restored them after its disastrous 2000–01 digression. These incentives work. California's per-capita use of electricity has been

flat for twenty-seven years of generally robust economic growth, while per-capita use grew by half in the other forty-nine states. California now wrings 14 percent more productivity from its electricity—half via efficiency standards that prompted national standards saving 40 billion watts (40 gigawatts) in refrigerator/freezers and 135 gigawatts in air conditioners, versus the 61 gigawatts lost in the blackout.

The second key option is decentralized or “distributed” generation.

Why did the Manhattan skyline show islands of light twinkling in the darkness? Because some local “micro-power” generators were designed to isolate from the collapsing grid and keep serving their local loads. The accompanying article on San Francisco (see p. 8) describes how to integrate distributed generation and efficiency into the utility system.

The third key option is “demand response,” which involves signaling customers when power is scarce, so they can choose convenient ways to trim or defer power use.

New smart meters and gateway systems can make demand response pay in homes and businesses alike. Both load management and efficient use of electricity free up transmission capacity without building new lines. Just a few hundred megawatts of timely, well-placed load management, plus properly working switches, could probably have blocked the 14 August 2003 blackout and saved California ratepayers millions of dollars during 2001.

Such demand response also dampens price spikes when power is scarce, and provides cheap insurance against artificial scarcity. Had California installed more load management, equivalent to 1 percent of its peak load, shrewd investors could simply have shorted the power market (bet on lower prices) in 2000–01 when suppliers were withholding supply to raise prices—then activated their load management, dropped prices, averted shortages, and taken more than \$1 billion from the miscreants.

Moreover, almost all peak power is made by inefficient gas-fired combustion turbines, so shaving just 5 percent of U.S. peak electric load would save 9.5 percent of total U.S. natural gas use—enough to return gas prices to their previous normal range for years. (That'd save customers about \$40 billion a year, plus power-cost reductions estimated by McKinsey & Co. at \$15 billion a year.) And both demand response and efficient use can be fast. Two decades ago, the ten million people served by Southern California Edison Company were cutting its forecasted peak demand by 8.5 percent *every year*. This cost the utility about 1 percent as much as new supply. Today's technologies and delivery methods are far better, which is why RMI worked with **Invensys** plc, the Britain-based energy controls manufacturer (see www.invensys.com) to bring demand response to the most important-but-vexing part of the grid—the home.



Power from the People

A utility can now maintain two-way communication with its customers, as well as its customers' appliances, in real time.

RMI is known for cutting edge ideas. In *Small Is Profitable: The Hidden Benefits of Making Electrical Resources the Right Size*, RMI outlined the 207 hidden economic benefits of a decentralized, distributed, and self-regulating grid devices, which can boost the value of distributed resources and demand response by about five to ten fold (see www.smallisprofitable.org).¹ While this work was named an *Economist* book of the year, ideas alone are not enough—the utility industry must adopt the technology for the country to benefit from the results. RMI's role is making adoption happen.

Next Generation Technology Arrives

For many years, utilities have developed load management programs for the commercial and industrial sectors. More recently, utility interest has focused on the potential of demand response in the residential and small commercial sector. Residential demand for heating and cooling tends to be the major contributor to system peaks.

These sectors are more capable of reducing their loads—by bigger amounts and with more flexibility—

than large commercial customers. This is particularly valuable for utilities, whose residential and small commercial customers drive systems' peaks.

At the same time, as the interest in demand response for the residential and small commercial sectors grew, a few manufacturers have made commensurately impressive strides in metering and load control technologies in the residential and small commercial sectors such that a utility can maintain two-way communication with its customers, as well as its customers' appliances, in real time.

This new load management technology, known individually as **automated demand response systems** (ADRS), represents a breakthrough that solves many of the problems that limited the older generation of load control. The first generation of load control was one-way: during a crisis, the utility would shut off your air conditioning to lower demand, and you sat on the front porch, sweating and drinking lemonade. The second generation was better, utilizing controllable thermostats. However, in one-way systems, the utility doesn't know if you overrode the command to shut down, so it had to shut down many more homes than necessary. ADRS systems control the temperature of the home within the comfort zone that you define, and provide the

utility with real time information on how many kilowatts have been saved, thus just the right number of homes are controlled. Several companies offer this new generation of technology, including large established corporations like **Carrier, Honeywell, and Invensys**, along with new technology companies such as **Converge, Cannon, and Distributed Control Systems**.

Invensys's **GoodWatts** technology—a system whereby homeowners and their utilities can communicate with and remotely control major home appliances via the Internet—combines clear market signals and efficiency to add reliability to local and regional grids, as well as to shave off unnecessary kilowatts for consumers. During the last eighteen months, RMI has been working with Invensys, to define the “distributed benefits”² of GoodWatts, quantify the product's value in the context of the current regulatory environment, and recommend how to get the industry to adopt residential demand response. More recently, the Institute worked with utilities such as PECO Energy in Pennsylvania, Nevada Power, and all three major California utilities to measure the amount of demand reduction that is achievable using GoodWatts through a series of ADRS pilots.

RMI in the news

RMI Alumni Picnic Slated for 20 August



RMI alumni/ae and their families are invited to attend the RMI Alumni Picnic, 20 August 2004, at RMI's Southeast Annex located on the Windstar Land Conservancy (plan on late afternoon/evening). Like last year's event, this will be a casual affair. Please join us for a roast or two and to hear about what fellow RMI alumni/ae are doing these days. RMI's website is currently hosting a page in which attendees can RSVP for the picnic, at www.rmi.org/sitepages/pid636.php. Please log on to let us know what you're doing and if we'll see you in August.

What is GoodWatts?

GoodWatts is a sophisticated home energy management system that employs an “always on” broadband connection to allow utilities and customers to engage in two-way communications to automatically control a customer’s home energy loads in real time. Homeowners can program their thermostats, pool pumps, water heaters, and other devices at home or remotely, around the clock, via any Internet connection (computer, cell phone, etc.). Customers with Goodwatts can also monitor their settings and home usage whenever and wherever they happen to be. The GoodWatts computer database analyzes the energy used by each of the controlled appliances, and stores and graphically presents the data, including reports, on the GoodWatts website.

On those days when the utility system is at peak electricity usage, the utility sends a “critical” signal to the whole-house meter. This signal may be in the form of a simple alarm or an instantaneous electricity price. A wireless network within the house relays the signal to various appliances, which are preprogrammed to respond a certain way (generally to turn down or shut themselves off). The appliances can be programmed to respond on their own, or, as mentioned, the homeowner—if he or she has Internet access—can adjust appliance controls him- or herself. Alternatively, the

home-owner can allow a utility representative to access the appliances remotely to initiate demand control.

For utilities, GoodWatts provides much better data so demand can be more accurately forecasted. More importantly, GoodWatts also lets the utility monitor customer usage in real time and *directly control demand* by turning off pool pumps and raising and lowering thermostat set points, thereby reducing power supply costs and the risk of rolling blackouts.

“The GoodWatts system is setting a new standard in residential energy management,” said Frank Jiruska, PECO vice president of customer and marketing services. “PECO has been impressed with the GoodWatts system’s ability to provide verifiable energy consumption data and real time availability of synchronized capacity. This information is critical when trying to manage peak demand, but unfortunately has not been available to utilities with traditional demand-side management programs.”

