

RMI Solutions

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Catching Waves

RMI Helps Hawaii Update Its Energy Strategy

BY LENA HANSEN AND KITTY WANG, PE

It is safe to say that those who are fortunate enough to live or vacation in Hawaii do so in large part because of the environment, which many call paradise. Hawaii is one of the most isolated places in the world, its air is almost constantly refreshed by its prevailing trade winds, its ocean is clean, and its tropical location ensures a pleasantly warm climate year-round. Although recent waves of settlement have harmed some native flora and fauna, Hawaii remains home to hundreds of species found nowhere else on earth.

Hawaii's remoteness creates many challenges as well. Since the late 1960s, the state has relied on oil to meet roughly 90 percent of its energy demand. The cost of this oil dependence translates to a higher overall cost of living, the nation's highest electricity prices, and very high gasoline prices. In September 2006, Hawaii's residential electricity revenues per kilowatt-hour ranged from 19.75 cents to 34 cents, with a statewide average of 24.24 cents compared to a national average of 10.92

cents. Overall, electricity costs were 21.51 cents per kilowatt-hour in Hawaii compared to the national average of 9.26 cents. Hawaii's gasoline prices consistently rank among the highest in the country.

The economic impacts of this heavy reliance on oil are magnified when oil prices rise sharply, as has been the case in recent years. Sharp increases in oil prices affect every aspect of Hawaii's economy, including tourism, agriculture, transportation, and electricity generation. Such a high dependence on oil also creates a supply disruption risk, and has the potential to damage Hawaii's fragile environment. Marine and shore

life is vulnerable to accidental oil spills, and oil-fired power produces air pollution (the effects of which are reduced by the islands' trade winds) and significant greenhouse gas emissions.

Recognizing these vulnerabilities, the State crafted the first Hawaii Energy Strategy (HES) in 1995. The State's goal was to better understand the risks it faces due to its unique energy situation, and to propose recommendations for achieving its objectives of reduced oil dependence, lowered energy costs, increased environmental sustainability, and a diversified economic base. The strategy was updated in 2000 by Hawaii's Department of Business, Economic



Kauai's Na Pali Coast is one of the true wonders of the world.

Hawaii Energy Strategy

Development & Tourism (DBEDT). This year, DBEDT retained Rocky Mountain Institute (RMI) to help DBEDT craft HES 2007 and outline a strategy that will, among other things:

- Promote the more efficient use of Hawaii's energy resources;
- Manage risk by diversifying Hawaii's fuel supply and expand the use of indigenous resources;
- Ensure a secure, reliable, and affordable energy supply; and
- Protect the environment through cost-effective reductions of greenhouse gas emissions.

Achieving these goals could radically transform Hawaii's energy future. However, transformation requires action, not theory. Thus, RMI's recommendations focus on specific steps to be taken by Hawaii's government and regulatory organizations to ensure the success of HES 2007.

In fact, Hawaii has already made significant strides toward energy independence and security. Led by the Governor's Energy for Tomorrow program, the State government, the private sector, and non-profit organizations, coordinated action is

Creating Hawaii's Energy Strategy

The first step in creating the Hawaii Energy Strategy 2007 was to model Hawaii's energy system in order to gain a greater understanding of how it responds under a set of plausible future scenarios. Part of this modeling effort is to test the impacts of potential future policies, such as a carbon tax, new biofuels incentives, and strengthened renewable electricity requirements.

RMI is using the insights gleaned from this modeling to make recommendations on a set of policies and government actions needed to move the State toward greater energy self-sufficiency with higher utilization of indigenous, renewable energy.

An additional objective of HES 2007 is to build collaboration and support. Key stakeholder groups from government and industry have been invited to comment and provide information for the strategy development process. Four stakeholder meetings will be held by the end of the project.

The final HES 2007 report is scheduled to be available to the public in the first half of 2007.

being taken on many fronts to reduce the State's dependence on oil.

In 2001, Hawaii passed a renewable portfolio standard (RPS) that set a goal for each electric utility to meet 20 percent of its net electricity demand with renewable resources by 2020. The RPS was strengthened by making it a mandate in 2004, and the Legislature added penalty provisions in 2006. Also in 2006, the

State passed an Alternative Fuels Standard (AFS), which established that 20 percent of highway fuel demand must be met with renewable fuels by 2020. Currently, Hawaii is on track to meet its 2010 AFS goal of 10 percent renewable fuels.

The State government is "leading by example" in energy efficiency measures in government buildings and vehicle fleets,

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Save the Dates Thursday and Friday, 9 and 10 August 2007

Rocky Mountain Institute's Celebration of 25 Years: Past and Future

Get ready to party—RMI's turning 25!

RMI's August 9–10, 2007 celebration of its past and next quarter centuries will feature leaders and luminaries committed to addressing the world's challenges related to climate change and energy and resource use. *New York Times* columnist and author Tom Friedman will lead the celebratory activities, and as of this issue of *RMI Solutions*, John Abele, Ray Anderson, Yvon Chouinard, Newt Gingrich, Bill Joy, James Murdoch, and Lew Wells had confirmed their participation.

The goals of our celebration are to: inspire and motivate a new audience; encourage meaningful collabora-

tion; raise funds for RMI's cutting-edge work; engage RMI's network of friends and supporters; develop sponsorships for corporations that have chosen the competitive edge of prospering naturally; host a resource-neutral event; and celebrate and have fun.

From Thursday's RMIQ presentation to Friday's all-day symposium, followed by the dinner/dance at the beautiful Peace Ranch in Basalt, Colorado, RMI's 25th Celebration Co-Chairs (Molly and Tom Bedell and Elaine and Rob LeBuhn) promise an inspirational and intellectual feast—and a lot of fun!

Stay tuned to www.rmi.org/rmi25 for additional information.

RMI25
CELEBRATING SOLUTIONS

Amory Named Chief Scientist, Chairman of Trustees' Board

AMORY IS CHANGING SEATS AT RMI.

In November, Institute officials announced that its founder and CEO would take on a new role at the 24-year-old “think and do tank”—that of Chief Scientist. He will also take up the position of Chairman of RMI’s Board of Trustees.

“It’s my pleasure to announce that RMI has begun a search for a new CEO with exceptional skills and vision to lead RMI through its next phase of developing and executing ambitious goals,” Amory said.

Amory, an acclaimed scientist, researcher, and author, co-founded RMI in 1982. An energetic globetrotter at 58, he’ll remain RMI’s CEO until a new CEO is found, then assume his new position as Chief Scientist. In that role, Amory will focus solely on strategic influence, thought leadership, and guidance of RMI’s key strategic projects.

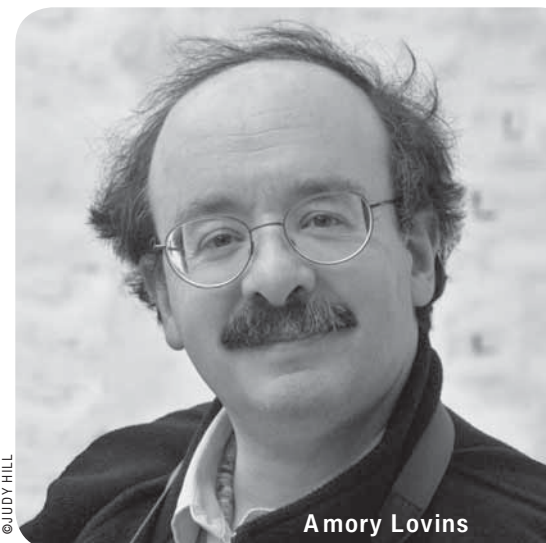
“RMI’s growth and vision have created new opportunities to apply our unique integrative skills in advanced resource efficiency,” Amory noted. “The convergence of costly oil, global tensions, climate change, and political polarization makes RMI’s nonpartisan and systemic approach even more needed and effective. RMI’s achievements and influence are growing as more decision makers and opinion leaders seek our counsel. Where some see only costly problems, we see profitable solutions.”

