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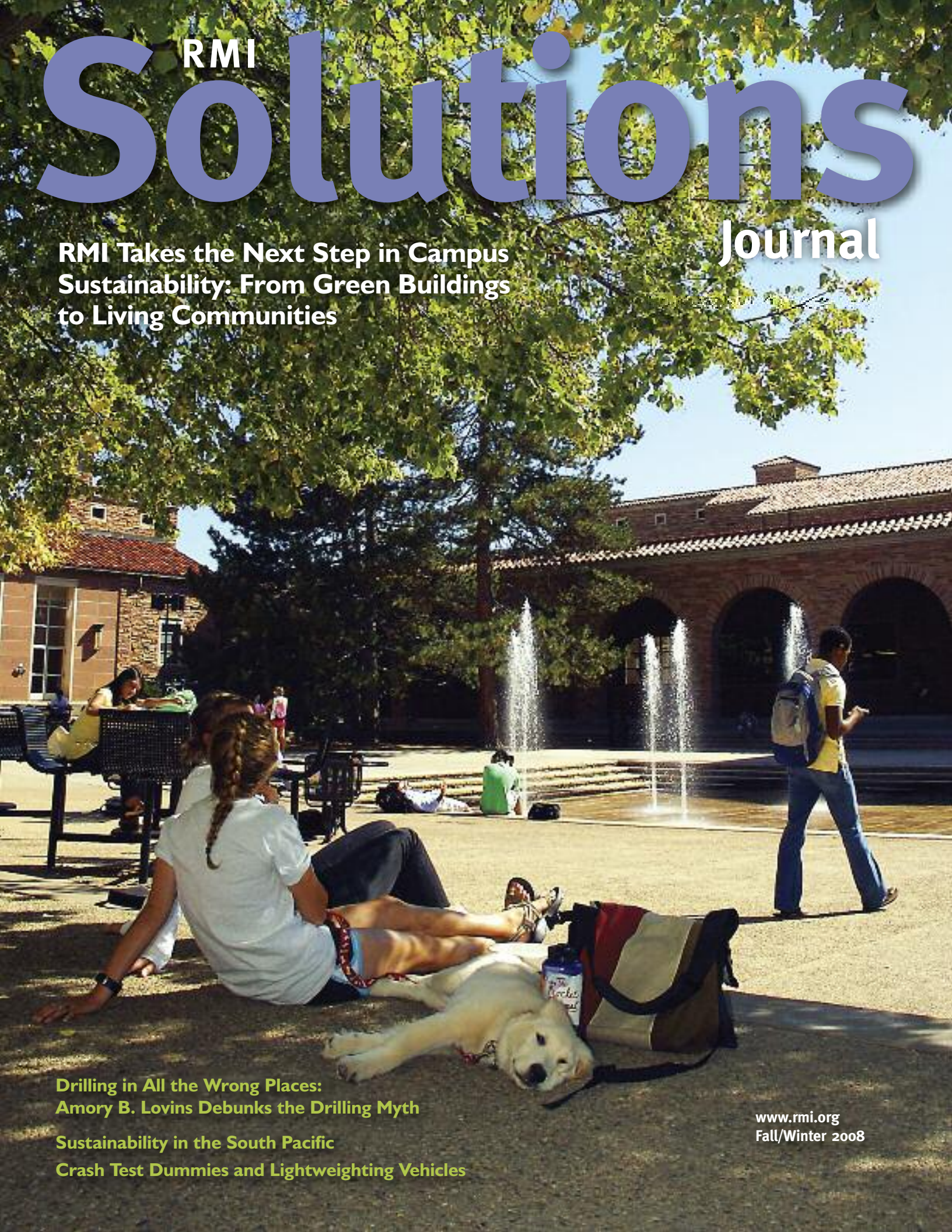
RMI Takes the Next Step in Campus Sustainability: From Green Buildings to Living Communities



Drilling in All the Wrong Places: Amory B. Lovins Debunks the Drilling Myth

Sustainability in the South Pacific

Crash Test Dummies and Lightweighting Vehicles

www.rmi.org
Fall/Winter 2008

RMI
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Drilling in All the Wrong Places

By Amory B. Lovins

Drilling for oil in the Arctic National Wildlife Refuge is an unwise, unnecessary gamble, argues RMI Chief Scientist Amory B. Lovins. He points out that innovators and entrepreneurs focused on energy efficiency are achieving their ends faster, more securely, more profitably, and more competitively than oil companies that might tap Refuge oil.

Sustainability in the South Pacific

By Jeffrey John

Hawaii is one of the most fertile places on Earth, yet only 15 percent of food consumed there is grown locally. RMI has been working with the largest private landowner in Hawaii and a cooperative fellowship program to rethink the agricultural value chain and help build the local leadership necessary to sustain it.

Volume 2 . Number 2 . Fall/Winter 2008

Crash Test Dummies: Challenging the Safety Myth

By Cameron M. Burns

Are radically lightweight cars inherently less safe than heavier cars? Through simulating hundreds of crashes of normal and lightweight cars, RMI's MOVE Team is taking a closer look at this conventional wisdom.

RMI Takes the Next Step in Campus Sustainability: From Green Buildings to Living Communities

By Cameron M. Burns

RMI's whole-system approach has the potential to transform the idea of campus greening efforts from single projects to integrative communities.

Rocky Mountain Institute® (RMI) is an independent, entrepreneurial, nonprofit think-and-do tank.

We foster the efficient and restorative use of resources to make the world secure, just, prosperous, and life-sustaining.

RMI Solutions Journal

Volume 2 . Number 2 . Fall/Winter 2008

Publisher	**Rocky Mountain Institute**
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Noah Buhayar is a freelance journalist and graduate student at the University of California, Berkeley. Before moving to the Bay Area, he spent a year as a research fellow at Rocky Mountain Institute, reported for the *NewsHour* with Jim Lehrer, and studied in Chile on a Fulbright Fellowship.

Cameron M. "Cam" Burns is an award-winning writer, photographer, designer and communications and publishing specialist. He has authored, co-authored, edited, and contributed to twenty-four books, written thousands of magazine, newspaper, and journal articles, and has won twenty-nine national and regional awards for his writing.

Jeffrey John earned a BA in rhetoric and communication studies from the University of Richmond and now works with RMI's Energy & Resources Team. He is excited to make ERT's innovative ideas and research, "more accessible to RMI's interested supporters."

Jennifer Walton is a marketing and communications intern at RMI. She holds a BA in environmental communication from UNC-Chapel Hill and a master's degree in technical communication from Colorado State University. Jen has more than ten years of communication and field experience in environmental nonprofits and federal natural resources organizations.

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Cover photo by Lauren di Scipio

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Loving "Environmental Lovins"

It's time to celebrate. By the time you read this edition of the *Solutions Journal*, the blogosphere will have marked the one-year anniversary of RMI's Environmental Lovins blog—published by Yahoo! Green.

by Andrew Demaria

"Until recently, solar thermal electric power has not received the same level of attention as solar PV. But the advantages of this technology and the recent surge of activity in this space may soon change that trend." -- Virginia Lacy, ERT, Generating electricity from the sun's heat.

"People looking to build new homes now have a standard to work toward." -- Steve Brauneis, BET, A new standard for green homes

"America's preeminent natural resource, innovation, can deliver us cars that don't run on oil at all." -- Michael Brylawski, VP, MOVE, Why oil is still a dinosaur


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Environmental Lovins

Rethinking the cost of hybrid cars

By Noah Buhayar and Bryan Palminter

A lot of people get sticker shock when they look at the price of a new hybrid. They figure that the added expense won't pay itself back very quickly on fuel savings alone.

And in some cases they're right. Even with $4 gas, someone who drives 15,000 miles per year won't necessarily recoup those added costs in the first year of ownership. Depending on the non-hybrid car used for comparison, it may take two or more years before the gas savings alone equals the up-front premium for the hybrid.

But this quick analysis misses a number of hybrids' other economic benefits.

For starters, hybrids are holding their value better than non-hybrid cars. This means that, even if you don't recoup the extra cost of the hybrid in gas savings, you're likely to get more money out of the car when you decide to sell it.

In addition to resale, some lenders -- typically credit unions -- offer discounted loan rates for hybrids. And some insurance companies -- including Geico, the Travelers, and Farmers -- offer discounted premiums.

The federal government is also offering tax credits of up to $3,400 for hybrids -- but only for the first 60,000 vehicles, which means that Toyota and Honda models are no longer eligible. Some employers offer incentives for hybrid vehicles as well.

THE BLOGS HAVE BEEN VERY POPULAR, with some postings generating hundreds of thousands of views ("Rethinking the cost of hybrid cars" being the most popular with more than 700,000 hits).

During the past year, dozens of RMI staff have contributed to the blog program, often breaking away from their intensive consulting or research work and tailoring their expertise to deliver clear, concise stories about consumer-orientated topics suitable for the Yahoo! audience. Some quotes are sprinkled on this page.

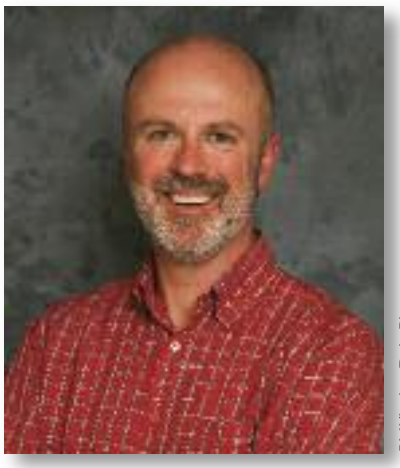
Combined, the blog has had millions of views—not only extending the image and awareness of RMI but also going some distance to spread the Institute's mission. This reach and impact quite simply would not have been possible without the help of all those who have worked on the blog, particularly Noah Buhayer, who recently left RMI to pursue a career in journalism, and Maria Stamas, who's running the program now.

Since Environmental Lovins's debut, RMI also posts a regular blog on Treehugger.com, whose focus and content is more research-based.

Most recently, RMI CEO Michael Potts joined the efforts. His blog, worldwakingup.com, launched in September and focuses on mission issues for an audience of clients, donors, thought leaders, and decision-makers. If you haven't had a chance to read it, do so now. It's another way RMI is getting out there and sharing its voice, its thoughts, and, most importantly, its work.

Bigger news will be delivered in the next edition of the *Solutions Journal*, as the revamped, supercharged, and highly efficient rmi.org will be live. Stay tuned. •

The View from Here



RMI/Jackie Daly Photo

Conservation vs. Efficiency: Sweaters Are Not the Answer

By Michael Potts, RMI President and CEO

A NEWLY ELECTED JIMMY CARTER APPEARED ON national television 30 years ago in a beige sweater and declared that energy issues would call from us a level of effort that was "the moral equivalent of war." He strongly urged the nation to "learn to live thriftily" and adopt "strict conservation."

Wags called him "Sweater Jimmy" to make fun of his plea to turn down our thermostats. And when real energy prices declined in proceeding years, they looked at his comments with nostalgic ridicule.

Today, when energy prices are hitting historic highs, many fear that "strict conservation" will mean draconian deprivation. Sweaters required in winter, clothing optional in summer. Stop driving, wind down your thermostat, quit taking showers, and turn off your television.

Americans, famously independent, hate being told what to do. So there is, at times, a polarizing effect of two opposing camps: "greenies" installing double-flush toilets, and defiant "skeptics" driving Hummers.

The irony is that both camps miss the real point.

If we want to reduce fossil fuel use, become energy independent, and cut carbon emissions—the first thing we have to do is improve the efficiency of the way we use energy in the first place. To reduce your miles driven by 20 percent in a vehicle that gets nine miles to the gallon is progress, but it's missing the point. It's also somewhat futile to set your air conditioning thermostat up two degrees in a building with single-pane windows and poor insulation.

Between 75 and 90 percent of the energy we consume is wasted due to bad design and poor choices. We live in a world where energy has been so cheap for so long that very few people have paid attention to it, and most of our energy services are delivered in a sloppy, inefficient manner.

Architects don't buy the energy their buildings consume, car companies don't pump gas for their SUVs, and landlords don't want to make energy improvements that will only benefit their tenants. Throughout this entire system, most of the key players—oil companies, utilities, manufacturers—make more money if we buy bigger machines and use more fuel. In fact, the metrics we use to measure growth and success generally register efficiency gains as a negative trend!

Consider the legions of smart, dedicated, and fundamentally reasonable people who make their living in the current morass of mixed signals, dysfunctional policies, and ineffective incentives. Sometimes it almost seems as if our economic systems were designed to encourage the wasteful and destructive use of resources. If we wait for market forces to correct these imbalances, we will be waiting for a long, long time.

Enter RMI. On these pages you will see examples of our quest to see across boundaries, to confront "whole systems," and to collaborate with leaders who are committed to transformational change.

We use philanthropic support to identify radical resource efficiency solutions and to bust the barriers that hold them back. We convene key players and thought leaders from industries that are target-rich in efficiency opportunities to examine standards and establish new visions. Then we identify organizations that are committed to transformation and work with them to execute client-funded demonstration projects.

These projects multiply the impact of the philanthropy we receive and prove that the solutions are "ready for prime-time." We can then communicate the concepts and benefits of these solutions to a wider audience and pass them on to our for-profit colleagues who can bring them to scale.

It's cheaper to save fuel than it is to go find more of it. And it's ineffective to put our efforts into developing biofuels or renewable energy if we pump it into an inefficient system that fritters most of it away.

"Conservation," in the sense of being conscious and careful about consumption, should be encouraged, and will most likely be part of our final solution. But I think Jimmy Carter would agree, hopefully along with every "greenie" and every "skeptic," that efficiency—the elimination of waste—is our first priority and our major opportunity. •

RMI Welcomes Doug Laub New VP of Development

RMI/Jackie Daly Photo

By Marty Pickett
RMI Executive Director

RMI'S NEW VICE PRESIDENT OF DEVELOPMENT, Doug Laub, joined the team in September. With an impressive 24-year career in nonprofit fundraising and management, Doug brings extensive experience in every facet of development, including significant major gift and planned giving experience, foundation grant-making, volunteer leadership support, strategic planning, and philanthropic advisory services.

