

Issue: January 2010

green practices

## Going Green: You can start by Turning Off the Lights

**Optometrists around the country are discovering the tangible and intangible benefits of going green.**

**RICHARD MARK KIRKNER**  
*Phoenixville, Pa.*

Wal-Mart demands it of its suppliers. DuPont and Owens Corning regularly set aside capital expenditures to do it. Even in challenging economic times, Clorox, Hilton Hotels, Heinz and Coca-Cola announced plans to continue it. And today, a host of optometrists around the country are embracing it: a "green" strategy for their practices. These O.D.s are not only addressing environmental and social concerns — they're generating savings that ultimately impact their practices' bottom lines.

For William Wong, O.D., minimizing the carbon footprint means going beyond recycling paper and turning off the re-stroom light. The new office he and partner Douglas Leo, O.D., expect to complete this spring, the Fontana Optometric Group in the southern California town of the same name, uses natural light wherever possible, has solar panels for electricity, and extra insulation and radiant heat wrap to minimize the drain on heating and cooling systems.

Recent studies by both New Buildings Institute (NBI) and the CoStar Group, a commercial real estate information company, conclude that "green" buildings are not only effective in reducing energy costs, but also increase property values. But you don't have to build a new structure or spend a fortune in renovations to realize savings from implementing earth-friendly principles in your practice. Some cost virtually nothing, such as the insulated totes with the practice's logo that optometrists Shawn and Cathy Doty and Mark Leary in New Bern, N.C., gave their staff to encourage them to bring their lunches to work and drive less. Some cost a little more up front but provide big savings in their use, such as the LED (light-emitting diode) lights Todd Wylie, O.D., put in his Spokane, Wash., office.

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Ceiling fans, skylights and large windows, window screens and blinds, reflective roofing, extra insulation, motion sensors, dimmer switches, heat pumps, LED lights, solar panels and even storm water recycling rain gardens are some of the sustainable practices popping up in O.D.s' offices.

These sustainable building practices range in cost from a couple hundred dollars to over \$100,000, and in complexity from simple to sophisticated. Even the smallest steps, such as e-mailing recalls, reminders and follow-up documents, can reduce energy, paper use and costs. This article looks at a host of eco-friendly ideas optometrists have adopted.



ILLUSTRATION BY NICK ROTONDO

## **Sustainability as an industry**

An entire industry has grown up around building more cost-efficient and energy-saving buildings. A LEED-certified building, for example, is one that meets specific benchmarks for energy use and sustainability as determined by the U.S. Green Building Council. (LEED stands for Leadership in Energy and Environmental Design.) In the NBI study, LEED-certified buildings had a median energy-use intensity 24% below (or better than) conventional buildings.

As president of Sustainable Solutions Corporation in Royersford, Pa., Tad Radzinski, a mechanical engineer and LEED project advisor, has advised veterinarians and optometrists on sustainability. "We talk a lot about energy efficiency because that has the most value as far as saving money," he says. "Lighting is really important to look at, and so is heating and cooling the building. If we could make a pie chart of how we consume electricity in an office, the biggest chunk of the pie would be the heating and cooling; lighting would be second, and computers and plug loads would be third."

Saving energy doesn't take an expert like Mr. Radzinski to come into your practice. Some solutions are as close as a light switch. "Off is really one of the best energy efficiency measures we can use," he says.

Sustainability goes beyond power and plugs, however. "Anytime you're in a building that has a "new carpet smell," that's really not a good thing, because you're breathing the volatile organic compounds (VOCs) that are coming off the carpet," Mr. Radzinski says. (VOCs are chemicals that enter the air as gases from other solids or liquids, such as paints, solvents, furniture, adhesives and carpeting.) The Environmental Protection Agency notes that VOC's health effects vary greatly, "from those that are highly toxic, to those with no known health effect." VOCs may cause eye and respiratory tract irritation, headaches, dizziness, visual disorders, and memory impairment.



**Tad Radzinski, a mechanical engineer and green building consultant, advises, "Off is really one of the best energy efficiency measures we can use." (Photo courtesy Sustainable Solutions Corporation)**

So the carpet and flooring industry has embraced low-VOC floor coverings that are recyclable, thus averting a trip to the landfill. Low-VOC paints are becoming more common, and ceiling tile manufacturers are starting to use recycled content and renewable resources.