The ability to program appliances remotely is particularly important when electric rates vary. In the California ADRS pilot to be initiated this summer, for example, GoodWatts will allow homeowners to turn down equipment in response to pricing signals sent by the utility. The equipment can be programmed so that the higher the price, the more it will turn down—and even be turned off altogether.

The equipment can be programmed so that the higher the price of electricity, the more it will turn down—and even be turned off altogether.



RMI’s evaluation concluded that a demand response program employing GoodWatts is an effective strategy, with an almost 3 kilowatt reduction per home. It’s profitable too. The net cost, including incentives to the customer, ranges from \$12 to \$21 per kilowatt-year—one third to one half the cost of building a new combustion turbine. RMI’s current work with the California utilities’ pilots will look at the additional load reduction realized in demand response using GoodWatts relative to a similar pricing program without GoodWatts technology.

“Invensys is extremely pleased to be associated with RMI as we go to market with the GoodWatts program,” said Geoff Williamson, vice president of business development for Invensys. “The support by RMI for our unique approach to this market has been a key element in gaining the attention of investor-owned utilities, energy retailers, and various federal and state agencies and regulators. We are looking forward to working alongside RMI as we expand the programs with PECO, Nevada Power, and the Californian ADRS program.”

For more information, see www.invensysnetworks.com.

Katherine Wang, PE, Kyle Datta, and Joel Swisher, Ph.D., PE are energy experts with RMI’s Energy & Resources Services team.

¹ Lovins, A.B., Datta E.K., Feiler T., Rabago K.R., Swisher J.N., Lehmann A., Wicker K. 2002 *Small Is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size.* See www.smallisprofitable.org.

² **Distributed benefits** are the multiple economic advantages of small, modular, locally-suited energy supply and demand-side resources, which are described in detail in *Small Is Profitable*.

Green Development in the Desert

By Will Clift

Las Vegas is world-renowned as a city of fantasy, flaunting its reputation for excess—a green oasis of refrigerated plenty in the midst of a blazing desert. But dig a little deeper, and a harsh reality becomes evident: this is not an oasis, but rather a region that is exceeding its human carrying capacity. This is evidenced by the city's congested traffic, severe water shortages, expensive power, and dwindling amounts of developable land.

And yet, people keep coming. The real estate market is staggering; Las Vegas has consistently been ranked as one of the fastest-growing cities in the country for much of the last decade. Certain recently-completed developments have nearly sold out before a single house was finished. Area officials are now faced with two challenges. The first is how to reduce



the rate at which Las Vegas consumes resources. The second is to create a model for development that allows the city to continue to grow, without increasing its burden on the area's resources.

Planners in the city's **Comprehensive Planning Department** are hoping to create this model in the Kyle Canyon Gateway development project, a 1,600-acre parcel of BLM land, seventeen miles northeast of downtown and the Strip, which will be auctioned to developers later this year. The city plans to place restrictions on its sale that will require the developers to address issues of sustainability. Multiple stakeholders, from developers to the Sierra Club, applauded this innova-

tive approach. If the effort is successful, the city hopes to apply similar restrictions to all future developments.

Last November, RMI was asked to hold a *charrette*¹ to inform the city about what sustainable development in Las Vegas would look like, and how to make it achievable within the economics of the real estate market. In this project, RMI saw a potentially unique opportunity to address the thorny challenges faced in the Southwest.

“Addressing imminent growth in resource-overburdened regions is a real challenge for GDS,” says Green Development Services team leader Alexis Karolidis AIA, who led the charrette. “Is it possible to develop

RMI *in the news*

RMI Senior Fellow Named DARPA “Outstanding Investigator”

This spring, at the annual **Defense Advanced Research Projects Agency (DARPA)** Systems and Technology Symposium in Anaheim, RMI Senior Fellow **Eric Rasmussen**, MD, MDM, FACP, received DARPA's Award for Sustained Excellence (a.k.a. “Outstanding Investigator”) for his “exceptional vision, innovation, and perseverance that have resulted in several successful DARPA programs.”



The awards, which have been presented at DARPA's S&T Symposiums since 1985, are designed to recognize outstanding performance by individuals supporting DARPA programs.

“Commander Rasmussen's assigned job for the Navy is practicing internal medicine,” said DARPA Director Tony Tether. “He works on DARPA activities on his off-time.... Commander Rasmussen is an exceptional officer and his dedication and leadership have been in the highest DARPA tradition.”

Eric noted that “the best part was a nice ovation from people I admire, followed quickly by a lot of interest in supporting Strong Angel II this summer.” Operation Strong Angel—conceived and led by Eric—was a 2000 civil-military effort in Hawai'i to raise awareness and preparedness between various military and humanitarian agencies. This summer he will extend it with a new effort called Strong Angel II: Designing the Edge.

in a whole-system way that has an overwhelmingly positive, even a restorative, effect on the region? Could we create a community plan that not only avoided exacerbating the standard sprawl-and-waste pattern of development, but could instigate restorative retrofits (addressing such issues as water and energy efficiency, xeriscaped landscaping, waste reduction, etc.) *throughout the greater community* and start to heal the city's overall development pattern?"

Overburdened Natural Resources

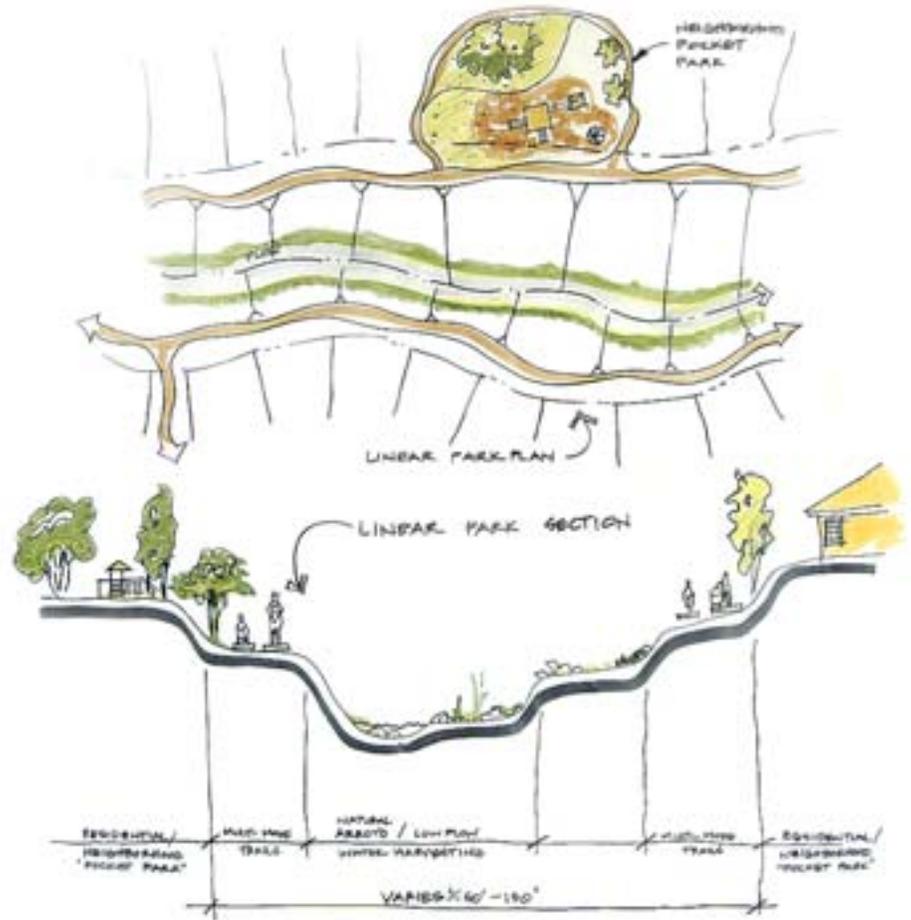
Whether one arrives in Las Vegas by plane or by car, one is struck by a stark contrast between the lushness of the city and the dryness of the desert that stretches in all directions. While this contrast creates part of Las Vegas's allure, it also reveals the artificiality of its seeming abundance of life-sustaining resources.