A long-time Colorado resident, Doug was named by *Denver* magazine as one of its "50 Business People to Watch in Denver." His experience includes, from most recent to past, serving as CEO of Partnership for Cures of Chicago; President of Bonfils Blood Center Foundation; Director of Endowments and Gift Planning for Allied Jewish Federation of Colorado; Director of Gift and Estate Planning and Associate Vice President for the Denver office of City of Hope National Medical Center/Beckman Research Institute; Founder and President of Planned Gift Acquisitions, Inc., a nonprofit consulting business focusing on the development needs of small and medium-sized organizations; and National Director of Planned Giving for the National Jewish Hospital (now known as National Jewish Medical Center).

After receiving his BA from the University of Rochester, Doug received a JD from the University of Denver College of Law. He cofounded the Denver Planned Giving Roundtable (now known as Colorado Planned Giving Roundtable) and is a founding member of the National Committee on Planned Giving. He is currently on the board of the Lions' Club of Denver and the National Pain Foundation and has served on the board of the Rocky Mountain Children's Law Center and Goldman Philanthropic Partnerships, Chicago.

Doug and his wife, Kathleen, have three children ages 18, 16, and 11. When Doug is not out raising money, he plays three musical instruments, as well as tennis—which he has both taught and played professionally.

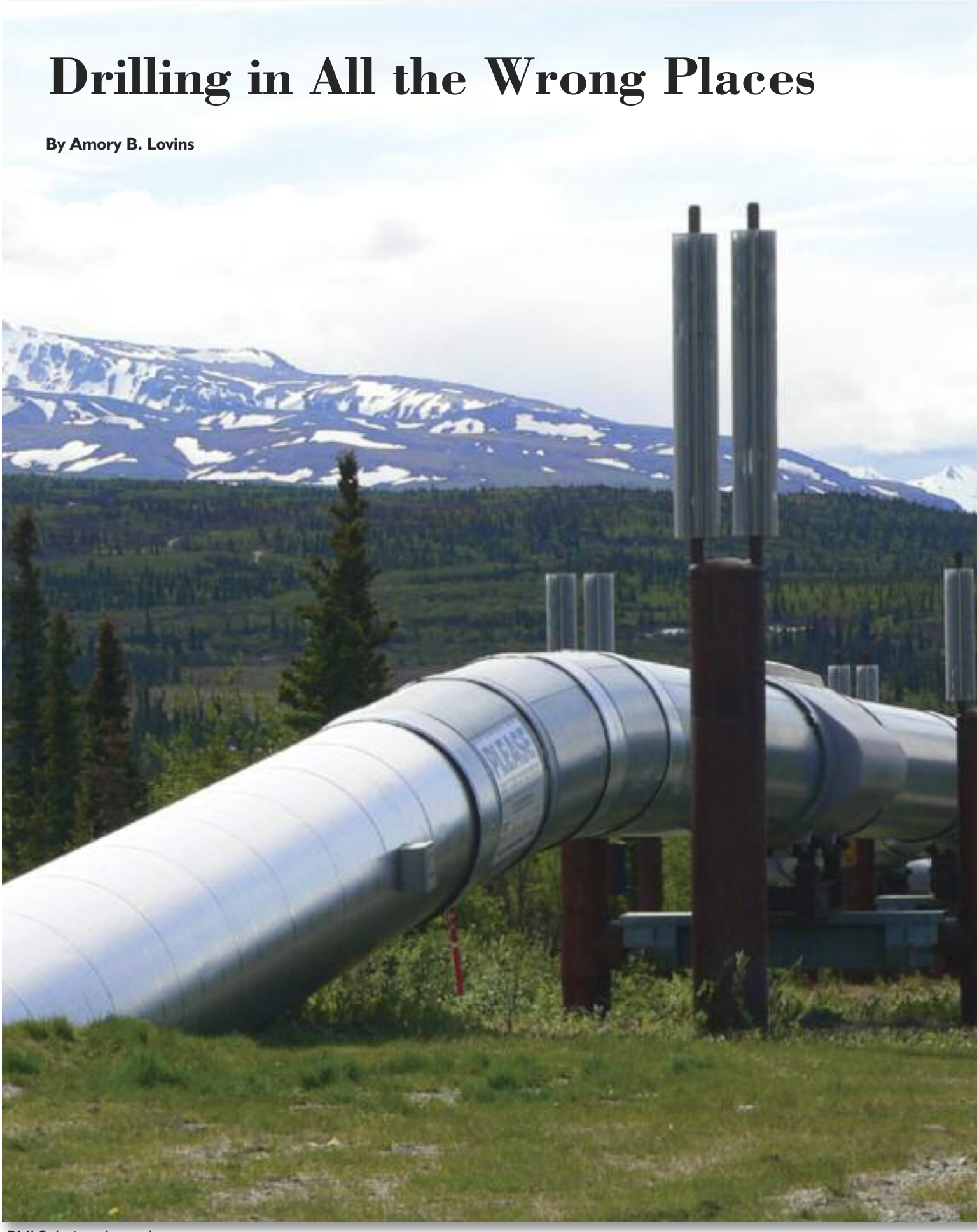
Please join us in welcoming Doug to RMI and feel free to stop by and visit or give him a call to introduce yourself. •

Doug Laub leads NSC members on the Energy & Resources Team tour of the solar PV system at Denver International Airport.

JefferyJohn

Drilling in All the Wrong Places

By Amory B. Lovins



DRILLING FOR OIL IN THE ARCTIC National Wildlife Refuge should offend conservatives because it's insecure, unimportant, unprofitable, and uncompetitive.

Oklahoman ex-CIA Director R. James Woolsey testified against drilling because its "real show-stopper is national security. Delivering that oil by its only route, the 800-mile-long Trans-Alaska Pipeline System (TAPS), would make TAPS the fattest energy-terrorist target in the country—Uncle Sam's 'Kick Me' sign.…Doubling and prolonging dependence on TAPS…imperils [national] security."

"TAPS," he wrote, "is frighteningly insecure. It's largely accessible to attackers, but often unrepairable in winter. If key pumping stations or facilities at either end were disabled, at least the above-ground half of 9 million barrels of hot oil could congeal in one winter week into the world's biggest ChapStick®. The Army has found TAPS indefensible. It has already been sabotaged, incompetently bombed twice, and shot at more than 50 times[;] a drunk shut it down with one rifle shot. In 1999, a disgruntled engineer's sophisticated plot to blow up three critical points with 14 bombs, then profit from oil futures trading, was thwarted by luck. He was an amiable bungler compared with the [9/11] attackers."

Importance? The Energy Information Administration (EIA) says the Refuge's limited and scattered oil—its biggest field is one-tenth of a Prudhoe Bay—could start flowing around 2018, peak in 2027 at 3 percent of U.S. use, and temporarily cut oil import dependence by two percentage points and 2025 oil prices by 2 cents a gallon.

Profitability? EIA in May 2008 found today's quintpled oil prices won't yield more or earlier Refuge oil, because drilling costs have soared even higher: Alaskan onshore drilling costs rose 564 percent during 2000–2005, then *really* stood up on end. Today's soaring capital costs for frontier hydrocarbon projects strain even the biggest oil companies' exploration budgets. In 2001, Refuge oil's costs and risks were among the highest in the industry's global portfolios. Today's higher oil prices don't change prospects' *relative* merits, better technologies tend to advantage other prospects more, and volatile oil prices raise financial risks in a sour capital market, so Refuge oil still lacks a sound business case.

Competitiveness? My team's Pentagon-cosponsored 2004 study *Winning the Oil Endgame* (free at move.rmi.org/oilendgame) road-mapped eliminating U.S. oil use by the 2040s, led by business for profit, at an average cost of $15 per barrel—lucrative at $26/bbl, far more so with today's far higher prices. Refuge oil would be costlier and slower than those efficiency and supply-side competitors, and they're getting cheaper.

So why press for a project that would create a new and even more vulnerable Strait of Hormuz, depend for decades on a geriatric pipeline (corroding, maintenance-challenged, already past its 30-year design life), yield little oil slowly and riskily, and lose money? Perhaps advocates simply misunderstand the nature of America's oil problem.

The U.S. has lifted oil faster and longer than any other country, so it's more depleted, and the next barrel costs more at home than abroad. A market economy offers only three solutions: protectionism, trade, and substitution.

Protectionism distorts relative prices by taxing foreign oil (violating free-trade rules) or subsidizing domestic oil (suppressing efficient use). Both approaches weaken competitiveness. Both illogically suppose the solution to domestic depletion is to deplete faster—or as David Brower said, "strength through exhaustion." Oil-less countries like Japan and Germany trade—buying oil from the cheapest sources (diversified and buffered by stockpiles), earning the money to pay for it, and maintaining good relations with exporters. The U.S. buys copiously but lags in earnings and friendships.

By substituting resources that do oil's tasks better and cheaper, the U.S. can lead the world beyond oil. Face facts: America's oil output peaked in 1970 and Texas is now a net importer of oil. Let's get on with what we *can* do together, better than anyone: saving oil quickly and depleting it slowly.

If the U.S. had kept saving oil as fast as it did during 1976–1985, we wouldn't have needed any Persian Gulf oil ever since. But now wildcatters are finding new gushers of savings: more than 8 million barrels per day (nearly a Saudi Arabia's worth) in the Detroit Formation, 0.9 in the Seattle Formation—in all, over 14 million barrels per day of "negabarrels" (saved oil) that is all-American and inexhaustible, climate-safe and secure, costing an average of $12 a barrel.

If oil companies went to the ends of the earth drilling for very expensive oil that might not even be there, while innovators and entrepreneurs found all those negabarrels under Detroit, wouldn't the old-fashioned drillers be embarrassed, even bankrupt?

Smart developers drill the most prospective plays first. We should all be able to agree about that. If we do it, then the oil we don't agree about—at least 50 times smaller and several times costlier—will become superfluous, America will be richer and stronger, and the world will be cooler and safer. •

The Realistic Dreamer

By Jonah Bea-Taylor

IT'S A BEAUTIFUL SUMMER SUNDAY MORNING IN THE MAROON Bells—Snowmass Wilderness, and 13,600 feet up on the side of Capitol Peak, Lionel Bony and a group of RMI staffers are inching across the infamous "Knife Edge." On either side of the legendary ridge is an empty void—thousands of feet of terrifyingly open air. But Lionel seems to be enjoying the view of the snowfields far below. The group departed from a trailhead about twelve miles from RMI's Snowmass offices the day before, embarking on one of the most anticipated and enjoyable expeditions of the summer.

The hike is challenging and some group members struggle with altitude sickness before reaching the 14,200-foot summit. But not Lionel. For him, the mountains are a delightful homecoming: "My mind and my heart open up when I'm out there," he says.

The mountains are like home in more ways than one for Lionel, who until just recently was a Senior Consultant with RMI's transportation innovation group (MOVE). These days he's transitioning to a new role as Director of the Office of the Chief Scientist (OCS), where he'll be working directly with Amory B. Lovins. Lionel grew up outside the small village of Orcival in the French Central Massif and spent most of his free time hiking, mountain biking, or skiing. But he always dreamed of the true wilderness—"the Rocky Mountains in the U.S."

Dreams do come true. And Lionel gets a little taste of that wilderness every day at RMI's Snowmass office on the Windstar Land Conservancy—a 900-acre nature preserve. On this early Monday morning Red-tailed hawks can be seen soaring outside his office window. He takes off his shoes and slips into his customary blue slippers for the busy day ahead, legs still a little sore from the weekend climb.

While Lionel is working through the morning emails, Michael Brylawski, Vice President of MOVE, comes in and out of the office, catching up on current projects. Lionel is still actively supervising several MOVE initiatives while transitioning to running Amory's office full time. Michael and Lionel's interaction is energetic and almost playful as they define the next steps on each project and new ideas pop up. The big MOVE projects still on Lionel's plate include implementing the recommendations from *Winning the Oil Endgame* (WTOE) and launching RMI's India Initiative, which will focus on a new generation of super-efficient vehicles and transportation systems. As he transitions to his new role in the Office of the Chief Scientist, Lionel is focusing on 10X Engineering—a project that aims to radically change design and engineering practices to create huge increases in resource productivity.

Lionel's career path before RMI took some exciting turns. After completing his

Lionel Bony traverses the Knife Edge on Capitol Peak.

Blake Gordon Photography

Lionel feels at home in the Colorado Rockies: "My mind and my heart open up when I'm out there."

Blake Gordon Photography

undergraduate work at Grande École Sciences-Po in Paris, he made a clear career choice for business experience and began working for L'Oreal. Exciting opportunities came his way, and he took on the challenge of relocating to their Madrid office without knowing a word of Spanish. After 16 months in Spain, Lionel returned to Paris where he worked for L'Oreal as a haircare and shampoo product manager, collaborating with 200 sales representatives—and all of this by age 24. Feeling like he was learning a lot, but not completely satisfied by his job, Lionel decided one day to move to Bolivia, thus fulfilling a long-term dream to live in the Andes and Amazon Basin. Once there, he found a volunteering opportunity helping Conservation International with ecotourism projects.

Based on these diverse experiences, Lionel started looking for opportunities to combine his interest in business strategy and passion for sustainability. While studying at Harvard Business School, he interned at RMI's former Hawaii office with Kyle Datta. After finishing his MBA, Lionel planned to return to France, but a last-minute offer with the MOVE team in Snowmass came in and he decided to take it.

He began by concentrating on the Team's basic operations with Michael Brylawski. The first few months were challenging; MOVE was a brand-new team that needed to build its capabilities and relationships from scratch. But Lionel credits Michael's recognition of his work and growing management skills for a lot of the happiness and fulfillment he gets from his job. "It makes all the difference when someone is giving you opportunities…and pulling you up to his level."