RMI’s important recent work includes promoting energy efficiency throughout the military; strategically

supporting President Bill Clinton’s initiative to help the mayors of the world’s 40 biggest cities address climate change; helping Wal-Mart double the efficiency of its heavy truck fleet by 2015, saving more than \$300 million per year; supporting the State of Hawaii in transforming its energy strategy; educating utility investors to shift from polluting power plants to cheaper, faster, healthier, climate-safer choices; reinforcing progress in aviation, heavy-truck, and military adoption of key recommendations in RMI’s Pentagon-cofunded 2004 study *Winning the Oil Endgame* (www.oilendgame.com)—a roadmap for eliminating U.S. oil use by the 2040s and revitalizing the economy, all led by business for profit; and redoubling those off-oil implementation efforts in automaking and biofuels.

“We congratulate Amory on his achievements in RMI’s first 25 years, and enthusiastically support him and RMI’s senior management team as they plan for continued success in the next quarter-century,” said John C. Fox, current Board Chairman, who will continue as the lead trustee. “We’re excited for Amory because this transition will enable him to do even more of the strategic work that he’s passionate about. The new CEO’s leadership will complement the skills of the current management team.”

“RMI has accomplished much and expanded its capabilities in the past six years, and we now enjoy exciting growth potential,” said RMI’s Executive Director Marty Pickett. “Over the past 15 months, we’ve hired top talent to



Amory Lovins

lead our research and consulting efforts. With such a powerful leadership team and an extraordinary staff to match, the sky’s the limit.”

Marty noted that most of the expansion will occur in RMI’s Boulder, Colorado office, to which the U.S. Green Building Council recently awarded the world’s first LEED Platinum rating for Commercial Interiors. The office houses two of RMI’s Teams, the Energy & Resources Team and the Built Environment Team.

“RMI earns half its revenue by consulting for many of the world’s leading corporations. In recent years we’ve redesigned nearly \$30 billion worth of facilities in 28 sectors for radical energy and resource efficiency, often at reduced capital cost,” Amory added. “Such practical and profitable answers to both global and bottom-line needs are now in urgent demand. RMI’s progress in using market competition to spread efficiency, and efficiency to make the world better and safer, sets the course for our next steps.”

The Little Green Schoolhouse

BY GREG FRANTA, FAIA,
AALOK DESHMUKH, AND ERIC MAURER

All of you who think that healthful, effective learning environments with low operating costs and no negative environmental impact is a good thing, please raise your hand. Any hands still down? Probably not. Who wouldn't want this for our children, teachers, and school administrators? Yet, such schools are not the norm.

This school year (2006–07), there are 53.4 million children enrolled in grades K–12 in the United States. Many of these children are learning their A-B-Cs and 1-2-3s in environments that are loud, poorly lit, and unhealthy. McGraw-Hill Construction, a division of McGraw-Hill that forecasts construction activity, expects that \$90 billion in new contracts will be awarded over the next two years for construction of new education facilities and alterations to existing structures, with approximately 80 percent of this contract value being for K–12 schools. The time is ripe to make America's schools better—so they have fewer harmful environmental dangers, boast lower operating costs,

and, most important, offer a healthy and productive learning venue for the next generation's leaders.

Key strategies in the creation of “little green schoolhouses” include high-quality electric lighting design for great visibility, natural lighting with outdoor views, acceptable and controllable thermal comfort, abundant fresh air, building materials with low toxicity, climate-responsive design for the building and its systems, and water-efficient plumbing. The results are superior indoor environmental quality, improved academic performance and attendance, better health, and the greater retention of teachers and administrators.

RMI has been involved in the development of high-performance schools for many years. Our most current research—sponsored by the Hawaii Department of Business, Economic Development, and Tourism (DBEDT) and the U.S. Department of Education (DOE)—includes a study of the benefits of green design in schools throughout the United States. It is clear that low operating costs are important to school districts' administrators and building operators, particularly during periods of budget shortfalls. But, the most important benefits

of green schools accrue to the students who live and learn in these environments. The school representatives we interviewed cited better test performance and increased occupant comfort and health as the primary benefits in schools with improved indoor environmental quality (IEQ) as shown in Figure 1.

On average, the improvements in performance and health were most commonly associated with the provision of better daylighting, increased ventilation, and thermal comfort. The incorporation of views and user controls (e.g., temperature controls) proved less important (see Figure 2).

This RMI research was part of a study done for DBEDT/DOE by Ferraro Choi Architects in Honolulu. The project team surveyed twelve high-performance schools scattered across the United States to determine the occupant, environmental, and economic benefits of high-performance schools. Additionally, the team developed a life-cycle cost calculator and interviewed experts in the field. Afterwards, RMI collaborated with the project team to recommend how the State of Hawaii could most effectively implement a high-performance-school program.

The survey results were surprisingly

Figure 1. Percentage of high-performance schools that identified the following benefits from improved indoor environmental quality.

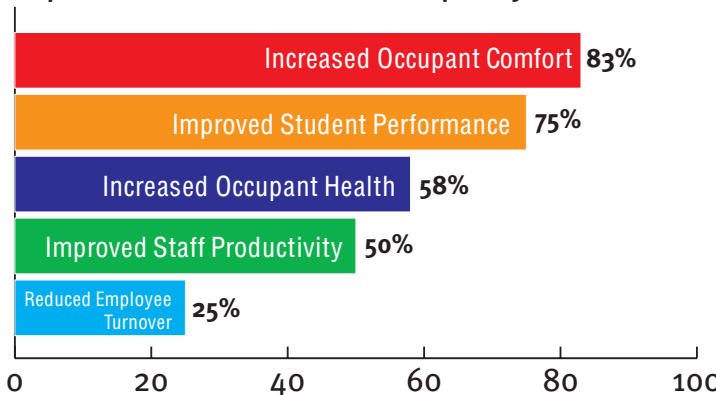
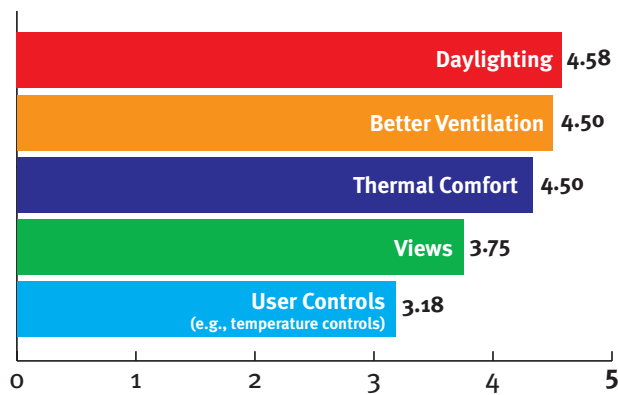


Figure 2. Average importance of IEQ strategies: 1=least important, 5=most important.



consistent across the study group. Most schools prioritized their design efforts around:

- lighting, through the provision of ample daylighting and the use of efficient lighting systems;
- water efficiency, through the use of water-efficient plumbing fixtures; and
- indoor air quality, by using paints, coatings, carpet, adhesives, and sealants that emitted fewer volatile organic compounds (VOCs).

Officials at all twelve schools believed that the operational savings over the lifetime of the school associated with incorporating energy efficiency and sustainable design elements outweighed any additional upfront costs in the creation of a high-performance school.

Numerous other studies have identified better testing performance and reduced student absenteeism as benefits of high-performance schools. For example, elementary school students in classrooms with the most daylight showed a 21 percent improvement in learning rates compared to students in classrooms with the least daylight in a California Energy Commission Study by Lisa Hescong. In “Greening America’s Schools: Costs and Benefits,” Greg Katz of Capital-E uses data from several studies to estimate the earnings of children taught in a high-performance school. Based on research that correlates earnings and student performance, Katz estimates that high-performance schools and improved test scores translate to \$6,800 of additional lifetime earnings per student.

Clearly there is a case for high-performance schools—operational cost savings and improved student performance and health are powerful arguments. However, utilizing the school’s sustainable-design elements as a pedagogical tool that provides real-life experience with concepts

of sustainability and natural resource management may bestow the most lasting—and elegantly simple—benefits.