Las Vegas has one of the highest per-capita rates of water consumption in the nation, at over 240 gallons per day. Last year the city's water supply, Lake Mead (itself artificial, created by Hoover Dam), dropped to its lowest level in more than three decades. Though appearances might suggest otherwise, the resort casinos are not the worst water wasters. Rather, the main culprits are private residences, which frequently have water-intensive amenities such as turf lawns and swimming pools.

Nevada's energy demand has greatly exceeded its production for many years, forcing it to purchase electricity from outside the state. Nevada's electricity users now often pay premium prices, especially during afternoon hours when the state is consuming electricity at the highest rates and

every air-conditioner is on, creating an infamously sharp "needle peak." The inherent cost of that loadshape, plus exposure to the volatile power market during the California power crisis, recently forced the local utility, Nevada Power, to the edge of bankruptcy.

Developable parcels of land are in short supply in the Las Vegas area, as the suburbs have begun to run into the mountains, protected land, and other undevelopable areas. The Kyle Canyon Gateway development, for instance, is nestled between the Red Rock Canyon National Conservation Area, Floyd Lamb State Park, and the Paiute Indian Reservation. The limits to growth are readily apparent.



Above: the preservation of a natural watercourse so it can do both its job and serve as a community amenity.

RMI's Whole-System Approach

RMI brought a multi-disciplinary team to Las Vegas, including experts in energy, water, transportation, green buildings, and urban and landscape design, explicitly to look across boundaries. Nearly seventy participants from the Las Vegas area joined them, including utility representatives, real estate agents, developers, and city officials. During the charrette, discussion cycled between specific topics and general ideas, as well as the connections between them.

Green Development in the Desert

Development with Minimal Resource Consumption

The immediate goal of a green development approach was to identify design methodologies that would allow growth (buildings and people) without increasing resource consumption. Because new development necessarily consumes resources, the development must either create enough of its own resources to cover the increase, or offset it with savings nearby. The participants applied this concept differently for different resources.

Energy: By installing renewable energy and distributed generation systems within Kyle Canyon Gateway, as much electricity can be generated as the development consumes over the course of a year. This would result in net-zero electricity consumption. In particular, charrette participants discussed the installation of a large solar photovoltaic (PV) array on a berm along a depressed arterial roadway.

Such a PV system would have the advantage of generating the most power during the mid- to late-afternoon hours (the shoulder peak) when the area must import the most power.

Charrette participants also discussed energy efficiency opportunities, which are generally the least expensive way to reduce power imports and approach net-zero electricity consumption. Careful building design and the installation of energy efficient appliances such as washers, dryers, air conditioners, and light fixtures can cut peak electric loads and annual usage by upwards of 80 percent, as compared to a typical utility-certified “energy-efficient” house design. These savings can result in a win-win situation for both the utility and the customer. As RMI’s Amory Lovins testified to the Public Service Commission of Nevada in 1985, such improvements could cut customer energy bills in half, at no extra construction cost, while saving the utility over \$10,000 in capacity investments.



Water: Rather than focus on ways to offset new water consumption by reducing it elsewhere, charrette participants looked at ways to minimize water use in the development in the first place. The discussion spelled out practical ways to reduce the amount of water drawn from Lake Mead to a remarkable fifty gallons per person, per day—a nearly 80 percent reduction from the Las Vegas area average. Proven opportunities included capturing and using stormwater, allowing only native and drought-resistant plants in landscaping, and installing a dual-distribution water system. This system, akin to the fresh/brackish system already used in Salt Lake

RMI *in the news*

RMI’s Koomey Selected Aldo Leopold Leadership Fellow for 2004

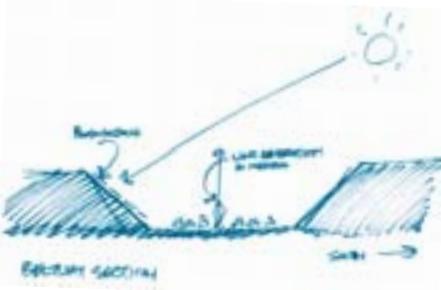


RMI Senior Fellow **Jon Koomey**, Ph.D., has been selected as Aldo Leopold Leadership Fellow for 2004; he is one of only twenty “outstanding academic environmental scientists from throughout the United States” to receive the honor. He is also currently serving as Stanford’s MAP-Ming Professor of Environmental Science—a visiting chair occupied last year by RMI’s Energy team leader, **Joel Swisher**, Ph.D., PE.

The Leopold Fellowships provide scientists with intensive communications and leadership training to help them communicate scientific information effectively to non-scientific audiences, especially policy makers, the media, business leaders, and the public. The fellows are selected through a competitive application process and they must have outstanding scientific qualifications, demonstrated leadership ability, and a strong interest in communicating science beyond traditional academic audiences (see Jon’s article “Debunking an Urban Legend” in *RMI Solutions*, spring 2003).

“Jon brings to the Fellowship Network important expertise in energy, energy-use forecasting, and the economics of options for reducing greenhouse gases,” said Cynthia Robinson, executive director of the Aldo Leopold Leadership Program. “These are critical issues that policy makers and the public need to understand in order to make decisions that solve energy challenges and climate change issues in a sustainable way.”

For more information, see www.leopoldleadership.org.



City which has two separate sets of piping, one for fresh water and one for recycled. All water for indoor use comes from the fresh water pipe. After it has been used in sinks, showers, washing machines and the like, it is cleaned in a nearby recycling plant and put into the second set of pipes. This recycled water is for the development's outdoor requirements, such as landscaping. This makes nearly 100 gallons per person per day available while drawing only fifty from Lake Mead. Another significant component of the reduction stems from the wide availability of water-efficient but high-performance plumbing fixtures, whose spread was in part catalyzed by RMI's 1980s publication of two influential industry-wide catalogues showcasing then little-known water-saving technologies that were becoming available.

Land: Building on any open land is ultimately an unsustainable practice, but good design can mitigate its negative effects. Views and access to nearby mountains and protected areas can be preserved by limiting building height and placement, maintaining open space within the development, and including an extensive network of trails to maintain links between surrounding areas. Additionally, by maintaining natural contours instead of leveling and filling them, natural water channels and animal pathways can be preserved, along with the distinctive character of the original landscape.

Creating Connections

During the charrette, RMI's multidisciplinary approach revealed several ways that a single element of green design could multiply value in ways often overlooked by traditional slice-and-dice design and budgeting processes. For example, every gallon of water saved is a gallon that does not need to be pumped 2,000 vertical feet and several miles from Lake Mead. This, in turn, will save significant pumping energy, whose value could offset the cost of efficient equipment or dual distribution systems.