Later that morning, Lionel is involved in an important planning meeting for WTOE—a project he has managed for one year now. Today the MOVE team is working with Chairman and Chief Scientist Amory Lovins and Executive Director Marty Pickett to think about how to raise funds for a high-level summit on ending U.S. oil dependence. This meeting of business leaders will focus on the specific strategies that will one day completely eliminate our use of oil.

With its door wide-open to the morning sunshine, the Sopris conference room is a perfect place to brainstorm big ideas. During the meeting Lionel shows his talent for both coordination and understanding—he organizes ideas on the whiteboard and spends a lot of time listening very carefully while writing notes on a huge legal pad.

After the meeting Lionel has to rapidly switch gears for his new role as Director of the Office of the Chief Scientist. There is an interview scheduled with a reporter from *Le Temps*, Geneva's main newspaper, and Lionel has to give Lovins some important background information for that conversation. Lovins notes that there does not seem to be time for lunch in the day's busy schedule. "I usually don't eat," Lionel jokes as they run to prepare lunch in the Snowmass kitchen.

Lionel's goals for his work in the Office of the Chief Scientist are similar to those he had with MOVE: He has always focused on building stronger processes and more effective teams. "I want to strengthen RMI internally, to help us all succeed…. I want to make the organization better, and once we have that it's a given that the impact will be there."

But Lionel keeps these goals on a very realistic footing. In his own journey from an "angry environmentalist" as an MBA student to someone who uses nuanced whole-system thinking to work toward practical solutions with some of the world's largest companies, Lionel says he is a "realistic dreamer." This basic philosophy has led him to realize many of his own dreams —from living in Latin America to finding the work he is passionate about today. He notes, "Once you start thinking this way, it keeps going and going because you're more natural, you're more secure, you are more genuine … you are more yourself; it leads to new opportunities."

It's that same mix of "idealism and pragmatism" that has led Lionel to never own a car. His ideal vision is a world where public transportation serves most purposes. "We are talking about reducing oil consumption here," he points out. But practical tools, like RMI's free bus passes and staff shuttle, make it a realistic option.

Adhering to the local bus schedule is an important part of his day, and at 5:30 p.m. he is waiting with other RMI staff at the Snowmass bus stop. Later that evening, the group holds a small barbeque to celebrate their conquest of Capitol Peak. Lionel chats with MOVE Fellow Alok Pradhan and Communications Intern Tripp Hyde while quickly catching up on the latest emails on his PDA—for him, commuting hours on the bus are often a time of focused productivity.

His new position at RMI is a brilliant opportunity and a clear recognition of his skills, but Lionel remains very down to earth about his role. It is this same, grounded attitude that helps him feel comfortable in face of big challenges—even on Capitol's Knife Edge where many climbers turn back.

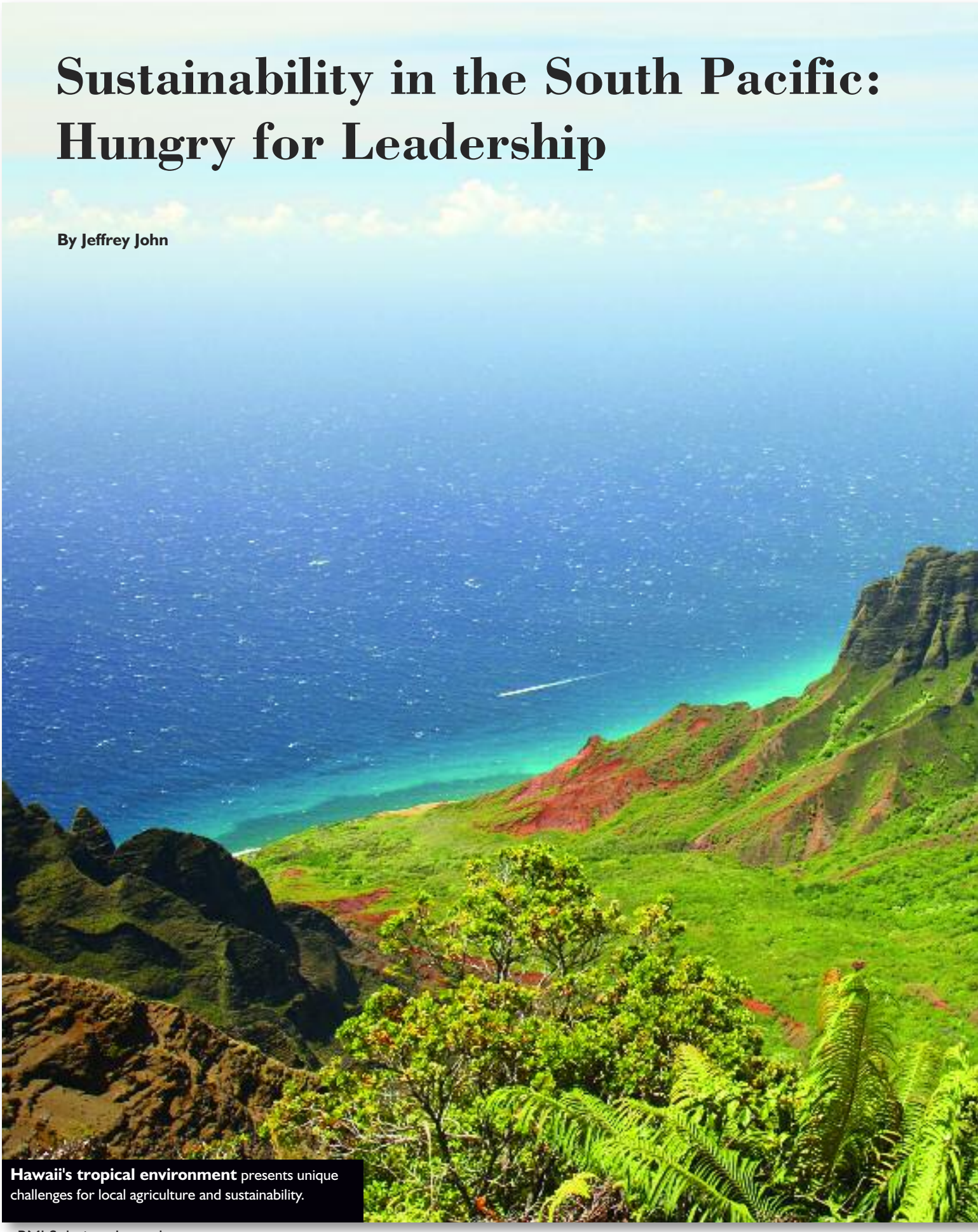
"The first rule on the mountain is that you need to be humble," he notes.

And it's certainly one he has taken to heart. •

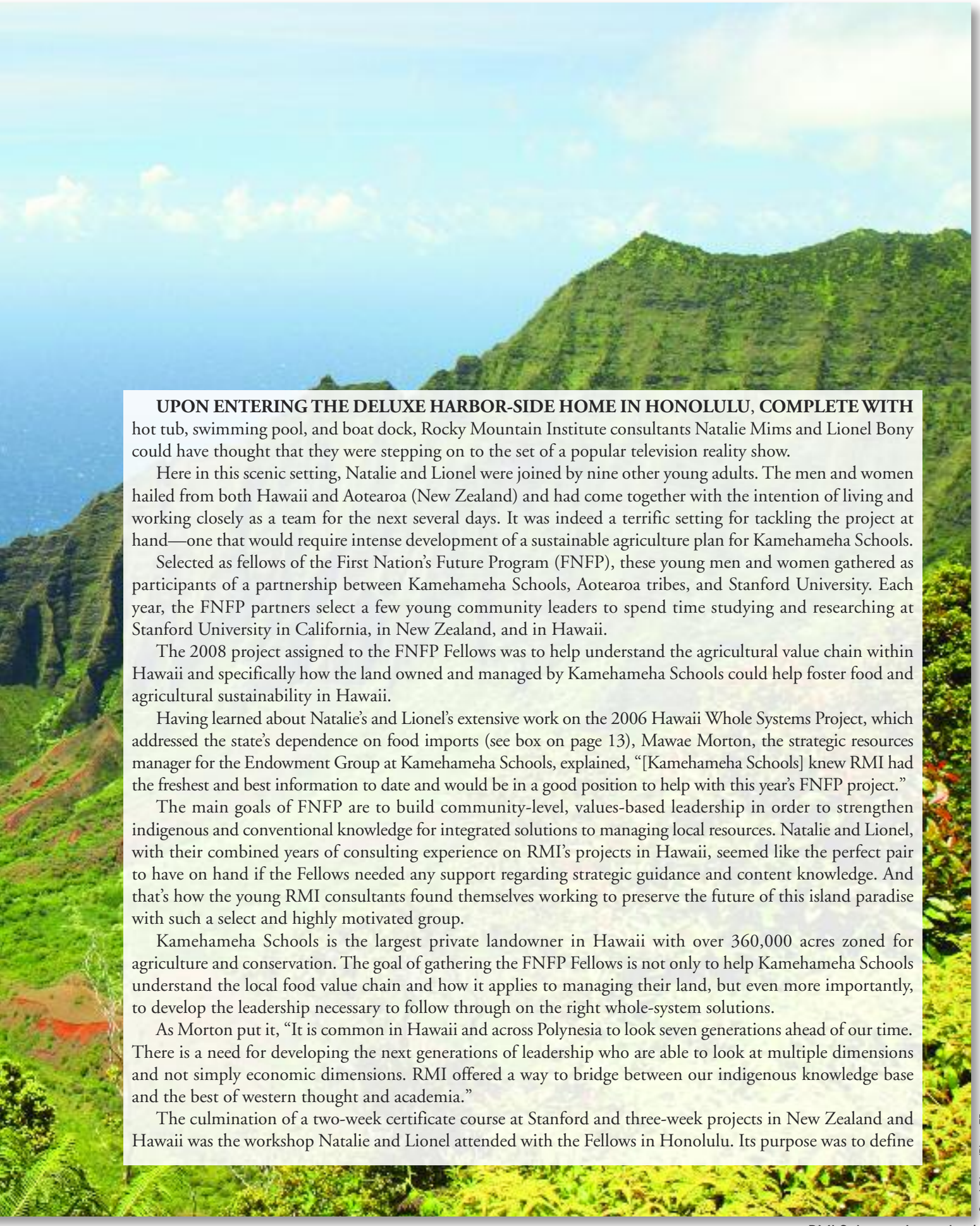
Lionel participates in a WTOE planning meeting with (clockwise) Michael Brylawski, Amory B. Lovins, and Marty Pickett.

Sustainability in the South Pacific: Hungry for Leadership

By Jeffrey John



Hawaii's tropical environment presents unique challenges for local agriculture and sustainability.



UPON ENTERING THE DELUXE HARBOR-SIDE HOME IN HONOLULU, COMPLETE WITH hot tub, swimming pool, and boat dock, Rocky Mountain Institute consultants Natalie Mims and Lionel Bony could have thought that they were stepping on to the set of a popular television reality show.

Here in this scenic setting, Natalie and Lionel were joined by nine other young adults. The men and women hailed from both Hawaii and Aotearoa (New Zealand) and had come together with the intention of living and working closely as a team for the next several days. It was indeed a terrific setting for tackling the project at hand—one that would require intense development of a sustainable agriculture plan for Kamehameha Schools.

Selected as fellows of the First Nation's Future Program (FNFP), these young men and women gathered as participants of a partnership between Kamehameha Schools, Aotearoa tribes, and Stanford University. Each year, the FNFP partners select a few young community leaders to spend time studying and researching at Stanford University in California, in New Zealand, and in Hawaii.

The 2008 project assigned to the FNFP Fellows was to help understand the agricultural value chain within Hawaii and specifically how the land owned and managed by Kamehameha Schools could help foster food and agricultural sustainability in Hawaii.

Having learned about Natalie's and Lionel's extensive work on the 2006 Hawaii Whole Systems Project, which addressed the state's dependence on food imports (see box on page 13), Mawae Morton, the strategic resources manager for the Endowment Group at Kamehameha Schools, explained, "[Kamehameha Schools] knew RMI had the freshest and best information to date and would be in a good position to help with this year's FNFP project."

The main goals of FNFP are to build community-level, values-based leadership in order to strengthen indigenous and conventional knowledge for integrated solutions to managing local resources. Natalie and Lionel, with their combined years of consulting experience on RMI's projects in Hawaii, seemed like the perfect pair to have on hand if the Fellows needed any support regarding strategic guidance and content knowledge. And that's how the young RMI consultants found themselves working to preserve the future of this island paradise with such a select and highly motivated group.

Kamehameha Schools is the largest private landowner in Hawaii with over 360,000 acres zoned for agriculture and conservation. The goal of gathering the FNFP Fellows is not only to help Kamehameha Schools understand the local food value chain and how it applies to managing their land, but even more importantly, to develop the leadership necessary to follow through on the right whole-system solutions.

As Morton put it, "It is common in Hawaii and across Polynesia to look seven generations ahead of our time. There is a need for developing the next generations of leadership who are able to look at multiple dimensions and not simply economic dimensions. RMI offered a way to bridge between our indigenous knowledge base and the best of western thought and academia."

The culmination of a two-week certificate course at Stanford and three-week projects in New Zealand and Hawaii was the workshop Natalie and Lionel attended with the Fellows in Honolulu. Its purpose was to define

iStockPhoto/Photo75

FNFP Fellowship

Mahina Paishon (left) and Noelani Yamashita, 2008 FNFP Fellows.

food sustainability in Hawaii and identify key opportunities for Kamehameha Schools' use of the land. The workshop brought together individuals involved at every level of the food and agriculture value chain. Participants ranged from the Department of Agriculture and the University of Hawaii to Whole Foods and local farmers.