For instance, at Bacon Elementary, in Fort Collins, Colorado, Diane Odberth teaches an Explorers LAB class that explains the energy-saving and environmental features that are prominently displayed throughout the school. The students then provide tours to fellow students and the public that highlight these features. In Clearview Elementary School in Hanover, Pennsylvania, a sundial integrated into the solar shading of the building provides students with a hands-on opportunity to learn about the movement of the sun.

At Clackamas High School in Clackamas, Oregon—a school that RMI helped design and build as a national model for performance-based compensation and exceptional energy performance—students were actually engaged in the design of the building. Students in a shop class built a full-scale wood mock-up of a classroom that was then used to test natural ventilation. The mock-up helped designers learn that the air stack and custom-designed vent that provided natural ventilation far exceeded design expectations. Creating a living laboratory for teaching students about sustainability should be a key consideration in the successful design and operation of high-performance schools.

Randy Overton, assistant physical plant director at Punahou, a K–12 high-performance school in Hawaii, elaborates on what he has seen at Punahou.

“The health benefits we gain, the resources we save, the conducive learning environments, and the sustainable education our faculty [and] students experience everyday and begin to view as a way of life are priceless,” he says.

RMI is building the financial case for high-performance design through life-cycle

cost analysis (LCCA). An LCCA looks at the cost of designing, constructing, operating, and replacing a school. Ultimately this analysis will allow schools to select the design elements that, taken together, produce a school with the lowest costs over its lifetime. The initial analysis shows that a high-performance school has a lower life-cycle cost than a conventionally designed school because of reduced operating costs and lower replacement costs.

Our goal is to inspire the creation of healthful, effective learning environments with low operating costs and environmental impacts in all schools. As Mark Biedron, the co-founder of the Willow School in Gladstone, New Jersey, noted, “We believe that buildings that resonate with our own human biology, that are connected to the natural world, and that are deeply rooted in place are buildings that feel good to be in. Ask our teachers, staff, and students... they all say they love to be in the building... they can’t wait to get to school. Although we have no figures to prove it, we believe our building is a healthy place to be and that students learn better in it because it is a teacher in its own right.”

The authors are members of RMI’s Built Environment Team.

For more information on high-performance schools visit:

• **The Green Schools Initiative** at www.greenschools.net

• “**Greening America’s Schools: Costs and Benefits**,” Gregory Kats, October 2006, A Capital E Report, www.cap-e.com

• **U.S. Environmental Protection Agency Primer on High Performance Schools** at www.epa.gov/iaq/schooldesign/highperformance.html

• **National Clearinghouse for Educational Facilities** at www.edfacilities.org/rl/high_performance.cfm

Local Governments

Filling the Sustainability and Climate Change Leadership Void

BY JONATHAN KEVLES

A MILLION INCANDESCENT LIGHT BULBS

exchanged for compact fluorescents? Efficient lighting fixtures in small businesses? Energy-efficiency ratings for homes? Are these state or federal programs? Guess again. These are just a few examples of cities taking the initiative to combat global warming. In the absence of federal leadership, cities are among those filling the sustainability leadership vacuum.

Now, RMI sees opportunities around the country to assist this kind of city and county activism.

In November 2006, the Institute brought together 32 directors of sustainability offices from cities and counties around the country and Canada. The gathering was the largest of its kind in the burgeoning area of local-government-based sustainability initiatives. These sustainability directors (as well as a handful who participated in a pre-conference survey) represented cities whose combined populations total more than 35 million—more than 10 percent of the U.S. population!

For participants, it was a rare opportunity to learn from colleagues they'd never met or only knew through emails and phone calls, and who, in many cases, were working on creative solutions to challenges with which other participants were also struggling.

RMI's researchers were impressed and inspired by how much these cities are doing, and how these innovative

participants are solving and managing the interconnected technical, political, bureaucratic, and financing challenges they face.

As a follow-up to the conference, RMI is drafting a manual for local governments, slated for publication this spring. The manual will describe how cities and counties can develop and launch a comprehensive and effective sustainability program, and incorporate managerial practices that will ensure long-term durability of that program. Much of the manual's contents will be based on what RMI learned from the conference participants.

The conference had two purposes: to share best practices, innovations, and challenges; and to understand the kind of help local governments need in defining and achieving their sustainability strategies.

During our two days, we covered: challenges faced and the strategies cities are using to address them; whole-system design and the possible application of whole-system concepts to participants' sustainability agendas; latest innovative sustainability programs and policies within cities; how to institutionalize a city's sustainability program; and key federal policies needing change so they don't inhibit local governments from being as sustainable as possible.

The most inspiring moments came when participants described their latest innovations and victories. For instance, the City of Albuquerque had a requirement to set aside 1 percent of a project's funding for capital improvement investments. However, according to the city code, investments that would

reduce greenhouse gas emissions (GHG) were not eligible. John O'Connell, Albuquerque's environmental sustainability program manager, was successful not only in having GHG reduction investments qualify as a capital improvement, but also in increasing the set-aside amount from 1 to 3 percent.

In the Midwest, Kansas City Mayor Kay Barnes launched the Million Lights initiative, whose goal is to swap out one million incandescent light bulbs for compact fluorescent lamps (CFLs). The City had more than 14,000 CFLs donated by Burns & McDonnell (an international engineering, architecture, and consulting firm based in Kansas City) and a consortium of the KC Chapter of the National Electrical Contractors Association and the International Brotherhood of Electrical Workers Local 124 distributed them to low-income households. Ace Hardware and Hy-Vee grocery stores are offering discounts that, when combined with rebates from Kansas City Power & Light, reduce the price of the CFLs to 99 cents apiece. The program is so successful that retailers are having difficulty keeping CFLs in stock.

In 2002, the cities of Berkeley and Oakland, California in partnership with Pacific Gas and Electric, initiated a "Smart Lights" program, which targets small businesses that fall under the radar of the local utility's energy efficiency outreach programs and are too small to have trained energy managers. Going block by block in local business districts, a local non-profit, the Community Energy Services Corporation, conducts free energy audits for interested businesses. The audit report outlines the benefits of energy-efficiency improvements. The program is designed so that the average payback period on the energy-efficiency improvements (through electric bill savings) is one year—and the program provides instant rebates to help defray the cost

of the improvements. Thus, even businesses with leases as short as two years have sound economic reasons to make the improvements. In addition, most energy-efficiency improvements improve both the customer and employee experience in the business. The program is so successful that businesses that initially declined to take part are calling the cities after learning of their neighbors' positive experiences.

Working together, the cities of Berkeley, San Francisco, and Oakland are creating a new Residential Energy Ordinance, which is expected to jump-start the home energy-rating market. Once sufficient raters (technicians) are available, the ordinance will require that every home sold gets either a home energy rating or has basic energy-efficiency systems installed. The rating will include an energy-efficiency upgrade plan specific to each home. Officials expect that homebuyers will make better financial decisions (based on the full monthly carrying costs of the home, rather than just the mortgage payment in isolation), thus driving the real-estate industry to design and build energy-efficient homes. At the same time, the cities are working with lenders to leverage mortgages for energy-efficient houses, which allow for a) rolling the costs of implementing energy efficiency measures into the financing and b) accounting for lower operating costs (i.e., lower utility bills) in determining the size of the loan that a borrower can service.

The overarching challenge faced by cities is institutionalizing the sustainability agenda in the city bureaucracy and community behavior. One seemingly simple yet hard-won example of how to institutionalize sustainability (and whole-system) thinking came from Santa Monica. Last summer, the City of Santa Monica started requiring that staff reports to city council about capital projects include both construction and operating costs, and the source of funds for both. This



Photo by Susan Rich

Attendees at RMI's 2006 Sustainability Directors' Conference.

will help to accelerate staff, elected official, and community understanding of the need to analyze investment decisions using life-cycle-cost analysis rather than dealing with capital funding and operations and maintenance as separate and distinct cost areas; the latter practice creates a significant barrier to energy-efficiency investments.