### **Efficient lighting fixtures**

Optometrist Tressa Malikkal sought Mr. Radzinski's expertise while planning her new office, which is just across the street from her existing strip center space in southeastern Pennsylvania. She expects to open the new office in the second quarter of 2010. Her husband, Jacob, a civil engineer with an MBA, is the project manager. He has devoted as much attention to the interior lighting as to the solar panels and the on-site storm water management system.

He chose Eco-Lights, a low-wattage type of lighting made from recycled materials, ecologically harvested timber and other earth-friendly ingredients, as the company says. "The additional cost per fixture is not exorbitant," Mr. Malikkal says. "It's about 10% to 20% more than traditional fixtures. It is manageable." He also plans to use motion sensors in restrooms and other lightly used areas. The Malikkals expect to recover these lighting costs in 5 to 10 years.

Lighting is important for another reason: it can warm a room and drive up temperatures in the summer. "Up to 40% of the heat generated within commercial office space can be attributed to lighting," says optical office designer Barbara Wright of Barbara Wright Design, Portland, Ore. So she recommended LED lights to Dr. Wylie when he planned his new office in Spokane, Wash.

Dr. Wylie has found an added benefit of using LED lighting, which runs on direct current, instead of fluorescent lighting, which runs on alternating current. He provides vision therapy for head trauma patients. "A very common visual symptom of patients with traumatic brain injury (TBI) is that they are bothered by fluorescent lighting," he says. "As I see a good number of these patients in the office I do not want to be causing them additional eyestrain while they are in my office." Additionally, unlike fluorescent lights, LED lights do not contain mercury. When fluorescent lights are not disposed of properly, the mercury in the lights becomes an environmental contaminant that has been linked to kidney failure and brain damage.

That doesn't mean you should discount fluorescent lights altogether. Ms. Wright notes that newer designs are dimmable, which improves their utility in the examination room. "I've been in this business for 25 years, and for many years we had

to put incandescent lights plus fluorescent lights and extra switches in examination rooms, but this year, they finally got the technology right," she explains. Compact fluorescents can even fit into the recessed circular ceiling fixtures characteristic of incandescent lights. "The lighting technology in the last year or so has made great leaps and bounds," she adds. (For a breakdown of the costs and potential savings associated with lighting, see "Will Going Green Actually Save You the 'Green,' " below.)

### **Will Going Green Actually Save You the "Green"?**

Calculating what you can save by using energy-efficient fixtures and systems can be difficult to squeeze into a simple formula. However, a few authoritative sources have developed some rules of thumb for estimating cost reductions linked to energy efficiency.

McGraw-Hill Construction, Green Building SmartMarket Report, 2006, provides these estimates for green buildings:

- Operating costs decrease 8% to 9%.
- Building value increases 7.5%.
- Return on investment improves 6.6%.

The Government Services Agency provides the following benchmarks in its 2008 report, Assessing Green Building Performance: A Post Occupancy Evaluation of 12 GSA Buildings:

- Green buildings consume 26% less energy than average commercial buildings.
- Green buildings have 13% lower maintenance costs.

LED fixtures consume about 75% less electricity than incandescent lights of similar lumens, according to LED-lighting distributor Kichler Landscape Lighting. For example, the average installed system of 340 watts at 6 hours a day converts to 80.2 watts of LED. At the U.S. average retail price of 12.05 cents per kilowatt hour (according to the U.S. Energy Information Administration), it would cost 24.6 cents a day to power those incandescent lights versus 5.8 cents a day for the LED lights. Over a year, the average system would cost \$89.54 while the LED system would cost \$21.11. (To calculate electric rates in your area, go to [http://www.eia.doe.gov/cneaf/electricity/epm/table5\\_6\\_a.html](http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_a.html).)

Architects and engineers use the "life-cycle cost method" to calculate cost-effectiveness of sustainable buildings. It's a way of assessing total building costs over time. This calculation consists of:

- Initial costs (design and construction)
- Operating costs (energy, water/sewage, waste, recycling and other utilities)
- Maintenance, repair and replacement costs
- Other environmental or social costs/benefits (impacts on transportation, solid waste, water, energy, infrastructure, worker productivity, outdoor air emissions, etc.).

### **Light: the old-fashioned way**

Of course, the most eco-friendly lighting is the kind that's free, and optometrists are employing numerous tricks to let the sun shine in. In his new building, Dr. Wong is using the Light Pipe, a reflective stovepipelike skylight. Dr. Malikkal's building design includes large windows throughout. "Our goal was to have a lot of natural lighting, not only to help light the eyewear, but also to create a better environment for our employees," Mr. Malikkal says. "A lot more natural light coming in keeps everyone a lot happier."