Neil Hannahs, the director of Kamehameha Schools Land Assets Division, said, "RMI's facilitation made it a better workshop. We ask our Fellows to take on very complex subjects in a very short period of time, so having consultant expertise helps them ramp up faster and RMI was a very effective guide. RMI is an expert in facilitating workshops and synthesizing information. Because of the nature of RMI's work … you have mastered how to think through an issue. Our Fellows come from a wide variety of backgrounds—some have this ability, but some don't." Working with RMI allowed the FNFP Fellows to create a whole-system framework to attack the problem.

RMI also helped encourage and cultivate the Fellows' leadership skills. Hannahs pointed out, "Natalie and Lionel knew they were in a supportive role … and they allowed the Fellows to shine. How can you encourage leadership from the next generation if you do not rely on the Fellows to step forward? We do not want to shelter the Fellows from taking the risk and making the mistakes."

The First Nation's Future Program is guided by the Hawaiian saying, "Ma ka hana ka'ike," which means, "In the work there is knowledge." Morton explained that it is a simple principle of experiential learning. "Through doing you learn," he said, "and then our Fellows retain what they have learned for longer and they are driven back to the classroom with a focus."

This year, the FNFP Fellows' main concentration was on the land. "Aina ulu," another guiding Hawaiian principle, asserts to "grow that which feeds us." Hannahs explains, "Stewardship of the land and literally 'growing the land' becomes an inspiration for our own growth. As we bring people to the land, the land becomes a classroom we cannot afford to buy."

With "Aina ulu" in mind, Kamehameha School officials recognized prior to the Fellows' gathering that the community was hungry for new leadership. The local food market and the industry were in need of better coordination One of the most valuable ideas to come out of the workshop was this: If you compress the value chain and organize the marketplace of producers, you will ultimately gain a better understanding of the demand profile.

Understanding the local food producers means that the future leaders of this movement need to understand the farmers. As Mawae Morton reflected, "Seeing ranchers and farmers, who are used to wrangling cattle and breaking their backs in the

FNFP Fellowship

Neil Hannahs, director of Kamehameha Schools Land Assets Division addresses the Honolulu workshop attendees.

fields, get an emotional reaction to our young people's willingness to lead is very powerful."

Rethinking this system is a tremendous challenge and it is inspiring to see young local leadership rising to confront it head on. Hannahs added, "By bringing production and consumption closer together on the value chain it helps the farmers. Right now [farmers] are at the most volatile part of the chain—they assume the most risk and receive the smallest margins."

Mahinapoepoe Duarte, executive director of Paepae O He'heeia and one of the 2008 FNFP Fellows, may understand this challenge more than anybody—she has more than ten years' experience cultivating cultural sustainability in Hawaii. After the workshop she observed, "The real benefit happens on our follow-through. The workshop offered a good venue for dialogue, but it is in acting on the ideas that we discussed where the true value of the workshop will be revealed."

So, it is with a great challenge on the horizon that the future leaders of a more sustainable Aotearoa and Hawaii move forward. With RMI's guidance, Kamehameha Schools and Stanford University are encouraging the values-based community-level leadership necessary to sustain a hungry community isolated by 2,000 miles of water.

"I really enjoyed the opportunity to meet and work closely with the Fellows," says Natalie. "Lio and I were able to provide them with help on the workshop, and the Fellows offered us a fantastic cultural perspective that we would not have heard otherwise. They did a great job of pulling the workshop together and working under pressure, together as a team." •

The Hawaii Gateway Energy Center (NELHA) visitor complex. The building is cooled by pumped seawater, and all the necessary energy is provided by the PV array.

A GLANCE AT OTHER RMI HAWAII PROJECTS

SOME OF RMI'S BUILT ENVIRONMENT TEAM PROJECTS INCLUDE:

HAWAII GATEWAY ENERGY CENTER

- Hawaii's first LEED Platinum building
- Net-zero energy building produces twice the energy it consumes; uses 25kW solar PV array
- Deep seawater used for cooling
- Over $25,000 annual energy savings

KAMAKOA AT WAIKOLOA HOUSING PROJECT

- High-quality affordable housing for Waikoloa workers
- Village-setting design promotes social interaction
- More than half of the total 268 acres is devoted to parks, open space, community facilities, and to preserving natural features

KANU O KA AINA LEARNING OHANA

- High-performance goals combined effectively with traditional building aesthetics of the community
- Completely naturally ventilated
- Efficient lighting design and daylighting strategies reduced energy use by 30 percent
- A 7.2 kW PV system generates 17 percent of total energy

SOME OF RMI'S ENERGY & RESOURCES TEAM PROJECTS INCLUDE:

2007 STATE OF HAWAII ENERGY STRATEGY

- One of the most aggressive renewable portfolio standards when enacted
- Requires wind, solar, and geothermal to make up 20 percent of the state's electricity supply by 2020

2006 HAWAII BIOFUELS SUMMIT

- Convened approximately 50 participants from around the state, including CEO-level representatives of the private-sector biofuels value chain, large landowners, biofuels converters, oil companies, and marine and electric biofuels end users

- Recommendations included: incentives for in-state production; coordinated research and development on crops, processing, and conversion; development of infrastructure to enable fuels to move to market; and coordinated investments across the value chain

2006 HAWAII WHOLE SYSTEMS PROJECT

- Funded by eBay's Pierre Omidyar
- Focused on increasing local food's market share
- Diversify the Island's economy, making it less dependent on tourism
- Increase the safety and security of residents should food imports be compromised
- Strengthen family and sense of community
- Decrease the environmental impacts on the Island

Crash Test Dummies: Challenging the Safety Myth

By Cameron M. Burns

RMI is examining whether lightweight vehicles can be as safe as regular ones.

iStockPhoto / Doug Schneider Photo

IT WAS SUMMER 2000, AND LAURA SCHEWEL was driving to her internship position in Richmond, Virgina. As she passed through a notoriously dangerous intersection, a Class-D truck barreled into the side of her '98 Honda Accord.

Luckily, she walked away from the crash. A full year later, after many hours of physical therapy, Schewel's back injury had fully healed, but getting behind the wheel again remained a nerve-wracking ordeal.

Thankfully, time heals on many levels and Schewel's experience on that early August morning cultivated a professional interest in automotive safety and design. Back then there was no way to imagine that only eight years later she'd be crashing two vehicles together hundreds and hundreds of times—albeit virtually—just to see what would happen to the people inside.

When Schewel joined RMI in 2006, her first assignment was to update *Winning the Oil Endgame*, RMI's 2004 roadmap for getting the United States off oil. But when she had the chance to lead a project aimed at making vehicles as safe as they can possibly be, she jumped at it. Simply put, she was asked to look into the notion that lightweight vehicles can be just as safe as regular vehicles. By studying the dummies and vehicles that she repeatedly crashes in computer simulations, and examining the physics behind those collisions, Laura now has the opportunity to fully understand the forces she previously experienced firsthand.

"There's a lot of compelling anecdotal evidence that light cars can be as safe as regular cars," she says, "but there was no academic or statistical base. As I catalogued the studies that had been done, I realized there was a really significant gap in the literature."

iStockPhoto

The "gap" she mentions was simply the fact that while there were studies that described what might happen to people in a car that was a few pounds lighter, there was nothing describing what would happen with a car that had gone on a real diet—and lost, say, 40 to 50 percent of its mass.

"In every major study there'd be this little footnote that said while lighter is not necessarily more dangerous, we don't want to be held to that statement up to more than 100–200 pounds," she says. "Those little footnotes were a problem for us."

So, Laura wrote up "a little paper" about the many ways vehicles can be safer for the planet and for both drivers and other road users and presented it at a Society of Automotive Engineers conference where it was well received. With that success, she subsequently wrote a blog post for Yahoo! Green about the subject.

Yahoo!'s editors liked the piece so much they moved it to their homepage, where it was viewed more than 300,000 times.

"All of a sudden the site traffic for rmi.org went crazy, and people were sending me death threats via outreach," she recalls. "I thought, wow, this is really a hot topic. We should pay a bit more attention to it."

About the same time—as luck would have it—Schewel had crafted a proposal centered on exploring the literature gap. A flurry of emails went around RMI, the proposal was submitted and, just a week later, the William and Flora Hewlett Foundation committed to fund the project.

Today, RMI's MOVE Team is deep into researching whether lightweight cars can be just as safe as heavy cars.

Model Dummies

The research involves creating computer models to simulate crashes of lightweight vehicles and popular on-the-road vehicles of about the same size. MOVE Team Analyst Mike Simpson is in charge of the modeling and is working with a subcontractor who will generate 500 virtual crashes in real-world configurations.

Jonah Bea-Taylor

RMI Analyst Mike Simpson reviews simulation data.

Most people, says Simpson, assume that in a collision a heavier car will fare better than a lighter one.

"The computer models are based on Newton's Laws but you don't have a solid single particle the way most people expect," he says. "You actually have multiple components that all react differently depending on their orientation, the material they're made of, their mass, the components around them they react with, and other considerations. And there are so many different materials in a car that it becomes a pretty complicated problem pretty quickly."

Specifically, the computer doing the modeling divides the cars into tiny tetrahedrons (pyramid-shaped particles) that represent parts of the car. Millions of the tetrahedrons might represent the bumper, for example. Tens of thousands might make up a door handle. The tetrahedrons are then assigned values for various characteristics of that component (density, material characteristics, deformation properties, etc.).

"The bumper, for instance, is a single piece of metal or plastic," Simpson explains. "But you don't analyze it as a single solid piece of plastic or metal."

The computer will then pull together what happens to the millions of tetrahedrons and generate images and animations of how the vehicle deforms, where the forces are greatest, and, ultimately, what happens to the people inside.

The larger the number of particles studied, the clearer the picture becomes of what happens—"higher resolution," Simpson calls it.

Once the testing is complete, MOVE researchers will write a technical paper on their findings and publish it on a dedicated Web site. In addition to this crash testing, Schewel will design a market survey to query vehicle buyers on their attitude toward light vehicles.

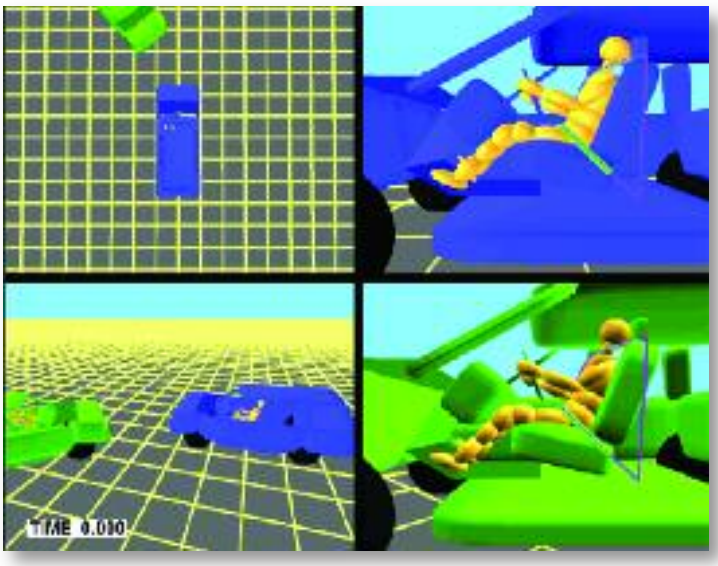
The Target Audience

The MOVE Team has several specific audiences targeted for this research. First are vehicle buyers themselves, who, according to MOVE Team research thus far, are overwhelmingly women in their 20s, 30s, and 40s.

The second audience—perhaps the most important one—consists of insurance providers. Some members of the insurance industry associate lightweight cars with danger. That's because they're accustomed to steel cars. And steel cars that are lighter have, by definition, less steel in them, which makes them more dangerous.

Anything that's new to insurance companies is going to be an inherent risk," says Simpson. "That's just how insurance companies operate. And insurance companies know steel vehicles because that's all we have."

Besides the obvious greenhouse-gas emissions and fuel savings-related benefits of lightweight cars, Schewel is quick to point out that there are huge benefits to the people who might be hit by lightweight cars: pedestrians, cyclists, and drivers of other vehicles. That means that the government will become another key audience.



Dynamic Research, Inc.

A computer simulation of vehicles approaching a head-on collision.

"All the indications are that the benefits to other road users are going to outweigh benefits to the car drivers themselves," she notes. "And it is absolutely in the insurance industry and government's interest to promote those societal benefits. In Europe they're really focused on pedestrian safety and 'other-car' safety but that wave of regulations hasn't hit the U.S. as hard yet."

One of the big challenges with lightweighting cars will be aligning individual consumer interest with societal goals. There are ways to do that, Schewel says, but for now, she's just glad that the effects of lightweighting on carbon emissions and safety look extremely positive.

"Car crashes are the second-leading cause of death among young people between five and 29 years old, worldwide," Schewel adds. "So it's an extraordinary example of multiple solutions for a single expenditure, if you can simultaneously bring down these two scourges on society: global warming and traffic deaths." •

Walking the Talk and Leading Others to RMI

By Cindy Cash


Treena Joi

FROM HIS OFFICE IN ONE OF THE THREE landmark towers that comprise the world headquarters for Adobe Systems, Inc. in San Jose, California, Chris Quartetti can watch planes take off and land at San Jose's Mineta Airport two miles away. Back in 2006, when the Adobe Towers were recognized as the world's first commercial enterprise to achieve a total of three Platinum certifications under the Leadership in Energy and Environmental Design (LEED) program, RMI was a proud member of the celebrated design team.

But that's not how Quartetti came to be involved with RMI. And it's sure not the way he first heard about Amory Lovins and the Institute's work.

People learn about RMI in many interesting ways. Sometimes it's through a book they picked up at a bookstore or been given by a friend or been assigned to read for a class. For others, it's an off-the-beaten path visit to Amory's home and the Snowmass Headquarters as part of a road trip. And for some folks, the first time they hear about RMI is because of a magazine article, a TV show, or even an internet blog.