Conference attendees agreed that most cities need a central office of sustainability, which should be within a mayor's or city manager's office. Sustainability initiatives typically require departments to change decades-old ways of doing things, and to break out of their silos to work together under a single executive directive. Without the explicit backing of the executive, sustainability initiatives may be still-born.

But many cities recognize that a centralized office of sustainability does not a sustainable city make. In addition to such an office, many cities are forming sustainability working groups or "green teams," which include high-level representatives from key departments. Other cities are providing sustainability training to targeted staff.

As the conference wound down, we spent hours discussing possible next steps. Some participants self-organized, such as the *ad hoc* coalition of

Midwestern and Rocky Mountain sustainability directors whose cities share the same electric utility. The seven officials from the California cities represented will be working more closely together than ever before, looking to leverage each other's influence for improvements in state legislation and regulation. And a New Jersey mayor who attended is eager to take what she learned to her fellow mayors in the Garden State.

As for RMI's next steps, we continue to analyze the Institute's involvement in this emerging role for local government. Our challenge, as RMI Senior Consultant Michael Kinsley succinctly put it, is "to help the most number of cities become as effective as possible as quickly as possible."

Jonathan Kevles is a Fellow in RMI's Snowmass office. RMI is extremely grateful to Blackstone Ranch for underwriting conference costs, including travel expenses. The Institute is also grateful to the participants (those who attended, and those who completed the survey but did not attend) for their time and for their candor when interviewed and at the conference. For more information, please visit www.rmi.org/greencity.

The Magic of Windows, Part 2

BY GREGORY FRANTA, FAIA

In “The Magic of Windows, Part 1,” I summarized a history of glazing, presented fundamental performance characteristics, and introduced integrated design (see *RMI Solutions*, Fall '06). In this article, I'll describe the analysis and integration of fenestration's effects in building design.

Integrating optimal window design into the initial conception and engineering of building systems is a critical step in creating low-energy buildings. The design and analysis process for integrated glazing solutions includes considerations of orientation, area, application, thermal transfer (U-Value), and solar heat gain coefficient (SHGC). Other important factors include the transmittance of visible light, air leakage, cost (initial and life-cycle), energy, thermal comfort, and effective daylighting.

RMI's researchers have studied window design in hundreds of buildings around the world and we have perfected processes to optimize total building performance. The two examples presented here exemplify how window design influences energy use in buildings. Both are educational facilities with six side-by-side classrooms and have windows along one side. However, they are located in two very different climates: Minneapolis and Atlanta.

In the Minneapolis example, our analysis found the building will use a total of 57.7 kBtu per square foot per year (see chart on page 9). And, predictably, heating is the largest single energy user, at 27 kBtu per square foot per year.

To fully illustrate the impact of glazing, the base case chosen for the analysis was a classroom that had clear double-glass covering a little more than 20 percent of one west-facing wall, and win-

dows with no overhangs. The room had a 1.3-watt-per-square-foot lighting power density, required a modest amount of energy for computers, and, overall, the construction was typical.

During the window optimization process, considerations included “tuned” glazing,* which has ideal performance characteristics (U-value, SHGC, visible light transmittance, infiltration), overhangs and light shelves for sun control, daylight controls on electric light fixtures, and a southern orientation. These strategies alone reduced the total energy use to 34.5 kBtu per square foot per year. In addition, the operating costs dropped by \$0.55 per square foot per year, with the largest savings being in energy for heating and lighting.

By comparison, in Atlanta the building needs much more cooling and less heating, and it has a total energy appetite of 37.0 kBtu per square foot per year.

A Project To Change a Continent?

RMI's Research & Consulting teams are constantly being invited to work on many very diverse projects, and one recent effort is, so to speak, no different. RMI is currently providing building, energy, and transportation recommendations for the city of Kigali, the capital of Rwanda.

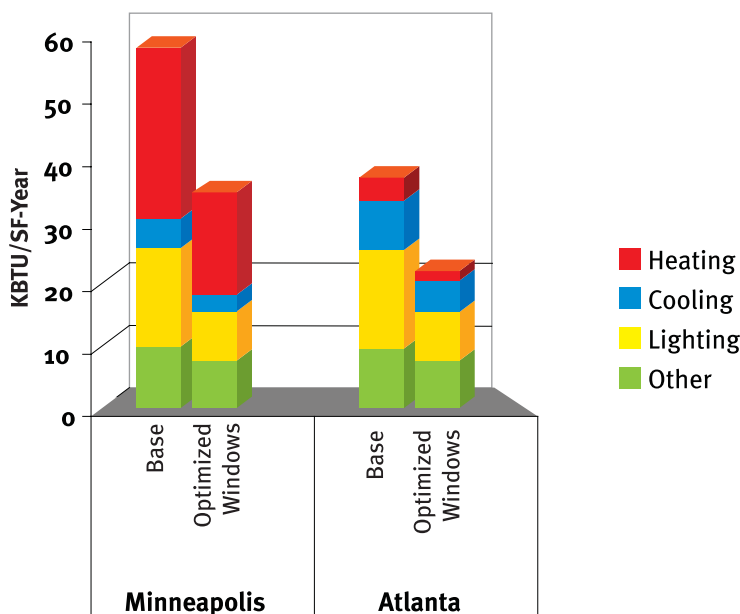
To get his nation over the physical and psychological damage that occurred in the twentieth century, President Paul Kagame recently established “Vision 2020,” a set of key goals to be realized by that year. Infrastructure development is one of the main pillars of this vision, and it's where RMI's efforts are focused.

As part of a team of consultants led by Oz Architecture, RMI is participating in an analysis of the existing conditions and the master planning efforts for the quickly urbanizing Kigali.

With a population of nearly one million people, Kigali is currently the largest city in Rwanda. The city was recently appointed the aviation hub for central Africa, and Rwandan leaders also envision it becoming the “technological hub” of Africa.

Establishing an ecologically sound center of technological innovation in the midst of an agricultural nation creates both challenges and opportunities for the master plan team. Rwanda's electric grid is already badly strained, so serving technology centers, Class-A office space, and outlying rural communities will require restructuring government regulations and deploying efficiency, demand management, and new generation. Transportation systems must consider the hilly landscape, a new airport and regional transit systems, and a wide variety of young and elderly users in a low-carbon manner. For buildings, RMI is focusing on climate-sensitive design and load reductions before examining the most efficient ways to use energy.

In addition to the infrastructure and master planning efforts for Kigali, new “satellite” cities and a national master plan are on the horizon. At one-tenth the size of Colorado, tiny Rwanda is aiming to manage its resources and population in a sustainable manner that will set an example for the region and the world.



Energy use comparison for educational facilities in Minneapolis and Atlanta showing typical construction and optimized window design as part of integrated solutions.

When the same kind of windows used in Minneapolis are optimized for the Atlanta climate, the results show the energy use dropping to 21.8 kBtu per square foot per year. This energy use reduction is less than that for the Minneapolis school, but because the cost of supplying electrical cooling in Atlanta is more expensive than providing gas heating in Minneapolis, the energy cost saving is still about \$0.55 per square foot per year.

In both cases, the most important economic factor was the reduction in peak loads for big equipment in the heating, cooling, and ventilation systems. The peak heating loads dropped by more than 20 percent, and the cooling and ventilating loads dropped by more than 50 percent. These construction cost savings due to equipment down-sizing can be achieved in any kind of climate to off-set the cost of up-front efficiency

measures to the point that the return on investment is more than 50 percent (a two-year simple payback period)—not bad compared to my IRA.

Ultimately, the bottom line in both cases is that the emissions of carbon dioxide, nitrous oxide, and sulfur hexafluoride caused by the burning of coal and gas to power the buildings were reduced by 40 percent. When we combine these efficiencies with a whole-building design approach that includes other building envelope measures, enhanced lighting efficiencies, reduced mechanical equipment, passive energy strategies, on-site renewable energy systems, and green power from the utility company, the goal of net zero emissions can be realized.