Another example of compounding benefits arises by integrating transportation infrastructure from the start. By mixing residences with commercial buildings, developing a public transportation system, and building trails designated for alternative transportation (like bicycles and small electric vehicles), Kyle Canyon Gateway can realize diverse benefits. Fewer trips by car will mean less air pollution and less money spent on gas, as well as safer streets for pedestrians. Giving residents an opportunity to run errands and hold jobs locally will reduce traffic congestion there and in downtown Las Vegas, retain more money within Kyle Canyon Gateway's neighborhoods, and encourage interaction between residents, strengthening the development's sense of community.



What's Next

While RMI's work with Las Vegas and the Kyle Canyon Gateway development might seem a minor highlight in a long saga that mixes public- and private-sector interests, the underlying implications are much greater. Settlements in the desert Southwest are growing at an astounding rate. During 1990–2000, Nevada, at 66 percent, was the fastest-growing state in the nation, adding nearly a million people to the already heavily burdened desert. More citizens demand more housing, more roads, more energy, and more food—more than the overburdened environment and the aging infrastructure can provide.

Moreover, the western part of North America, from British Columbia to Chihuahua, has been experiencing a major seven-year drought that shows no sign of abating. The conflict between growth and preserving the natural environment has reached a critical juncture. How our society—the government, public and private firms, NGOs, and academic institutions—designs and governs growth in arid regions is of vital importance.

RMI's role is to define whole-system solutions that can cost-effectively reduce the impact of new growth to the level where it is sustainable—and then go beyond this to understand how we can restore our damaged environment. The public-private-NGO collaboration around Kyle Canyon Gateway may, we hope, become part of that emerging blueprint.

Will Clift (wclift@rmi.org) is an associate with RMI's Research & Consulting group.

¹ **Charrette:** an intensive, interdisciplinary workshop that brings together stakeholders and experts at the very outset of a design or problem-solving process.

The Pattern that Connects



Marty Pickett,
Executive
Director

In the summer 2002 issue of *RMI Solutions*, we solicited feedback from readers about newsletter content. Overwhelmingly, readers wanted to see articles about energy and green building design, in that order.

That's fine, and we certainly aren't going to stop reporting on those topics, but one of our goals with this publication is to broaden coverage to include other areas of RMI's work—notably our consulting efforts aimed at bringing natural capitalism to corporate and public partners.

Unfortunately, sometimes we aren't able to report specific outcomes of consulting projects, at least at the time, for obvious

proprietary reasons. But for this issue of *RMI Solutions*, Managing Director of Research & Consulting **Kyle Datta** made a special effort to gain approvals from a variety of recent clients so that we could print their diverse stories. As Kyle notes on the cover, and as CEO **Amory Lovins** has been saying for years, our consulting work with private-sector clients is extremely important because businesses have the resources (human and financial) and motivation to focus and hasten social change. Business can be at least as much a part of any solution as it is of any problem, and we want to help leading firms that are committed to making that key shift.

Just think of the advances made by those people at the cutting edge of technological innovation and how their ideas, for better or worse, spawned some of the greatest enterprises ever known and pro-

duced fundamental societal change. From the light bulb to the telephone to the microchip to the electric motor, the combination of technology and business has driven dramatic social shifts.

But in these pages you'll also read about our public sector consulting work that is just as important. How cities regulate growth can affect building-materials firms, construction workers, developers, and the quality of life of communities and whole regions; how electricity portfolios are crafted can affect manufacturers of renewable energy systems, coal miners, and customers; and how communities deal with brownfields can affect local industries, tourists, and residents.

In this issue, you'll find a well-rounded view of our on-the-ground consulting work—and even more, I hope their tapestry will reveal what anthropologist Gregory Bateson called “the pattern that connects.”

Editor's Notes

Practicing What We Preach



Cam Burns,
Editor

I recently helped prepare an application for a sustainability prize, and one of its questions asked us to describe our in-house efforts to be sustainable. We brainstormed for a few hours and came up with twenty-nine diverse things that RMI does to live more lightly on the earth, save money, and make life better.

You already know about RMI's headquarters building and you might've noticed that our publications favor recycled papers and non-toxic inks and glues. You may know that we're stewarding and restoring nearly a thousand acres, where four-fifths of our employees

work. But there's a lot more going on here, and I thought I'd outline a few of the Institute's lesser-known activities.

For example, we buy 93–94 percent of the electricity we don't generate ourselves from certified-green suppliers who build windfarms in northeastern Colorado.

Obviously, nearly all our information is exchanged electronically, but we also pre-tape speeches, videoconference all over the world, and loan our meeting space and videoconferencing services to other community members (like local political groups). We offer flextime and work-at-home arrangements, and we provide onsite housing for nearly half our staff and their families. When possible, we choose green venues for offsite events.

The Institute encourages staff participation in local volunteer fire/ambulance/mountain-rescue services, and we allocate up to eight paid hours per month per employee for community service.

RMI is also in the process of completing a carbon budget and joining the Chicago Climate Exchange as an associate member to offset the Institute's carbon dioxide emissions. If appropriate, we may also re-partner with “Trees for the Future,” which devotes mileage-based fees to planting trees (offsetting carbon emissions from our travels).

And even though some Old-Snowmass-based RMItes lament a lack of mass transit, the Institute supplies employees with fully-stocked kitchens to reduce trips to town. So, although we don't succeed at everything we try, I'm pleased to report we're doing what we can.

Bill Simon, RMI Communications Department



A lot of folks who end up on staff at Rocky Mountain Institute don't get here as a result of a linear comparison between an advertised job

description and a résumé. Rather, many people end up here because philosophically, artistically, and spiritually, they belong here.

Case in point: Bill Simon, RMI's resident webmaster, multimedia coordinator, and indispensable member of the Communications Department. Long before Bill even thought about a move to Colorado, he was deeply involved with a broad range of public-interest organizations, environmental groups, and activist projects. While volunteering, he began wondering if there was a way to combine his concern for the earth and his design skills into one satisfying career. A short time later, in 1999, he interviewed at RMI, got hired, and learned that satisfying careers do exist.

As webmaster, the importance of Bill's work cannot be understated—he has the biggest audience of any single person on the staff, and the material he posts at www.rmi.org is read by close to a mil-

lion people a year. Today, www.rmi.org weaves together more than a thousand pages and receives, on average, around 2,500 visitors a day. Its vast depths hold the kinds of information you'd expect, from energy efficiency principles to business consulting stories—as well as a lot of fun, interesting, and compelling surprises, like stories by sustainability experts on e-commerce (www.rmi.org/sitepages/pid644.php), a virtual tour of RMI's headquarters building (www.rmi.org/sitepages/pid624.php), and an extensive online library (www.rmi.org/sitepages/pid99.php). Managing this diverse and ever-shifting melange, maintaining it, and making its content digestible is Bill's job, and he's so good at it that both he and the website itself have received wide recognition.

RMI's website was featured in the 2003 book *Designing Usable Web Interfaces*, which touted www.rmi.org as a good example of a graphically effective, user-friendly interface. "The content is made accessible through an unassuming, simple, and consistent interface," said the author, Ameeta Jadav. "Each page is clearly labeled and provides navigational cues that could help a visitor move around the site without feeling

"In my position, I get to add a level of creativity to RMI's work."

lost. I am especially impressed by the fact that most of the navigation and interface on the site is through text." This text-focused linkage is not accidental: many of the site's guests come from remote areas, often in developing countries, where their bandwidth is limited to a slow dialup, so fancy graphics mean long wait times which might discourage those who most need our information.