For Chris Quartetti, it boils down to a cassette tape.

Today an accomplished software engineer on the Adobe Illustrator Team he tells a story about a day long ago, when he was in Chicago: "The first time I ever heard of Amory Lovins, a friend of the family, Carl Parker, stopped by the house with a cassette tape of Amory speaking about negawatts. And I thought that was such a smart idea and a smart way to look at it from that approach—that it's cheaper to build efficiency than it is to build a new power plant!"

This took place in the early- to mid-1980s, and something "clicked" with him at the time. In fact, Quartetti has been "finding ways to lead a more energy-efficient life ever since."

In between then and now came college, followed by a move west to Stanford for graduate school. He found himself drawn to the "clean logic that you get in computer science," and understanding how things really "work inside." Even as a kid, he enjoyed building and tinkering with things, so there was also the appeal of "designing something and building it and seeing it work."

Yet there's a fundamental difference about being in the business of building software, he says. "Unlike another field, if you break it, you're not really breaking anything physical. You can unwind it and start all over again. No penalty."

After earning his master's degree in 1998 and working for Northrup Grumman for five years, he joined Adobe as a member of the Illustrator Engineering Team. One of the rewards of "working on this particular product," he says, "is that sometimes we interact with the people who are testing pre-release versions and they'll ask questions or say, 'Gee it would be really great if it did it this way,' and we can respond back. Sometimes it's something that's very easy for us to do and it will make these people's lives easier on a daily basis. Every time they click here, they get a particular action. It's really nice to be able to tailor [the program] and make it more effective for people."

This desire to make things better and do things more effectively is a strong and recurring theme throughout Quartetti's life—one that brings us back to the Chicago cassette tape and ultimately to the man who has actively supported RMI for well over a decade.

During the 1990s Quartetti kept hearing about RMI from many different directions. He heard Amory's name mentioned more and more, and the memory of the long-ago taped interview and its message resonated even deeper. Over time, he liked what he heard and read so much that he became a donor. His generosity

was soon noticed at RMI and one day former RMI Development Director Dale Levy called to acknowledge his support.

"Dale called when I stepped up my contributions in 2002," recalls Quartetti, "apparently when most people were dialing back due to the recession."

After receiving this call, Quartetti responded by offering even more. He not only reaffirmed his commitment to RMI, but also began donating Adobe products for use throughout the Institute.

And he didn't stop at that. Instead, he worked with Adobe to leverage additional support for RMI through the company's matching funds program. In addition, Quartetti encouraged—and continues to encourage—his friends, relatives, and fellow employees to contribute to RMI.

Here's how he did it: "Often people come to me with software requests," he says. "And I'm happy to get software for my friends and relatives when they ask. My policy is to trade a check payable to RMI in an amount at least double my cost (still below retail) for the software. I leave the upside of their donation amount open. For What It's Worth (FWIW) software obtained through the employee software purchase program is for personal use and gifts," he adds, "so it cannot be sold."

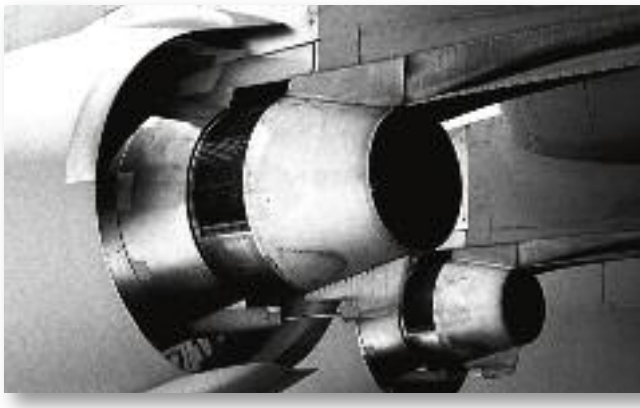
On a day-to-day basis, the Adobe software donations made possible through Quartetti have radically increased RMI's ability to do cutting-edge work in graphic design and web development. As Jonah Bea-Taylor from the Communications Department explains, "Dynamic visuals are much more engaging to our audiences, and they help us explain some of the complex ideas RMI is developing."

Moreover, Llewellyn Wells, RMI's VP of Communications and Media, reports that Quartetti's most recent software donations have "already been put to use in the design of our new microsites for the research and consulting teams. In addition, we are planning a major overhaul of our home page (www.rmi.org). This design process will greatly benefit from having the industry standard Adobe software."

[**Editor's note:** Even the *Solutions Journal* you are now reading benefitted greatly from our ability to work with professional layout artists and photographers—all the images and designs for the final copy had to pass through Adobe software.]

The list of Quartetti's interests and accomplishments is long and varied. He's a man who's been walking his talk in all areas of life, from bicycling to and from work, to pet projects involving state-of-the-art lighting and retrofitting his parents' home, to exploring cutting-edge economics and trends in markets and finance. He's a skilled photographer whose love for nature and the environment shines through the lens of a camera, as shown in the photos at right.

According to RMI Senior Development Officer Ginni Galicinao, "Some donors prefer to support a specific project. Chris, on the other hand, totally understands the importance of providing core support to RMI's general operations. Chris represents what a true ambassador looks like for RMI…not only is he a member of the National Solutions Council (NSC), he has donated software to RMI for years now, and he spreads the word about RMI every chance he gets. He is truly one of RMI's most active supporters and promoters." •



A selection of photographs taken by RMI donor and NSC member Chris Quartetti.

RMI Takes the Next Step in Campus Sustainability: From Green Buildings to Living Communities

By Cameron M. Burns

RMI's whole-system approach has the potential to transform the idea of campus greening from single projects to integrative communities. This leap could provide a model for the next generation of leaders.

College campuses have long been hotbeds of social change. The Civil Rights Movement, the Free Speech Movement, human rights causes, and numerous anti-war and social justice movements can all trace their roots—at least in part—to campuses across the United States and abroad. And the persuasive power of dedicated, idealistic young students can often be harnessed to bring about the greatest social change.

Today, many college campuses are focusing on a new kind of societal transformation by leading the green movement and doing what they can to address environmental problems. What used to be the occasional recycling program or an inclination toward organic food has become a full-fledged international movement that many observers believe will revitalize communities, introduce new areas of academic study, alter traditional career choices, and revolutionize education itself.

Even a casual scan of educational institutions' green activities shows there are thousands of efforts underway in nearly every state involving schools of every type and size.

The University of Monmouth in New Jersey, for example, recently put in the largest solar installation east of the Mississippi, saving the school $150,000 and reducing electricity demand by almost 500,000 kilowatt-hours a year. The Richard Stockton College of New Jersey installed one of the world's largest closed-loop geothermal heating and cooling systems, an 18-kilowatt solar photovoltaic array, and a 200-kilowatt fuel cell. In 2005, students at U.C. Santa Barbara started an educational program that ultimately led to campus-wide lighting retrofits, the use of motion sensors, and the installation of more efficient heating and cooling systems, thereby reducing carbon dioxide emissions by 8,100 tons. The list is long and varied, but the green wave is rising.

RMI's Work with Communities

Henry Ford once observed, "If everyone is moving forward together, then success takes care of itself."

Rocky Mountain Institute has worked on sustainability as it relates to a variety of communities since 1984, when Senior Consultant Michael Kinsley cofounded a research and consulting practice based on the notion that engaging large subsets of people can be a powerful way to get energy and resource solutions adopted and implemented.

And, not surprisingly, colleges and universities have been prime candidates for the type of work RMI does. In 2002, the Institute assessed ways that Oberlin College could reduce its greenhouse-gas emissions. In 2005, Stanford enlisted RMI to help identify ways to reduce emissions at its two-mile-long Linear Accelerator Center. More recently, RMI has assisted the University of Hawaii, the University of Vermont, and Duke University with environmental sustainability and stewardship goals.

"In the past we've done individual [campus and community] projects oriented toward technical analysis," Kinsley says. "Typically they've been one-offs of buildings or energy systems or something else; excellent projects, but we weren't doing any whole-campus or whole-city jobs."

Over the years, Kinsley has been pushing his practice toward working with the larger subset of a "sustainable human settlements." His goal of larger community-oriented issues was recently given a boost when a foundation contacted RMI and enquired if the Institute could delve into college- and university-wide climate solutions, specifically in terms of campus operations, taking RMI's work, Kinsley says, "to a whole new level."

Architect Randy Wilmot tours the newly constructed Sophia Gordon dormitory at Tufts University.

Tufts University

Tackling a Vast Set of Challenges

"Accelerating Campus Climate-Change Initiatives" sounds grandiose, but in reality, RMI's campus climate initiative is—from the outside—rather straightforward. It's about information, a sort of fact-finding and fact-sharing mission. Working with the Association for the Advancement of Sustainability in Higher Education, RMI will build on foundational research that has already been published by various sustainability professionals at universities and the National Wildlife Federation's growing Low-Carbon Campus Series.

Supported by a grant from an anonymous funder, Kinsley and Sally DeLeon, a Research Fellow on RMI's Built Environment Team, spent the summer gathering stories from colleges and universities across the country on how their climate-change initiatives are unfolding and what obstacles the campuses have encountered. Throughout the fall and winter, they will be in the process of conducting deeper research with ten selected campuses. Next spring, they will publish their generalized findings as a web-based framework for whole-system climate action in campus operations. The stories include everything from wild successes to instructive failures. "To make this project genuinely informative, we need to understand failures as well as successes," Kinsley notes. After visiting the selected schools this fall, Kinsley and DeLeon will conduct an RMI workshop with participants from all ten campuses to tease out the best ways to advance their climate-change initiatives.

Tufts University

The process may sound simple, but the two researchers say the issues are anything but. Colleges and universities can have Byzantine organizational structures that are often much more complex than corporate entities. Financing, split incentives, school culture, stranded assets, and faculty and staff buy-in create unique challenges that can be difficult for a school to overcome.


RMI Trustee David Orr thinks that the green campus movement can spur widespread societal changes.

"For example, often one department is responsible for capital investments, while another runs operations and the two don't necessarily work together," Kinsley notes. "There's no incentive for the capital budget manager to invest in building retrofits that'll help the budget of the operations people. It's just a dumb structural condition that nobody meant to create that becomes an institutional barrier. Those are the kinds of things we want to dig up."

RMI Trustee and Oberlin College professor David Orr is quick to point out that one enormous barrier to change is the notion of changing curricula, which can threaten faculty jobs, budgets, and fundamental school principles.

"The main architecture of the curricula is sacrosanct," he says. "Conversations still don't easily cross back and forth between disciplines. And anything that begins to threaten that structure dies a pretty quick and painful death."

Moving the project forward will also involve a workshop and additional research, followed by the creation of "an overarching framework for accelerating campus climate-change initiatives" and offer it as a web-based report.

"This RMI project focuses mainly on operations," notes DeLeon. "But since all of these aspects have a lot of potential for synergy and cross-over, we will also learn about connections between operations and the other aspects and hopefully expose creative, innovative ways to make these connections and create solutions that address multiple aspects at once."

What's truly inspiring about this effort—all green campus initiatives, really—is its vast potential, especially in terms of education.

A Complete (and Completely) Powerful Education

As a professor of many years, Orr has developed some remarkable notions of just how far the green campus movement could go. In fact, Orr says that if the green campus movement is followed to its logical end, it would change society entirely.

At present, he points out, students and faculty are thinking of the green campus movement in terms of physical flows: for example, how much waste a campus produces and how much energy it needs.

"But that's only a means to an end," he says. "The real end is about changing the way people think, not just about resource flows through the places in which we purport to be thinking. I could imagine a university having one subject: carbon. Just follow the carbon. And when you think about it, that's a big doorway. You get into the realm of carbon and it would take you to English literature, it would take you to poetry, certainly to chemistry, it would get you to economics, it would get you really quickly to philosophy."

Changing the way people think about educational topics might "sound flaky as hell," Orr says, but it also could turn education on its head, which in turn could change society by changing what's important in society. The thinking is that by changing what people learn in college (and other educational settings) you change what they do in life and how they respond to the world around them.

Even if Orr thinks his ideas are slightly radical, all indications suggest that they're not far off at all. Sustainability-related efforts are already turning curricula upside-down at many schools. Graduate students at the University of Virginia's business school are studying ways to use waste rice husks to generate power in India. Vermont's Middlebury College recently established a grant program for "sustainable study abroad." And architecture schools across the country are offering "green building" courses of every type. In 2007, Arizona State University created the country's first school of sustainability, and now offers degrees in "sustainability" from the bachelor to Ph.D. level.

Many students are even pledging to take what they've learned out into the real world, as a group of George Washington University students did last May when they pinned green ribbons on their graduation robes and caps and signed a commitment to bring sustainability principles to their careers.

"My personal thought is that the biggest changes are yet to come," says Ken Bagstad, a Ph.D. candidate in ecological economics at the University of Vermont. "As more and more students from all fields, beyond the traditional environmental studies/science majors (e.g., engineering, business, etc.) become leaders in greening their campus, they'll have the opportunity to 'green revolutionize' their professional fields. I envision that just as we're now seeing incoming students use 'greenness' as a criteria to pick a college or university to attend, these same students will become a major force in transforming their professional worlds, using the skills and expectations they gained in their years participating in the green campus movement."

The Enormous, Unexpected Benefits of Green Campuses

Colleges and universities starting down green paths are already finding huge advantages over their not-so-green competition. Some are experiencing increases in student applications because of their sustainability and climate initiatives.

Top: Colorado State University is one of the research universities that RMI will visit this year. © CSU

Middle: The Luther College Center for the Arts features a geothermal heating system. © Luther College

Bottom: The University of Vermont's Dudley H. Davis Center was the first new student center in the U.S. to achieve LEED Gold Certification. © Bob Handleman.