Integrated design is critical for the cost-effective development of buildings. Optimizing window design within a whole-building approach will assure a high performance building. RMI continues to conduct research and consulting on glazing strategies to reduce greenhouse gas emissions and operating costs.

Gregory Franta, FAIA, leads RMI's Built Environment Team.

* "Tuned": when specific glazing characteristics are applied for each orientation, climate, and application.

Coming Soon to a Theater Near You: RMI Helps Make Green Building Video

Break out the popcorn—RMI's making movies.

RMI's Built Environment Team is currently completing research and coordination for the filming of a video aimed at accelerating the adoption of high-performance buildings in the marketplace. A lack of information, higher priority investments, and awkward design team dynamics, along with the assumption of higher capital costs are common barriers to energy-efficient building design. The currently untitled video will feature a variety of complete and in-progress green building projects ranging in size, location, and use. The projects will demonstrate—using real numbers—how architects and engineers overcame a variety of barriers related to energy efficiency and sustainable design. The video will also feature interviews with a range of high-profile RMI associates and partners. RMI is collaborating with CoreNet Global, an Atlanta-based real-estate learning organization, and the U.S. Green Building Council for the video, which is scheduled for release in late 2007.

Getting off Oil

By AMORY B. LOVINS

The world uses a cubic mile of oil a year, costing almost \$2 trillion. Oil and cars are the world's biggest and most entrenched industries. Yet an inexorable half-century transition beyond oil has begun, squeezing oil between efficient use and alternative supplies.

Lamp oil from whales lit most American homes in 1850. Yet in the next nine years, just before Drake struck oil in Pennsylvania, five-sixths of whale oil's lighting market fled to cheaper competitors. Likewise in 2007 powerful ways to save and replace oil, which have been quietly emerging for 30 years, will visibly start to rout oil from its strongholds.

Fleet turnovers take time: putting the first half-million hybrid cars on the road took nearly a decade. Yet in 2007 20 new hybrid models will enter the American market, and operating efficiency will finally become entrenched as carmakers' top design priority, locking in oil savings for decades. Biofuels, too, will continue double-digit growth as Brazil's 2006 oil independence and Sweden's 2020 off-oil goal spur emulation.

Some 94 percent of the world's oil reserves are held by governments that don't know or won't reveal the size of their holdings. But no matter how much oil there is, we should save it whenever doing so is cheaper than buying it, and nowadays that is always. Unlike short-term behavioral changes, efficiency investments are irreversible:

you don't scrap fuel-frugal furnaces or remove roof insulation when fuel prices drop, so efficiency ratchets up. And elegant frugality will outdo incrementalism: efficiency often yields expanding returns.

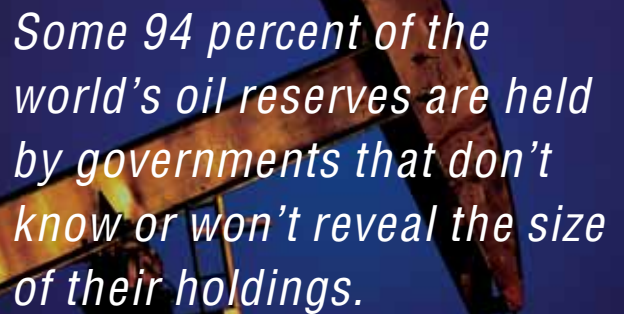
Each day a modern car burns fuel derived from 100 times its weight in ancient plants; yet a mere 0.3 percent of that fuel moves the driver. Tripled-efficiency, ultralight gasoline-hybrid SUVs were designed in 2000, paying back in one year at European and Japanese fuel prices or two years at America's much cheaper pump prices. In 2007 the Automotive X Prize will start moving such designs to market. Just in America, they will ultimately save 8 million barrels of oil a day—equivalent to finding a new, secure, and inexhaustible Saudi Arabia under Detroit.

In 2007, too, Toyota will emerge as the leader in superefficient plug-in hybrid cars: electric for short commutes, gasoline-hybrid for long trips. This could double the already doubled gasoline efficiency of a *Prius*. Next, make that car ultralight and its gasoline efficiency redoubles. Biofuel it and you quadruple gasoline efficiency again, to 30 times today's norm. Sound like the whale-oil story yet? Oil prices will drop—but efficiency will remain cheaper still.

Full practical use of the best 2004 efficiency technologies in all applications would halve American barrels

burnt per dollar of GDP, to a quarter the 1975 level.

The average cost: \$12 per saved barrel. Saved natural gas and advanced biofuels could replace the remaining oil for \$18 per barrel. Thus eliminating American oil use by the 2040s costs \$15 per barrel—one-fifth its 2006



Some 94 percent of the world's oil reserves are held by governments that don't know or won't reveal the size of their holdings.

price. It surely follows that getting off oil—thus abating 42 percent of global carbon-dioxide emissions—will be led by business for profit.

That transition already shapes competitive strategy. Wal-Mart's new heavy trucks will be a quarter more efficient in 2007 than in 2006. By 2015 they will be twice as efficient, saving more than \$300 million a year. Next will come trebled efficiency, which yields a 60 percent internal rate of return.

In 2007, Boeing's 20-percent-more-efficient but same-price 787 will take flight. In Detroit, Schumpeterian "creative destruction" will accelerate as smart money favors leapfrogs; markets will change managers or their minds, whichever happens first. Ford's new chief executive, Alan Mulally, whose efficiency-based Boeing strategy is beating Airbus, will bring to Ford Boeing's focus

on ultralight materials (the 787 is 50 percent advanced composites), systems integration, and breakthrough design.

The Greening of the Pentagon
In Washington, D.C. a surprisingly strong voice in 2007 for getting off oil will be the world's biggest buyer both of oil and of renewable energy—the Pentagon. This is not just because oil-garchs tend not to be freedom-loving democrats and sometimes foment instability and conflict. Rather, the risk and cost of vulnerable fuel convoys, easy prey to roadside bombs, will persuade military leaders that only superefficient platforms dragging dramatically slimmer fuel logistics tails, or none, can fight persistent, dispersed, affordable wars.

This strategic shift will not just save hundreds of lives and tens of billions of dollars a year. It will also speed key technologies, like ultralight materials, that can triple the efficiency of civilian cars, trucks, and planes—just as military R&D created the Internet, GPS, and the jet and chip industries. Thus

the Pentagon will start to lead America, and the world, off oil so nobody need fight over it.

A vision will form of a United States that can treat countries with oil the same as countries without oil, and gives others no reason to suppose it is motivated by oil. The bet of Russia's President Vladimir Putin that he could hold fuel customers to ransom will eventually turn sour. China's 2005 adoption of energy efficiency as its top development priority will start paying off. Decisive evidence will emerge that stabilizing the earth's climate is in fact not costly but profitable (because saving fuel costs less than buying it). And as we all drill for wasted oil to power our buildings, factories, and vehicles, the market- and community-driven rise of energy saving—or “negabarrels”—will begin laying visible foundations for a richer, cooler, fairer, and safer world.

Amory Lovins is Cofounder and CEO of RMI. This article is reprinted with permission from The Economist.

RMI's Boulder Office Gets LEED Platinum Rating

RMI's Boulder, Colorado office is officially one of the greenest on the planet.

Last fall, the U.S. Green Building Council awarded the Institute's Boulder office a Platinum rating in the Council's Leadership in Energy and Environmental Design (LEED) rating system for commercial interiors.

The office earned 44 points out of a possible 57, making it the first Platinum LEED-CI (version 2.0) office on earth and the first LEED Platinum project within Colorado.

“This is a great achievement,” said RMI Sustainable Design Consultant Cara Carmichael. “Our Boulder office isn't just a place to work, it's a showcase of green design that will help us sell sustainable design to clients.”

RMI's Military Work Gathers Important Press Attention

RMI's important work with the military and our Department of Defense-oriented application of *Winning the Oil Endgame* continues to pick up significant press attention—last fall in the *Christian Science Monitor*. In the September 7 edition, staff writer Mark Clayton penned a piece about how the U.S. military leaders in Iraq are calling for the DoD to send them renewable energy systems.