One of Bill's first tasks when he joined RMI was to create a website dedicated to promoting what was then the organization's most recent publication, *Natural Capitalism*. The book is still promoted through www.natcap.org, Bill's creation, and is one of RMI's best-selling publications to date, with more than 100,000 print copies sold in English (plus numerous translations). Currently, three other RMI affiliated websites fall under Bill's watch as well: www.nepinitiative.org, www.smallisprofitable.org, and the recently launched www.finder.rmi.org, all of which are hosted by **SolarHost**, a solar-powered web-hosting company.

In addition to his talents with the web, Bill has become the unofficial RMI cameraman, shooting and editing video productions for the organization, and documenting through photographs such RMI events as development dinners, research meetings, and speaking engagements. His photos (and hand-drawn illustrations) have graced RMI publications such as newsletters and annual reports, been published in local newspapers like the *Aspen Times*—and, of course, been posted on the website.

Bill first learned about RMI when he read an article on the Hypercar® concept in a design periodical. Shortly thereafter,

Simon says: The World's Largest Chap Stick



Source: A.B. Lovins, "U.S. Energy Security Facts" (RMI, 2003), p. 17, www.rmi.org/sitepages/pid533.php, artist: Bill Simon

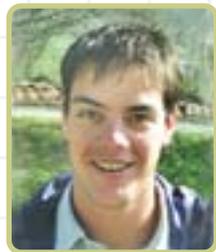
CONTINUED ON P. 30

What Are You Doing?

Editor's note: In this issue of RMI Solutions, we feature the work of our interns.

Tomakin Archambault

As the current Green Development Services Intern, I have been able to work



on a variety of interesting projects. My primary work—with GDS team leader Alexis Karolides, AIA—is a report for the United Nations

Environment Programme on the environmental impacts of housing. The report is global in scope and will outline a plan for decoupling the adequate provision of housing from environmental and social degradation. I have also provided research assistance for the GDS team on such topics as waterfront development for the Cuyahoga project (see p. 5), researched information for several project proposals, updated the department's resource list, and researched HVAC components for data centers. I recently participated in a GDS charrette in New York to develop a prototype for green golf courses.

Nate Glasgow

I'm currently assisting with the *Winning the Oil End Game* project, for which



I'm helping create stock-and-flow models for U.S. vehicle fleets. I am also working on a scrappage-resource supply curve for cars and light

trucks that compares the *Blue Book* value with the estimated end-of-life gallons to be used by each vehicle. This supply curve offers useful insights into which vehicles, if prematurely scrapped, could save the largest amount of oil at the least cost.

Sarah Goorskey

When I started my internship in October 2003, I was involved in the Hawai'i Energy Forum.



This project pinpointed ways to reduce Hawai'i's energy demand by more efficient use. I have also been involved

in some conferences put on by RMI on the Big Island. My main task now is updating RMI's "Home Energy Briefs," which are ten years old. This involves tracking down the latest information on ways to save household energy and resources. Additionally, over the past few months I have been doing some number-crunching for RMI's project with Anglo American (see p. 3). Part of that work involved analyzing the technical and financial aspects of constructing a field of solar parabolic troughs in South Africa.

Lena Hansen

I'm currently working on two energy-related projects. The first involves



electric utility Integrated Resource Planning (IRP—see p. 8), the process by which utilities' strategic planners evaluate renew-

able energy and demand side-management programs alongside traditional fossil-fuel-based resources. We're helping one utility revise an existing IRP and another create a model IRP framework. The other main project I'm helping out on is creating an energy technology

strategy for Anglo American (see p. 3), the world's second-largest mining company. By applying the principles of natural capitalism, Anglo has the potential to significantly reduce its energy consumption and improve its performance.

Anna Jaffe

My time at RMI has been devoted to two projects. During the first week and



a half I updated information about the foundations that have supported RMI over the past ten years and then created a table that can

be sorted by foundation name, grant deadline, and relevance to ten primary RMI initiatives. I then compiled all the content cut from the published version of *Natural Capitalism* in late stages of the editing process to reduce its length. My part of the project, "stage one," resulted in the creation of PDF files linked to the body of the original text that, once edited, will be posted at www.natcap.org. In the future, new case studies and examples that have matured since publication of the book in 1999 will be added, along with analyses of how the studies highlighted in *Natural Capitalism* have evolved over the past five years.

Contact

RMI offers three-month to one-year internships, depending on the needs of the project and the funding available.

For more information, please visit www.rmi.org/sitepages/pid164.php

Morley McBride

As the Public Information Intern for the past nine months, I've spent much of my time responding to inquiries from the public via phone, email, and snail-mail. These inquiries run the gamut from individuals asking how they can retrofit their home or business to be more energy-efficient to researchers looking for specific statistics about hydrogen and fuel cells. Manning the outreach desk is a fun job—I feel at times like Google incarnate—and searching through RMI publications and outside resources to get the information people are looking for makes continuous learning a big part of my job. I am also involved in writing and distributing press releases, project updates, and other announcements to RMI's Ambassadors List, an extensive list of people interested in RMI's work. In addition, I research and write "Advanced Automotive News," a biweekly posting on RMI's website (www.rmi.org/sitepages/pid388.php) that highlights progress towards a less polluting, more fuel-efficient vehicle fleet.



Bailey McCallum

As part of RMI's Development Department, I've been learning about how RMI keeps the wheels turning. Non-profit organizations have a tendency to fall short of their goals because of a lack of financial know-how. RMI, however, is known for combining business savvy with its mission-driven approach to create a big impact.



I have been learning from RMI's past successes and researching ways to be even more efficient by promoting internet-based philanthropy. Receiving contributions online, sending paper-free newsletters, and more would allow RMI to save both natural and human resources, funnel more of each donation into project work rather than overhead, and free up time for Development Department staff members to have more personal contact with supporters. The logistics of fundraising force this transition to carry certain risks, though. For instance, email is more easily overlooked than paper mail, paper newsletters have more impact than a link in an email, and email addresses change far more often than street addresses. We hope to overcome these challenges by allowing each supporter to select preferences between email and snail-mail for newsletters, appeals, and other mailings. Not only will we save resources; we will also personalize contact with our supporters.

Andy Smith

During my internship at Rocky Mountain Institute, I was able both to enjoy the pristine environment of Old Snowmass and to work with and learn from some of the most hard-working efficiency experts on Earth. The first thing I worked on was The Community Energy Opportunity Finder. I helped design and create the website (www.finder.rmi.org) and wrote much of its energy efficiency



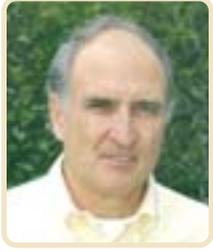
text. I then worked on a variety of consulting projects with the Commercial & Industrial Services team, investigating energy efficiency and renewable energy opportunities for clients in numerous industries. I performed the initial research, calculated benefits of opportunities found, helped write final reports, and even got to attend one of RMI's famous Innovation Workshops. I've had a remarkable time working at RMI and it has solidified a personal and professional path that I will undoubtedly pursue for the rest of my life.

Ramola Yardi

I approached RMI for a six- to twelve-month volunteer internship so I could learn more about whole-system thinking, economic development, and the application of natural capitalism. For the past two months I have provided general research support to the Commercial & Industrial Services team, mainly contributing support, ideas, and research for the Cuyahoga River Valley Initiative (CVI, p. 5). The CVI aims to revitalize an aging and ugly (though promising) industrial area in Cleveland using an integrated approach. It involves interlinked initiatives in green development, energy, water, and industrial symbiosis. Over the next few months I will be working to refine the process, ideas, and knowledge gained from the CVI into a specific RMI product: "Urban Natural Capitalism." The project will involve a wide range of RMI staff members and their networks, and it promises to be fascinating—to say the least. In all, this internship helped me turn my career in a greener direction; hopefully I have contributed to the work of the Institute in the process.