Ms. Wright advises her clients to install double switching, which turns on only half the lights in an area. "If the natural light is strong, then you don't need a full complement of general lighting, and many building codes require double

switching," she says.

In Dr. Wylie's Spokane practice, Ms. Wright recycled the glass panels left behind from the bank that occupied the building previously. "We put them on an interior wall right next to an exterior room that had daylight coming in," she says.



**The second floor waiting area in Dr. Todd Wylie's practice uses glass panels recycled from the bank that had been in the space to let in natural light from an adjoining space with exterior windows. (Photo courtesy Barbara Wright Designs)**

Window blinds help control the light in optometrist Pam Miller's Highland, Calif., office. "We have blinds on all our windows, similar to plantation blinds, so if we need more light in our office, we open them," she says. The office is also painted in what she describes as "happy colors." The reception area is yellow, which reflects light, and the examination rooms are orange.

In fact, painting is an economical way to dramatically update and brighten an office, advises Ms. Wright. And, to keep it green, low-VOC paints are widely available from the likes of Sherwin-Williams and Lowe's at prices ranging from \$40 to \$55 a gallon, according to [www.consumersearch.com](http://www.consumersearch.com).

### **A "Green" Optometrist's Advice**

Optometrist Todd Wylie opened his eco-friendly office in Spokane, Wash., in 2007. Since then, he's learned a few things about sustainable practices. Among them:

- Use motion sensors to control lighting in some areas.
- Find out if your electric supplier offers rebates on devices, such as motion sensors and LED lights.
- Check out a newer type of paint that contains microscopic ceramic beads that act like a thin coat of insulation. Dr. Wylie says it costs about three to four cents a square foot more than regular paint.
- Ask your utility company for an energy audit. Energy experts can make recommendations for reducing your usage, and the audit is usually free.

Finally, Dr. Wylie advises, plan before you implement. "Do your research and make sure it pencils out to be financially worthwhile," he says.

### **Glossary of Green Terms**

**CLOSED LOOP** – products made of recycled materials that are returned to the manufacturer after their life to be made

into the same material.

**DELAMPING** – reducing the wattage of light fixtures.

**FSE CERTIFIED** – certification from the Forest Stewardship Council for wood from a forest that's managed sustainably.

**GREEN PRODUCT** – a product made of recycled content or rapidly renewable materials, manufactured within 500 miles of the end user, has low VOC emissions and is recyclable at the end of its life.

**INTEGRATED DESIGN** – a multidisciplinary approach to planning a building or renovation that involves the owner, tenants, architect, mechanical, electrical and plumbing engineers, sustainability consultant, general contractor and landscaper.

**NET METERING** – the practice by which a utility buys back excess energy that an alternative energy source generates. Mandated by Congress in the Energy Policy Act of 2005.

**SEER RATING** – seasonal energy efficiency ratio for rating heating, ventilating and cooling systems. A higher rating indicates greater efficiency.

**VOLATILE ORGANIC COMPOUNDS (VOCS)** – gaseous solvents, chemicals and adhesives used in furniture, fixtures and building supplies.

## Keeping it cool or warm

Besides harnessing the sun's rays for lighting, you can take other creative steps to manage sunlight and minimize heating and cooling costs. You don't have to have a new office to do this, either. Dr. Miller's practice is in a converted 2-story Victorian-era house, but that hasn't stopped her from using sustainable principles to slash her energy bills. Nor have the 105° summertime temperatures dissuaded her from thinking of ways to not turn on the air conditioning.

"We use ceiling fans throughout the office, and that's particularly important in the summer," she says. "During the summer-time here, we basically turn our lights off — probably 80% of them go off in our reception and front office area — and everything is open in our office. Just that factor alone decreases the temperature by about 10 degrees." Open windows and security doors with screens allow for a cross breeze, and Dr. Miller is investigating installing a whole-house fan in the office attic.

"It's like a big suction fan," she explains. "For example, if you have one or two doors open downstairs and you flip the fan switch, it will draw all the outside air in through office, so you can either cool or heat your office or home substantially." If the air conditioning has been turned off over the weekend or overnight, a whole-house fan can significantly reduce the power the air conditioning draws to cool the building, Dr. Miller says.