“Calling for more energy in the middle of oil-rich Iraq might sound odd to some,” Clayton wrote. “But not to Marine Corps Maj. Gen. Richard Zilmer, whose deputies on July 25 sent the Pentagon a ‘Priority 1’ request for ‘a self-sustainable energy solution’ including ‘solar panels and wind turbines.’ The memo may be the first time a frontline commander has called for renewable-energy backup in battle. Indeed, it under-

scores the urgency: Without renewable power, U.S. forces ‘will remain unnecessarily exposed’ and will ‘continue to accrue preventable ... serious and grave casualties,’ the memo says.”

Not surprisingly, many of the ideas regarding the DoD adoption of efficiency and renewables, Clayton reports, had their genesis in *WTOE*, and several Defense Science Board Task Forces that RMI has served on and continues to serve on.

“At the tip of the spear is where the need to avoid the cost of fuel logistics is most acute,” RMI CEO Amory Lovins is quoted as saying. “If you don't need divisions of people hauling fuel, you can realign your force structure to be more effective as well as less vulnerable.” To read the full story, see www.csmonitor.com/2006/0907/p01s04-usmi.html.

Staff Spotlight

Mike Brylawski

One of RMI's best has returned to the nest. In August, Michael Brylawski returned to Rocky Mountain Institute as a senior consultant with the Breakthrough Design Team, working on *Winning the Oil Endgame* implementation in the automotive and finance sectors. Michael has had an interesting career, which includes a five-year stint at RMI in the late 1990s. Now, we're glad he has rejoined the team.

The son of a college professor, Michael attended the North Carolina School of Science and Math in Durham. At the school, Michael was offered an internship with the North Carolina Alternative Energy Corporation. There, he learned about RMI CEO Amory Lovins and his work in radical resource efficiency, and was instantly inspired.

After high school, Michael attended Stanford University. He claims that he was a typical college student—playing rugby, crewing on the rowing team, entertaining fellow students as a college radio deejay, and co-chairing the campus environmental group. In 1993, he attended a campus sustainability conference at Yale where he met Amory for the first time. Amory gave Michael information about RMI internships, and before he knew it, Michael was packing his bags for Snowmass.

Fresh out of college in 1994, Michael joined the staff full-time. His first official task was to fact-check Amory's well-known article "Reinventing the Wheels," an early dissemination of the Hypercar concept. When asked about the experience, Michael quoted Amory: "It was like throwing a baby in the deep end and asking him to swim!"

The Hypercar Center, as it was known at the time, soon expanded its staff to

five and Michael was given the knotty challenge of making the business case for lightweight composite materials, which led to his co-authoring several technical papers and a book with Amory.

After five years at RMI doing Hypercar™ research and consulting, he co-founded the spin-off Hypercar, Inc. (now Fiberforge) and served as a vice president for three years, leading its marketing and business planning efforts. One of his claims to fame is creating the moniker "Revolution" for the company's 99-mpg concept vehicle.

The business and engineering challenges at Hypercar were thrilling, and Michael soon realized he wanted to bolster his management and technical skills. In 2002, he enrolled in a Massachusetts Institute of Technology (MIT) program known as Leaders for Manufacturing, which combined an MBA from the Sloan School of Business with a master's degree in mechanical engineering.

As part of his graduate work, Michael completed an internship with Boeing in Melbourne, Australia, at the facility where they make the 777's all-composite tail. He worked on the company's technology strategy and brought in a U.S.-based "intrapreneurship" program to foster innovation. Besides watching a lot of "footie" (Australian Rules Football) and enjoying the local fermented beverages, he helped mentor two new product ventures, one of which got funding from Boeing Capital.

After completing his graduate work, he received several significant job offers. He had an offer from General Motors working for the office of the CEO (with whom he interviewed) on strategic initiatives. He also considered working for Burton Snowboards in

Vermont, as they use lightweight composites in all of their products. But his interest in consulting work won out, and he joined the Los Angeles office



Michael Brylawski

of the Boston Consulting Group, one of the world's leading management consultancies. Michael's clients included a medical devices maker, an athletic shoe company, a major defense contractor, and a well-known time-share business.

Enjoying the consulting work, but desiring to get back into his passion of environmental technology, he found himself on the phone with Amory, chatting about various opportunities. Amory described the many positive recent changes at RMI, and before he knew it, Michael had accepted a position as a senior consultant with the Breakthrough Design team.

Michael is excited by all the changes at RMI, but he is most impressed by the improvement on the staff "bench" under Amory. In recent years, RMI has increased the size and qualifications of its staff remarkably and Michael is a significant part of that improvement.

Outside work, Michael was recently engaged and his fiancé, Stacy, who is an accomplished family attorney, will join him full-time in the Snowmass area in April. Michael concedes that it was tough to move away from the ocean and his Venice Beach, California apartment, but he is excited about pursuing other passions, including hiking, biking, snowboarding, writing, playing guitar, and enthusiastic Karaoke singing.

We are all excited that Michael is back at RMI—and we hope he will enjoy continued success in the years to come.

—Cory Lowe

Three More Ways To Support RMI



DALE LEVY,
DEVELOPMENT DIRECTOR

For the third time, RMI has been selected as a recipient of donations made by Working Assets—the progressive San Francisco-based telecommunications firm that participates in activism. Throughout 2007, the company’s customers can vote for their favorite organization, which will receive a grant from Working Assets.

The size of Working Assets’ gift to RMI will be determined by the size of the overall pool (Working Assets is aiming for a pool of \$3 million) and how many votes RMI gets.

Current Working Assets long-distance, wireless, or credit card customers can visit www.workingassets.com/vote and vote for their favorite NGO or charity. The groups are organized by programmatic designation: “Peace & International Freedom,” “Education & Freedom of Expression,” “Environment,” “Economic & Social Justice,” and “Civil Rights.” RMI is listed in the Environment group.

Voting can be done in several ways, including the sharing of votes among groups, and customers who use all three Working Assets services will have their votes weighted accordingly. Funds will be distributed in early 2008. In 2006, RMI received \$58,938 in support from Working Assets and in 2003, we received \$59,592. So please log on and vote for RMI (at www.workingassets.com/voting/?atid=70828279)!

In addition to working with Wal-Mart to improve the fuel efficiency of its heavy-truck fleet, RMI was one of three organizations that convinced the company to launch its first Earth Share campaign in fall 2005. Earth Share is an organiza-

tion that helps corporations conduct workplace-giving campaigns that benefit groups that concentrate on environmental issues—one of which is RMI. We should receive a sizeable contribution from Wal-Mart and hopefully, as more employees participate, the amount will grow.

RMI has been increasing its involvement with Earth Share in recent years. Please think about whether your company might be interested in an Earth Share campaign. Contact me at 970-927-7217 or dalelevy@rmi.org for more information on how to proceed.

Another Earth Share company supporting the Institute is iCIMS, a growing internet software developer that has been touted as “hot” in the industry. iCIMS started running its workplace giving campaign in November 2005.

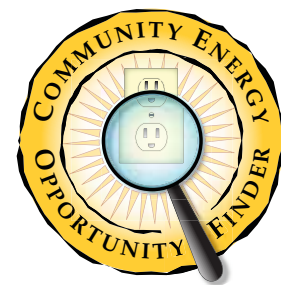
Rather than limit their renewable energy gifts option to just one organization, iCIMS selected three organizations to receive the proceeds of any renewable energy donation: RMI, New Jersey Audubon Society, and the Environmental and Energy Study Institute. Additionally, the company is matching one dollar for every three dollars contributed.

Finally, check out www.changingthepresent.org—a new website that features specific RMI programs. It will do for nonprofits what malls have done for shopping, and it will do for shopping something that shopping seldom does for any one—elevate spirits and add meaning to our lives. Launched in December 2005, the website founders hope to divert some of the billions of dollars spent on gifts toward nonprofits that are changing the world. More features will be added every few weeks, and as more and more people discover this wonderful new way to give, people can smile and think to themselves: “Well of course. Where have you been?”