"We have heard that students make a decision on where to go to school solely based on sustainability," Dave Weil, University of California at San Diego's director of building commissioning and sustainability recently told Climate Wire, a climate-change-oriented news service.

But that draw isn't limited to big-name universities. In fact, DeLeon points out, smaller and lesser-known—even two-year—colleges can be leaders in sustainability-related fields.

Case in point: Butte College, a two-year community college in Northern California. That school recently won the National Wildlife Federation's Chill-Out Award, aimed at celebrating campus-based initiatives, by delving heavily into energy efficiency. It is now on course to be carbon neutral by 2015. Butte College also recycles more than 75 percent of its waste and runs the largest community college transportation system in California. *Community College Times*, the biweekly newspaper of the American Association of Community Colleges, recently called the school "one of the national leaders in sustainability, and one that can serve as a model for community colleges."

Bob Handleman

Local and organic food options in the Marketplace at the University of Vermont's energy-efficient student center.

Still others are pulling in more funding from donors, and others are winning funding from government programs that support renewable energy. Some are attracting more promising students, and many are drawing top-level faculty members.

"If I were to give a list of the benefits that came about because of the Lewis Center now, most of them were things I couldn't have fully anticipated at all when we started the project in 1995," says Orr of the Adam Lewis Environmental Center at Oberlin. "I would never have anticipated, for example, that a lot of money would've come in long after we had the thing paid for. I wouldn't have anticipated the bump in enrollments, which continues to this day. We have students come here just because ecological design is part of our curriculum. At the last U.S. Green Building Council meeting we went to, we had 42 alums at that meeting, all of whom were involved in the making of the Lewis Center. I wouldn't have anticipated any of this, but opportunities feed on opportunities."

Impacts Across the Board

As this issue of *RMI Solutions Journal* goes to press, 558 school presidents have signed the American College and University Presidents' Climate Commitment, which is a voluntary agreement that their institutions will strive for carbon neutrality. Some schools that haven't signed are actively working toward ambitious greenhouse-gas emissions reduction goals of their own. As Orr is quick to note, there are roughly 3,700 colleges and universities in the country with a buying power of around $20 billion a year.

"That's a lot of clout," he says. "If ecological design and carbon neutrality become the norm, that changes a lot of resource flows right away. And if colleges and universities begin to see themselves as catalytic agents in developing re-localized, self-reliant, solar-powered economies, if they become like the salt in the stew—agents of much larger change—you begin to see the makings of a very serious revolution. And I think that's kind of where we're headed, it's just not as fast nor is it as thorough as it needs to be."

Drawing students and donations is one thing, but changing the rules is something entirely different. RMI's Built Environment Team experienced the power of green campus work in the early 2000s when the Institute helped design the University of Denver College of Law's Frank H. Ricketson, Jr. Building.

The design included waterless urinals and other water conservation features. But when the state's lead plumbing inspector read about the urinals in the newspaper, "He basically got up in arms and said 'you're not installing these on my watch,'" recalls Cara Carmichael, a Senior Consultant on RMI's Built Environment Team. "He had never worked with them, he didn't trust them to hold up, and he had about a dozen other excuses."

But the law school had connections with the governor. The students rallied together and, with the help of several influential professors, got the governor to pressure the plumbing inspector to allow the urinals on a one-year trial basis to see how well they worked and if they would be appropriate for general use.

"So they were installed and they worked great and still work great," Carmichael says. "Now, other buildings in Denver are using them. They were pretty much granted because of that building."

Huge environmental benefits, fantastic educational opportunities, green campuses and communities—the benefits are too significant to ignore. Yet the movement is still experiencing fits and starts. Just like many companies, colleges and universities need to understand the full range of benefits—including important business benefits—that can be derived from reducing their carbon footprint. And according to DeLeon, this is one way that RMI's involvement could spur fresh thinking about energy and carbon in campus operations. "That's why we're taking this on," she says. "It's similar to Amory Lovins's old adage about the business sector: schools will either have to follow suit or lose competitive advantage." •

Photo © Lauren di Scipio

ACCELERATING CAMPUS CLIMATE INITIATIVES

An RMI Research Project

Twelve schools have been invited first to host a two-day site visit for research by RMI this fall. Next, they will collaborate with each other, RMI, and AASHE in a barrier-busting workshop on campus carbon footprint reduction. This group was chosen for its diverse range of experience and understanding of the successes as well as obstacles to climate-change mitigation on campus.

TWO-YEAR COMMUNITY COLLEGES:

Harford Community College
Bel Air, Maryland • 27,000 students

Lakeshore Technical College
Cleveland, Wisconsin • 12,600 students

Richland College
Dallas, Texas • 20,000 students
(One of seven colleges in the Dallas County Community College District.)

FOUR-YEAR LIBERAL ARTS INSTITUTIONS:

Furman University
Greenville, South Carolina • 3,000 students

Luther College
Decorah, Iowa • 2,500 students

Unity College
Unity, Maine • 500 students

University of Minnesota
Morris, Minnesota • 1,700 students

RESEARCH UNIVERSITIES:

Colorado State University
Fort Collins, Colorado • 25,000 students

Tufts University
Medford/Somerville, Massachusetts • 8,500 students

University of Vermont
Burlington, Vermont • 11,200 students

University of Missouri
Columbia, Missouri • 28,000 students

Yale University
New Haven, Connecticut • 11,300 students

Greening the Purple "Y!"

By Noah Buhayar

IT COULD BE AN AVALANCHE THAT'S EXPLODED down a chute near Ashcroft, in the mountains of Central Colorado. Or a climber with a broken leg stranded at 11,000 feet on Capitol Peak. Maybe this time it's a hiker, disoriented and lost in the cold, dark night—a hiker who could be anywhere on a grid of dozens of square miles.

But there's one thing that's certain, says Christina Page: "You don't know what you're going to get when that pager goes off." During her seven years at RMI, Page was an active member of Mountain Rescue Aspen—helping dozens of hikers and skiers out of difficult, even life-threatening situations.

This deep concern for her fellow humans, her ability to face critical situations head on, and her fearlessness in tackling the "unknown," extends to her life's work as well. Page talks about the "view from 30,000 feet," a metaphor for looking at the big picture. And from that height she's focused in on the some of the most serious problems facing our technology-driven society from her new position at one of the world's largest and most influential technology companies.

To most of us, the Internet represents a huge breakthrough in progress and sustainability. We no longer have to labor in longhand, use up paper, pay for postage, and bide time while a gas-guzzling jet carries our information across the country. A few electrons slip effortlessly through wires and, presto! Our communications arrive instantaneously.

All it takes is to boot up, launch a browser, type in an address, and, before you know it, you're sending email, reading news, or looking at a friend's online photo album.

But for Page, now Director of Climate and Energy Strategy at Yahoo! Inc., the Sunnyvale, California-based Internet company, all those services have a physical and environmental impact to consider. And the challenge for this forward-thinking company stems from the sheer volume of its activities. Yahoo! reaches 500 million people around the world. From data centers to office space to employee air travel, Yahoo! consumes energy that emits greenhouse gases while providing its search, news aggregation, email, and other tools to users.

Jack Huynh / Orange Photography

But behind that obvious fact, the company and its employees all share a core belief and a set of core values. As Page points out, "from the cofounders to the accountants, to the legal department to the amazing engineers who design and run the data centers, the importance of energy efficiency and reducing waste to this company and the entire industry is a no-brainer." As a result, the company pledged to go climate neutral, and it achieved that goal in 2007 by purchasing offsets against its entire annual carbon footprint—250,000 metric tons of carbon dioxide-equivalent emissions.

Lena Hansen

An accomplished outdoorswoman, Page is shown with Lena Hansen and Danielle and Andy Smith.

That's comparable to powering down the Las Vegas Strip for two months each year.

This bold start is only part of a long-term strategy. Page, who has been with Yahoo! for the past year, is devising even better ways of measuring the company's greenhouse-gas emissions, figuring out how to reduce them, and helping the company make responsible decisions about how to offset the rest.

Her first day on the job was spent on an airplane, flying down to Brazil. "I didn't even have a computer or business card," she recalls. Once there, she and a colleague looked at a number of small, run-of-river hydroelectric projects in remote wilderness areas. Yahoo! is committed to purchasing offsets that meet rigorous standards and are in parts of the world where it has a presence. Any offset the company buys is thoroughly vetted by third-party sources.

Jack Huynh / Orange Photography

Page gives a tour at the Sunnyvale, California, headquarters

Things have barely slowed down since her whirlwind start at Yahoo! more than a year ago. Corporate sustainability programs are bursting onto the scene across almost all disciplines, yet they are still fairly young ventures charting brand-new waters.

"It's all moving so fast. I got used to drinking from a fire hydrant while at RMI, but this is a whole different fire hydrant," she says with a smile.

Hitting the ground running is exactly her style, though. Prior to joining Yahoo!, Page spent seven years at RMI, rotating through the Institute's consulting practices, working with corporate clients on sustainability strategies and helping utilities with energy efficiency and greenhouse gas management. At one point, she taught a semester-long course on Natural Capitalism at Peking University in China.

"Her experience at RMI is one of the first things that stood out for us," says Meg Garlinghouse, Senior Director of Yahoo! for Good, the company's social responsibility arm, and one of the people Page reports to. "In addition to coming from one of—if not the most prominent environmental organization in the U.S.—she also had extensive experience working with corporations. She understands that you can't just create a solution in an intellectual vacuum."

For her own part, the Wellesley, Massachusetts, native credits RMI for teaching her to look at problems from a whole-system approach and spot the opportunities. At Yahoo!, that means working with staff across the company to understand the biggest leverage points. When pressed to compare the two companies even further, Page's trademark wit surfaces, "There's a lot of spirit of creative collaboration here like there is at RMI," she says, "but here it's computer geeks not efficiency geeks."

According to Page, electricity consumption is by far the largest contributor to the company's carbon footprint. Some of Yahoo!'s most energy-intensive facilities are data centers, buildings that store and process the vast amounts of information that make services like Flickr possible. According to a recent EPA study, the data center industry as a whole doubled in size from 2001 to 2006. If past trends continue, energy use in the sector would nearly double again by 2011.

Getting a handle on Yahoo!'s energy use and figuring out creative ways to reduce it is key to Page's climate strategy. But it's also key to Yahoo!'s corporate strategy. In June, she organized a meeting with the company's cofounders, Jerry Yang and David Filo. "At the highest level…there's a really acute understanding of how, if you use your servers more efficiently, if you eliminate servers that are under-utilized, if you figure out ways to code more efficiently, it's good for the bottom line, it's good for your reliability, it's good for your capital costs, good for reducing your operating expenditures," says Page. "Before you even get to the greenhouse-gas aspect of it there is an understanding that this is good for the company."

One of Yahoo!'s newest data centers, in Washington state, is designed to be passively cooled three-quarters of the year. The savings on energy will drop straight to the bottom line, says Page. More importantly, though, Yahoo! is sharing its ideas with other firms in the industry, hoping that through partnerships and collaboration they can come up with better solutions, faster.

Page is the first to admit the challenges her company faces are significant. "This is a strategy that works well in the mid-term," she says of the company's current offset program. Going forward, she's confident that in another two or three years, she'll have an even wider array of options for mitigating or offsetting Yahoo!'s carbon footprint. This could involve anything from advances in computing efficiency to breakthroughs in data center design.

If there's anyone who's well prepared to face an unknown future and tackle a complex challenge, it's Christina Page. "Mathematically and scientifically [climate change] is a really daunting problem," she says. "But one of the things I got from my time at RMI was to recognize how important and urgent the problem was—then get back to work." •

RMI Helps the Department of Defense with Energy Policy

U.S. Army photo by Spc. Christa Martin

"Big breakthrough."

That's how RMI Chief Scientist Amory Lovins described the Pentagon's recent shift in thinking about energy use. When buying platforms or devices that use energy in combat, all the Armed Services must now value energy at its "fully burdened cost." This means the entire cost of *delivering* the energy—sometimes hundreds of times the fuel's direct cost—will be counted, rather than assumed to be zero as it was in the past.

Lovins believes the benefits of this change in thinking will be widespread. Entire divisions of military personnel are devoted to delivering fuel and guarding fuel convoys, so properly valuing saved fuel and using it far more efficiently will save billions, ultimately tens of billions, of dollars a year. And since half the casualties in theater are related to convoys, and about 70 percent of the tonnage they haul is fuel, saving fuel will also save lives.

The decision was made in 2007 but couldn't be revealed until an unclassified report, "More Fight, Less Fuel," crafted by a Defense Science Board Task Force on which Lovins served, came out in February 2008. The document strongly reinforces RMI's 2004 findings in *Winning the Oil Endgame* and previous work about the potential to triple military energy efficiency while making warfighting both more capable and less necessary.

"The military has emerged this year as the leader within our federal government in getting our country off oil," Lovins said. "They're going to require, design, and buy platforms—anything that uses energy in the battlespace, from tanks and planes to soldier electronics—based on the fully burdened cost of fuel. In other words, they're going to value saved energy enormously higher than they did before. We're now helping to work this into military doctrine, training, reward systems, cultures, and practices, so the Department of Defense will irreversibly focus on efficiency."

DoD and Energy Efficiency

The Department of Defense is the world's largest buyer of oil and the nation's largest single user of energy. In 2006, DoD purchased 110 million barrels of petroleum, costing $13.6 billion, and 3.8 billion kilowatt-hours of electricity—roughly 78 percent of all energy consumed by the federal government. Much of that energy is wasted and could be saved without compromising combat effectiveness.

Also, because of its scale and skills, DoD is in a unique position to innovate and help lead the nation to a post-oil economy. Military R&D can greatly speed massive shifts in civilian technology, as it has done by creating the microchip industry, the Internet, the Global Positioning System, and modern jet engines. Moreover, DoD is already the world's largest buyer of renewable energy and is driving cutting-edge installations and developments in electricity and biofuels.

But the military's strongest motivation comes from the direct and immediate costs of energy waste.

