Permaculture**inPractice**

Smith cuts emerald in Parade crown

NATE DOWNEY

It would be a miracle in this small space to describe all of the eco-features associated with Solarsmith's project at the end of Nine Mile Road. Given its hefty photovoltaic array and carport-wall of solar water-heating panels, its nearly 7,000 square feet of shaded and/or passively cooled space, and its many super-insulated skylights (which eliminate the need for electric lights on sunny days), obviously the home deserved its Excellence in Green Building Grand Award in the Parade of Homes.

But that's just the beginning. The home's new owners will soon be able to boast receipt of regular payments *from* PNM for the company's use of the juice that the owners' panels produces. Under a new law, utilities are mandated to use some renewable energy, and such companies have realized that a convenient way to comply is to buy power from people like Solarsmith's clients.

"Ironically," owner/designer/builder/Realtor Mitchell Smith told me on the last day of the tour, "the highest priority here was to maintain the property's spectacular views." Looking west over the Jemez, he beamed. "Unlike traditional solar architecture where orientation is paramount, solar radiant-heating systems allow for a more flexible floor plan."

I first met Smith 15 years ago when we both were setting up shop, so I wasn't surprised when the same guy who gave me the scoop on the Valle Vidal started exuding his love of the forest. Pointing to vigas harvested from standing dead spruce, beams salvaged after a fire, and walls that use mostly small-growth lumber, he even said beetle-killed piñon from the site was saved for erosion control and soil building projects. "Cabinets and windows? All SFI-certified," he grinned with tempered ecstasy.

With the help of Michael Nelsen of Ecoscapes, roofwater runoff is diverted to either of two landscape-oriented systems: a 15,000 gallon cistern to the south or a set of pumice wicks to the north. In addition, all of the home's wastewater is treated with an aerated bag of bugs known as a "Sludgehammer." The system then conveys irrigation-quality water to the root zones of an orchard and berry patch.

There's even a fenced veggie garden perfectly planned between the carport and the kitchen door. Smith also won the tour's Best Exterior Character award in the super-pricey category, and, perhaps awkwardly, this helps promote sustainability more than Sudgehammers and solar panels ever will.

Smith's jewel was immediately enchanting from the road. Rising slowly from behind a wide, hydromulched knoll, the structure's smooth, rotund forms seemed to smolder in a polyvalent glow ranging from raspberry to chocolate. Under the noonday sun, its thick walls and Puebloesque rooflines almost hummed in harmony. At least to this thirsty cyclist, the structures appeared to emanate auspiciousness.

So enchanted I became, in fact, that I even thought to ignore, for this column, the property's front yard *faux pas* (namely, the water-hungry fish pond, lawn patches, and aspen trees). At least now the neighbors know the new folks down the block are human, too.

Nate Downey (424-4444, www.santafepermaculture.com) is president of Santa Fe Permaculture, a locally owned landscape-design firm. His first book, Harvest the Rain, is scheduled to be published this year by Sunstone Press.

Our**waterQuality**

Solutions for water hardness

STEPHEN WIMAN

The most compelling arguments for softening hard water are economic: the high cost of replacing plumbing infrastructure, fixtures, faucets, water heaters and electrical appliances damaged by "lime scale." Scale accumulations may also cause losses in appliance efficiency and dramatic increases in electricity consumption. As water is heated, hardness minerals come out of solution and precipitate as scale. Water heaters, dishwashers and glass shower doors are the most common sites of scale accumulation. Extreme hard water can also be annoying for bathing and laundry.

Passing water through an ion-exchange resin tank is the most common method of hardness reduction. Positively charged ions (cations) are exchanged for like-charged sodium or potassium ions attached to the resin. When the resin is no longer effective (estimated by the removal capacity of the water and the number of gallons used), it is regenerated on demand (not on the basis of a preset time interval regardless of water usage) using a brine solution that is discharged to a drain line, a leachfield (French drain), or septic tank. Pretreatment to remove contaminants that interfere with ion exchange, particularly iron and sediment, is commonly required for well water.

Softening is controversial both because of the water used in backwashing and chloride discharge. There is also controversy as to whether waste brine is injurious to leachfields and septic tanks. The New Mexico Environment Department's liquid-waste program is increasingly concerned with any potential water contaminants entering septic tanks.

Ion-exchange technology will continue to evolve with improved efficiency, but the technically similar anion exchange process (contaminant-specific resins using negatively-charged ions) will remain the most practical method for removing contaminants of the greatest health concerns (arsenic, nitrates and radionuclides) in the Santa Fe area.

The biggest future paradigm shifts in water treatment will involve salt-free systems, new filtration methods, and turnkey treatment and disposal of contaminants with the highest-known risks to human health. Alternatives to conventional ion exchange, such as magnets and catalytic systems, do exist; but the buyer should be wary as these systems also have limitations and most are unproven. The fact that many of these "salt-free" systems require backwashing is often cleverly omitted.

In the arid Southwest, environmentally responsible water-treatment companies offer tested alternatives to ion exchange. One of the most promising developments involves nanotechnology, wherein specialized resins create atomic-level nucleation sites (seed crystals) by template-assisted crystallization. Calcium and magnesium ions accumulate at crystallization sites on the resin, slough off and pass through the water system in colloidal suspension. No salt, chemicals or electricity are required. Because the system does not require backwashing water, no drain is required. However, as with any other method of water conditioning, this technology can only be successful if the water chemistry is determined suitable for its application.

Stephen Wiman has a background in earth science (Ph.D. in geology) and is the owner of Good Water Company in Santa Fe. He may be reached at 505-471-9036 and skwiman@goodwatercompany.com.