RMI Relaunches Community Energy Opportunity Finder

One great way community members can get involved in energy-efficiency planning in their town or city is with RMI’s Community Energy Opportunity Finder. Updated and relaunched in January, 2007, the “Energy Finder” (www.energyfinder.org) is an interactive, web-based tool that enables community members and local leaders to explore their community’s untapped opportunities for economic development, pollution prevention, and risk reduction through energy efficiency. The revitalized Energy Finder includes a case-study of a real-life community, reorganization of site information, and an update of Energy Information Administration (EIA) statistics used in Energy Finder calculations. These improvements were made to an already important and unique tool.

“The Energy Finder mimics an expert consultant’s preliminary analysis of what a community can do to save money and create jobs through energy efficiency, but costs the community nothing,” said project director Michael Kinsley of RMI’s Breakthrough Design Team.



www.energyfinder.org

Suzanne Farver

VISIT RMI BOARD OF TRUSTEES MEMBER

Suzanne Farver's home, and, after you've been awed by her fascinating collection of contemporary art, you might notice a few things: energy-efficient appliances, a huge photovoltaic array on the roof, efficient light bulbs, strategically planted shade-trees, and programmable thermostats.

Suzanne is in the process of greening up her home, a project she started in 2005. The home is large—"a monster" Suzanne calls it—and used to chew through a whopping 70,000 kilowatt-hours per year. So far she's halved that energy use and "is still working on it."

"Homes in the United States have gotten enormous," she says. "And as they get bigger, people have more room to put stuff in them—and a lot of electric and electronic devices that we put in them are driving energy demand. While many appliances have become more efficient, we've got a lot more of them and they all stay plugged in. I believe the individual consumer needs to be better educated about energy issues."

And that's just what she intends to do. Once Suzanne has "greened" her home as much as possible, she plans to share her activities with other homeowners and start a "virus" of energy efficiency in the Roaring Fork Valley, near RMI's headquarters.

And Suzanne just might just be the one to pull it off, as she has a mix of skills and interests that are far from ordinary.

Suzanne grew up in Iowa, in a small town called Pella, "where they make the windows." After earning degrees in economics and law, she found herself practicing tax and estate law. She wasn't as happy as she'd hoped, so she took a two-and-a-half-day aptitude test. At the end of the exam, the test administrators told Suzanne that she had many aptitudes that

weren't being satisfied and that she should "go and find problems to solve."

"I thought, 'Gee, thanks,'" she recalls. "Now what do I do?"

After pondering the recommendation awhile, she decided to resign from her law job. She remained content for several years while raising her two daughters, but then Suzanne began drifting toward the arts, and became involved in various capacities with the Denver Art Museum (she has been on the museum's board since 1988 and has served on numerous museum committees).

After moving to Aspen in 1990, Suzanne served as Development and Public Relations Director with the Anderson Ranch Arts Center, then, in 1992, took the Executive Director job with the Aspen Art Museum, which was off-course financially and professionally. During the next seven years she righted the Museum's finances, straightened out personnel issues, and helped to develop a strong team of supporters. "The Art Museum was my problem to solve," she says.

Suzanne's love of art—stimulated from years of hanging pictures in her father's office at Pella—extends far beyond just an appreciation of pretty pictures and interesting shapes. She believes art can be used to get people to think about and act on issues and problems.

After resigning from the Aspen Art Museum in 1999, Suzanne spent several years volunteering and reconnecting with her two teenage daughters. Then in 2004 (after finding a brochure on the program in a recycling bin), she enrolled in an online environmental management program at Harvard. "I thought, 'Well that's a big problem,'" she said. "That could keep me busy for a while."

The program was not Suzanne's first



Suzanne Farver at home in Colorado with her 48 photovoltaic panels.

exposure to environmental issues, but the courses have helped her refine her understanding of the issues and prompted her to focus on energy.

It was through the environmental management program that Suzanne became aware of RMI and the Institute's work on energy and resource issues. Indeed, RMI's work with Texas Instruments and the City of San Francisco were the subjects of papers for her courses. Her interaction with various RMI staffers and clients, and her extensive board experience, eventually led to a position on RMI's Board.

"The environment has been one of my passions for a long time," she says. "People ask me what I'm going to do when I get my degree. I'm not sure, but I think it's a growth industry. There are plenty of problems to solve."

Suzanne thinks RMI's nonadversarial, free-market approach to problems makes more sense than most other approaches to resource issues, and hopes she can further RMI's efforts.

Correspondingly, she also thinks art teaches people ways of thinking that could be applicable for environmental and resource issues.

"I think part of changing people's lives is helping them visualize that change," Suzanne said. "And part of that is not necessarily trying to solve the problem but to instead change the process so that the problems don't happen."

—Cameron M. Burns

Nelly Weiser

THE INSTITUTE'S AVERAGE SUPPORTER IS around 60, open-minded, intellectual, and concerned about the fate of the world, according to RMI Development Director Dale Levy. That description might hold true as a statistic, but, then again, none of RMI's supporters is average.

Take Nelly Weiser, for example, the daughter of National Solutions Council Co-Chair Doug Weiser and his wife, Lynda. Nelly is just thirteen, and during her recent bat mitzvah celebration, she decided to donate the cash presents she received—\$15,000 altogether—to three worthwhile organizations: Creativity for Peace, the Southern Poverty Law Center, and RMI. Why? Nelly has three big concerns: world peace, tolerance, and the environment.

"Part of the bat mitzvah tradition is giving," Nelly said. "Since I'm really blessed, it was meaningful to me to share that."

And, she said, the three organizations are working on issues related to world

peace, tolerance, and the environment.

"Creativity for Peace is an organization that brings Palestinian and Israeli girls together in New Mexico to discuss and work out their differences," Nelly said. "The Southern Poverty Law Center prosecutes hate groups and teaches tolerance. And RMI works on issues that benefit the environment."

Nelly grew up in Florida and Colorado, and has taken a keen interest in her parents' recent efforts to green up their Snowmass, Colorado home. In particular, Nelly is fascinated by energy problems and solutions.

"I think that energy conservation or reuse is very important and we use so much of it globally," she said. "And there are always these little things

we can do, like turning off lights and computers. We have solar panels and efficient systems here at our house, but it'd be good to use more wind power."

Nelly said she likes RMI's approach to energy and resource issues.

"RMI understands that everyone has to work together to help the environment," she said. "It figures out, in profitable ways, how to turn waste

into something useful, or eliminate it altogether. And it's right next door!"

So what are Nelly's plans for the future? The eighth-grader likes all the subjects she's studying at school, but admits, "I like reading and writing a lot, but I also enjoy acting. And I'm interested in politics."



Nelly Weiser

Three Awards of Note

RMI has won a lot of awards for our work over the years, but in recent months, the Institute was the recipient of three important awards.

In January, RMI won the 2007 Collaborative Achievement Award from the American Institute of Architects (AIA). The AIA awards for Collaborative Achievement are given biennially to "recognize and encourage distinguished achievements of allied professionals, clients, organizations, architect teams, knowledge communities and others who have had a beneficial influence on or advanced the architectural profession."

RMI won the prestigious award for its work on green architecture, which began in the early 1990s.

Meanwhile, at November's Greenbuild conference in Denver, RMI architect Greg Franta, FAIA, was recognized for the 30-plus years he has spent educating

and transforming the building industry with the U.S. Green Building Council's Leadership Award in the category of education.

"The companies and individuals receiving the USGBC Leadership Award inspire us each and every day with their words, their actions, and their passion," said Rick Fedrizzi, President, CEO and Founding Chair of the USGBC. "It's an honor to work with them, and to support their dedication to advancing green building."

And finally, a Rocky Mountain Institute building project has won the Council of Educational Facility Planners coveted James D. MacConnell Award.

Fossil Ridge High School in Fort Collins recently won the award, given out by the Council of Educational Facility Planners International (CEFPI). Congratulations all!

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We also want to thank those individuals who have contributed to RMI through Earth Share, the combined federal campaign, and other workplace charitable programs. If you would like to have RMI as a charitable option in your workplace campaign, please contact our Development Department at (970) 927-3851.