"When you have a limited number at the army 'speartip,' supported by a vast pyramid of people and equipment, and those few trigger-pullers are tied down hauling or guarding fuel, there's an enormous penalty in lost combat capability. It's not just blood and treasure, but also being unable to fight because you're distracted by fuel logistics. All the field commanders know this. We've had Marine generals begging for efficiency and renewables to untether them from oil so they can fight," said Lovins. The Task Force also found that the electric grid's physical and cybernetic vulnerabilities are so severe that all 585 military bases in the United States, as well as those abroad, should shift to "islandable" netted microgrids and on-site renewable power where possible. The report even urges "net-zero installations"—bases and facilities that need no energy from the grid. "It never occurred to me when I wrote *Brittle Power*—long before the modern Internet took shape—how stupidly we'd use the grid," Lovins notes. "You can hack into some utilities' control systems through their billing systems by pretending you're a customer. And you can then do very, very bad things that don't just interrupt the power system but destroy it."

Getting the Word Out

For many years, Lovins has lectured at a variety of military and civilian venues about military energy efficiency's potential and importance. He believes "endurance" and "resilience" should be seen as two new "strategic vectors"—big ideas that drive the revolution in military affairs. (The four strategic vectors already adopted have been speed, stealth, precision, and networking.)

He has taken this message to the Defense Acquisition University, where all the military's acquisition officers are trained. He's also eyeing the Training and Doctrine Command (TRADOC) and other centers that form military doctrine. "Doctrine is sort of like the Constitution," Lovins explains. "It's the set of written principles that guide military strategy and behavior. The military is an enormously complex entity. If you want to change the mindsets of the people who make the rules, you go to places like TRADOC."

But he doesn't plan to stop with the military. The biggest traction, he thinks, will come when DoD demands more and more efficient platforms and requires its contractors to build them.

Once prime contractors seriously compete over who can build the most efficient tanks, trucks, ships, and planes, military leadership in the technology and adoption of advanced energy efficiency will really take off. Ultimately, it will greatly accelerate the tripled-efficiency cars, trucks, and planes that will get America off oil, so the military needn't fight over oil. That's a sound path to a safer world.

Clearly, RMI is fighting the good fight. •

Defense Science Board Task Force's Key Recommendations:

Recommendation 1:
Accelerate efforts to implement energy efficiency key performance parameters (KPPs) and use the fully burdened cost of fuel (FBCF) to inform all acquisition trades and analyses about their energy consequences, as recommended by the 2001 Task Force.

Recommendation 2:
Reduce the risk to critical missions at fixed installations from loss of commercial power and/or other critical national infrastructure.

Recommendation 3:
Establish a Department-wide strategic plan that establishes measurable goals, achieves the business process changes recommended by the 2001 DSB report, and establishes clear responsibility and accountability.

Recommendation 4:
Invest in energy efficient and alternative energy technologies to a level commensurate with their operational and financial value.

Recommendation 5:
Identify and exploit near-term opportunities to reduce energy use through policies and incentives that change operational procedures.

DSB Report: www.acq.osd.mil/dsb/reports/2008-02-ESTF.pdf

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Banking on People to Build a Better World

By Cameron M. Burns

Every year Woods and a group of bank employees travel to Mexico to build houses for families.

Photos courtesy of Don Woods

FOR DON WOODS, CHAIRMAN AND CEO OF Community Banks of Colorado and the newest member of RMI's Board of Trustees, banking is more than just moving dollars around in a way that makes financial sense. It's an activity that can bring value to the people and economy of a community, as well as to the natural environment.

"A good, true community bank is very locally focused," Woods says. "They tailor their products and services and pricing to the local community and they get to know their customers in a very intimate way."

Woods's love of community involvement began during his college days, when he spent summers working at various community banks. He liked the banking business model; he liked what they were all about.

After graduating from the University of Denver, Woods began his finance career in Chicago. Later, he moved to London, where he earned a graduate degree in finance and economics and then worked for the Wall Street firm Drexel Burnham Lambert. Although the firm was later driven into bankruptcy in the junk bond market debacle, during the late 1980s the bank was "a very interesting organization in many ways," Woods says. "It changed the way the American economy finances growth, businesses, and new technologies. Many of our current household-name companies were first financed by Drexel."

In 1989, Woods returned to Colorado where he and two others bought Rocky Ford National Bank, a small community bank located fifty miles east of Pueblo.

Colorado's economy was fairly weak in the late 1980s. But as the 1990s dawned, the economy improved and Woods and his colleagues were able to acquire other banks, add new branches, and expand to California. Today, Community Banks has 47 branches and $2 billion in assets.

But these numbers only tell part of the Community Banks story. Social involvement is at the core of the bank and Woods's business practice.

"Philanthropy has just always been part of what I've done and it's always been very important from a cultural point of view here at the bank," he says.

Community Banks donates to more than fifty nonprofit organizations (including RMI), and each year distributes a number of full-ride college scholarships that focus on intensive community and personal leadership education. The bank supports

underprivileged kids and students who have limited access to educational opportunities—typically those from rural areas. By offering a leadership training program for young people in small towns, the bank hopes to make an impact in meeting one of its goals of "stopping the brain drain" from rural communities.

In addition to local community work, Woods takes a group of bank employees to Mexico every year, where together they build houses in the poorest areas of Tijuana.

"We build three or four houses on each trip," he says. "We start on Friday afternoon and we're done by the end of the day Sunday. It's our goal, over time, to have every bank employee go down at least once. But it is so inspiring that several have gone on the trip more than once, and a few have even brought their whole families—including young children—and they now make it an annual tradition."

Woods is also the current Chairman of the Board of Trustees of the Colorado chapter of The Nature Conservancy, is on the board of the Boettcher Foundation, and is a supporter of numerous other conservation organizations.

Although he has followed RMI's work for many years, as a new Board member, Woods has been impressed to discover the breadth of RMI's suite of issues.

"It's a lot more than what I thought," he notes. "RMI helps redefine the issues."

He especially likes that RMI's work on energy and resource efficiency has a market bent to it.

"The way we think from an economic perspective in this country is such a huge barrier to change," he says. "In many ways this country is unique in that thought process. The technology is there, the willingness is probably there, but it's often the CFO, not the CEO who needs to be convinced to make the right choices. The need for change cannot always be calculated and justified using traditional accounting and financial models. We need to fundamentally rethink the economic model and RMI is clearly in the forefront of this shift in thinking." •

"We look at our communities with a 'hundred-years-from-now' perspective. Communities that are prosperous over time nurture and cultivate three things: the social quality, the economic quality, and the environmental quality of their communities. We compare this idea to three legs of a stool. Each leg is equally important, otherwise, the stool will fail. We invest in those people, organizations, businesses, and entrepreneurs who are working hard to improve the quality of the lifestyles in our communities now, and for the foreseeable future."

—Don Woods, Chairman and CEO, Community Banks of Colorado

Woods discusses a building project with a group of Tijuana residents.

A Green Room with a View

By Jennifer Walton

Ashley Muse

Buried in a hillside 60 miles down a dirt road in the Alaskan wilderness sits an RMI success story, high-performance windows framing the snowy peak of Mount McKinley.

THIS IS NOT YOUR USUAL GREEN BUILDING. Of course, the priorities for green building—efficiency, comfort, and ease of maintenance—are all in place. But the newly rebuilt Eielson Visitor's Center in Denali National Park, Alaska, has something more to offer those willing to travel the distance for a visit. According to RMI Principal Victor Olgyay, the park's director wanted to create a building that took nothing from the view, which meant blending the new architecture with the landscape. In essence, the new Eielson strives to be an "invisible" building, responsive and adapted to its remote location, extreme climate, and seasonal use.

"PEOPLE DON'T RIDE ON A BUS FOR SIX HOURS to look at a piece of architecture—they ride on a bus for six hours to look at a great landscape. Rather than fight it, we decided to join it," said James Dougherty, Principal of RIM Architects, the architecture firm that designed Eielson in partnership with RMI.

In addition to RMI/ENSAR (now RMI's Built Environment Team) and RIM Architects, energy modeling agency Enermodal Engineering helped shape the design of Eielson. Carrying RMI's main consulting responsibilities, Olgyay and RMI Consultant Ashley Muse, who served as a project manager, facilitated design charrettes, provided energy and daylighting recommendations, and helped identify the best methods for alternative energy sources for the building, such as photovoltaics, battery storage, and small-scale hydropower. Olgyay and Muse also later coordinated the LEED application process, resulting in Eielson's Platinum certification. Created in 1994 by the U.S. Green Building Council (USGBC), the LEED (Leadership in Energy and Environmental Design) program has proven to be a useful tool in benchmarking just how "green" a building is—and is emerging as a definitive standard for what constitutes a high-performance building.

Much of that planning occurred in 2005. Since then, Eielson's original 1960s era visitor's center has been completely redesigned and rebuilt. It is the first entirely federally funded National Park Service building to receive LEED Platinum certification, and it is running completely off the grid. The building also boasts top-notch passive design and the ability to "go cold" during the six to seven winter months when Denali becomes impassable and is not in use.

"When you are out in the wilderness, you don't want to be confronted with something that interrupts your experience of the awe of nature and its wildness," said Muse. "This building really sort of becomes a part of the landscape; the architectural design is aesthetically in tune with the experience of the beautiful vistas."

Luckily, visitors to Eielson won't have much to interrupt their reverie. Sharing walls with the hillside and tucked beneath a roof planted with native species cultivated from the surrounding foliage, the center neatly blends in to its tundra setting. In addition, the building is small, measuring just under 15,000 square feet. One does not find it by accident; the only way to get there is to take a bus from the park entrance. It is an educational landmark for visitors to the interior of the park and a starting point and shelter for backcountry hikers. It can

Ashley Muse

Looking at Eielson's south-facing window; a direct view from the trail below.

Ashley Muse

The view of Eielson's roof deck and green roof, which also serves as a bus loop.

accommodate up to 300 people and in addition to the exhibit space in the main visitor's lobby, the building houses a first aid room, a bookstore, restrooms, and a small staff apartment.

Eielson's superb design results in an annual energy cost reduction of 84.7 percent. The building's passive design halves energy consumption immediately and keeps the atmosphere bright and comfortable. Designers capitalized on Eielson's function as an assembly space by devising a natural heating system that recovers heat from the air as it is exhausted after a rush of visitors. The heat collected by the HRVs—heat recovery ventilators—is then used to pre-warm incoming air. Eielson's design maximizes solar gain through its south-facing windows and is well-insulated for the extreme climate, including the use of high-performance windows that reduce the glass's transfer of bitter temperatures while allowing plenty of light into the space. Heat conservation is additionally facilitated by the partial underground location, where the ambient earth temperature is warmer and a majority of the building walls are protected from the wind. Apertures in the side of the building and skylights provide the majority of daytime light, and daylight sensors monitor light levels to reduce the use of electric lighting during the long summer days. The little energy demands that remain are met by the integrated photovoltaic and small-scale water turbine systems, which are supplemented by a propane generator in times of high-energy need.

Denali's "summer" season is May through September. During the winter, Denali can be one of the coldest places on Earth, sustaining temperatures of -40 degrees Fahrenheit and below. Large amounts of energy that might have been used to maintain the building throughout the winter are not needed, however, because the building is designed to be shut down or "go cold" in winter. The exhibits, the plumbing, and other elements are designed to withstand the extremely cold weather without damage.

Eielson's redesign is also a certification measure for preservation. In pursuing LEED Platinum certification, which is based on a credit-point system, the design team was awarded points for innovation in design through the preservation of the site's viewshed. The redesign of Eielson is in part intended to help preserve the panoramas and vistas that bring visitors from around the world. According to the project's LEED application, the preservation credit highlights the intent "to protect and preserve this viewshed as a unique and limited resource pivotal to the sustainable design of the facility."

"From an architectural standpoint, we were able to stretch our legs and explore our boundaries," said Dougherty. "Through that process, we were able to achieve a better blend between the natural environment and the built environment."

Moreover, Eielson's LEED Platinum certification is significant because it shows that state-of-the-art buildings can be built on a federal budget. Both Muse and Olgyay noted that several years ago, most Park Service projects using the LEED rating system aimed for LEED Silver certification; however, more recent Park Service projects have begun to push for higher levels of certification. Eielson is a shining example of such an effort. Despite its remote location, which made design and construction even more expensive, designers were encouraged to reach for Platinum within a federal budget.