David Orr



When RMI CEO Amory Lovins bids many of his colleagues in the sustainability community good night, he admonishes them to “sleep

fast.” That’s because the way Amory sees it, fixing the world’s problems should not take a back seat to a good night’s slumber.

If there’s one guy who has probably been living this credo for the past three decades, it’s David Orr, a newcomer to RMI’s Board of Directors. David is, arguably, one of the most motivated and productive individuals to ever be involved with the Institute, and his résumé is commensurately jammed with publications, accolades, and civic duties.

Take, for example, his astonishing tally of published articles and books. Books he’s authored, coauthored, and edited include *The Last Refuge: The Corruption of Patriotism in an Age of Terror*; *The Nature of Design: Ecology, Culture, and Human Intention*; *Earth in Mind: Essays on Education, Environment, and the Human Prospect*; *Ecological Literacy and the Transition to a Postmodern World*; *The Campus and Environmental Responsibility*; and *The Global Predicament: Ecological Perspectives on World Order*—to name a few.

His articles have appeared in *Conservation Biology*, *Harvard Design Magazine*, the *Ecologist*, *Orion Afield*, *Sierra*, *Resurgence*, *Harvard Educational Review*, the *Annals of Earth*, *Whole Earth Review*, the *Arkansas Gazette*, *Bioscience*, *Forum*, *Futurist*, *Human Ecology*—again, to name a few.

“What’s most rewarding [is] seeing these great kids go off and do really remarkable things at very young ages. It’s really exciting.”

David’s list of guest lectures and professional appointments reads like a high-school senior’s directory to world universities. He has made presentations at well over a hundred institutes of higher education, from Carnegie-Mellon University to Pacific Lutheran University, from the Agricultural University of Norway to Schumacher College in England. In fact, there are few schools in the northeastern United States where he has not lectured or been a visiting scholar of some kind.

He has presented material to dozens of sustainability associations, conferences, and departments of environmental protection and regulation; and he has been involved with a huge range of organizations that wouldn’t normally qualify someone as a card-carrying member of the “green mafia,” like the Library of Congress, the Jewish Theological Seminary, and NASA. And over the years he has sat on the boards, advisory committees, and editorial boards of nineteen organizations, including the Educational Foundation of America, the Compton Foundation, the Luce Foundation, the Aldo Leopold Foundation, Second Nature, Warren Wilson College, the Center for Respect of Life and Environment, the Center for Ecoliteracy, the Pew Scholars Program Advisory Committee, the Jessie Smith Noyes Foundation, the Annenberg Foundation, Environmental Practice, EcoCity Cleveland, and Urban Ecology—yet again, to name just a few.

So what keeps this guy ticking?

“This isn’t work to me,” he said recently. “I get to hang out with all these wonderful, remarkable people and travel the world and work on solving problems with them.”

The key to his successful life as a disseminator of environmental awareness and ecological stewardship started with his upbringing in New Wilmington, a small town in western Pennsylvania where his father was president of Westminster College. The Orrs had a cabin in the woods, on the edge of the Allegheny National Forest, and much family free time was spent there, considering nature and the human role within it.

David earned a BA at Westminster College in 1965, and when he started an MA at Michigan State University in the mid-1960s, his life was further propelled toward a career in environmental matters by the influence of two leading luminaries on campus: **Ian McHarg** (1920–2001), the famous Scottish landscape architect and environmentalist, and **Loren Eiseley** (1907–1977), the literary naturalist.

“I began to realize these things about nature that I had felt as a kid were being described by these writers,” David said. “It had a strong influence on me.”

David completed a Ph.D. in international relations at the University of Pennsylvania in 1973. Even before earning his doctorate, he began teaching various courses on politics and environmental issues, and he began earning a reputation. He was a remarkably early follower of energy and energy issues, so it was no surprise that in 1974 he was asked to take part in the Limits to Growth forum in Houston where he met another young energy thinker, Amory Lovins.

In 1976, David, Amory, and several others then put together a briefing paper for the Carter Administration on energy policies, which became known as the **Wolfcreek Statement**—although David

CONTINUED ON P. 31

"We like what you folks do."

R.E.M.

Rocky Mountain Institute draws its support from a vast range of individuals and organizations, including a handful of celebrities. One of the really great acts that supports the Institute's work is REM, the influential rock band from Athens, Georgia.

REM has been contributing to RMI for over six years. According to **Bertis Downs**, general counsel to REM, musicians **Peter Buck**, **Michael Stipe**, and **Mike Mills** like RMI's approach to problem solving—that is, by going after the root causes of the problems—so much that they became Institute supporters in 1997.

"We like what you folks do," Downs said. "We support organizations that both react to problems and organizations that help shape policy. As long as it's all good work."

That REM supports organizations like RMI is not particularly surprising as the band has a long history with social, environmental, and political issues. In the late 1980s, REM started inviting various organizations—like Greenpeace and Amnesty International—to operate booths at REM concerts. Those issues-oriented organizations weren't the only ones benefiting from the band's social awareness; as often as it could, REM's management team would invite small, local organizations to share entry-hall space with the big national and global groups.

REM band members have been involved in important issues in other ways, too. In 2002, Buck, Stipe, and Mills (**Bill Berry** retired from the band in 1997) spearheaded a recycled paper campaign in which they encouraged consumers to switch to recycled paper. The campaign came about when the three members of REM learned about southern logging, which, according to the magazine *Hooked on the Outdoors*, consumes an estimated five million acres of Southern forests (for paper-making) each year.

"Growing up in the South, one tends to have a very strong connection to what we call the 'woods' or the 'forests,'" Mills, the bass guitarist, was quoted as saying. "And the potential loss of that makes me very nervous."

Members of REM became aware of RMI CEO Amory Lovins's work in the early 1990s. In the spring of 1993, Laurie Fowler, a professor specializing in environmental law and ecology at the University of Georgia Law School, who was familiar with Amory's writing and work, asked band members to cosponsor a visit and lecture by Amory. The other cosponsors were the

University of Georgia Law School, the Institute of Ecology, the College of Agriculture, and the School of Environmental Design.

Amory delivered a speech entitled "How Not to Parachute More Cats: Sustainable Environmental and Economic Solutions."

In 1997, the band signed on as a regular contributor to RMI, and its first gift was specified for community economic renewal work. In 1998, REM's donation was designated for filming an economic renewal seminar. In 2001, the band supported RMI's work spreading natural capitalism through Brazil. Other gifts over the years have been for general support.

Perhaps the best donation the staff and band members of REM have yet given RMI is the gift of music. Last fall, when REM toured the country to promote the band's latest CD, *In Time: The Best of REM*, Downs decided to offer RMI staff members free tickets to one of the band's concerts at Red Rocks, near Denver—yet another benefit of working at RMI. Then, last winter, RMI Communications Director Karen Nozik decided to run some short ads on public radio, touting the Institute's work and directing listeners to www.rmi.org. REM agreed to let the Institute use the band's music to run under the voice-overs.