The following people have notified us that they have included RMI in their wills and/or trusts. We are grateful to each of them.

Esther & Francis Bligh
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Anne Cooke
Richard Ford
Erika Leaf
Stanton Klose
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Joel Shapiro
Marge Wurgel & Keith Mesecher

Your Legacy

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

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

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Members of the National Solutions Council are:

- **Invited to participate** in various discussions with RMI staff and/or Board of Trustees about global issues.
- **Special invitees** to RMIQs (RMI's Quest for Solutions presentations) and other RMI events.
- **Sponsors** of regional RMIQ presentations or series.
- **Recipients** of advance notification of key upcoming RMI publications.

The NSC extends an invitation to all RMI donors of \$1,500+ annually to join. Watch your mailbox for upcoming NSC events!
For more information about the Council, please contact Development at (970) 927-3851 or develop@rmi.org.

2007 RMIQ Dates Set

Mark your calendars. Dates have been set for RMI's 2007 "RMIQ" (Rocky Mountain Institute's Quest for solutions) presentation series. On Wednesday, February 21, Victor Olgyay, AIA, and Greg Franta, FAIA, of RMI's Built Environment Team, will present "Building Solutions for Climate Change." This RMIQ will describe a range of options for communities and businesses to drastically reduce carbon emissions through building design. In the United States, buildings are responsible for roughly 40 percent of our carbon dioxide emissions. Through attention to building design, construction, and operation, these impacts can be significantly reduced. Various building metrics and rating systems will be discussed, including the U.S. Green Building Council's LEED rating system and Ecological Footprint. The usefulness of these systems for accomplishing greenhouse gas emissions reductions will be discussed, and tools and techniques for assessing carbon reduction will be described.

On Tuesday, March 13, Dr. Joel Swisher, PE (RMI's Research & Consulting Team Leader) and John Waters (RMI's Breakthrough Design Team Leader) will present "The Smart Garage: The Fleet Meets the Grid and Other Questions of Energy System Integration in a Carbon-Constrained World." This RMIQ will highlight RMI's work on plug-in hybrid electric vehicles (PHEVs), which combine the fuel-economy advantage of hybrid vehicles with the flexibility to source energy from liquid fuels (gasoline, diesel, biofuels, etc.) and/or electricity

(from conventional or renewable sources). Joel and John will describe RMI's work on PHEVs with major electric utilities as well as a major governmental agency. Once the vehicle fleet connects to the power grid, many new opportunities and challenges will arise. These questions will be addressed from both the vehicle and utility sides; also, advanced batteries, vehicle range and performance, the potential of PHEVs to reduce carbon emissions, utility strategies for charging PHEV batteries, and the discharge of the batteries to feed power into the grid when most needed will also be covered.

On Thursday, August 9, 2007, RMI CEO Amory Lovins will lead an RMIQ titled "A Convenient Truth: Profitable Business-Led Climate Solutions" that will focus on the premise that climate protection is profitable. Amory will cover three points: a) climate protection is profitable, not costly; b) it doesn't take much to effect this change (in fact, the world only needs a 1–2 percentage point increase in the rate of raising energy efficiency to profitably solve the climate problem); and c) there are a growing number of companies that are achieving 5–8 percent annual gains in energy efficiency with handsome returns. Amory will share examples of organizations with whom RMI has worked. Possible panelists include: Ray Anderson from Interface, key individuals from Google, DuPont, and London-based British Sky Broadcasting (BSkyB), and RMI's Dr. Joel Swisher, PE.

All RMIQs will be held at the Given Institute at 100 East Francis Street in Aspen, Colorado, and run from 5:30 to 7 p.m.

NSC Salons Gain Traction

RMI's National Solutions Council continues to grow and—along with RMI's Board of Trustees—its members serve as important ambassadors for RMI's work and message. Last fall, NSC members Rebecca and Christopher Roberts, Victoria Smith, Alice and Phillip Melly and David Richter, Peter Boyer and Terry Gamble, and Leslie and MacMcQuown hosted four salons—our highly popular events that include dinner and discussion on an important topic—in the Princeton, NJ, New York City, Greenwich, Ct., and San Francisco areas, respectively. Each of the fall's salons focused on *Winning the Oil Endgame*, RMI's 2004 independent 319-page study of how to get the United States completely off oil. The salons in San Francisco coincided with a presentation by RMI CEO Amory Lovins to the Commonwealth Club (he also spoke at all four

salons), and RMI Managing Director Joel Swisher, PE, spoke at the San Francisco salons on RMI's work with various California utilities. All told, the four salons brought RMI's work and message to about 600 influential listeners.

"We believe our nation is at a cultural tipping point, and it's clear that our NSC members want to be part of the change," said Senior Development Officer Ginni Galicinao. "We're fortunate that they are excited about introducing RMI to their friends who care about the kind of work RMI is doing. The NSC Salons have become quite popular. In the early days we sometimes had only 20 guests. Now, we have anywhere from 60 to 100 guests at each Salon. In many cases, 60 percent of the guests are new to RMI ... many later choose to **become part of the solution.**"

Hawaii

continued from page 2

and in the installation of photovoltaic panels on schools.

Hawaii's electric utilities are getting involved as well. New renewable energy projects are underway on three islands. On Maui, a 20-megawatt windfarm became operational in 2006 and a major wind developer is pursuing another 30-megawatt windfarm. On the Island of Hawaii, a new 10-megawatt windfarm was added in 2005 while another windfarm has retired about 7 megawatts in older units and is repowering with 20 megawatts of capacity. On Oahu, HECO has announced its intention to build a new nominal 100-megawatt combustion turbine peaking unit to be fueled by

biofuels. Hawaii's agricultural history and climate make it an ideal location for the production of biofuels, which can not only reduce Hawaii's dependence on oil but also bolster the state's agricultural sector and economy. Recognizing this potential, the state has crafted some of the most aggressive biofuels policies in the country, and with RMI's help, continues to explore effective ways to expand the industry.

Hawaii is clearly demonstrating the potential for a state to transform its energy future, thereby increasing the security of its energy supply, lowering its energy costs, improving its environmental sustainability, and bolstering its economy.

Kitty Wang is a Principal and Lena Hansen is a Consultant with RMI's Energy & Resources Team.

Amory To Profess, Lecture at Stanford

An emerging tradition of RMI staff teaching at Stanford University will continue this spring. RMI CEO and Cofounder Amory Lovins has accepted the MAP*/Ming Visiting Professorship for Energy and Environment at Stanford, and will teach two courses on our national and global environment and energy future: "Energy End-Use Efficiency," March 26–31, and "Energy End-Use Efficiency Opportunities at Stanford," which runs the entire 10-week spring quarter.

To date, RMI has provided three of the five recipients of the MAP/Ming Visiting Professorship: Managing Director Dr. Joel Swisher, PE, during 2002–03; Senior Fellow Dr. Jonathan Koomey during 2003–04, and now Amory.

RMI has had a special relationship with Stanford for many years as a result of the Institute's relationship with MAP, an investment firm that acquires natural gas and renewable energy rights throughout the lower 48 states. MAP sponsors a handful of Stanford students to become interns at leading non-profits each year and matches students with NGOs best-suited to their interests while providing living and travel expenses. Many MAP interns come through RMI, and several staff members are former MAP interns.

Additionally, March 25–31, Amory will present a series of lectures on various energy-related topics. The lectures will take place on campus, and will be free and open to the public. Please visit RMI's calendar of events (www.rmi.org/sitepages/pid22.php) for additional details.

*Mineral Acquisition Partners

RMI Solutions

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Letters to the Editor

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About RMI

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

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

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

Founded in 1982, Rocky Mountain Institute is a §501(c)(3)/509(a)(1) public charity. It has a staff of approximately 55. The Institute focuses its work in several main areas—business practices, climate, community economic development, energy, real-estate development, security, transportation, and water—and carries on international outreach and technical-exchange programs.

RMI Solutions

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- 8 The Magic of Windows, Part 2**
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