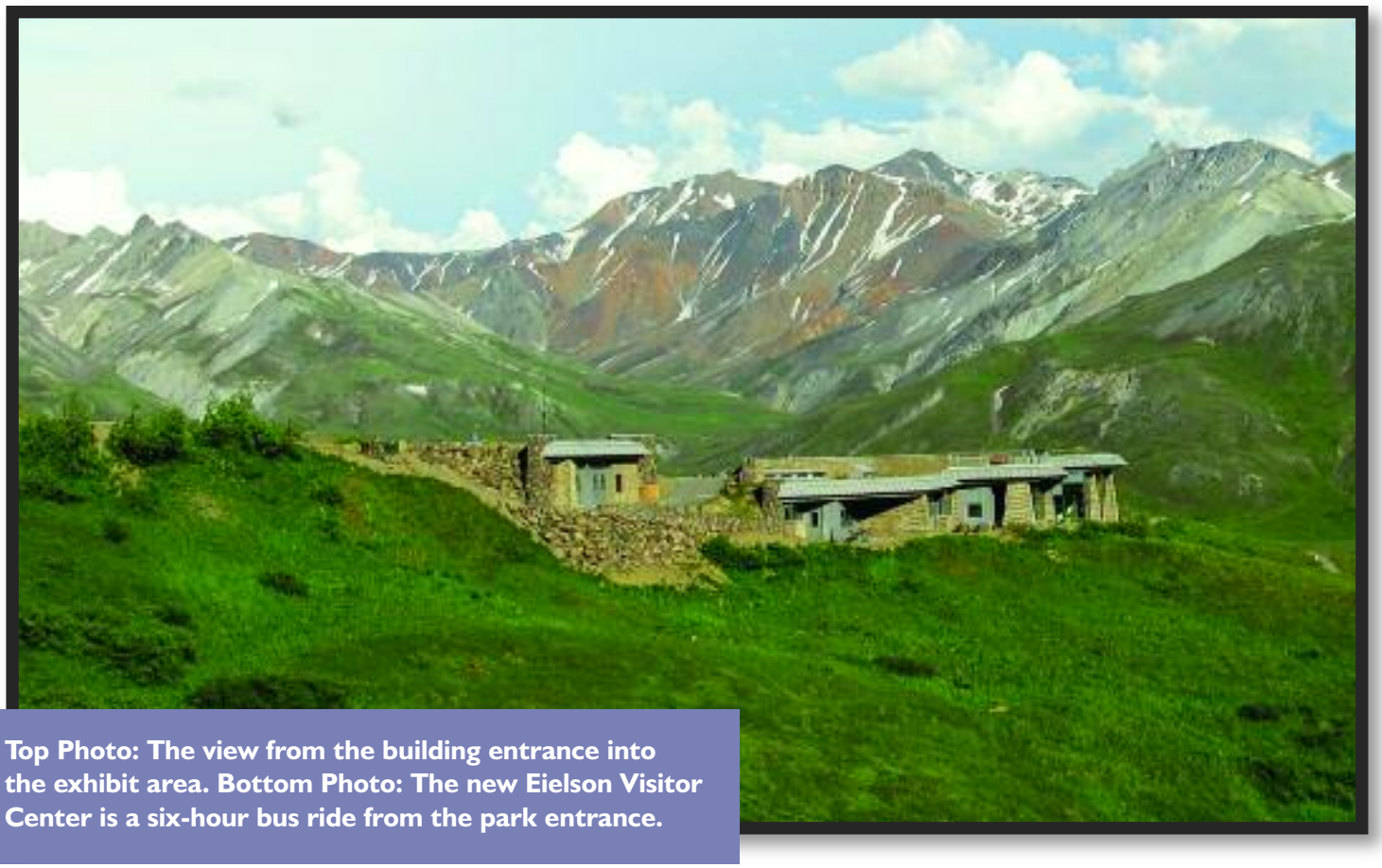
"It's not just that they are meeting the majority of their energy needs through renewable energy—this is possible because the team has worked so hard to design something that is appropriate to place, an important cornerstone to sustainability. And they were able to do all that within the budget of the federal government," said Muse.

Eielson was completed on June 8, 2008, and the dedication and grand re-opening ceremony took place on August 12, 2008.

Eielson is just one shining example of the hundreds of successful projects completed by the Built Environment Team at RMI, including several more in partnership with the Park Service. RMI's partnership with Denali National Park began in 2002, in the redesign of Denali Visitor's Center. Other work RMI is doing or has done with the National Park Service includes the new Visitor's Center in Lassen Volcanic National Park, which is also pursuing LEED Platinum using solely federal dollars, Zion Visitor's Center in Zion National Park, and Apgar Transit Center in Glacier National Park, which has been certified LEED Gold. Additionally, they are assisting in the renovation of Carlsbad Caverns National Park Visitor's Center at Carlsbad National Park, and Beaver Meadows Visitor's Center in Rocky Mountain National Park.

Ashley Muse

By contributing to the design of projects like Eielson, RMI's Built Environment Team has become an international leader in the green building industry, with projects throughout the world that span diverse climates and building types. •



Top Photo: The view from the building entrance into the exhibit area. Bottom Photo: The new Eielson Visitor Center is a six-hour bus ride from the park entrance.

Greetings from Doug Laub

Kyle Duba

I've come home! After a 23-year career in nonprofit fundraising and management, for both large national organizations and smaller regional ones, I am blessed and honored to support the vital work of the Rocky Mountain Institute as its new Vice President for Development.

I look forward to hearing from our current financial supporters about their passion and aspirations for our mission and their experiences with philanthropy and RMI. Nothing energizes an organization more than the vibrancy of its donor base, and we can't thank you enough for your support! As a member of RMI's senior leadership team, I can assure you that support will never be taken for granted.

To those still considering directing some of their philanthropic dollars to our cause, our extraordinarily creative development team is anxious to facilitate matching your personal values with our "game changing" initiatives! Make sure to check below for an outline of the various gift options available to you as the holiday season approaches. Don't forget that with a $50 charitable gift to RMI, we will send a gift subscription of this informative and newly redesigned journal to a family member or friend—just include their name and address with your donation. If you ask us to send it as a holiday gift, we'll even include a card!

On behalf of all of us at Rocky Mountain Institute, thank you for your unbridled encouragement of our world-class "thinkers" and "doers" as they construct real-world, market-driven solutions to the Earth's and mankind's most pressing problems. While the issues are urgent, together we have a chance to deliver a cleaner, healthier, and more sustainable planet and economy to our children and grandchildren. There can be no greater calling than that! •

Ways to Give to RMI

Many of us will make a gift to our favorite organization before the year's end so that we may take advantage of the benefit of a 2008 charitable tax deduction. Here's a list of different ways to make a gift to Rocky Mountain Institute:

Giving online. Logging on to **www.rmi.org** and making your contribution online is probably the easiest way to make a gift to Rocky Mountain Institute.

Cash. Cash gifts are deductible up to 50 percent of adjusted gross income and very easy to transact. Checks that are mailed and postmarked before January 1, 2009, will be deductible on your 2008 return.

Stocks, bonds, or mutual funds that have increased in value significantly —and that you have owned more than one year. You can deduct the current market value of these items, not just your original cost, and avoid capital gains taxes 100 percent.

Surplus life insurance. Many individuals own policies purchased at a time when they had young families or other financial responsibilities. Gifts of policies that are no longer needed for their original purpose will generate charitable deductions, and any future premiums you pay will also be tax deductible.

Stock in your business. Closely held stock often can be transferred with excellent tax results. These gifts usually require careful planning with your financial advisor.

Other investment assets that have grown in value. Other assets that have been owned for more than one year, such as real estate, collectibles, and art can make great charitable gifts, and usually require planning with your financial advisor.

Planned gift. While the prior examples are gifts that Rocky Mountain Institute can use immediately, planned gifts are vital to the growth of RMI's endowment, providing future income for our important work. Remembering RMI as the recipient of a bequest, charitable gift annuity, or charitable trust will also enroll you in the Legacy Society, created in 2007 to celebrate and honor donors who remember RMI with a planned gift.

Note about donor recognition. Although having your name listed as a RMI supporter may well serve to inspire others to give, Rocky Mountain Institute will always respect your wish should you choose to remain anonymous.

If you have any questions about ways to give to Rocky Mountain Institute, you may contact Jim Kozel or any of the RMI Development Staff at **303-245-1003 or jimkozel@rmi.org.**

2008 National Solutions Council Weekend

September 19–21, 2008 Denver, Colorado

Steve Z Photography, LLC

Michael Brylawski addresses RMIQ panelists Friday evening.

Jeffery Johns

Richard Kaplan and Michael Edesess, EDS' Dale Hohenshell, and Marty Pickett tour the solar panels at DIA.

RMI Staff

Cocktails were served on the magnificent rooftop of Denver's Museum of Contemporary Art Saturday evening.

NEARLY 100 NATIONAL SOLUTIONS COUNCIL members from 17 states were welcomed to Denver for the 2008 National Solutions Council Weekend.

The event kicked off on Friday with the RMI Quest for Solutions (RMIQ) entitled, "Solutions for a New Energy Paradigm," which was attended by more than 500 people. Moderated by Stephen Doig, Vice President of RMI's Energy and Resource Team, panelists included RMI Founder Amory Lovins, Principals Kitty Wang and Michael Brylawski, and guests Roy Palmer of Xcel Energy, Tom Dinwoodie of SunPower, Corp., and David Brewster of EnerNOC, Inc.

On Saturday morning, NSC members were divided into three groups to embark upon field trips hosted by the RMI Energy and Resources Team, the MOVE Team, and the Built Environment Team. Destinations included the National Renewable Energy Lab (NREL) Wind Technology Center; HYBRID-PLUS, a business that converts hybrid vehicles into plug-in hybrid vehicles (PHEV); and the largest operating solar array in Colorado at the Denver Museum of Nature & Science.

Upon return, members attended an exclusive mid-afternoon tea in the magnificent setting of a Japanese garden. It featured a discussion between Amory Lovins and Denver Mayor John Hickenlooper, who recently hosted the most "green" political convention to date. That evening, NSC members gathered at the Museum of Contemporary Art for cocktails, dinner, and a presentation on Cooling the Warming by Greg Franta, Vice President, Built Environment Team.

The 2008 Weekend concluded on Sunday morning with a private breakfast and three Solutions Breakout Sessions focused on the Solar Value Chain, Smart Garage, and RMI's Integrated Design Film. Each breakout session—or mini-charrette—utilized RMI's unique approach to identifying solutions: ideation, barrier-busting, and implementation.

In just five short years, NSC membership has grown from 12 original members to more than 200. Almost a third of them attended this year's gathering.

Next year's National Solutions Council Weekend will be held in San Francisco, California. •

Ben Holland

Denver Mayor John Hickenlooper (left) and RMI Trustee John Abele discuss energy issues.

The Energy & Resources group visit a renewable energy site near Boulder.

Jeffery Johns

Contributions

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RMI Event Calendar

October through January, 2008-2009

Smart Garage Summit
October 9–10, 2008 • Portland, OR
A three-day intensive workshop bringing RMI together with experts and stakeholders from throughout and beyond the Smart Garage system, discussing the interconnection of the vehicle fleet, buildings, and the power grid to create energy system synergies in efficiency, cost, and emissions.
nc.rmi.org/NETCOMMUNITY/Page.aspx?pid=232&srcid=211

Energy Imperative Briefing
October 14, 2008 • Boulder, CO
RMI CEO and President Michael Potts will deliver the Energy Imperative briefing, a presentation geared to influence decision makers, at the National Center for Atmospheric Research.

Our Town: Transportation for Energy (Wilmington Area Planning Council)
October 22, 2008 • Newark, DE
Biannual community forum. Given current gas prices and people's attention on transportation and energy issues, this year's Our Town will focus on setting sustainable priorities for the future of transportation. Stephanie Johns of MOVE speaking.

Emerging Technologies Summit 2008
October 26–28, 2008 • San Diego, CA
The ET Summit will bring together top industry experts to discuss the latest innovations in energy-efficient technologies and practices in energy efficiency and transportation technologies. Michael Brylawski of MOVE moderating and participating in Clean Transportation Panel.
http://www.etccconference.com/homepage.html

Association for the Advancement of Sustainability in Higher Education's Working Together for Sustainability: On Campus and Beyond Conference & Expo
November 9, 2008 • Raleigh, NC
Panels and workshops to help faculty and administrators network and learn methods for implementing sustainable measures at their universities. Victor Olgyay of BET has contributed, Michael Kinsley and Sally Deleon, also of BET, attending.
www.aashe.org/conf2008/index.php

Green Car Conference & Exhibition
November 13, 2008 • Novi, MI
Senior automotive executives discuss in depth the challenges, opportunities and trade-offs of reducing the carbon footprints of their vehicles. Michael Brylawski of MOVE speaking.
www.autonews.com/Assets/html/08_angc

Building Our Economy Through Sustainable Development: Greater Portland Council of Governments
November 14, 2008 • Portland, ME
This is part two of a three-part sustainability forum for the city of Portland, which is developing a regional sustainability plan. The forum series is geared toward municipal officials, councilors, private companies, and others. Michael Kinsley of BET speaking.

Multi-state Highway Transportation Agreement Conference
November 16–18, 2008 • Carefree, AZ
MHTA was established for the purpose of solving problems, educating lawmakers about issues in the highway transportation industry, providing communication and information sharing among participating members, and to recommend changes in law or policy with emphasis on compatibility and uniformity of administrative rules or regulations. MHTA's goal is to promote effective governmental action and coordination for the safe and efficient movement of people and goods. Michael Brylawski of MOVE presenting "Transformational Trucks: Determining the Energy Efficiency Limits of Class 8 Tractor-Trailer."

Greenbuild Conference and Expo
November 19–21, 2008 • Boston, MA
USGBC's Greenbuild Conference and Expo is an unparalleled opportunity to connect with other green building peers, industry experts, and influential leaders as they share insights on the green building movement and its diverse specialties. Members of RMI's BET attending.
www.greenbuildexpo.org

Social Entrepreneurship for College Students
January 16, 2009 • Denver, CO
Johnson Wales University runs a two-year intensive leadership development program for college students called Leadership Academy. The purpose is to develop socially responsible leaders for the campus, industry, and community. One of the key topics is Social Entrepreneurship, and Maria Stamas of Comms will speak to students about how social enterprise works, why it's important, and what RMI does to promote it.

8th Annual New Partners for Smart Growth Conference
January 22-24, 2009 • Albuquerque, NM
This gathering of planning professionals from all sectors will showcase research, best practices, and case studies. Members of BET attending.
www.newpartners.org

Building SustainAble Communities
January 24–26, 2009 • Kelowna, BC
Conference that promotes sustainable behavior in British Columbia. Michael Kinsley of BET speaking by videoconference January 25th.
www.freshoutlookfoundation.org/default.asp

www.rmi.org

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As the holiday season approaches, may we suggest honoring your friends and family with a gift to RMI?

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Or, you can choose to specifically support one of the many RMI projects outlined in this issue of *Solutions Journal* by designating your end-of-year charitable gift to RMI. Visit www.rmi.org to learn more about the "game-changing" initiatives underway that are being either fully or partially funded by public charitable support. RMI is a nonprofit so your gifts are tax deductible.

2008 National Solutions Council Weekend

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