The Malikkals are looking forward to a more energy-efficient heating, ventilating and air conditioning (HVAC) system in their new building, and no longer paying to run the outdated, expensive equipment in the existing office. "As a tenant, even though you're responsible for heating and cooling costs, you're not going to spend \$10,000 to install new equipment that you can't take with you, so you deal with it," Mr. Malikkal says. Another factor that increases their energy costs in the existing space, which is about 15 years old, is the "leakage" through the windows, adds Dr. Malikkal.

Sealing that "leakage" is critical to reducing energy costs. "Insulate like crazy," Dr. Wylie says. "Shoot for around R-100 in

the attic." The R-value measures thermal resistance for insulation. The higher the R-value, the greater the thermal resistance. By comparison, the U.S. Department of Energy recommends an R-Value of 49 for insulation in a residential attic. Mr. Radzinski advises a minimum R-value of 38 in commercial buildings.

"If you do your windows and insulation right, then your heating and cooling equipment can get smaller," Mr. Radzinski says. For energy efficiency, the roof is critically important, because heat rises. He advises clients to use "white" roofs, which reflect heat and reduce a building's cooling load. A dark roof can easily reach 140° F on a summer day in the Northeast. "Instead of a temperature differential of, say, 140° and 74°, you'll go down to a little above ambient and 74°," he explains.

To allow for thicker insulation, Dr. Wong is having his new office built with 2x6 studs instead of the typical 2x4s, but he's not stopping there. The plywood on the roof will have radiant insulation on one side to reflect heat. Dr. Wong has already used radiant insulation on the roof of his home workshop and claims it reduces the building temperature 25 degrees on a hot day. "My workshop went from unbearably hot in the summer months to comfortable until 3:00 or 4:00 in the afternoon," he says. In cold months, the reflective barrier also saves on heating.

### **How Green Is Your Marketing?**

A couple of studies have quantified the marketing benefits of going green. The consultancy Heschong Mahone Group performed a study in 1999 that showed sales in stores with skylights were up to 40% higher than those in similar stores without skylights. A McGraw-Hill study in 2007 found that 57% of people surveyed perceived that green fosters innovation.

Some of those people may have found their way to the Hackensack, N.J., office of pediatrician Larry Rosen, M.D. He has found that using sustainable principles has compensated for the additional installation costs, which he estimates are 3% to 5% higher than traditional building methods.

"There are many ways you make up that cost," Dr. Rosen says. "One is energy savings over time, but there is also a tremendous marketing component in terms of building your practice and your business." Many new patients have come calling because of the practice's philosophy, Dr. Rosen says.

Marketing was a secondary aspect of optometrist Todd Wylie's green renovations. "I did the lighting primarily for my health and my patients' comfort," he says of the switch from incandescent to LED lighting. Patients, however, have noticed. "Patients continue to comment about the pleasing lighting and how soothing it is compared to standard fluorescents."

In northeastern Pennsylvania, Eye Care Specialists, a 9-office practice, has been working with Tad Radzinski, president of Sustainable Solutions Corporation, to employ sustainable principles in its new outpatient surgery center. Mark Kelly, CEO, sees the potential in helping to promote the practice. "I don't know if it's a marketing tool as much as you would hope to get some favorable press from the community," he says. "We expect it will be a one-time shot in the arm of good free press, and we're doing a good thing for the community and the environment overall."

### **Going solar**

In California, where Dr. Wong's office is located, and in Pennsylvania, where Dr. Malikkal is building her new office, incentive programs encourage the use of alternative energy sources.

"Most cities have taken the good-citizen approach and are waiving inspection fees and engineering inspections for solar systems," Dr. Wong says. "Cities are counting on the installers to do the engineering because their own staffs cannot do that yet."

Also, solar and wind turbines are subject to federal rules on net metering. That means electric utilities must buy back any excess power a customer's system generates, according to the Energy Policy Act of 2005.

Mr. Malikkal estimates the energy generated by solar panels will cover the cost of lighting the first floor of the new 2-story building. Thanks to tax credits and subsidies, he also expects the net cost of the solar panels will be about 40% to 50% less than the actual cost.

Installing solar panels is not necessarily a slam dunk. Dr. Wong's project requires specialized engineering because the roof panels have to withstand the Santa Ana winds. Mr. Malikkal says installing solar panels has to be one of the last things done in finishing the building.

### **Don't forget the fixtures**

You may not think much about the carbon footprint that your furniture, cases and cabinets leave, but Ms. Wright says these deserve a close look for a couple of reasons. "The furniture and fixture manufacturing companies have the hardest time trying to get low VOCs into their products, because they have to use so many glues and lacquers to maintain the integrity of the products," she says. "They have to use glue that will hold the furniture together."