Certainly, RMI has been lucky to win support from such smart, considerate musicians. Now we just need to get them to call their next album *Natural Capitalism*.

—Cameron M. Burns

RMI Gets Help from Special, Like-Minded Souls



**Dale Levy,
Development
Director**

A quote from the Army Corps of Engineers describes the

passion and spirit RMI donors and partners bring to knotty problems:

“The difficult can be done immediately, the impossible takes a little longer.”

RMI is surrounded by people who take this to heart, and I thought I'd take this opportunity to introduce you to a few:

- **Steve MacAusland** leads **Massachusetts Interfaith Power & Light**, a nonprofit organization devoted to helping faith communities find sustainable ways of operating their facilities. He's been incredibly helpful to RMI by introducing us not only to prospective donors, but to individuals whose organizations—including congregations—are interested in applying RMI's natural capitalism principles.
- **Kathy Borgen** and **Martha Davis** both live in Denver and are involved with **Rachel's Network**—a national group of women dedicated to the environment through their own activism as well their philanthropy. They've collaborated with RMI in arranging a four-part lecture series in Denver on issues related to natural capitalism.

“I particularly like that RMI can see that progress will best be made by not antagonizing entrenched constituencies, but by cooperative opportunism. Sustainability can be profitable, and RMI can provide the tools.”

George P. Caulkins, III
Caulkins Family Foundation

- **Betsy Mendelsohn** lives in Washington DC and teaches ethics to engineering students at the **University of Virginia**. She's helped link us with key engineering academicians and engineering associations to aid in initial planning for a project called 10XE or Factor 10 Engineering—whose goal RMI CEO Amory Lovins describes as “the non-violent overthrow of bad engineering.”

- **Carola Lea**, who's from New Hampshire and is the daughter of long-time RMI supporter and Emerita Board member **Carol Noyes**, has organized two receptions for Amory and other staff members to let others hear first-hand about RMI.

- **Mac McQuown**, a San Francisco resident, keeps finding opportunities for RMI staff members to meet with key decision makers at universities and private firms so we can begin to change the way they design new buildings and conduct business.

RMI donors and partners are truly amazing. They're from all points on the political compass. They support RMI for a host of reasons. Some give small gifts, a few give substantially bigger gifts. Some hope for immediate change; all are excited by the cutting-edge nature of RMI's work.

We are indeed fortunate to have such a cadre of willing and able partners.

“The leaders of RMI understand that we live in a universe of abundance—not scarcity—and that by offering enlightened guidance to a system of free enterprise, as opposed to undermining those who are free to dream and create, humankind will rapidly evolve into a cleaner, renewable, more equitable society, free from hunger, disease, and pollution.”

Lynda and Douglas Weiser

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The National Solutions Council seeks to initiate relationships with individuals on a national and international level to represent the interests of RMI in his or her geographic region, to broaden the base of financial support for RMI, and to sponsor specific RMI projects from time to time.

For more information about the Council, contact Ginni Galicinao at ginni@rmi.org or 970-927-7201.

Our sincere appreciation is offered to these friends who have contributed to RMI between 1 January 2004 and 15 April 2004. 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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Dwight Foreman
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Marjorie Garber
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Green Mountain Permaculture
Andrew Gil,
in memory of Gail Cottingham
Koch and in honor of
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John Gilmore
Jay & Jean Glassman
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Elementary School
Charlotte Goodenough
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Mildred J. & Carl P. Keiser, Jr.
Noreen Kinney
Eric Knudstrup (2)
Sarosh Kumana
Katherine & Lee E. Larson
Tom & Pat Lawson

RMI *in the news*

National Solutions Council To Meet



This summer, RMI's National Solutions Council will be hosting two events for its members and their guests. On **13 July**, Council members Doug and Lynda Weiser will host "**A Summer Evening with RMI and the National Solutions Council**" at their Old Snowmass home. On **5 August**, following RMI CEO Amory Lovins's RMIQ presentation (see p. 4) on *Winning the Oil Endgame*, the Council will host a special evening of "**Conversation and Dinner with Amory.**"

Formed last year, the Council is a group of individuals whose mission is to promote RMI locally, nationally, and internationally; represent the Institute in members' geographic regions; broaden the base of support for RMI; and sponsor specific RMI projects from time to time. One of the benefits of belonging to the Council is that it provides its members with an opportunity to engage in stimulating conversation about issues in a casual setting.

The receptions are open to all Council members (see list, p. 26), their guests, and others interested in joining the Council. For more information about the Council, please contact **Ginni Galicinao** at (970) 927-7201 or ginni@rmi.org.

Judith A. & William C. Lee
 Deborah K. Lindell &
 Donald Lee Butler
 Michelle Maggiore
 William B. Marks
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 Ross Melinda
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 Steven Miller
 Marcia Morrison
 National Renewable Energy Lab
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 Jacqueline A. Neurauter
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 Environmental Group
 Virginia & Rick Newton
 Genevieve & Morris J. Nicholson
 Michael Anthony Nidel (4)
 Georgiana & Kenneth Nielsen
 Ronald J. & Marilyn A. O'Dell
 Juris Odins
 Susan D. Osofsky
 Kradan & Kent Ostby
 John & Marsha Parrish, in memory
 of P.R. Wilkes
 Mary Alyce Pearson
 Michael P. & Patricia Lane Petelle
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 Helen Rasmussen
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 Elisabeth K. Ryland
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 Joyce & David L. Schmoeger
 Jared Schneider
 Mary Seagrove, in memory of
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We also want to thank those individuals who have contributed to RMI through Earth Share, the combined federal campaign, and other workplace charitable programs. If you would like to have RMI as a charitable option in your workplace campaign, please contact our Development Department (970-927-3851).

IN KIND CONTRIBUTIONS

John Beatty,
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 Lloyd Fortney, in memory of
 John Denver and in support
 of his vision
 Cathryn M. Harrison,
 in memory of John Denver

Wanted: No- and Low-Interest Loans

RMI is seeking no-interest (and low-interest) loans to finance renovation of staff housing units and for capital improvements to the Institute's Windstar facility. If you're looking for a creative way to help RMI, this may be it.

For more information, contact Development Director Dale Levy (970-927-7217 or dalelevy@rmi.org) or Finance Director Steve Swanson (970-927-7349 or sswanson@rmi.org).

Wills

Below is suggested wording for including RMI in your will. But we suggest you consult with your attorney.

"I hereby leave _____ percent of my estate (or a fixed amount, specific property, or the remainder of my estate) to Rocky Mountain Institute, a Colorado nonprofit corporation, whose purpose is to foster the efficient and restorative use of resources to make the world secure, just, prosperous, and life sustaining."

Staff Spotlight

Bill Simon (cont. from p. 21)

he subscribed to RMI's newsletter and began reading various RMI publications to learn more about the organization.

A 1992 graduate of California State University at Long Beach's Industrial Design program, Bill has worked with several product-development consultancies on the West Coast that design laboratory equipment, scientific instruments, consumer electronics, and toys. His extensive organizational and computer-graphics volunteering benefited the **Seattle Audubon Society**, the **Bolsa Chica Conservancy**, the **Earth Day Network**, and the **Student Conservation Association**. Having always been a bit of a self-proclaimed "tech-head," Bill enjoys helping organizations he believes in to get their messages out through graphic and web

media. For Bill, RMI has been an ideal place to blend his design skills, technical knowledge, and an interest in environmental issues into one career.

"In my position, I get to add a level of creativity to RMI's work," he says, "whether it's building a new website, editing a video, or aiding in the layout of a report or presentation. My position helps get RMI's word out into the world. It's my way of helping make the world a better place."

Bill continues to use his talents outside work to assist other organizations. He has provided web and technical assistance to a number of local non-profits including the **Aspen Valley Land Trust**, the **Basalt & Rural Fire Protection District**, the **Independence Pass Foundation**, and the **International Design Conference** in Aspen. He also applies his down-to-earth personal style as a mentor for

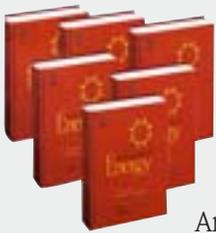
young adults through the Roaring Fork Valley's **Buddy Program**.

With the amazing magnitude of work that Bill does both inside and outside the Institute, one might think that he is all work and no play—quite the contrary. Bill works hard inside (he's here many nights and weekends) to ensure that he has time to be outside. In the winter he spends his free time skiing, snowboarding, snowshoeing, and cross-country skiing, while in the summer he is often found mountain biking, hiking, camping, kayaking, rafting, mushrooming, and gardening. "Spending time outdoors reenergizes and revitalizes me," he said. "RMI's headquarters is located in a beautiful part of Colorado. I like to get out and explore my environment as often as possible, and I always stop and smell the [wild]flowers."

—Morley McBride

RMI *in the news*

RMI Contributes to *Encyclopedia of Energy*, *Journal of Vehicle Design*



RMI's Amory Lovins is famous for writing and contributing to books that inundate the meticulous with statistics and overwhelm the pedestrian with hope. This spring Amory did it again, contributing to one of the most significant energy publications in recent years, Elsevier's March 2004 six-volume *Encyclopedia of Energy* (see www1.elsevier.com/homepage/sai/encycofenergy).

Amory's contribution was a semi-technical *tour d'horizon*, "Energy Efficiency: Taxonomic Overview," of all the important things he and RMI have learned about energy efficiency during the past thirty years—things even many energy experts don't know and may have forgotten to ask.

Elsevier's editor-in-chief for the project, Cutler Cleveland, worked with an international team of associate editors (including Amory) and 400 authors to complete the *Encyclopedia*. This excellent reference "draws together all aspects of energy, covering a wealth of areas throughout the natural, social, and engineering sciences." RMI is pleased to have its distilled experience so well represented.

Also, Amory and **Hypercar, Inc.**'s VP of Engineering **David Cramer** this spring published a major paper in the *International Journal of Vehicle Design* (see www.inderscience.com/catindex.html and scroll down to the *IJVD* listing), the quarter-century-old, highly-respected journal of vehicle engineering, automotive technology, and components. In the invited technical review paper, Amory and Dave explain why lightweighting is the key to making vehicles superefficient but safe, using as an example Hypercar's 2000 virtual design of the *Revolution* 99-on-road-mpg SUV as an example case. The paper also shows how Hypercar's **Fiberforge**™ process promises to achieve that goal at competitive cost, and how this manufacturing breakthrough can accelerate an exciting new stage in automaking and the emergence of the hydrogen economy.



RMI thanks the **Hewlett Foundation** for supporting the preparation of both these authoritative articles.

Board Spotlight

David Orr (cont. from p. 24)

is quick to suggest that didn't have much of an effect in Washington. Still, his association with Amory Lovins, and RMI, has been close ever since. (In fact, the roof timbers for RMI's headquarters building were provided by the **Meadowcreek Project**, an environmental education center in Arkansas founded by David, who with his brother Will and other hard workers cut and milled 50 tons of oak for RMI with their own hands.)

David's long and distinguished career of writing and teaching has made him an international celebrity of sorts, and two of his books, *Earth in Mind* and *Ecological Literacy*, have sold widely. In fact, Island Press is preparing to release the tenth anniversary edition of *Earth in Mind* this fall, and David's newest book, *Last Refuge* ("an emerging classic," as David likes to put it) should be rolling off the presses about the same time as this newsletter.

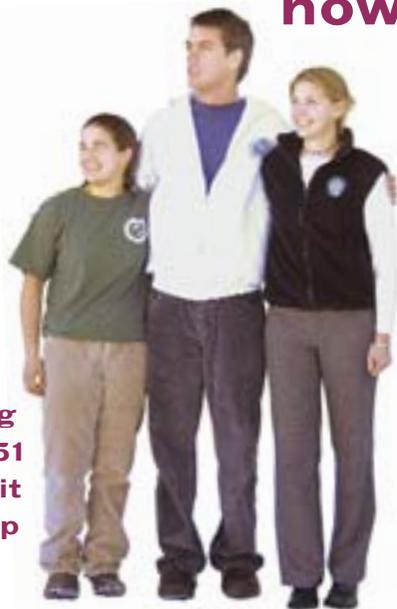
Today, David and wife Elaine live in Oberlin, Ohio, where he chairs the environmental studies program and oversees the **Adam Joseph Lewis Environmental Studies Center**. They have two sons, Mike and Danny, and two grandchildren, whom David cheekily estimates are "the two most beautiful children born within the last 500–600 years." Mike works for Sybase, a California-based IT firm; Danny is an Episcopal priest.

Besides his obvious love of the outdoors, David enjoys reading, traveling, sports, and serves as "a construction advisor to [his] four-year-old grandson." But he also steers other young people, especially his students, into careers—lifestyles and ways of being, really—that would've been hard to imagine when he was young. He is, after all, widely considered the best living environmental educator, and education doesn't stop at the classroom door.

"That's what's most rewarding," he said. "Seeing these great kids go off and do really remarkable things at very young ages. It's really exciting." His former students work in a range of fields, from environmental policy to the earth sciences—"we even have one in the mayor's office in Chicago," he said proudly. That's the remarkable Sadhu Johnson, and a whole other story.

—Cameron M. Burns

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RMI Solutions

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LETTERS TO THE EDITOR

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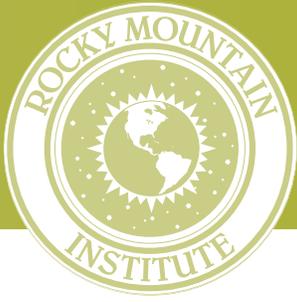
ABOUT THE INSTITUTE

RMI is an entrepreneurial nonprofit organization that fosters the efficient and restorative use of natural, human, and other capital to make the world secure, just, prosperous, and life-sustaining. We do this by inspiring business, civil society, and government to design integrative solutions that create true wealth.

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.



RMI Solutions

NEWSLETTER

Features

- 1 **Mobilizing Innovation**
- 3 **All That Glitters**
Uncovering the Hidden Wealth
in a Platinum Mine
- 5 **Regenerating Cuyahoga Valley**
A Vision for a Valley
- 8 **San Francisco Rides New Wave
of Energy Planning**
- 13 **Power from the People**
Demand Response Comes Home
- 16 **Green Development
in the Desert**

In Every Issue

Life at RMI **20**

Editor's Notes **20**

Staff Spotlight 21

Bill Simon, RMI Communications Department

What Are You Doing? 22

Tomakin Archambault,
Nate Glasgow, Sarah Goorskey,
Lena Hansen, Anna Jaffe,
Morley McBride,
Bailey McCallum,
Andy Smith,
Ramola Yardi

Board Spotlight 24

David Orr

Donor Spotlight 25

R.E.M.

RMI Supporters 26

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