That said, Mr. Radzinski works at a desk made with low-VOC compressed wood. He acknowledges that particle board and wood composite is used "everywhere" in all types of furniture. He also has found a source that recycles and reconditions old office furniture for a fraction of the cost of new furniture. Such reconditioning companies sell their goods on the Internet.

This is where quality craftsmanship can be better for the environment. "Something everyone can do is invest in really good design in the first place, then you don't have to throw out cabinets or fixtures after 5 or 6 years because they look dated," Ms. Wright says. "A more timeless design that can withstand years of use and still look good is probably one of the most eco-friendly things you can do for your practice."

Recycling is a mantra that's inspiring more office designers, as well. "When we work with clients, we try to recycle whatever we can," Ms. Wright says. "If their display items still look good, I don't want to discard those items. I want to keep whatever I can."



**Jacob Malikkal, MBA, and Tressa Malikkal, O.D., with a rendering of the green building they plan to open in 2010. The mansard roof actually hides solar panels from street view to fit in with the character of other Main Street buildings. (Rendering courtesy Jacob Malikkal, MBA; photo by Richard Mark Kirkner)**

### **Additional Resources**

**U.S. Green Building Council:** <http://www.usgbc.org>

**Environmental Design and Construction magazine:** <http://www.edcmag.com>

**U.S. Department of Energy Green Power Network:** <http://apps3.eere.energy.gov/greenpower/index.shtml>

**State-by-state guide to net metering programs for solar power:** [http://apps3.eere.energy.gov/greenpower/resources/maps/netmetering\\_map.shtml](http://apps3.eere.energy.gov/greenpower/resources/maps/netmetering_map.shtml)

#### **Manufacturers of mentioned products**

**Eco-Lights, distributed by GreenCulture:** <http://www.eco-lights.com>

**Hy-Tech Thermal Solutions, producer of insulating house paint:** <http://www.hytechsales.com>

**LED folio:** <http://www.ledfolio.com>

**Light Pipe by 3M:** <http://www.3m.com>

**Sustainable Solutions Corporation:** <http://www.sustainable-solutions.com>

### **The next level**

The Malikkals' project involves demolishing an existing house, and their goal is to preserve as many trees on the property as possible. In fact, they've paid into an escrow account for the town's open space fund that obligates them to make a contribution for each tree that's removed.

Meanwhile, Mr. Malikkal has designed a storm water management system for the new office that will retain all rainwater on site, thus avoiding the town's storm sewer system. "We're using an underground storage retention basin under the parking lot," he says. "As it overflows, it will discharge into a rain garden that retains water because of the types of plantings in it and also removes impurities before it percolates into the ground." Once the building is open, the Malikkals may consider using rain barrels to catch water from the downspouts.

For the Malikkals and others, the desire to adopt new sustainable principles won't stop just because the building is finished. **OM**

## Is LEED Certification Really Worth It?

The U.S. Green Building Council awards LEED (Leadership in Energy and Environmental Design) certification for buildings that meet specific performance criteria for sustainability. Two optometrists have looked into securing LEED status for their new buildings, but decided it was impractical for them.

"For the private practitioner, having a LEED-certified building may not be a wise business investment," William Wong, O.D., says. "It does not make your business operation or practice more efficient." The checklist of sustainable principles, however, can be a good guide. "You can pick and choose what's efficient energy-wise — insulation, windows, the common sense stuff — not necessarily all the politically correct stuff," Dr. Wong adds.

Jacob Malikkal, project manager for his optometrist wife's new office, reached a similar conclusion.

"When I started the project, my desire wasn't to apply for LEED certification because I knew the process was a lot more involved than I was willing to do," Mr. Malikkal says. "I looked at the basic charts and concluded it would have been a struggle, because I was tearing down an existing building. So I tried to implement all the best practices."

Portland, Ore., optical office designer Barbara Wright lends her perspective on LEED certification: "Functionality is always the tradeoff," she remarks. "As designers, we're always looking at how something will work, and price is another factor. The price has to be reasonable for the client, and it has to perform."

Ms. Wright has yet to obtain LEED certification on an optical office. "On a small building, it adds a lot to the cost," she says. "I don't see the advantage of LEED certification for most optometrists. It's for larger projects and larger buildings, but that doesn't mean they can't be conscious about it."

**Mr. Kirkner** is a medical editor and writer in suburban Philadelphia.

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